Earth Solutions NW LLC

Geotechnical Engineering
Geology
Environmental Scientists
Construction Monitoring

GEOTECHNICAL ENGINEERING STUDY
PROPOSED SOUNDVIEW TECHNOLOGY CENTER
36th AVENUE WEST
EVERETT, WASHINGTON

ES-4011.03

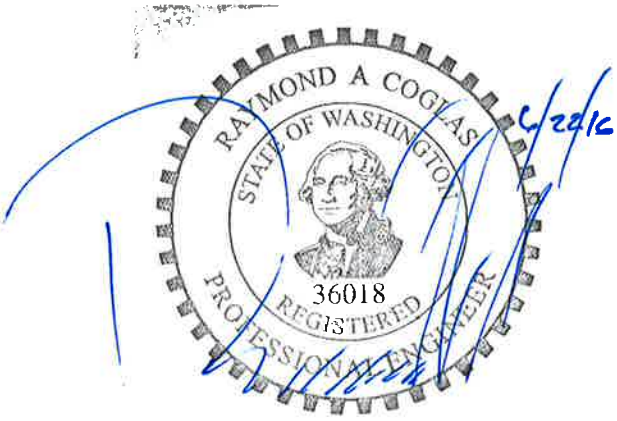
1805 - 136th Place N.E., Suite 201 Bellevue, WA 98005
(425) 449-4704 Fax (425) 449-4711
www.earthsolutionsnw.com

PREPARED FOR

VERITAS CONSTRUCTION, INC.

June 17, 2016
Revised June 22, 2016

Brett J. Priebe, E.I.T.
Staff Engineer



Ray A. Coglas, P.E.
Principal

GEOTECHNICAL ENGINEERING STUDY
PROPOSED SOUNDVIEW TECHNOLOGY CENTER
36TH AVENUE WEST
EVERETT, WASHINGTON

ES-4011.03

Earth Solutions NW, LLC
1805 – 136th Place Northeast, Suite 201
Bellevue, Washington 98005
Ph: 425-449-4704 FAX: 425-449-4711
Toll Free: 866-336-8710

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

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER06045.0M

June 17, 2016
Revised June 22, 2016
ES-4011.03

Earth Solutions NW LLC

- Geotechnical Engineering
- Construction Monitoring
- Environmental Sciences

Veritas Construction, Inc.
22819 – Woodway Park Road
Woodway, Washington 98020

Attention: Ms. Ashley Previs

Dear Ms. Previs:

Earth Solutions NW, LLC (ESNW) is pleased to present this report titled "Geotechnical Engineering Study, Proposed Soundview Technology Center, 36th Avenue West, Everett, Washington." Based on conditions encountered at the test sites explored by ESNW and review of previous subsurface explorations by others, subsurface conditions throughout the proposed development area of the site are comprised primarily of dense to very dense glacial till deposits. The planned development will include three concrete-tilt up warehouse buildings, paved parking areas, and associated infrastructure improvements.

In our opinion, the proposed development is feasible from a geotechnical standpoint. Recommendations for earthwork, site preparation, retaining walls, foundations, pavement sections, and other pertinent geotechnical recommendations are provided in this study.

The opportunity to be of service to you is appreciated. If you have any questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

Brett J. Priebe, E.I.T.
Staff Engineer

Table of Contents

ES-4011.03

Table of Contents

Cont'd

ES-4011.03

GRAPHICS

APPENDICES

GEOTECHNICAL ENGINEERING STUDY
PROPOSED SOUNDVIEW
TECHNOLOGY CENTER
36TH AVENUE WEST
EVERETT, WASHINGTON

ES-4011.03

INTRODUCTION

General

This geotechnical engineering study was prepared for the proposed light industrial development to be constructed at the north end of 36th Avenue West in Everett, Washington (See Vicinity Map – Plate 1). The purpose of this study was to provide geotechnical recommendations for the proposed development. Our scope of services for completing this geotechnical engineering study included the following:

- Characterization of the soil and groundwater conditions throughout the development areas of the site based on conditions encountered at boring and test pit locations;
- Review of current plans with respect to the planned site layout and grading activities;
- Preparation of this geotechnical engineering study with recommendations for building foundations, earthwork, retaining wall design parameters, pavements, and other pertinent geotechnical recommendations.

The following documents were reviewed as part of the preparation of this geotechnical engineering study:

- Associated Earth Sciences, Inc., Geotechnical Report, dated March 31, 2000;
- Earth Solutions NW, LLC, Stability Assessment, ES-4011, dated October 6, 2015;
- Preliminary Site Plan provided by the client, undated;
- City of Everett Municipal Code, Chapter 37 (Critical Areas);
- City of Everett Critical Area Maps;
- Coastal Zone Atlas of Washington (Snohomish County), Volume 5, dated 1979;
- Online Web Soil Survey (WSS) resource, maintained by the Natural Resources Conservation Service under the United States Department of Agriculture, and;
- The Geologic Map of the Mukilteo Quadrangle, Washington, prepared by James P. Minard, 1982.

Project Description

We understand construction of a light industrial business center is planned for the subject property. The proposed development will include three concrete tilt-up buildings, paved parking areas, and associated infrastructure improvements. Grading activities will involve cuts and fills on the order of roughly 20 to 40 feet (or more in some areas) to establish design grades. Stormwater will be conveyed to a series of detention vault structures located on the north and west sides of the development. The stormwater vaults will incorporate control structures that release into armored spillways within the natural drainage courses surrounding the property.

The proposed buildings will likely consist of concrete tilt-up panel construction supported on conventional foundations. Based on our experience with similar developments, we anticipate wall loads on the order of 2 to 4 kips per lineal foot. Column loads are anticipated to range from 100 to 150 kips. Slab-on-grade loading will likely be on the order of 250 to 350 pounds per square foot (psf). Retaining wall construction will likely incorporate mechanically stabilized earth (MSE) structures and rockeries.

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

SITE CONDITIONS

Surface

The subject property is located on the north end of the upland plateau south of Possession Sound in Everett, Washington. The property consists of a single tax parcel (Snohomish County Parcel No. 28040300200100) totaling approximately 39.48 acres. The approximate location of the subject property is depicted on the Vicinity Map (Plate 1). The site is accessed from the north end of 36th Avenue West. The subject site is bordered on the west by a steep, north-trending drainage ravine identified as Japanese Gulch; at the base of this ravine there is a railroad system. The northern margin of the property borders a moderately steep, northward-facing slope. Existing residential developments are located north of the subject site at the base of the steep slope on the north property line and along the north half of the east property line. The rest of the east property line is bordered by 36th Avenue West and undeveloped areas. An undeveloped property is located on the south margin. Topographically, the upland portion of the site is characterized by gentle to moderate, north-to-northwest facing slopes with overall gradients of about 20 to 30 percent. Slope gradients in excess of 40 percent are located along west and north areas of the site. Elevation change on the subject site is on the order of 150 feet.

The property is currently undeveloped. Vegetation consists of a mixture of medium to large deciduous and evergreen trees with moderate to dense underbrush. The steep slopes located in the west and north areas of the site are heavily vegetated with no signs of landslide activity based on reconnaissance performed in 2014, 2015, and 2016.

Subsurface

An ESNW representative was onsite July 31, 2015 and April 18 and 19, 2016 to observe, log, and sample soils at seven test pit locations and five boring locations advanced at accessible areas of the site. The borings and test pits were advanced to a maximum exploration depth of 51.5 feet below existing grades. Soil samples collected at the boring locations were evaluated in the field and laboratory for the purposes of characterizing and classifying the site soils. Please refer to the boring and test pit logs provided in Appendix A and laboratory sieve analysis in Appendix B for a more detailed description of the subsurface conditions. Additional subsurface data was provided in the referenced geotechnical report prepared by Associated Earth Sciences, Inc. (AESI) and are provided in Appendix A. The subsurface explorations were conducted by Hart-Crowser in December 1988 and AESI in March 2000. The approximate boring and test pit locations for all test sites are illustrated on the Boring and Test Pit Location Plan (Plate 2).

Topsoil

Topsoil was encountered generally within the upper 4 to 14 inches below existing grades at the test pit locations. The topsoil was characterized by dark brown color, the presence of fine organic material, and small root intrusions. Based on our field observations, we estimate topsoil will be encountered with an average thickness of 10 to 12 inches across the site, deeper pockets of topsoil, however, may be locally present. Topsoil is considered unsuitable for direct foundation support, or for use as structural fill. However, the topsoil is suitable for use in landscaping areas, if desired. During the initial stages of site work, the geotechnical engineer should discuss the required level of stripping with the owner and contractor based on final grading plans. Overstripping of the site is unnecessary and should be avoided.

Native Soils

The native soils encountered at the boring and test pit locations consisted primarily of medium dense to very dense silty sand with variable gravel content (USCS: SM) and dense to very dense sandy silts (ML). Poorly graded sand with silt (SP-SM) was encountered at one boring location (B-2) at a depth of approximately 50 feet below existing grades.

Native soils reported in the referenced AESI report consisted primarily of medium dense to very dense sandy silts and silty sands with variable gravel contents which is consistent with soils encountered at ESNW test pit and boring locations.

Geologic Setting

The referenced geologic map resource identifies Vashon glacial till (Qvt) across the majority of the subject site and surrounding areas. As reported on the geologic map resource, glacial till typically consists of a nonsorted mixture of variable amounts of clay, silt, sand, pebbles, cobbles, and boulders, and is commonly referred to as "hardpan". Throughout the descending sloped areas to the north and west, Advance outwash (Qva) is identified with localized exposures of undivided till (Qtu).

In addition, the referenced WSS resource identifies Alderwood-Everett gravelly sandy loam with slopes of 25 to 70 percent across the majority of the site and surrounding areas; Alderwood gravelly sandy loam with slopes of 0 to 8 percent are identified in the southeast area of the site and Alderwood gravelly sandy loam with slopes 15 to 30 percent are identified in the northwest area of the site. Based on our field observations and reported subsurface data, native soils on the subject site are generally consistent with the geologic setting outlined in this section.

Groundwater

Groundwater seepage was encountered at a depth of 29 feet below existing grades at one boring location (B-1) during our subsurface exploration completed on April 18, 2016. Groundwater was not encountered during our subsurface exploration completed in July 2015; however, light to moderate (perched) groundwater seepage was reported in the referenced AESI report at depths of one to six feet below existing grades. Subsurface exploration was conducted in March 2000 and December 1988 for the AESI report.

Our interpretation of the reported groundwater seepage is that of a perched condition atop the relatively impermeable glacial till. Groundwater seepage is common within glacial till, and is typically observed at the contact with the dense to very dense, unweathered deposits. It should be noted that groundwater elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. In general, groundwater levels are generally higher during the wetter, winter months. With respect to the proposed development activities, locally perched seepage zones should be expected in underground utility and general site excavations, but flow volumes are expected to be relatively light.

Geologically Hazardous Areas

As part of this study, the site and proposed development areas were evaluated for the presence of geologically hazardous areas. As part of our evaluation, Chapter 37 of the Everett Municipal Code (EMC) was reviewed as well as critical area maps provided by the City of Everett.

Erosion Hazard

According to EMC 37.080(A)(3), erosion hazard areas are defined as the following:

- "High or very high" risk of erosion:
    - Those areas defined as high and very high/severe risk of erosion in the Dames and Moore Methodology for the Inventory, Classification and Designation or Geologically Hazardous Areas, City of Everett, Washington, July 1, 1991;
    - Areas including slopes of 25 to 40 percent in Qva and Qal geologic units, and slopes greater than 40 percent in other (not Qva or Qal) geologic units, and;
    - Areas including slopes of greater than 40 percent in Qva and Qal geologic units.
- "Medium" risk of erosion:
    - Those areas defined as medium risk of erosion in the Dames and Moore Methodology for the Inventory, Classification and Designation or Geologically Hazardous Areas, City of Everett, Washington, July 1, 1991, when they contain debris and mud flows, gullying or rifling, immature vegetation, or no vegetation, and;
    - Slopes of 25-40 percent in other (not Qva or Qal) geologic units.

Based on the referenced critical area maps and our field observations, areas meeting these criteria are located mostly in the southwest area of the site and along the west and north margins of the property.

It should be noted that based on our investigation and site reconnaissance, areas of widespread severe erosion were not present. In any case, erosion is a process that can be managed. In this respect, provided appropriate temporary erosion and sediment control (TESC) measures are incorporated into final designs, erosion potential can be adequately mitigated during construction. Based on our experience with similar projects in similar settings, the permanent landscaping and drainage control measures will adequately mitigate the potential for erosion with respect to the proposed final development. Site-specific TESC measures should be prepared by the project civil engineer within the submittal plan set.

ESNW should review the final TESC plans prior to construction to see that appropriate means of controlling off-site sedimentation are implemented and to provide supplemental recommendations, as necessary.

Landslide Hazard

According to EMC 38.080(A)(1), landslide hazard areas are defined as:

- Those areas defined as high and very high/severe risk of landslide hazard in the Dames and Moore Methodology for the Inventory, Classification and Designation or Geologically Hazardous Areas, City of Everett, Washington, July 1, 1991;
    - Very High/Severe: Slopes greater than 15 percent in the Qtb, Qw, and Qls geologic units; and slopes greater than 15 percent with uncontrolled fill;
    - High: Slopes greater than 40 percent in all other geologic units (not Qtb, Qw, and Qls or uncontrolled fill);
- Those areas defined as medium risk of landslide hazard in the Dames and Moore Methodology for the Inventory, Classification and Designation or Geologically Hazardous Areas, City of Everett, Washington, July 1, 1991, when combined with springs or seeps, immature vegetation, and/or no vegetation;
    - Slopes less than 15 percent for Qtb, Qw, and Qls geologic units and uncontrolled fill;
    - Slopes of 25 to 40 percent in all other geologic units;
- Any area with all three of the following characteristics:
    - Slopes greater than 15 percent;
    - Hillsides intersecting geologic contacts with the relatively permeable sediment overlaying a relatively impermeable sediment or bedrock;
    - Springs, groundwater seepage, or saturated soils.
- Any area which has shown movement during the Holocene epoch (from ten thousand years ago to the present) or which is underlain or covered by mass wastage debris of that epoch;
- Any area potentially unstable as a result or rapid stream incision, stream bank erosion or undercutting by wave action;
- Areas of historic failures, including areas of unstable, old and recent landslides or landslide debris within a head scarp, and areas exhibiting geomorphological features indicative of past slope failure, such as hummocky ground, slumps, earthflows, mudflows, etc;
- Any area with a slope of forty percent or steeper and with a vertical relief of fifteen or more feet, except those manmade slopes created under the design and inspection of a geotechnical professional, or slopes composed of consolidated rock;
- Areas that are at risk of landslide due to high seismic hazard;
- Areas that are at risk of landslides or mass movement due to severe erosion hazards.

With respect to the subject site, the areas meeting the definition of a "medium to high" landslide hazard (15 to 40 percent or greater slopes) are located mostly in the southwest corner and along the west and north margins of the site. It should be noted, during our fieldwork and reconnaissance of the surrounding slope areas, we did not observe signs of deep seated slope instability. Dense and competent till soils are prevalent throughout the upland and surrounding slope areas of the site.

Mass grading activities will involve fills on the order of roughly 20 to 40 feet to establish design grades near areas characterized as a landslide hazard. Based on review of the preliminary site plan, slopes to be constructed on the north margin of the proposed development are expected to be sloped no steeper than three horizontal to one vertical (3H:1V); the base of the slope is expected to be set back 25 feet from the north property line. Slopes to be constructed on the west and other surrounding areas of the proposed development are expected to be sloped no steeper than two horizontal to one vertical (2H:1V). A storm water detention vault will be constructed on the north area of the site but, to the east of an existing ravine located in the northwest area. During construction of the detention vault, an ESNW representative should observe the slopes of the excavation and surrounding areas for signs of instability and landslide potential. During our subsurface exploration, native soils observed at test pit locations near the area of the site designated as landslide hazards consisted of medium dense to dense silty sand with gravel (SM) generally in the upper three to seven feet below existing grades underlain by very dense "unweathered" glacial till. These soils generally do not exhibit excessive instability.

Per EMC 37.080C (Permitted Alterations), alterations within designated landslide hazard areas can only occur if the planned development will not create a hazard to the site and surrounding properties. Based on our review and investigation, it is our opinion that stability will be maintained and the potential for a landslide should be characterized as low provided our geotechnical recommendations are incorporated into final design.

In addition, ESNW prepared a Stability Assessment letter, dated October 6, 2015, relating to the proposed stormwater detention vaults located on the north margin of the subject property. Slope stability analysis was completed as part of an overall evaluation for the proposed detention vaults in the referenced letter demonstrating acceptable stability for the static and seismic conditions is satisfied.

Minimal Risk Statement

Based on our understanding of the proposed development, in our opinion the proposed development will not increase the potential for soil movement, and the risk of damage to the proposed development or adjacent properties from soil movement will be minimal. This estimate does not cover unforeseen or changed conditions.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our study, construction of the proposed light industrial development is feasible from a geotechnical standpoint. The primary geotechnical considerations associated with the proposed development include structural fill placement and compaction, pavement and foundation subgrade preparation, and underground utility and vault installations.

In our opinion, the proposed structures can be supported on conventional foundations bearing on competent native soil, recompacted native soil, or new structural fill. Suitable onsite soils can generally be considered for use as structural fill provided the soil moisture content is at or near its optimum level at the time of placement and compaction. Recommendations for site preparation, structural fill placement, retaining wall design, foundations, and other pertinent geotechnical recommendations are provided in the following sections of this study.

This geotechnical engineering study has been prepared for the exclusive use of Veritas Construction Inc. and their representatives. The study has been prepared specifically for the subject project. 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, and performing clearing and site stripping (as necessary). Subsequent earthwork activities will involve mass site grading and related infrastructure improvements.

Temporary Erosion Control

During construction, surface water runoff must be controlled around the site perimeter and topographically lower margins of the site. In general, erosion control measures for the site should incorporate silt fencing, drainage swales, temporary ponds, and plastic sheeting to cover stockpiles, as necessary. Additionally, exposed earth surfaces should be protected during construction to help reduce the potential for erosion and off-site sediment transport. Construction entrances should consist of quarry spalls underlain by a non-woven filter fabric. Quarry spall thickness will depend on subgrade stability at the entrance, but should typically be at least 6 inches. The temporary erosion control elements specified on the approved plans and applicable state and county stormwater permits should be implemented, as necessary, prior to grading activities.

Stripping

Topsoil was encountered generally within the upper 4 to 14 inches of existing grades at the test pit locations. We estimate topsoil will be encountered with an average thickness of 10 to 12 inches (locally deeper areas, however, may be encountered). ESNW should be retained to observe site stripping activities at the time of construction so as to thoroughly assess the degree of required stripping. Over-stripping should be avoided as it is unnecessary and may result in increased project development costs. Topsoil and organic-rich soil is neither suitable for foundation support nor for use as structural fill. Topsoil and organic-rich soil may be used in non-structural areas if desired.

Insitu and Imported Soils

The moisture sensitivity of the on-site soils is characterized as moderate. Successful use of native soils as structural fill will largely be dictated by in-situ moisture contents at the time of placement and compaction. At the time of our investigation, in-situ moistures at-depth were generally near the optimum level.

In general, soil that is at (or slightly above) the optimum moisture content at the time of placement and compaction may be used as structural fill. Conversely, soil that is found to be dry at the time of installation will likely require moisture conditioning (typically achieved through the application of water) prior to soil compaction. Soil encountered during site excavations that is excessively over the optimum moisture content will likewise require moisture conditioning (typically achieved through soil aeration) prior to placement and compaction. It should be emphasized native material should never be placed and compacted dry of the optimum moisture content, especially in site utility trench applications. If the on-site soils 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 or less (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, and roadway areas. Fill placed to construct permanent slopes and throughout retaining wall and utility trench backfill areas is also considered structural fill. Soils placed in structural areas should be placed in loose lifts of 12 inches or less and compacted to a relative compaction of 90 percent, based on the laboratory maximum dry density as determined by the Modified Proctor Method (ASTM D1557). Soil placed in the upper 12 inches of slab-on-grade, utility trench, and pavement areas should be compacted to a relative compaction of at least 95 percent. Additionally, more stringent compaction specifications may be required for utility trench backfill zones depending on the responsible utility district or jurisdiction.

Foundations

In our opinion, the proposed development may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil, recompacted native soil, or new structural fill. Where loose or unsuitable soils are exposed at subgrade elevations, the soil should be compacted to structural fill specifications or overexcavated further as recommended by the geotechnical engineer and replaced with a suitable granular structural fill material.

Assuming the foundations are supported as described in this report, the following parameters should be used for design:

- Allowable soil bearing capacity — 3,000 psf*
- Coefficient of base friction — 0.40
- Passive resistance — 300 pcf (equivalent fluid)**

**** ESNW can reevaluate the recommended allowable soil bearing capacity if heavy column loading (associated with post-tensioned slab construction) is anticipated.***
***** Assumes foundations backfilled with structural fill or poured neat against competent soils.***

For short term wind and seismic loading, a one-third increase in the allowable soil bearing capacity can be assumed. A factor-of-safety of 1.5 has been applied to the friction and passive resistance values.

With structural loading as expected, total static settlement in the range of one inch is anticipated, with differential settlement of about one-half inch or less over a typical column bay spacing. The majority of the static settlements should occur during construction, as dead loads are applied.

Slab-On-Grade Floors

Slab-on-grade floors for the proposed residential structures should be supported on a well-compacted, firm and unyielding subgrade. Unstable or yielding areas of the subgrade should be recompacted or overexcavated and replaced with suitable structural fill prior to construction of the slab. A capillary break consisting of a minimum of four inches of free draining crushed rock or gravel should be placed below the slab. The free draining material should have a fines content of 5 percent or less (percent passing the #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. If a vapor barrier is to be utilized it should be a material specifically designed for the use as a vapor barrier and should be installed in accordance with the manufacturer's specifications.

Retaining Walls

Conventional concrete retaining walls for the project will likely consist of building foundation walls and exterior site retaining walls. Retaining walls should be designed to resist earth pressures and any applicable preload loads. The following values should be used for concrete retaining and foundation wall design:

• Active earth pressure (yielding wall)	35 pcf (equivalent fluid / granular fill)
• At-rest earth pressure (restrained wall)	55 pcf
• Traffic surcharge (passenger vehicles)	70 psf (rectangular distribution)
• Passive earth pressure	300 pcf (equivalent fluid)
• Allowable soil bearing capacity	3,000 psf
• Coefficient of friction	0.40
• Lateral seismic surcharge*	6H (where H equals wall height in feet)

*for walls at least six feet in height

Additional surcharge loading from foundations, sloped backfill, or other loading should be included in the retaining wall design, where applicable. Drainage should be provided behind retaining walls such that hydrostatic pressures do not develop. If drainage is not provided, hydrostatic pressures should be included in the wall design. The geotechnical engineer should review retaining wall designs to confirm that appropriate earth pressure values have been incorporated into the design and to provide additional recommendations.

Concrete 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 one foot of the wall backfill can consist of a less permeable soil, if desired. A perforated drain pipe should be placed along the base of the wall, and connected to an approved discharge location. A typical retaining wall drainage detail is provided as Plate 3 of this study.

Mechanically Stabilized Earth (MSE) Walls

MSE walls will likely be utilized throughout the site as part of the overall final grading plan. Rockeries throughout cut areas of the site may also be utilized. ESNW previously prepared wall design recommendations and details for the MSE and rockery wall construction.

Excavations and Slopes

The Federal Occupation Safety and Health Administration (OSHA) and the Washington Industrial Safety and Health Act (WISHA) provide soil classification in terms of temporary slope inclinations. Soils that exhibit higher strength parameters are allowed steeper temporary slope inclinations than are soils that exhibit lower strength parameters.

Based on the soil conditions encountered at the test site locations, weathered glacial till, areas of fill, and any area where groundwater seepage are exposed are classified as Type C by OSHA and WISHA. Temporary slopes over four feet in height in Type C soils must be sloped no steeper than one-and-one half horizontal to one vertical (1.5H:1V). Very dense, cemented, undisturbed glacial till encountered without the presence of groundwater may be classified as Type A by OSHA and WISHA. Temporary slopes over four feet in height in Type A soils must be sloped no steeper than 0.75H:1V. Type A soils that are fissured, subjected to vibrations from heavy traffic, or have been otherwise previously disturbed must be classified as Type B by OSHA and WISHA. Temporary slopes over four feet in height in Type B soils must be sloped no steeper than 1H:1V.

Where encountered, the presence of perched groundwater may cause caving of temporary slopes due to hydrostatic pressure. ESNW should observe site excavations to confirm soil types and allowable slope inclinations. If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations.

Permanent slopes should be planted with vegetation to enhance stability and to minimize erosion and should maintain a gradient of 2H:1V or flatter. An ESNW representative should observe temporary and permanent slopes to confirm the slope inclinations are suitable for the exposed soil conditions. Supplementary recommendations with respect to excavations and slopes may be provided as conditions warrant.

Seismic Considerations

The 2012 IBC recognizes ASCE for seismic site class definitions. In accordance with Table 20.3-1 of ASCE, Minimum Design Loads for Buildings and Other Structures, Site Class C, should be used for design.

In our opinion, the site has a low susceptibility to liquefaction. The soil composition, relative density and the depth to groundwater table is the primary basis for this opinion.

Drainage

Based on our field observations, discrete zones of perched groundwater seepage should be anticipated within site excavations, especially within those excavations for utilities. Perched groundwater seepage should also be expected within shallower site excavations depending on the time of year grading operations take place. Temporary measures to control surface water runoff and groundwater seepage during construction would likely involve interceptor trenches and sumps. ESNW should be consulted during preliminary grading to identify areas of seepage and provide recommendations to reduce the potential for instability related to seepage effects. Permanent interceptor drains may be necessary in some areas.

Finish grades must be designed to direct surface drain water away from structures and slopes. Water must not be allowed to pond adjacent to structures or slopes. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 4.

Preliminary Detention Vault Recommendations

Based on review of the preliminary site plan, we understand a series of stormwater detention vaults will be constructed along the north and east margins of Building C and the north and west margins of Building B. ESNW should review the vault design to confirm the recommendations provided in this report are followed and provide supplemental recommendations. The presence of minor perched groundwater seepage should be expected in the detention vault excavations, depending on the time of year grading takes place.

ESNW prepared a Stability Assessment letter, dated October 6, 2015, relating to the proposed stormwater detention vaults. Slope stability analysis was completed as part of an overall evaluation for the proposed detention vaults in the referenced letter. Based on our field observations, grade cuts for the vault are likely to expose dense to very dense, undisturbed glacial till. ESNW should review detention vault designs, particularly with respect to location relative to sensitive site features and property lines when final designs are completed.

The following values can be used for design of the vault:

• Allowable soil bearing capacity	3,000 psf*
• Active earth pressure (yielding condition)	35 pcf (equivalent fluid)
• At-rest earth pressure (restrained condition)	55 pcf
• Traffic surcharge for passenger vehicles (where applicable)	70 psf (rectangular distribution)
• Passive earth pressure	300 pcf (equivalent fluid)
• Coefficient of friction	0.40
• Seismic surcharge (active condition)	6H (where H equals retained height)
• Seismic surcharge (restrained condition)	14H

* Value is for native or structural fill subgrade condition.

ESNW should observe grading operations for the vault and subgrade conditions prior to concrete forming and pouring. ESNW should be contacted to review final vault designs to confirm appropriate geotechnical parameters have been incorporated, as necessary.

Utility Trench Backfill

In our opinion, on-site soils will generally be suitable for support of utilities. Remedial measures may be necessary in some areas in order to provide support for utilities, such as overexcavation and replacement with structural fill, 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.

In general, on-site soils will likely be suitable for use as structural backfill throughout utility trench excavations, provided the soil is at (or slightly above) the optimum 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 City of Everett or other responsible jurisdiction or agency.

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 detailed in the *Site Preparation and Earthwork* section of this report. In addition, the upper one foot of pavement subgrade should be compacted to a relative compaction of at least 95 percent. It is possible that soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions may require remedial measures such as overexcavation and thicker crushed rock or structural fill sections prior to pavement. Cement treating the base can be considered to improve conditions. For preliminary design considerations an admixture ration of 5 to 7 percent based on unit weight, and a treatment depth of 12 inches can be used. Admixture ratio and treatment depth may be increased depending on the conditions at the time of placement.

For relatively lightly loaded pavements subjected primarily to automobiles, the following preliminary sections can be considered:

- Two inches of asphalt concrete (AC) placed over four inches of crushed rock base (CRB), or;
- Two inches of AC placed over three inches of asphalt treated base (ATB).

Heavier traffic areas (such as access drives) generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for heavy traffic areas can be considered:

- Three inches of asphalt concrete (AC) placed over six inches of crushed rock base (CRB), or;

- Three inches of AC placed over four and one-half inches of asphalt treated base (ATB).

The AC, ATB and CRB materials should conform to WSDOT specifications.

ESNW can provide pavement section design recommendations for truck traffic areas and right-of-way improvements, upon request. Additionally, Everett road standards may supersede the recommendations provided in this report.

Rigid Pavement and Aprons

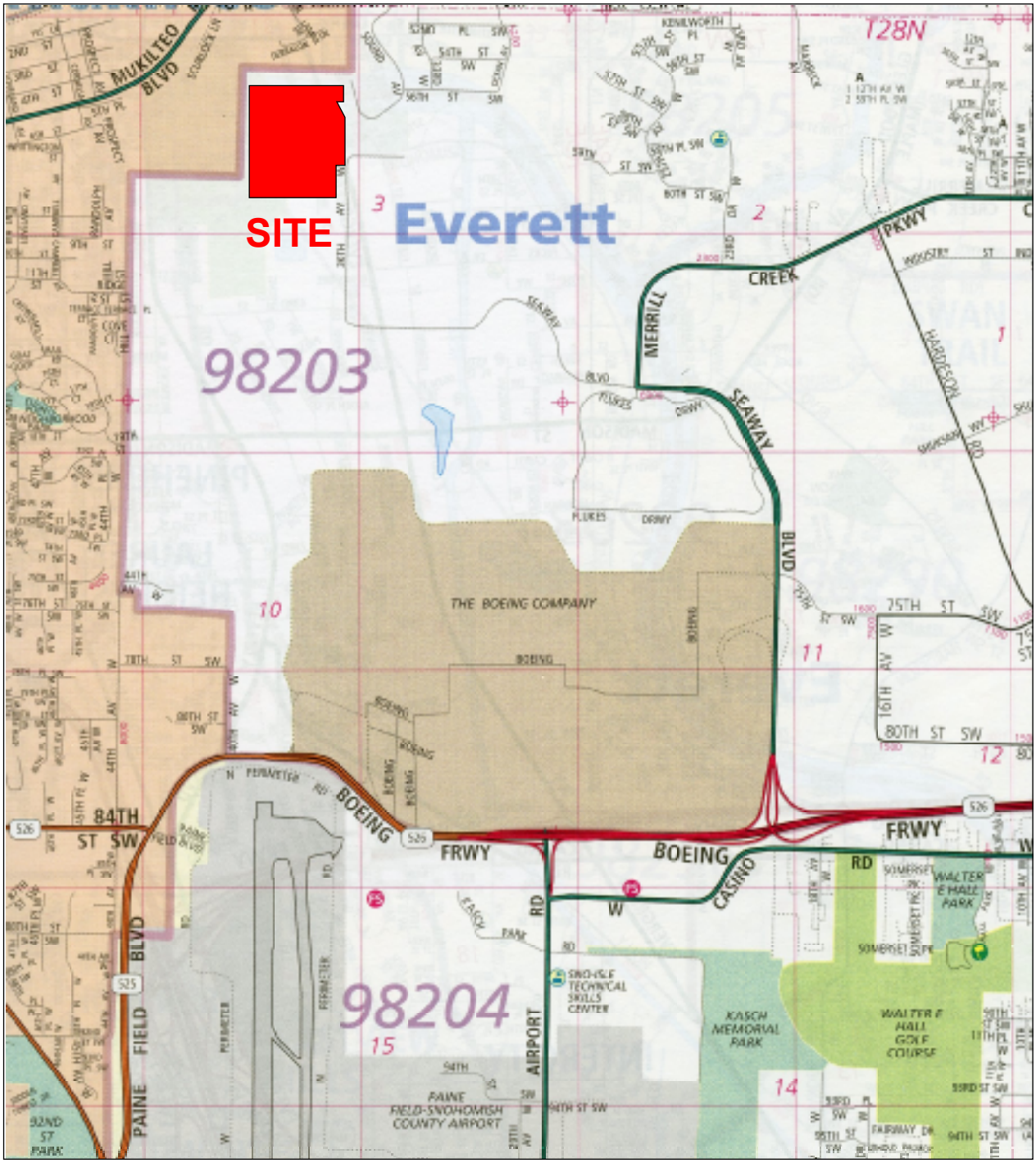
Rigid pavement/apron areas can consist of five inches of fiber-reinforced concrete supported on at least six inches of crushed rock base.

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 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.



Reference:
Everett, Washington
Map 415
By The Thomas Guide
Rand McNally
32nd Edition

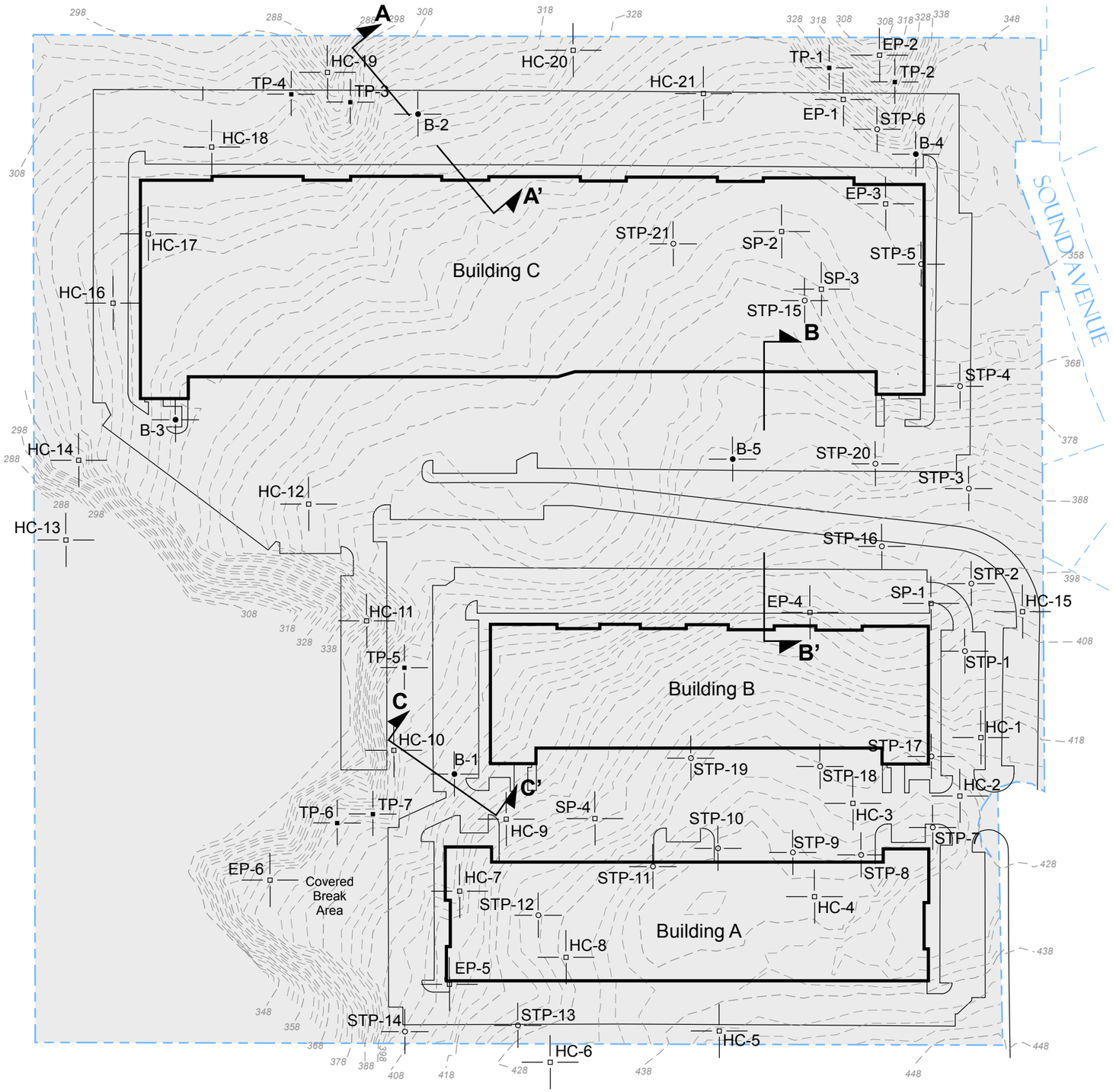
NORTH

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.

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring and Environmental Sciences

Vicinity Map
Soundview Business Center
Everett, Washington

Drwn. GLS	Date 06/10/2016	Proj. No. 4011.03
Checked BJP	Date June 2016	Plate 1



LEGEND

- B-1 — Approximate Location of ESNW Boring, Proj. No. ES-4011.03, April 2016
- TP-1 — Approximate Location of ESNW Test Pit, Proj. No. ES-4011, July 2015
- STP-1 — Approximate Location of Shovel Test Probe Proj. No. 2014-077
- SP-1 — Approximate Location of Backhoe Shovel Pit Proj. No. 2014-077
- EP-1 — Approximate Location of Associated Earth Sciences, Inc. Test Pit, Proj. No. KE00149A March 2000
- HC-1 — Approximate Location of Hart Crowser Test Pit Proj. No. J-2306, Dec. 1988
- Subject Site
- Proposed Building

NORTH

1"=150' — 0, 75, 150, 300 Scale in Feet

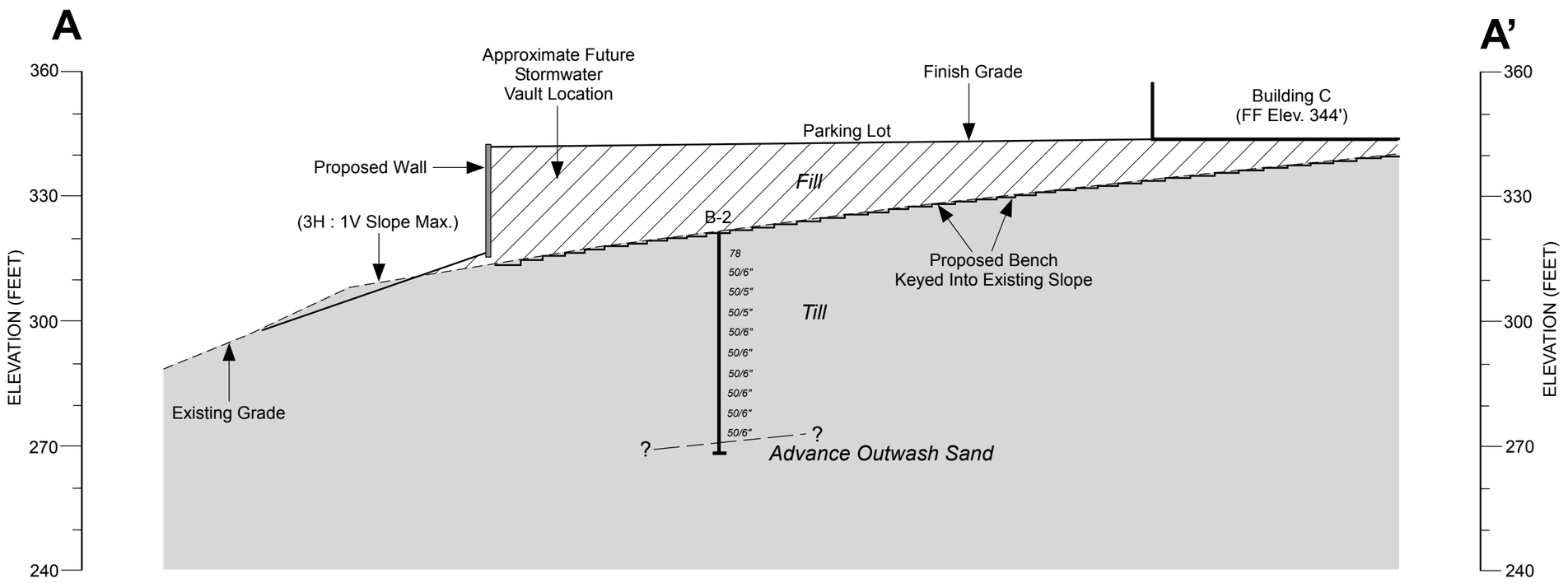
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

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.

Boring and Test Pit Location Plan
Soundview Business Center
Everett, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring and Environmental Sciences

Drwn. By	GLS
Checked By	BJP
Date	06/10/2016
Proj. No.	4011.03
Plate	2



Horizontal Scale
1"=30'
0 15 30 60
Scale in Feet

Vertical Scale
1"=30'
0 15 30 60
Scale in Feet

NOTE: The stratification lines shown on this cross section represent the approximate boundaries between soil types. The actual transitions may be either more gradual or more severe. They are based on our interpretation of the subsurface conditions encountered at the individual test locations and our judgement and experience. ESNW cannot be responsible for the interpretation of the data by others.

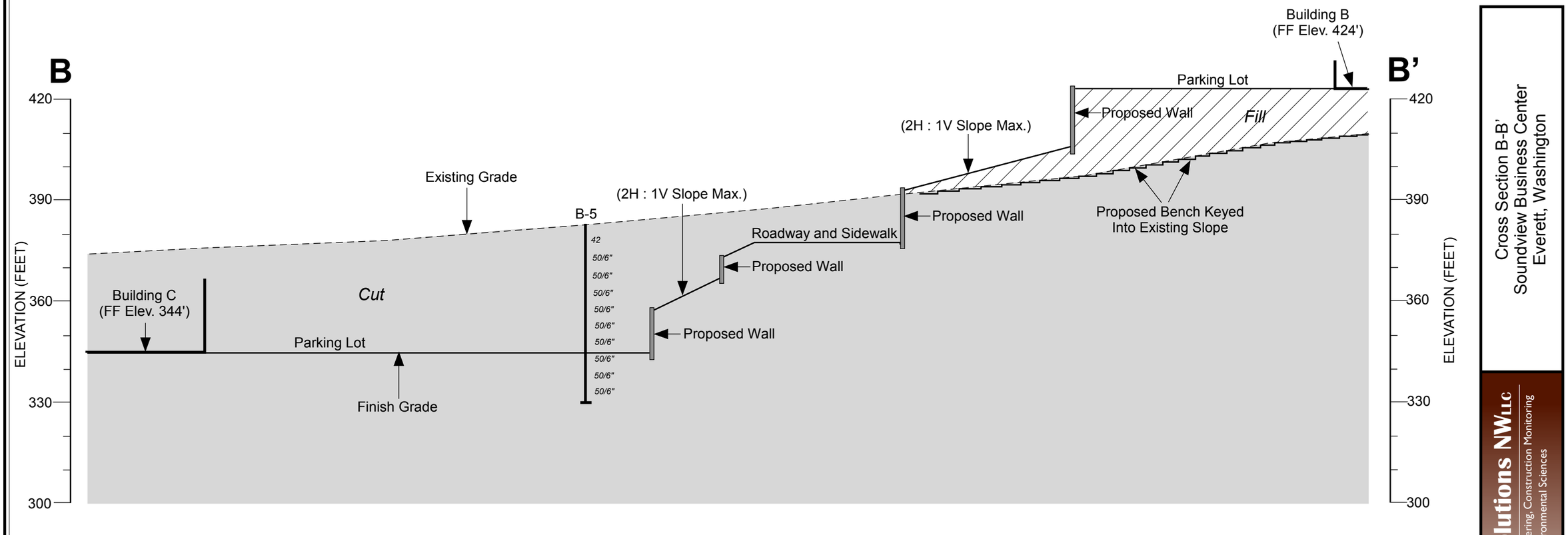
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided 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.

Cross Section A-A'
Soundview Business Center
Everett, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring
and Environmental Sciences

Drwn. By	GLS
Checked By	BJP
Date	06/10/2016
Proj. No.	4011.03
Plate	3



Horizontal Scale
1"=30'

0 15 30 60

Scale in Feet

Vertical Scale
1"=30'

0 15 30 60

Scale in Feet

NOTE: The stratification lines shown on this cross section represent the approximate boundaries between soil types. The actual transitions may be either more gradual or more severe. They are based on our interpretation of the subsurface conditions encountered at the individual test locations and our judgement and experience. ESNW cannot be responsible for the interpretation of the data by others.

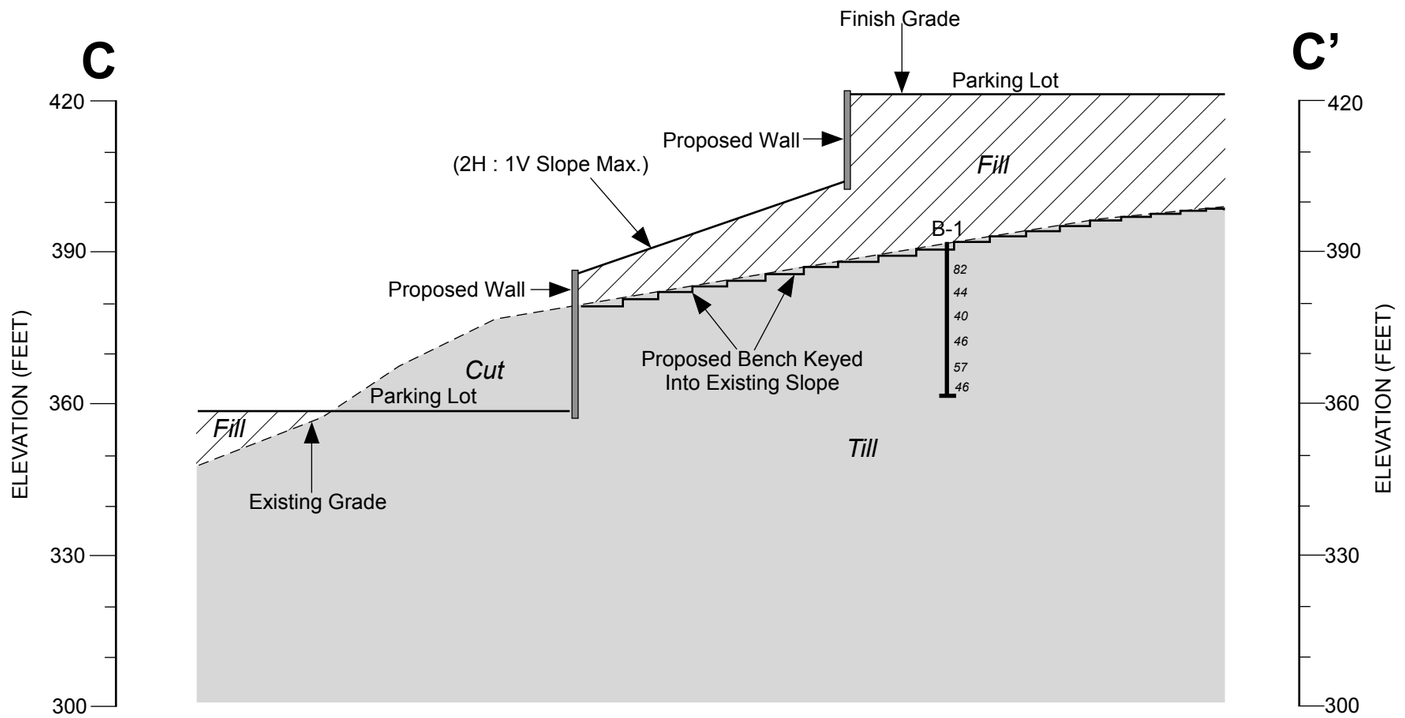
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided 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.

Cross Section B-B'
Soundview Business Center
Everett, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring
and Environmental Sciences

Drwn. By	GLS
Checked By	BJP
Date	06/10/2016
Proj. No.	4011.03
Plate	4



Horizontal Scale
1"=30'
0 15 30 60
Scale in Feet

Vertical Scale
1"=30'
0 15 30 60
Scale in Feet

NOTE: The stratification lines shown on this cross section represent the approximate boundaries between soil types. The actual transitions may be either more gradual or more severe. They are based on our interpretation of the subsurface conditions encountered at the individual test locations and our judgement and experience. ESNW cannot be responsible for the interpretation of the data by others.

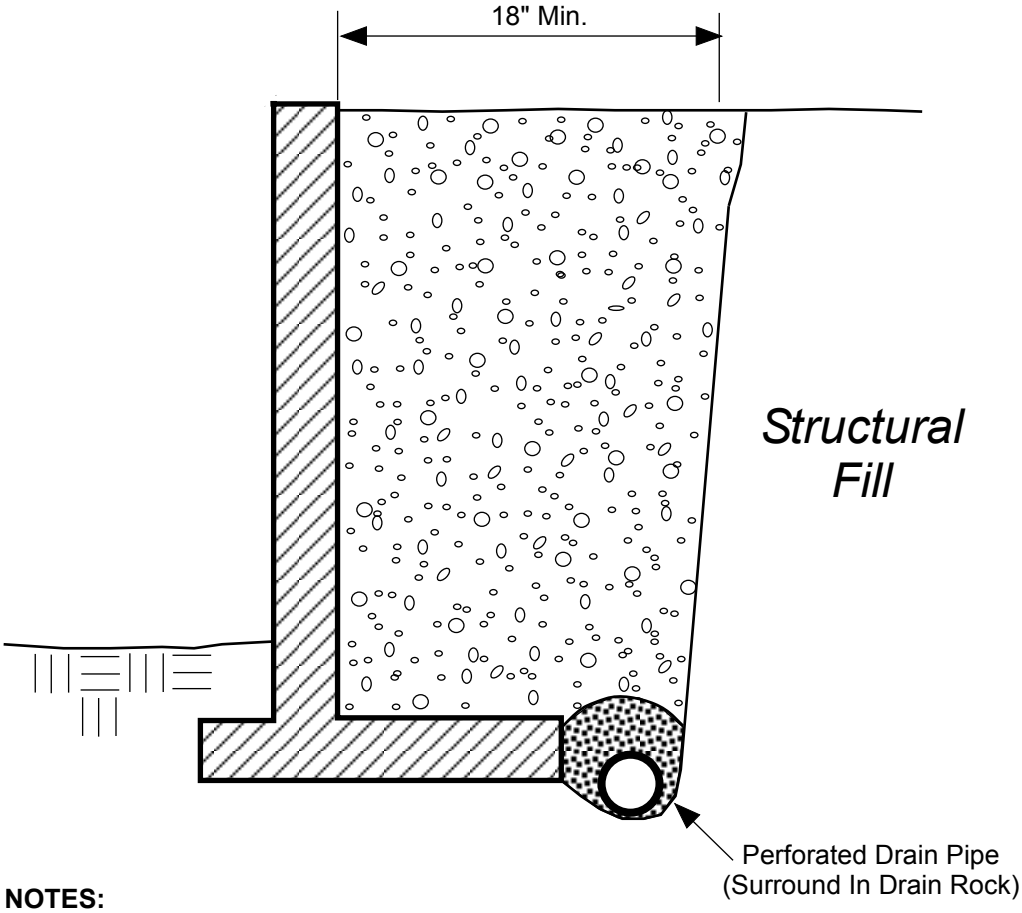
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided 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.

Cross Section C-C'
Soundview Business Center
Everett, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring
and Environmental Sciences

Drwn. By	GLS
Checked By	BJP
Date	06/10/2016
Proj. No.	4011.03
Plate	5



NOTES:

- Free Draining Backfill should consist of soil having less than 5 percent fines. Percent passing #4 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" Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

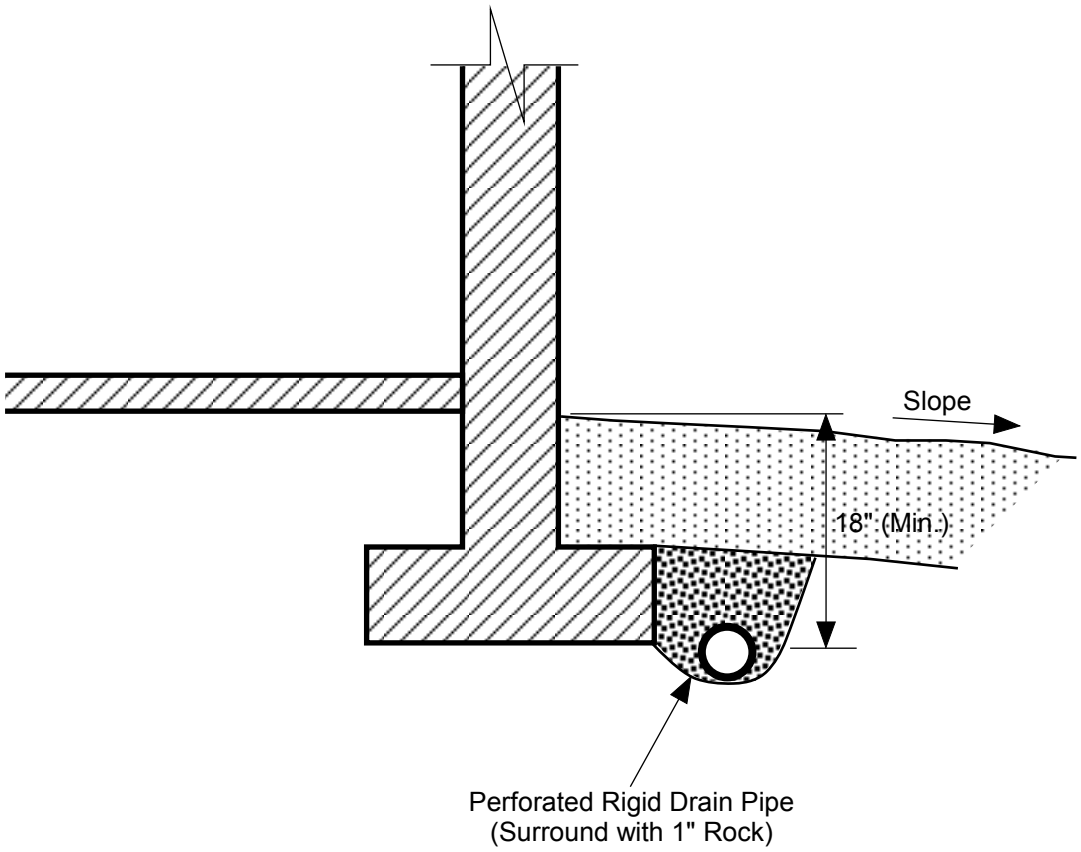
Free Draining Structural Backfill

1 inch Drain Rock

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring and Environmental Sciences

RETAINING WALL DRAINAGE DETAIL
Soundview Business Center
Everett, Washington

Drwn. GLS	Date 06/10/2016	Proj. No. 4011.03
Checked BJP	Date June 2016	Plate 6



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" Drain Rock

Earth Solutions NW LLC
Geotechnical Engineering, Construction Monitoring and Environmental Sciences

FOOTING DRAIN DETAIL
Soundview Business Center
Everett, Washington

Drwn. GLS	Date 06/10/2016	Proj. No. 4011.03
Checked BJP	Date June 2016	Plate 7

Appendix A

Subsurface Exploration

ES-4011.03

The subsurface exploration at the site was conducted by Earth Solutions NW, LLC for the purpose of evaluating and characterizing the onsite soils. An ESNW representative was onsite July 31, 2015 and April 18 and 19, 2016 to observe, log, and sample soils at seven test pit locations and five boring locations advanced at accessible areas of the site. The borings and test pits were advanced to a maximum exploration depth of 51.5 feet below existing grades. Additional subsurface data was provided in the referenced geotechnical report prepared by Associated Earth Sciences, Inc. (AESI) and are provided in Appendix A. The subsurface explorations were conducted by Hart-Crowser in December 1988 and AESI in March 2000. The approximate locations of the borings and test pits are illustrated on Plate 2 of this report. The boring and test pit logs are provided in this Appendix.

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		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
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
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-1

CLIENT Ventas Construction Inc.
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011.03
PROJECT LOCATION Everett, Washington
DATE STARTED 4/18/16 **COMPLETED** 4/18/16
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Holocene Drilling
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING ---
LOGGED BY BJP **CHECKED BY** BTS
AT END OF DRILLING ---
NOTES Topsoil
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Brown silty SAND with ravel, loose to medium dense, moist
5	SS	18	8-32-50/5"	MC = 27.20%			-becomes dense, wood debris observed, no sample, root intrusion
10	SS	89	2-12-32 (44)	MC = 10.70%			-becomes gray
15	SS	100	4-14-26 (40)	MC = 14.00%			
20							20.0

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-1

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	100	13-20-26 (46)	MC = 5.90%			Gray silty SAND, dense, moist -higher sand content to B.O.H.
25	SS	100	13-25-32 (57)	MC = 7.40% Fines = 12.10%	SM		[USDA Classification: slightly gravelly SAND] -water seepage
30	SS	100	11-19-27 (46)	MC = 20.10%			-becomes wet
							31.5 Boring terminated at 31.5 feet below existing grade. Groundwater seepage encountered at 29.0 feet during drilling. Boring backfilled with bentonite. Bottom of hole at 31.5 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-2

CLIENT Ventas Construction Inc.
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011.03
PROJECT LOCATION Everett, Washington
DATE STARTED 4/18/16 **COMPLETED** 4/18/16
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Holocene Drilling
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING ---
LOGGED BY BJP **CHECKED BY** BTS
AT END OF DRILLING ---
NOTES Silty Sand with Gravel
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 with gravel, loose, moist
	SS	67	15-34-44 (78)				
5				MC = 8.50%	SM		-becomes gray, very dense, moist
10							10.0
	SS	101	44-50/6"	MC = 16.10% Fines = 73.10%			Gray SILT with sand, very dense, moist [USDA Classification: slightly gravelly LOAM]
15					ML		
	SS	73	9-50/5"	MC = 9.50%			
20							

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-2

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	73	9-50/5"	MC = 8.70%	ML		Gray SILT with sand, very dense, moist *(continued)*
25	SS	67	50/6"	MC = 6.40%			
30	SS	50	50/6"	MC = 4.50%			
35	SS	67	50/6"	MC = 6.00%			
40	SS	33	50/6"	MC = 5.90%			

GENERAL BH / TP / WELL 4011-3.GPJ GINT US.GDT 5/12/16

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-2

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
							Gray SILT with sand, very dense, moist *(continued)*
45	SS	67	50/6"	MC = 7.10%	ML		
50							50.0
	SS	98	50/6"	MC = 4.90% Fines = 7.20%	SP-SM		Becomes gray poorly graded SAND with silt, very dense, moist 51.5 [USDA Classification: gravelly SAND]
							Boring terminated at 51.5 feet below existing grade. No groundwater encountered during drilling. 2" PVC standpipe installed to 25.0 feet. Lower 10.0 feet slotted. Boring backfilled with bentonite and sand. Bottom of hole at 51.5 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-3

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DATE STARTED 4/18/16 **COMPLETED** 4/18/16 **GROUND ELEVATION** _____ **HOLE SIZE** _____

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

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

LOGGED BY BJP **CHECKED BY** BTS **AT END OF DRILLING** ---

NOTES Silty Sand with Gravel **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 with gravel, loose to medium dense, moist
5					SM		
	SS	100	15-24-30 (54)	MC = 13.80%			-becomes gray, very dense, moist
10							10.0
	SS	94	6-25-50 (75)	MC = 9.60%			Gray sandy SILT, very dense, moist
15					ML		
	SS	92	28-50/6"	MC = 13.10% Fines = 58.40%			[USDA Classification: slightly gravelly LOAM]
20							

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-3

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	83	50/6"	MC = 7.70%	ML		Gray sandy SILT, very dense, moist *(continued)*
25	SS	83	50/6"	MC = 7.00%			
30	SS	83	50/6"	MC = 6.30%			
							31.5
							Boring terminated at 31.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 31.5 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-4

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DATE STARTED 4/18/15 **COMPLETED** 4/18/15 **GROUND ELEVATION** _____ **HOLE SIZE** _____

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

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

LOGGED BY BJP **CHECKED BY** BTS **AT END OF DRILLING** ---

NOTES Grass, Topsoil **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 with gravel, loose to medium dense, moist
5	SS	100	7-28-38 (66)	MC = 10.00%	SM		-becomes gray -becomes very dense
10	SS	100	9-28-49 (77)	MC = 10.70%			10.0 Gray sandy SILT, very dense, moist
15	SS	100	9-19-48 (67)	MC = 10.10%	ML		
20							

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-4

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	83	50/6"	MC = 5.00%	ML		Gray sandy SILT, very dense, moist *(continued)*
25	SS	83	50/6"	MC = 9.40% Fines = 52.50%			[USDA Classification: slightly gravelly LOAM]
30	SS	67	48-50/6"	MC = 6.70%			
							31.5 Boring terminated at 31.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 31.5 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-5

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DATE STARTED 4/19/16 **COMPLETED** 4/19/16 **GROUND ELEVATION** _____ **HOLE SIZE** _____

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

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

LOGGED BY BJP **CHECKED BY** BTS **AT END OF DRILLING** ---

NOTES Topsoil, Silty Sand **AFTER DRILLING** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Brown silty SAND with gravel, loose to medium dense, moist
5	SS	78	7-17-25 (42)	MC = 9.50% Fines = 33.30%			-becomes gray -becomes dense [USDA Classification: gravelly fine sandy LOAM]
10	SS	11	7-26-50/6"	MC = 13.20%			10.0 Gray sandy SILT, very dense, moist
15	SS	75	36-50/6"	MC = 10.40% Fines = 50.60%	ML		[USDA Classification: slightly gravelly LOAM]
20					SM		17.0 Gray silty SAND with gravel, very dense, moist

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-5

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	83	50/6"	MC = 9.00%	SM		Gray silty SAND with gravel, very dense, moist *(continued)*
25	SS	83	50/6"	MC = 8.20%			
30	SS	50	50/6"	MC = 7.10% Fines = 30.10%			[USDA Classification: gravelly LOAM]
35	SS	50	50/6"	MC = 7.40%			
40	SS	50	50/6"	MC = 8.60%			

(Continued Next Page)

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

BORING NUMBER B-5

CLIENT Ventas Construction Inc. **PROJECT NAME** Soundview Business Center

PROJECT NUMBER 4011.03 **PROJECT LOCATION** Everett, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
45					SM		Gray silty SAND with gravel, very dense, moist *(continued)*
	SS	50	50/6"	MC = 7.60%			
50							
	SS	33	50/6"	MC = 5.60%			
							51.5
							Boring terminated at 51.5 feet below existing grade. No groundwater encountered during drilling. 2" PVC standpipe installed to 50.0 feet. Lower 15.0 feet slotted. Boring backfilled with bentonite and sand. Bottom of hole at 51.5 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-1

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 330 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 12": brambles, ferns
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		Brown silty SAND, dense, moist (Weathered Till)
				-fractured very dense till
5				-increased gravel, very dense, moist -gray silty SAND with gravel, very dense, moist (unweathered till)
8.0				322.0 Test pit terminated at 8.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 8.0 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-2

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 324 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 12": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Brown silty SAND, medium dense, moist (Weathered Till)
5				-becomes dense
		SM		-oxide staining -becomes gray, very dense, moist (unweathered till)
10				
13.0				311. Test pit terminated at 13.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 13.0 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-3

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 302 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 10"- 12": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0				Brown silty SAND with gravel, medium dense, moist (Weathered Till)	
		SM		-oxide staining	
5				-becomes gray, dense to very dense (weathered till)	
				-sparse cobbles and boulders	
				-increased sand content	
				7.0	295.0
		SP-SM		Gray poorly graded SAND with silt, dense, moist	
				8.5	293.5
		SM		Gray silty SAND with gravel, very dense, moist	
10				10.0	292.0
				Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 10.0 feet.	

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-4

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 308 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 4"-6": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		SM		Gray silty SAND with gravel, dense to very dense, moist (Native-Unweathered Till)	
				-cemented	
5				5.0	303.0
				Test pit terminated at 5.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 5.0 feet.	

GENERAL BH / TP / WELL 4011.GPJ GINT US.GDT 8/12/15

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-5

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 780 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 10"- 12": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		Brown silty SAND, medium dense to dense, moist (Weathered Till)
5				-becomes gray, very dense, cemented (unweathered till)
7.0				773.0
				Test pit terminated at 7.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 7.0 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-6

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 378 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 12"- 14": ferns
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		Brown silty SAND, medium dense to dense, moist (Weathered Till)
				-becomes brownish-gray, dense to very dense (unweathered till)
5				-becomes cemented
8.0				370.0
				Test pit terminated at 8.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 8.0 feet.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-7

CLIENT Veritas Construction
PROJECT NAME Soundview Business Center
PROJECT NUMBER 4011
PROJECT LOCATION Everett, Washington
DATE STARTED 7/31/15 **COMPLETED** 7/31/15
GROUND ELEVATION 378 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BTS **CHECKED BY** BTS
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 12"- 14": ferns
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		Gray silty SAND with gravel, dense, moist (Native-Till)
5				-becomes cemented
9.0				369.0
				Test pit terminated at 9.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 9.0 feet.

LOG OF EXPLORATION PIT NO.EP-1

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Forest Duff over Topsoil
	Weathered Lodgement Till
1	Loose, moist, brown, silty, fine to coarse SAND with some gravel and small roots.
	Lodgement Till
2	Dense to very dense, moist, gray, gravelly, silty, fine to coarse SAND.
3	
4	
5	
6	
7	
8	
9	Bottom of exploration pit at depth 8 feet Very minor ground water seepage @ 1 1/2' deep, no caving.
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

KCTP3 00149.GPJ March 15, 2000

Silver Sound Corporate Center
Everett, WA

Logged by: SRH
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00149A
March 2000

CE2956

US-CE2956

LOG OF EXPLORATION PIT NO.EP-2

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Forest Duff over Topsoil
1	**Colluvium**
2	Loose, moist to saturated with depth, brown, sandy SILT to silty SAND with scattered gravel.
3	
4	**Lodgement Till**
5	Dense, wet, mottled gray and orange, gravelly, silty, fine to coarse SAND.
6	Bottom of exploration pit at depth 5 feet Moderate ground water seepage @ 4' deep, minor sloughing.
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

KCTP9 00149.GPJ March 28, 2000

Silver Sound Corporate Center
Everett, WA

Logged by: SRH
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00149A
March 2000

CE2957

US-CE295

LOG OF EXPLORATION PIT NO.EP-3

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Forest Duff and Topsoil
	Weathered Lodgement Till
1	Loose, saturated, brown, sandy SILT to silty SAND with some gravel and roots.
	Lodgement Till
2	Very dense, moist, gray, gravelly, silty, fine to coarse SAND. Upper 1 1/2' mottled orange.
3	
4	
5	
6	
7	
8	Bottom of exploration pit at depth 7 feet Moderate ground water seepage @ 1 1/2' deep, no caving.
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

KGTP3 00149.GPJ March 15, 2000

Silver Sound Corporate Center
Everett, WA

CE2958

Logged by: SRH
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00149A
March 2000

US-CE295

LOG OF EXPLORATION PIT NO.EP-4

Depth, ft

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

DESCRIPTION

Forest Duff and Topsoil

Weathered Lodgement Till

1 — Loose, saturated, brown, sandy SILT to silty SAND with some gravel and roots.

Lodgement Till

2 — Very dense, moist, gray, gravelly, silty, fine to coarse SAND. Upper 1 1/2' mottled orange.

3

4

5

6

7

8

9 — Bottom of exploration pit at depth 8 feet
Moderate ground water seepage @ 1' deep, no caving.

10

11

12

13

14

15

16

17

18

19

20

KCTPS 00149.GPJ March 15, 2000

Silver Sound Corporate Center
Everett, WA

CE2959

Logged by: SRH
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00149A
March 2000

US-CE2959

LOG OF EXPLORATION PIT NO.EP-5

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

Depth, ft	DESCRIPTION
	Forest Duff and Topsoil
1	**Weathered Lodgement Till** Loose, moist, brown, silty, fine to medium SAND with some gravel and roots.
2	**Lodgement Till**
3	Very dense, moist, gray, gravelly, silty fine to coarse SAND.
4	
5	
6	
7	Bottom of exploration pit at depth 6 feet Very minor ground water seepage @ 1 1/2', no caving.
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

KCTP3 00149.GPJ March 18, 2000

Silver Sound Corporate Center
Everett, WA

CE2960

Logged by: SRH

Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00149A

March 2000

US-CE296

LOG OF EXPLORATION PIT NO.EP-6

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Forest Duff and Topsoil
1	**Weathered Lodgement Till** Loose, moist to wet, brown and gray, sandy SILT to silty SAND with some gravel and roots.
2	
3	**Lodgement Till** Dense to very dense with depth, moist, gray and brown, silty, fine to coarse SAND with some gravel.
4	
5	**Pre-Vashon** Dense, moist, brown, silty , fine to coarse SAND with gravel and trace charcoal. Becomes gray sandy SILT below 8' with trace gravel.
6	
7	
8	
9	
10	
11	
12	
13	Bottom of exploration pit at depth 12 feet Very minor ground water seepage @ 2', no caving.
14	
15	
16	
17	
18	
19	
20	

KDTP3 00149.GPJ March 28, 2000

Silver Sound Corporate Center
Everett, WA

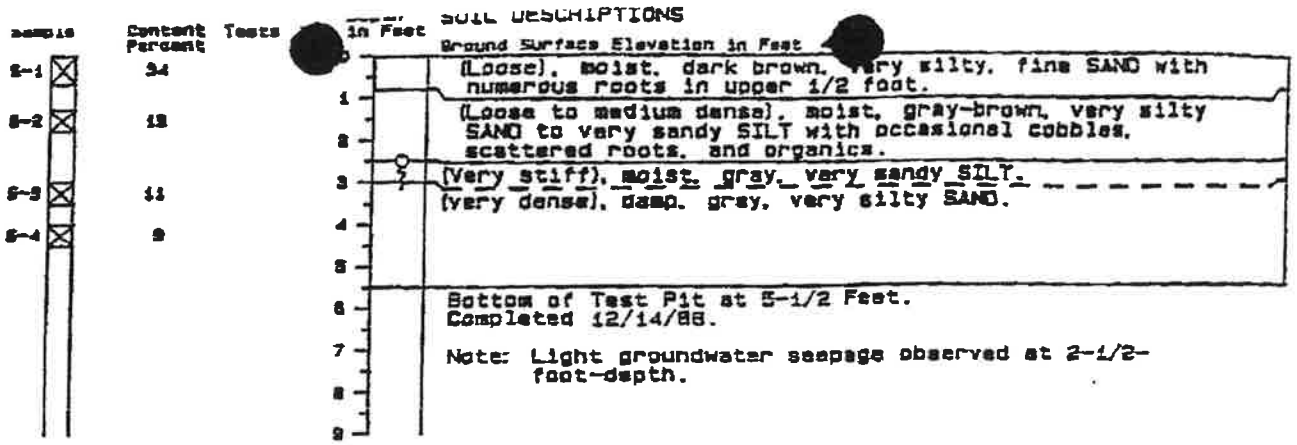
Logged by: SRH
Approved by:

ASSOCIATED EARTH SCIENCES, INC

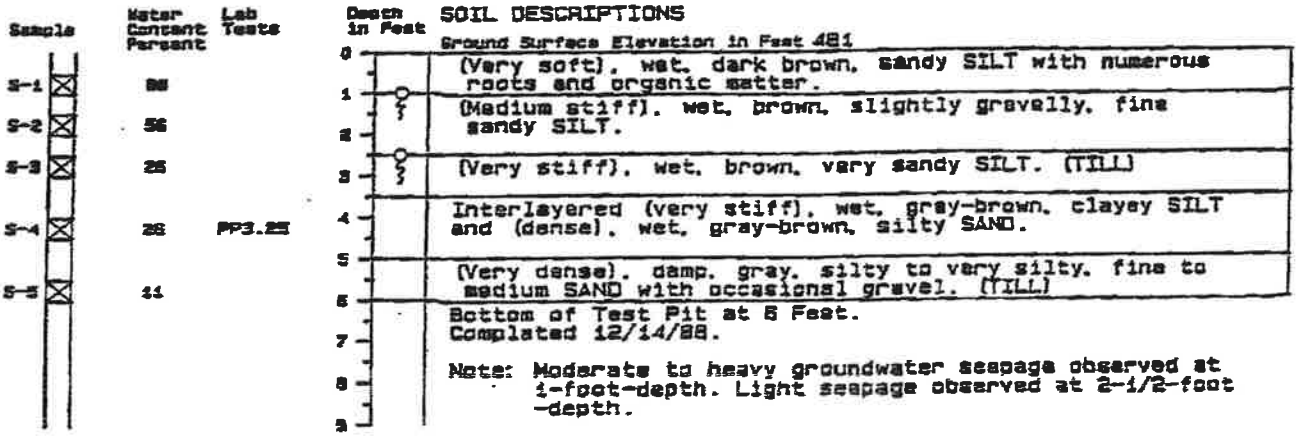
Project No. KE00149A
March 2000

CE2961

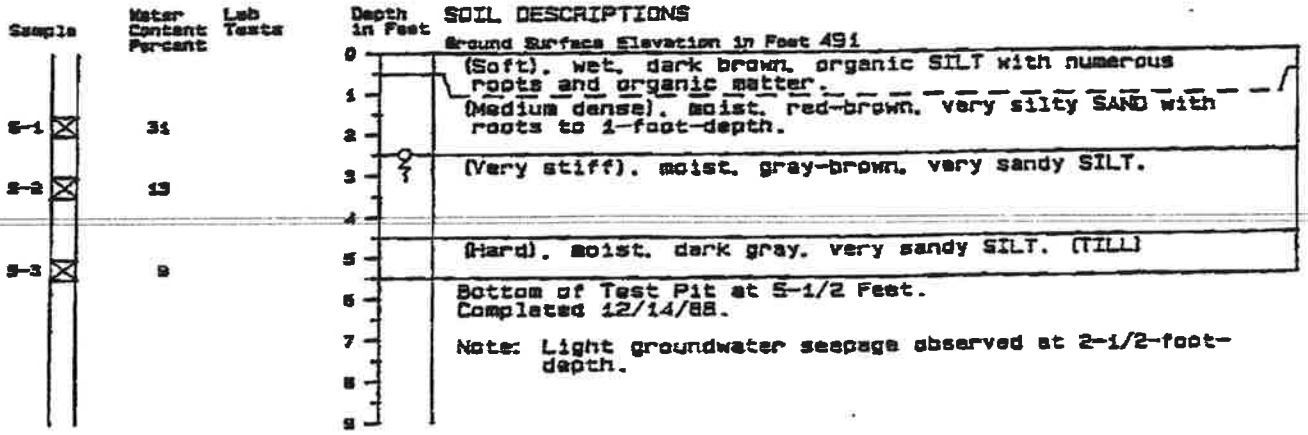
US-CE296



Test Pit Log TP-2



Test Pit Log TP-3

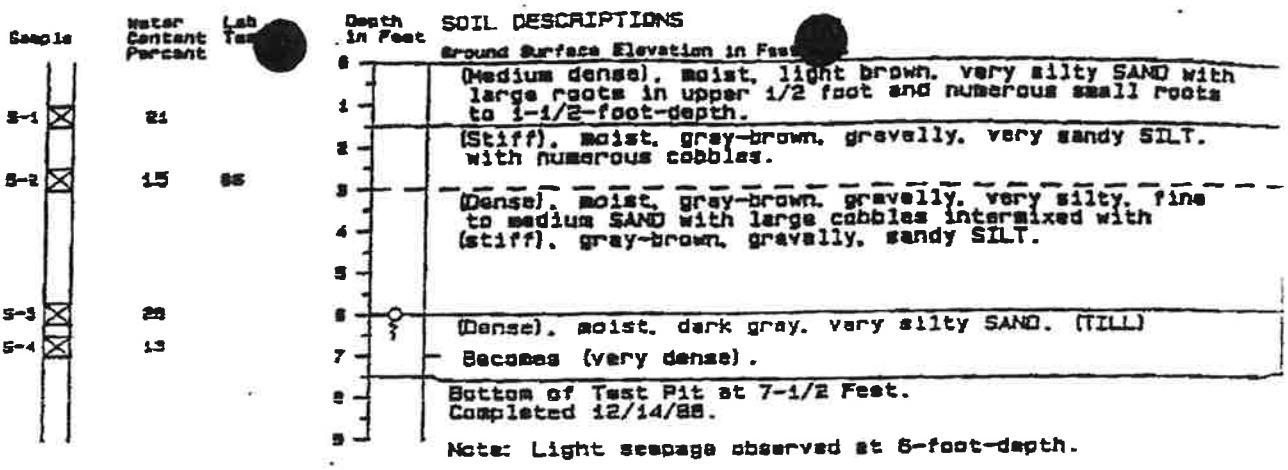


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

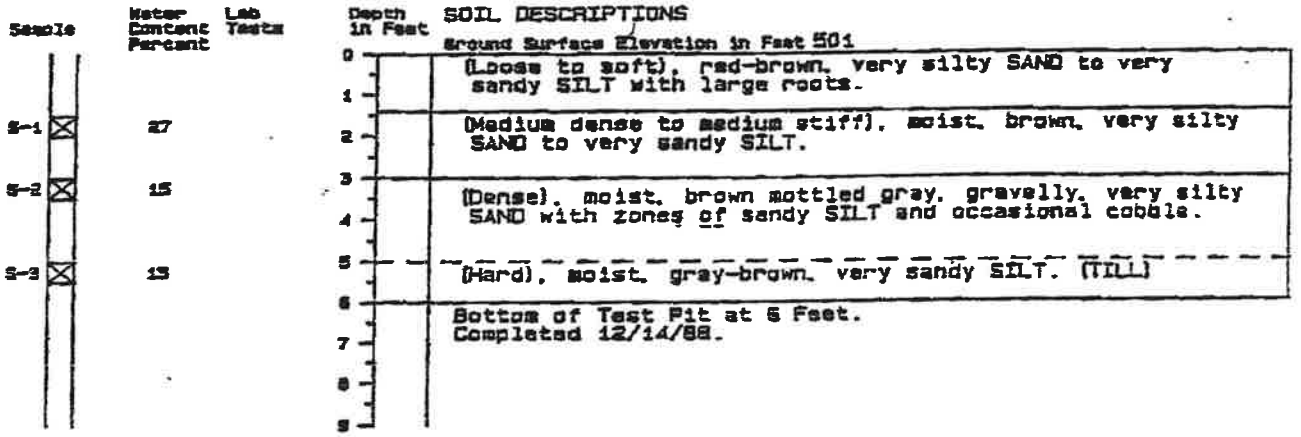
J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-2

CE2962

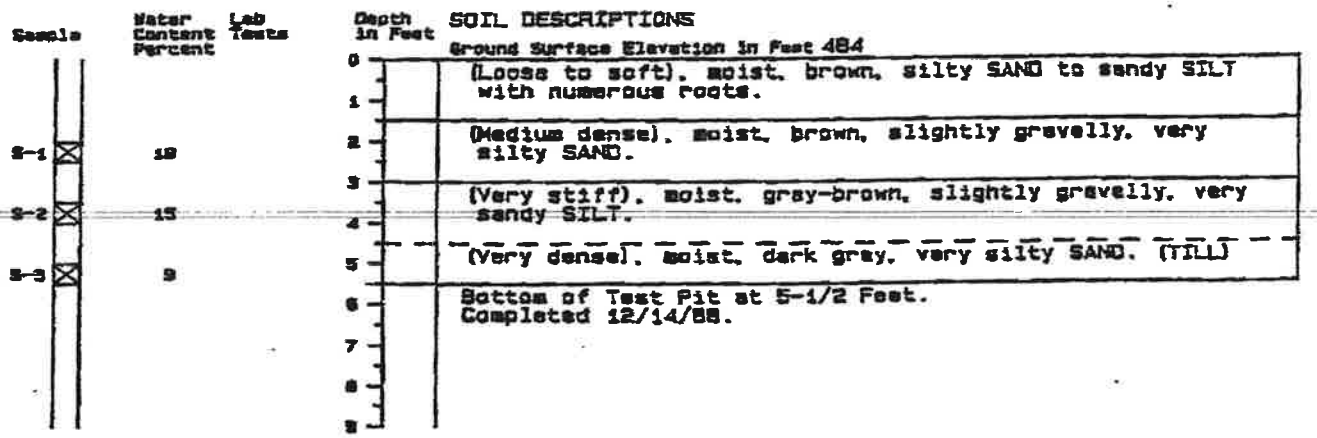
US-CE2962



Test Pit Log TP-5



Test Pit Log TP-6

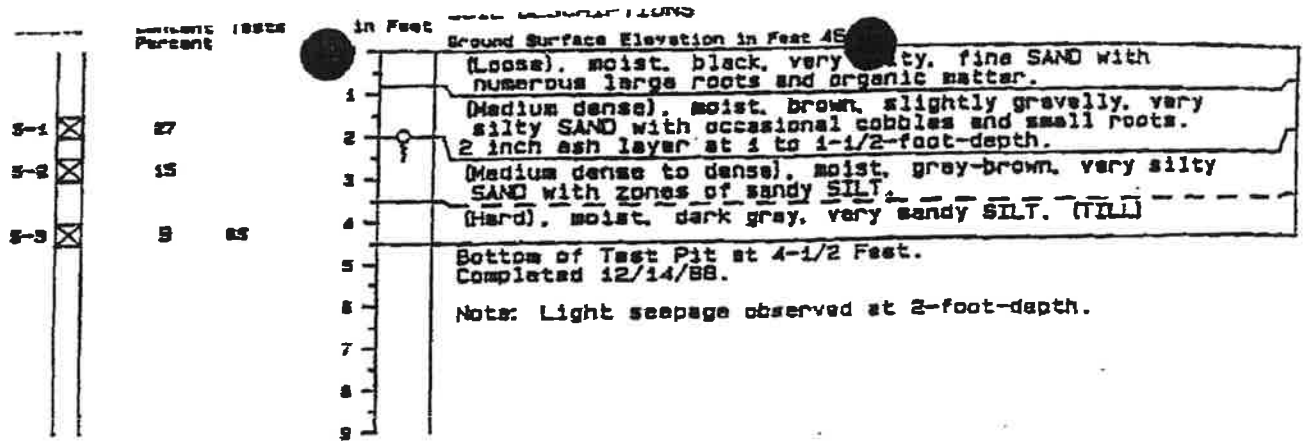


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

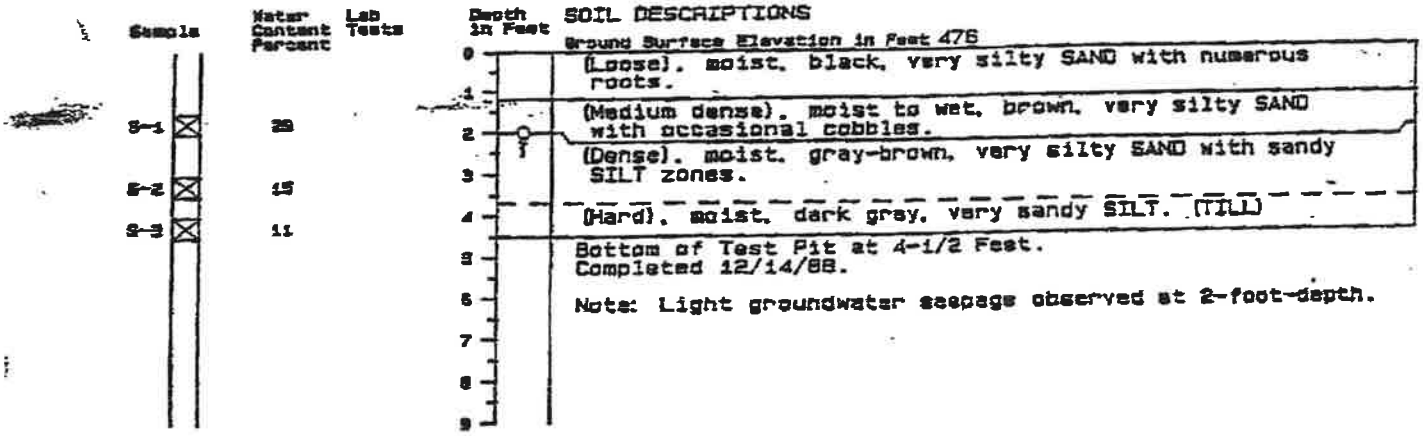
J-2306 December 198
HART-CROWSER & associates, inc
Figure A-3

CE2963

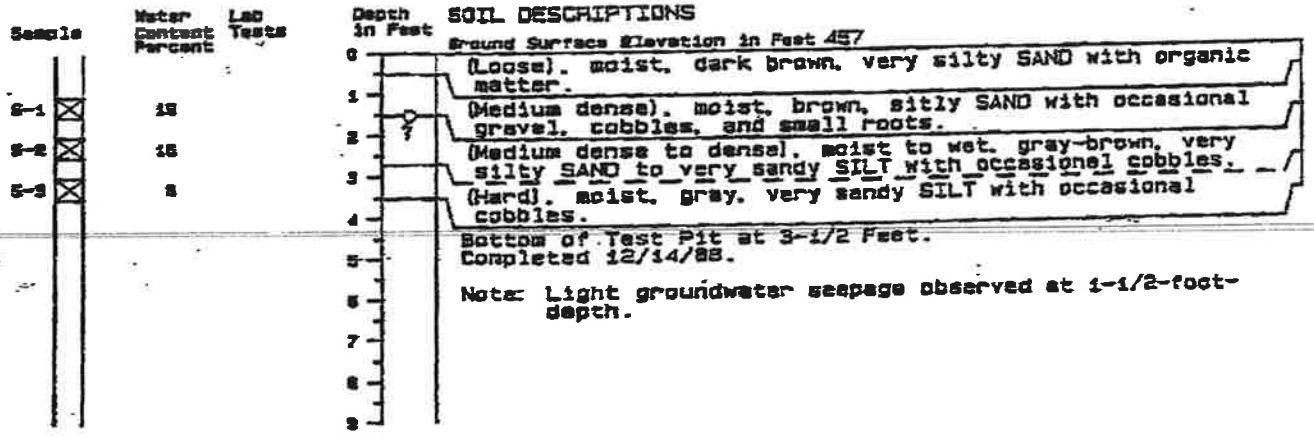
US-CE2963



Test Pit Log TP-8



Test Pit Log TP-9

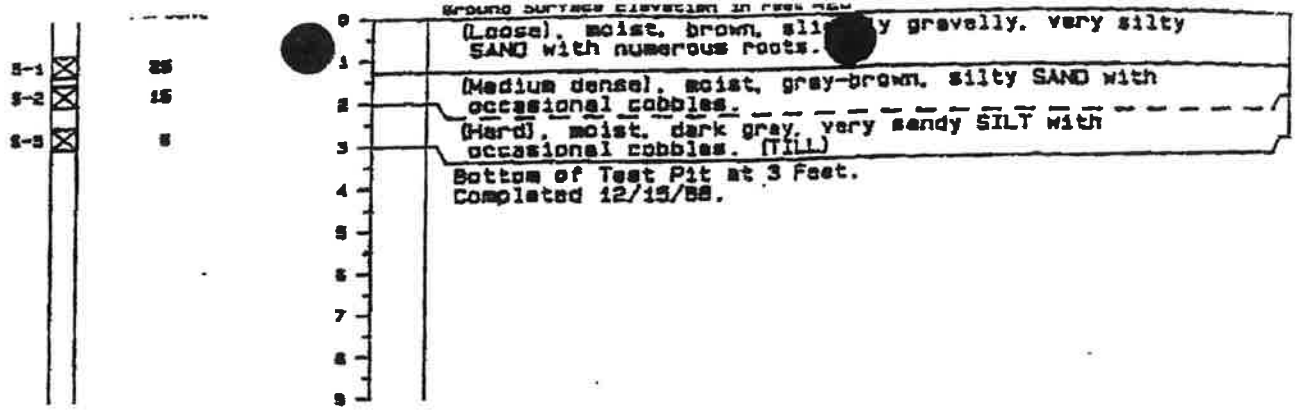


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

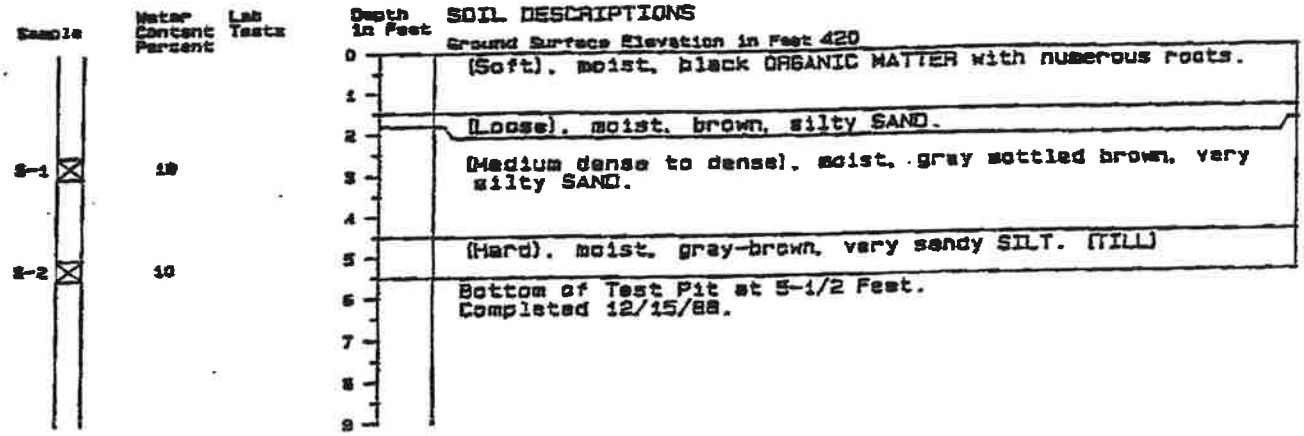
J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-4

CE2964

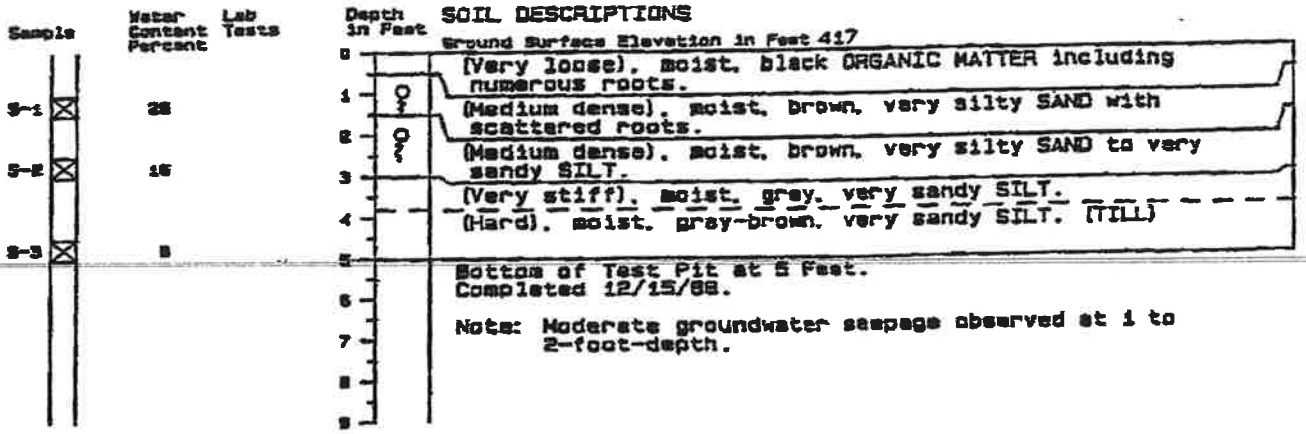
US-CE2964



Test Pit Log TP-11



Test Pit Log TP-12

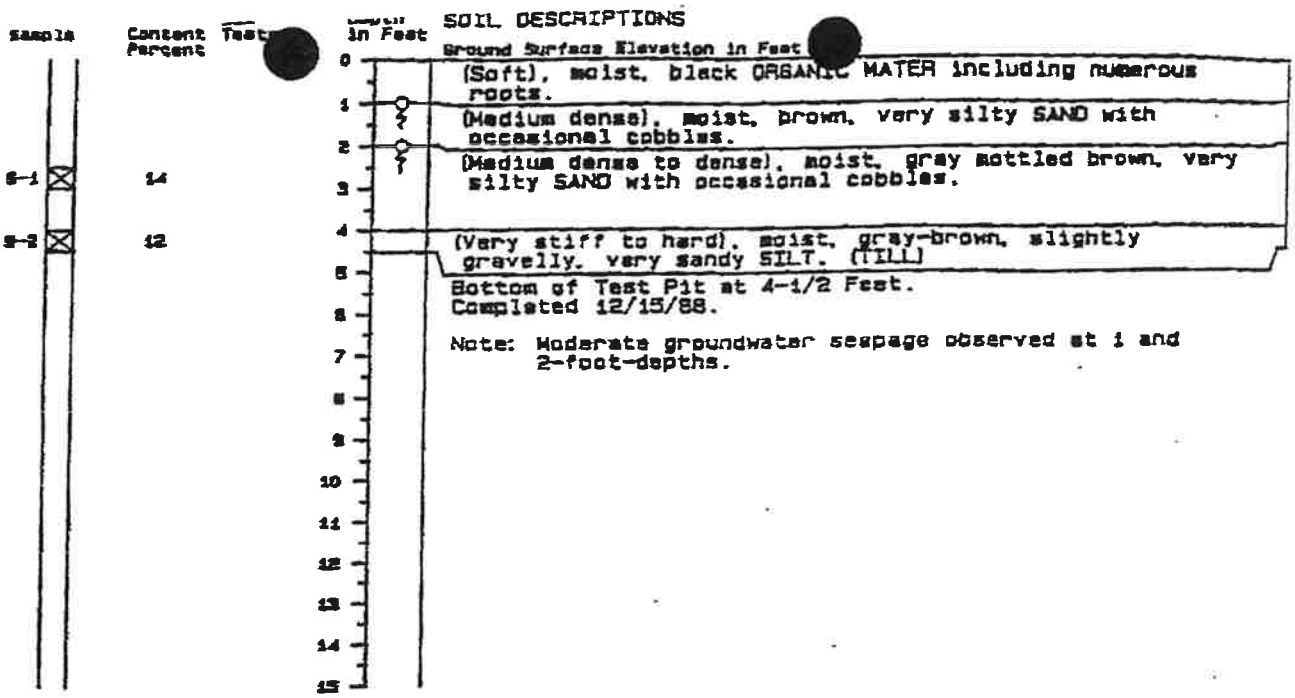


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

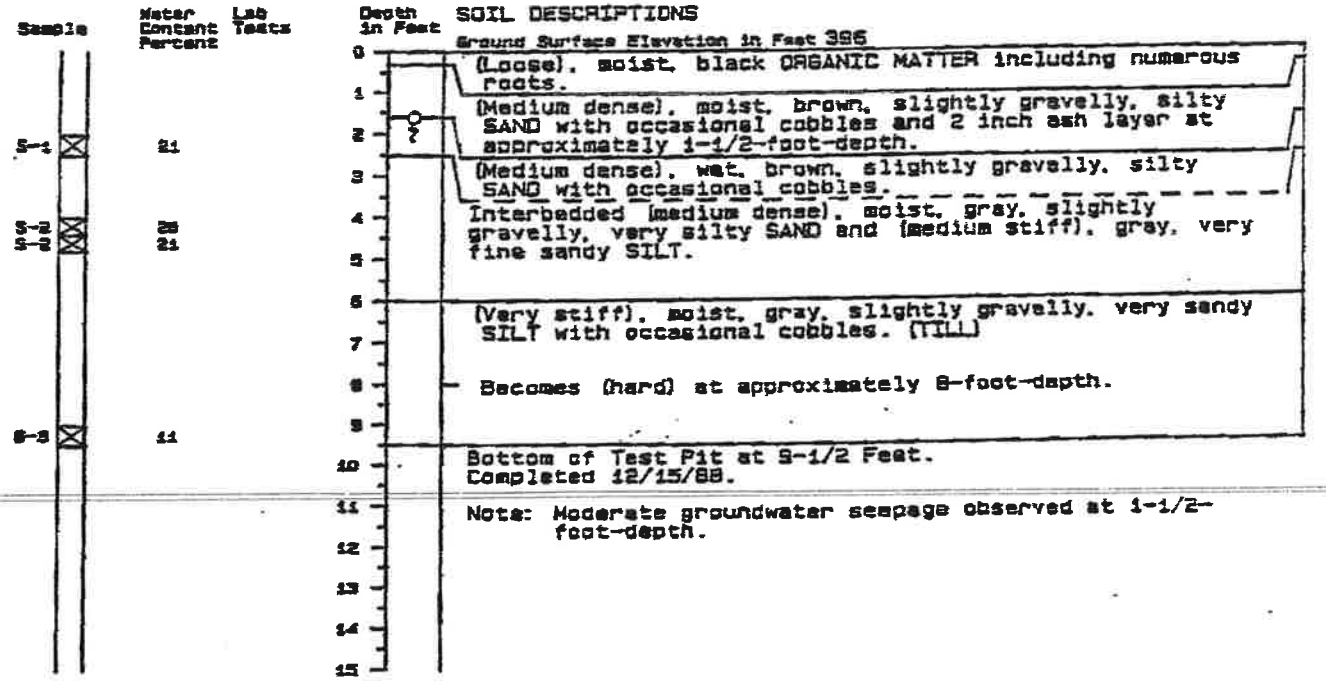
J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-5

CE2965

US-CE2965



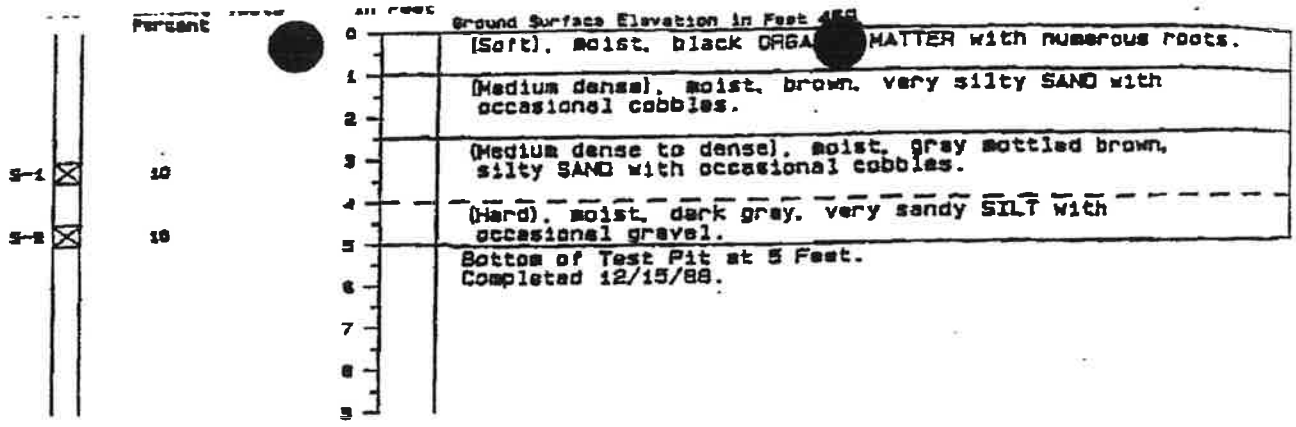
Test Pit Log TP-14



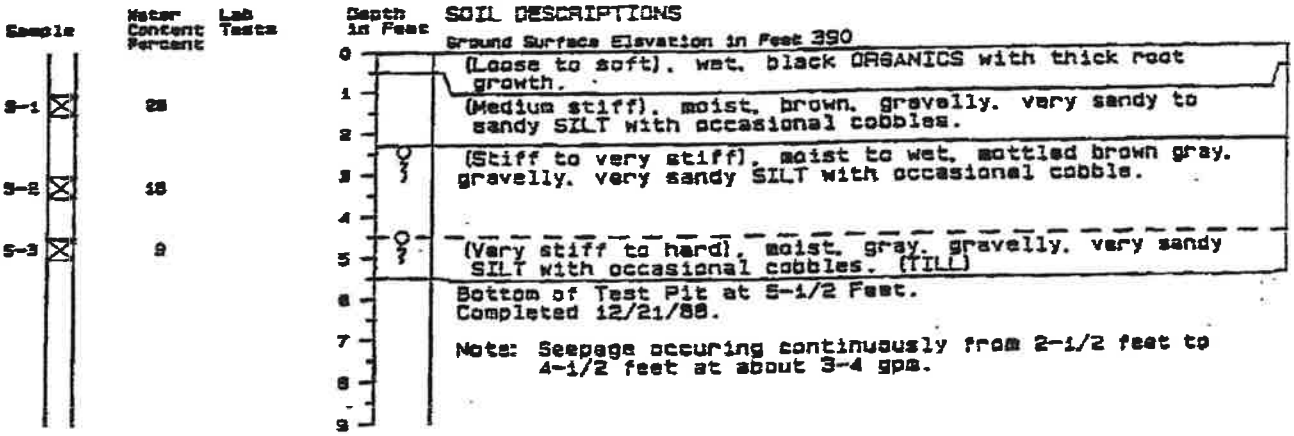
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-6

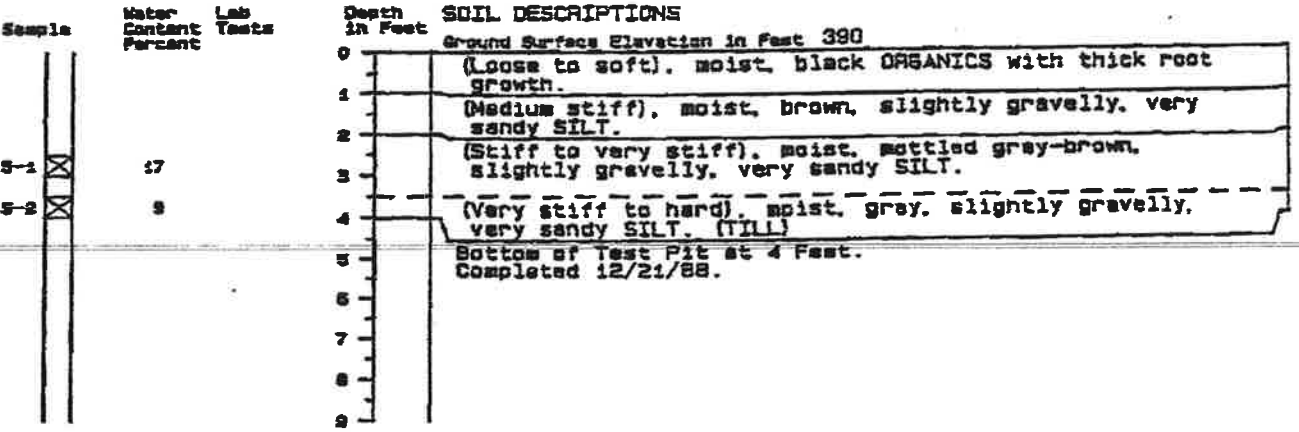
CE2966



Test Pit Log TP-16



Test Pit Log TP-17

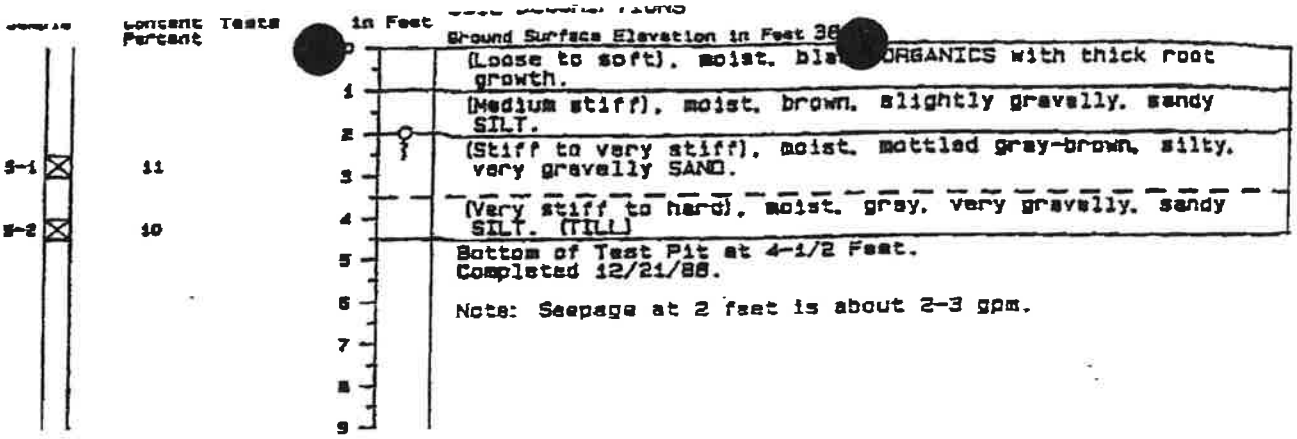


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

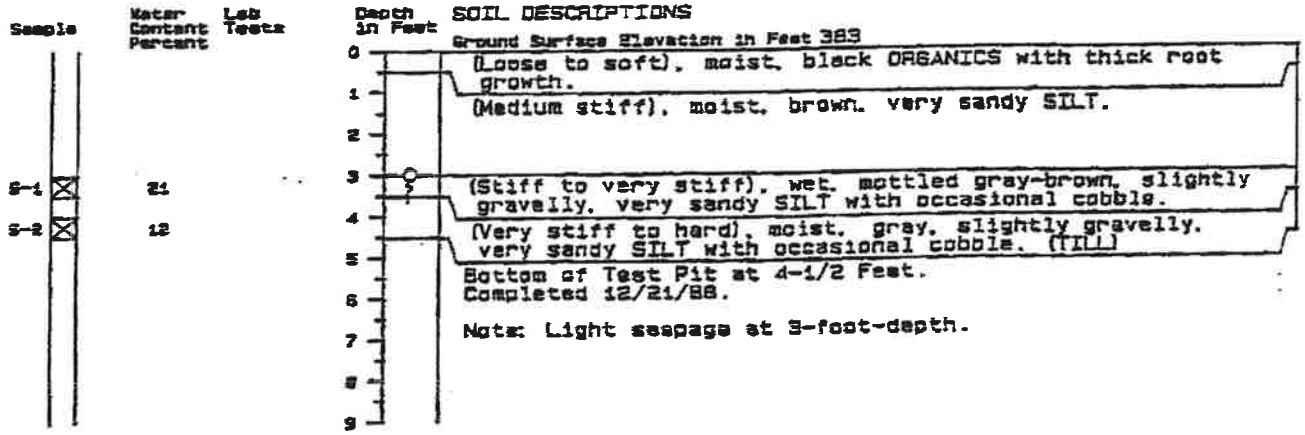
J-2306 December 1988
HART-CROWSER & associates, inc
Figure A-7

CE2967

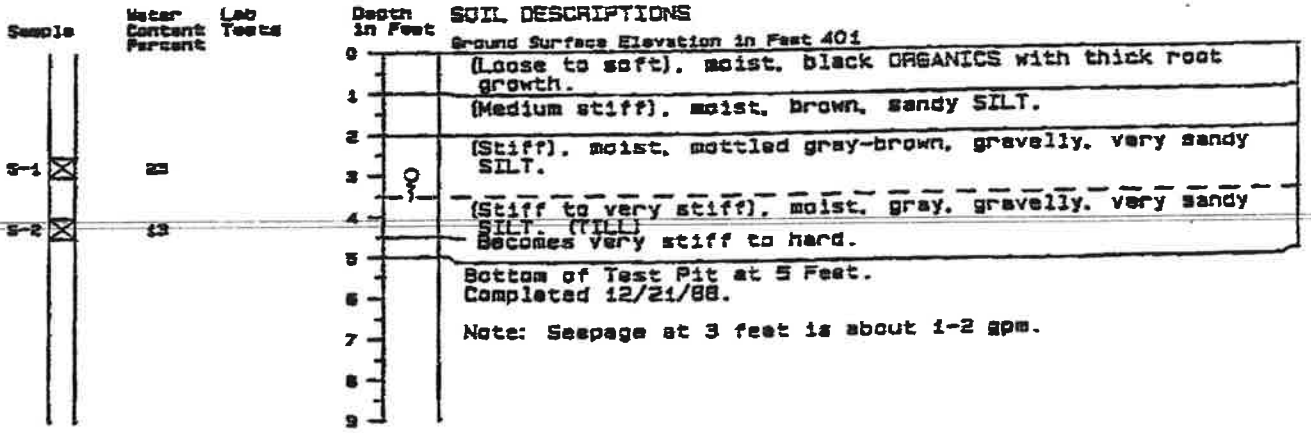
US-CE2967



Test Pit Log TP-19



Test Pit Log TP-20

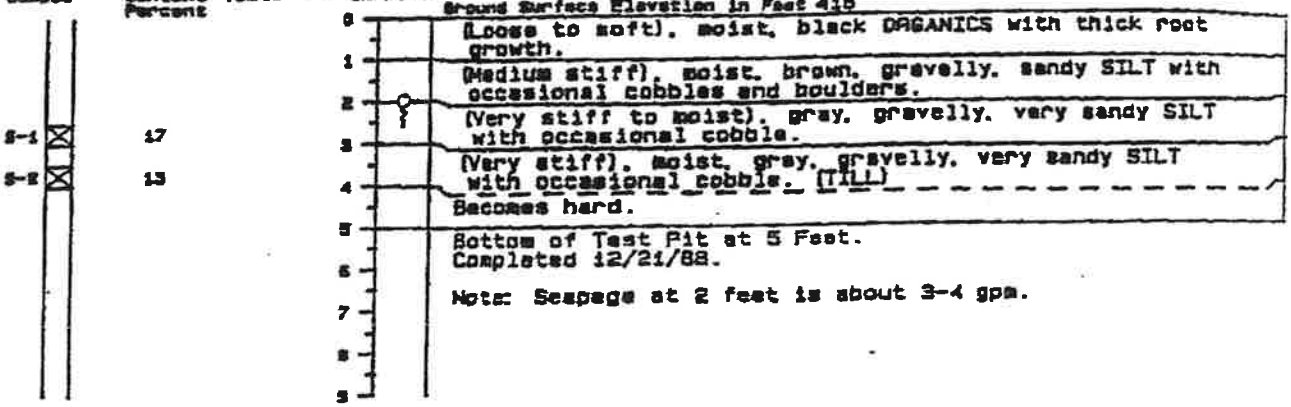


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-8

CE2968

US-CE2968



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2306 December 1988
HART-CROWSER & associates, inc.
Figure A-9

Table A.1. Summary of Results of Shovel Probe Testing (UTM Zone 10T WGS84 Datum, 50-cm-Diameter Units)

STP	Elevation (Feet)	UTM	Depth (cm below surface)	Sediment Description	Interpretation
1	127.06	5310451N, 553573.3E	0–26	10YR3/4, dark yellowish brown sandy loam with woody organics and small rounded gravels	Wet forest soils with bark and chipped wood suggesting disturbance from logging activity
			26–35	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles.	Alderwood-Everett series glacial till
2	124.08	5310478N, 553579.2E	0–9	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			9–37	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			37–52	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
3	119.98	5310510N, 553577.6E	0–10	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			10–50	2.5Y5/3 light olive sand/silt with rounded gravels. Fist-sized cobbles in upper 10-20 cm, only small rounded gravels below	Alderwood-Everett series glacial till
4	117.76	5310545N, 553575.6E	0–38	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Wet forest soil
			38–48	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
5	112.07	5310572N, 553559.5E	0–15	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			15–51	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			51–61	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
6	108.23	5310647N, 553529.7E	0–8	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			8–24	2.5Y5/3 light olive sand/silt with rounded gravels. Fist-sized cobbles in upper 10-20 cm, only small rounded gravels below	Alderwood-Everett series glacial till

STP	Elevation (Feet)	UTM	Depth (cm below surface)	Sediment Description	Interpretation
7	134.36	5310379N, 553550.2E	0–18	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			18–32	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
8	134.53	5310369N, 553529.5E	0–20	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Wet forest soil
			20–50	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles. At 30-40 cmbs, a rotting root or burned log was on the north wall. Unit terminated at dense cobbles	Alderwood-Everett series glacial till
9	132.39	5310360N, 553507.3E	0–32	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
10	133.28	5310366N, 553482.4E	0–9	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			9–43	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			43–57	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
11	134.83	5310368N, 553457.6E	0–8	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			8–54	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			54–61	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
12	134.21	5310343N, 553424.7E	0–6	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			6–34	10YR4/3 brown sand/silt loam with rounded gravels and cobbles. At 10-20 cmbs, charred wood, charcoal	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			34–40	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till

STP	Elevation (Feet)	UTM	Depth (cm below surface)	Sediment Description	Interpretation
13	132.52	5310314N, 553418.8E	0–10	10YR3/4, dark yellowish brown sandy loam with rooty organics and small rounded gravels	Shallow wet forest soil
			10–41	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			41–55	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
14	129.34	5310306N, 553383.0E	0–22	10YR4/3 brown sand/silt loam with rounded gravels and cobbles	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			22–40	2.5Y5/3 light olive sand/silt with rounded gravels and cobbles	Alderwood-Everett series glacial till
15	115.99	5310539.2N, 553525.7E	0–20	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			20–65	10YR4/3 dry, compact brown sand/silt loam with sub-rounded gravels and cobbles	Alderwood-Everett series glacial till
16	119.92	5310500.5N, 553553.45E	0–16	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			16–55	10YR4/3 dry, compact orange brown sand/silt loam with sub-rounded gravels and cobbles, small and med. Cobbles throughout, some mottling at upper edge	
17	130.42	5310408.5N, 553553.25E	0–3	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			3–38	10YR4/3 dry, compact orange brown sand/silt loam with small cobbles throughout	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			38–50	Light gray very compact sandy silt , small gravels	Alderwood-Everett series glacial till
18	130.64	5310388.5N, 553516.61E	0–12	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			12–49	10YR4/3 damp orange brown clay loam with small cobbles throughout	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			49–60	Light gray damp, very compact sandy silt , small gravels	Alderwood-Everett series glacial till
19	131.82	5310393.72N, 553473.28E	0–12	10YR3/4, dark yellowish brown silty loam with small rooty organics	

STP	Elevation (Feet)	UTM	Depth (cm below surface)	Sediment Description	Interpretation
19	131.82	5310393.72N, 553473.28E	12–51	10YR4/3 dry, compact orange brown sand/silt loam with small cobbles throughout	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			51–70	Light gray very compact sandy silt , small gravels	Alderwood-Everett series glacial till
20	119.36	5310509.42N, 553550.05E	0–12	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			12–39	10YR4/3 dry, compact orange brown sand/silt loam with small cobbles throughout	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			39–50	Light gray very compact sandy silt , small gravels	Alderwood-Everett series glacial till
21	112.05	5310590.48N, 553470.08E	0–6	10YR3/4, dark yellowish brown silty loam with small rooty organics	
			6–53	10YR4/3 dry, compact orange brown sand/silt loam with small cobbles throughout. Charcoal, evidence of burning	Mixture of Alderwood-Everett series glacial till and surface soil horizon and organic material
			53–65	Light gray compact sandy silt	Alderwood-Everett series glacial till

Table A.2. Summary of Results of Backhoe Soil Test Pits (UTM Zone 10T WGS84 Datum)

SP	Length (m), Direction	Width (m), Direction	Depth (cm below surface)	Sediment Description
1	3.5 E/W	2.2 N/S	0–35	Dark brown loam with rooty organics
			35–90	Orange-brown glacial till, mottled with upper and lower strats at respective depths
			90–180	Compact light gray sandy loam
2	4.5 N/S	2.2 E/W	0–5	Dark brown loam with rooty organics
			5–72	Orange-brown glacial till, mottled with upper and lower strats at respective depths
			72–160	Compact light gray sandy loam
3	4.4 E/W	2.2 N/S	0–14	Dark brown loam with rooty organics
			14–90	Orange-brown glacial till, mottled with upper and lower strats at respective depths
			90–200	Compact light gray sandy loam
4	4.3 E/W	2.2 N/S	0–7	Dark brown loam with rooty organics
			7–75	Orange-brown glacial till
			75–220	Compact light gray sandy loam

Appendix B

Laboratory Test Results

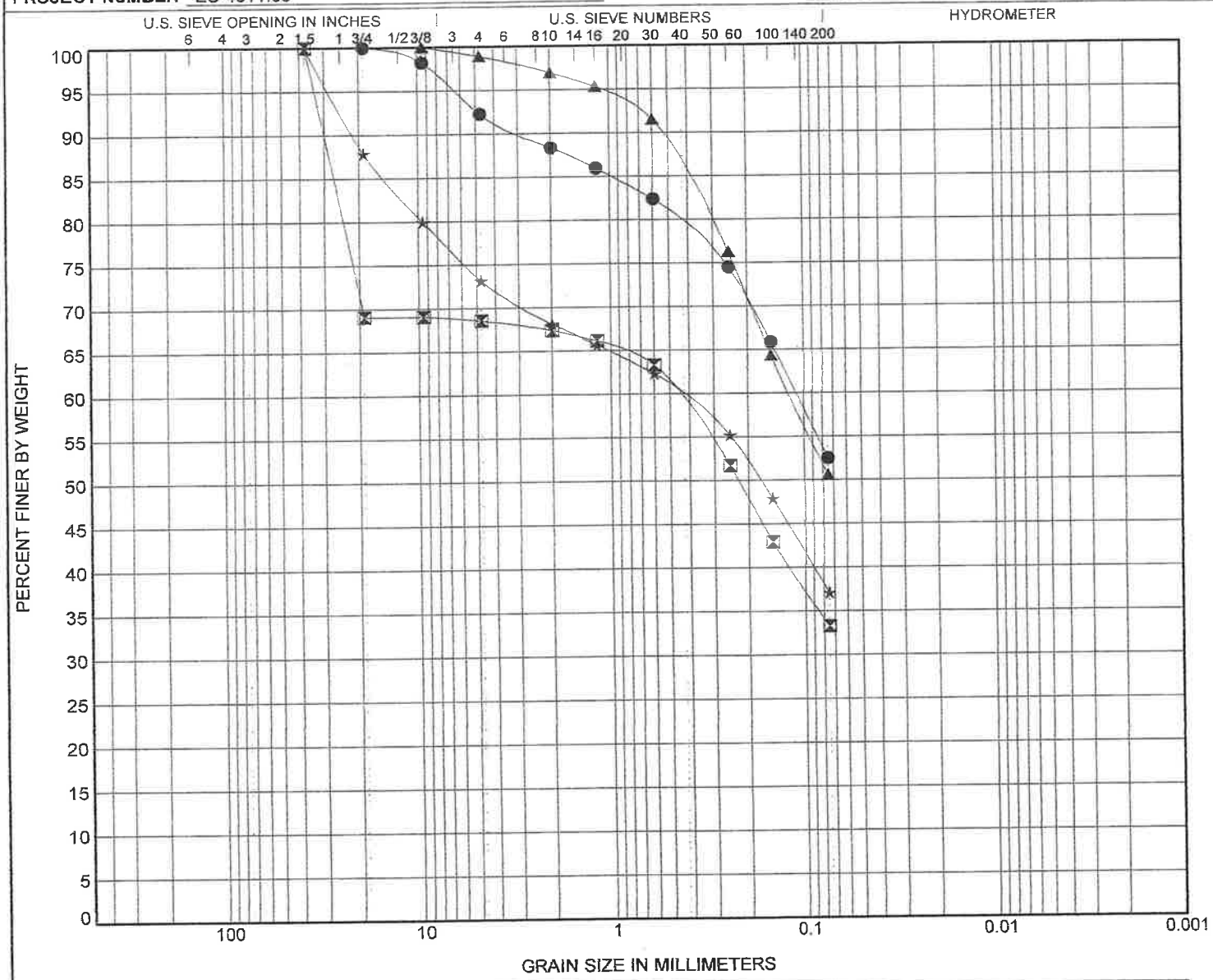
ES-4011.03

GRAIN SIZE DISTRIBUTION

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, WA 98005
Telephone: 425-284-3300

CLIENT Veritas Construction Inc **PROJECT NAME** Soundview Business Park

PROJECT NUMBER ES-4011.03 **PROJECT LOCATION** Everett



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	B-4	25.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: Sandy ML.		
⊠	B-5	5.00ft.	USDA: Gray Gravelly Fine Sandy Loam. USCS: SM with Gravel.		
▲	B-5	15.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: Sandy ML.		
★	B-5	30.00ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	B-4	25.0ft.	19	0.111						52.5	
⊠	B-5	5.0ft.	37.5	0.468						33.3	
▲	B-5	15.0ft.	9.5	0.121						50.6	
★	B-5	30.0ft.	37.5	0.451						37.1	

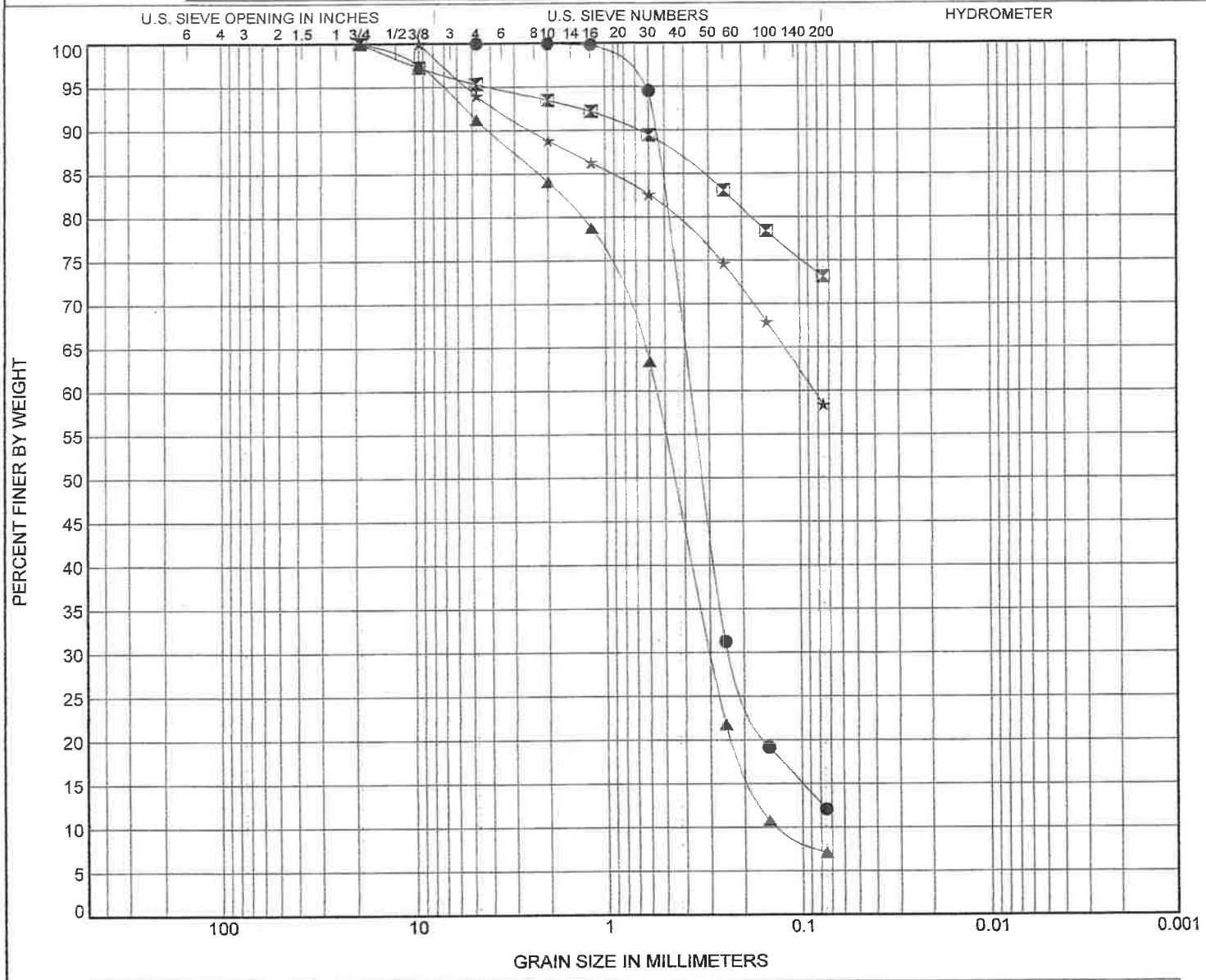
GRAIN SIZE USDA ES-4011.03.GPJ GINT US LAB.GDT 4/26/16

GRAIN SIZE DISTRIBUTION

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, WA 98005
Telephone: 425-284-3300

CLIENT Veritas Construction Inc **PROJECT NAME** Soundview Business Park

PROJECT NUMBER ES-4011.03 **PROJECT LOCATION** Everett



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	B-1	25.00ft.	USDA: Gray Slightly Gravelly Sand. USCS: SM.	2.46	6.07
⊠	B-2	10.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: ML with Sand.		
▲	B-2	50.00ft.	USDA: Gray Gravelly Sand. USCS: SP-SM.	1.22	4.34
★	B-3	15.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: Sandy ML.		

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	B-1	25.0ft.	4.75	0.372	0.237					12.1	
⊠	B-2	10.0ft.	19							73.1	
▲	B-2	50.0ft.	19	0.559	0.297	0.129				7.2	
★	B-3	15.0ft.	9.5	0.084						58.4	

GRAIN SIZE USDA ES-4011.03.GPJ GINT US LAB.GDT 4/26/16

Report Distribution

ES-4011.03

EMAIL ONLY

Veritas Construction Inc.
22819 Woodway Park Road
Woodway, Washington 98020

Attention: Ms. Ashley Previs