GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, Washington 98424 | 253.896.1011 | www. georesources.rocks

September 5, 2023

Discovery Materials, LLC
PO Box 68697
Seattle, WA 98168-0697

Attn: Mr. Logan Davidson
logan.d@scarsellabros.com
(206) 741-3612

RECEIVED
September 5, 2023
Washington Geological Survey

Revised Geotechnical Report
Discovery Bay Pit Reclamation Plan
Jefferson County, Washington
PN: 902133005
Doc ID: DiscoveryMaterials.Hwy101.RG02

INTRODUCTION

This revised geotechnical report summarizes our site observations, our review of subsurface explorations by others, our review of the preliminary reclamation grading provided by you, our analyses, and provides geotechnical recommendations for the proposed reclamation grading operations at the subject site. Additionally, we have revised this report to include a brief discussion of the mapped "moderate" landslide hazard at the site, as requested by Jefferson County staff. The general location of the site is shown on the attached Site Location Map, Figure 1.

SCOPE

The purpose of our services was to review the available data for the site area relative to the surface and subsurface conditions at the site, as a basis for providing geotechnical conclusions regarding the reclamation of the surface mine. Specifically, our scope of services for the project included the following:

1. Reviewing the available geologic, hydrogeologic and geotechnical data for the site area including the previous geotechnical and hydrologic data far the site;
2. Describing surface and subsurface conditions, including soil type, depth to groundwater, and an estimate of seasonal high groundwater levels;
3. Addressing the DNR Reclamation requirements for the proposed site grading;
4. Addressing portions of Jefferson County Code, Chapter 18.22.510 for landslide hazards;
5. Providing geotechnical conclusions and recommendations regarding earthwork and grading activities including site preparation, subgrade preparation, fill placement criteria, suitability of on-site soils for use as structural fill, temporary and permanent cut and fill slopes, drainage and erosion control measures;
6. Preparing this *Geotechnical Report.*

SITE CONDITIONS

Literature Review

We reviewed the *Geotechnical engineering Investigation Report, Proposed M&E Trucking Pit Expansion, Jefferson County, Washington* prepared by Krazan & Associates, Inc (KAI) dated April 10, 2003. The KAI report included the descriptive logs of nine test pits excavated to depths of 12 to 17 feet below the existing ground surface. The 2003 KAI report is included in Appendix A.

Surface Conditions

The Discovery Pit is located at an unaddressed parcel along Washington State Highway 101 in the Maynard area of Jefferson County, Washington. The site is generally rectangular in shape and encompasses about 23 acres. The site is bounded by undeveloped property to the west and north, by undeveloped property and a WSDOT maintenance facility to the east, and by Hwy 101 to the south.

The site generally slopes down to the southeast to southwest and broadly consists of two local topographic high points separated by a drainage swale. Vertical relief across the site is on the order of 200 to 220 vertical feet. The lowest, southern portion of the site, in the location of the former and present mining operations, generally consists of a level topographic low.

Vegetation has largely been removed from the active operation area, while the remaining northern portion of the site is well vegetated with mature to sub mature forest of species typical for the area. The existing site conditions and topography are shown on the attached Site Vicinity Map, Figure 2. Proposed reclamation grading is shown on Figure 3.

Site Soils

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey maps the northeast corner of the site as being underlain by Hoypus gravelly sandy loam (HvC), the remaining northern portion of the site as being underlain by Clallam gravelly sandy loam (CmD), and the southern portion of the site as being underlain by Hoypus gravelly loamy sand (HuD).

An excerpt of the NRCS soils map for the site area is included as Figure 4, and detailed descriptions of the soils are included below.

- *Hoypus gravelly sandy loam (HvC)*: The Hoypus soils are derived from glacial outwash, from on slopes of 0 to 15 percent, are listed as having a “moderate” erosion hazard, and are included in hydrologic soils group A.
- *Hoypus gravelly sandy loam (HuC)*: The Hoypus soils are derived from glacial outwash, from on slopes of 15 to 30 percent, are listed as having a “severe” erosion hazard, and are included in hydrologic soils group A.
- *Clallam gravelly sandy loam (CmD)*: The Clallam soils are derived from basal till, from on slopes of 15 to 30 percent, are listed as having a “severe” erosion hazard, and are included in hydrologic soils group D.

Site Geology

According to the *Geologic Map of the Port Townsend South and Part of the Port Townsend North 7.5-Minute Quadrangles, Jefferson County, Washington* (Schasse & Slaughter, 2005), the site is in an area underlain by modified land (Qml), recessional outwash delta deposits (Qgo_d), lodgment till (Qgt), and advance outwash (Qga). The modified land was created by anthropogenic activity in the

current Holocene epoch, while the remaining geologic units were generally deposited during the most recent Vashon Stade of the Fraser Glaciation, some 12,000 to 15,000 years ago. An excerpt of the above reference geologic map is attached as Figure 5, and descriptions of the geologic units are included below.

- *Modified Land (Qml)*: This designation encompasses all soil, sediment, or other earth material locally reworked by anthropogenic means including excavation or redistribution for the purpose of modifying topography.
- *Recessional Outwash-delta deposits (Qgo_d)*: Outwash deposits typically consist of a poorly sorted, lightly stratified mixture of sand and gravel that may locally contain silt or clay. Recessional outwash was deposited by meltwater streams issuing from the receding continental ice mass and are considered normally consolidated. Accordingly, they typically offer moderate strength and compressibility characteristics. Infiltration is generally favorable, depending on grain size.
- *Lodgment Till (Qgt)*: Lodgment till typically consists of a heterogeneous mixture of clay, silt, and sand, and gravel that was deposited at the base of the prehistoric continental glacial ice mass and was subsequently over-ridden. As such, glacial till is considered over-consolidated and exhibits high strength and low compressibility characteristics where undisturbed.
- *Advance Outwash (Qga)*: Advance outwash typically consist of poorly to well stratified sand and gravels with local deposits of silt and clay that were deposited during the advance of the continental ice sheet during the Vashon Stade of the Fraser Glaciation. These soils are typically encountered in a dense to very dense condition, as they are generally overridden by the base of the continental ice sheet during its advancement south. Thus, these deposits are considered overconsolidated and exhibit high strength and low compressibility characteristics where undisturbed. Infiltration characteristics are generally favorable.

Subsurface Conditions

We have not performed any site specific subsurface explorations on the site as part of our current scope of work. Instead, we have visited the site, reviewed published geologic literature as described above, and have reviewed available water well logs available on the Washington State Department of Ecology (Ecology) Well Report Viewer.

The subsurface exploration logs generally confirmed the mapped stratigraphy; outwash mantling dense to very dense glacial till soils. At depths of about 30 to 40 feet below grades, the glacial till was underlain by what was described as coarse gravels, that we interpret to be advance outwash.

Groundwater Conditions

Based on a review of the KAI exploration logs, it appears that shallow perched groundwater was encountered in the upper 10 feet of soils in the northwest portion of the site. The available DOE water well reports include a residential well drilled in April 1996 south of the site at an approximate surface elevation of 20 feet, and a commercial well drilled in August 1977 east of the site at an approximate elevation of 100 feet. These well reports indicate groundwater was encountered south of the site across Highway 101 at depths of approximately 40 to 50 feet below existing grade in the advance outwash soils and was not encountered within the recessional soils and underlying bedrock to the east of the site. Copies of the water well reports are included in Appendix B of this report.

Based on the above, it is our opinion that the groundwater described in the KAI exploration logs is likely perched within the recessional outwash atop the dense glacial till, and that static groundwater is at approximately Elevation -30 to -20 feet MSL. We anticipate that static groundwater levels are present at the contact between the glacial soils and the underlying bedrock, and that the groundwater fluctuates with the wet and dry season.

ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Based on our assessment, the proposed reclamation plan appears feasible from a geological and geotechnical engineering standpoint. The following sections provide additional comments and recommendations for reclamation.

Geologically Hazardous Areas – per Jefferson County Code Chapter 18.22.510

Jefferson County Title 18.22.510 defines geologically hazardous areas based on the following classification/designation:

(1) The following are geologically hazardous areas and subject to the standards of this article when mapped as high or moderate geologically hazardous areas:
   A. Erosion hazard areas (as defined in JCC 18.10.050).
      (i) “Erosion hazard areas” has the same meaning as in WAC 365-190-030(5). "Erosion hazard areas" are those areas containing soils which, according to the United States Department of Agriculture Natural Resources Conservation Service Soil Survey Program, may experience significant erosion. Erosion hazard areas also include coastal erosion-prone areas and channel migration zones.
   B. Landslide hazard areas (as defined in JCC 18.10.120). Landslide hazard areas include any areas susceptible to landslide because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors, as follows:
      (i) Areas of historic failures, such as:
         (A) Areas delineated by United States Department of Agriculture, Natural Resources Conservation Service as having a significant limitation for building site development;
         (B) Coastal areas mapped by the Washington Department of Ecology Coastal Atlas as unstable, unstable old slides, and unstable recent slides; or
         (C) Areas designated and mapped as quaternary slumps, earthflows, mudflows, lahars, or landslide hazards by the Washington Department of Natural Resources or the United States Geological Survey.
      (ii) Areas where all three of the following conditions occur:
         (A) Slopes are steeper than 15 percent;
         (B) Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
         (C) Spring or groundwater seepage.
      (iii) Areas that have shown movement during the Holocene epoch (from 10,000 years ago to present) or have been underlain or covered by mass wastage debris of this epoch.

(iv) Areas with slopes that are parallel or subparallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials.
(v) Areas with slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking.
(vi) Areas that are potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action, including stream channel migration zones.
(vii) Areas that show evidence of, or are at risk from, snow avalanches.
(viii) Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.
(ix) Areas with a slope of 40 percent or steeper and with a vertical relief of 10 or more feet, except areas composed of bedrock.

Landslide Hazard Areas

According to the Jefferson County Landslide Hazard Map, the majority of the site is mapped as a "slight" landslide hazard with the eastern portion of the site being mapped as a "moderate" landslide hazard. An excerpt of the County Landslide Hazard Map for the site area is included as Figure 6.

The *Geologic Map of the Port Townsend South and Part of the Port Townsend North 7.5-minute Quadrangle, Jefferson, Washington* (Schassse, Slaughter 2005) does not map a landslide deposit or mass wasting deposit on or within the site vicinity. We also reviewed the Washington State Department of Ecology Coastal Atlas which maps the southern portion of the site as being "unstable" and the northern portion of the site as having "intermediate" slope stability. No areas on or within the site vicinity are mapped as being "unstable (old slide)" or "unstable (recent slide)". An excerpt of the DOE Coastal Atlas map is included as Figure 7. Slopes steeper than 15 percent are mapped and were observed at the site. The *Geotechnical engineering Investigation Report* prepared by KAI (2003) indicates portions of the site consist of outwash gravel overlying glacial till. This stratigraphic relationship may constitute and adverse geologic contact. However, it appears the thickness and extent of the outwash gravel is somewhat limited across the site. We do not interpret the site, nor does the published map suggest, to have slopes that are parallel or subparallel to planes of weakness. The site is located approximately 500 feet from the shoreline. We do not interpret the site to be at risk of snow avalanches. There are slopes steeper than 40 percent with 10 feet or more of vertical relief at the site.

The site has several of the above listed indicators of a landslide hazard area as defined by Jefferson County Code 18.22.510. Slope stability analyses in the *Geotechnical engineering Investigation Report* prepared by KAI (2003) indicated the site is generally globally stable for the proposed configuration. Revised reclamation grading, as shown on Figure 3, will significantly reduce the steepness, length, and vertical height of proposed reclamation slopes compared to those analyzed by KAI. Additionally, we anticipate that initial aggregate extraction will target the shallow loose to medium dense outwash soils at the site, effectively removing those soils that are more susceptible to downslope movement and exposing intact glacially consolidated soils. Provided DNR surface mining reclamation best management practices are adhered to, it is our opinion that the proposed mining and reclamation grading can be accomplished without increasing the likelihood of landslide events on or adjacent to the site. Accordingly, no prescriptive buffers related to landslide hazards should be required by Jefferson County.

Groundwater Quality and Quantity

No logs or reports of subsurface explorations or water wells that extend significantly below the apparent glacial till aquitard are available within the proposed mining limits. Accordingly, the elevation and characteristics of the aquifer(s) that potentially underlie the proposed mining limits should be considered unknown. Based on a review of the KAI exploration logs and available DOE water well reports from adjacent sites, we anticipate that groundwater encountered within the planned mining depth would be seasonal in nature and would consist of a shallow, unconfined groundwater table perched atop the dense glacial till that underlies portions of the site. It is likely that this groundwater table is discontinuous across the proposed mining limits, and variation should be expected both as mining progresses and with seasonality.

As stated, the proposed expansion area appears to be underlain by a dense glacial till aquitard that limits infiltration to the current lower elevations of the site. We expect that aggregate extraction operations will remove most of the glacial till aquitard within the proposed expansion area, resulting in a temporary net increase to local groundwater recharge while mining operations are underway. Provided stormwater management regulations and best management practices are adhered to as anticipated, we assess the likelihood of impacts to groundwater quality during extraction operations as low to very low. Additionally, establishment of and adherence to a clean backfill policy letter should be sufficient to mitigate potential impacts to groundwater quality during reclamation and for the reclaimed site condition.

We expect that reclamation of the site and return to a forested condition will generally return the site to a similar groundwater recharge scenario as the undisturbed condition. Explorations performed as part of the 2003 KAI report encountered glacial till with fines contents that ranged from about 16 to 40 percent in three of the nine test pit locations. The remaining six explorations encountered soils in a dense to very dense condition that we interpret to be glacially consolidated. As such, the permeability of the onsite soils in their native condition should be considered relatively low. Precipitation not utilized by the proposed vegetation on the site will likely be routed to the permanent stormwater facility, allowing for limited infiltration to occur within the lower elevations of the site, generally consistent with the current site condition. This assumes that reclamation fill consists of generally low permeability material that is well compacted in accordance with the guidelines contained in this report. Deviations of the reclamation fill material from these assumptions could result in significant variation of future groundwater recharge impacts.

If static groundwater is encountered within the approved mining depth, extraction operations should be suspended, and the design team should be notified immediately. This will allow for additional analysis, appropriate amendment of the mining plan and permit documents, and notification to jurisdictions having authority.

Final Reclamation

The current site zoning is rural residential (RR-20), limiting future development to one dwelling unit per 20 acres. Accordingly, it appears feasible that the proposed reclamation will allow for future development in accordance with the current requirements of the RR-20 zoning and with considerations for setbacks from slopes. Provided the reclamation fill is placed and compacted in accordance with the recommendations below, International Building Code (IBC) presumptive design criteria should be applicable for use in design of proposed residential structures. However, a post-reclamation, site-specific geotechnical engineering assessment should be completed prior to issuance of building permits in order to verify both the density and quality of the reclamation fill.

Temporary Slopes

Temporary cut slopes will be necessary during extraction and reclamation operations. Surface drainage should be directed away from all temporary and permanent slope faces, including active working faces.

As a general guide, temporary slopes of ¾H:1V (horizontal to vertical) or flatter may be used for temporary cuts in the dense glacial till soils. Where outwash soils are present, we recommend temporary slopes do not exceed 1H:1V. These guidelines assume that the temporary cut slopes will not exceed 50 feet in height, and that all surface loads are kept a minimum distance of at least one half the depth of the cut away from the top of the slope. In addition, the slope inclination should be flattened where seepage occurs on the slope face and drainage should be provided to prevent erosion.

Permanent Slopes

Permanent slopes in cut or fill soils should not exceed 2H:1V unless supported by site-specific analysis and design. Permanent slopes should blend with the surrounding topography to the extent possible and should avoid rectilinear features. We recommend that permanent slopes not exceed vertical heights of 50 feet without providing a topographic break with a minimum width of 6 feet. Based on our discussion with you, this minimum width will be exceeded because of the size of earthmoving equipment expected on site. All final grades should be capped with topsoil or amended soils and should be seeded as soon as practical to facilitate the development of a protective vegetative cover or otherwise protected. DNR best management practices should be followed with respect to replacing topsoil and subsoil at the site.

Reclamation Fill

Reclamation fill should consist of non-organic earth materials free of debris and deleterious material. The organic content of reclamation fill should be less that 3 percent by weight. Earth materials may be blended to reduce organic content to acceptable levels, provided appropriate laboratory analyses verify blending results. We anticipate that reclamation fill may consist of on-site materials and material imported from offsite. Material imported from offsite should adhere to a clean backfill policy established for the surface mine.

All earth fill material associated with reclamation grading should be placed in horizontal lifts of appropriate thickness to allow adequate and uniform compaction of each lift. For planning purposes, 12-inch loose lifts are typically appropriate for single- and double-drum vibratory roller compaction equipment. Track walking or compaction with conventional earth working equipment generally does not provide sufficient compaction on thicker lifts, and as such may require individual lifts be limited to 4- to 6-inch loose lifts. Lift thickness should be evaluated and adjusted as appropriate by the supervising geotechnical engineer at the time of placement. Reclamation fill should be compacted to at least 90 percent of MDD (maximum dry density as determined in accordance with ASTM D-1557).

The suitability of material for use as reclamation fill during wet weather will depend on the gradation and moisture content of the soil. As the amount of fines (material passing US No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. It will be necessary to wait for dry weather conditions where these soils are present. In general, soils suitable for placement in

wet conditions will have a fines content of 5 percent or less. If prolonged dry weather prevails during the earthwork activities, higher fines content (up to 10 to 12 percent) may be acceptable. Extended periods of dry weather may require the addition of moisture to achieve the desired compaction.

We expect the outwash soils will be extracted from the site, leaving only glacial till soils for use as reclamation fill. The native glacial till soils on the site generally contain a fines content that generally ranges from approximately 15 to more than 40 percent. These soils should be considered moisture sensitive and will be difficult or impossible to compact during wet weather or where seepage is present. Blending of the soils may be required prior to placement.

Quality Assurance

Quality assurance density testing by nuclear methods in general accordance with ASTM D-6938 should be performed by an appropriately qualified professional and reviewed by the supervising geotechnical engineer during reclamation grading. We recommend that testing is completed at intervals of approximately 1 to 3 tests per acre of fill and a minimum of every 10 vertical feet.

Earth materials imported from offsite to be used as reclamation fill should be sampled to determine MDD at a minimum of one soil sample for every 500 cubic yards. On-site material used as reclamation fill may be sampled initially and that MDD value may be used until deviation is observed. Blending of materials is inevitable during reclamation operations. Accordingly, additional sampling should be completed at the direction of the supervising geotechnical engineer.

The moisture content of reclamation fill should be monitored, and excessively moist soils should be placed aside and aerated until the moisture content is generally within 4 percent of optimum before placement is attempted. Moisture conditioning of soils over optimum moisture content should include aeration by the creation of wind rows.

Daily field reports should be provided that summarize the observations and testing of the supervising geotechnical engineering and their representatives. Upon completion of reclamation grading, a summary letter, prepared by the supervising geotechnical engineer should be provided that describes the testing program and summarizes deviations from the above recommendations.

LIMITATIONS

We have prepared this report for use by Discovery Materials, LLC and members of the permitting and reclamation design team. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on subsurface and groundwater data from others, and our limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions. No subsurface explorations were completed as part of this study.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We appreciate the opportunity to be of continued service to you on this project. If you have any questions or comments, please do not hesitate to call at your earliest convenience.

Respectfully submitted,
GeoResources, LLC

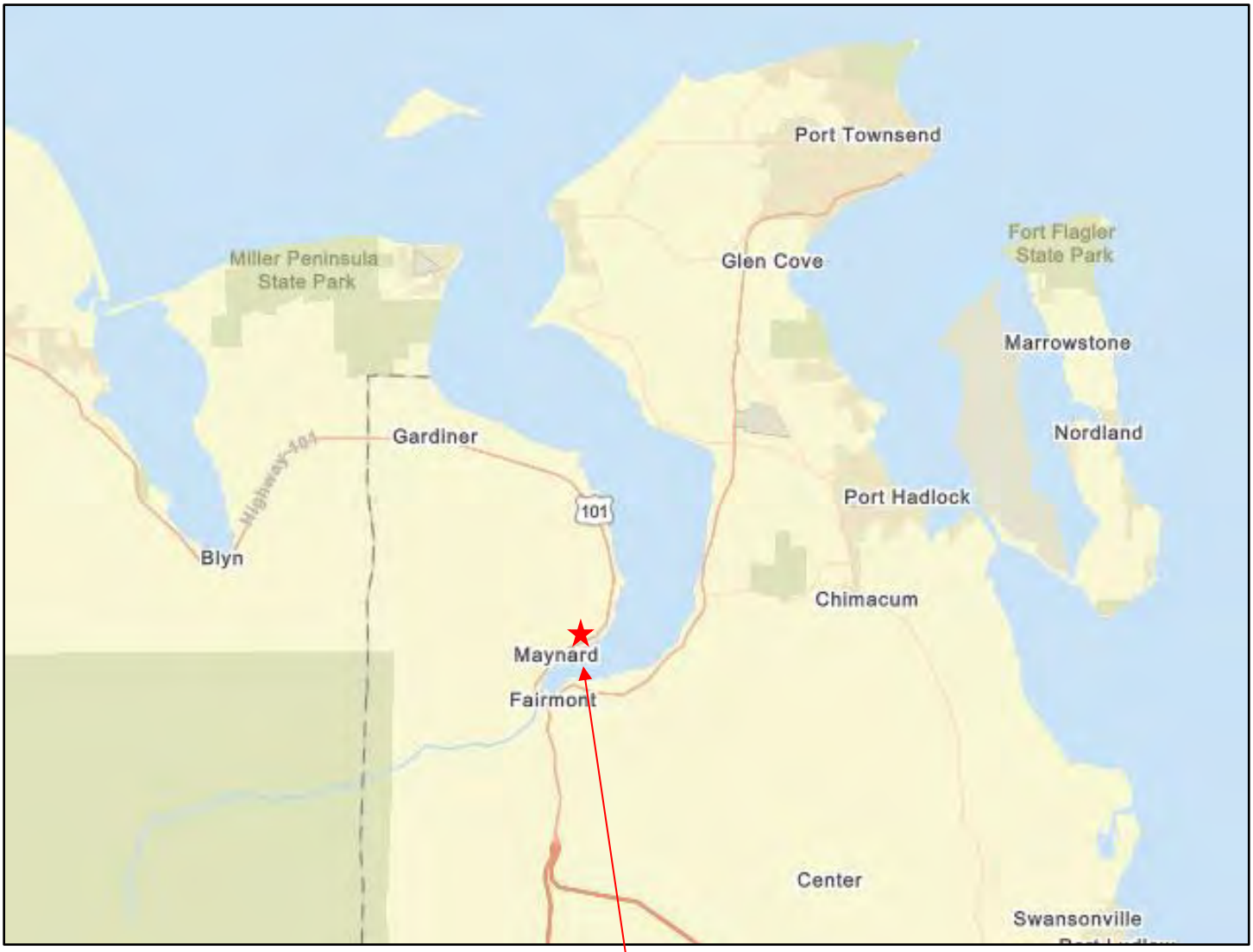
State of Washington
Engineering Geologist
3237
Licensed Geologist
9.5.23
Seth Taylor Mattos

Seth Mattos, LEG
Associate

KYLE EUGENE BILLINGSLEY
STATE OF WASHINGTON
56931
REGISTERED
PROFESSIONAL ENGINEER
9/5/2023

Kyle E. Billingsley, PE
Senior Geotechnical Engineer

STM:KEB/stm
Doc ID: DiscoveryMaterials.Hwy101.RG02.doc
Attachments:
Figure 1: Site Location Map
Figure 2: Site Vicinity Map
Figure 3: Proposed Reclamation Grading
Figure 4: NRCS Soils Map
Figure 5: Geologic Map
Figure 6: Jefferson County Landslide Hazard Map
Figure 7: DOE Coastal Atlas – Slope Stability
Appendix A – Previous Geotechnical Reports
Appendix B – Water Well Reports



Approximate Site Location

Map created from Jefferson County Public GIS (https://jeffcowa.maps.arcgis.com/apps/webappviewer/)

N W E S

Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www.georesources.rocks

Site Location Map

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

DocID: DiscoveryMaterials.Hwy101.F	September 2023	Figure 1

Approximate Site Location

Map created from Jefferson County Public GIS (https://jeffcowa.maps.arcgis.com/apps/webappviewer/)

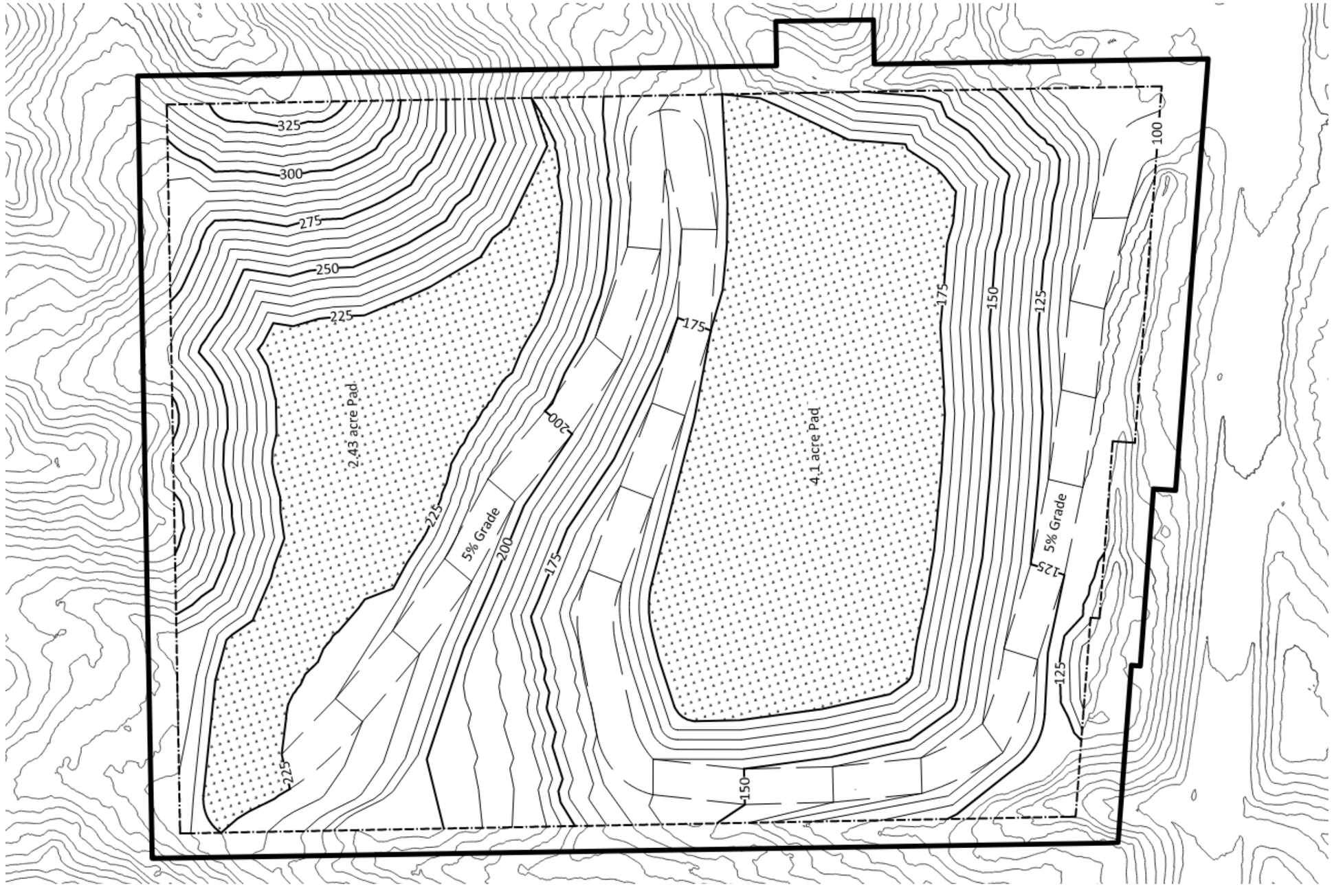
Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www. georesources.rocks

Site Vicinity Map

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

DocID: DiscoveryMaterials.Hwy101.F	September 2023	Figure 2



N
E
S
W

Proposed reclamation grading provided by Discovery Materials

Not to Scale

GEORESOURCES
earth science & geotechnical engineering

Proposed Reclamation Grading
Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

DocID: DiscoveryMaterials.Hwy101.F3	September 2023	Figure 3

Approximate Site Location

Map created from Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)

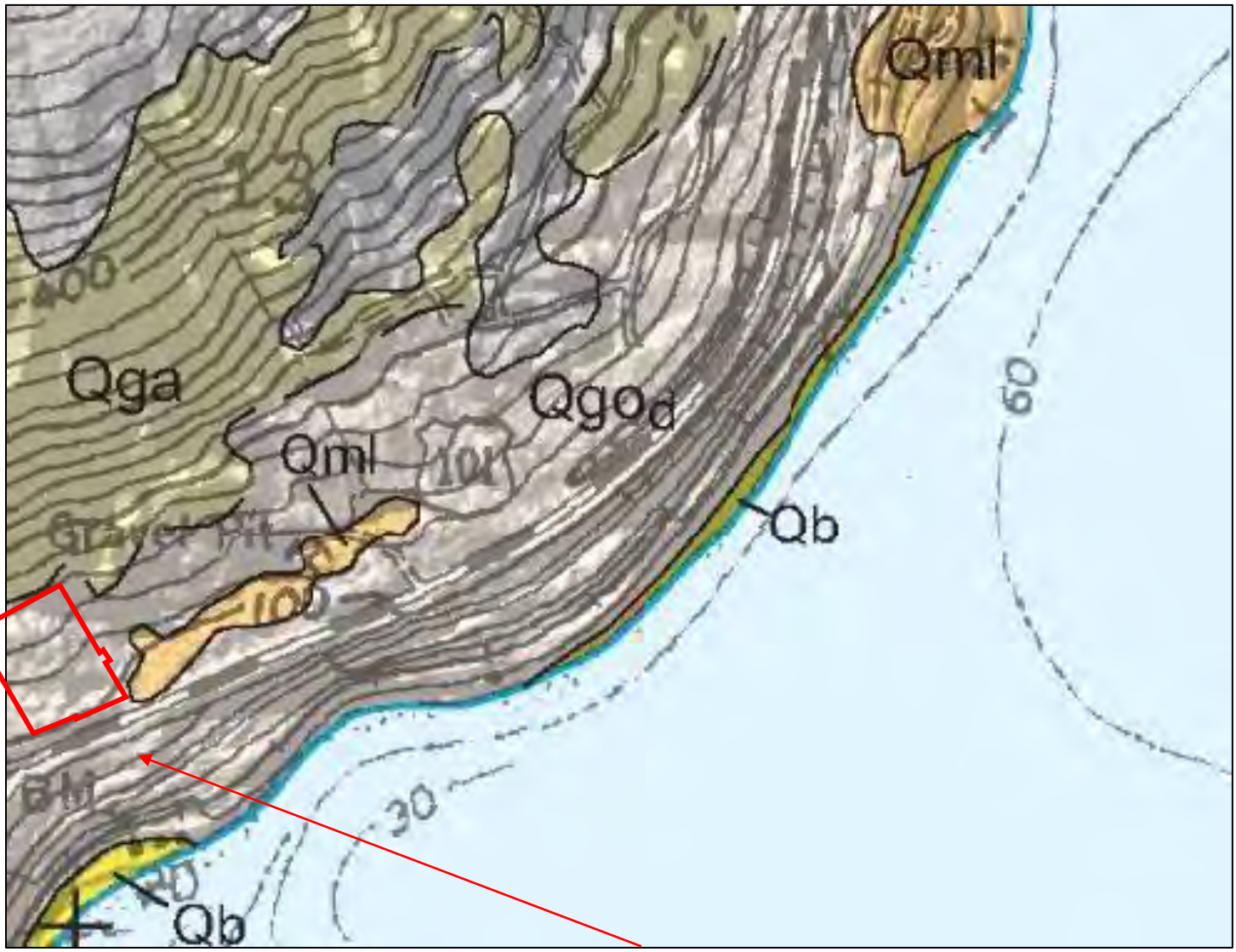
Soil Type	Soil Name	Parent Material	Slopes, %	Erosion Hazard	Hydrologic Soils Group
CmD	Callam gravelly sandy loam	Basal till	15 to 30	Severe	D
HuD	Hoypus gravelly loamy sand	Glacial outwash	15 to 30	Severe	A
HvC	Hoypus gravelly sandy loam	Glacial outwash	0 to 15	Moderate	A

Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www. georesources.rocks

NRCS Soils Map

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005



Approximate Site Location

An excerpt from The *Geologic Map of the Port Townsend South and Part of the Port Townsend North 7.5-Minute Quadrangles, Jefferson County, Washington* (Schasse & Slaughter, 2005)

Qml	Modified land
Qb	Beach Deposits
Qgo$_d$	Delta deposits
Qga	Advance outwash

Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www. georesources.rocks

Geologic Map

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

Approximate Site Location

Map created from Jefferson County Public GIS (https://jeffcowa.maps.arcgis.com/apps/webappviewer/)

Geohazard Areas

Landslide Hazard

- High
- Moderate
- Slight

N W E S

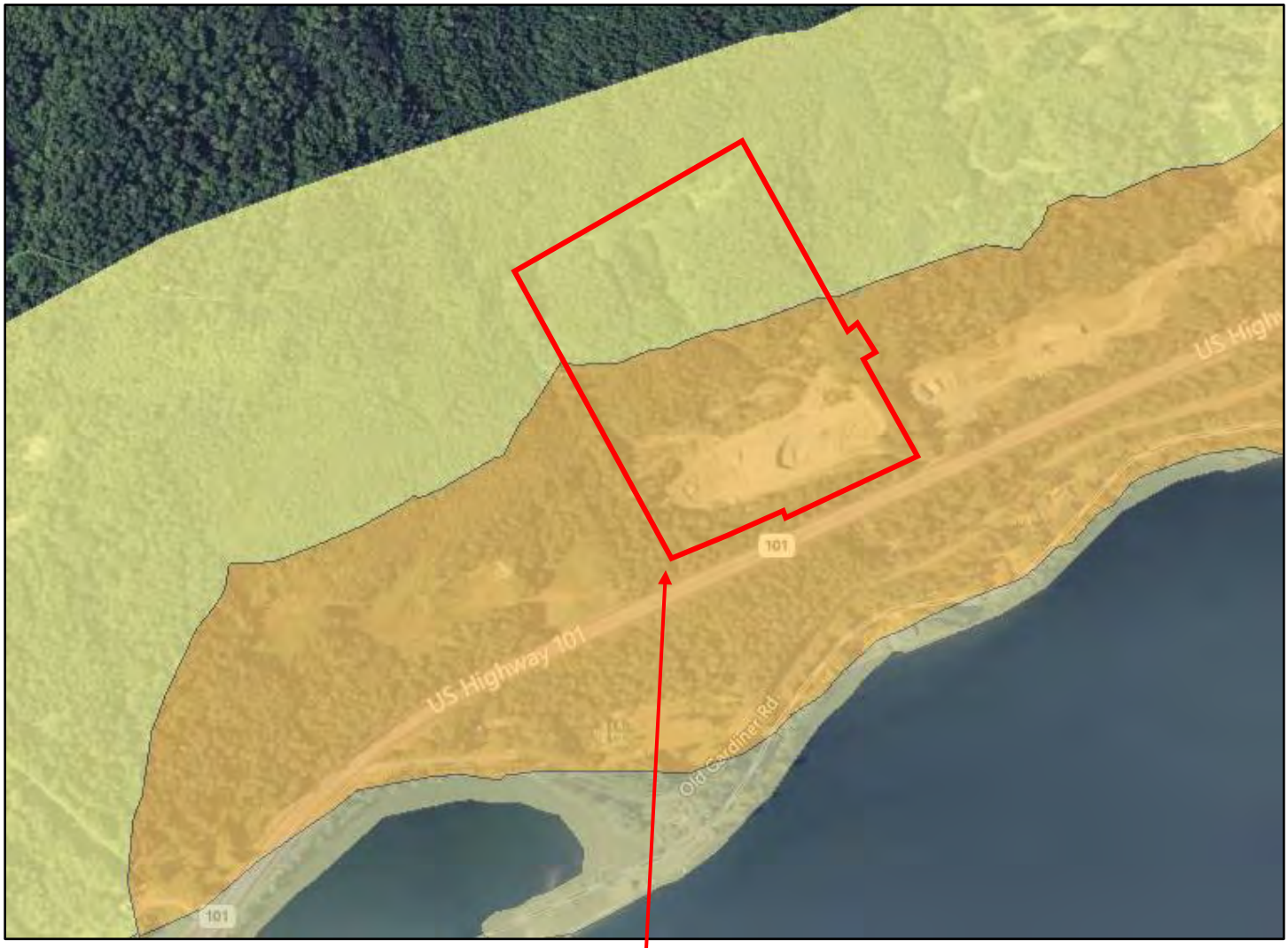
Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www.georesources.rocks

Jefferson County Landslide Hazard Map

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

DocID: DiscoveryMinerals.Hwy101.F	September 2023	Figure 6



Approximate Site Location

Map created from the Washington State Coastal Atlas Map
(https://fortress.wa.gov/ecy/coastalatlas/tools/Map.aspx)

Drift cells
- Divergence zone
- Left to right
- No appreciable drift
- Right to left
- Undefined

Slope stability
- Stable
- Intermediate
- Modified
- Unstable
- Unstable (old slide)
- Unstable (recent slide)

Not to Scale

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www. georesources.rocks

DOE Coastal Atlas – Slope Stability

Discovery Pit Reclamation
Jefferson County, Washington
PN: 90133005

Appendix A

Previous Geotechnical Reports

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT

PROPOSED M & E TRUCKING PIT EXPANSION
JEFFERSON COUNTY, WASHINGTON

JOB NUMBER 102-03020
APRIL 10, 2003

Prepared for:

M & E TRUCKING, INC.
ATTN: MR. MIKE GREEN
P.O. BOX 524
PORT HADLOCK, WASHINGTON 98339

Prepared by:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
20714 State Highway 305 NE, Suite 3C
Poulsbo, Washington 98370
(360) 598-2126

Krazan & ASSOCIATES, INC.
SITE DEVELOPMENT ENGINEERS

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

April 10, 2003

KA Project No. 102-03020

M & E Trucking, Inc.
Attn: Mr. Mike Green
P.O. Box 524
Port Hadlock, WA 98339

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

RE: GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
PROPOSED M & E TRUCKING PIT EXPANSION
JEFFERSON COUNTY, WASHINGTON

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the referenced project. The results of our investigation are presented in the attached report. This report presents the results of our field exploration, laboratory tests, and engineering analyses.

If you have any questions or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,

KRAZAN AND ASSOCIATES, INC.

Todd S. Parkington

Todd S. Parkington, P.E.
Senior Geotechnical Engineer

TSP/sew

TABLE OF CONTENTS

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

April 10, 2003

KA Project No. 102-03020

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
PROPOSED M & E TRUCKING PIT EXPANSION
JEFFERSON COUNTY, WASHINGTON

INTRODUCTION

This report contains the results of a site investigation performed by Krazan & Associates for the above referenced project.

SITE LOCATION

The project area is located on the west side of Discovery Bay near the south end. According to the United States Geological Survey (USGS), 7.5 minute Port Townsend South, Washington topographic quadrangle map, the property is located in the southeast quarter of Section 13, Township 29 North, Range 2 West, W.M. Latitude 48.003 degrees and at Longitude 122.871 degrees. The site location is shown on the Site Vicinity Map, Figure 1.

PROPOSED CONSTRUCTION

We understand that the proposed project consists of expanding the existing sand and gravel pit to the maximum extent possible within the existing property lines (see the Site Plan, Figure 2). The present pit occupies a portion of the south corner of the property. Storm water runoff will be directed to an infiltration system to be located near the east corner of the property. The infiltration system design has not been completed at this time.

In the event the proposed construction information detailed in this report is inconsistent with the final design, we should be notified so that we may update this writing as applicable.

PURPOSE & SCOPE

The purpose of the geotechnical investigation is to estimate the stability of slopes within the project area. Our scope of work was outlined in our proposal K&A Number PE02-220P, dated February 19, 2003 and includes the following items:

- Investigation of the soil and groundwater conditions by excavating 9 test pits. One of the test pits was excavated in the area of the proposed infiltration system. Groundwater measurements were taken during excavation.

- Perform laboratory tests appropriate to the soil conditions encountered. Tests for moisture content and grain size distribution were performed.

- Perform stability analysis on existing and final slope configurations. The slope stability analyses utilized static and seismic loading conditions.

- Preparation of this written report detailing our findings and conclusions.

Note that the proposal referenced above includes additional work regarding an aquifer recharge area, which will be addressed in a separate report.

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

SITE INVESTIGATION

SITE DESCRIPTION

The property is bounded by Highway 101 to the southeast, a Washington State Department of Transportation facility to the northeast, and undeveloped land to the northwest and southwest. Most of the site is currently forested with the existing small gravel pit at the south corner of the property. The site slopes up to the north with an overall grade of 20 to 25 percent and localized grades on natural slopes as steep as 100 percent. Areas within the active portion of the pit have near vertical grades on slopes 10 to 15 feet high.

GEOLOGIC SETTING

The Washington Division of Geology and Earth Resource (WDGER), Geologic Map of Washington - Northwest Quadrant, dated 2002, indicates that the property is located in an area identified as Undifferentiated Outwash (Qgo) with Glacial Till (Qgt) upslope and Beach Deposits (Qb) downslope. Undifferentiated outwash consists of recessional and proglacial stratified sand, gravel and cobbles with minor silt and clay interbeds deposited in meltwater stream environments. Glacial till consists of an unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel and boulders deposited by glacial ice. Beach deposits consist of sand and gravel deposited in shoreline environments. They may contain shell fragments and gravel tends to be well rounded. It may also include dune deposits and deposits of estuarine origin.

The USDA Soil Conservation Services (SCS) Soil Survey for Jefferson County, Washington maps the soils in the project area as Hoypus gravelly loamy sand, 15 to 30 percent slopes and Clallam gravelly sandy loam, 15 to 30 percent slopes. This soil occupies glacial terraces. The hazard of water erosion is moderate and runoff is medium.

RECEIVED
JUN 27 2003
JEFFERSON COUNTY

Slope Stability

The "Coastal Zone Atlas of Washington", Volume 11, Jefferson County, Washington, Department of Ecology, 1979 identifies slopes in the site vicinity as Unstable (U) with Intermediate (I) upslope. Unstable slopes are considered unstable due to erosional, stratigraphic, slope gradient, or groundwater conditions. They may show indications of past or present movement. Intermediate slopes are generally steeper than 15 percent, but also include areas of lesser slopes with weak material or heavy groundwater concentration. This designation includes slopes without known failures of a variety of deposits (sand, gravel, and till) and thin soils over bedrock.

SUBSURFACE EXPLORATION

The subsurface conditions were investigated at the site by excavating a total of 9 test pits to depths of up to 17 feet at the locations indicated on the attached Site Plan, Figure 2. Test Pit 9 was excavated in the general vicinity of the proposed infiltration system. Additional test pits will be excavated in the area of the proposed infiltration system at a later date.

Soil

The subsurface soils consist of dense to very dense sand and silty sand with varying amounts of gravel. For additional information regarding the soils encountered, please refer to the test pit logs in Appendix A.

Groundwater

Slow water seepage was encountered in TP-3 at a depth of about 9 feet below the ground surface. Ground water was not encountered in any of the other test pits. We did not see any evidence of springs on the site. Water table elevations fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the mining phase of the project. The evaluation of such factors is beyond the scope of this report Additional information regarding groundwater levels may be available in our forthcoming Aquifer Recharge Report.

Laboratory Testing

Soil samples were obtained from the borings for visual classification and laboratory testing for engineering properties. Tests were performed for moisture content and grain size distribution. Please see Appendix A for more information.

SEISMIC ZONE

The United States Geologic Survey, Earthquake Hazards Program, National Seismic Hazard Mapping Project website indicates that the peak ground acceleration for the site with a probability of exceedence of 10 percent in 50 years is 0.28 g.

RECEIVED
JUN 27 2003

Due to the dense nature of the soils encountered in our test pits, we estimate that the potential for liquefaction at the site is low to non-existent.

A detailed, site specific study of seismicity at the site was not part of our scope of work. However, we did not that two north-south trending fault zones are mapped on the Geologic Map of Washington – Northwest Quadrant within about 1 to 2 miles of the project site. However, both faults are indicated as inferred, which likely means they do not show at the ground surface. Further seismicity from these known fault zones would have been included in the National Seismic Hazard Mapping Project, and are therefore accounted for in our analyses by the seismic coefficient derived from the peak ground acceleration.

SITE RECONNAISSANCE

We examined the slopes on the site and adjacent properties for any indication of slope failures or instability. Indications of slope failure and/or instability include head scarps, hummocky terrain, inconsistent patterns of vegetation, tension cracks, seepage zones and course grain material overlaying silt and clay soils. We did not observe any indications of slope instability.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on our investigation and a review of the Jefferson County Unified Development Code (UDC), it is our opinion that the site is a Landslide Hazard Area as defined in section 3.6.6 of the UDC. This designation is due to the site being within an area mapped as Unstable in the Coastal Zone Atlas. In our opinion, the site is not an Erosion Hazard Area as defined in the same section and is a Seismic Hazard Area. However, the Seismic Hazard Area designation would be due solely to the potential for slope movement in a seismic event and is therefore not a separate designation from the Landslide Hazard Area.

Although, the entire site meets the definition of a Landslide Hazard Area from the UDC, it is our opinion that the proposed pit expansion can occur without adverse affects to the property or adjacent properties. Please see the Slope Stability Conclusions section below for more information.

The results of our investigation indicate that the site slopes in the current configuration are relatively stable. As detailed below, we recommend that permanent slopes less than 120 feet high be graded no steeper than 1.5H:1V (horizontal:vertical), and slopes more than 120 feet but less than 250 feet high be graded no steeper than 1.6H:1V. Temporary slopes may be graded no steeper than 1H:1V. Please see below for additional information.

SLOPE STABILITY

We performed slope stability analyses on a generalized cross section in which the height and grade of the slope was varied. The height range used was based on the topographic information provided by Zenovic and Associates. The slope stability computer program Slope/W by Geomatic was utilized to evaluate the stability

RECEIVED
JUN 27 2003

of the slopes under static and seismic conditions. Soil strength parameters used in our analysis were estimated from the soil encountered in our test pits. The soil strength parameters used for the undisturbed dense to very dense sand and silty sand were an angle of internal friction of 40 degrees and a cohesion of 100 pounds per square foot (psf). For purposes of our slope stability analysis, ground water was assumed at the base of the slope analyzed. We did not analyze slopes constructed from compacted fill as we understand that the current mining plan does not call for any of the pit to be backfilled.

The psuedostatic method was used for our slope stability analyses to estimate the factor of safety under seismic conditions. The United States Geologic Survey, Earthquake Hazards Program – National Seismic Hazard Mapping Project, indicates that a peak ground acceleration (PGA) of 0.28 g has a 10 percent probability of exceedence in 50 years (500 year return period). The seismic coefficient is typically taken to be ½ of the PGA. A seismic coefficient of 0.14 was used in our analyses.

The results of slope stability analyses are expressed as factors-of-safety against rotational failure. The factor-of-safety is the ratio of driving forces to resisting forces. A factor-of-safety of 1.0 is equilibrium; a factor-of-safety of less than 1.0 indicates failure. Typically, a factor-of-safety of 1.3 for static conditions and 1.1 for seismic conditions is considered adequate. Factors of safety greater than 1 but less than 1.3 or 1.1 are not adequate due to the uncertainties inherent in the modeling process. A lower safety factor for seismic conditions is adequate as the probability of occurrence of the seismic conditions analyzed is relatively low.

Slope Stability Analysis Results

We primarily analyzed an estimated cross section for permanent final slopes at the end of mining (i.e. when the mine shuts down). For this case both static and seismic conditions were analyzed. The grade of the slope was varied to estimate the steepest slope for which an adequate factor of safety existed. In addition to the grade, the total height of the slope has an affect on the safety factor. The results indicate that for slopes up to 120 feet high, a grade of 1.5H:1V or about 34 degrees has a factor of safety of 1.1 under seismic conditions and more than 1.4 under static conditions. For slopes up to 250 feet high, a grade of 1.6H:1V or about 32 degrees has a factor of safety of 1.1 under seismic conditions and more than 1.3 under static conditions.

We also analyzed a generalized cross section at a 1H:1V grade under static conditions to confirm that temporary slopes could be graded at 1H:1V. The results of the analysis indicates that slopes up to 100 feet high and 1H:1V have a factor of safety greater than 1.

Note that in all cases the resulting potential slip surfaces with the minimum calculated factors of safety occur essentially on the slope face with no more than about 10 feet of the crest of the slope including within the potential slip surface. We understand that the mining permit requires a buffer from the property line of at least 25 feet. Therefore potential slip surfaces that would impact adjacent properties will likely have higher factors of safety than those presented above.

Slope Stability Conclusions

Based on our site investigation and analyses results we conclude the following:

- There is minimal landslide hazard at the site as we did not observe any evidence of landslide activity in the vicinity.
- Our slope stability analyses indicate that the pit can be excavated in such a manner that the risk of landslides is essentially eliminated.
- Although we have not prepared the drainage and erosion control plan ourselves, it is our understanding that all surface water runoff will be directed to an infiltration system. Therefore, excavation of the pit will not increase surface water discharge or sedimentation to adjacent properties.
- As there are slopes in the vicinity of the property as steep or steeper than the proposed final slopes for the pit, it is our opinion that excavation of the pit will not decrease the stability of slopes on adjacent properties.
- As previously mentioned, our analyses were performed for both static and seismic conditions, and all of the preceding statements apply under seismic conditions up to the probability event described (10 percent probability of exceedence in 50 years or 475 year return event).

SLOPE GRADES

As discussed in the previous section (Slope Stability), we make the following recommendations regarding slope grades on slopes constructed from undisturbed soils:

- Temporary slopes should be no steeper than 1H:1V up to 100 feet high. The phrase "temporary slope" as used here is not intended to apply to the portion of the property that is being actively mined. A temporary slope, as used here, is an intermediate slope configuration where the soil comprising the slope is to be mined months or years in the future. The configuration of slopes within the active portion of the mine (i.e. the working face) is an issue for mine operation, rather than a long-term slope stability issue.

- Permanent slopes up to 120 feet high may be no steeper than 1.5H:1V.

- Permanent slopes up to 250 feet high may be no steeper than 1.6H:1V.

Note that if the mining plan is changed to include slopes constructed from compacted fill, they will likely need to be 2H:1V or shallower or reinforced with geotextile. If this becomes the case, please contact us for more information on compacted fill slopes. As mining operations approach the property lines, care must be taken not to cut a temporary slope so close to the property line that the required permanent slope grade can not be achieved.

All permanent slopes should be replanted with fast-growing, deep-rooted grass, shrubs and other ground cover as soon after final grading as practical. Temporary slopes likely do not need erosion protection as we

RECEIVED
JUN 27 2003
COUNTY

anticipate that temporary slopes will only be constructed during mining operations. Erosion of temporary slopes will only be an issue to the extent that the deposited soil from slope erosion is confined to the property.

INFILTRATION RATES

As part of this study, one test pit was excavated in the general vicinity of the proposed infiltration system. A sample of the soil from this test pit was tested for grain size distribution in accordance with the USDA textural analysis. The results of this test indicate that the soil in this area is a very gravelly sand. We understand that Jefferson County is currently using the 1992 version of the Puget Sound Stormwater Management Manual. The recommended short-term infiltration rate for sand (from the Stormwater Management Manual) is 8 inches per hour. This value (with an appropriate safety factor applied) may be used for initial design of the infiltration system. When the infiltration system design is complete and the precise location and depth has been determined, some additional testing will need to be done to confirm the infiltration rate.

LIMITATIONS

Geotechnical engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences improves. Although your site was analyzed using the most appropriate current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to improvements in the field of Geotechnical engineering, physical changes in the site either due to excavation or fill placement, new agency regulations or possible changes in the proposed structure after the time of completion of the soils report may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review.

Earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original geotechnical investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Geotechnical engineer should be notified so that supplemental recommendations can be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The Geotechnical engineer should be notified of any changes so the recommendations can be reviewed and reevaluated.

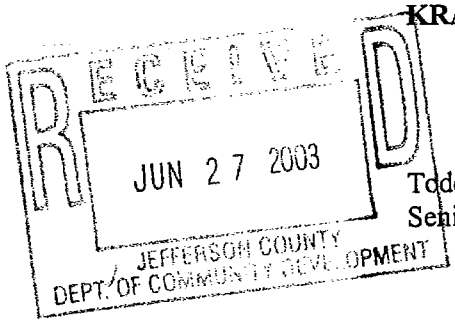
This report is a geotechnical engineering investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any environmental site assessment for

the presence or absence of hazardous and/or toxic materials in the soil, groundwater or atmosphere, or the presence of wetlands. Any statements, or absence of statements, in this report or on any test pit log regarding odors, unusual or suspicious items, or conditions observed are strictly for descriptive purposed and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical developments. We emphasize that this report is valid for this project as outlined above, and should not be used for any other site.

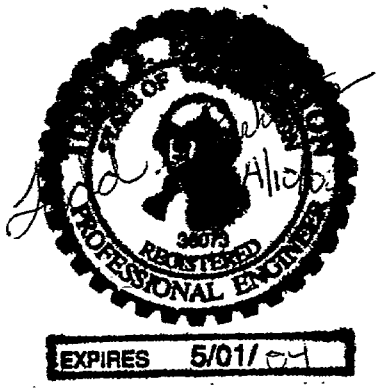
If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (360) 598-2126.

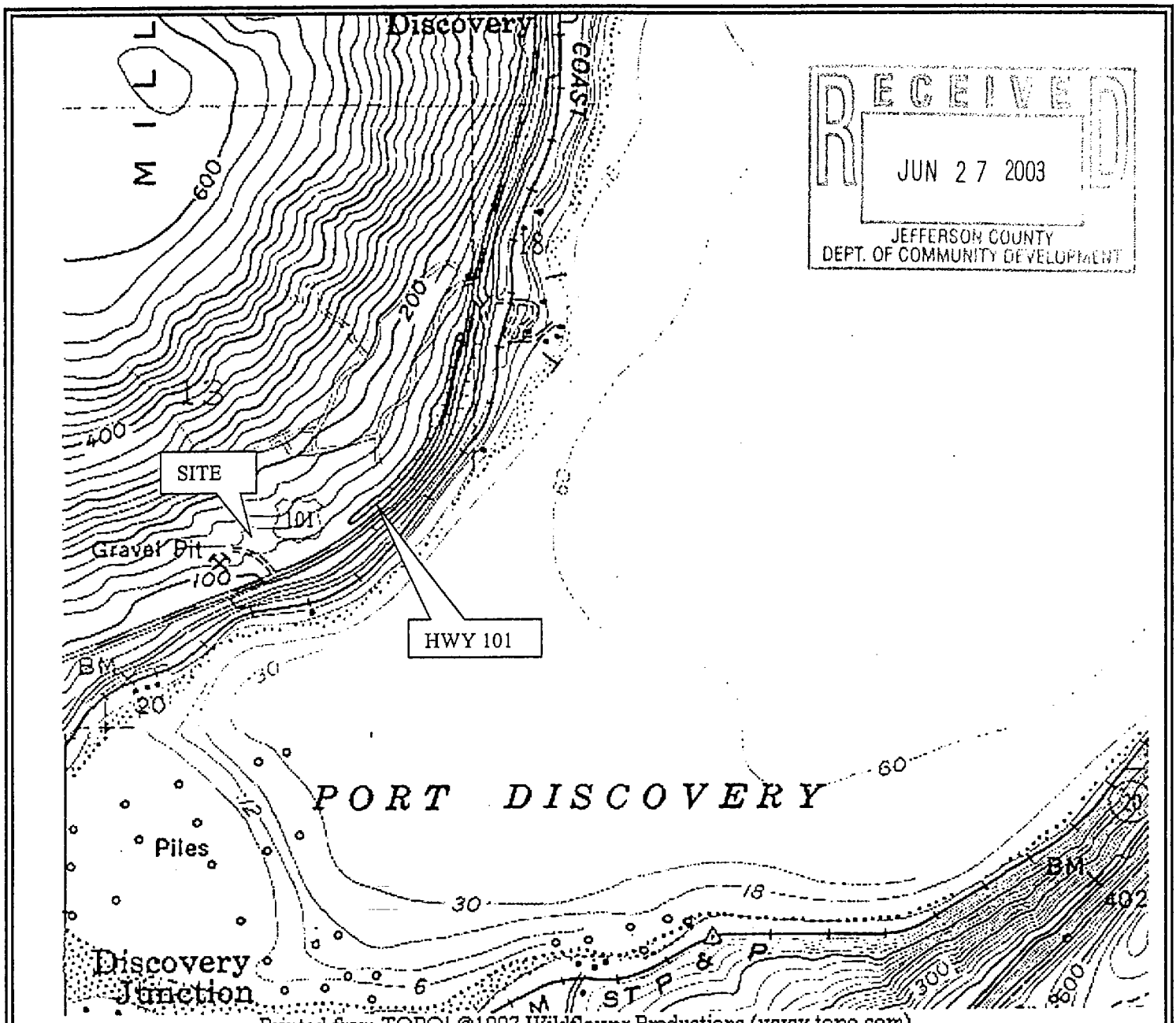
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.



Todd S. Parkington, P.E.
Senior Geotechnical Engineer

TSP/wrj:sew





RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Printed from TOPO! ©1997 Wildflower Productions (www.topo.com)

Note: Map adapted from TOPO! © 1997, Wildflower Productions.

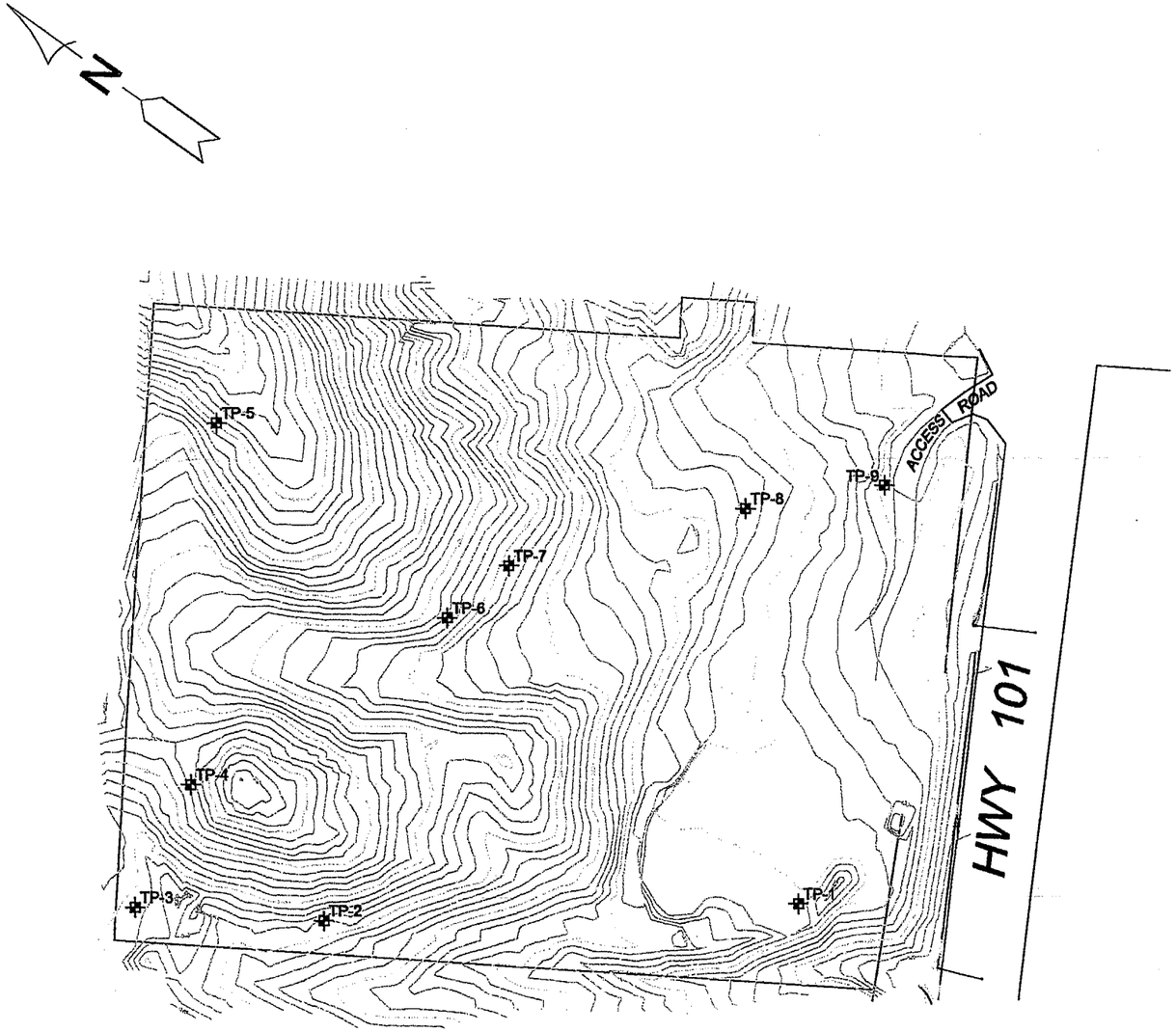
KRAZAN & ASSOCIATES, INC.
20714 State Route 305-Suite 3C
Poulsbo, WA 98370
360-598-2126

FIGURE 1 – SITE VICINITY MAP

Job name: Proposed M & E Trucking Expansion
Location: Jefferson County, Washington
Job No. : 102-03020
Client: M & E Trucking Inc.
Date: 3/3/03

N

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT



LEGEND

TP-3 — TEST PIT LOCATION

CONTOUR LINE

PROPERTY LINE

Site Plan

M & E Trucking Pit Expansion		Figure 2
Scale: 1 in = 200 ft	Job Number: 102-03020	Drawn By: JLM
		Revised By:
Date: April 9, 2003	Krazan & Associates, Inc.	Drawing Number: 1
		Drawing Type: Site Map

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

FIELD

AND

LABORATORY

INVESTIGATIONS

Appendix A

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program with nine test pits. The test pit locations are shown on the Site Plan, Figure 2. The depths shown on our test pit logs are established from the existing ground surface at the time the test pits were excavated. Soil samples were collected from the test pits and retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. All samples were returned to our Poulsbo laboratory for evaluation.

Logs of the test pits are presented as Figures A-1 through A-9.

Laboratory Investigation

The laboratory investigation was performed to estimate the physical and mechanical properties of the soil underlying the site. Test results were used as criteria for determining the engineering characteristics of the surface and subsurface materials encountered.

Insitu moisture content and grain size distribution tests were performed on representative soil samples. These tests, supplemented by visual observation, comprised the basis for our evaluation.

The logs of the exploratory borings and laboratory determinations are presented in this Appendix. The results of the in situ moisture content and fines content (the portion of the sample passing a #200 sieve as part of a grain size distribution test) are indicated on the boring log. The results of the grain size distributions are indicated on Figures A-10 through A-18.

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

WinLoG Symbol Legend

USCS

- Well Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
- Poorly Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
- Silty Gravels, Gravel-Sand-Silt Mixtures
- Clayey Gravels, Gravel-Sand-Clay Mixtures
- Well Graded Sands, Gravelly Sands, Little or No Fines
- Poorly Graded Sands, Gravelly Sands, Little or No Fines
- Silty Sands, Sand-Silt Mixtures
- Clayey Sands, Sand-Clay Mixtures
- Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands
- Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty
- Organic Silts and Organic Silty Clays of Low Plasticity
- Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic
- Inorganic Clays of High Plasticity, Fat Clays
- Organic Clays of Medium to High Plasticity, Organic Silts
- Peat, Humus, Swamp and Other Highly Organic Soils

Well Symbols

Pipes and Screens

- None
- Pipe
- Double Walled Pipe
- Sealed Pipe
- Fine Screen
- Coarse Screen
- Screen 1
- Screen 2

Top Fittings

- None
- Cap
- Flush-mount Cap
- Above-ground Cap
- Connector
- Reducer
- Pipe Break
- Packer

Bottom Fittings

- None
- Cap
- Cone
- Screw-on Cap
- Connector
- Enlarger
- Pipe Break
- Packer

Packing and Backfill

- None
- Bentonite
- Clay
- Silt
- Cement
- Sand
- Sand and Gravel
- Gravel

Sample Symbols

- Split Spoon
- Auger
- Core
- Grab
- Shelby Tube
- Excavation
- Undisturbed
- No Recovery

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-1

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-1

Logged By: D.H.

Elevation: 150

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*POORLY GRADED SAND WITH GRAVEL (SP)* Dense, medium grained sand, brown, moist.					
6			S-1	2.8	Grab	3.5	■
15		End of Test Pit					
18		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-2

Project No: 102-03020

Figure No.: A-2

Logged By: D.H.

Elevation: 230

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0-4		*SILTY SAND WITH GRAVEL (SM)* Dense, fine grained sand, light brown, moist. Roots up to 1/2 inch in diameter to 4 feet. Possible fill in road area.	S-1	16.2	Grab	9.2	■
4-8		*POORLY GRADED SAND WITH SILT (SP-SM)* Dense, fine grained sand, yellowish brown, moist.					
8-13		*SILTY SAND WITH GRAVEL (SM)* Dense to very dense, fine grained sand, gray, moist, weakly to moderately cemented. (GLACIAL TILL)	S-2	19.0	Grab	5.9	■
13		End of Test Pit					
		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Slow Seepage at ~9 feet.

Log of Test Pit TP-3

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-3

Logged By: D.H.

Elevation: 245

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Loose, fine grained sand, brown, moist. Contains roots and rootlets. (TOPSOIL)					
2		*POORLY GRADED SAND WITH GRAVEL (SP)* Medium dense, medium grained sand, yellowish brown, moist. Becomes dense at 2 feet.	S-1	2.2	Grab	4.1	■
8		Becomes very moist to wet at ~8 feet. Slow water seepage at ~9 feet. Minor sloughing at seepage zone.					
13		Becomes silty and possible organic layer at contact.					
14		*SILTY SAND (SM)* Dense, fine grained sand, gray, moist. Moderately cemented. (GLACIAL TILL)	S-2	40.4	Grab	9.8	■
16		End of Test Pit					
18		Monor sloughing of test pit sidewalls at seepage zone at ~9 feet.					
20							

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-4

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-4

Logged By: D.H.

Elevation: 285

Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*SILTY SAND WITH GRAVEL (SM)* Medium dense to dense, fine grained sand, light brown, moist. Contains roots up to 1/2 inch in diameter.	S-1	18.6	Grab	10.2	■
4		Becomes very dense and gray at 4 feet. (GLACIAL TILL)					
12		End of Test Pit					
15		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-5

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-5

Logged By: D.H.

Elevation: 325

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Medium dense, fine grained sand, yellowish brown, moist.					
2		Becomes dense at 2 feet.					
9		Becomes gray to brown in color at 9 feet.					
12		End of Test Pit					
		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-6

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-6

Logged By: D.H.

Elevation: 240

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0–2		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Loose, fine grained sand, medium brown, moist.					
2–10		*SILTY SAND (SM)* Medium dense to dense, fine grained sand, light brown to brown, moist. Contains roots to 3 feet.	S-1	21.2	Grab	16.9	■
4–5		Becomes dense, light brown to tan, and cross-bedded at 4.5 feet.					
10–17		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Dense, fine grained sand, gray, moist.	S-2	11.2	Grab	3.9	■
17		End of Test Pit					
17–20		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-7

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-7

Logged By: D.H.

Elevation: 220

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Loose, fine grained sand, brown, moist.					
2		Becomes dense and gray to brown in color at 2 feet.					
5		Sandy silt/silty sand layer from 5 to 6 feet.					
9		Becomes more gray in color at 9 feet.					
13		End of Test Pit					
16		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-8

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT OF COM

Project No: 102-03020

Figure No.: A-8

Logged By: D.H.

Elevation: 165

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
		Ground Surface					
0		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Medium dense, fine to medium grained sand, yellowish brown, moist.					
1							
2		Becomes dense at 2 feet.					
3							
4							
5		Becomes very dense at 5 feet.					
6							
7		Becomes gray in color at 7 feet.					
8							
9							
10							
11							
12							
13							
14							
15		End of Test Pit					
16							
17		No sloughing of test pit sidewalls.					
18							
19							
20							

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

Project: M & E Trucking Pit Expansion

Client: M & E Trucking

Location: Jefferson County, WA

Depth to Water: Not Encountered

Log of Test Pit TP-9

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

Project No: 102-03020

Figure No.: A-9

Logged By: D.H.

Elevation: 125

SUBSURFACE PROFILE			SAMPLE DATA				
Depth (ft)	Symbol	Description	Sample Number	Fines %	Type	Moisture%	Water Content (%) 10 20 30 40 50
0		Ground Surface					
0		*POORLY GRADED SAND WITH SILT* AND GRAVEL (SP-SM) Loose to medium dense, fine to medium grained sand, brown, moist. (BACKFILL IN PREVIOUS PIT)					
5		*POORLY GRADED SAND WITH GRAVEL (SP)* Dense, fine to medium grained sand, gray, moist.					
9			S-1	1.8	Grab	3.5	■
15			S-2		Grab		
15		End of Test Pit					
		No sloughing of test pit sidewalls.					

Method: Deawoo 170 Trackhoe

Excavator: M & E Trucking

Operator:

Krazan and Associates
20714 State Highway 305 N.E.
Suite 3C
Poulsbo, Washington 98370

Excavation Date: 3/7/03

Sheet: 1 of 1

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
DEPARTMENT

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	40.4	56.8	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
0.75 in.	94.1		
0.625 in.	88.7		
0.5 in.	80.8		
0.375 in.	75.5		
#4	59.6		
#8	46.1		
#16	34.5		
#30	24.9		
#60	10.8		
#100	5.5		
#200	2.8		

* (no specification provided)

Soil Description

USCS: POORLY GRADED SAND WITH GRAVEL (SP)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 14.4 D_{60}= 4.83 D_{50}= 2.95
D_{30}= 0.858 D_{15}= 0.330 D_{10}= 0.235
C_u= 20.53 C_c= 0.65

Classification

USCS= SP AASHTO=

Remarks

SAMPLE #: P4524
REPORT #: 10093
DATE: 3/10/2003

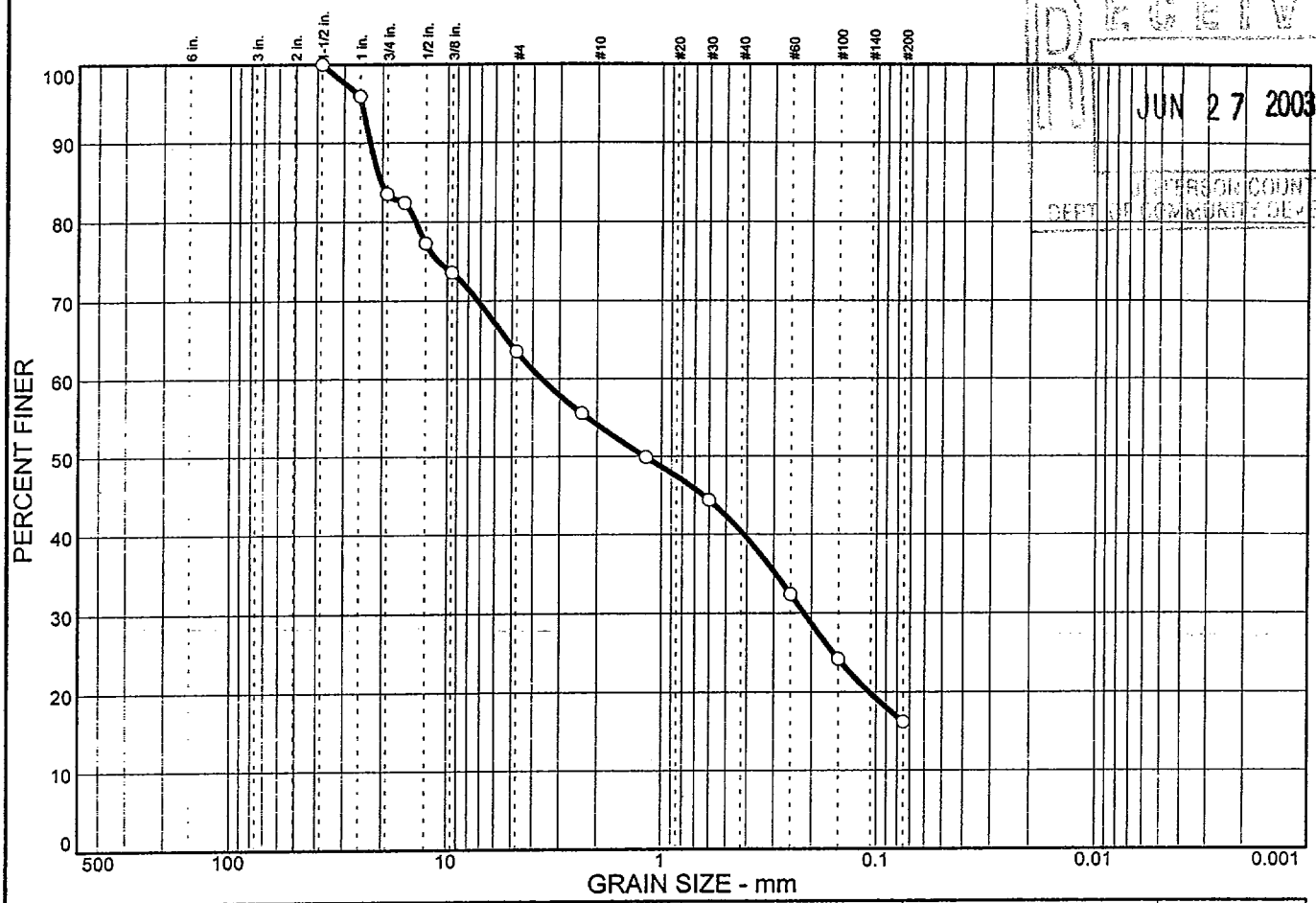
Sample No.: P4524 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-1,S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-10

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT OF COMMUNITY DEVELOPMENT



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	36.5	47.3	16.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1.0 in.	95.9		
0.75 in.	83.5		
0.625 in.	82.4		
0.5 in.	77.3		
0.375 in.	73.6		
#4	63.5		
#8	55.6		
#16	49.9		
#30	44.4		
#60	32.4		
#100	24.2		
#200	16.2		

* (no specification provided)

Soil Description

USCS: SILTY SAND WITH GRAVEL (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 20.3 D_{60}= 3.63 D_{50}= 1.20
D_{30}= 0.216 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

SAMPLE #: P4525
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4525 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-2, S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-11

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	31.5	49.5	19.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1.0 in.	94.4		
0.75 in.	85.5		
0.625 in.	80.4		
0.5 in.	77.3		
0.375 in.	74.4		
#4	68.5		
#8	64.3		
#16	60.5		
#30	56.1		
#60	42.5		
#100	30.7		
#200	19.0		

* (no specification provided)

Soil Description

USCS: SILTY SAND WITH GRAVEL (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 18.8 D_{60}= 1.07 D_{50}= 0.371
D_{30}= 0.145 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

SAMPLE #: P4525
REPORT #: 10093
DATE: 3/10/2003

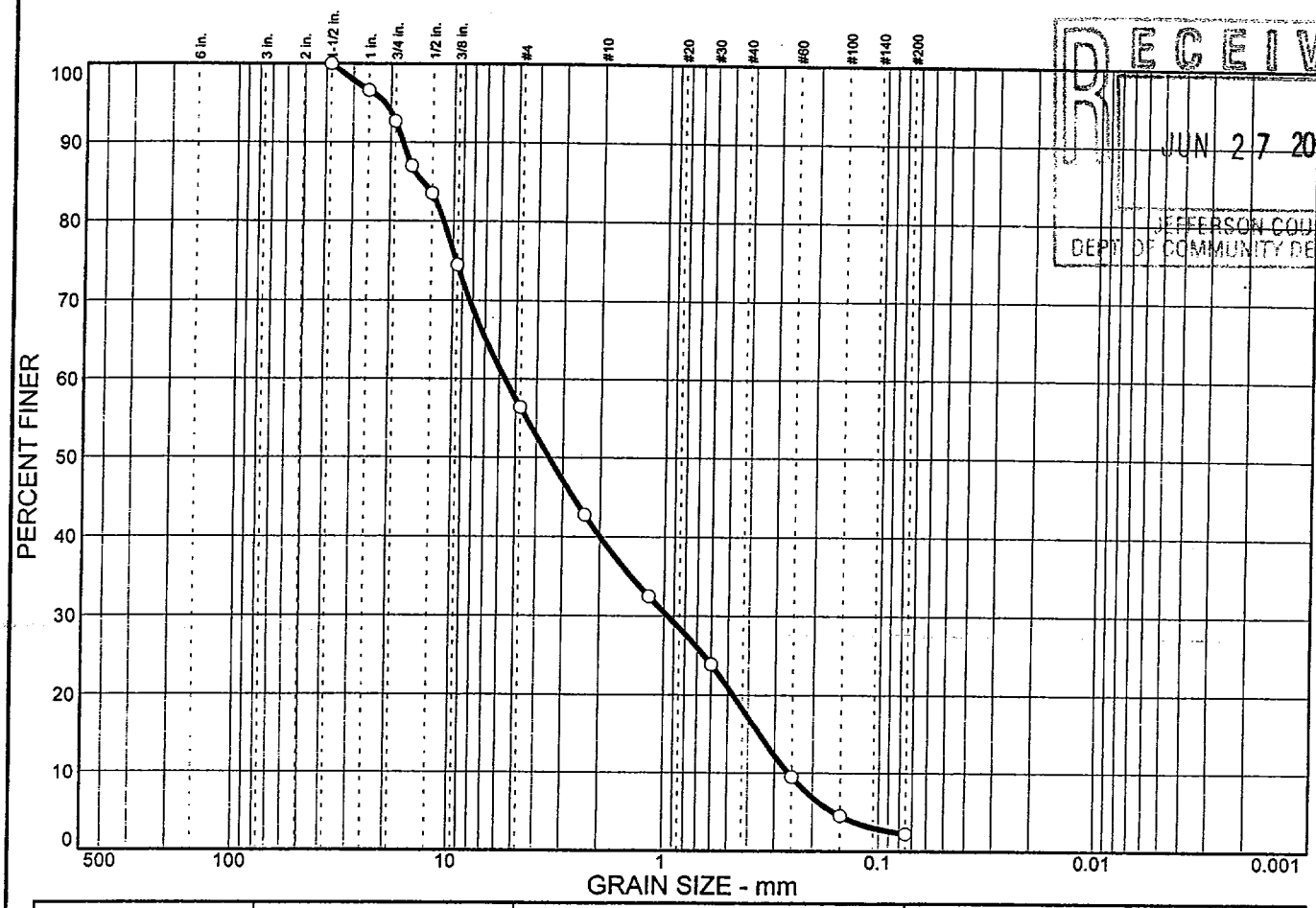
Sample No.: P4525,TP-2,S-2 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-2,S-2 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-12

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT OF COMMUNITY DEVELOPMENT



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	43.6	54.2	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1.0 in.	96.6		
0.75 in.	92.7		
0.625 in.	87.0		
0.5 in.	83.5		
0.375 in.	74.5		
#4	56.4		
#8	42.8		
#16	32.5		
#30	23.9		
#60	9.5		
#100	4.5		
#200	2.2		

* (no specification provided)

Soil Description

USCS: POORLY GRADED SAND WITH GRAVEL (SP)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 14.1 D_{60}= 5.61 D_{50}= 3.48
D_{30}= 0.961 D_{15}= 0.354 D_{10}= 0.259
C_u= 21.66 C_c= 0.63

Classification

USCS= SP AASHTO=

Remarks

SAMPLE #: P4526
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4526, TP-3,S-1 **Source of Sample:** TEST PITS **Date:** 3/10/03
Location: TP-3,S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-13

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT OF COMMUNITY DEVELOPMENT

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	10.6	49.0	40.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.0 in.	100.0		
1.0 in.	100.0		
0.75 in.	100.0		
0.625 in.	97.8		
0.5 in.	93.4		
0.375 in.	93.0		
#4	89.4		
#8	85.7		
#16	82.4		
#30	77.9		
#60	63.8		
#100	52.4		
#200	40.4		

* (no specification provided)

Soil Description

USCS: SILTY SAND (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.04 D_{60}= 0.211 D_{50}= 0.133
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

SAMPLE #: P4526
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4526 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-3,S-2 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-14

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	29.6	51.8	18.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
0.75 in.	91.6		
0.625 in.	87.8		
0.5 in.	84.5		
0.375 in.	80.5		
#4	70.4		
#8	61.7		
#16	55.5		
#30	50.0		
#60	36.3		
#100	26.9		
#200	18.6		

* (no specification provided)

Soil Description

USCS: SILTY SAND WITH GRAVEL (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 13.2 D_{60}= 2.00 D_{50}= 0.600
D_{30}= 0.180 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

SAMPLE #: P4527
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4527 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-4,S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-15

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
PETERS ON COUNTY
DEPT OF COMMUNITY DEVELOPMENT

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	78.8	21.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#8	99.9		
#16	99.9		
#30	99.8		
#60	88.2		
#80	63.4		
#100	44.2		
#200	21.2		

* (no specification provided)

Soil Description

USCS: SILTY SAND (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.238 D_{60}= 0.174 D_{50}= 0.159
D_{30}= 0.123 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

SAMPLE #: P4528
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4528 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-6, S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-16

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	35.3	53.5	11.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.0 in.	100.0		
1.0 in.	100.0		
0.75 in.	94.9		
0.625 in.	92.1		
0.5 in.	86.4		
0.375 in.	79.1		
#4	64.7		
#8	57.0		
#16	50.8		
#30	44.3		
#50	29.9		
#100	19.9		
#200	11.2		

* (no specification provided)

Soil Description

USCS: POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 12.1 D_{60}= 3.25 D_{50}= 1.06
D_{30}= 0.302 D_{15}= 0.101 D_{10}=
C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

SAMPLE #: P4528
REPORT #: 10093
DATE: 3/10/2003

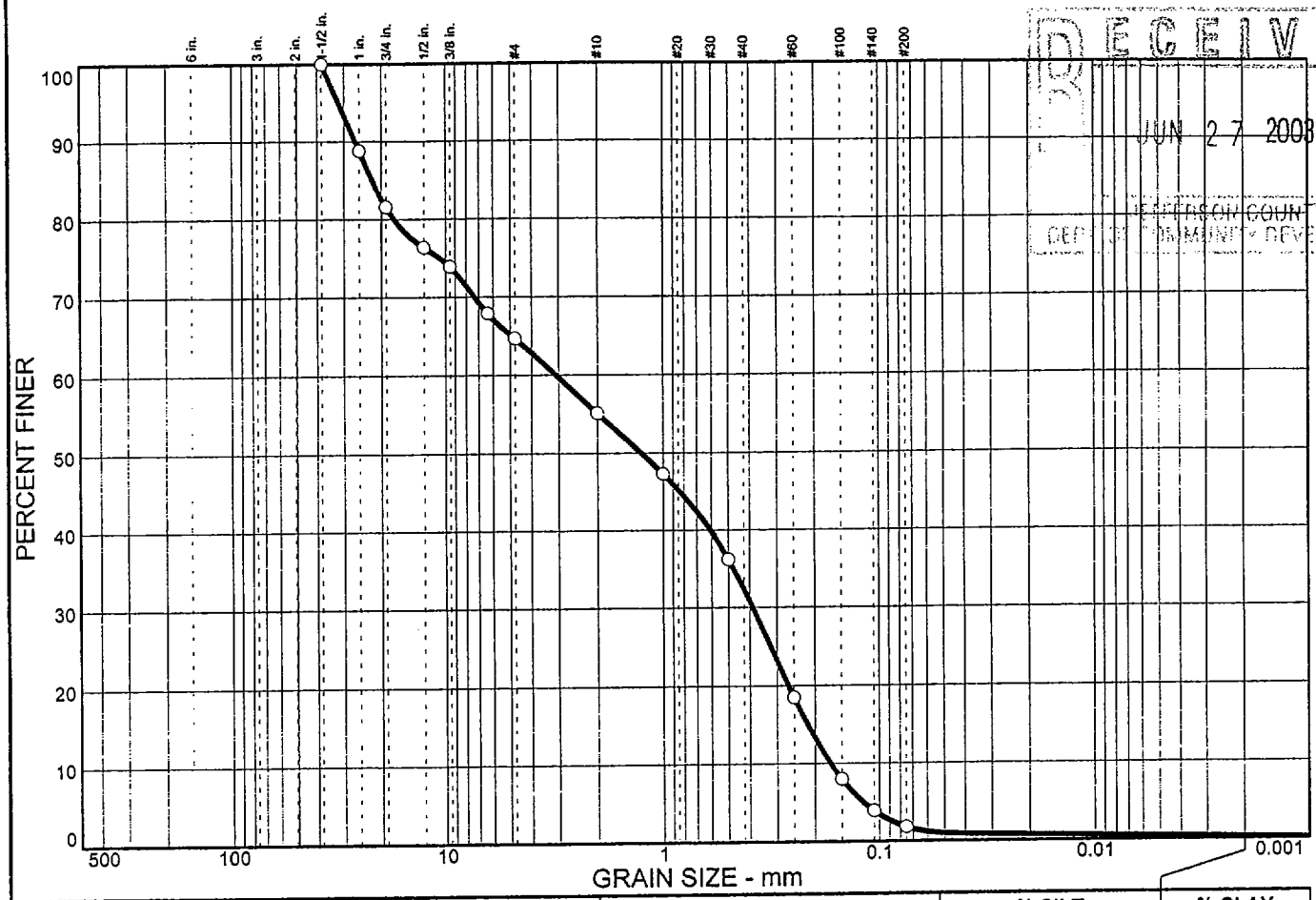
Sample No.: P4528, TP-6,S-2 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-6,S-2 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-17

GRAIN SIZE DISTRIBUTION REPORT

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	44.9	54.1	0.8	0.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1.0 in.	88.8		
0.75 in.	81.6		
0.5 in.	76.4		
0.375 in.	73.9		
0.25 in.	67.9		
#4	64.7		
#10	55.1		
#18	47.3		
#35	36.2		
#60	18.5		
#100	8.0		
#140	3.9		
#200	1.8		

* (no specification provided)

Soil Description

USDA: VERY GRAVELLY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 22.0 D_{60}= 3.08 D_{50}= 1.26
D_{30}= 0.387 D_{15}= 0.216 D_{10}= 0.169
C_u= 18.22 C_c= 0.29

Classification

USCS= AASHTO=

Remarks

SAMPLE #: P4529
REPORT #: 10093
DATE: 3/10/2003

Sample No.: P4529 **Source of Sample:** TEST PITS **Date:** 3/10/2003
Location: TP-9,S-1 **Elev./Depth:**

KRAZAN & ASSOCIATES, INC.

Client: M & E TRUCKING & CONSTRUCTION, INC.
Project: M & E TRUCKING PIT EXPANSION
Project No: 102-03020 **FIGURE:** A-18

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

USDA SOIL CLASSIFICATION

CLIENT : M & E TRUCKING

DATE : 3/10/03

PROJECT NO.: 102-03020

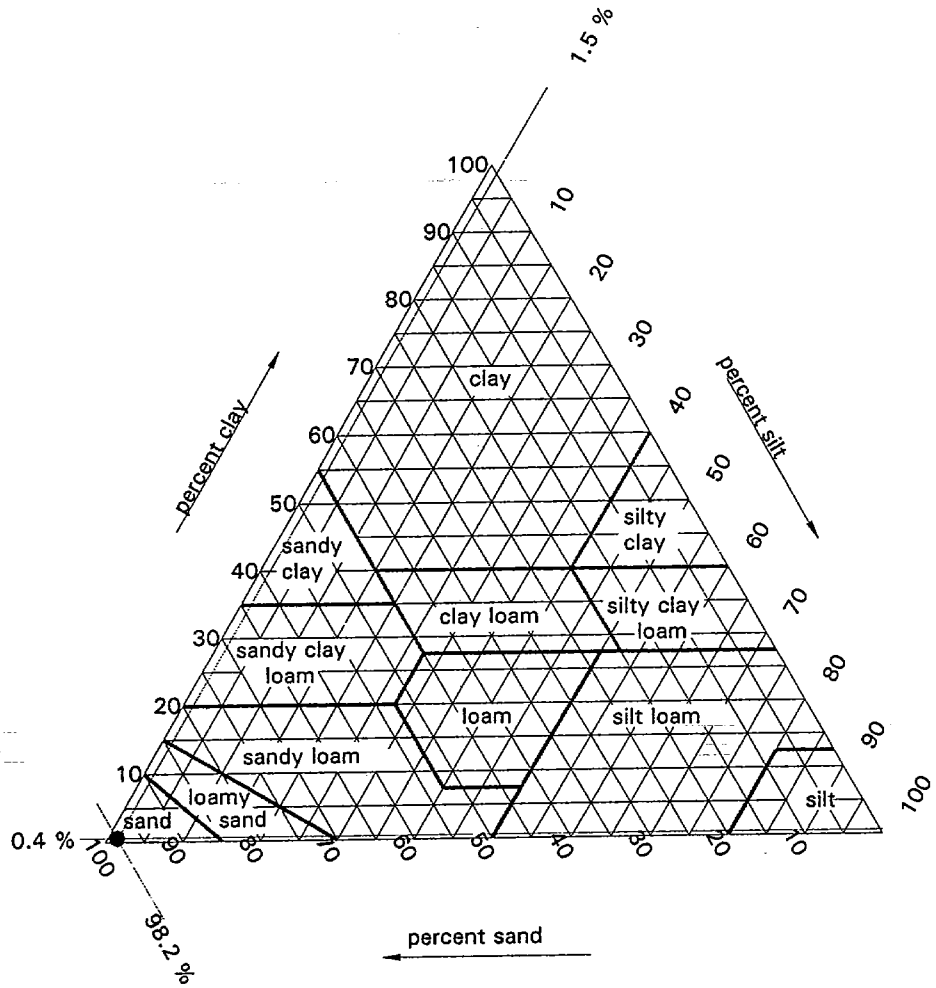
REPORT NO.: 10093

SAMPLE ID : P4529

TECHNICIAN : JLM

LOCATION : TP-9; S-1

RECEIVED
JUN 27 2003
JEFFERSON COUNTY
DEPT. OF COMMUNITY DEVELOPMENT



GRAVEL:	44.9 %	REPROPORTIONED	
SAND :	54.1 %	98.2 %	
SILT :	0.8 %	1.5 %	CLASSIFICATION : "Very Gravelly" Sand
CLAY :	0.2 %	0.4 %	

383 NW Equestrian Drive • Poulsbo, WA. 98370 • (360) 598-2126 • Fax: (360) 598-2127

Appendix B

Water Well Reports

Start Card No. WC66643

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

UNIQUE WELL I.D. # ABB046

Water Right Permit No. _____

(1) **OWNER:** Name Mark Getzendaner Address 4128 125th St SE, Everett WA 98028

(2) **LOCATION OF WELL:** County Jefferson SW 1/4 SE 1/4 Sec 13 T. 29 N. R. 2W W.M.

(2a) **STREET ADDRESS OF WELL** (or nearest address) 5821 Old Gardener Rd Pt. Townsend

(3) **PROPOSED USE:** ☑ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) **TYPE OF WORK:** Owner's number of well (if more than one) _____
Abandoned ☐ New well ☑ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☑ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 6 inches. Drilled 56 feet. Depth of completed well 56 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 6 " Diam. from 0 ft. to 53 ft.
Welded ☑ _____ " Diam. from _____ ft. to _____ ft.
Liner installed ☐ _____ " Diam. from _____ ft. to _____ ft.
Threaded ☐

Perforations: Yes ☐ No ☑
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☑ No ☐
Manufacturer's Name Johnson
Type Stainless steel Model No. _____
Diam. 6 Slot size 12 from 53 ft. to 56 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☑ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) **PUMP:** Manufacturer's Name _____
Type: _____ H.P. _____

(8) **WATER LEVELS:** Land-surface elevation above mean sea level _____ ft.
Static level 39 ft below top of well Date 4-11-96
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test 15 gal./min. with 6 ft. drawdown after 2 hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date 4-11-96
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☑

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
topsoil	0	7
Gravel/sand	7	44
Gravel/sand w/B	44	56

Work Started 4-8-96 19. Completed 4-11 19 96

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Mel Williams Drilling Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 741 W. Sequim Bay Rd. Sequim

(Signed) Mel Williams (WELL DRILLER) License No. 0524

Contractor's Registration No. MELWID108805 Date 4-12 19 96

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (Rev.)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. .....

Permit No. .....

(1) OWNER: Name Washington State Highway Dept. Address Olympia, Wash.

(2) LOCATION OF WELL: County Jefferson NW¼ SE¼ Sec. 12 T. 29 N., R. 2 W.M.

Bearing and distance from section or subdivision corner Discovery Bay Maintenance Site

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☒ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 333 ft. Depth of completed well ..... ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 42 ft.
Threaded ☐ ..... " Diam. from ..... ft. to ..... ft.
Welded ☒ ..... " Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 30 ft.
Material used in seal Grout cement & Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level .... Approx. 108 ft.
Static level ..... ft. below top of well Date .....
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? .....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Gravel & sand	0	14
Sandy clay, some gravel	14	30
Boulders & gravel	30	40
Gray sand stone	40	80
Gray sand stone & shale	80	220
Shale (Gray)	220	333
No water, hole was prepared, sealed and abandoned.		

RECEIVED
AUG 11 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 7/27 19 77 Completed 8/3 19 77

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Stoican Drilling Co., Inc. (Person, firm, or corporation) (Type or print)

Address P.O. Box 161 Sequim, Wash. 98382

[Signed] Valeri Stoican 0473 (President)
Joe Pike 0391 (Well Driller)

License No. Harold Miller 0343 Date 8/4 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.