TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

May 12, 2020
Project No. T-6897-3

Mr. Bjorn Brynestad
Panattoni Development Company
1821 Dock Street, Suite 100
Tacoma, Washington 98402

Subject: Geotechnical Engineering Study
DuPont Trailer Yard
International Place
DuPont, Washington

References:
1. Subsurface Exploration, Geologic Hazard and Preliminary Geotechnical Engineering Report, International Place, DuPont, Washington, Project No. KE120002B, prepared by Associated Earth Sciences, Inc., dated March 1, 2012

2. Geotechnical Report, International Place, DuPont, Washington, Project No. T-5853, prepared by Terra Associates, Inc., dated January 30, 2006

Dear Mr. Brynestad:

As requested, we have reviewed subsurface data contained in our files and developed geotechnical engineering recommendations for the subject site. This report presents our findings and provides geotechnical recommendations for the project.

PROJECT DESCRIPTION

We were provided a site plan titled "Northwest Logistics #2 (Trailer Diagram)" prepared by NELSON, dated January 28, 2020. The project consists of developing the site for semi-trailer parking and storage in support of the adjacent Northwest Logistics Phase 2 facility. Access to the trailer storage yard will be from entrances and driveways off International Place, and from loading dock areas at the southern perimeter of the adjacent Northwest Logistics Phase 2 building.

Site grades will match existing paved areas south and east of the site. Based on our observations, fill thicknesses approaching a maximum of about five feet will be required to match adjacent grade elevations. We understand project stormwater runoff will be directed to a retention/infiltration facility.

SCOPE OF WORK

Our work was completed in accordance with our authorized proposal, dated April 16, 20020. Specifically, this report addresses:

- Soil and groundwater conditions.
- Site preparation and grading.
- Infiltration feasibility.
- Utilities
- Pavements

SITE CONDITIONS

Surface

The project site consists of a single approximately 5.3 acre tax parcel located near the northern terminus of International Place in DuPont, Washington. It is bounded to the north by a rental storage facility and to the east by an asphalt-paved parking lot. A driveway accessing adjacent warehouse buildings bounds the site to the south. The location of the site is shown on the Vicinity Map, Figure 1.

The site has been cleared of primary vegetation and is currently covered with scattered brush and small deciduous trees. An approximately 4- to 5-foot tall slope rises from site grades to adjacent eastern parking lot elevations. At the southern property line, the slope continues along the driveway edge, flattens and is covered with quarry rock. An approximately 4- to 8-foot deep stormwater retention swale and associated concrete control structures are located at the northern margin of the site. No ponded water was observed in the facility at the time of our visit. Stacks of utility pipe and a stockpile of washed drain rock were also observed. A near-vertical 2- to 3-foot tall soil cut face extends across the central portion of the site.

Soils

Terra Associates explored subsurface conditions at the site on January 11, 2006 by excavating 10 test pits to depths of 10 to 20 feet below 2006 surface elevations. On February 27, 2012, AESI logged five test pits at the site to depths of 5 to 12 feet. The locations of the test pits are shown on Figure 2. The soils were classified in the field in accordance with procedures outlined in the Unified Soil Classification System attached as Figure 3. The Terra Associates and AESI test pit logs, as well as grain size distribution test results from our January 2006 geotechnical study are attached.

In 2006, our test pits found 12 to 24 inches of forest duff with gravel overlying Recessional outwash soils consisting of silty sand and silty gravel in Test Pits TP-6, TP-7, and TP-13 to depths ranging from 3.5 to 5 feet. Below these depths, and underlying the forest duff in the remaining test pits, we observed outwash deposits composed mainly of gravel with sand containing variable contents of cobbles and few boulders. Four of the test pits showed outwash soil layers consisting of sand with variable gravel contents. The outwash soils are generally in a medium dense to condition.

Four of the AESI test pits found fill consisting of loose to medium dense sand and silty sand with gravel to depths of 2 to 5 feet. Beneath the fill, AESI personnel observed Recessional outwash deposits composed of medium dense sandy gravel and sand with gravel. The test pits indicated varying degrees of stratification in the outwash soils.

The *Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington,* by J.E. Schuster et al (2015) maps the site soils as Vashon Recessional outwash, Steilacoom gravel (Qgo_{sg}). The soils observed in the test pits correlate with the published description of this soil unit.

Groundwater

We observed groundwater at a depth of 16 feet in each of Test Pits TP-8 through TP-10. Observed seepage flow rates were slight to moderate. No groundwater was observed during excavation of the AESI test pits.

DISCUSSION AND RECOMMENDATIONS

Based on our study, there are no geotechnical conditions that would preclude the planned development. Pavements can be constructed on competent native soils, compacted existing inorganic fills, or on structural fill placed on these soils.

A review of historical aerial imagery indicates that in 2007, the site was cleared and stripped of vegetation, and rough grading was underway. By 2009, grading at the site included construction of a building pad with loading dock cuts. The site's grading activities were concurrent with construction of the neighboring 3250 International Place warehouse building. As indicated by the 2012 AESI test pits, grading at the site included removal of the forest duff layer identified in our 2006 test pits, as well as placement of relatively organic-free fills at the site. Existing fill subgrades prepared as recommended below will be suitable for support of new pavements.

Most of the native outwash sands and gravels observed below the surficial fills have a low percentage of soil fines and should be suitable for use as structural fill in most weather conditions. The upper silty sand fill and native silty gravel soils contain sufficient percentages of soil fines to make them difficult to compact as structural fill when too wet. The ability to use these soils from site excavations as structural fill will depend on their moisture content and the prevailing weather conditions at the time of construction. If soils need to be imported to the site, the contractor should be prepared to import free-draining granular material for use as structural fill and backfill during the wet season.

Detailed recommendations regarding these issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

Site Preparation and Grading

To prepare the site for construction, all vegetation and organic soils should be removed from areas of new pavement construction. If the existing infiltration facility is abandoned, control structures should be removed and replaced with structural fill. Abandoned pipes can be left in place provided the ends are sealed to prevent migration of soil into the pipe.

We recommend supporting pavements on competent, inorganic subgrades consisting of native soils, existing inorganic fills or compacted structural fill. Terra Associates, Inc. should examine all surfaces to verify that conditions encountered are as anticipated and are suitable for placement of structural fill or direct support of pavements. Our representative may request proofrolling of exposed surfaces with a heavy rubber-tired vehicle to determine if any isolated soft and yielding areas are present. If unstable yielding areas are observed, they should be cut to firm bearing soil and filled to grade with structural fill. If the depth of excavation to remove unstable soils is excessive, use of geotextile fabric such as Mirafi 500X or equivalent in conjunction with clean granular structural fill can be considered in order to limit the depth of removal.

As discussed above, the silty sand fill and native silty gravel soils at the site contain a sufficient percentage of fines (silt and clay size particles) that will make them difficult to compact as structural fill if they are too wet or too dry. Accordingly, the ability to densify these soils in place or use the soils as structural fill will depend on their moisture content and the prevailing weather conditions when site grading activities take place. Soils that are too wet to properly compact could be dried by aeration during dry weather conditions, or mixed with an additive such as cement or lime to stabilize the soil and facilitate compaction. If an additive is used, additional Best Management Practices (BMPs) for its use will need to be incorporated into the Temporary Erosion and Sedimentation Control (TESC) plan for the project. Soils that are dry of optimum should be moisture conditioned by controlled addition of water and blending prior to material placement. The site's gravels containing relatively low percentages of fines should be suitable to reuse as structural fill in most weather conditions.

We recommend removing cobbles larger than six inches and boulders from the fill prior to placement and compaction.

If grading activities are planned during the wet winter months, or if they are initiated during the summer and extend into fall and winter, the owner should be prepared to import wet weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

*Based on the 3/4-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

Infiltration Feasibility

Based on our observations, the outwash sands and gravels that contain relatively low fines contents will support infiltration of project stormwater. A stormwater infiltration facility located in the vicinity of Test Pits TP-8 through TP-10 will need to have its base constructed no lower than 11 feet below January 2006 surface grade elevations to establish the minimum required separation distance of 5 feet from the seasonal high groundwater level. In addition, relatively low permeability silty sand soils were identified in AESI EP-1 and Terra Associates' TP-13 to a depth of 5 feet. Accordingly, we recommend designing infiltration facilities at these locations with their bases no higher than 5 feet below surface elevations at their respective locations.

The City of DuPont has adopted the 2012 (amended 2014) Department of Ecology *Stormwater Management Manual for Western Washington* (SMMWW) for stormwater design. An average long-term design infiltration rate of 12 inches per hour can be used for preliminary design of the site's infiltration facilities. This infiltration rate was derived based on grain size distribution results for samples of outwash gravel obtained from Test Pits TP-8 and TP-10 using methods outlined in the SMMWW. In addition, as provided in Section 3.3.8 in Vol. III of the SMMWW, our calculation of the preliminary infiltration rate incorporates an assumed facility size and is based on an allowable minimum separation distance of five feet between the base of the infiltration facility and the expected seasonal high groundwater barrier layer. For preliminary purposes, the above infiltration rate assumes the facility will be 30 feet wide and 100 feet long. The preliminary design infiltration rate incorporates correction factors recommended in the SMMWW.

We should review the stormwater retention facility plans when available to confirm facility design is consistent with our analysis and ground conditions as observed at the site.

Utilities

All utility pipes and stormwater structures should be bedded and backfilled in accordance with American Public Works Association (APWA) or applicable jurisdictional requirements. At minimum, backfill should be placed and compacted as structural fill as described in the Site Preparation and Grading Section of this report. As noted, most of the soils are predominantly fine grained and moisture sensitive and will therefore require moisture conditioning to facilitate proper compaction. If utility construction takes place during the winter, it may be necessary to import suitable wet weather fill for utility backfilling.

Pavements

Pavement subgrades should be prepared as described in Site Preparation and Grading section of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proofrolled with heavy rubber-tired construction equipment such as a loaded 10-yard dump truck to verify this condition.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. New pavements for the project will consist of drive aisles and parking spaces for heavy traffic consisting of semi-tractor trailer rigs. For design considerations in heavy traffic pavement areas, we have assumed an ESAL of 300,000 would be representative of the expected loading. These ESALs represent loading approximately equivalent to 18, loaded (80,000-pound GVW) tractor-trailer rigs traversing the pavement daily.

With a stable subgrade prepared as recommended, we recommend the following options for pavement section options:

Heavy Traffic:

- Three inches of HMA over six inches of CRB
- Full depth HMA – 5 inches

The paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for ½-inch class HMA and CRB.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability. For optimum pavement performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

ADDITIONAL SERVICES

Terra Associates, Inc. should review the final designs and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical services during construction in order to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

LIMITATIONS

This report has been prepared for the exclusive use of Panattoni Development Company and its authorized representatives, and was prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for the specific application to the DuPont Trailer Yard project in DuPont, Washington.

The conclusions and recommendations presented in this report are based on published data and the subsurface observations accomplished for this study. Subsurface conditions can vary substantially with depth, distance, or due to unanticipated geologic conditions. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

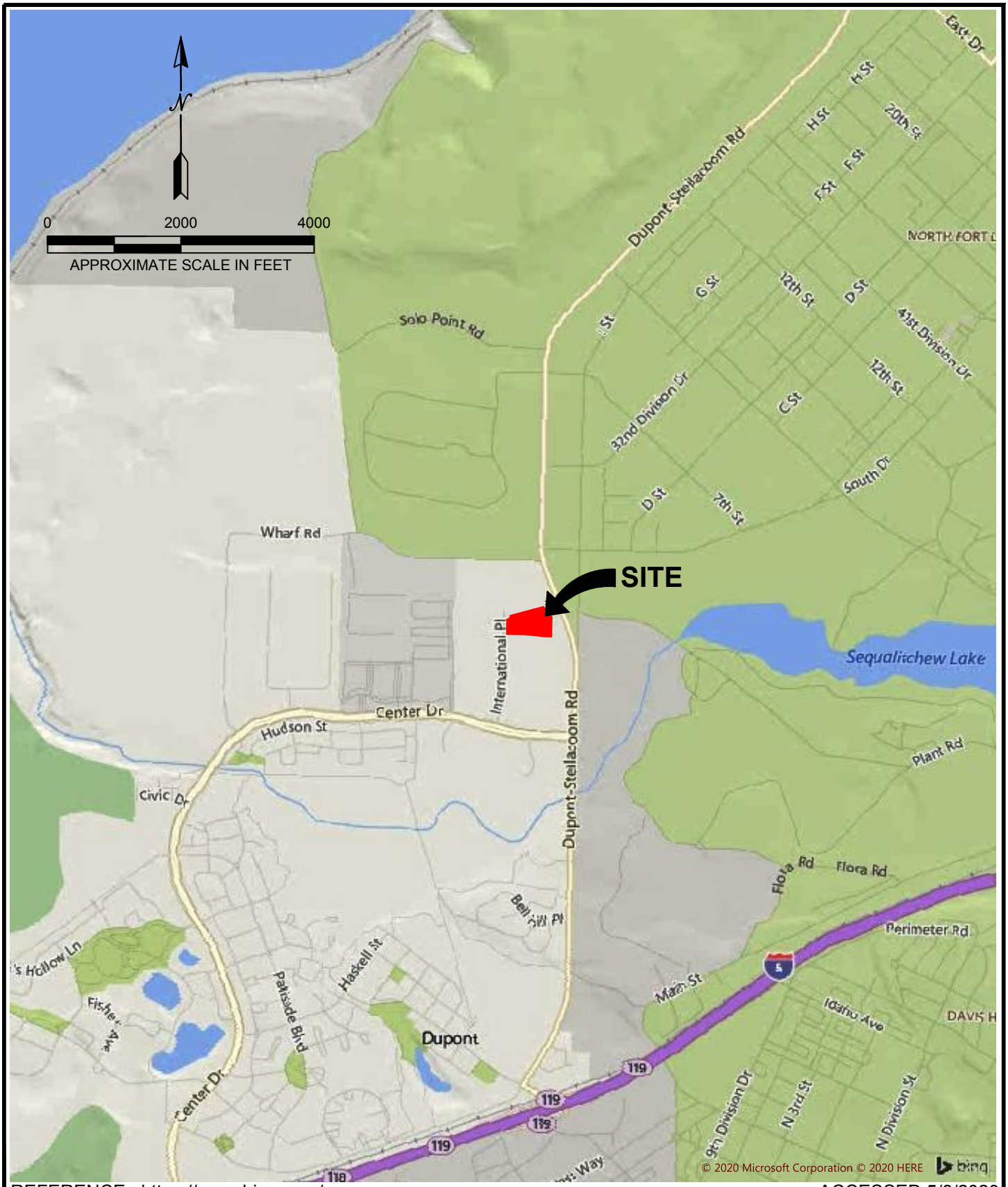
Kevin P. Roberts, P.E.
Geotechnical Engineer

THEODORE J SCHEPPER
STATE OF WASHINGTON
26742
REGISTERED
PROFESSIONAL ENGINEER

5/12/2020

Theodore J. Schepper, P.E.
President

Encl: Figure 1 – Vicinity Map
Figure 2 – Exploration Location Plan
Figure 3 – Unified Soil Classification System
Terra Associates, Inc. Test Pit Logs and Grain Size Analysis Reports
AESI Test Pit Logs



REFERENCE: https://www.bing.com/maps ACCESSED 5/8/2020

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Environmental Earth Sciences

VICINITY MAP
DUPONT TRAILER YARD
DUPONT, WASHINGTON

Proj.No.T-6897-3	Date: MAY 2020	Figure 1

NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY NELSON.

LEGEND:

- APPROXIMATE TEST PIT LOCATION (TERRA ASSOCIATES 1/2006)
- APPROXIMATE TEST PIT LOCATION (ASSOCIATED EARTH SCIENCES 3/2012)

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EXPLORATION LOCATION PLAN
DUPONT TRAILER YARD
DUPONT, WASHINGTON

Proj.No.T-6897-3	Date: MAY 2020	Figure 2

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS: More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% 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	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS: More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
‖	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
DUPONT TRAILER YARD
DUPONT, WASHINGTON

Proj.No.T-6897-3 | Date: MAY 2020 | Figure 3

Test Pit No. TP-5

Logged by: DPL
Date: 01/10/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches FOREST DUFF with roots and gravel.	4.1
5	Brown to gray sandy GRAVEL, fine to coarse grained, some cobbles, medium dense to dense, moist. (GP)	3.9
10		6.3
15	Test pit terminated at 11.5 feet. No groundwater seepage observed. Some test pit sidewall caving.	
20		

Test Pit No. TP-6

Logged by: DPL
Date: 01/10/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 to 24 inches FOREST DUFF with organics and roots, gravel, soft, wet.	
	Brown silty sandy GRAVEL, fine to coarse grained, cobbles, medium dense, wet. (GM)	14.1
5	Gray sandy GRAVEL, fine to coarse grained, some cobbles, dense, moist. (GP)	4.4
10		4.9
15	Test pit terminated at 12 feet. No groundwater seepage observed. Some test pit sidewall caving.	
20		

Test Pit No. TP-7

Logged by: DPL
Date: 01/10/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 to 24 inches FOREST DUFF with organics and roots, gravel, soft, wet.	
	Brown silty sandy GRAVEL, fine to coarse grained, some roots and cobbles, medium dense, wet. (GM)	8.8
5	Gray SAND with gravel, fine to coarse grained, medium dense, moist. (SP)	7.5
10	Gray sandy GRAVEL, fine to coarse grained, medium, moist. (GP)	5.3
15	Test pit terminated at 12 feet. No groundwater seepage observed. Some test pit sidewall caving.	
20		

Test Pit No. TP-8

Logged by: DPL
Date: 01/10/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	12 inches FOREST DUFF with roots and gravel.	
	Brown to gray sandy GRAVEL, fine to coarse grained, some cobbles, medium dense, moist. (GP)	3.6 7.2
5	Gray gravelly SAND, fine to coarse grained, medium dense, moist. (SP)	6.4
10	Gray sandy GRAVEL, fine to coarse grained, some cobbles, medium dense to dense at 17 feet, moist to wet at 15 feet. (GP)	5.4
15	Heavy iron staining at 15 to 19 feet.	4.4 ▼
20	Test pit terminated at 19 feet. Slight to moderate groundwater seepage observed at 16 feet. Some test pit sidewall caving. 2-inch slotted PVC pipe installed. Water level measureed at 16.5 on 1/26/06.	

Test Pit No. TP-9

Logged by:
Date:

Approximate Elev.

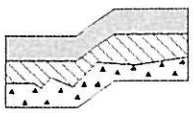
Depth (ft.)	Soil Description	Moisture Content (%)
0	12 to 18 inches FOREST DUFF with roots and gravel.	
5	Brown to gray sandy GRAVEL, fine to coarse grained, cobbles, medium dense to dense at 16 feet, moist to wet at 16 feet. (GP)	4.1
10		5.2
15		▼
20	Test pit terminated at 20 feet. Slight to moderate groundwater seepage observed at 16 feet. Test pit sidewalls easily caved below 10 feet.	

Test Pit No. TP-10

Logged by:
Date:

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 to 24 inches FOREST DUFF with organics and roots, gravel, soft, wet.	
	Grayish-brown SAND with gravel, fine to coarse grained, medium dense, moist. (SP)	4.0
5		4.2
10	Gray sandy GRAVEL, fine to coarse grained, medium dense to dense, cobbles to small boulders below 16 feet. (GP)	3.0 ▼
15	Heavy iron staining below 16 feet.	3.7
20	Test pit terminated at 18.5 feet. Slight to moderate groundwater seepage observed at 16 feet. Some test pit sidewall caving. 2-inch slotted PVC pipe installed. Water level measured at 16.25 feet on 1/26/06.	



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TEST PIT LOGS
INTERNATIONAL PLACE
DUPONT, WASHINGTON

Proj. No. T-5853	Date JAN 2006	Figure A-6

Test Pit No. TP-11

Logged by: DPL
Date: 01/11/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches FOREST DUFF with roots and gravel.	
	Brown to gray sandy GRAVEL, fine to coarse grained, trace cobbles, medium dense to dense, moist. (GP)	6.3 5.9 3.6
10	Test pit terminated at 10 feet. No groundwater seepage observed. Some test pit sidewall caving.	
15		
20		

Test Pit No. TP-12

Logged by: DPL
Date: 01/11/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	12 to 18 inches FOREST DUFF with roots and gravel.	
	Brown to gray sandy GRAVEL, fine to coarse grained, trace cobbles, medium dense to dense, moist to wet at 8 feet. (GP)	4.4 4.3 4.7
10	Test pit terminated at 10 feet. No groundwater seepage observed. Some test pit sidewall caving.	
15		
20		

Test Pit No. TP-13

Logged by: DPL
Date: 01/11/06

Approximate Elev.

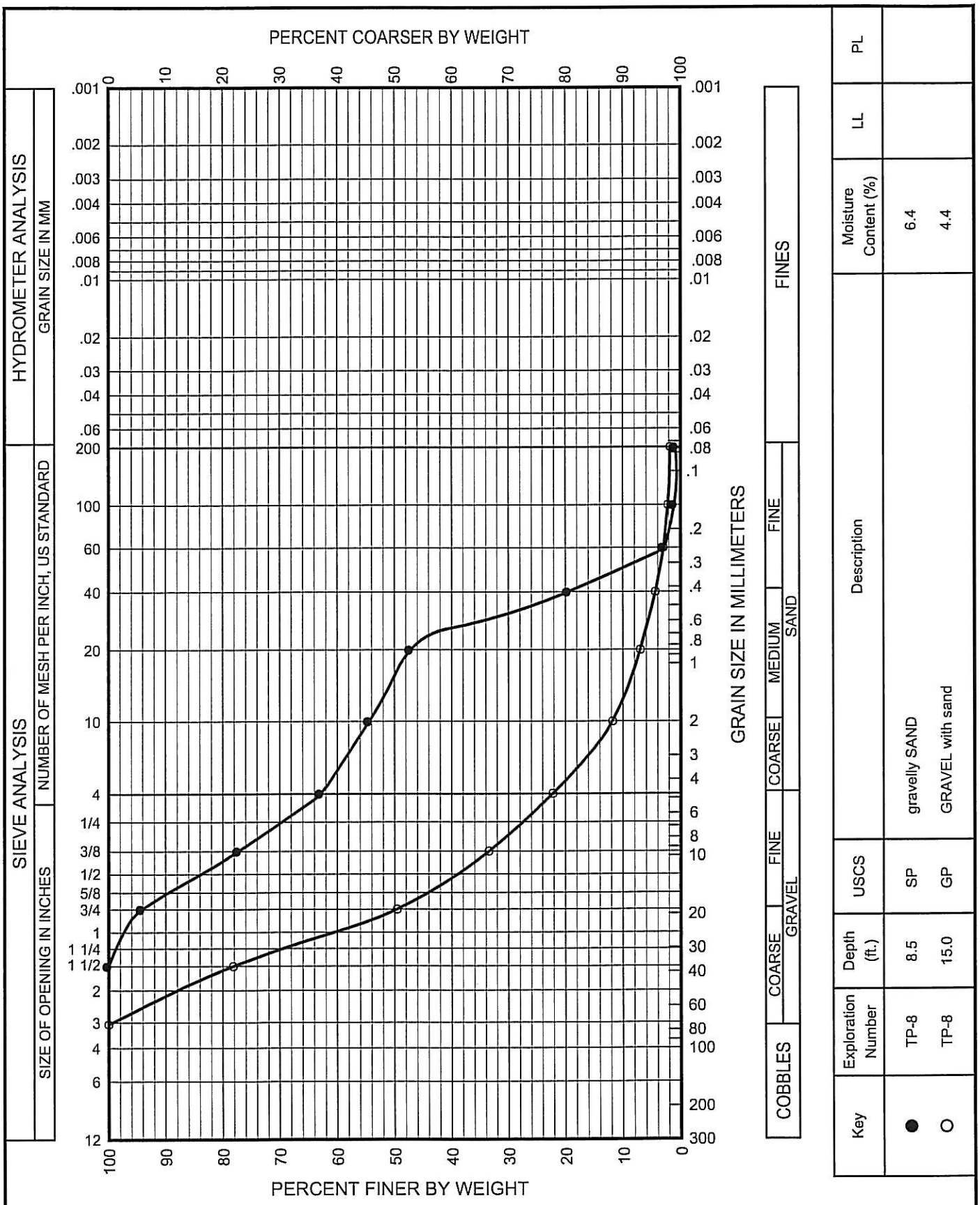
Depth (ft.)	Soil Description	Moisture Content (%)
0	18 to 24 inches FOREST DUFF with organics and roots, gravel, soft, wet.	
	Grayish-brown silty SAND with gravel, fine to medium grained, medium dense, moist. (SM)	5.8
5	Gray sandy GRAVEL to gravelly SAND, fine to coarse grained, trace cobbles, medium dense, moist to wet at 9 feet. (GP/SP)	4.3
10		5.1
	Test pit terminated at 11 feet. No groundwater seepage observed. Some test pit sidewall caving.	
15		
20		

Test Pit No. TP-14

Logged by: DPL
Date: 01/11/06

Approximate Elev.

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 to 24 inches FOREST DUFF with organics and roots, gravel, soft, wet.	
	Brown sandy GRAVEL, fine to coarse grained, medium dense, moist. (GP)	8.5
5	Gray sandy GRAVEL, fine to coarse grained, some cobbles, medium dense, moist to wet. (GP)	4.6
10		
	Test pit terminated at 11 feet. No groundwater seepage observed. Test pit sidewalls easily caved.	
15		
20		



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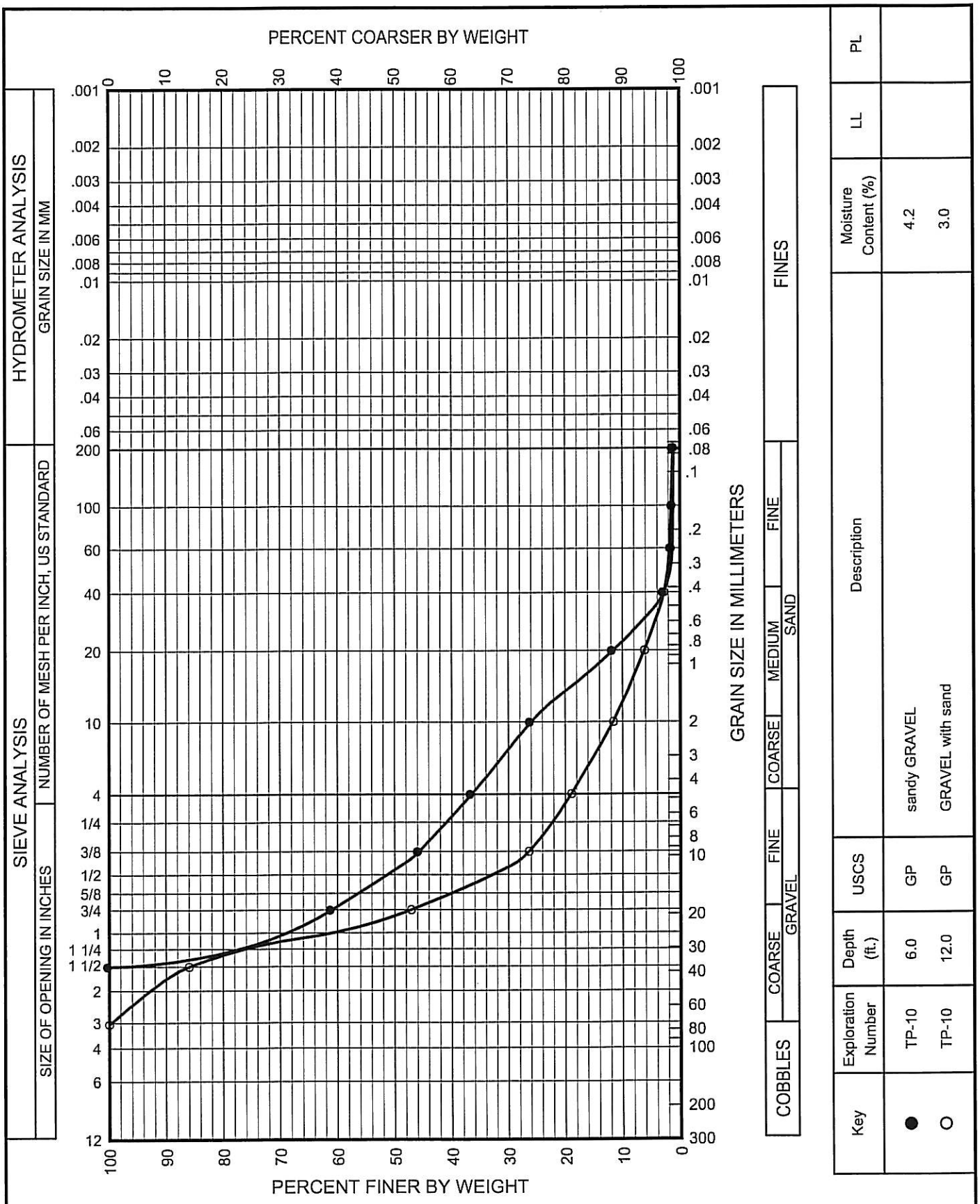
GRAIN SIZE ANALYSIS
INTERNATIONAL PLACE
DUPONT, WASHINGTON

Proj. No. T-5853 | Date JAN 2006 | Figure A-11



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GRAIN SIZE ANALYSIS
INTERNATIONAL PLACE
DUPONT, WASHINGTON

Proj. No. T-5853 | Date JAN 2006 | Figure A-12

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
	Fill
1	Medium dense, moist, dark brown, silty fine to medium SAND with gravel, minor organics.
2	
3	Roots from 2.5 to 4.5 feet.
4	
5	**Vashon Recessional Outwash**
6	Medium dense, moist, light brown, coarse SAND with gravel.
7	
8	
9	Medium dense, moist, gray, GRAVEL with medium to coarse sand.
10	Horizontal stratification.
11	
12	
13	Bottom of exploration pit at depth 12 feet No ground water. No seepage. Moderate caving.
14	
15	
16	
17	
18	
19	
20	

International Place
DuPont, WA

Logged by: MT

Approved by:

Associated Earth Sciences, Inc.

Project No. KE120002B

KCTP3 120002 B.GPJ February 27, 2012

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**
	Fill
1	Loose to medium dense, moist, dark brown, silty fine to medium SAND, minor organic content.
2	**Vashon Recessional Outwash**
3	Medium dense, moist, yellow brown, fine to medium sandy GRAVEL with cobbles, minor stratification.
4	
5	
6	More moist and trace silt below 6 feet.
7	
8	
9	
10	Medium dense, very moist, brown gray, sandy GRAVEL.
11	
12	Trace silt at 12 feet.
13	Bottom of exploration pit at depth 12 feet No ground water. No seepage. Caving below 4 feet.
14	
15	
16	
17	
18	
19	
20	

International Place
DuPont, WA

Logged by: MT

Approved by:

Associated Earth Sciences, Inc.

Project No. KE120002B

KCTP3 120002 B.GPJ February 27, 2012

LOG OF EXPLORATION PIT NO. EP-3

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
	Fill
1	Medium dense, moist, brown gray, fine to medium SAND with gravel, cobbles, minor organics.
2	
3	
4	
	Concrete pipe east-west through exploration pit.
5	
	Bottom of exploration pit at depth 5 feet No ground water. No seepage. Moderate caving.
6	
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19	
20	

International Place
DuPont, WA

Logged by: MT

Approved by:

Associated Earth Sciences, Inc.

Project No. KE120002B

KCTP3 120002.B.GPJ February 27, 2012

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

Fill - **3 inches pea gravel on surface.**

Vashon Recessional Outwash

1

Medium dense, moist, brown gray, GRAVEL with fine to coarse SAND, with gravel and cobbles.

2

3

Stratified with thin coarse sand lenses.

4

5

6

7

8

Bottom of exploration pit at depth 8 feet
No ground water. No seepage. Moderate caving.

9

10

11

12

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14

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16

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19

20

International Place
DuPont, WA

Logged by: MT

Approved by:

Associated Earth Sciences, Inc.

Project No. KE120002B

KCTP3 120002 B.GPJ February 27, 2012

LOG OF EXPLORATION PIT NO. EP-5

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
	DESCRIPTION
	Fill
1	Loose to medium dense, moist, dark brown, fine to medium SAND with gravel, trace silt, slightly organic.
2	
3	**Vashon Recessional Outwash**
4	Medium dense, moist, yellow brown, fine to coarse SAND with gravel, cobbles.
5	
6	
7	
8	
9	Bottom of exploration pit at depth 8 feet No ground water. No seepage. Moderate caving.
10	
11	
12	
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15	
16	
17	
18	
19	
20	

KCTP3 120002 B.GPJ February 27, 2012

International Place
DuPont, WA

Logged by: MT

Approved by:

Associated Earth Sciences, Inc.

Project No. KE120002B