March 29, 2011
Project No. KE100078A

Brandt Properties, LLC
22731 244th Avenue SE
Maple Valley, Washington 98038

Attention: Mr. Bob Costagna

Subject: Geologic Assessment and Site Reconnaissance
Wilderness Crossing
Maple Valley, Washington

Dear Mr. Costagna:

This letter presents the results of Associated Earth Sciences, Inc.'s (AESI's) site reconnaissance and subsurface exploration for the Wilderness Crossing project property located generally northeast of the intersection of Maple Valley-Black Diamond Road (SR 169) and SE 240th Way in Maple Valley, Washington (Figure 1). The site exploration was performed in general conformance with AESI's scope of work outlined in our proposal dated March 11, 2011. The subsurface exploration was intended to provide preliminary information related to fundamental geologic and hydrogeologic characterization of the site. The scope included preliminary interpretation of the site soils in relation to infiltration and the disturbance of the slope on the south side of the property.

PROJECT AND SITE DESCRIPTION

The project elements include single-family lots in the northeastern third of the property, multifamily units in generally the northwestern third of the property, and retail/office development in the southern third of the property. However this is subject to change as the project planning progresses.

The project property encompasses the following parcels listed generally from north to south: 1522069012, 1522069119, 1622069023, 1522069013, 1622069138, 1622069168, 1622069030, 2122069050, 2122069182, 222069072, and 8856971110. We understand that all of the parcels listed above, except Parcel No. 8856971110, will be developed. The site is bounded by SR 169 on the southwest, existing single-family residential development along the entire east side, SE

Cedar River Pipeline Road to the northeast, a gravel pit to the northwest, and partially developed residential parcels to the west. The south half of the site is transected by SE 240th Way.

Currently the subject site is covered with low growth vegetation and a well established forest of mostly evergreen trees with some deciduous trees. There is an understory of fern, sallal, Oregon grape, and other low shrubs, and an occasional young tree. The topography of the site is relatively flat adjacent to Highway 169 then slopes down to the east across the center of the site before flattening again on the east side of the site. Based on survey, the slope south of SE 240th Way is inclined from approximately 33 to 50 percent. The slope configuration is such that areas of slope with inclinations greater than 40 percent are separated by slope areas with inclinations less than 40 percent. The slope height generally ranges from approximately 24 to 32 feet.

SUBSURFACE EXPLORATION

AESI excavated a total of 10 backhoe exploration pits across the site on March 16, 2011. An attempt was made to place exploration pits near the location of proposed infiltration facilities.

The approximate locations of the pits are shown on the "Site and Exploration Plan," Figure 2. The pits were excavated using a tracked excavator and conditions in the pits were documented by an engineering geologist from our firm. Detailed descriptions of the sediments encountered in each exploration pit are provided on the exploration logs included in Appendix A.

Vashon Recessional Outwash

The natural sediments encountered throughout the site underlying the upper organic topsoil generally consist of medium dense to dense, moist, sand with gravel and scattered cobbles and small boulders, and trace amounts of silt. We interpret these sediments to be representative of Vashon recessional outwash. The soils within this unit were deposited in streams and rivers directly in front of the melting glacial ice during the Vashon Stade of the Fraser Glaciation, less than approximately 15,000 years ago. The recessional outwash extended beyond the maximum depth explored in our exploration pits.

Review of the regional geologic map previously noted indicates that the area of the subject site is underlain by Vashon-age recessional deposits. Our interpretation of the sediments encountered in our exploration pits is in general agreement with regional geologic mapping.

Ground Water

No ground water seepage was encountered in the exploration pits at the time of our field program. However, groundwater seepage can occur where water has infiltrated into the sub surface and become perched on low permeability soils.

It should be noted that the depth and occurrence of ground water seepage at the site may vary in response to changes in season, precipitation, and site use.

We also reviewed readily available literature concerning groundwater during this phase of our investigation which included the following:

- *Geology and Groundwater Resources of Southwestern King County, Washington*, Water-Supply Bulletin No 28, by J.E. Luzier, Department of Water Resources, dated 1969.

- The Pacific Northwest Center for Geologic Mapping Studies (GeoMapNW) web site (geomapnw.ess.washington.edu/).

- Washington State Department of Ecology Water Well Log web site (http://apps.ecy.wa.gov/welllog/).

- *The Hydrogeology of Rock Creek, Kent, Washington*, prepared for City of Kent, dated May 1, 2003.

Based on review of ground water literature for the site and vicinity, it appears the regional shallow ground water aquifer is inclined gently to the south. The ground water elevation varies generally from about 400 feet amsl immediately south of the site to about 390 feet amsl directly northwest of the gravel pit based on several nearby water wells. However, it should be noted that locally shallower aquifers can be present beneath the site where ground water may become perched above soils with low permeability, such a till.

Geologic Hazards

There is a slope that runs roughly parallel to Highway 169 that will be disturbed as part of the project. As noted in the Subsurface Exploration section of this letter the soils on site typically consist of sandy, fine to coarse gravel with scattered cobbles and boulders and are interpreted to be Vashon recessional outwash. This interpretation is consistent with the published geologic map of the area (Booth, 1995, *Surficial Geologic Map of the Maple Valley Quadrangle, King County, Washington).* Based on our reconnaissance of the slope, there is no ground water seepage emanating from the slope and the mature evergreen trees on the slope grow straight and upright and exhibit trunk diameters ranging from about 12 to 30 inches. We did not observe any indications of past or present, shallow or deep-seated slope movement.

Review of the City of Maple Valley Municipal Code (MVMC) Chapter 18.60.030 indicates the slopes on the subject site do not meet the criteria for a Landslide Hazard Area but those portions steeper than 40 percent meet the criteria of a Steep Slope Hazard Area (Chapter 18.60.250). The MVMC allows for alterations of steep slopes for approved mining and quarrying activities (18.60.250(D)(5) and provides an exemption for slopes steeper than 40 percent up to 20 feet high (18.60.250(E)(1) if a soils report prepared by a geologist or geotechnical engineer can demonstrate no adverse impact will result from the exemption.

Municipal codes strive to protect steep slopes due to the propensity for landslides to occur on steep slopes not because the slope provides any sort of special habitat. However, just because a slope is steep does not mean it is unstable. The slope inclination is not the only factor that determines if a landslide potentially can occur. In most cases three factors determine the potential for landslides to occur: 1) high slope inclination, 2) low soil strength and 3) ground water occurrence; and typically at least two out of the three factors are present when landslides happen. The slope on the subject site exhibits areas with inclinations greater than 40 percent but these areas are comprised of coarse granular soils that have high shear strength and do not exhibit

ground water seepage. In our professional opinion, the subject slope is stable and is not prone to landsliding even when disturbed.

In the sloping area of the subject site, the project proposes to eliminate the steep slope hazard by regrading the slope via cutting to lower grades adjacent to Highway 169 and using the cut material to fill the north side of the site. The top of the nearest steep slope area to Highway 169 is at least 100 feet from the edge of the right-of-way and the bottom of the nearest steep slope area to the adjacent residential development on the south end is at least 70 feet from the property line. Final grade transitions between Highway 169 on the west and 240th Boulevard SE on the east would be accomplished using engineered 2H:1V (Horizontal:Vertical) slopes, retaining walls or rockeries. In our opinion, if good construction practices are used and proper erosion control measures are implemented during construction, the proposed grading activities can be accomplished without having an adverse impact on the surrounding roads or properties. Furthermore, similar regrading activities have previously been allowed for the construction of SE 240th Way across this same slope.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

The soils found during our explorations are medium dense to dense and appear suitable for the support of foundations. Recommendations for foundation support, support of slab-on-grade floors are provided below.

Foundations

Conventional concrete spread footings may be used for foundation support. The spread footing foundations may gain soil bearing support within the site's medium dense to dense, natural recessional outwash soils below the top two feet. Alternatively, the foundations can be supported on structural fill (the existing site soils used as fill subsequent to compaction and testing).

For footings founded either directly upon the recessional outwash deposits, or on structural fill (recompacted existing site soils), we recommend that an allowable bearing pressure of 2,500 pounds per square foot (psf) be used for design purposes, including both dead and live loads. An increase of one-third may be used for short-term wind or seismic loading.

Perimeter footings for the proposed developement should be buried a minimum of 18 inches into the surrounding soil for frost protection. No minimum burial depth is required for interior footings; however, all footings must penetrate to the prescribed stratum, and no footings should be founded in or above loose, organic, or existing fill soils.

Anticipated settlement of footings founded as described above should be on the order of 1 inch or less. However, disturbed soil not removed from footing excavations prior to footing placement could result in increased settlements.

All footing areas should be observed by AESI prior to placing concrete to verify that the exposed soils can support the design foundation bearing capacity and that the soils encountered are similar to that encountered in our explorations.

Slab-on-Grade Floor Support

Slab-on-grade floors may be constructed either directly on the competent, undisturbed, natural glacial sediments, or on structural fill placed over these materials. Areas of the slab subgrade that are disturbed (loosened) during construction should be recompacted to an unyielding condition prior to placing the pea gravel capillary break material, as described below.

Preliminary Infiltration

As part of the current scope of work a preliminary infiltration was requested from the civil engineer to evaluate t he potential for stormwater infiltration. Therefore, preliminary long-term infiltration rates were estimated from the results of three sieve analyses. A method from the Washington State Department of Ecology's (Ecology's) Alternative Recommended Infiltration Rates based on American Society for Testing and Materials (ASTM) Gradation Testing (Table 3.8, Ecology *Stormwater Management Manual for Western Washington* [SWMM], 2005) was used to determine a preliminary infiltration rate. Preliminary infiltration rate estimates under the ASTM Methodology are based on the grain size of the D_{10} (the diameter at which 10 percent of the sample passes) for a grain size analysis of the proposed receptor soils. Preliminary long-term design infiltration rates based on the grain size analyses for three samples of the proposed stormwater receptor soils are presented in Table 1 below.

Table 1. ASTM Methodology: Preliminary Long-Term Design Infiltration Rates

Sample	Sample Depth	D_{10} Size (mm)	Estimated Long-Term Design Infiltration Rate (inches/hour)
EP-2	10	0.15	2
EP-3	5.5	0.6	9
EP-6	5	0.6	9

These rates should be verified by field testing methods once the potential locations for stormwater infiltration are determined.

Conclusion

This letter summarizes the results of our limited subsurface exploration and evaluation for the site. A full-scale geotechnical report was not requested at this time, but is recommended. At the time of this letter, site grading, development plans, and construction methods have not been finalized. We recommend that AESI perform a geotechnical review of the plans prior to final design completion. In this way, recommendations may be properly interpreted and implemented in the design.

We have enjoyed working with you on this evaluation. Please contact us if you have any questions or if we can be of additional help to you.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Frank S. Mocker, P.G., P.E.G.
Senior Staff Geologist

Matthew A. Miller, P.E.
Senior Associate Engineer

Attachments: Figure 1: Vicinity Map
Figure 2: Site Plan

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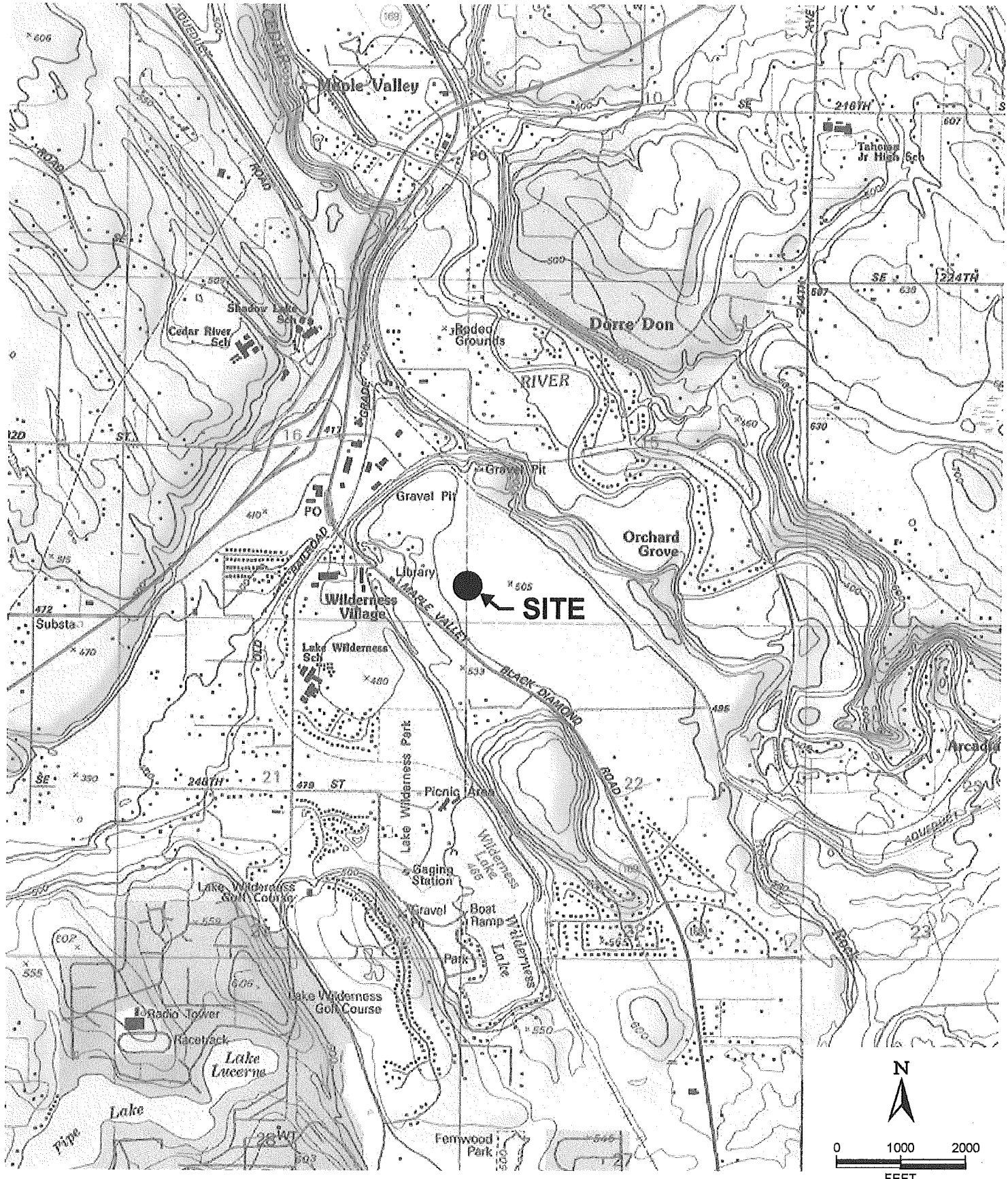


REFERENCE: USGS TOPO!

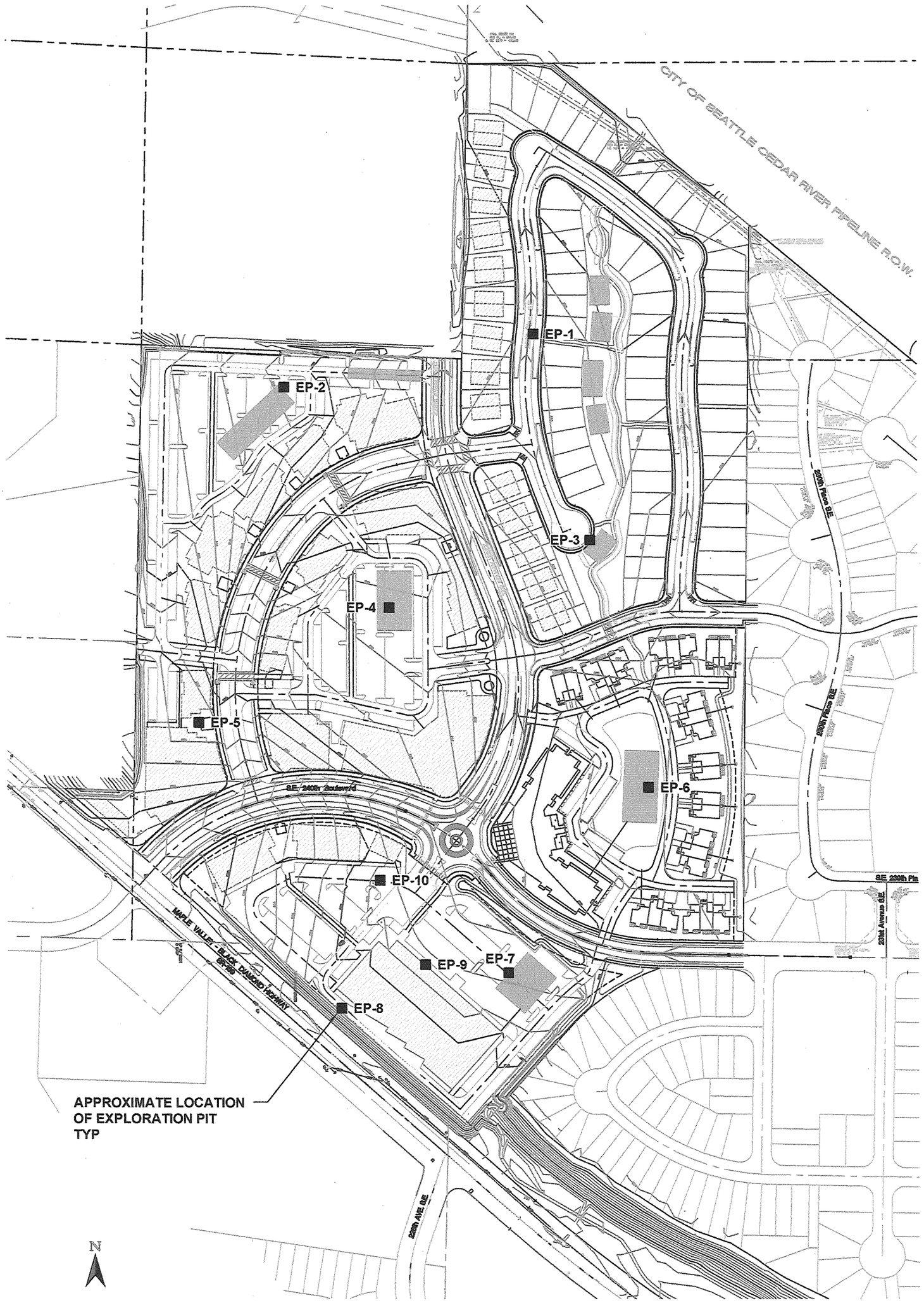
Associated Earth Sciences, Inc.

VICINITY MAP

WILDERNESS CROSSING
MAPLE VALLEY, WASHINGTON

FIGURE 1
DATE 3/11
PROJ. NO. KE100078A

100078 Wilderness Crossing \ 100078 Vicinity.cdr



REFERENCE: DMP, INC.

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SITE AND EXPLORATION PLAN

WILDERNESS CROSSING
MAPLE VALLEY, WASHINGTON

FIGURE 2
DATE 3/11
PROJECT NO. KE100078A

100078 Wilderness Crossing \ 100078 Site and Expl.dwg LAYOUT: aesl

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

Weathered Vashon Recessional Outwash

Loose, moist, reddish brown, non-stratified, fine to coarse SAND, few to little silt, few organics (roots), some fine to coarse rounded gravel, iron oxide staining.

Vashon Recessional Outwash

Loose to medium dense, moist, yellowish olive, stratified, fine to coarse SAND, with fine to coarse rounded gravel, trace cobble, trace to few silt, varies to fine to coarse rounded GRAVEL and fine to coarse SAND, trace silt, trace cobble, trace small boulder.

Bottom of exploration pit at depth 11 feet
No ground water. Slight caving.

Coordinates: N 47.39028
W 122.03665

Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

Logged by: FSM

Approved by:

Project No. KE100078A

3/16/11

KCTP3 100078A.GPJ March 18, 2011

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

Loose, moist, reddish brown, non-stratified, silty SAND, little to some rounded fine to coarse gravel, trace cobble, few organics (roots).

Vashon Recessional Outwash

Medium dense, moist, grayish olive, stratified, fine to coarse SAND, with fine to coarse rounded gravel, trace cobble, roots in upper 12 to 18 inches, varies to fine to coarse GRAVEL, some sand, trace silt, trace cobble, trace small boulder.

Vashon Recessional Outwash

Medium dense, moist, light grayish olive, stratified, fine to medium SAND, trace silt, trace fine gravel.

Bottom of exploration pit at depth 10 feet
No ground water. Slight caving.

Coordinates: N 47.38995
W 122.03874

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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Project No. KE100078A

3/16/11

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LOG OF EXPLORATION PIT NO. EP-3

Depth (ft)

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

DESCRIPTION

Topsoil

Weathered Vashon Recessional Outwash

1 Loose, moist, reddish brown, non-stratified, fine to coarse SAND, some silt, little gravel, trace cobble, trace organics.

2

Vashon Recessional Outwash

3 Medium dense, moist, light grayish olive, stratified, fine to coarse rounded GRAVEL, trace to few rounded cobble, trace small boulder, some sand, trace organics (rootlets) upper 18 inches.

4

5

6 At ~6 feet, increase to few cobbles and small boulders.

7

8

9 At ~9 feet, decrease to trace cobbles.

10 At ~10 feet, thin (~6 inches) open works gravel lens across on end of pit.

11

12

13 Bottom of exploration pit at depth 12 feet
No ground water. Slight caving.

14 Coordinates: N 47.38910
W 122.03615

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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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Approved by:

Project No. KE100078A

3/16/11

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

Weathered Vashon Recessional Outwash

1 — Loose, moist, reddish brown, non-stratified, silty SAND, little gravel, trace cobble, trace organics (roots).

2 —

Vashon Recessional Outwash

3 — Medium dense, moist, light grayish olive, stratified, fine to coarse rounded GRAVEL, some fine to coarse sand, trace silt, trace organics (roots) upper 12 inches, varies to fine to coarse SAND, with gravel, trace silt, trace cobbles, trace small boulder.

4 — Iron oxide staining upper 3 feet.

5 —

6 —

7 —

8 —

9 —

10 —

11 —

12 — Bottom of exploration pit at depth 11 feet
No ground water. Slight caving.

13 — Coordinates: N 47.38809
W 122.03783

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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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Project No. KE100078A

3/16/11

KCTP3 100078A.GPJ March 18, 2011

LOG OF EXPLORATION PIT NO. EP-5

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

Depth (ft)	DESCRIPTION
1	**Fill/Weathered Vashon Recessional Outwash** Loose to medium dense, moist, brownish olive, non-stratified, fine to coarse GRAVEL, some sand, trace cobble, trace organics (rootlets).
2	**Vashon Recessional Outwash** Medium dense, moist, grayish olive, stratified, fine to coarse rounded GRAVEL, some fine to coarse sand, trace silt, few cobble, trace small boulder, trace organics (rootlets) upper 18 inches.
3	
4	
5	
6	At 6 feet, cleaner gravel interbed.
7	At ~7 feet, becomes fine to coarse SAND, few fine to coarse rounded gravel, trace silt.
8	
9	
10	
11	Bottom of exploration pit at depth 10 feet No ground water. Moderate caving.
12	Coordinates: N 47.38801 W 122.03942
13	
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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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Project No. KE100078A

3/16/11

KCTP3 100078A.GPJ March 18, 2011

LOG OF EXPLORATION PIT NO. EP-6

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 simplfication of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Topsoil
1	**Weathered Vashon Recessional Outwash**
2	Loose, moist, reddish brown, non-stratified, fine to coarse SAND, little to some silt, little gravel, trace cobble, trace organics (roots).
	Vashon Recessional Outwash
3	Medium dense, moist, light grayish olive, stratified, fine to coarse rounded GRAVEL, some fine to coarse sand, fine to coarse rounded cobble, trace small rounded boulder, varies to fine to coarse
4	SAND, little to some fine to coarse gravel, trace cobble, trace silt, trace rootlets in upper 18 inches.
5	
6	
7	
8	
9	At ~9 feet, becomes less cobbly.
10	
11	Bottom of exploration pit at depth 10 feet No ground water. Moderate caving.
12	Coordinates: N 47.38768 W 122.03503
13	
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Wilderness Crossing
Maple Valley, WA

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Project No. KE100078A

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KCTP3 100078A.GPJ March 18, 2011

LOG OF EXPLORATION PIT NO. EP-7

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

Weathered Vashon Recessional Outwash

1 — Loose, moist, reddish brown, fine to coarse SAND, some silt, little gravel, trace organics (roots), trace cobble.

2

Vashon Recessional Outwash

3 — Medium dense, moist, grayish olive, stratified, fine to coarse SAND, with fine to coarse rounded gravel, trace silt, trace cobble, trace small boulder, trace organics (rootlets) in upper 3 feet.

4

5

6 — At ~6 feet, varies to fine to coarse rounded GRAVEL, some sand, few cobbles, trace silt.

7

8

9

10 — Bottom of exploration pit at depth 9 feet
No ground water. Slight caving.

11 — Coordinates: N 47.38660
W 122.03679

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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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Project No. KE100078A

3/16/11

LOG OF EXPLORATION PIT NO. EP-8

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

1

Vashon Recessional Outwash

Medium dense, moist, grayish olive, stratified, fine to coarse rounded GRAVEL, some fine to coarse sand, trace silt, trace to few cobble, trace small boulder, rootlets and iron oxide staining in upper 18 inches.

2

3

Contains occasional thin (<12 inches) clean gravel lenses/interbeds.

4

5

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7

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9

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12

Bottom of exploration pit at depth 12 feet
No ground water. Moderate caving.

13

Coordinates: N 47.38638
W 122.03819

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Wilderness Crossing
Maple Valley, WA

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LOG OF EXPLORATION PIT NO. EP-9

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

Colluvium

1 Loose, moist, reddish brown, massive, fine to medium SAND, few to little silt, trace organics (roots).

2

Vashon Recessional Outwash

3 Loose to medium dense, moist, light greenish gray, stratified, fine to medium SAND, trace silt.

4

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Bottom of exploration pit at depth 12 feet
No ground water. Severe caving while at 12 feet.

13

Coordinates: N 47.08664
W 122.03749

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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

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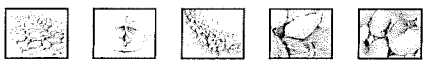
Approved by:



Project No. KE100078A

3/16/11

LOG OF EXPLORATION PIT NO. EP-10

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 simplfication of actual conditions encountered.

DESCRIPTION

Topsoil

1

Colluvium

Loose to medium dense, moist, brownish orange, stratified, fine to coarse SAND, with fine to coarse rounded gravel, few to little silt, trace organics, upper and lower contacts are subparallel with sloping ground surface (rootlets).

2

3

4

5

Vashon Recessional Outwash

Medium dense, moist, brownish olive to light grayish olive, stratified, fine to coarse SAND, little to some fine to coarse rounded gravel, trace to few silt, trace organics, lower contact is subhorizontal (rootlets).

6

7

8

Vashon Recessional Outwash

Medium dense, moist, brownish olive, stratified, fine to medium SAND, trace silt, trace fine gravel.

9

10

11

12

Bottom of exploration pit at depth 12 feet
No ground water. Slight caving.

13

Coordinates: N 47.38712
W 122.03788

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Wilderness Crossing
Maple Valley, WA

Associated Earth Sciences, Inc.

Logged by: FSM

Approved by:

Project No. KE100078A

3/16/11

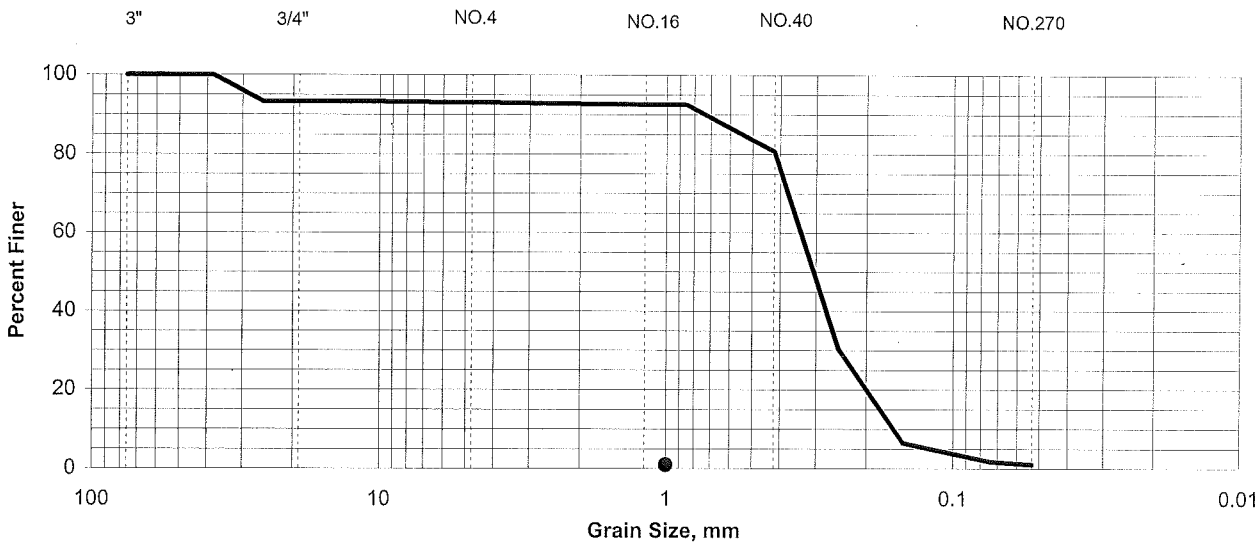
GRAIN SIZE ANALYSIS - MECHANICAL

Date	Project	Project No.		Soil Description
3/17/2011	**Wilderness Crossing**	**KE100078A**		**Sand few gravel trace silt**
Tested By	Location	EB/EP No	Depth	
MS	**Onsite**	**EP-2**	**10'**	

Wt. of moisture wet sample + Tare	507.34	Total Sample Tare	336.5
Wt. of moisture dry Sample + Tare	464.86	Total Sample wt + tare	979.49
Wt. of Tare	94.87	Total Sample Wt	643.0
Wt. of moisture Dry Sample	369.99	Total Sample Dry Wt	576.8
Moisture %	11%		

					Specification Requirements	
Sieve No.	Diam. (mm)	Wt. Retained (g)	% Retained	% Passing	Minimum	Maximum
3	76.1		0.0	100.0		
2.5	64		0.0	100.0		
2	50.8		0.0	100.0		
1.5	38.1		0.0	100.0		
1	25.4	38.85	6.7	93.3		
3/4	19	38.85	6.7	93.3		
3/8	9.51	38.85	6.7	93.3		
#4	4.76	39.97	6.9	93.1		
#8	2.38	41.45	7.2	92.8		
#10	2	41.85	7.3	92.7		
#20	0.85	43.29	7.5	92.5		
#40	0.42	111.27	19.3	80.7		
#60	0.25	401.74	69.7	30.3		
#100	0.149	539.13	93.5	6.5		
#200	0.074	566.44	98.2	1.8		
#270	0.053	570.53	98.9	1.1		

US STANDARD SIEVE NOS.



ASSOCIATED EARTH SCIENCES, INC.

911 5th Ave., Suite 100 Kirkland, WA 98033 425-827-7701 FAX 425-827-5424

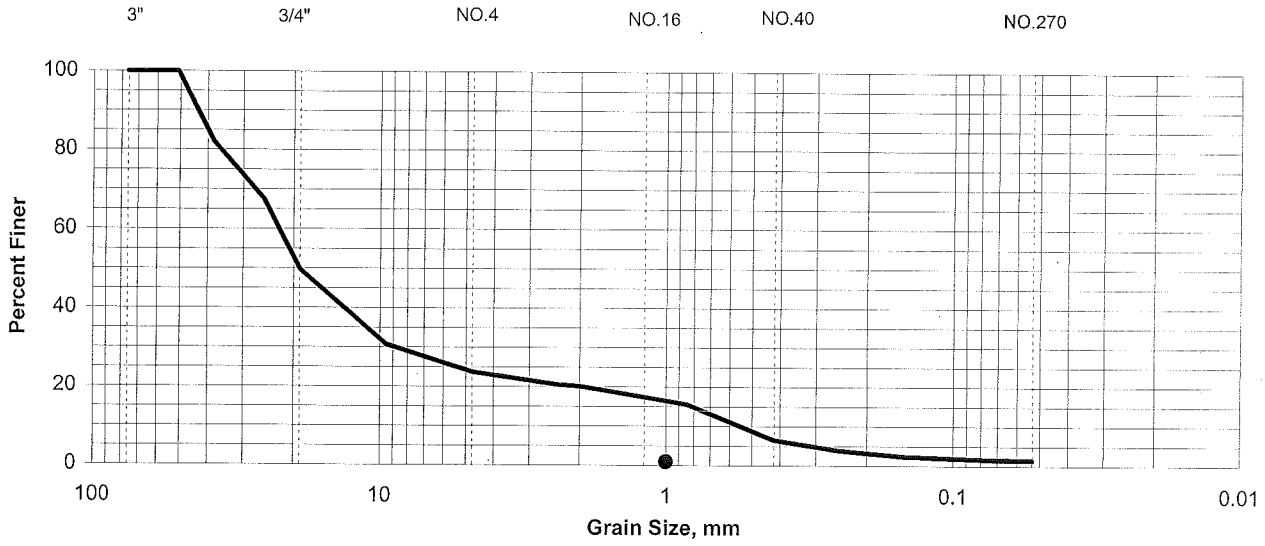
GRAIN SIZE ANALYSIS - MECHANICAL

Date	Project	Project No.		Soil Description
3/17/2011	**Wilderness Crossing**	**KE100078A**		
Tested By	Location	EB/EP No	Depth	**Gravel little sand trace silt**
MS	**Onsite**	**EP-3**	**5.5'**	

Wt. of moisture wet sample + Tare	604.1	Total Sample Tare	519.81
Wt. of moisture dry Sample + Tare	584.39	Total Sample wt + tare	2007.11
Wt. of Tare	100.77	Total Sample Wt	1487.3
Wt. of moisture Dry Sample	483.62	Total Sample Dry Wt	1429.1
Moisture %	4%		

					Specification Requirements	
Sieve No.	Diam. (mm)	Wt. Retained (g)	% Retained	% Passing	Minimum	Maximum
3	76.1		0.0	100.0		
2.5	64		0.0	100.0		
2	50.8		0.0	100.0		
1.5	38.1	256.09	17.9	82.1		
1	25.4	463.94	32.5	67.5		
3/4	19	716.88	50.2	49.8		
3/8	9.51	990.07	69.3	30.7		
#4	4.76	1089.75	76.3	23.7		
#8	2.38	1135.27	79.4	20.6		
#10	2	1140.95	79.8	20.2		
#20	0.85	1206.13	84.4	15.6		
#40	0.42	1335.68	93.5	6.5		
#60	0.25	1373.2	96.1	3.9		
#100	0.149	1394.08	97.6	2.4		
#200	0.074	1405.4	98.3	1.7		
#270	0.053	1407.82	98.5	1.5		

US STANDARD SIEVE NOS.



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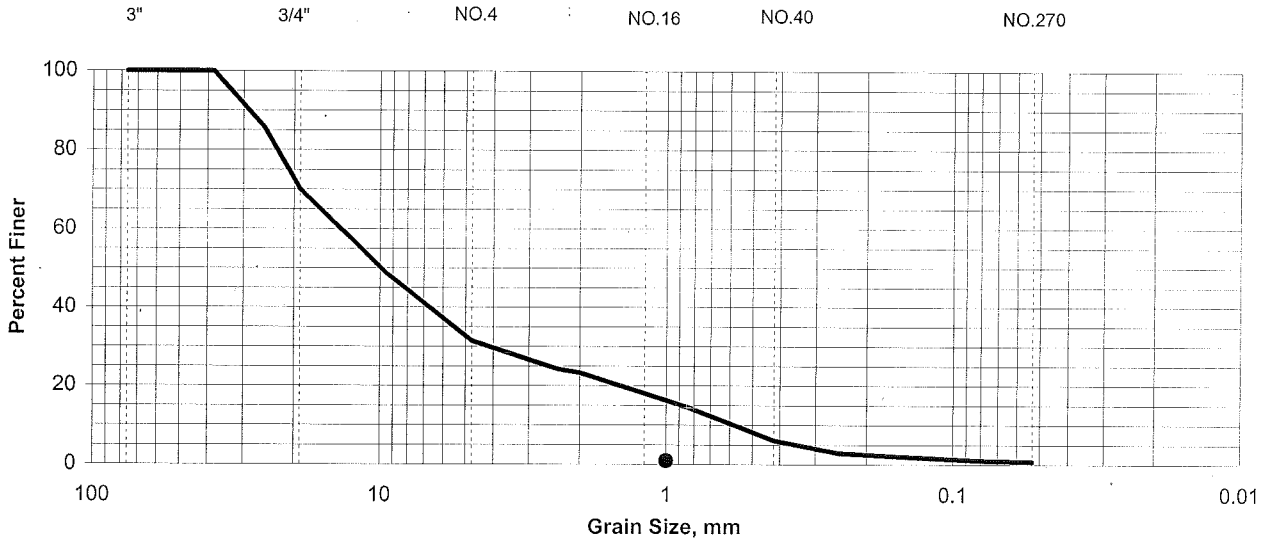
GRAIN SIZE ANALYSIS - MECHANICAL

Date	Project	Project No.		Soil Description
3/17/2011	**Wilderness Crossing**	**KE100078A**		
Tested By	Location	EB/EP No	Depth	**Gravel with sand trace silt**
MS	**Onsite**	**EP-6**	**5'**	

Wt. of moisture wet sample + Tare	603.93	Total Sample Tare	395.77
Wt. of moisture dry Sample + Tare	577.79	Total Sample wt + tare	1541.24
Wt. of Tare	101.78	Total Sample Wt	1145.5
Wt. of moisture Dry Sample	476.01	Total Sample Dry Wt	1085.8
Moisture %	5%		

					Specification Requirements	
Sieve No.	Diam. (mm)	Wt. Retained (g)	% Retained	% Passing	Minimum	Maximum
3	76.1		0.0	100.0		
2.5	64		0.0	100.0		
2	50.8		0.0	100.0		
1.5	38.1		0.0	100.0		
1	25.4	155.59	14.3	85.7		
3/4	19	325.26	30.0	70.0		
3/8	9.51	555.88	51.2	48.8		
#4	4.76	744.23	68.5	31.5		
#8	2.38	822.96	75.8	24.2		
#10	2	832.64	76.7	23.3		
#20	0.85	926.94	85.4	14.6		
#40	0.42	1019.87	93.9	6.1		
#60	0.25	1053.94	97.1	2.9		
#100	0.149	1063.36	97.9	2.1		
#200	0.074	1075.51	99.0	1.0		
#270	0.053	1077.45	99.2	0.8		

US STANDARD SIEVE NOS.



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