Preliminary Geotechnical Report

Proposed Skagit Valley YMCA Facility
1901 Hoag Road
Mount Vernon, Washington

for
Skagit Valley YMCA

February 9, 2017

GeoEngineers
Earth Science + Technology

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1901 Hoag Road
Mount Vernon, Washington

File No. 22760-001-00

February 9, 2017

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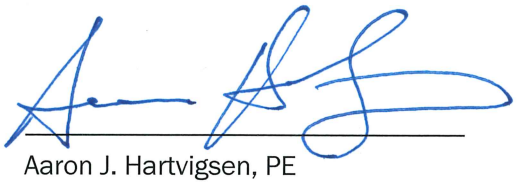

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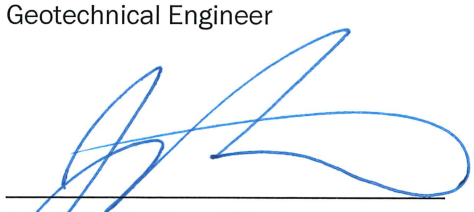

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INTRODUCTION AND SCOPE

This report presents a description of the site conditions and preliminary geotechnical engineering conclusions and recommendations for the proposed Skagit Valley Family YMCA development at 1901 Hoag Road in Mount Vernon, Washington. The project location is shown in the Vicinity Map, Figure 1.

We understand that the proposed site facility will include construction of a new two-story structure with a total proposed floor area of approximately 60,000 square feet. The new building will include a pool, gymnasium, teen center and administrative offices. Another single-story structure will be constructed to house an early childhood education center. Other site improvements will include a paved parking lot, access driveways, landscaping, and stormwater improvements.

GeoEngineers previously completed a geotechnical exploration program for the project site for a potential buyer. We completed 6 borings to depths of 11½ to 36½ feet below the ground surface (bgs). The results of that study were never published.

The existing site conditions and locations of the previous explorations are shown in the Site and Exploration Plan, Figure 2. Our scope of services for this submittal included reviewing existing information and providing preliminary geotechnical conclusions and recommendations for the proposed site development. This report can be used for permitting assistance and preliminary planning by the design team. Additional exploration and design level conclusions and recommendations will be necessary prior to final design. Our specific scope of services is described in our proposal for the project dated January 6, 2017.

SITE CONDITIONS

General

Based on our previous work at the site, we understand that the site has been used as a "disposal site" for materials excavated from other site(s) in the vicinity. Based on local anecdotal information, most of the material may have been strippings from the adjacent site. It appears that the original topography sloped more steeply downward to the northwest, and based on the existing topography (Figure 2) it appears that the fill soils were placed across the entire upland portion of the site with an increased thickness toward the northwest. Some potential fill/disturbed soils were identified in boring B-1 that may or may not be related to the main fill event, or might be associated with installation of the sanitary sewer shown in Figure 2.

Geology

We reviewed a U.S. Geologic (USGS) map for the project area, "Surficial Geologic Map of the Port Townsend 30- by 60-Minute Quadrangle, Puget Sound Region, Washington" by Pessl, Dethier, Booth, and Minard (1989). The geologic soil deposits are the result of both glacial and non-glacial processes that have occurred during the last 12,000 years. The most recent glacial event includes the Vashon Stade of the Fraser Glaciation. Sea level fluctuated significantly relative to the land surface and present day sea level, in response to the glacial advance and retreat (melting).

Recessional marine drift (RMD) is mapped at the site. RMD is a glaciomarine drift that typically consists of unsorted, unstratified silt and clay with varying amounts of sand, gravel, cobbles and occasional boulders. RMD is derived from sediment melted out of floating glacial ice that was deposited on the sea floor during

periods of glacial retreat, while the land surface was depressed 500 to 600 feet below present levels from previous glaciations. This material locally contains shells and wood, and large erratics (boulders) can be present sporadically or even in a cluster.

The upper 5 to 15 feet of the RMD unit in upland areas is typically stiff. This is generally attributed to desiccation, although some consolidation from ice-contact loading may have occurred. The stiff layer possesses relatively high shear strength and low compressibility characteristics. The stiff layer typically grades with increasing depth to medium stiff or even soft to very soft, gray, clay with varying amounts of sand and gravel and occasional boulders. In contrast to the upper portion of this unit, the medium stiff to very soft glaciomarine drift possesses relatively low shear strength and moderate to high compressibility characteristics. Performance of large and/or deep foundation loads can be impacted by this lower compressible unit.

Advance outwash is not mapped as an exposed geologic unit in the area; however, we interpret the sand unit encountered below the RMD in B-1 and B-6 to consist of this geologic unit. Advance outwash is a sand unit that was fluvially deposited in front of the glaciers and then overridden during the Vashon Stade glaciation.

Surface Conditions

The site is currently undeveloped with open fields and is bounded by Hoag Road to the south, a church to the east, single family residences to the south and northeast, and undeveloped property to the north and west. Skagit River is located approximately 800 feet northwest. The site slopes moderately downward starting from the southeast corner of the site, with a steeper gradient noted as shown in Figure 2 that would suggest that this is the edge of the previous fill area. Vegetation at the site is primarily well maintained field grass.

Subsurface Explorations

Subsurface soil and groundwater conditions were previously evaluated by drilling 6 borings using a subcontracted drill rig on November 1, 2011. The borings were completed to depths ranging from 11½ to 36½ feet bgs. The approximate locations of the borings are shown in Figure 2. Details of the field exploration program, laboratory testing, and the boring logs are presented in Appendix A.

Subsurface Conditions

Soil Conditions

The subsurface soil profile at the boring locations generally consisted of sod overlying fill overlying recessional marine drift, overlying advance outwash. The thickness of the sod layer at our boring locations ranged from 1 to 4-inches.

Fill

Fill soils were observed underlying sod, in all of our boring locations, to depths ranging from 2½ to 5½ feet bgs. The fill material generally consisted of medium stiff to very stiff sandy silt with variable gravel content or medium dense silty fine sand. Occasional organic matter was observed in some of the fill in the small boring samples recovered; we understand that this fill may include strippings from the adjacent site. We recommend that test pits be completed during the geotechnical design phase to better understand the mineral and organic characteristics of the fill soils. Underlying the fill in borings B-4 and B-5, it appears that

a relict topsoil layer was encountered ranging in thickness from 6 inches to 2 feet. The fill has variable, but generally low shear strength and moderate compressibility characteristics.

Recessional Marine Drift

Beneath the fill or relict topsoil, stiff to very stiff silty clay/find sandy silt and medium dense silty sand representative of RMD was encountered to the full depth explored in borings B-2 through B-5. The RMD extended to depths of 18 and 27½ feet in B-1 and B-6, respectively. The RMD did not grade softer with depth as is sometimes observed in this unit. Therefore, this unit has reasonably uniform high shear strength, low compressibility, and low permeability characteristics.

Advance Outwash

Underlying the RMD in B-1 and B-6, advance outwash was observed to the full depth explored. This unit generally consisted of medium to very dense fine to medium sand, sand with silt, and silty fine sand with occasional gravel. This unit has high shear strength and low compressibility characteristics. The clean sand (SP) has moderate permeability while the silty sand will have relatively low permeability.

Groundwater Conditions

Groundwater seepage was encountered in B-1 and B-6 at approximate depths 11 and 29½ feet bgs (Elevation 26 and 20½ feet, respectively). We interpret the groundwater observed in B-1 as a perched condition, although Elevation 20 may represent the regional water table. No groundwater seepage was observed in borings B-2 through B 5. Perched groundwater conditions should be expected to occur at the contact between the fill and above the RMD during winter months. Groundwater conditions should be expected to vary as a function of season and precipitation and other factors.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

General

The preliminary geotechnical considerations are provided in the following sections. The preliminary conclusions are presented for planning purposes only and are not considered appropriate for final design or construction. A design report will be prepared as the project design and team collaboration move forward.

Seismic Considerations

The site conditions are not susceptible to liquefaction. The 2015 International Building Code (IBC) is the appropriate building code for development at the site. We recommend a seismic site class D for design.

Building Support

The final building location and finished floor elevations have not been determined. If it can be accommodated when considering other project objectives, we suggest that elevations be selected to optimize the required cuts and fills at the site and reaching the bearing layer to minimize earthwork costs. The main consideration is that the upper 2½ to 6½ feet of fill soils/relict topsoil are not suitable for bearing without some kind of mitigation.

Shallow Foundations

- Conventional shallow foundation design can be appropriate for the buildings if founded on the native soils. Based on the sloping ground surface and presence of uncontrolled fill, overexcavation will be required to reach the bearing layer.
    - We expect that the gymnasium will need to be supported by the native soils and/or structural fill over the native soils because of the high loads typically associated with this type of building.
- It may be possible to use alternative mitigation strategies for the proposed one- to two-story structure. Some options could include a partial overexcavation if no significant organic matter is identified in the native soils, designing the footings as grade beams, or using a structural mat foundation.

Slab-on-Grade Support

- We expect that conventional slab-on-grade design can be used, although there is risk of some settlement if founded on the existing fill soils. If fill is left in place, some mitigation will be necessary. Steel reinforcement and possibly a structural slab may be appropriate if fill is left in place. If overexcavation and replacement of fill soils over the entire building footprint is completed, then all slabs may be conventional slab-on-grade.

Groundwater Considerations

- Based on our current knowledge of groundwater conditions, perimeter footing drains and subsurface wall drains will be adequate to manage groundwater seepage. The pool should also include a perimeter drain.

Earthwork Considerations

- A sod and topsoil layer was encountered in all the explorations. Therefore, stripping is necessary beneath building and pavement areas.
- Excavations will be required to remove fill soils, install utilities, and to construct the planned pool area. It is possible that significant overexcavation of the existing fill and/or relict topsoil horizons may be necessary. We recommend that we collaborate with the design team early in the pre-design process to minimize cost impacts.
- Structural fill should consist of select import fill. The on-site soils will not be suitable for reuse as fill.
- We do not anticipate that extensive dewatering will be required during construction and that sumps and pumps will be sufficient to manage seepage.
- Temporary excavations into the soil at the site should be in accordance with appropriate local, state and federal regulations. Based on the soils encountered, temporary excavations can be planned at an inclination of 0.75H:1V (Horizontal:Vertical) if stiff clay soils are encountered. Temporary excavations in fill at the site can be planned at an inclination of 1.5H:1V.
- The site soils have a high susceptibility to erosion when disturbed. During wet weather, the upper silty/clay soils become muddy and trafficability will be very difficult to impossible with rubber tired equipment and considerable disturbance will occur.
- Providing gravel “working mats” over areas of prepared subgrade, and providing haul roads for wet weather construction will be required if site work is completed during wet weather.

- Appropriate best management practices (BMPs) should be incorporated into the temporary erosion and sediment control plan by the civil engineer.

Stormwater Considerations

- Stormwater infiltration is not feasible based on the soil conditions observed.
    - We understand that a conventional stormwater pond is planned.

Recommended Additional Geotechnical Services

We recommend that GeoEngineers collaborate with the design team to optimize foundation design and minimize earthwork costs. At the conclusions of design, we will provide a design report once the location has been finalized and project elements are coordinated with the civil, structural engineer and other members of the design team.

LIMITATIONS

We have prepared this report for use by the Skagit Valley YMCA, Underwood & Associates LLC, and other members of the design team for use in planning for the proposed 1901 Hoag Road Facility. This report is not intended for design.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

FIGURES

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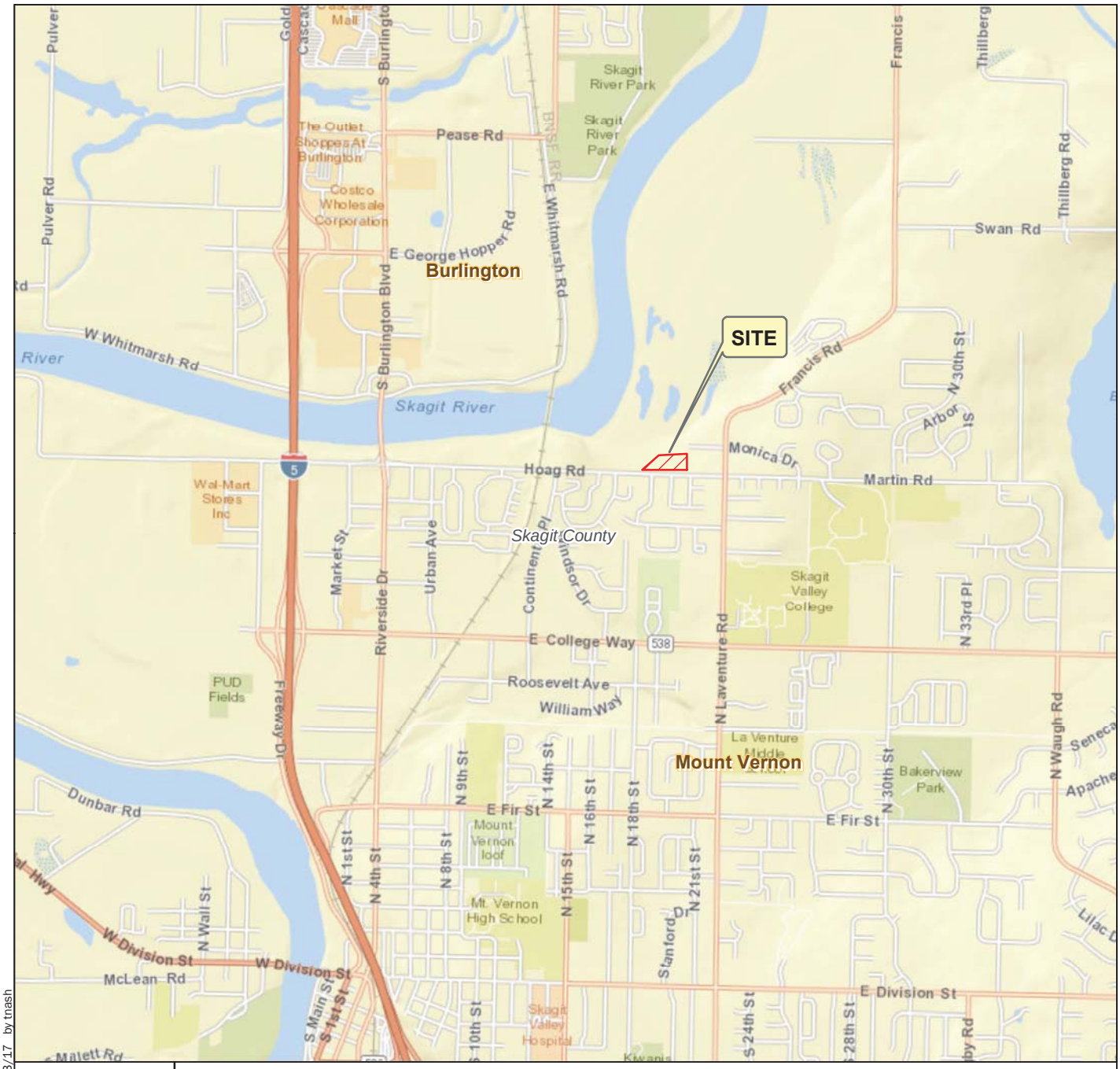

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2,000 0 2,000

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Vicinity Map

Skagit Valley Family YMCA, 1901 Hoag Rd
Mt Vernon, Washington

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Figure 1

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Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background survey from Lisser & Asociates, PLLC, Surveying & Land use Consultation dated 01/20/2017

Projection: NAD83 Washington State Plane, North Zone, US Foot

Legend

Site Boundary

B-1 Boring by GeoEngineers, 2011

N W E S

80 0 80
Feet

Site Plan

Skagit Valley Family YMCA, 1901 Hoag Rd
Mt Vernon, Washington

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Figure 2

P:\22\22760001\CAD\00\GeoTech\276000100_F02_Site Plan.dwg TAB:F02 Date Exported: 01/27/17 - 12:35 by cstickel

APPENDICES

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APPENDIX A
Previous Field Explorations and Laboratory Testing

APPENDIX A
PREVIOUS FIELD EXPLORATIONS AND LABORATORY TESTING

Field Explorations

Subsurface conditions were evaluated by completing 6 borings (B-1 through B-6) on November 1, 2011 for a different project proposed at the site. The borings were completed to depths ranging from approximately 11½ to 36½ feet below the existing ground surface (bgs) by using a track-mounted drill rig subcontracted to GeoEngineers. The locations of the explorations are shown in the Site and Exploration Plan (Figure 2). The locations of the explorations were determined by GPS/iPad and taping from existing features. The locations should be considered accurate to the degree implied by the method used. Ground surface elevations were estimated from Google Earth and should be considered approximate.

Borings

Soil samples from the borings were obtained using the Standard Penetration Test (SPT) method. This method involves driving a split-spoon sampler a total of 18 inches using a 140-pound rope and cathead hammer free falling 30 inches. The number of blows required to drive the sampler the last 12 inches are recorded on the boring logs. The soil samples were placed in plastic bags to maintain the moisture content and transported back to our laboratory for analysis and testing.

The soil borings were continuously monitored by a geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions, and prepared a detailed log of each exploration. Soils were visually classified in general accordance with ASTM D-2488-90, which is described in Figure A-1. An explanation of our boring log symbols is also shown in Figure A-1.

The logs of the borings completed for the geotechnical evaluation are presented in the attached figures. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. They also indicate the depths at which these soils or their characteristics change, although the change might actually be gradual. If the change occurred between samples in the borings the depth was inferred.

LABORATORY TESTING

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of the determination of the moisture content. The tests were performed in general accordance with test methods of the American Society for Testing and Materials (ASTM) or other applicable procedures.

Moisture Content Testing

Moisture content tests were completed in general accordance with ASTM D 2216 for representative samples obtained from the explorations. The results of these tests are presented on the exploration logs at the depths at which the samples were obtained.

SOIL CLASSIFICATION CHART

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

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

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Figure A-1

Drilled Start 11/1/2011 End 11/1/2011	Total Depth (ft) 11.5	Logged By AF2 Checked By AJH	Driller Boretec1, Inc.	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 55 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment M55 Track Mounted Drill Rig	
Easting (X) 1280584 Northing (Y) 529909		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0					SOD	2 inch sod layer			
						SM	Brown silty fine sand with occasional rootlets (medium dense, moist) (fill)			
		18	18	1A MC 1B MC		CL	Brown silty clay with trace fine sand (very stiff, moist) (recessional marine drift)	23 30		
50	5	18	23	2 MC				31		
						CL	Brown clay (very stiff, moist)			
45	10	18	17	3 MC				35		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Topographic Survey, Vertical approximated based on Topographic Survey

Log of Boring B-2

GeoEngineers

Project: Skagit Valley Family YMCA
Project Location: 1901 Hoag Road, Mount Vernon, Washington
Project Number: 22760-001-00

Figure A-3
Sheet 1 of 1

Drilled Start 11/1/2011 End 11/1/2011	Total Depth (ft) 16.5	Logged By AF2 Checked By AJH	Driller Boretec1, Inc.	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 46 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment M55 Track Mounted Drill Rig	
Easting (X) 1280225 Northing (Y) 529883		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0					SOD	1 inch sod layer			
45						ML	Brown fine sandy silt with occasional gravel (very stiff, moist) (fill)			
		4	16	1 MC				20		
	5	16	17	2A MC 2B MC			With occasional organic matter	24		
40						CL-ML	Brown-gray silty clay with trace fine sand and iron staining (very stiff, moist) (recessional marine drift)	21		
		18	23	3 MC		CL	Brown clay with occasional gravel (very stiff, moist)	27		
	10	18	18	4 MC				32		
35						ML	Gray fine sandy silt (stiff, moist)			
	15	18	14	5 MC				24		
30										

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Topographic Survey, Vertical approximated based on Topographic Survey

Log of Boring B-3

GeoEngineers

Project: Skagit Valley Family YMCA
Project Location: 1901 Hoag Road, Mount Vernon, Washington
Project Number: 22760-001-00

Figure A-4
Sheet 1 of 1

Drilled Start 11/1/2011 End 11/1/2011	Total Depth (ft) 16.5	Logged By AF2 Checked By AJH	Driller Boretec1, Inc.	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 47 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment M55 Track Mounted Drill Rig	
Easting (X) 1280440 Northing (Y) 530137		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SOD	2.5 inch sod layer			
45		12	13		1A 1B MC		ML	Brown sandy silt with clay and occasional gravel (medium stiff, moist) (fill)	18		
	5	18	8		2A MC		TS	Relict topsoil layer	23		
40					2B MC		SP	Gray fine to medium sand (medium dense, moist)	24		
		17	17		3A MC 3B MC		CL/ML	Brown-gray silty clay (very stiff, moist) (recessional marine drift)	10 29		
	10	18	17		4 MC		CL	Brown clay (very stiff, moist)	32		
35											
	15	18	12		5 MC				35		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Topographic Survey, Vertical approximated based on Topographic Survey

Log of Boring B-4

GeoEngineers

Project: Skagit Valley Family YMCA
Project Location: 1901 Hoag Road, Mount Vernon, Washington
Project Number: 22760-001-00

Figure A-5
Sheet 1 of 1

Drilled Start 11/1/2011 End 11/1/2011	Total Depth (ft) 11.5	Logged By AF2 Checked By AJH	Driller Boretec1, Inc.	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 49 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment M55 Track Mounted Drill Rig	
Easting (X) 1280590 Northing (Y) 530158		System Datum WA State Plane North NAD83 (feet)		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SOD	3 to 4 inch sod layer			
							ML	Brown fine sandy silt with gravel and rootlets (medium stiff, moist) (fill)			
		12	7		1A						
S-4					1B MC		TS	Relict topsoil layer	20		
					1C MC		CL	Brown to gray clay with fine sand and occasional gravel (stiff, moist) (recessional marine drift)	33		
	5	3	13		2A						
					2B MC				11		
		18	18		3 MC				30		
S-4											
	10	18	20		4 MC				27		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Topographic Survey, Vertical approximated based on Topographic Survey

Log of Boring B-5

GeoEngineers

Project: Skagit Valley Family YMCA
Project Location: 1901 Hoag Road, Mount Vernon, Washington
Project Number: 22760-001-00

Figure A-6
Sheet 1 of 1

Drilled	Start 11/1/2011	End 11/1/2011	Total Depth (ft)	36.5	Logged By	AF2	Driller	Boretec1, Inc.	Drilling Method	Hollow-stem Auger
					Checked By	AJH				

Surface Elevation (ft) Vertical Datum	50 NAVD88	Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	M55 Track Mounted Drill Rig
Easting (X) Northing (Y)	1280456 530032	System Datum	WA State Plane North NAD83 (feet)	Groundwater observed at 29½ feet at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SOD	2 inch sod layer			
							SM	Brown silty fine sand with occasional gravel and rootlets (medium dense, moist) (fill)			
		12	10		1 MC				19		
					MC				18		
					MC				16		
45							CL	Brown silty clay with sand (very stiff, moist) (recessional marine drift)			
	5	18	19		2 MC				28		
		18	17		3 MC				29		
40											
	10	18	17		4 MC				30		
35											
	15	18	20		5A MC				11		
					5B MC		SM	Gray silty fine sand (medium dense, moist)	14		
30	20										

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Topographic Survey, Vertical approximated based on Topographic Survey

Bellingham: Date:2/9/17 Path:W:\PROJECTS\22\22760001\GINT\22760001.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_GEOTECH_STANDARD_%F_NO_GW

Log of Boring B-6

GeoEngineers

Project: Skagit Valley Family YMCA
Project Location: 1901 Hoag Road, Mount Vernon, Washington
Project Number: 22760-001-00

Figure A-7
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	20	18	27		6 MC				23		
							ML	Gray sandy silt (very stiff, moist)			
-25	25	18	17		7						
							SM	Gray silty fine sand with occasional gravel (very dense, wet) (advance outwash)			
-20	30	12	75		8 MC				26		
-15	35	18	81		9 MC				25		

Log of Boring B-6 (continued)

GeoEngineers

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Project Location: 1901 Hoag Road, Mount Vernon, Washington
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