

# LIU & ASSOCIATES, INC.

Geotechnical Engineering

Engineering Geology

Earth Science

August 3, 2017

Ms. Sherry Tseng  
4319 Lake Washington Boulevard NE, #4211  
Kirkland, WA 98043

Dear Ms. Tseng:

Subject: Original Grade Determination  
Tseng Residence  
2720 – 71<sup>st</sup> Avenue SE  
Mercer Island, Washington  
L&A Job No. 17-080

## INTRODUCTION

At your request, we have completed an evaluation of original grade for the development of a new residence on the subject property located at the address in Medina, Washington. The general location of the residence site is shown on Plate 1 – Vicinity Map. Presented in this report are our findings and conclusions.

## SITE CONDITIONS

### Surface Condition

The topographic survey and layout plan of the residence site is shown on Plate 1, attached hereto. The residence site generally slopes gently from its northwest corner down to its northeast corner, with a small sunken court on the its north side. This sunken court appears to have been cut down to enable walkout from the north side of the lower level of the existing house. Lining the cut banks along the east and west sides of this sunken court are rockery walls. Also, there appears to be a shallow cut along the south side of the house and the paved driveway. This cut is lined by a timber wall about a foot tall.

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### **Geologic Setting**

Both the Preliminary Geologic Map of Seattle and Vicinity, Washington, by H. H. Waldron, B. A. Liesch, D. R. Mullineaux, and D. R. Crandell, published by U. S. Geological Survey in 1962, and the Geologic Map of King County, compiled by Derek B. Booth, Kathy A. Troost and Aaron P. Wisher, 2007, were referenced for the geologic and soil conditions of the subject property. Both the above publications show that the surficial soil unit at and in the vicinity of the project site is mapped as a Vashon Till (Q<sub>vt</sub>).

The deposits of the Vashon till soil unit were plowed directly under glacial ice during the most recent glaciation period as the glacier advanced over an eroded, irregular surface of older formations and sediments. The surficial 2 to 3 feet of this soil unit are normally consisted of a thin layer of dark-brown organic topsoil underlain by a layer of brown to light-brown weathered soil of medium-dense silty fine sand. Underlying the weathered soil is glacial till deposits of very-dense, cemented, gravelly, silty, fine sand with occasional cobble, commonly referred to as “hard pan”.

### **Expected Soil Condition**

It will be helpful to understand the geologic and soil conditions of the site to make an educated estimate of the original grade at the corners of the proposed new residence. Undisturbed ground consisting of a Vashon till soil unit is almost always covered with a layer of dark-brown to black organic topsoil with roots. The topsoil is normally underlain by a layer of weathered soil of brown to light-brown to brown-gray, loose to medium-

dense, silty fine sand with various amount of gravel. Underlying the weathered soil is normally a deposit of fresh glacial till soil of light-brown to light-gray, gravelly, silty, fine sand with occasional cobble. If the original ground of a site is covered by fill, the soils in the fill are normally jumbled in mixture of varying color soils without clear stratification and often contain man-made debris. If the original ground had been excavated down previously, the topsoil and weathered soil would have been stripped and the original ground at a certain location in an excavated area can only be estimated by the presence of the soil layers at the location or by its surrounding terrain.

#### **Actual Soil Condition**

Subsurface conditions at or near the 10 corners of the proposed new residence, marked out in paint in the field by others, were explored with hand-augered test holes dug on July 26, 2017. The approximate locations of the test holes are shown on Plate 1.

A geotechnical engineer from our office was onsite digging test holes, examining soil and geologic conditions encountered, and completing logs of the test holes. Samples obtained from each soil layer in the test holes were visually classified in general accordance with United Soil Classification System, a copy of which is presented on Plate 2. Soil conditions encountered by these test holes are presented in the logs of test holes as follows:

**TH-1** (Estimated Original Ground at El. 282.0')

- 0" – 10" Dark-brown, loose, organic, silty fine SAND, dry (TOPSOIL)
- 10" – 3'-0" Brown-gray, medium-dense, silty fine SAND, slightly-moist (WEATHERED SOIL)
- 3'-0" to 4'-0" Light-brown to light-gray, very-dense, silty fine SAND, some gravel, cemented, slightly-moist (VASHON TILL)

Hole terminated at 4.0 feet, groundwater not encountered.

**TH-2** (Estimated Original Ground at El. 281.5')

- 0" – 5" PEA GRAVEL (FILL)
- 5" – 2'-0" Light-brown to light-gray, dense to very-dense, silty fine SAND, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.0 feet, groundwater not encountered.

**TH-3** (Estimated Original Ground at El. 281.0')

- 0" – 4" PEA GRAVEL (FILL)
- 4" – 2'-6" Light-brown to light-gray, very-dense, silty fine SAND, trace gravel, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.5 feet, groundwater not encountered.

**TH-4** (Estimated Original Ground at El. 278.0')

- 0" – 4" Dark-brown, loose, organic, silty fine SAND, dry (TOPSOIL)
- 4" – 2'-6" Light-brown to light-gray, very-dense, silty fine SAND, some gravel, slightly-moist (GLACIAL TILL)

Hole terminated at 2.5 feet, groundwater not encountered.

**TH-5** (Estimated Original Ground at El. 278.0')

- 0" – 6" Light-brown to light-gray, medium-dense, silty fine SAND, with pea gravel mixed in, dry (FILL)
- 6" – 2'-6" Light-brown to light-gray, very-dense, gravelly, silty, fine SAND, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.5 feet, groundwater not encountered.

**TH-6** (Estimated Original Ground at El. 282.5')

- 0" – 9" Dark-brown, SHREDDED BARK over a layer of plastic tarp (FILL)
- 9" – 1'- 11" Dark-brown, loose, organic, silty fine SAND,
- 1'-11" – 3'- 6" Light-brown to light-gray, very-dense, gravelly, silty, fine SAND, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 3.5 feet, groundwater not encountered.

**TH-7** (Estimated Original Ground at El. 281.75')

- 0" – 9" CRUSHED ROCK (FILL)
- 9" – 1'- 6" Dark-brown, loose, organic, silty fine SAND, slightly-moist (relic TOPSOIL)
- 1'- 6" – 1'- 11" Light-brown, medium-dense, silty fine SAND, slightly-moist (WEATHERED SOIL)
- 1'- 11" – 2'- 6" Light-brown to light-gray, very-dense, silty fine SAND, some gravel, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.5 feet, groundwater not encountered.

**TH-8** (Estimated Original Ground at El. 280.75)

- 0" – 4" SHREDDED BARK (FILL)
- 4" – 1'-4" Light-brown to light-gray, medium-dense, silty fine SAND, slightly-moist (WEATHERED SOIL)
- 1'-4" – 2'-9" Light-brown to light-gray, very-dense, silty fine SAND, some gravel, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.5 feet, groundwater not encountered.

**TH-9** (Estimated Original Ground at El. 283.5')

- 0" – 10" CRUSHED ROCK (FILL)
- 10" – 1'-2" Dark-brown, loose, organic, silty fine SAND, slightly-moist
- 1'-2" – 2'-0" Light-brown to light-gray, very-dense, gravelly, silty, fine SAND, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 2.0 feet, groundwater not encountered.

**TH-10** (Estimated Original Ground at El. 279.0')

- 0" – 6" Dark-brown, loose, organic, silty fine SAND, dry (TOPSOIL)
- 6" – 2'-2" Light-brown to light-gray, medium-dense, silty fine SAND, trace gravel, slightly-moist
- 2'-2" – 3'-0" Light-brown to light-gray, very-dense, silty fine SAND, some gravel, cemented, slightly-moist (GLACIAL TILL)

Hole terminated at 3.0 feet, groundwater not encountered.

**ESTIMATED ORIGINAL GRADE**

Our estimated original grade at locations of the test holes is shown above in parentheses next to the test holes numbers. Test Holes 4 and 5, located in the sunken court area on the

north side of the existing house, encountered very-dense cemented glacial till soil at 4 and 6 inches deep, respectively, indicating the original ground had been excavated down previously with the original topsoil and weathered soil being removed. This explains why the rockery walls are constructed along the east and west sides of the sunken court, obviously to line the cut banks of the excavated sunken court. Therefore, we estimated the original grade at these locations to be approximately the top of the adjacent rockery walls. Also, the original grade at Test Pits 7 and 9, next to a timber wall, is adjusted slightly above their existing grade due to the previous cut down with the cut bank lined by the timber wall. The original grade at all other test pit locations should be at their existing grade.

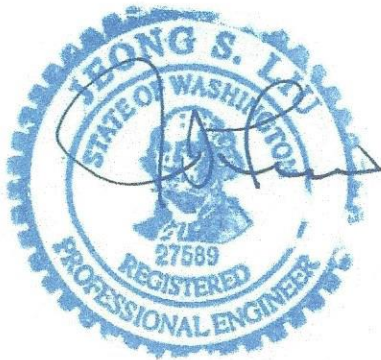
#### **ORIGINAL GROUND AT HIGHEST AND LOWEST POINTS**

Based on the above, it is our conclusion that the original ground elevations at the highest and lowest points at corners of the proposed new building are El. 283.5' at Test Hole 9 and El. 277.0' at Test Hole 5, respectively.

#### **CLOSURE**

We are pleased to be of service to you on this project. Please feel free to contact us if you have questions regarding this report or need further consultation.

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Yours very truly,  
LIU & ASSOCIATES, INC.

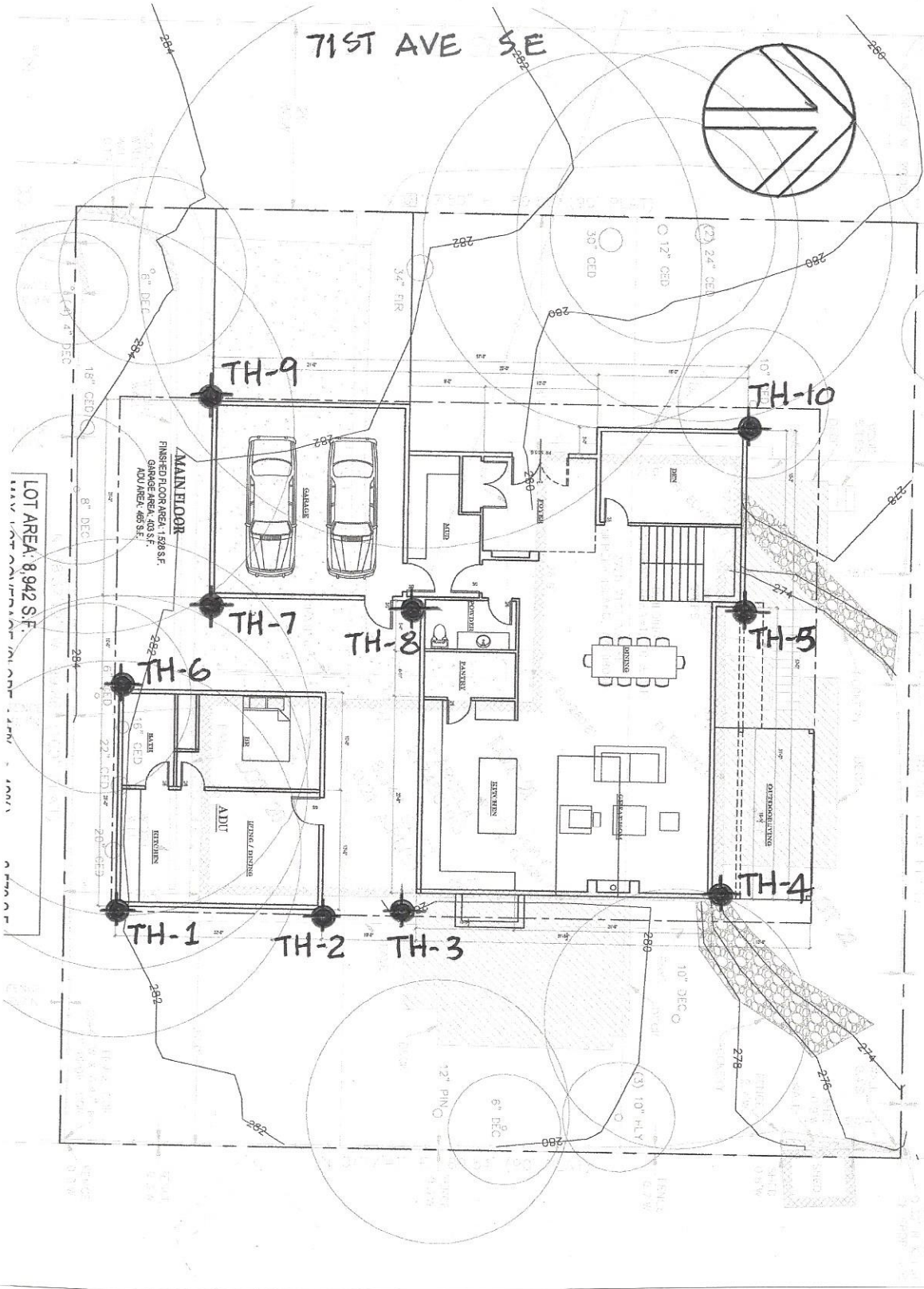
A handwritten signature in blue ink, appearing to read "J. S. Liu".

J. S. (Julian) Liu, Ph.D., P.E.  
Principal

Two plates attached

**LIU & ASSOCIATES, INC.**





LOT AREA: 8,942 S.F.

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**SITE AND TEST HOLE LOCATION PLAN  
TSENG RESIDENCE  
2720 - 71ST AVENUE SE  
MERCER ISLAND, WASHINGTON**

JOB NO. 17-080 | DATE 8/2/2017 | PLATE 1

# UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME	
<b>COARSE-GRAINED SOILS</b>  MORE THAN 50% RETAINED ON THE NO. 200 SIEVE	<b>GRAVEL</b>  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL	
		GRAVEL WITH FINES	GP	POORLY-GRADED GRAVEL	
		<b>SAND</b>  MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND	GM	SILTY GRAVEL
			SAND WITH FINES	GC	CLAYEY GRAVEL
	<b>FINE-GRAINED SOILS</b>  MORE THAN 50% PASSING ON THE NO. 200 SIEVE	<b>SILT AND CLAY</b>  LIQUID LIMIT LESS THAN 50%	INORGANIC	ML	SILT
			ORGANIC	CL	CLAY
			INORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
		<b>SILTY AND CLAY</b>  LIQUID LIMIT 50% OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			ORGANIC	CH	CLAY OF HIGH PLASTICITY, FAT CLAY
			ORGANIC	OH	ORGANIC SILT, ORGANIC SILT
<b>HIGHLY ORGANIC SOILS</b>			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

**NOTES:**

1. FIELD CLASSIFICATION IS BASED ON VISUAL EXAMINATION OF SOIL IN GENERAL ACCORDANCE WITH ASTM D2488-83.
2. SOIL CLASSIFICATION USING LABORATORY TESTS IS BASED ON ASTM D2487-83.
3. DESCRIPTIONS OF SOIL DENSITY OR CONSISTENCY ARE BASED ON INTERPRETATION OF BLOW-COUNT DATA, VISUAL APPEARANCE OF SOILS, AND/OR TEST DATA.

**SOIL MOISTURE MODIFIERS:**

- DRY - ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
- SLIGHTLY MOIST - TRACE MOISTURE, NOT DUSTY
- MOIST - DAMP, BUT NO VISIBLE WATER
- VERY MOIST - VERY DAMP, MOISTURE FELT TO THE TOUCH
- WET - VISIBLE FREE WATER OR SATURATED, USUALLY SOIL IS OBTAINED FROM BELOW WATER TABLE

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UNIFIED SOIL CLASSIFICATION SYSTEM

PLATE 2