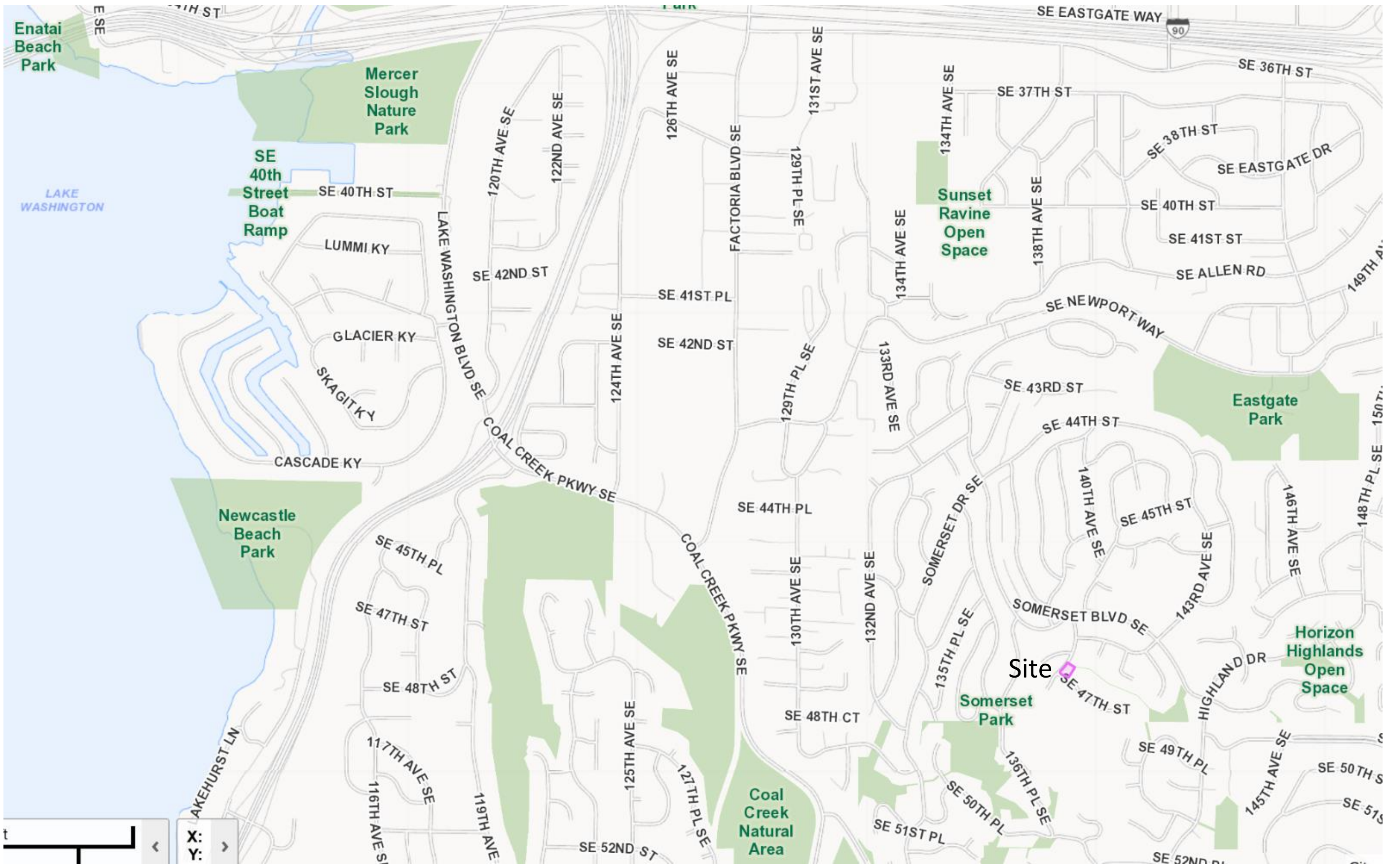
Vicinity Map



PROJECT ZERO & BUILDING ELEVATIONS	TRUE ELEVATION	ELEVATION TO PROJECT ZERO
PROJECT ZERO:	+821.82	+0.00
AVERAGE BUILDING ELEVATION	+824.22'	-2.40
GROUND LEVEL:	+821.82	+0.00
MAXIMUM BUILDING HEIGHT:	+854.22'	+32.40
MAXIMUM BUILDING HEIGHT (ROOF HEIGHT EXCEPTIONS):	+854.22	+32.40
ACTUAL BUILDING HEIGHT:	+845.00	+23.18

NOTE: ALL DIMENSION TO PROJECT ZERO, UON.

GENERAL NOTES

PERMIT DRAWINGS ARE NOT CONSTRUCTION DRAWINGS.

1. CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFYING THE DETAILS, DIMENSIONS AND CONDITIONS IN THE DRAWINGS IN THE FIELD.
2. CONTRACTOR IS SOLELY RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION.
3. CONTRACTOR IS SOLELY RESPONSIBLE FOR EVALUATING CONSTRUCTABILITY OF THE DESIGN.
4. IN THE EVENT CONTRACTOR IDENTIFIES AN ERROR OR INCONSISTENCY IN THE DRAWING, CONTRACTOR MUST NOTIFY DESIGNER.
5. IN THE EVENT CONTRACTOR MAKES MODIFICATIONS TO THE DRAWINGS OR MODIFIES THE AS-BUILT CONDITION, CONTRACTOR MUST NOTIFY DESIGNER IN ADVANCE OF THE MODIFICATION.
6. CONTRACTOR IS SOLELY RESPONSIBLE FOR IDENTIFYING AND LOCATING UTILITIES ON SITE.
7. CONTRACTOR IS SOLELY RESPONSIBLE FOR CONSTRUCTING THE PROJECT IN A SAFE MANNER.
8. IN THE EVENT CONTRACTOR DETERMINES IT NEEDS ADDITIONAL INFORMATION OR DETAIL REGARDING THE DESIGN, CONTRACTOR MUST CONTACT DESIGNER BEFORE PROCEEDING.

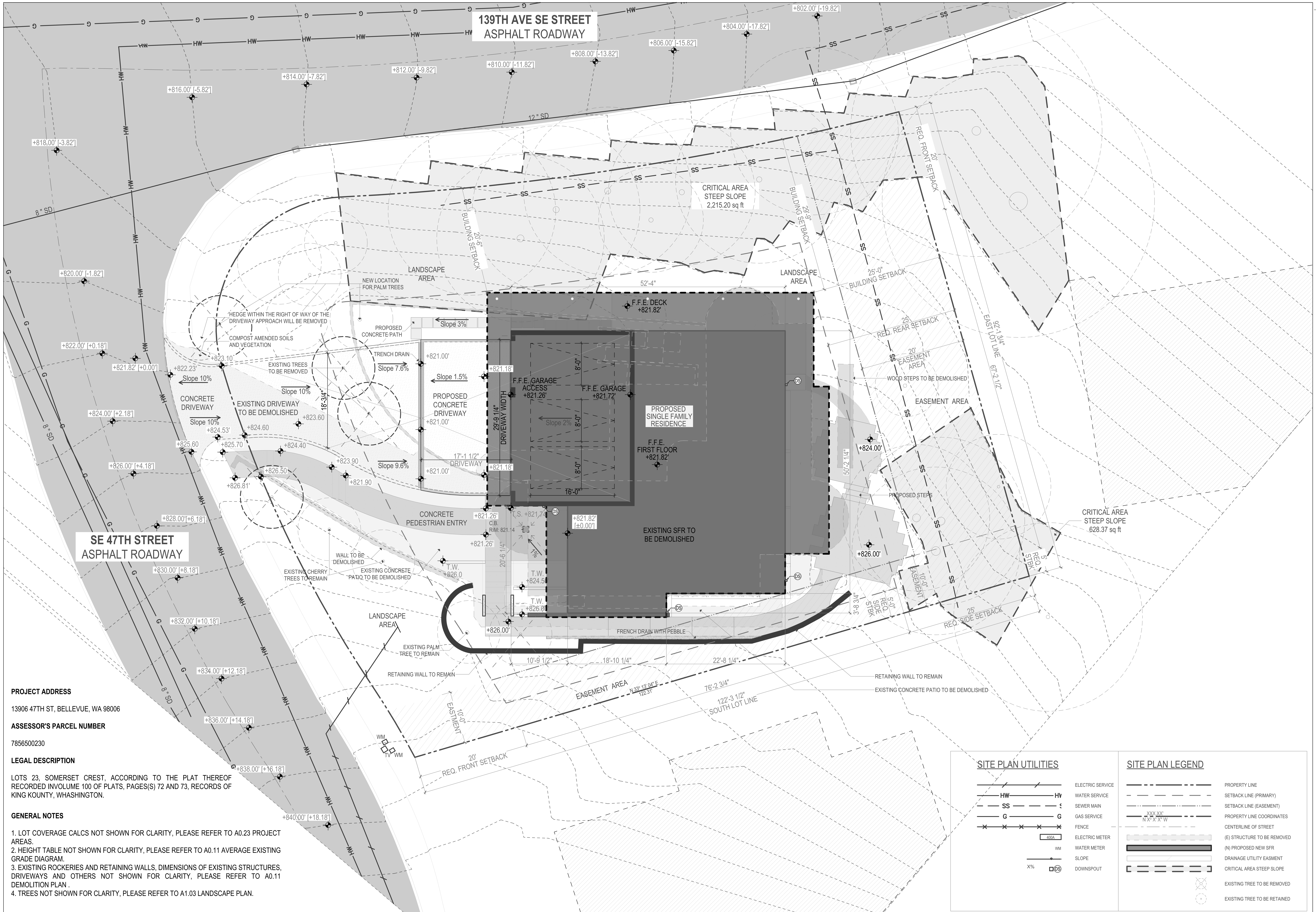
METRICA

Design

METRICA LLC
500 YALE AVE N, FLOOR 1
SEATTLE WA 98109

Owner

STEVEN AND WENHONG YAO
13906 47TH ST,
BELLEVUE WA 98006



PROJECT ADDRESS

13906 47TH ST, BELLEVUE, WA 98006

ASSESSOR'S PARCEL NUMBER

7856500230

LEGAL DESCRIPTION

LOTS 23, SOMERSET CREST, ACCORDING TO THE PLAT THEREOF RECORDED INVOLUME 100 OF PLATS, PAGES(S) 72 AND 73, RECORDS OF KING KOUNTY, WHASHINGTON.

GENERAL NOTES

1. LOT COVERAGE CALCS NOT SHOWN FOR CLARITY, PLEASE REFER TO A0.23 PROJECT AREAS.
2. HEIGHT TABLE NOT SHOWN FOR CLARITY, PLEASE REFER TO A0.11 AVERAGE EXISTING GRADE DIAGRAM.
3. EXISTING ROCKERIES AND RETAINING WALLS, DIMENSIONS OF EXISTING STRUCTURES, DRIVEWAYS AND OTHERS NOT SHOWN FOR CLARITY, PLEASE REFER TO A0.11 DEMOLITION PLAN .
4. TREES NOT SHOWN FOR CLARITY, PLEASE REFER TO A1.03 LANDSCAPE PLAN.

SITE PLAN UTILITIES

- ELECTRIC SERVICE
- WATER SERVICE
- SEWER MAIN
- GAS SERVICE
- FENCE
- ELECTRIC METER
- WATER METER
- SLOPE
- DOWNSPOUT

SITE PLAN LEGEND

- PROPERTY LINE
- SETBACK LINE (PRIMARY)
- SETBACK LINE (EASEMENT)
- PROPERTY LINE COORDINATES
- CENTERLINE OF STREET
- (E) STRUCTURE TO BE REMOVED
- (N) PROPOSED NEW SFR
- DRAINAGE UTILITY EASMENT
- CRITICAL AREA STEEP SLOPE
- EXISTING TREE TO BE REMOVED
- EXISTING TREE TO BE RETAINED

SITE PLAN
1/8" = 1'-0"

01

Project Name

YAO / CAO
RESIDENCE
13906 47TH ST,
BELLEVUE WA 98006

True North | Project North

Revision History

ID	NAME	DATE
REV.00	PERMIT SET	10/10/2019
REV.01	PERMIT SET	02/07/2020
REV 02	PERMIT SET	04/17/2020

Sheet Size:
24" x 36"

Drawing Title:
SITE PLAN

Drawing Status:
PERMIT SET

Issue Date:
3/6/20

Issue:
PERMIT SET

Revision:
REV 02

SHEET NAME

A1.01

PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

May 22, 2020
PanGEO Project No. 20-115

Steven Yao
13906 SE 47th Street
Bellevue, WA 98006

Subject: **Geotechnical and Critical Area Report**
Yao-Cao Residence
13906 SE 47th Street, Bellevue, WA

Dear Mr. Yao:

As requested, PanGEO, Inc. is pleased to present this geotechnical and critical area report to assist the project team with the design and construction of a new single-family residence at the above-referenced site. In preparing this report, we completed three test borings at the site, reviewed design plans provided by the architect, and conducted our engineering analyses. In summary, our borings encountered as much as 8 feet of loose soils overlying medium dense to very dense native silty sand to sand (Blakeley formation, sandstone). In our opinion, building support likely can be provided using conventional footings bearing on the competent native soils or on structural fill placed on undisturbed native soils.

The site contains steep slope critical area, the City of Bellevue requires a Critical Area Report for permitting. Additional discussions regarding relevant land use codes for critical area report are included in this report.

We appreciate the opportunity to be of service. Should you have any questions, please do not hesitate to call.

Sincerely,

Johnny Chen

Johnny C. Chen, P.E.
Project Geotechnical Engineer

3213 Eastlake Avenue East, Suite B
Seattle, WA 98102
T. (206) 262-0370
F. (206) 262-0374

TABLE OF CONTENTS

ATTACHMENTS:

GEOTECHNICAL AND CRITICAL AREA REPORT
YAO-CAO RESIDENCE
13906 SE 47TH STREET
BELLEVUE, WASHINGTON

1.0 GENERAL

As requested, PanGEO, Inc. is pleased to present this report for the proposed single-family residence in Bellevue, Washington. This study was performed in general accordance with our mutually agreed scope of services outlined in our proposal dated March 17, 2020. Our scope of services included reviewing readily available geologic and geotechnical data, drilling three test borings, conducting a site reconnaissance, and developing the conclusions and recommendations presented in this report.

2.0 SITE AND PROJECT DESCRIPTION

The subject property is an approximately 13,125 square foot lot located at 13906 SE 47th Street in the Somerset neighborhood of Bellevue, Washington (see Vicinity Map, Figure 1). The site is roughly rectangular in shape and is bordered to the east and south by single-family dwellings, to the west by SE 47th Street, and to the north by 139th Avenue SE, which is designated as the project north. The layout of the site is shown on Figure 2, Site and Exploration Plan.

The site topography generally descends from southwest to northeast. The total topographic relief within the property is about 35 feet, between roughly Elevation 839 feet at the southwest corner of the site and Elevation 804 feet at the northeast corner of the site. An existing two-story house is located on a relatively level bench near the middle of the site.

The area between the existing house and SE 47th Street includes front yard and a concrete paved driveway (see Plate 1, next page).

The area to the south and east of the existing house is a utility easement and has a walkway, a retaining wall, trees, and landscaping plants (see Plates 2 and 3, next page). The slopes in this area are generally about 20% to 30% gradient, except an area located at the southeast corner of the site contains an over 40% steep slope. The vertical height of the steep slope is approximately 10 feet. We understand that the existing retaining wall and utility easement in this area will remain, with minor site grading for new walkway and landscaping.

The area to the north of the existing house is a north-facing slope. The slope is relatively steep and is vegetated with small trees and landscaping shrubs (see Plate 4, below). The topographic survey provided for our review indicated that the slopes adjacent to and below the existing house exceed 40% gradient. The vertical height of the steep slopes is approximately 10 to 12 feet. Most of this area will also remain as is, with minor site grading for new walkway and landscaping.

The over 40% steep slope areas are indicated on Figure 2, as delineated by the project surveyor.

Plate 1. Front of the existing house and driveway. Looking east from SE 47th Street.

Plate 2. Area to the south of the existing house, looking east.

Plate 3. Area to the east of the existing house, looking south.

Plate 4. Existing slope along the north property line. Looking southwest from 139th Avenue SE.

We understand that you plan to remove the existing house and construct a new single-family residence at roughly the same location as the existing house. The layout of the proposed development is indicated on the attached Figure 2. We also understand that the proposed residence will be a two-story, at-grade, wood frame structure. The proposed finished floor will be at about Elevation 822 feet. Thus, the temporary excavations up to about 7 feet deep is anticipated for the foundation construction.

Because of the site contains steep slope critical area, the City of Bellevue requires a Critical Area Report for permitting. Additional discussions regarding relevant land use codes for critical area report are included in this report.

The conclusions and recommendations in this report are based on our understanding of the proposed development, which is in turn based on the project information provided. If the above project description is incorrect, or the project information changes, we should be consulted to review the recommendations contained in this study and make modifications, if needed. In any case PanGEO should be retained to provide a review of the final design to confirm that our geotechnical recommendations have been correctly interpreted and adequately implemented in the construction documents.

3.0 SUBSURFACE EXPLORATIONS

3.1 Site Geology

According to the *Geologic Map of King County, Washington* (Booth, D. B., Troost, K. A., and Wisher, A. P., 2007), the project site is underlain by Vashon till (Map Unit Qvt). Blakeley Formation (Map Unit Tb) is also mapped near the site to the east.

Vashon till typically consists of very dense, silty sand and silt with sub- to well-rounded gravels that were deposited directly below continental glaciers during the Vashon stade of the Fraser glaciation. Blakeley Formation typically consists of Eocene- to Oligocene-aged, well bedded, medium- to coarse-grained, sandstone and minor siltstone deposited in a shallow marine setting.

Both Vashon till and Blakeley formation typically exhibit low compressibility and high strength characteristics in their undisturbed state. However, near the surface they may be weathered to a loose to medium dense condition.

3.2 Test Borings

Three borings (PG-1 through PG-3) were drilled at the site on May 4, 2020. The borings were logged by a geologist from PanGEO. The borings were drilled to 8 to 13 feet deep when practical drilling refusal was met in very dense soils. The approximate boring locations were located in the field by measuring from property corners and site features and are shown on Figure 2.

The test borings were drilled using 4-inch outside diameter hollow stem augers. Standard Penetration Tests (SPT) were performed in the borings at 2½- and 5-foot depth intervals using a standard, 2-inch diameter split-spoon sampler. The sampler was advanced with a 140-pound drop hammer falling a distance of 30 inches for each strike, in general accordance with ASTM D-1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*.

The soils were logged in general accordance with ASTM D-2487 S*tandard Practice for Classification of Soils for Engineering Purposes* and the system summarized on Figure A-1, Terms and Symbols for Boring and Test Pit Logs. Summary boring logs are included as Figures A-2 through A-4 in Appendix A.

3.3 Soil Conditions

In summary, the subsurface conditions encountered in the test borings were quite consistent, and we generally interpret the soils as fill overlying Blakeley formation. The mapped Vashon till was not encountered in our test borings.

For a detailed description of the subsurface conditions encountered at each exploration location, please refer to the boring logs provided in Appendix A. The stratigraphic contacts indicated on the boring logs represent the approximate depth to boundaries between soil units. Actual transitions between soil units may be more gradual or occur at different elevations. The descriptions of groundwater conditions and depths are likewise approximate.

The following is a generalized description of the soils encountered in the borings.

UNIT 1: Fill/Completely Weathered Blakeley Formation – Below the ground surface each boring encountered loose to medium dense silty sand, which we interpret as completely weathered Blakeley formation and/or fill derived from Blakeley formation. This unit is characterized by its loose condition and mottled/disturbed appearance, and is not suitable foundation bearing soil. The poor soil extended to depths of about 8, 5½, and 6½ feet at PG-1 through PG-3, respectively.

UNIT 2: Slightly Weathered Blakeley Formation – Below Unit 1 each boring encountered medium dense to dense silty sand with some cementation and crossbedding, which we interpret as a slightly weathered expression of the Blakeley formation mapped in the site vicinity. This unit extended to 12, 7, and 8 feet at PG-1 through PG-3, respectively.

UNIT 3: Blakeley Formation – Below Unit 2 each boring encountered very dense, thinly bedded, fine-grained sandstone. The borings were terminated in this unit due to practical drilling refusal at 13, 8, and 10⅞ feet below grade.

Our subsurface descriptions are based on the conditions encountered at the time of our exploration. Soil conditions between our exploration locations may vary from those encountered. The nature and extent of variations between our exploratory locations may not become evident until construction. If variations do appear, PanGEO should be requested to reevaluate the recommendations in this report and to modify or verify them in writing prior to proceeding with earthwork and construction.

3.4 GROUNDWATER

No groundwater was observed during drilling. However, perched groundwater may develop in lenses of more permeable soil within the Blakeley formation, especially during periods of precipitation. If perched seepage is encountered in the building excavations, we anticipate the seepage volume will be relatively minor and can likely be controlled through the use of sumps and pumps.

It should be noted that groundwater levels will fluctuate depending on the season, amount of rainfall, surface water runoff, and other factors. Generally, the water level is higher and seepage rates are greater in the wetter, winter months (typically October through May).

4.0 GEOLOGIC HAZARDS ASSESSMENT

We conducted a geologic hazards assessment for the proposed development as part of our study. The assessment includes an evaluation of Steep Slopes and Erosion Hazards. Based on our review of the City of Bellevue's Geologic Hazards Map (see Plate 5, next page), the north edge of the site (along 139th Avenue SE) and the southwest portion of the site contain steep slopes (40 percent and greater). In addition, the entire site is mapped as an erosion hazard area. However, the site is not mapped within a liquefaction hazard area. The following sections contain our assessment of potential Geologic Hazards and their possible effects on the proposed development.

Plate 5. City of Bellevue Geologic Hazards Map

4.1 STEEP SLOPE CRITICAL AREA

The City defines Steep Slope Critical Area as follows:

> *20.25H.120.A.2 Slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.*

In general, where Steep Slope critical areas are present, the City requires a top-of-slope buffer of 50 feet, and a 75-foot toe-of-slope structural setback. The buffer and setback from the slope maybe modified based on the results of a critical area study.

Steep Slope Evaluation – Based on the site topographic survey (see attached Figure 2), the area along the north property line is 40% or steeper, which is consistent with the City's mapping. This slope has a maximum height of about 14 feet, and has a gradient of about 45%. However, most of the slope height is approximately 10 to 12 feet.

In addition, the topographic survey also identifies the slope at the southeast corner of the site as a 40% steep slope; this slope was not identified in the City's map. This steep slope descends from west to east, and is about 10 feet high. The elevation along the top of the slope ranges from Elevations 824 to 826 feet, and the elevation along its toe is at Elevation 814 feet. The total square footage of this steep slope is about 800 square feet; less than defined 1,000 square feet.

According to the topographic survey, the steep slope at the southwest corner of the site mapped by the City (see Plate 5, above) is actually less than 40%.

The extent of the steep slopes is shown on Figure 2. In our opinion, these steep slopes were created by previous grading activities, particularly the site landscaping.

Site Reconnaissance – As part of our study, we conducted a site reconnaissance on March 23, 2020. During our site reconnaissance, we observed the existing condition of the site and adjacent properties to look for evidence of past or ongoing instability, such as scarps, sloughs, tension cracks, uneven ground surfaces, jackstrawed trees, breaks in vegetation, water features and convergent landforms. We did not observe any obvious evidence of past slope instability during our site reconnaissance. Additionally, we observed that the steep slopes are covered with shrubs and trees. The mature trees on the steep slopes are observed to be straight.

To the best of our knowledge, there are no reported past known slides at the site and its immediate vicinity. Based on our observations of ground surface features, it is our opinion that the site is globally stable in its current configuration. It is also our opinion that the proposed development will not adversely impact the overall global stability of the subject site and surrounding properties, provided that the recommendations presented in this report are properly incorporated into the design and construction of the project.

Conclusion – As currently planned, the proposed residence will be constructed at roughly the same location as the existing house and outside of the steep slopes. Based on the height of steep slope, the observed slope conditions, and the subsurface soil conditions (Blakeley formation, sandstone), it is our opinion that the proposed residence may be constructed within the steep slope buffer from the top of slope along the north portion of the site. Since the steep slope located at the southeast corner of the site is less than 1,000 square feet, the required structure setback from the toe of the slope is not applicable to this location.

4.2 EROSION HAZARDS EVALUATION

Accordance to the City of Bellevue's Geologic Hazards Map, the site is mapped as a potential erosion hazard area. Based on our test borings, the surficial soils at the site are anticipated to exhibit low to moderate erosion potential when disturbed and left unprotected.

In our opinion, the erosion hazards at the site can be effectively mitigated with the best management practice during construction and with properly designed and implemented landscaping for permanent erosion control. During construction, the temporary erosion hazard can also be effectively managed with an appropriate erosion and sediment control plan, including but not limited to installing a silt fence at the construction perimeter, placing quarry spalls or hay bales at the disturbed and traffic areas, covering stockpiled soil or cut slopes with plastic sheets, constructing a temporary drainage pond to control surface runoff and sediment trap, placing rocks at the construction entrance, etc.

Permanent erosion control measures should be applied to the disturbed areas as soon as feasible. These measures may include but not limited to planting and hydroseeding. The use of permanent erosion control mat may also be considered in conjunction with planting/hydroseeding to protect the soils from erosion.

4.3 Relevant Codes for Critical Area Report

Because the site contains steep slope critical area, the City of Bellevue required a Critical Area Report for permitting. Additional discussions regarding relevant land use codes for critical areas report are included in the Appendix B.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 Seismic Design Parameters

The 2015 International Building Code (IBC) seismic design section provides a basis for seismic design of structures. Table 1, below, provides seismic design parameters for the site that are in conformance with the 2015 editions of IBC, which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years), and the 2008 USGS seismic hazard maps. The spectral response accelerations were obtained from OSHPD Seismic Design Maps website (https://seismicmaps.org) based on the project address

Table 1 – IBC Seismic Design Parameters

Site Class	Spectral Acceleration at 0.2 sec. [g] S_S	Spectral Acceleration at 1.0 sec. [g] S_1	Site Coefficients		Design Spectral Response Parameters	
			F_a	F_v	S_{DS}	S_{D1}
D	1.383	0.528	1.00	1.50	0.922	0.528

5.2 Building Foundations

Based on the subsurface conditions encountered at the site and our understanding of the planned development, it is our opinion the proposed building can be supported on conventional footings. The footings should bear on the medium dense to very dense, undisturbed native soils (Unit 2: slightly weathered Blakeley formation, or Unit 3: Blakeley formation). If loose soil (Unit 1: fill/completely weathered Blakeley formation) is encountered at the proposed footing subgrade elevation, the loose soil should be over-excavated and replaced with properly compacted structural fill placed on undisturbed native soils. The subgrade should be verified by a geotechnical engineer before placing structural fill.

Based on the proposed floor elevations, approximately 3 feet of over-excavation may be required to reach the bearing soils along the north perimeter of the proposed building, and up to 5 feet of over-excavation may be required to reach the bearing soils near the northeast corner of the proposed building.

Exterior footings should be placed at least 18 inches below final exterior grade. Interior footings should be placed at least 12 inches below the top of concrete slabs.

We recommend a maximum allowable soil bearing pressure of 2,500 pounds per square foot (psf) be used for sizing foundation elements bear on the competent native soils and well compacted structural fill. The recommended allowable soil bearing pressure is for dead plus live loads. For allowable stress design, the recommended bearing pressure may be increased by one-third for transient loading, such as wind or seismic forces. Continuous and individual spread footings should have minimum widths of 18 and 24 inches, respectively.

Footings designed and constructed in accordance with the above recommendations should experience total settlement of less than one inch and differential settlement of less than ½ inch. Most of the anticipated settlement should occur during construction as dead loads are applied.

5.2.1 Lateral Resistance

Lateral loads on the structure may be resisted by passive earth pressure developed against the embedded portion of the foundation system and by frictional resistance between the bottom of the foundation and the supporting subgrade soils. For footings bearing on the competent native soils or structural fill, a frictional coefficient of 0.35 may be used to evaluate sliding resistance developed between the concrete and the subgrade soil. Passive soil resistance may be calculated using an equivalent fluid weight of 350 pcf, assuming foundations are backfilled with structural fill. The above values include a factor of safety of 1.5. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

5.2.2 Perimeter Footing Drains

Footing drains should be installed around the perimeter of the buildings, at or just below the invert of the footings. Under no circumstances should roof downspout drain lines be connected to the footing drain systems. Roof downspouts must be separately tightlined to appropriate discharge locations. Cleanouts should be installed at strategic locations to allow for periodic maintenance of the footing drain and downspout tightline systems.

5.2.3 Footing Subgrade Preparation

All footing subgrades should be in a firm and unyielding condition prior to setting forms and placing reinforcing steel. Any loose or softened soil should be removed from the footing excavations. The adequacy of the footing subgrade soils should be verified by a representative of PanGEO, prior to placing forms or rebar.

It should be noted that the native soils underlying the site is moisture sensitive, and can be easily disturbed when exposed to moisture and construction activities. Efforts should be made to protect the exposed footing subgrade if the footings will be constructed in wet weather conditions. This may include placing a few inches of crushed rock or lean-mix concrete on the exposed footing subgrade to protect the subgrade.

5.3 Floor Slabs

The floor slabs for the proposed building may be constructed using conventional concrete slab-on-grade floor construction. The floor slabs should be supported on competent undisturbed native soils or structural fill paced on undisturbed native soils. Any over-excavations, if needed, should be backfilled with structural fill.

Interior concrete slab-on-grade floors should be underlain by a capillary break consisting of at least of 4 inches of pea gravel or compacted ¾-inch, clean crushed rock (less than 3 percent fines). The capillary break material should meet the gradational requirements provided in Table 2, below.

Table 2 – Capillary Break Gradation

Sieve Size	Percent Passing
¾-inch	100
No. 4	0 – 10
No. 100	0 – 5
No. 200	0 – 3

The capillary break should be placed on subgrade soils that have been compacted to a dense and unyielding condition.

A minimum 10-mil polyethylene vapor barrier should also be placed directly below the slab. Construction joints should be incorporated into the floor slab to control cracking.

5.4 Retaining Wall Design Parameters

Retaining wall, where needed, should be designed to resist the lateral earth pressures exerted by the soils behind the wall. Proper drainage provisions should also be provided behind the walls to intercept and remove groundwater that may be present behind the wall. Our geotechnical recommendations for the design and construction of the retaining wall are presented below.

5.4.1 Lateral Earth Parameters

Cantilever walls should be designed for an equivalent fluid pressure of 35 pcf for a level backfill condition behind the walls and assuming the walls are free to rotate. If the walls are restrained at the top from free movement, such as basement walls with a floor diaphragm, an equivalent fluid pressure of 45 pcf should be used for a level backfill condition behind the walls. Permanent walls should be designed for an additional uniform lateral pressure of 7H psf for seismic loading, where H corresponds to the height of the buried depth of the wall.

The recommended lateral pressures assume the backfill behind the walls consists of a free draining and properly compacted fill with adequate drainage provisions.

5.4.2 Surcharge

Surcharge loads, where present, should also be included in the design of retaining walls. We recommend that a lateral load coefficient of 0.3 be used to compute the lateral pressure on the wall face resulting from surcharge loads located within a horizontal distance of one-half the wall height.

5.4.3 Lateral Resistance

Lateral forces from seismic loading and unbalanced lateral earth pressures may be resisted by a combination of passive earth pressures acting against the embedded portions of the foundations and by friction acting on the base of the wall foundation. Passive resistance values may be determined using an equivalent fluid weight of 350 pcf. This value includes a factor of safety of 1.5, assuming the footing is backfilled with structural fill. A friction coefficient of 0.35 may be used to determine the frictional resistance at the base of the footings. The coefficient includes a factor of safety of 1.5.

5.4.4 Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe placed behind and at the base of the wall footings, embedded in 12 to 18 inches of clean crushed rock or pea gravel wrapped with a layer of filter fabric. A minimum 18-inch wide zone of free draining granular soils (i.e. pea gravel or washed rock) is recommended to be placed adjacent to the wall for the full height of the wall. Alternatively, a composite drainage material, such as Miradrain 6000, may be used in lieu of the clean crushed rock or pea gravel. The drainpipe at the base of the wall should be graded to direct water to a suitable outlet.

5.4.5 Wall Backfill

Retaining wall backfill should consist of free draining granular material. The site soils are relatively silty and would not meet the requirements for wall backfill. We recommend importing a free draining granular material, such as Seattle Type 17 or a soil meeting the requirements of Gravel Borrow as defined in Section 9-03.14(1) of the WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2020). In areas where space is limited between the wall and the face of excavation, pea gravel may be used as backfill without compaction.

Wall backfill should be properly moisture conditioned, placed in loose, horizontal lifts less than 12 inches in thickness, and compacted to a dense and unyielding condition. If density tests will be performed, the test results should show at least 95 percent of the maximum dry density, as determined using test method ASTM D-1557 (Modified Proctor). Within 5 feet of the wall, the backfill should be compacted with hand-operated equipment to at least 90 percent of the maximum dry density.

5.5 Temporary Excavations

As currently planned, the excavation for the proposed foundation may be as deep as 7 feet. We anticipate the excavations to encounter fill overlying Blakeley formation. All temporary excavations should be performed in accordance with Part N of WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes.

All temporary excavations deeper than a total height of 4 feet should be sloped or shored. Where space is available, it is our opinion that unsupported open cut excavation is feasible at the site. Based on the soil conditions at the site, for planning purposes, it is our opinion that temporary excavations for the proposed building construction may be sloped as steep as 1½H:1V (Horizontal:Vertical). Where space is limited, the use of L-shaped footings may be considered to reduce the lateral extent of the proposed excavation.

Based on our current understanding of the building layout and finished floor elevation, it appears that unsupported open cut excavations are feasible for the foundation excavations at the site. If sufficient space is not available for an unsupported open cut, and construction easements cannot be obtained from the neighboring property owners, excavation shoring will be required.

The temporary excavations and cut slopes should be re-evaluated in the field by PanGEO during construction based on actual observed soil conditions, and may need to be flattened in the wet seasons. The cut slopes should be covered with plastic sheets in the rainy season. We also recommend that heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance equal to 1/3 the slope height from the top of any excavation.

5.6 Permanent Cut and Fill Slopes

Based on the anticipated soil that will be exposed in the planned excavation, we recommend permanent cut and fill slopes be constructed no steeper than 2H:1V (Horizontal:Vertical).

6.0 EARTHWORK CONSIDERATIONS

6.1 Structural Fill and Compaction

In the context of this report, structural fill is defined as compacted fill placed under footings, concrete stairs and landings, slabs, pavement, or other load-bearing areas. Structural fill should consist of City of Seattle Type 17, WSDOT Section 9-03.9(3) Crushed Surfacing Base Course (WSDOT 2020), or an approved equivalent.

Structural fill should be properly moisture conditioned, placed in loose, horizontal lifts less than 12 inches in thickness, and compacted to a dense and unyielding condition. The adequacy of compaction should be verified by a PanGEO representative. Alternatively, a minimum 95 percent maximum density as determined using ASTM D-1557 (Modified Proctor) maybe used to determine the adequacy of the compacted fill.

The procedure to achieve proper density of a compacted fill depends on the size and type of compaction equipment, the number of passes, thickness of the lifts being compacted, and certain soil properties. If the excavation to be backfilled is constricted and limits the use of heavy equipment, smaller equipment can be used, but the lift thickness will need to be reduced to achieve the required relative compaction.

Generally, loosely compacted soils are a result of poor construction technique or improper moisture content. Soils with high fines contents are particularly susceptible to becoming too wet and coarse-grained materials easily become too dry, for proper compaction. Soils with a moisture content too high for adequate compaction should be dried as necessary, or moisture conditioned by mixing with drier materials, or other methods.

6.2 Material Reuse

The soils underlying the site primarily consist of silty sand with varying amounts of gravel, are moisture sensitive, and will become disturbed and soft when exposed to inclement weather conditions. We do not recommend reusing the native soils as structural fill. If it is planned to use the native soil in non-structural areas, the excavated soil should be stockpiled and protected with plastic sheeting to prevent it from becoming saturated by precipitation or runoff.

6.3 Wet Weather Construction

General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below. The following procedures are best management practices recommended for use in wet weather construction:

- Earthwork should be performed in small areas to minimize subgrade exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement and compaction of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- During wet weather, the allowable fines content of the structural fill should be reduced to no more than 5 percent by weight based on the portion passing the 0.75-inch sieve. The fines should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Geotextile silt fences should be installed at strategic locations around the site to control erosion and the movement of soil.
- Excavation slopes and soils stockpiled on site should be covered with plastic sheeting.

6.4 EROSION CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgrade perimeter ditches or low earthen berms in conjunction with silt fences to collect runoff and prevent water from entering excavations or to prevent runoff from the construction area leaving the immediate work site. Temporary erosion control may require the use of hay bales on the downhill side of the project to prevent water from leaving the site and potential storm water detention to trap sand and silt before the water is discharged to a suitable outlet. All collected water should be directed under control to a positive and permanent discharge system.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design such that surface runoff is collected and directed away from the structure to a suitable outlet. Potential issues associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

7.0 ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the project, PanGEO should be retained to conduct a review of the final project plans and specifications, and perform a field-monitoring program during construction. Specifically, we anticipate that the following construction support services may be needed:

- Review final project plans and specifications;
- Verify implementation of erosion control measures;
- Verify adequacy of foundation and slab subgrades;
- Confirm adequacy of the compaction of structural backfill;
- Observe installation of subsurface drainage provisions, and;
- Other consultation as may be required during construction.

Modifications to our recommendations presented in this report may be necessary, based on the actual conditions encountered during construction.

8.0 CLOSURE

We have prepared this report for Mr. Steven Yao and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of services.

Variations in soil conditions may exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at the site that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our services specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify

PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

Sincerely,

PanGEO, Inc.

05/22/2020

Chien-Lin (Johnny) Chen, P.E.
Project Geotechnical Engineer

Siew L. Tan, P.E.
Principal Geotechnical Engineer

9.0 REFERENCES

ASTM International (ASTM), *Annual book of standards, Section 04.08 Soil and Rock (I): D420-D5876*: West Conshohocken, Pennsylvania

International Code Council, 2015, *International Building Code (IBC), 2015.*

Booth, D. B., Troost, K. A., and Wisher, A. P., 2007, *Geologic Map of King County, Washington – U. S. Geological Survey, scale 1:100,000.*

United States Geological Survey*, Earthquake Hazards Program, Interpolated Probabalisitic Ground Motion for the Conterminous 48 States by Latitude and Longitude, 2008 Data,* accessed via: http://earthquake.usgs.gov/designmaps/us/application.php

Washington State Department of Transportation (WSDOT), 2020, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10.*

Washington Administrative Code (WAC), 2016, *Chapter 296-155. Safety Standards for Construction Work, Part N - Excavation, Trenching, and Shoring*, Olympia, Washington.

NORTH

Approx. Scale:
Not to Scale

Base Map: Google Maps

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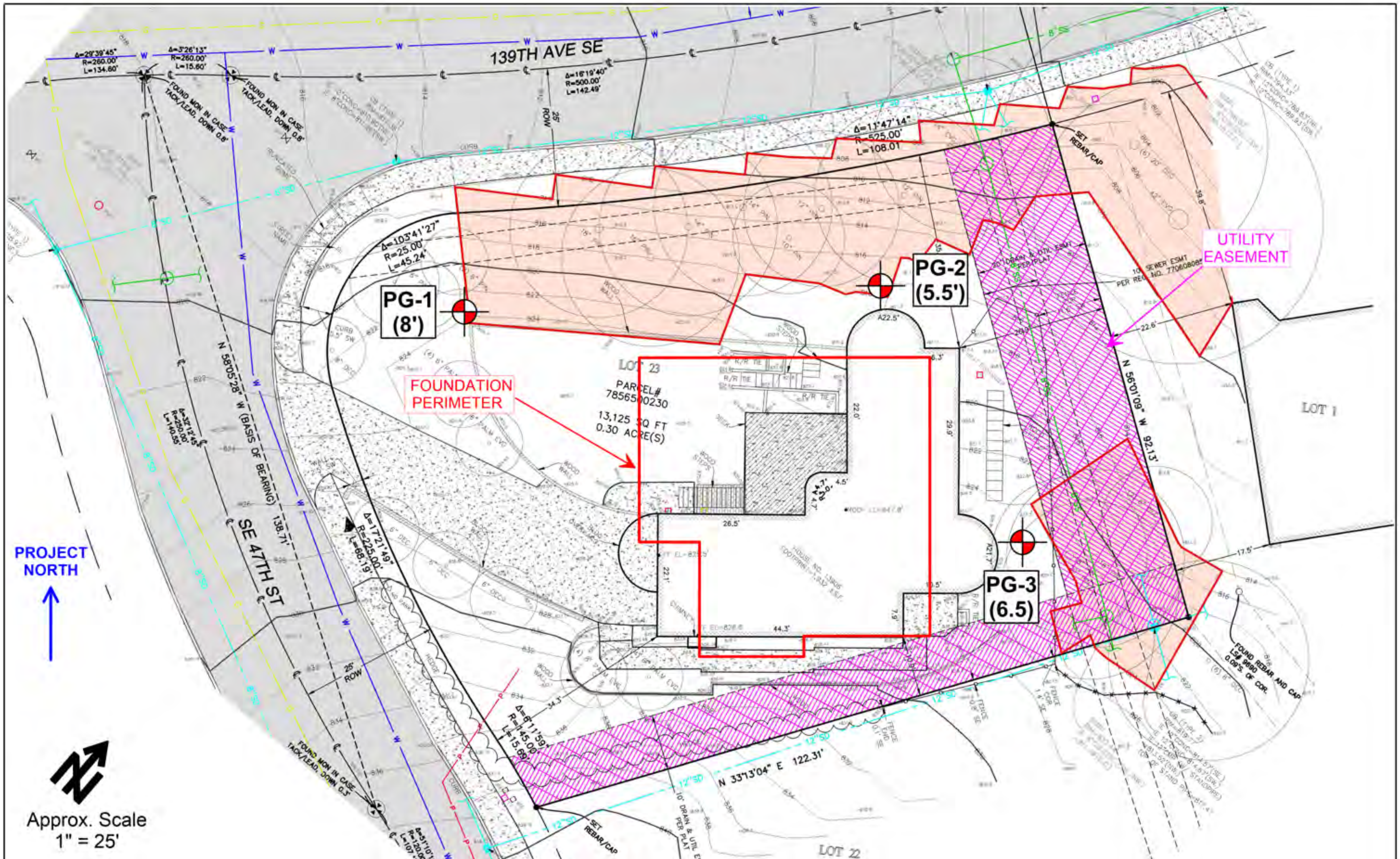
Yao-Cao Residence
13906 SE 47th Street
Bellevue, Washington

VICINITY MAP

Project No. **20-115**	Figure No. **1**

file.grf w/ file.dat 5/12/20 (13:25) BW



Base map modified from Topographic & Boundary Survey by Terrane dated January 1/17/2018

Legend:

Approx. Test Boring Location
(depth to bearing soil, ft)

Over 40% Steep Slope

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Yao-cao Residence
13906 SE 47th Street
Bellevue, Washington

SITE AND EXPLORATION PLAN

Project No.	20-115	Figure No.	2

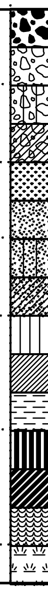
APPENDIX A

SUMMARY BORING LOGS

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM



MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes:

1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered:	Units of material distinguished by color and/or composition from material units above and below	**Fissured:**	Breaks along defined planes
Laminated:	Layers of soil typically 0.05 to 1mm thick, max. 1 cm	**Slickensided:**	Fracture planes that are polished or glossy
Lens:	Layer of soil that pinches out laterally	**Blocky:**	Angular soil lumps that resist breakdown
Interlayered:	Alternating layers of differing soil material	**Disrupted:**	Soil that is broken and mixed
Pocket:	Erratic, discontinuous deposit of limited extent	**Scattered:**	Less than one per foot
Homogeneous:	Soil with uniform color and composition throughout	**Numerous:**	More than one per foot
		BCN:	Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

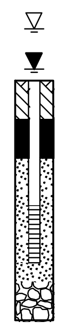
ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL



- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

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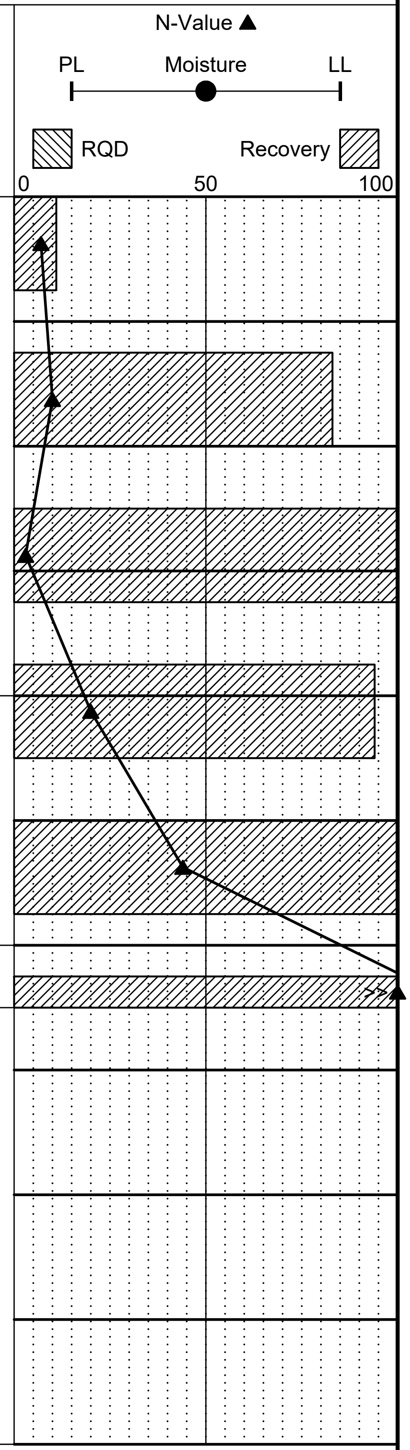
Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	Yao-Cao Residence	Surface Elevation:	823.0ft
Job Number:	20-115	Top of Casing Elev.:	N/A
Location:	13906 SE 47th Street, Bellevue, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.56125, Easting: -122.15562	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1		3, 3, 4			Mulch over loose, mottled dark brown, brown, and gray, gravelly, silty SAND; moist; well-graded, trace organics and iron oxide staining [Soil Unit 1 - Fill/Completely Weathered Blakeley Formation].
2	S-2		2, 4, 6			
4						--drillers begin adding water to aid drilling.
	S-3		1, 1, 2			--becomes very loose.
6						--becomes gray.
8	S-4		2, 8, 12			Medium dense to dense, brown to gray, silty fine SAND; moist; poorly graded, cross-bedded dipping ~20 degrees, slightly cemented , blocky fracture pattern, trace iron oxide staining [Soil Unit 2 - Slightly Weathered Blakeley Formation].
10	S-5		14, 20, 24			--becomes dense. --becomes gray.
12	S-6		50/6			Very dense, gray, fine to very fine SAND; moist; poorly graded, thinly bedded, moderately cemented [Soil Unit 3 - Blakeley Formation].
						Boring terminated at about 13 feet below ground surface due to practical drilling refusal. No groundwater was observed during drilling.
14						
16						
18						
20						



Completion Depth:	13.0ft
Date Borehole Started:	5/4/20
Date Borehole Completed:	5/4/20
Logged By:	B. Weitering
Drilling Company:	CN Drilling

Remarks: Boring drilled using a portable acker drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevation estimated from Topographic and Boundary Survey by Terrane dated January 17, 2018.

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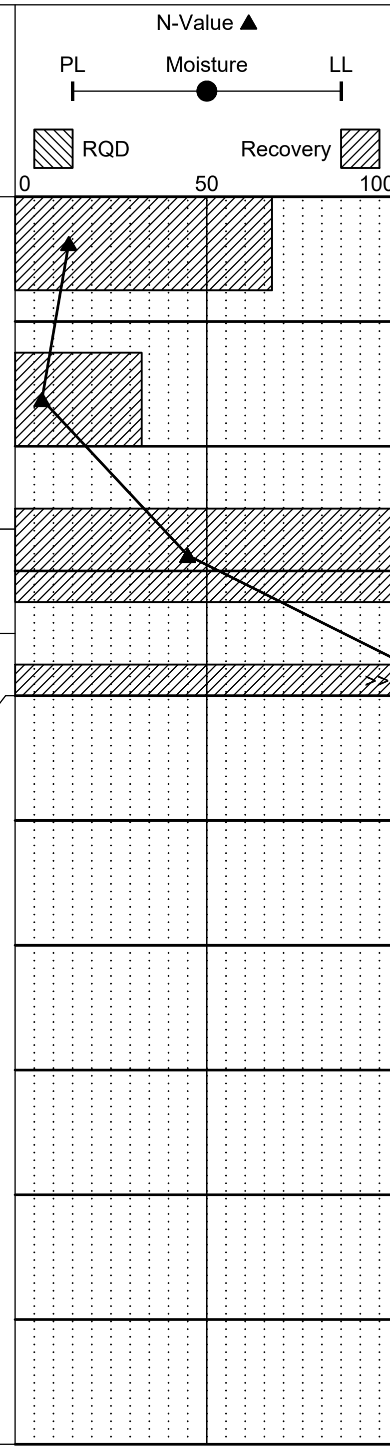
LOG OF TEST BORING PG-1

Figure A-2

The stratification lines represent approximate boundaries. The transition may be gradual.

Project:	Yao-Cao Residence	Surface Elevation:	818.0ft
Job Number:	20-115	Top of Casing Elev.:	N/A
Location:	13906 SE 47th Street, Bellevue, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.56142, Easting: -122.1554	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1		2 5 9			Mulch over loose, mottled dark brown, brown, and gray, trace to slightly gravelly, silty SAND; moist; poorly graded, trace organics and iron oxide staining [Soil Unit 1 - Fill/Completely Weathered Blakeley Formation].
2	S-2		2 3 4			
4						--drillers begin adding water to aid drilling.
6	S-3		6 14 31			Dense, gray-brown to gray, silty fine SAND; moist; poorly graded, cross-bedded dipping ~20 degrees, slightly cemented, blocky fracture pattern, iron oxide staining [Soil Unit 2 - Slightly Weathered Blakeley Formation].
						Very dense, gray to gray-brown, fine to very fine SAND; moist; poorly graded, thinly bedded, moderately cemented [Soil Unit 3 - Blakeley Formation].
8	S-4		50/6			Boring terminated at about 8 feet below ground surface due to practical drilling refusal. No groundwater was observed during drilling.
10						
12						
14						
16						
18						
20						



Completion Depth:	8.0ft
Date Borehole Started:	5/4/20
Date Borehole Completed:	5/4/20
Logged By:	B. Weitering
Drilling Company:	CN Drilling

Remarks: Boring drilled using a portable acker drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevation estimated from Topographic and Boundary Survey by Terrane dated January 17, 2018.

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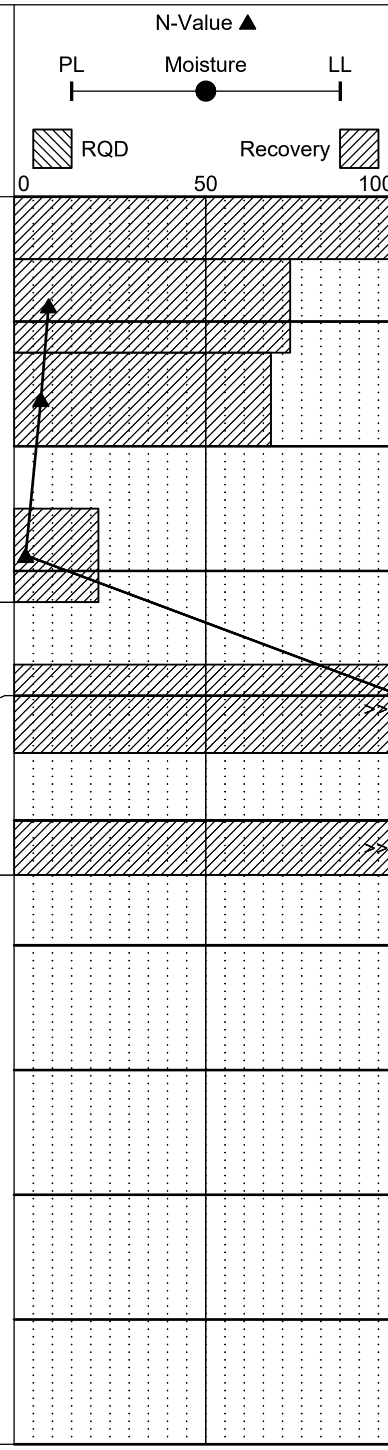
LOG OF TEST BORING PG-2

Figure A-3

The stratification lines represent approximate boundaries. The transition may be gradual.

Project:	Yao-Cao Residence	Surface Elevation:	825.0ft
Job Number:	20-115	Top of Casing Elev.:	N/A
Location:	13906 SE 47th Street, Bellevue, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.56136, Easting: -122.15519	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-0					Gravel walkway over loose, mottled dark brown, brown, and gray, trace to slightly gravelly, silty SAND; moist; poorly graded, roots, trace oxide staining [Soil Unit 1 - Fill/Completely Weathered Blakeley Formation].
2	S-1		4 4 5			
	S-2		3 4 3			
4						--drillers begin adding water to aid drilling.
6	S-3		1 0 3			--becomes very loose. --poor recovery.
						Medium dense, gray-brown to gray, silty fine SAND; moist; poorly graded, cross-bedded dipping ~20 degrees, slightly cemented , blocky fracture pattern, trace iron oxide staining [Soil Unit 2 - Slightly Weathered Blakeley Formation].
8	S-4		11 27 50/5			Very dense, gray, fine to very fine SAND; moist; poorly graded, thinly bedded, moderately cemented, trace iron oxide staining [Soil Unit 3 - Blakeley Formation].
10	S-5		27 50/4.5			
12						Boring terminated at about 10.9 feet below ground surface due to practical drilling refusal. No groundwater was observed during drilling.
14						
16						
18						
20						



Completion Depth:	10.9ft	Remarks: Boring drilled using a portable acker drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevation estimated from Topographic and Boundary Survey by Terrane dated January 17, 2018.
Date Borehole Started:	5/4/20	
Date Borehole Completed:	5/4/20	
Logged By:	B. Weitering	
Drilling Company:	CN Drilling	

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LOG OF TEST BORING PG-3

Figure A-4

The stratification lines represent approximate boundaries. The transition may be gradual.

APPENDIX B

RELEVANT CODES FOR CRITICAL AREA REPORT

As a part of our study, PanGEO reviewed the City of Bellevue's review letter dated March 10, 2020 for the proposed development (19-126364-BS). Specifically, comment #4 of the review letter requires geotechnical input to respond the applicable performance stands in Land Use Code (LUC) 20.25H for the Critical Areas Land Use Permit (LO) submittal. Our responses (in red) with relevant code sections are listed below:

LUC 20.25H.125 Performance standards – Landslide hazards and steep slopes.

In addition to generally applicable performance standards set forth in LUC 20.25H.055 and 20.25H.065, development within a landslide hazard or steep slope critical area or the critical area buffers of such hazards shall incorporate the following additional performance standards in design of the development, as applicable. The requirement for long-term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function.

A. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography; - The proposed residence will be constructed at roughly the same location as the existing house. The structures and improvements are designed to minimize alterations to the natural contour.

B. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation; - Most of the areas to the north and east of the proposed residence containing steep slopes will remain as is. The proposed structures and improvements will not change the existing critical slopes.

C. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties; - Based on our study, the proposed development will not result in greater risk to the neighboring properties, and it will not result in the need for increased buffers on neighboring properties.

D. The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall; - The existing retaining wall along the south property line will remain to retain the slope and south neighboring property. The existing natural slopes to the east and north of the existing house will be maintained and no artificial slopes are planned for the project.

E. Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer; - The proposed residence will be located at roughly the same location as the existing house. No impervious surface is planned within the critical area.

F. Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criteria; - Not applicable in this case. No grading on steep slope is proposed.

G. Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation; - Building foundation walls will be utilizes as retaining walls. No freestanding retaining structures are proposed.

H. On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification; - Not applicable in this case. No structure on steep slope is proposed.

I. On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types; and - Not applicable in this case.

J. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210. - Since this proposal residence will be constructed at roughly the same location as existing house, the disturbed area is minimal. In addition, the existing landform and vegetation on the slope will remain as is. Disturbed areas will be restored per Land Use Code. Mitigation and restoration plan may be needed and will be addressed by others.

20.25H.135 Mitigation and monitoring – Additional provisions for landslide hazards and steep slopes.

In addition to the general mitigation and restoration plan requirements of LUC 20.25H.210, each mitigation or restoration plan for geologic hazard critical areas shall include:

A. **Erosion and Sediment Control Plan.**

The erosion and sediment control plan shall be prepared in compliance with requirements set forth in Chapter 23.76 BCC, now or as hereafter amended. Such plans shall also include, if not otherwise addressed in Chapter 23.76 BCC, the location and methods of drainage, surface water management, locations and methods of erosion control, a vegetation management and/or replanting plan, and/or other means for maintaining long-term soil stability; - To be addressed by the project civil engineer.

B. **Drainage Plan.**

The technical information shall include a drainage plan for the collection, transport, treatment, discharge, and/or recycle of water prepared in accordance with applicable City codes and standards. The drainage plan should consider on-site septic system disposal volumes where the additional volume will affect the erosion or landslide hazard area; - To be addressed by the project civil engineer.

C. **Monitoring Surface Waters.**

If the Director determines that there is a significant risk of damage to downstream receiving waters due to potential erosion from the site, based on the size of the project, the proximity to the receiving waters, or the sensitivity of the receiving waters, the technical information shall include a plan to monitor the surface water discharge from the site. - To be addressed by the project civil engineer.

LUC 20.25H.140 Critical areas report – Additional provisions for landslide hazards and steep slopes.

In addition to the provisions of LUC 20.25H.230, any proposal to modify a landslide hazard or steep slope or associated critical area buffer through a critical areas report shall comply with the requirements of this section.

A. **Limitation on Modification.**

The provisions for coal mine hazard areas in LUC 20.25H.130 may not be modified through a critical areas report. - Not applicable in this case.

B. **Area Addressed in Critical Area Report.**

In addition to the general requirements of LUC 20.25H.230, the following areas shall be addressed in a critical areas report for geologically hazardous areas:

1. Site and Construction Plans. The report shall include a copy of the site plans for the proposal and a topographic survey; - Please see Figures 2, Site and Exploration Plan, in this report.

2. Assessment of Geological Characteristics. The report shall include an assessment of the geologic characteristics of the soils, sediments, and/or rock of the project area and potentially affected adjacent properties, and a review of the site history regarding landslides, erosion, and prior grading. Soils analysis shall be accomplished in accordance with accepted classification systems in use in the region; - Please see Section 3.0, Subsurface Explorations, in this report.

3. Analysis of Proposal. The report shall contain a hazards analysis including a detailed description of the project, its relationship to the geologic hazard(s), and its potential impact upon the hazard area, the subject property, and affected adjacent properties; and - Please see Section 4.0, Geological Hazards Assessment, in the report.

4. Minimum Critical Area Buffer and Building Setback. The report shall make a recommendation for a minimum geologic hazard critical area buffer, if any, and minimum building setback, if any, from any geologic hazard based upon the geotechnical analysis. - This proposal intends to request a modification to the standard critical area buffer. In our opinion, the proposed structures may be constructed within the critical area buffer with proper engineering support. Please see our discussions in Section 4.1 in the report.

LUC 20.25H.145 Critical areas report – Approval of modification.

Modifications to geologic hazard critical areas and critical area buffers shall only be approved if the Director determines that the modification:

A. Will not increase the threat of the geological hazard to adjacent properties over conditions that would exist if the provisions of this part were not modified; - The proposed improvements will not increase the threat of the site geological hazards to adjacent properties.

B. Will not adversely impact other critical areas; - The proposed improvements will not have adversely impacts on the other critical areas.

C. Is designed so that the hazard to the project is eliminated or mitigated to a level equal to or less than would exist if the provisions of this part were not modified; - In our opinion, the geologic hazards of the proposed improvements will be mitigated to a level equal to or less than the existing conditions.

D. Is certified as safe as designed and under anticipated conditions by a qualified engineer or geologist, licensed in the state of Washington; - The geologic hazards and geotechnical elements of the project were evaluated by a qualified civil engineer licensed in the State of Washington.

E. The applicant provides a geotechnical report prepared by a qualified professional demonstrating that modification of the critical area or critical area buffer will have no adverse impacts on stability of any adjacent slopes, and will not impact stability of any existing structures. Geotechnical reporting standards shall comply with requirements developed by the Director in City of Bellevue Submittal Requirements Sheet 25, Geotechnical Report and Stability Analysis Requirements, now or as hereafter amended; - The geotechnical report was prepared by a qualified engineer in general accordance with the City of Bellevue's submittal requirements.

F. Any modification complies with recommendations of the geotechnical support with respect to best management practices, construction techniques or other recommendations; and - The geotechnical elements of the proposed project should be constructed in general accordance with the recommendations contained in this geotechnical report.

G. The proposed modification to the critical area or critical area buffer with any associated mitigation does not significantly impact habitat associated with species of local importance, or such habitat that could reasonably be expected to exist during the anticipated life of the development proposal if the area were regulated under this part. - To be addressed by the others.