City of Bellevue
Development Services Department
Land Use Staff Report

Proposal Name:	**Tellefson Residence**
Proposal Address:	**20 Cascade Key**
Proposal Description:	Approval of a Critical Areas Land Use Permit to construct an addition to an existing single-family residence. The proposal includes a request to modify the toe-of-slope steep slope structure setback to a minimum distance of 40 feet.
File Number:	**16-128770-LO**
Applicant:	**Brian Bellissimo**
Decisions Included:	Critical Areas Land Use Permit (Process II. LUC 20.30G & 20.30P)
Planner:	Drew Folsom, Planner
State Environmental Policy Act Threshold Determination:	**Exempt per WAC 197-11-800**
Director's Decision:	**Approval with Conditions**

Carol V. Helland, Land Use Director
Development Services Department

Critical Areas Application Date:	April 4, 2016
Notice of Application Publication Date:	June 2, 2016
Decision Publication Date:	August 11, 2016
Project Appeal Deadline:	August 25, 2016

For information on how to appeal a proposal, visit Development Services Center at City Hall or call (425) 452-6800. Comments on State Environmental Policy Act (SEPA) Determinations can be made with or without appealing the proposal within the noted comment period for a SEPA Determination. Appeal of the Decision must be received in the City's Clerk's Office by 5 PM on the date noted for appeal of the decision.

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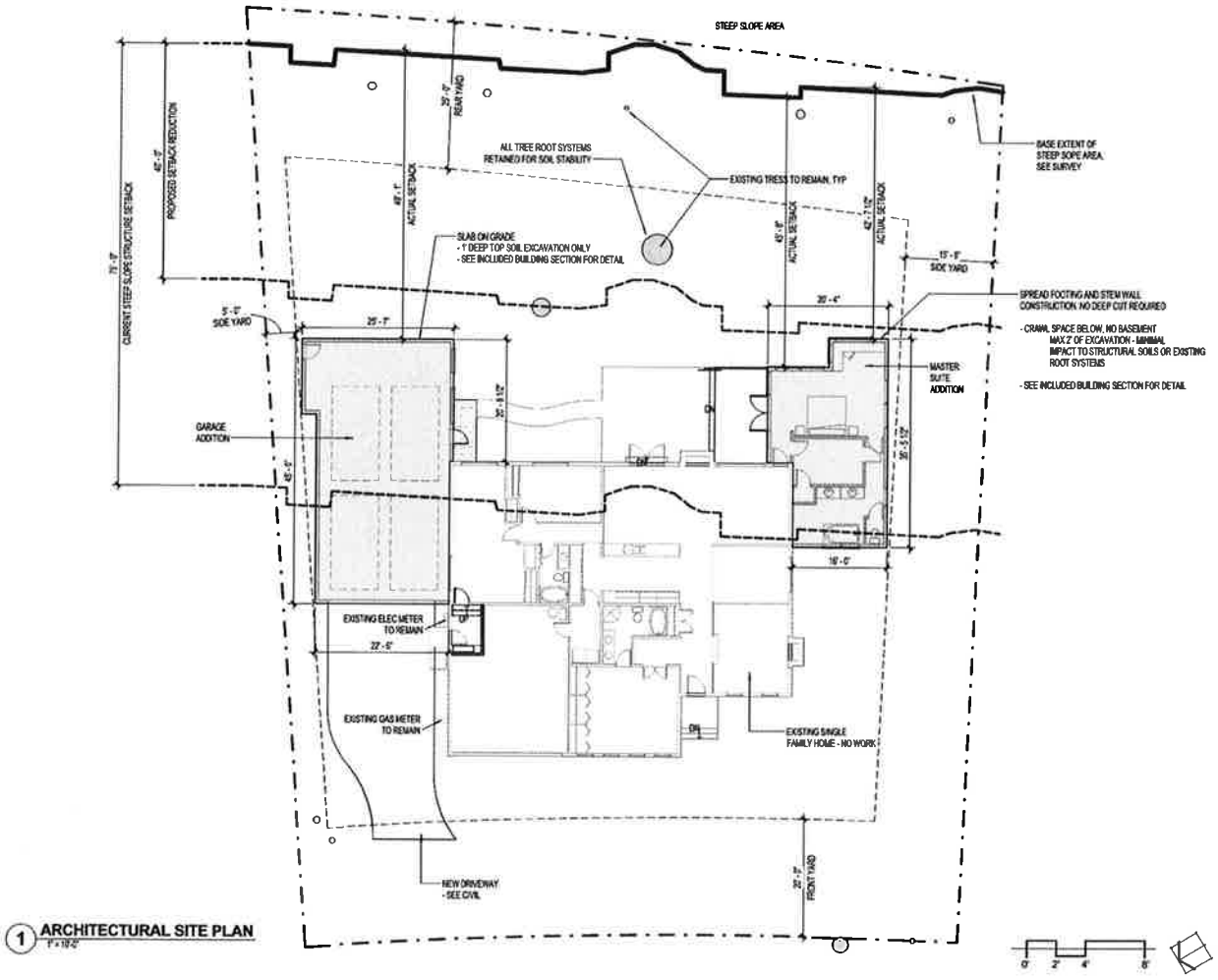
1. Development Plans
2. Geotechnical Report

I. Proposal Description

The applicant is requesting a Critical Areas Land Use Permit to modify the toe-of-slope steep slope structure setback to a minimum distance of 40 feet in order to construct an addition to an existing single-family residence.

The Land Use Code allows for modifications of critical areas structure setbacks if the performance standards for each critical area are addressed and the decision criteria in LUC 20.25H.255.A and LUC 20.30P are met. This application meets those requirements and the request is evaluated below.

Figure 1 Site Plan



II. Site Description, Zoning, Land Use and Critical Areas

A. Site Description

The property is located at 20 Cascade Key. The property is approximately 18,143 square feet. Vehicle access is from Cascade Key located to the west. Properties to the west, north and south of the property are developed with single-family residences.

The site contains several significant trees, predominately located along the east property boundary; the remaining area is developed with the single-family residence, driveway, landscape bushes, and mowed lawn. The majority of the site slopes gradually upward from west to east. The eastern boundary of the property is adjacent to the edge of the BNSF Railroad right-of-way. The BNSF railroad is located on a steep, raised hill, approximately 20 feet in height, east of the property. A Type-F stream, Coal Creek, and a tributary are located downslope and east of the railroad corridor. Above and further east is the western edge of the Interstate-405.

Figure 2: Site Aerial

B. Zoning

The property is zoned R-2.5. The property is also within the Critical Areas Overlay District.

C. Land Use Context

The property is located in the Factoria Subarea of the City and has a Comprehensive Plan land use designation of SF-M (Single Family Medium Density).

D. Critical Areas Functions and Values

i. Geologic Hazard Areas

Geologic hazards pose a threat to the health and safety of citizens when commercial, residential, or industrial development is inappropriately sited in areas of significant hazard. Some geologic hazards can be reduced or mitigated by engineering, design, or modified construction practices. When technology cannot reduce risks to acceptable levels, building in geologically hazardous areas is best avoided (WAC 365-190).

Steep slopes may serve several other functions and possess other values for the City and its residents. Several of Bellevue's remaining large blocks of forest are located in steep slope areas, providing habitat for a variety of wildlife species and important linkages between habitat areas in the City. These steep slope areas also act as conduits for groundwater, which drains from hillsides to provide a water source for the City's wetlands and stream systems. Vegetated steep slopes also provide a visual amenity in the City, providing a "green" backdrop for urbanized areas enhancing property values and buffering urban development.

III. Consistency with Land Use Code Requirements:

A. Zoning District Dimensional Requirements (LUC 20.20.010):

The site is located in the R-2.5 zoning district.

B. Critical Areas Requirements LUC 20.25H:

Geologic Hazards

20.25H.125 Performance standards for landslide hazards and steep slopes

The applicant is not proposing any development or construction within the critical area or critical area buffer. The applicant's geotechnical engineer has evaluated the slope and the proposed construction and recommends that the structure can safely be located within 40 feet of the toe of the steep slope without risk. No modification to the slope or top of slope buffer is proposed or allowed as part of this permit.

C. Consistency with Critical Areas Report LUC 20.25.230.

The applicant supplied a complete critical areas report in support of the proposed steep slope structure setback of 40 feet. The report met the minimum requirements in LUC 20.25H.250, and contained supporting information from a qualified geotechnical engineer that evaluated the steep slope critical area. The GeotCritical Areas Report Criteria for Steep Slope Critical Area Structure Setback reductions were met.

IV. Public Notice and Comment

Application Date:	April 4, 2106
Public Notice (500 feet):	June 2, 2016
Minimum Comment Period:	June 16, 2016

The Notice of Application for this project was published in the City of Bellevue weekly permit bulletin on June 2, 2016. It was mailed to property owners within 500 feet of the project site. No comments have been received from the public as of the writing of this staff report.

V. Summary of Technical Reviews

Clearing and Grading:
The Clearing and Grading Division of the Development Services Department has reviewed the proposed development for compliance with Clearing and Grading codes and standards. The Clearing and Grading staff found no issues with the proposed development.

VI. State Environmental Policy Act (SEPA)

The proposal is categorically exempt from SEPA review per WAC 197-11-800 for minor new construction of a single-family residence.

VII. Decision Criteria

A. Critical Areas Report Decision Criteria- General Criteria LUC 20.25H.255
The Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;

Finding: The modification of the steep slope critical area structure setback is at least as protective of the critical area functions and values because the area modified consists of pavement, open ground, or maintained lawn.

2. Adequate resources to ensure completion of any required mitigation and monitoring efforts;

Finding: This is a proposal to reduce a steep slope structure setback. No mitigation is required and no resources are needed aside from retention of the minimum 40-foot setback recommended by the geotechnical engineer of record (reference Geotechnical Report in Attachment *).

3. The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and

Finding: This is a proposal to reduce a steep slope structure setback. No impact to functions is expected. No mitigation is required.

4. The resulting development is compatible with other uses and development in the same land use district.

Finding: The resulting development of an addition to an existing single-family residential structure on the property is compatible with the other single-family residential structures in the neighborhood surrounding the subject property.

B. Critical Areas Land Use Permit Decision Criteria 20.30P

The Director may approve or approve with modifications an application for a critical areas land use permit if:

1. The proposal obtains all other permits required by the Land Use Code;

Finding: The applicant is required to obtain a single-family building permit for the construction of the proposed addition.

2. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer;

Finding: The proposal is standard design and construction techniques for residential development. The construction techniques, along with required clearing and grading development standards will ensure the least impact on the steep slope critical area. In addition, the applicant shall implement all of the recommendations provided by the Geotechnical Engineering Report prepared by Steven Evans and Michael Xue, PanGeo Incorporated, dated January 15, 2016 (Attachment *) See Section IX for condition of approval.

3. The proposal incorporates the performance standards of Part 20.25H to the maximum extent applicable, and ;

Finding: With exception of the requested modifications to the steep slope critical area structure setback, the proposal is incorporating the other applicable performance standards of Part 20.25H. This is a proposal to reduce a steep slope structure setback. No impact to functions is expected. See Section IX for conditions of approval.

4. The proposal will be served by adequate public facilities including street, fire protection, and utilities; and;

Finding: The property is currently served by adequate public facilities. Nothing in the

proposal will increase the need for public facilities on the property.

5. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC Section 20.25H.210; and

Finding: This is a proposal to reduce a steep slope structure setback. No impact to functions is expected. No mitigation is required. The applicant shall submit a hold harmless agreement prior to the issuance of the building permit.

6. The proposal complies with other applicable requirements of this code.

Finding: As discussed in Section III and V of this report, the proposal complies with all other applicable requirements of the Land Use Code.

VIII. Conclusion and Decision

After conducting the various administrative reviews associated with this proposal, including Land Use Code consistency, City Code and Standard compliance reviews, the Director of the Development Services Department does hereby **approve with conditions the Critical Areas Land Use Permit to modify a toe of slope structure setback to construct an addition to a single family residence.** Approval of the Critical Areas Land Use Permit does not constitute a permit for construction. A building permit is required and all plans are subject to review for compliance with applicable City of Bellevue codes and standards.

Note- Expiration of Approval: In accordance with LUC 20.30P.150 a Critical Areas Land Use Permit automatically expires and is void if the applicant fails to file for a Single Family Addition Building Permit or other necessary development permits within one year of the effective date of the approval.

IX. Conditions of Approval

The applicant shall comply with all applicable Bellevue City Codes and Ordinances including but not limited to:

Applicable Ordinances	Contact Person
Clearing and Grading Code- BCC 23.76	Savina Uzunow, 425-452-7860
Land Use Code- BCC 20.25H	Drew Folsom, 425-452-4441
Noise Control- BCC 9.18	Drew Folsom, 425-452-4441

The following conditions are imposed under the Bellevue City Code or SEPA authority referenced:

1. **Geotechnical Recommendations and Inspection:** The project shall be constructed incorporating the recommendations described by the Geotechnical Engineer of record. The Engineer shall verify implementation of the recommended procedures and practices in the geotechnical report Attachment 2. A report verifying

implementation and inspection shall be submitted to Drew Folsom at *dfolsom@bellevuewa.gov* or to the address below:

Environmental Planning Manager
Development Services Department
City of Bellevue
PO Box 90012
Bellevue, WA 98009-9012

Authority: Land Use Code 20.30P.140
Reviewer: Drew Folsom, Development Services Department

2. Hold Harmless Agreement: Prior to building permit approval, the applicant or property owner shall submit a hold harmless agreement releasing the City of Bellevue from any and all liability associated with site development. The agreement must meet city requirements and must be reviewed by the City Attorney's Office for formal approval.

Authority: Land Use Code 20.30P.170
Reviewer: Drew Folsom, Development Services Department

3. **Rainy Season restrictions:** No clearing and grading activity may occur during the rainy season, which is defined as October 1 through April 30 without written authorization of the Development Services Department. Should approval be granted for work during the rainy season, increased erosion and sedimentation measures, representing the best available technology must be implemented prior to beginning or resuming site work.

Authority: Bellevue City Code 23.76.093.A,
Reviewer: Savina Uzunow, Clearing and Grading

4. **Noise Control:** Noise related to construction is exempt from the provisions of BCC 9.18 between the hours of 7 am to 8 pm Monday through Friday and 9 am to 6 pm on Saturdays, except for Federal holidays and as further defined by the Bellevue City Code. Noise emanating from construction is prohibited on Sundays or legal holidays unless expanded hours of operation are specifically authorized in advance. Requests for construction hour extension must be done in advance with submittal of a construction noise expanded exempt hours permit.

Authority: Bellevue City Code 9.18
Reviewer: Drew Folsom, Land Use

VICINITY MAP - NTS

PROJECT TEAM

OWNER

JON TELLEFSON
20 CASCADE KEY
BELLEVUE, WA 98006
206-972-9950

ARCHITECT

BELLISSIMO ARCHITECTS, PLLC
206 HAYES ST
SEATTLE, WA 98109
CONTACT: BRYAN BELLISSIMO, AIA
206-661-6149
BJBELLISSIMO@GMAIL.COM

STRUCTURAL ENGINEER

BYKONEN, CARTER, QUINN
820 JOHN STREET, STE 201
SEATTLE, WA 98109
CONTACT: NICK CARTER, PE
206-264-7784

SHEET INDEX

G0.00	GENERAL INFORMATION
SUR	SURVEY
C1.0	TESC
C2.0	GRADING & DRAINAGE
C3.0	UTILITES & PAVING
C4.0	DETAILS & NOTES
C4.1	DETAILS
A1.01	SITE PLAN -B
A2.00	FIRST FLOOR PLAN DEMO
A2.01	FIRST FLOOR PLAN
A2.02	ROOF PLAN
A3.01	EAST & WEST ELEVATIONS
A3.02	NORTH & SOUTH ELEVATIONS
A3.11	BUILDING SECTIONS
A4.01	FIRST FLOOR RCP
A5.01	EXTERIOR DETAILS
A5.02	EXTERIOR DETAILS
A10.01	BUILDING ASSEMBLIES
A10.11	DOOR & WINDOW SCHEDULES
A10.21	GLAZING SCHEDULE / ENERGY NOTES
S 1.00	GENERAL STRUCTURAL NOTES
S 1.01	GENERAL STRUCTURAL NOTES
S 2.00	MAIN FLOOR FRAMING / FOUNDATION PLAN
S 2.01	ROOF FRAMING PLAN
S 3.00	TYPICAL DETAILS
S 3.01	TYPICAL DETAILS
S 6.00	DETAILS
S 6.01	DETAILS
S 6.02	DETAILS
S 6.03	DETAILS

PROJECT ADDRESS

20 CASCADE KEY - BELLEVUE, WA

TAX ASSESSOR'S PARCEL NUMBERS

606530-0100

PROJECT NUMBER

BLDG PERMIT # 6429885

LEGAL DESCRIPTION

NEWPORT DIV # 2
PLat Block: 1
Plat Lot: 10

PROJECT SUMMARY

CONSTRUCTION OF NEW 576 SF MASTER SUITE ADDITION AND 1000 SF GARAGE ADDITION TO EXISTING, SINGLE STORY HOME.

GOVERNING CODES

ZONING CODE: CITY OF BELLEVUE LAND USE CODE

ZONE: R2.5
LOT AREA: 18,143 SF

BUILDING CODE: 2012 INTERNATIONAL RESIDENTIAL CODE

ENERGY CODE: 2012 WASHINGTON STATE RESIDENTIAL PROVISIONS

BELLISSIMO ARCHITECTS pllc
206 HAYES ST.
SEATTLE, WA 98109

FOR PERMIT ONLY

THIS DOCUMENT HAS BEEN PREPARE FOR PERMIT APPLICATION AND IS SUBJ TO REVIEW AND MODIFICATION BY GOVERNMENTAL AGENCIES

20 CASCADE KEY
Bellevue, WA

15006

BLDG-XXXX

PERMIT SET 4/3

GENERAL INFORMATION

ORIGINAL SHEET SIZE 18" x 24"

G0.00

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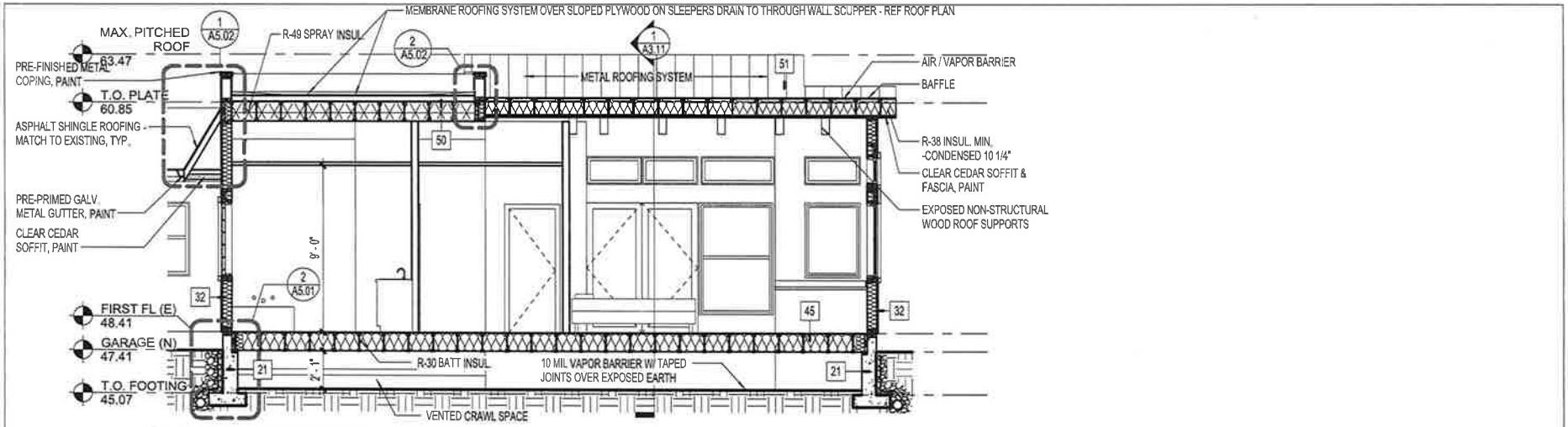
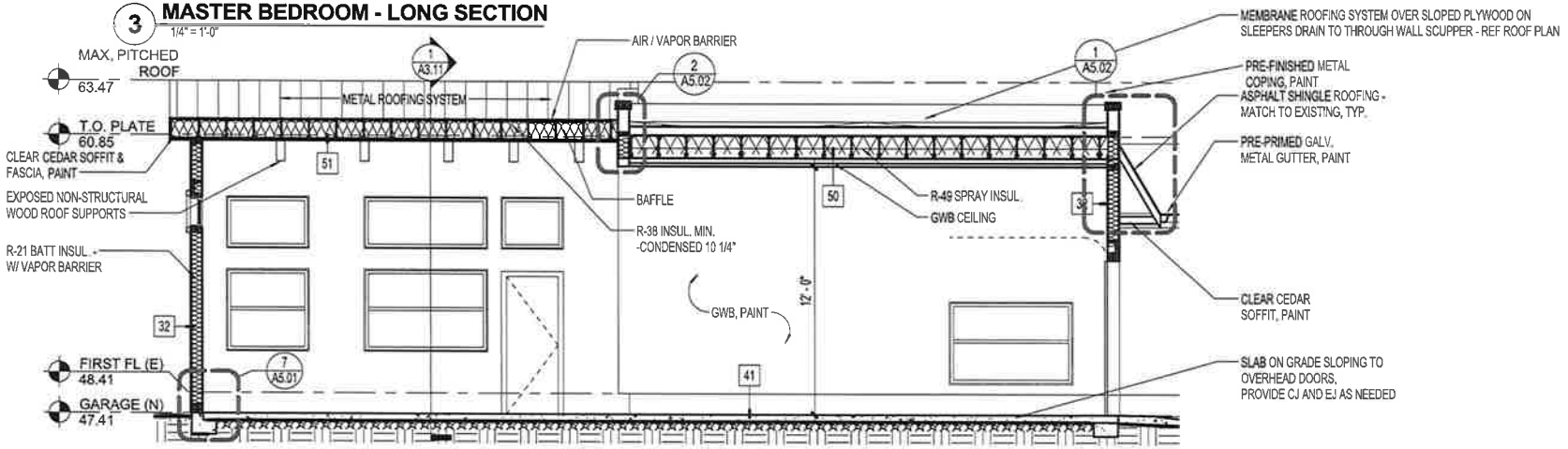


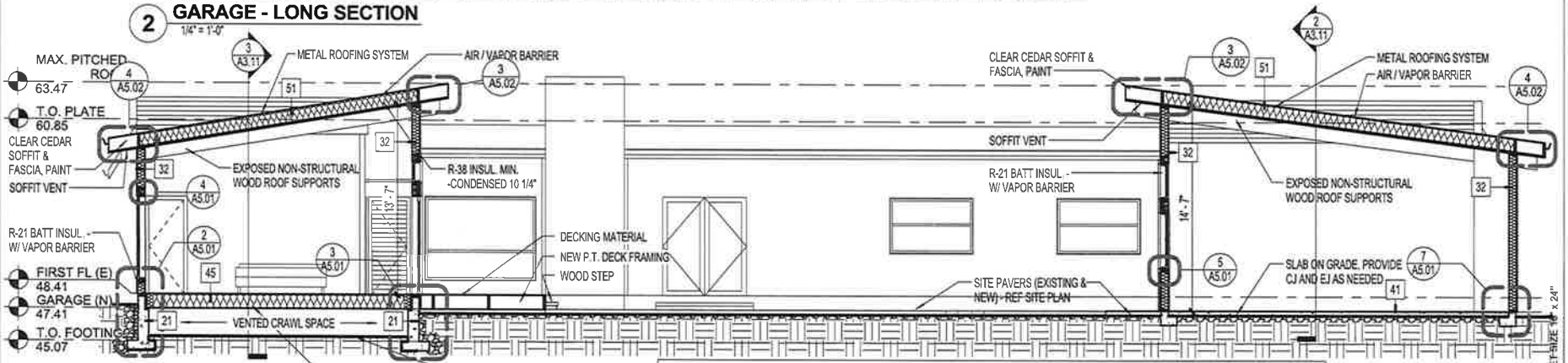
3 MASTER BEDROOM - LONG SECTION

1/4" = 1'-0"



2 GARAGE - LONG SECTION

1/4" = 1'-0"



1 SHORT SECTIONS

3/16" = 1'-0"

GENERAL NOTES

(T) TEMPERED GLASS - ALL PANES OF MARKED UNIT

1) PROVIDE HIGH-TEMP ICE & WATER SHEILD FROM LOWEST POINT OF ALL ROOF SURFACES TO ROOF RIDGE THROUGHOUT

2) ELEV. CALLOUTS TO TOP OF SUBFLOOR

3) PROVIDE GALV. EXPANSION JOINTS & DRIP EDGES PER STUCCO BUREAU, TYP.

0' 2' 4' 8'

ORIGINAL SHEET SIZE 18" x 24"

BELLISSIMO ARCHITECTS plic
206 HAYES ST,
SEATTLE, WA 98109

ARCHITECT SEAL

FOR PERMIT ONLY

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20 CASCADE KEY

Bellevue, WA

NO	DATE	REVISION

PROJECT NO
15006

BLDG DEPT PROJECT NO
BLDG-XXXX

CHECK PROJECT TEAM MEMB

PERMIT SET 4/3

BUILDING SECTIONS

DRB APPROVAL STAMP

A3.11

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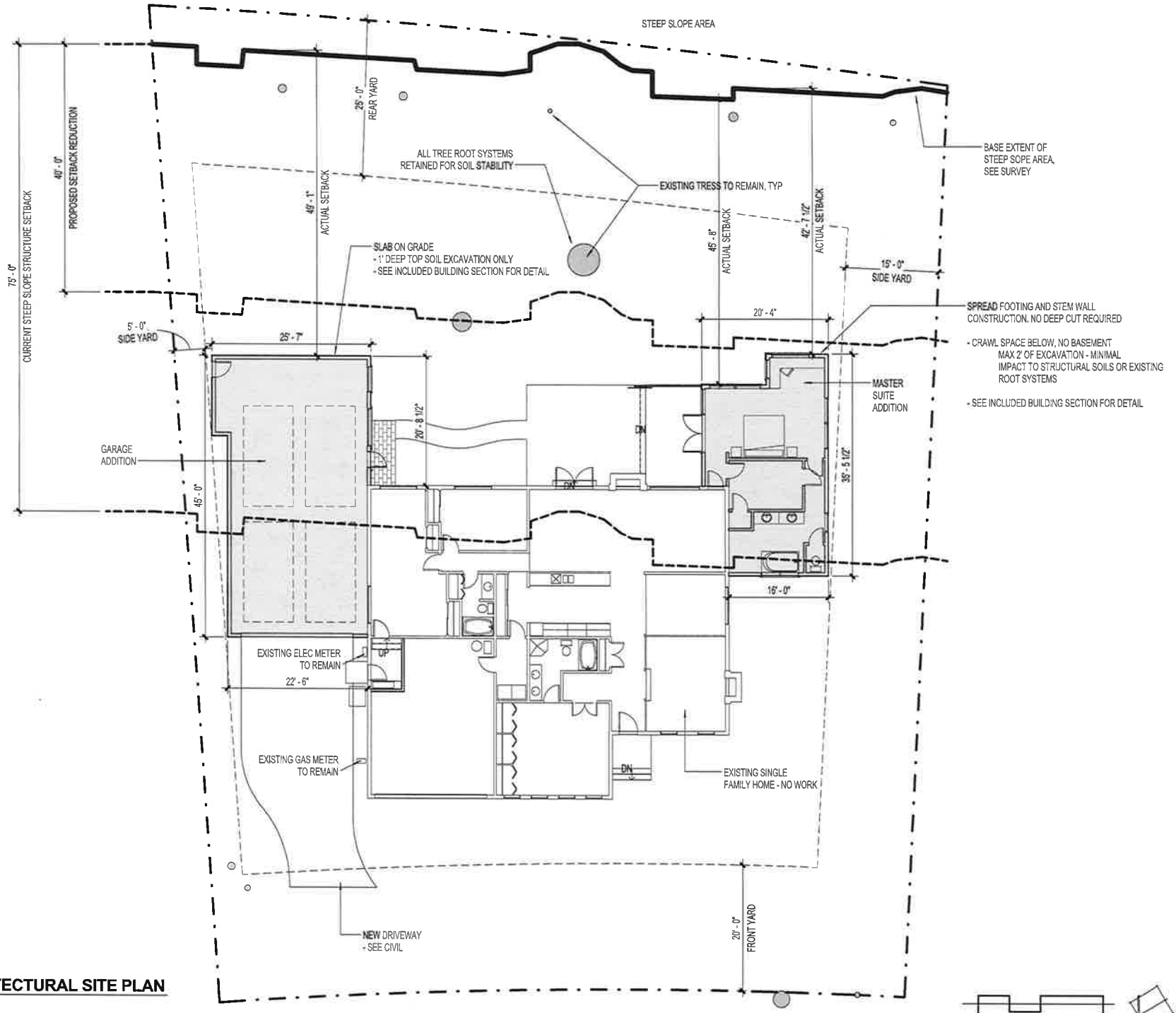

1 **ARCHITECTURAL SITE PLAN**
1" = 10'-0"

BELLISSIMO ARCHITECTS pllc
206 HAYES ST.
SEATTLE, WA 98109

FOR PERMIT ONLY

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20 CASCADE KEY

Bellevue, WA

NO	DATE	REVISION

PROJECT NO 15006
BLDG DEPT PROJECT NO BLDG-XXXX
CHECK PROJECT TEAM MEM

PERMIT SET 4/3

SITE PLAN -B

ORIGINAL SHEET SIZE 18" x 24"

A1.01

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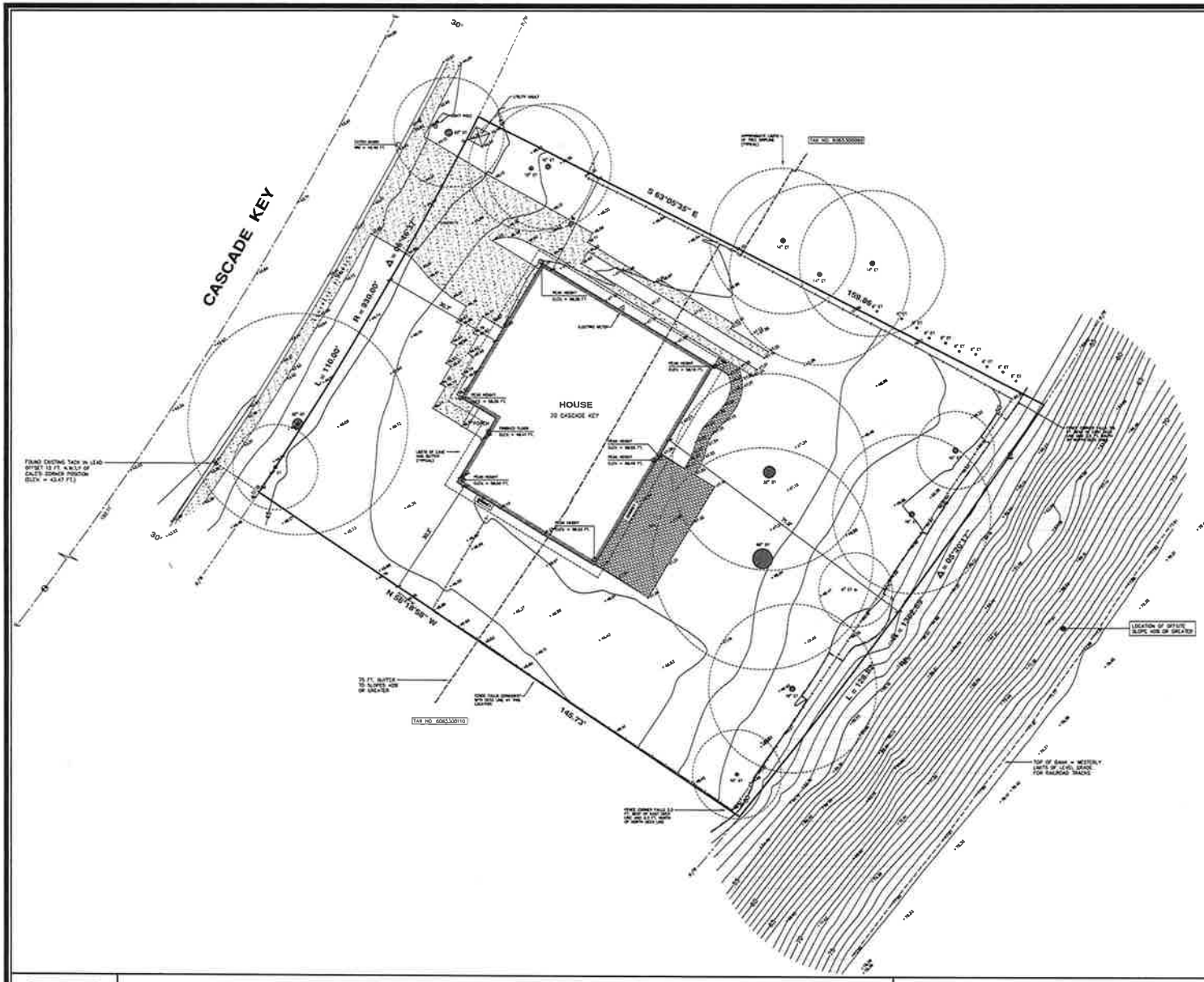
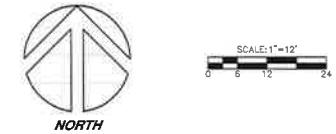




NOTES

1. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE USING A 10 SECOND "TOTAL STATION" THEODOLITE SUPPLEMENTED WITH A 100 FT. STEEL TAPE. THIS SURVEY MEETS OR EXCEEDS THE STANDARDS FOR LAND BOUNDARY SURVEYS AS SET FORTH IN WAC CHAPTER 332-130-090.
2. CONTOUR INTERVAL = 1 FT.
3. ELEVATION DATUM = NAVD'88, AS PER DIRECT OBSERVATIONS USING GPS EQUIPMENT ON NOVEMBER 11, 2015.
4. HORIZONTAL DATUM = NAD 83/91, AS PER DIRECT OBSERVATIONS USING GPS EQUIPMENT ON NOVEMBER 11, 2015.
5. PARCEL AREA = 18,152 SQ. FT.
6. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT. THEREFORE EASEMENTS AFFECTING THE PROPERTY, IF ANY, ARE NOT SHOWN HEREON.
7. TAX PARCEL NO. 6065300100
8. TREE DIAMETERS AND DRIPLINES DISPLAYED HEREON ARE APPROXIMATE. FOR SPECIFIC GENUS AND DIAMETER, TREES SHOULD BE EVALUATED BY A CERTIFIED ARBORIST.

ROBERT H. WINTERS
STATE OF WASHINGTON
PROFESSIONAL LAND SURVEYOR

DATE: _____

TOPOGRAPHIC DETAIL
20 CASCADE KEY
BELLEVUE, WASHINGTON

CHADWICK WINTERS
LAND SURVEYING AND MAPPING
1422 N.W. 85TH ST., SEATTLE, WA 98117
PHONE: 206.297.0996
FAX: 206.297.0997
WEB: WWW.CHADWICKWINTERS.COM

PROJECT #: 15-5327
DRAWING: 15-5327TOP02.DWG
CLIENT: SEASCAPE HOMES
DRAWN BY: SAL

PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

January 15, 2016
File No. 15-321

Mr. Jon Tellefson
Seascape Homes
P. O. Box 40568
Bellevue, WA 98015

Subject: **Geotechnical Engineering Report**
Proposed Additions
20 Cascade Key, Bellevue, Washington

Dear Mr. Tellefson,

As requested, PanGEO has completed a geotechnical engineering study for the proposed development. This study was performed in general accordance with our mutually agreed scope of work outlined in our proposal dated December 15, 2015, which was approved by you on the same day. Our service scope included reviewing readily available geologic data in the project vicinity, drilling two test borings, conducting a site reconnaissance, performing engineering analysis, and developing the conclusions and recommendations presented in this report.

SITE AND PROJECT DESCRIPTION

The subject property is an approximately 18,500 square foot lot located at 20 Cascade Key in Bellevue, Washington (see Vicinity Map, Figure 1). The site is roughly rectangular in shape, and borders Cascade Key to the west, King County Park property to the east, and existing single-family residences to the north and south. The site is currently occupied by a one-story house in the central portion of the lot. The existing site grade is practically level.

We understand that you plan to construct two additions, one on the north side and one on the south side of the existing house, for a total about 2,000 square feet (see Figure 2). We further understand that the additions will be one-story wood frame structures with foundations near the existing grade.

3213 Eastlake Ave E, Ste B
Seattle, WA 98102
Tel (206) 262-0370
Fax (206) 262-0374

The conclusions and recommendations outlined and provided 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.

SUBSURFACE EXPLORATIONS

Two test borings (B-1 and B-2) were drilled at the site on December 28, 2015 using a track mounted drill rig owned and operated by Bore-Tec, Inc. of Spangle, Washington. The borings were drilled to a depth of about 36½ feet below the existing grade in both borings. The approximate boring locations were taped in the field from on-site features, and are shown on Figure 2.

The drill rig was equipped with 6-inch outside diameter hollow stem augers. Soil samples were obtained from the borings at 2½- and 5-foot depth intervals in general accordance with Standard Penetration Test (SPT) sampling methods (ASTM test method D-1586) in which the samples are obtained using a 2-inch outside diameter split-spoon sampler. The sampler was driven into the soil a distance of 18 inches using a 140-pound weight freely falling a distance of 30 inches. The number of blows required for each 6-inch increment of sampler penetration was recorded. The number of blows required to achieve the last 12 inches of sample penetration is defined as the SPT N-value. The N-value provides an empirical measure of the relative density of cohesionless soil, or the relative consistency of fine-grained soils.

A geologist from PanGEO was present during the field exploration to observe the drilling, assist in sampling, and to describe and document the soil samples obtained from the borings. The soil samples were described and field classified in general accordance with the symbols and terms outlined in Figure A-1, and the summary boring logs are included as Figure A-2 and A-3 at the end of this report.

SUBSURFACE CONDITIONS

SITE GEOLOGY

According to the Geologic Map of King County, Washington (Booth, et al., 2007), the site is underlain by Alluvium (Qal). Alluvium (Qal) is described by Booth, et al. as horizontally

bedded, sand, silt, and gravel deposited by streams and running water. Alluvium is typically loose to dense in density and soft to stiff in consistency, and may locally contain soft fine-grained and peat lenses. The subsurface condition encountered in our exploration at the project site is generally consistent with mapped geology.

SOIL AND GROUNDWATER

The soils observed in our borings generally consisted of fill overlying alluvium. The following is a brief description of the soils encountered in the borings advanced at the site. Please refer to the summary boring logs (Figure A-2 and A-3) for details.

> ***Unit 1- Fill***: Fill was encountered in both borings from surface to about 4½ feet below the surface. The fill generally consisted of loose, silt, silty sand to sandy gravel with organics and charcoal.
>
> ***Unit 2 - Alluvium***: Below the fill, both borings encountered interbedded layers of loose to dense sand, silty, and soft to very stiff silt and clay that extended to the maximum exploration depth of about 36½ below the surface. This unit appeared to be consistent with the mapped Alluvium deposit.

Groundwater was encountered at about 5 feet during drilling below the ground surface in both borings. It should be noted that the groundwater level at the site will vary depending on the season, tidal fluctuations, local subsurface conditions, and other factors. Groundwater levels and seepage rates are normally highest during the winter and early spring.

GEOTECHNICAL DESIGN RECOMMENDATIONS

SOIL LIQUEFACTION EVALUATION

According to the City of Bellevue, the site is located in a Liquefaction Hazards area. Soil liquefaction is a condition where saturated cohesionless soils undergo a substantial loss of strength due to the build-up of excess pore water pressures resulting from cyclic stress applications induced by earthquakes. Soils most susceptible to liquefaction are loose, uniformly graded sands and loose silts with little cohesion.

The existing wood frame buildings in the project areas, including the existing building at the subject site, have performed well during the 2001 Nisqually earthquake. As such, it is our

opinion that the proposed wood frame addition structures will likely perform reasonably well during future earthquakes with the magnitude similar to 2001 Nisqually earthquake.

During a 2,475-year IBC-code level earthquake, however, our analysis indicated that the intermittent soil layers has a moderate to high potential for soil liquefaction. We evaluated the soil liquefaction potential using a 2,475-year event, which is consistent with the 2012 IBC design earthquake, and it appears that the potentially liquefiable layers are likely from the groundwater table (i.e. 5 feet) to about 25 to 30 feet. We estimate that three to four inches of ground settlement may occur as a result of soil liquefaction during the IBC-level design event. The estimated ground settlement could potentially result in architectural and structural damages. However, because of the presence of the soil crest between the bottom of the footing and the groundwater and structural fill recommended below the foundations, a significant loss of bearing capacity is not anticipated.

It is our opinion that the proposed additions may be founded on conventional continuous footings or mat foundations to mitigate the risk of differential settlements. We also recommend placing at least 12 inches of granular structural fill below the foundations. A layer of geogrid or high-strength woven geotextitle should be placed on the native soil prior to placement of structural fill. Additional design recommendations are include in the "Building Foundations" section of this report.

It should be noted that, even with these measures, some damages may still occur during an IBC-code level earthquake. However, in our opinion, egress from the buildings should not be severely impacted.

The owner should be aware of the potential risk and is willing to accept such risk. If a higher level of building foundation performance is desired, use of deep foundations will be required. PanGEO can provide additional design input if requested.

Based on the site topography and soil conditions, the potential for seismic-induced landsliding and lateral spreading is considered to be low. And it is our opinion that special design considerations associated with seismic-induced landsliding and lateral spreading are not necessary for this project.

SITE CLASS AND SEISMIC DESIGN PARAMETERS

We anticipate that the seismic evaluation of the structures will be accomplished in accordance with the 2012 International Building Code (IBC). The IBC seismic design parameters are in part based on the site soil conditions and site classifications. Based on 2012 IBC and the publication ASCE 7-02, it is our opinion that Site Class E is appropriate for the project site.

The Table 1 below provides seismic design parameters for the site that are in conformance with the 2012 edition of the International Building Code (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.

Table 1 - 2012 IBC Seismic Design Parameters

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters	
	S_S	S_1	F_a	F_v	S_{DS}	S_{D1}
E	1.365	0.529	0.9	2.4	0.819	0.846

BUILDING FOUNDATIONS

Based on the subsurface conditions at the site and our understanding of the project design, it is our opinion that conventional continuous footings or mat foundations is appropriate to support the proposed additions. Individual spread footings is not recommended. The following sections present our design recommendations for the design of continuous footings and mat foundations. Deep foundations, such as pin piles, will provide a higher level of foundation performance comparing to the shallow foundation. If deep foundation options are preferred, PanGEO can provide additional recommendation as requested.

The continuous footings and mat foundations should be founded on at least 12 inches of compacted structural fill. The structural fill may be placed on the native alluvial soils re-compacted to a firm and unyielding condition. If the existing soil at the bottom of 12-inch structural fill level cannot be adequately compacted, additional over-excavation may be needed. The needs for additional over-excavation should be determined by PanGEO, based on the actual

conditions observed during construction. A layer of geogrid or high-strength woven geotextitle should be placed on the firm native soil prior to placement of structural fill.

The structural fill should extend horizontally a minimum of 6 inches beyond the edge of the footings. Exterior foundation elements should be placed at a minimum depth of 18 inches below final exterior grade. Interior foundations should be placed at a minimum depth of 12 inches below the top of slab. Continuous footings should have a minimum widths of 24 inches.

We recommend that an allowable soil bearing pressure of 1,200 pounds per square feet (psf) be used for foundation design. The recommended allowable 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.

Provided the mat slab subgrade is prepared as described above, mat foundation settlement is estimated to be approximately one inch with differential settlement on the order of ½ inch during the static loading condition. Settlement for shallow foundations due to seismic shaking may be on the order of 1 to 2 inch during an IBC code-level design earthquake.

Lateral Resistance – Lateral loads on the structures 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 recompacted sand/structural fill, a frictional coefficient of 0.3 may be used to evaluate sliding resistance developed between the concrete and the compacted subgrade soil. Passive soil resistance may be calculated using an equivalent fluid weight of 250 pcf, assuming properly compacted structural fill will be placed against the footings. 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.

Perimeter Footing Drain – Footing drains should be installed around the perimeter of the building, 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.

Foundation Subgrade Preparation and Over-excavation – All foundation subgrade should be properly prepared and compacted to a dense condition prior to placing structural fill and form setting and rebar placement. As previously indicated, a minimum of 12 inches compacted structural fill should be placed below the footings. The exposed subgrade at the bottom of 12-inch structural fill should be properly compacted prior to structural fill placement. A layer of geogrid or high-strength woven geotextitle should be placed on the native soil prior to placement of structural fill. The adequacy of footing subgrade should be verified by a representative of PanGEO, prior to placing forms or rebar.

RETAINING WALL DESIGN PARAMETERS

Retaining walls, if needed, should be properly designed to resist the lateral earth pressures exerted by the soils behind the walls. 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/basement walls are presented below.

Lateral Earth Pressures

Concrete cantilever walls should be designed for an equivalent fluid pressure of 35 pcf for level backfills behind the walls assuming the walls are free to rotate. If walls are to be restrained at the top from free movement, equivalent fluid pressures of 45 pcf should be used for level backfills behind the walls.

Permanent walls should be designed for an additional uniform lateral pressure of 6H psf for seismic loading, where H corresponds to the buried depth of the wall. The recommended lateral pressures assume that the backfill behind the wall consists of a free draining and properly compacted fill with adequate drainage provisions.

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 wall height.

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 foundations. Passive resistance values may be determined using an equivalent fluid weight of 300 pcf. This value includes a factor of safety of 1.5, assuming the footing is poured against dense native sand, re-compacted on-site sandy soil or properly compacted structural fill adjacent to the sides of footing. 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 safety of 1.5.

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. Where applicable, in-lieu of conventional footing drains, weep holes (2" diameter and 10 feet on center) may be used for site retaining walls. 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.

Wall Backfill

In our opinion, the on-site sandy soil, excluding organic-rich soils, may be re-used as wall backfill provided they can be compacted to a dense condition and proper wall drainage discussed above is installed. Fine-grained soil, such as silt and clay if encountered at the site, should not be used as wall backfill. Use of on-site soil as wall backfill should be approved by the project geotechnical engineer. Imported wall backfill should consist of free draining granular material, such as Seattle Type 17 or WSDOT Gravel Borrow. In areas where the space is limited between the wall and the face of excavation, pea gravel may be used as backfill without compaction.

Wall backfill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the

maximum dry density, as determined using test method ASTM D 1557. 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.

CONSTRUCTION CONSIDERATIONS

TEMPORARY EXCAVATIONS

Temporary excavations will likely be less than 4 feet for the proposed project. We anticipate the excavations to mainly encounter loose to medium dense silt and sand. 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 and/or shoring.

All temporary excavations deeper than a total of 4 feet should be sloped or shored. In the event that temporary excavations deeper than 4 feet are needed, for planning purposes, they should be sloped 1H:1V or flatter, or properly shored. The temporary cut slopes should be re-evaluated in the field during construction based on actual observed soil conditions, and may need to be flattered in the wet reasons. 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.

MATERIAL REUSE AND STRUCTURAL FILL

In the context of this report, structural fill is defined as compacted fill placed under footings or other load-bearing areas. In our opinion, the on-site soils are not suitable to be used as structural fill, but can be used as wall backfill and general fill in the non-structural areas. Structural fill should consist of imported, well-grade, granular material, such as WSDOT CSBC or gravel borrow. Well-graded recycled concrete may also be considered as a source of structural fill. Use of recycled concrete as structural fill should be approved by the geotechnical engineer. The on-site soil may be used as general fill in the non-structural and landscaping areas. If use of the on-site soil is planned, the excavated soil should be stockpiled and protected with plastic sheeting to prevent softening from rainfall in the wet season.

STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

Depending on the type of compaction equipment used and depending on the type of fill material, it may be necessary to decrease the thickness of each lift in order to achieve adequate compaction. PanGEO can provide additional recommendations regarding structural fill and compaction during construction.

WET WEATHER EARTHWORK

In our opinion, the proposed site construction may be accomplished during wet weather (such as in winter) without adversely affecting the site stability. However, earthwork construction performed during the drier summer months likely will be more economical. Winter construction will require the implementation of best management erosion and sedimentation control practices to reduce the chance of off-site sediment transport. Some of the site soils contain a high percentage of fines and are moisture sensitive. Any footing subgrade soils that become softened either by disturbance or rainfall should be removed and replaced with structural fill, Controlled Density Fill (CDF), or lean-mix concrete. General recommendations relative to earthwork performed in wet conditions are presented below:

- Site stripping, excavation and subgrade preparation should be followed promptly by the placement and compaction of clean structural fill or CDF;
- The size and type of construction equipment used may have to be limited to prevent soil disturbance;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil;
- Structural fill should consist of less than 5% fines; and

- Excavation slopes should be covered with plastic sheets.

SURFACE DRAINAGE AND 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 from 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 directed away from structures. Potential problems associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed addition, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements. The City of Seattle DPD, as part of the permitting process, will also require geotechnical construction inspection services. PanGEO can provide you a cost estimate for construction monitoring services at a later date.

We anticipate that the following additional services will be required:

- Review final project plans and specifications
- Verify the adequacy of soil bearing;
- Verify the adequacy of subsurface drainage installation;
- Confirm the adequacy of the compaction of structural backfill; 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.

CLOSURE

We have prepared this report for Seascape homes LLC 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 work.

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 work 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.

We appreciate the opportunity to be of service.

Sincerely,

Stephen H. Evans

Stephen H. Evans, LEG
Senior Engineering Geologist

Michael H. Xue, P.E.
Senior Geotechnical Engineer

Enclosures:

Figure 1	Vicinity Map
Figure 2	Site and Exploration Plan

Appendix A **Summary Boring Logs**

Figure A-1	Terms and Symbols for Boring and Test Pit Logs
Figure A-2	Log of Test Boring B-1
Figure A-3	Log of Test Boring H-2

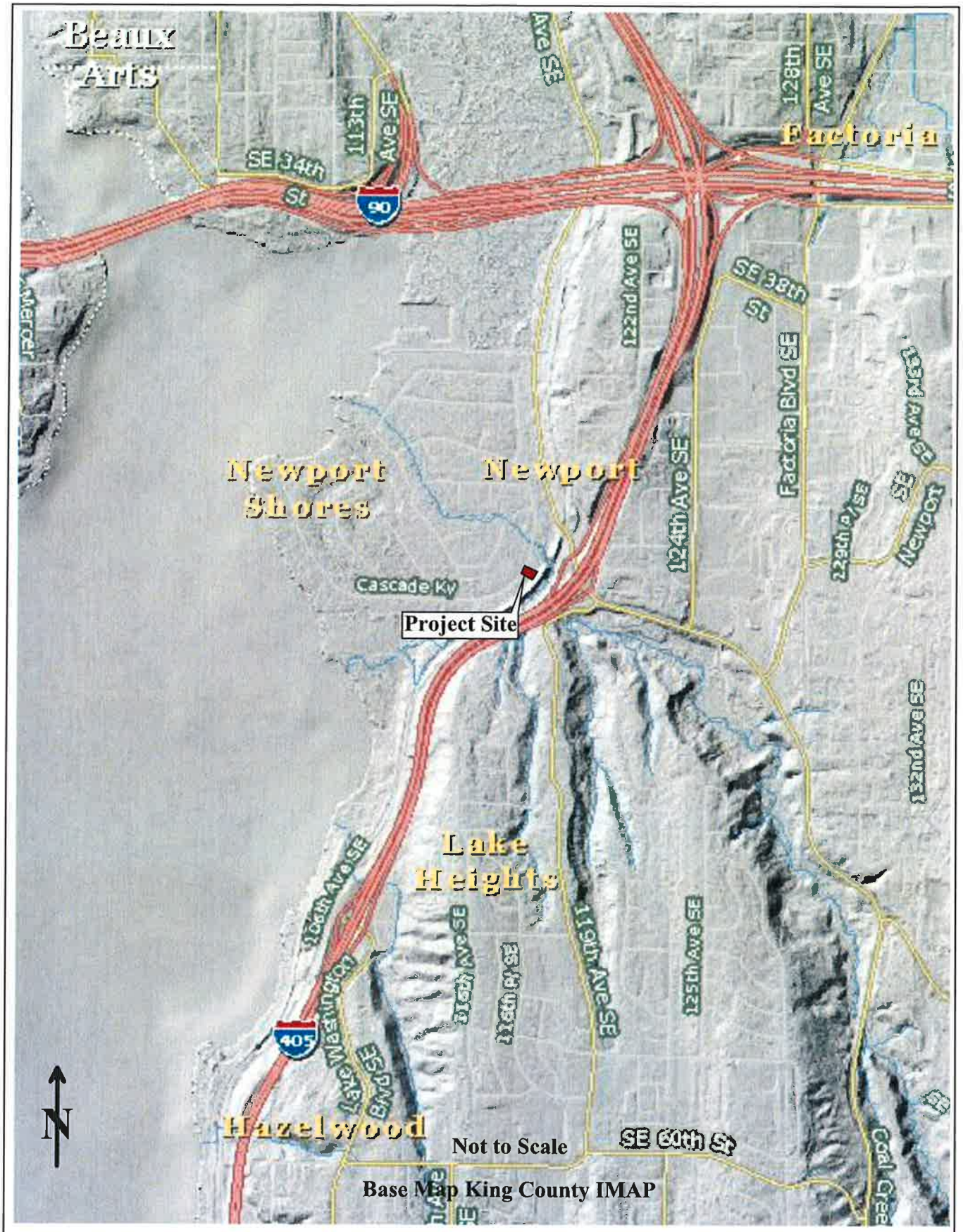
REFERENCES

America Society of Civil Engineers, 2002, *Minimum Design Loads for Building and Other structures (ASCE 7-02).*

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

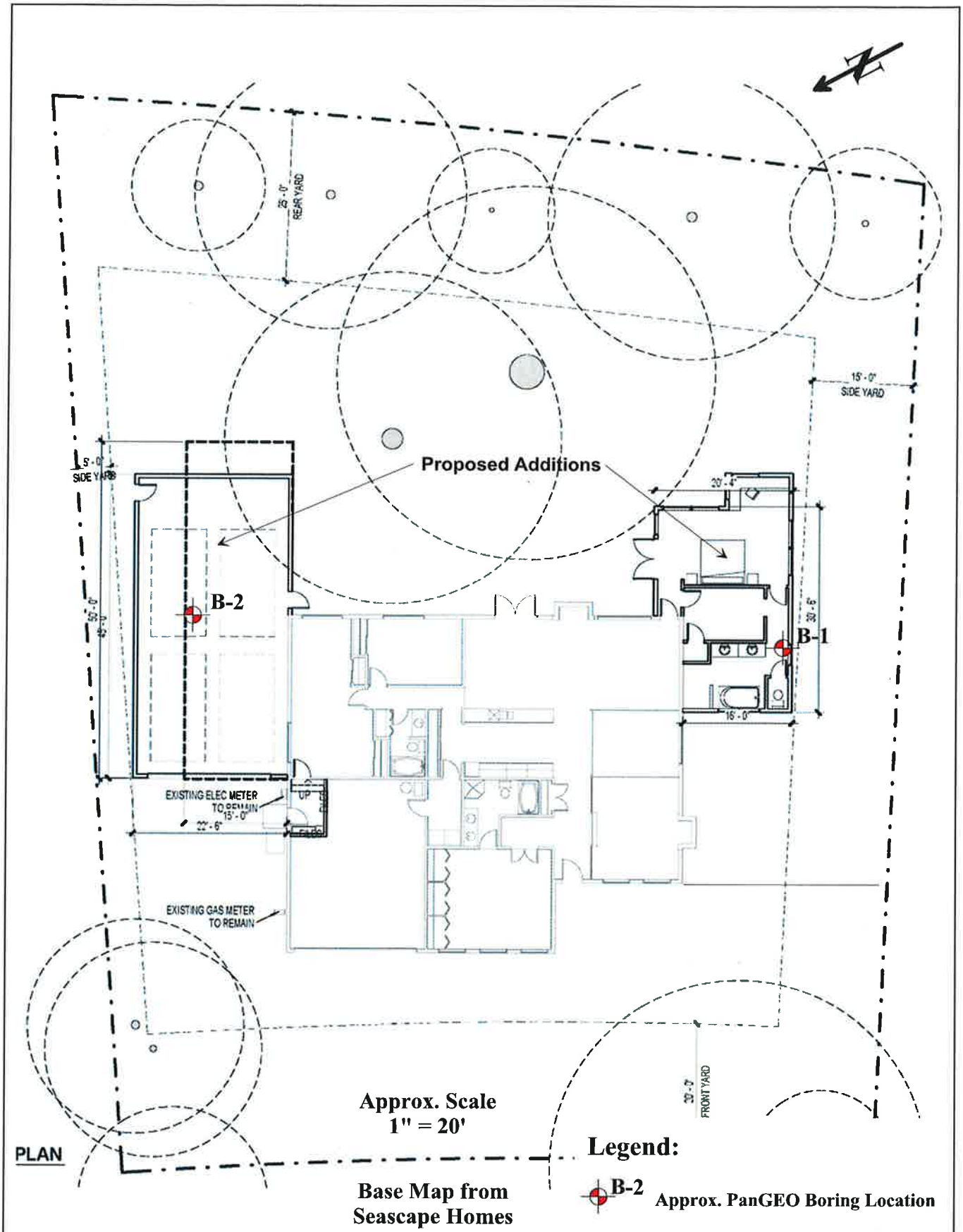
International Code Council, 2012, *International Building Code (IBC).*

WSDOT, 2014, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10, Washington State Department of Transportation.*



PanGEO INCORPORATED	Proposed Additions 20 Cascade Key Bellevue, Washington	VICINITY MAP	
		Project No. 15-321	Figure No. 1

15-321 Figure 1.grf 1/13/16 (16:39) SHE



PLAN

PanGEO INCORPORATED	Proposed Additions 20 Cascade Key Bellevue, Washington	SITE AND EXPLORATION PLAN	
		Project No. 15-321	Figure No. 2

15-321 Figure 2.grf 1/15/16 (13:22) SHE

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

Laminated: Layers of soil typically 0.05 to 1mm thick, max. 1 cm

Lens: Layer of soil that pinches out laterally

Interlayered: Alternating layers of differing soil material

Pocket: Erratic, discontinuous deposit of limited extent

Homogeneous: Soil with uniform color and composition throughout

Fissured: Breaks along defined planes

Slickensided: Fracture planes that are polished or glossy

Blocky: Angular soil lumps that resist breakdown

Disrupted: Soil that is broken and mixed

Scattered: Less than one per foot

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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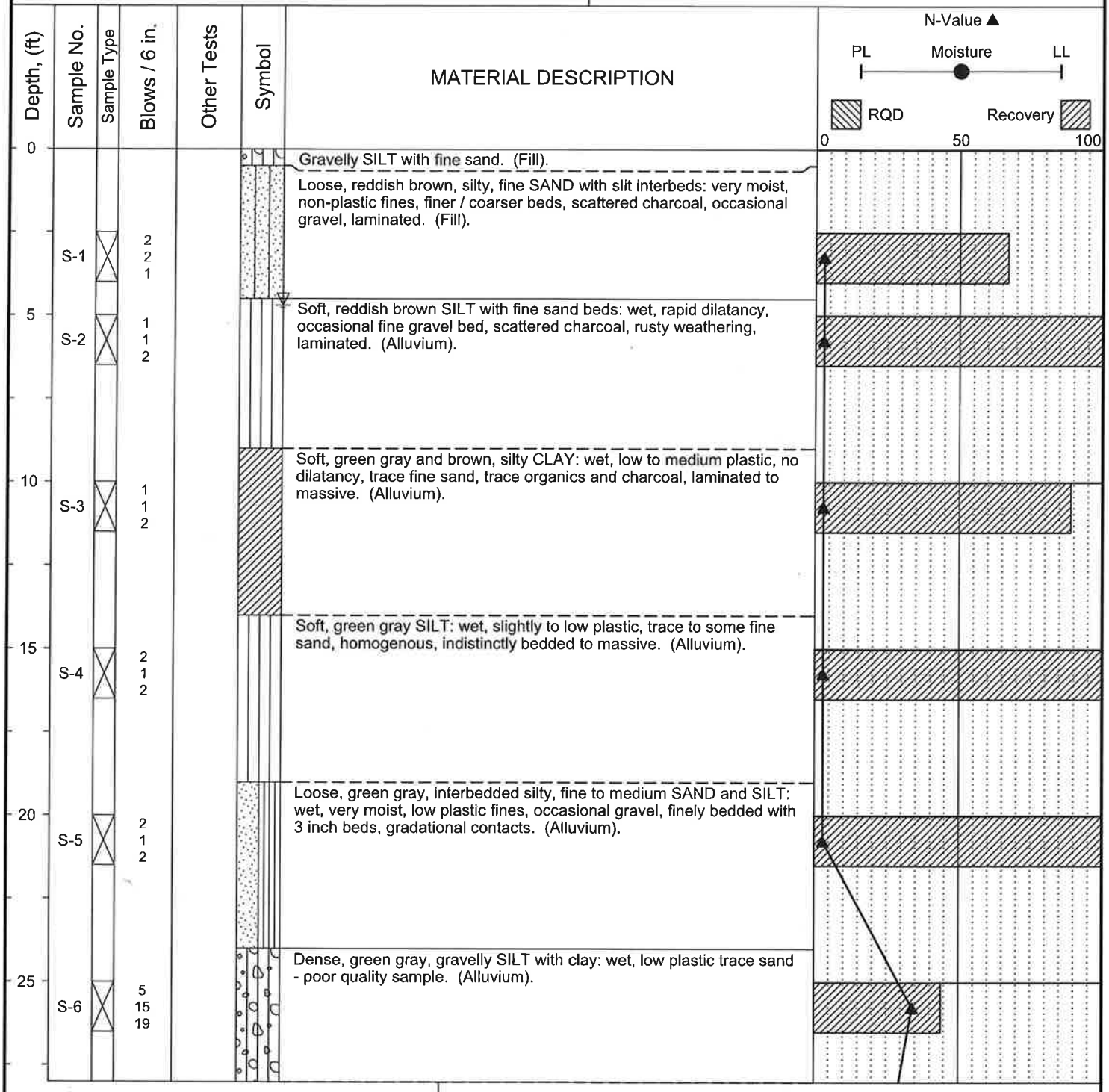
Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	Proposed Additions	Surface Elevation:	N/A
Job Number:	15-321	Top of Casing Elev.:	
Location:	20 Cascade Key, Bellevue, Washington	Drilling Method:	HSA
Coordinates:	Northing: , Easting:	Sampling Method:	SPT



Completion Depth:	36.5ft
Date Borehole Started:	12/28/15
Date Borehole Completed:	12/28/15
Logged By:	S. Evans
Drilling Company:	BoreTec, Inc.

Remarks: Groundwater measured in open hole following extraction of augers. Top of boring post-holed to clear utilities.

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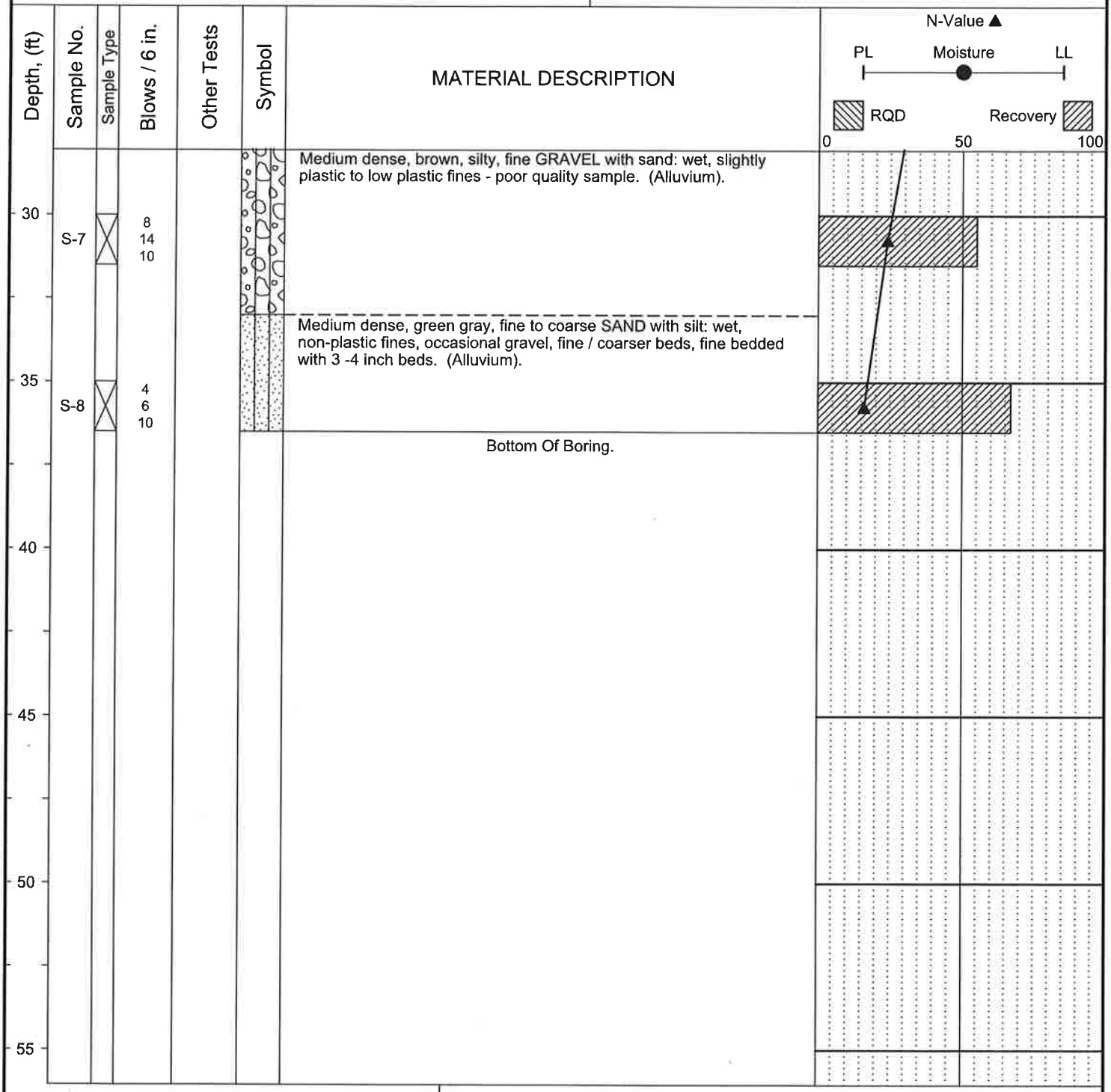
LOG OF TEST BORING B-1

Figure A-2

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

Project:	Proposed Additions	Surface Elevation:	N/A
Job Number:	15-321	Top of Casing Elev.:	
Location:	20 Cascade Key, Bellevue, Washington	Drilling Method:	HSA
Coordinates:	Northing: , Easting:	Sampling Method:	SPT



Completion Depth:	36.5ft
Date Borehole Started:	12/28/15
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Drilling Company:	BoreTec, Inc.

Remarks: Groundwater measured in open hole following extraction of augers. Top of boring post-holed to clear utilities.

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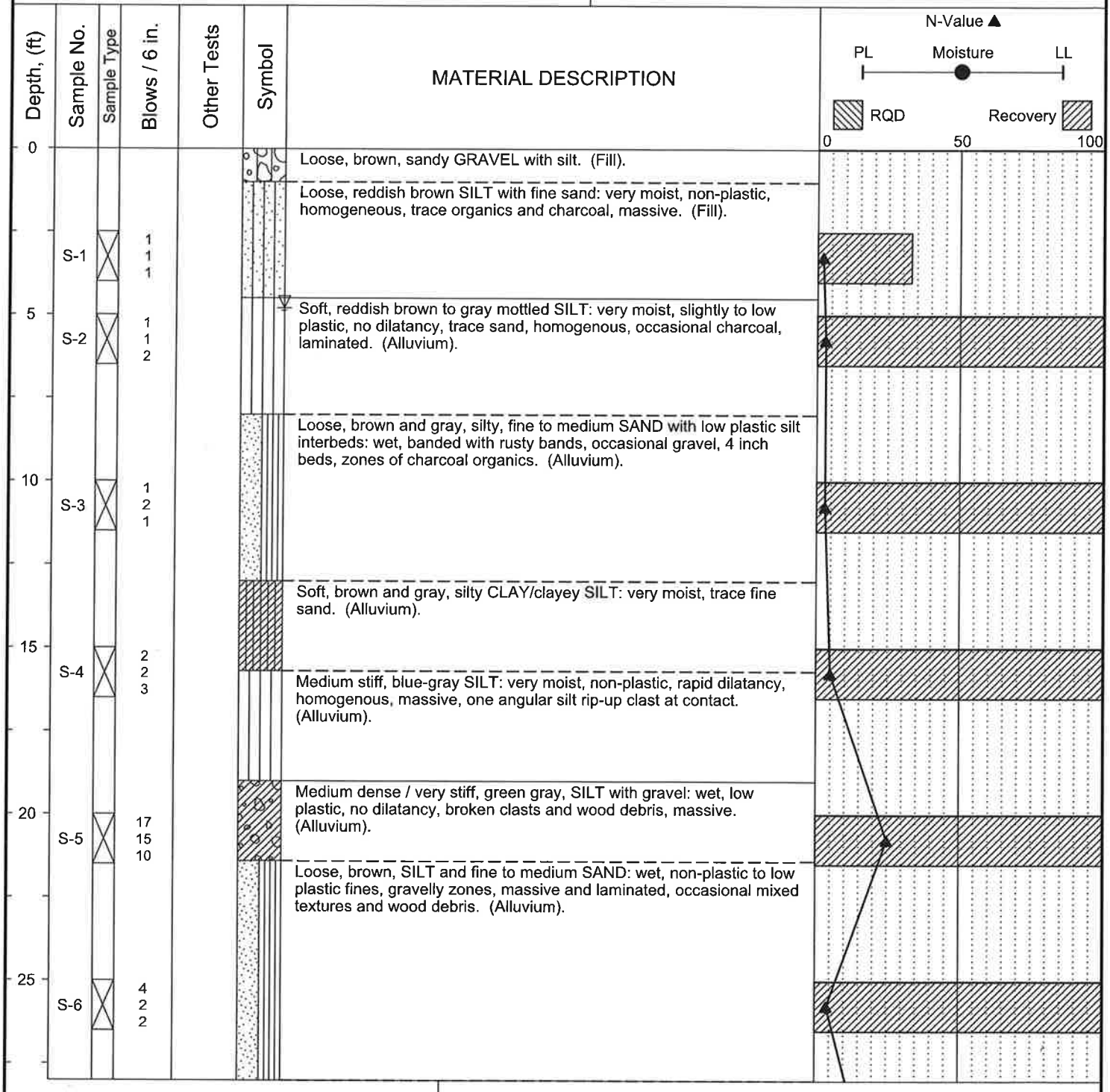
LOG OF TEST BORING B-1

Figure A-2

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

Project:	Proposed Additions	Surface Elevation:	N/A
Job Number:	15-321	Top of Casing Elev.:	
Location:	20 Cascade Key, Bellevue, Washington	Drilling Method:	HSA
Coordinates:	Northing: , Easting:	Sampling Method:	SPT



Completion Depth:	36.5ft
Date Borehole Started:	12/28/15
Date Borehole Completed:	12/28/15
Logged By:	S. Evans
Drilling Company:	BoreTec, Inc.

Remarks: Groundwater measured in open hole following extraction of augers. Top of boring post-holed to clear utilities.

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LOG OF TEST BORING B-2

Figure A-3

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

Project:	Proposed Additions	Surface Elevation:	N/A
Job Number:	15-321	Top of Casing Elev.:	
Location:	20 Cascade Key, Bellevue, Washington	Drilling Method:	HSA
Coordinates:	Northing: , Easting:	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
30	S-7		5 5 14			Medium dense, brown gray, silty, fine to medium SAND: wet, non-plastic fines with rapid dilatancy, scattered gravel and wood fibers, indistinctly laminated to massive. (Alluvium).
35	S-8		7 15 24			Dense, brown gray, fine to coarse SAND: wet, some silt, occasional fine gavel, homogenous, indistinctly laminated. (Alluvium).
						Bottom of Boring.
40						
45						
50						
55						

N-Value ▲

PL Moisture LL

RQD Recovery

0 50 100

Completion Depth:	36.5ft
Date Borehole Started:	12/28/15
Date Borehole Completed:	12/28/15
Logged By:	S. Evans
Drilling Company:	BoreTec, Inc.

Remarks: Groundwater measured in open hole following extraction of augers. Top of boring post-holed to clear utilities.

PanGEO INCORPORATED

LOG OF TEST BORING B-2

Figure A-3

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