DEVELOPMENT SERVICES DEPARTMENT
ENVIRONMENTAL COORDINATOR
450 110th Ave NE., P.O. BOX 90012
BELLEVUE, WA 98009-9012

OPTIONAL DETERMINATION OF NON-SIGNIFICANCE (DNS) NOTICE MATERIALS

The attached materials are being sent to you pursuant to the requirements for the Optional DNS Process (WAC 197-11-355). A DNS on the attached proposal is likely. This may be the only opportunity to comment on environmental impacts of the proposal. Mitigation measures from standard codes will apply. Project review may require mitigation regardless of whether an EIS is prepared. A copy of the subsequent threshold determination for this proposal may be obtained upon request.

File No. 16-144424-LO

Project Name/Address: Bryant Residence at 701 Shoreland Dr. SE

Planner: Reilly Pittman

Phone Number: 425-452-4350

Minimum Comment Period: November 28, 2016

Materials included in this Notice:

- ☒ Blue Bulletin
- ☒ Checklist
- ☒ Vicinity Map
- ☒ Plans
- ☒ Other: Critical Areas Report, Geotech Report

OTHERS TO RECEIVE THIS DOCUMENT:

☒ State Department of Fish and Wildlife / Sterwart.Reinbold@dfw.gov; Christa.Heller@dfw.wa.gov;
☒ State Department of Ecology, Shoreline Planner N.W. Region / Jobu461@ecy.wa.gov; sepaunit@ecy.wa.gov
☐ Army Corps of Engineers Susan.M.Powell@nws02.usace.army.mil
☒ Attorney General ecyolyef@atg.wa.gov
☒ Muckleshoot Indian Tribe Karen.Walter@muckleshoot.nsn.us; Fisheries.fileroom@muckleshoot.nsn.us

ENVIRONMENTAL CHECKLIST

10/9/2009

Thank you in advance for your cooperation and adherence to these procedures. If you need assistance in completing the checklist or have any questions regarding the environmental review process, please visit or call Development Services (425-452-6800) between 8 a.m. and 4 p.m., Monday through Friday (Wednesday, 10 to 4). Assistance for the hearing impaired: Dial 711 (Telecommunications Relay Service).

INTRODUCTION

Purpose of the Checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21c RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the City of Bellevue identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the City decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Answer the questions briefly, with the most precise information known, or give the best description you can. You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer or if a question does not apply to your proposal, write "do not know" or "does not apply." Giving complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the Planner in the Permit Center can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. Include reference to any reports on studies that you are aware of which are relevant to the answers you provide. The City may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impacts.

Use of a Checklist for Nonproject Proposals: *A nonproject proposal includes plans, policies, and programs where actions are different or broader than a single site-specific proposal.*

For nonproject proposals, complete the Environmental Checklist even though you may answer "does not apply" to most questions. In addition, complete the Supplemental Sheet for Nonproject Actions available from Permit Processing.

For nonproject actions, the references in the checklist to the words *project*, *applicant*, and *property* or *site* should be read as *proposal*, *proposer*, and *affected geographic area*, respectively.

Attach an 8 ½" x 11 vicinity map which accurately locates the proposed site.

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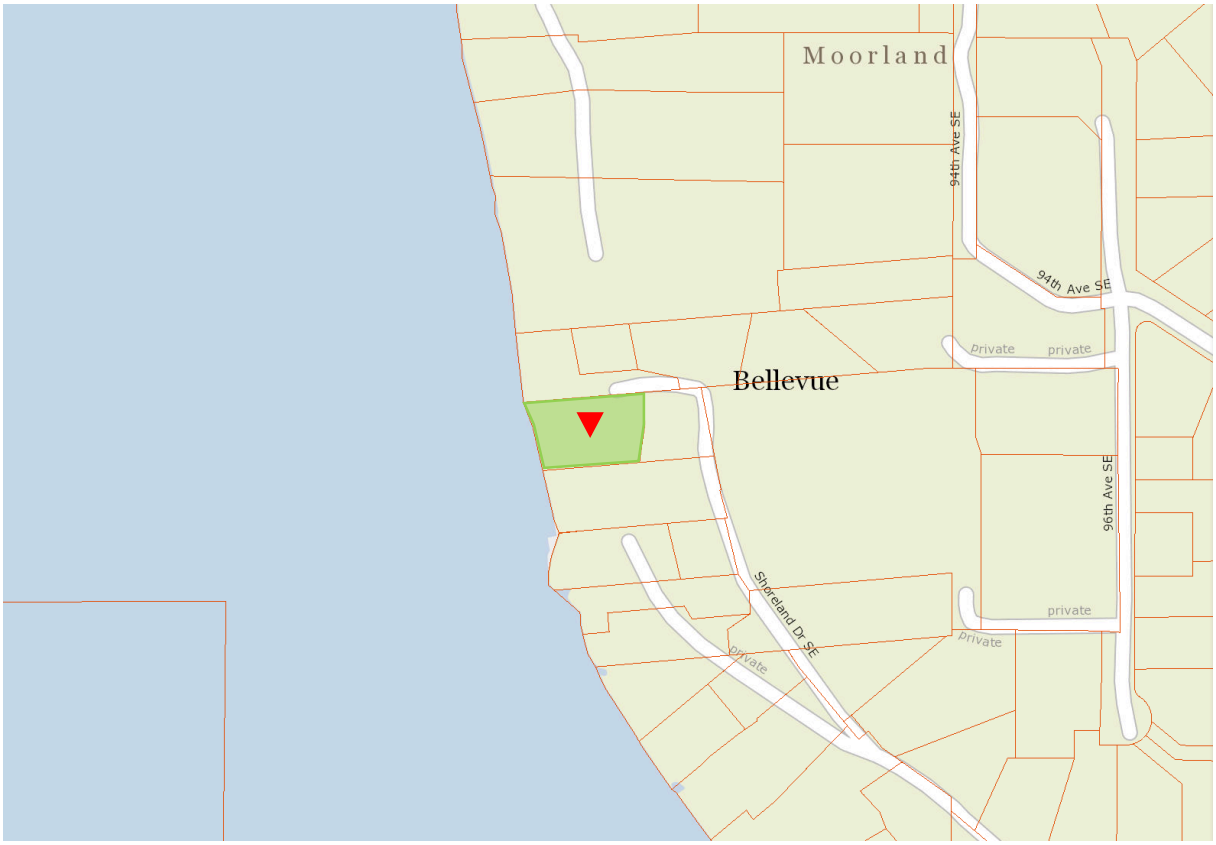
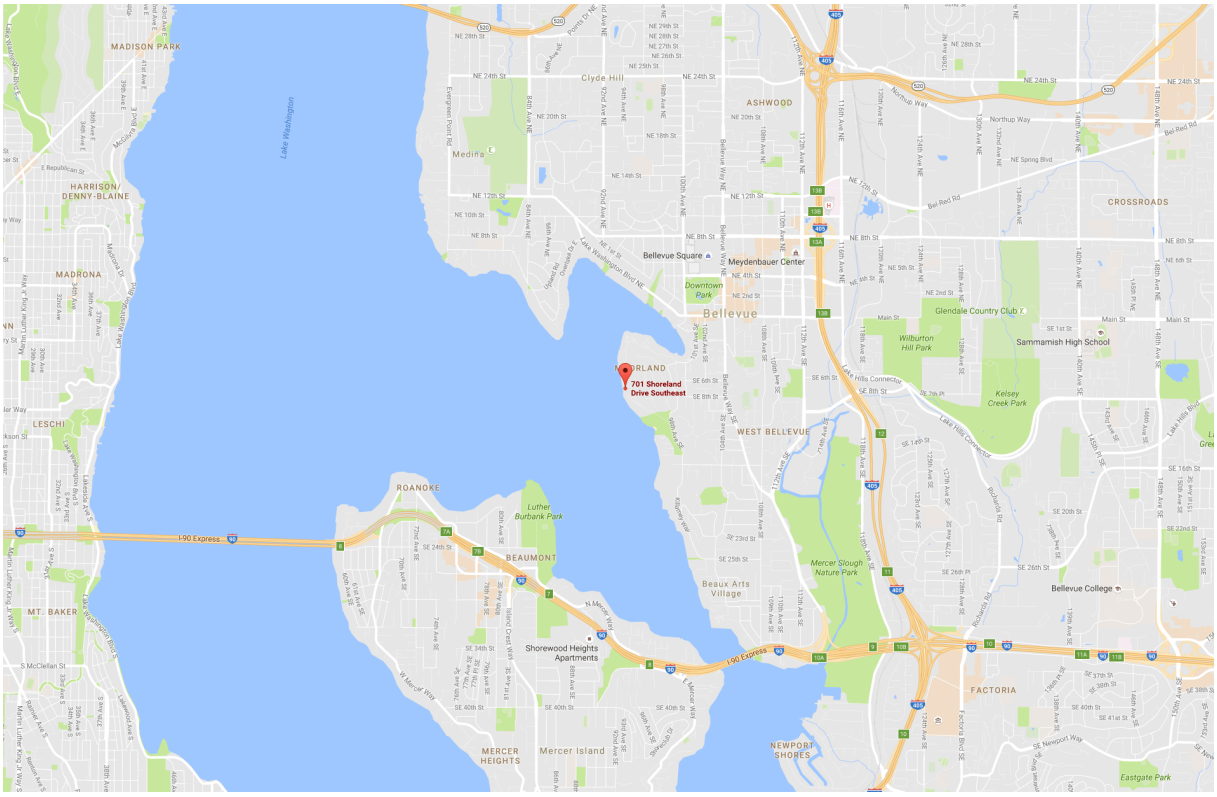
VICINITY MAP

LEGAL DESCRIPTION: LOT 2, CITY OF BELLEVUE SHORT PLAT NUMBER 81-24R, RECORDED UNDER RECORDING NUMBER 8302039001 BEING A PORTION OF LOTS 1 AND 2, BLOCK 4, MOORLAND, ACCORDING TO THE PLAT THERE OF RECORDED IN VOLUME 4 OF PLATS, PAGE 103, IN KING COUNTY, WASHINGTON.

TOGETHER WITH THOSE PORTIONS OF VACATED STREET ADJOINING SAID PREMISES; TOGETHER WITH SECOND CLASS SHORELINES ADJOINING.



KING COUNTY IMAP



BACKGROUND INFORMATION

Property Owner: PETER + TOBEY BRYANT

Proponent: JIM DEARTH - RIPPLE DESIGN STUDIO

Contact Person: BRIE NAKAMURA - RIPPLE DESIGN STUDIO - BRIE@RIPPLEDESIGNSTUDIO.COM
(If different from the owner. All questions and correspondence will be directed to the individual listed.)

Address: 4303 STONE WAY N SEATTLE WA 98103

Phone: 206-913-2333

Proposal Title: BRYANT RESIDENCE

Proposal Location: 701 SHORELAND DR SE, BELLEVUE, WA 98004
(Street address and nearest cross street or intersection) Provide a legal description if available.

Please attach an 8 ½" x 11" vicinity map that accurately locates the proposal site.

Give an accurate, brief description of the proposal's scope and nature:

1. General description: THE PROPOSED PROJECT INCLUDES THE DEMOLITION OF THE EXISTING SINGLE FAMILY RESIDENCE, ATTACHED CARPORT AND EXISTING NONCONFORMING ACCESSORY STRUCTURE. AFTER REMOVAL OF THE EXISTING STRUCTURES CONSTRUCTION OF A NEW SINGLE FAMILY RESIDENCE AND ATTACHED GARAGE WITH A FOOTPRINT OF APPROXIMATELY 5,342 SQUARE FEET WOULD BEGIN. THE PROPOSED NEW RESIDENCE IS STEPPED WITH THE SITE'S STEEP SLOPE CREATING A SINGLE STORY EASTERN FACADE AND THREE STORY WESTERN FACADE.
2. Acreage of site:
   THE ENTIRE PARCEL IS 22,890 SF, 0.52 ACRE
3. Number of dwelling units/buildings to be demolished:
   ONE SINGLE FAMILY RESIDENCE AND ONE ACCESSORY STRUCTURE WILL BE DEMOLISHED
4. Number of dwelling units/buildings to be constructed:
   ONE SINGLE FAMILY RESIDENCE
5. Square footage of buildings to be demolished:
   THE BUILDING ENVELOPE OF THE EXISTING RESIDENCE IS APPROXIMATELY 1,160 SF. THE BUILDING ENVELOPE OF THE ACCESSORY STRUCTURE IS APPROXIMATELY 566 SF.
6. Square footage of buildings to be constructed:
   THE ENVELOPE OF THE NEW RESIDENCE WILL BE 5,300 SQUARE FEET, THE AREA OF CONDITION SPACE IS 5,465 SQUARE FEET (NOT INCLUDING THE GARAGE).
7. Quantity of earth movement (in cubic yards):
   CUT: APPROXIMATELY 950 CY / FILL: APPROXIMATELY 750 CY
8. Proposed land use:
   NO CHANGES ARE PROPOSED TO THE EXISTING LAND USE.
9. Design features, including building height, number of stories and proposed exterior materials:
   SITED ON A STEEPLY SLOPING SITE THE BUILDING STEPS DOWN WITH THE SLOPE CREATING A SINGLE STORY EATERN FACADE AND A THREE STORY WESTERN FACADE. THE BUILDING MEETS THE CITY OF BELLEVUE HEIGHT REQUIREMENTS PER LUC 20.20.010 AND LUC 20.25E.017. EXTERIOR MATERIALS ARE ANTICIPATED TO BE SHINGLE SIDING/ROOFING AND WOOD TRIM.
10. Other

Estimated date of completion of the proposal or timing of phasing:
IT IS ANTICIPATED THAT A BUILDING PERMIT APPLICATION WILL BE SUBMITTED TO THE CITY OF BELLEVUE IN THE WINTER OF 2016. DEMOLITION OF THE EXISTING STRUCTURES AND CONSTRUCTION OF THE NEW RESIDENCE WOULD COMMENCE IMMEDIATELY FOLLOWING ISSUANCE OF THE BUILDING PERMIT. DEMOLITION AND SITE WORK WILL BE COORDINATED WITH CITY OF BELLEVUE MORATORIUM REQUIREMENTS.

Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
NONE AT THIS TIME

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List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

1. CRITICAL AREAS REPORT - PROPOSED BRYANT RESIDENCE. EVERGREEN AQUATIC RESOURCE CONSULTANTS, LLC. OCTOBER 2016.
2. GEOTECHNICAL ENGINEERING STUDY. PANGEO, INC. SEPTEMBER 2016.
3. ARBORIST REPORT. SELASCO & ASSOCATES LLC. OCTOBER 2016.
4. BALD EAGLE USE ASSESSMENT. CHRIS HOLCOMB. OCTOBER 2016.

Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. List dates applied for and file numbers, if known.

NO OTHER APPLICATIONS ARE PENDING GOVERNMENT APPROVALS OF OTHER PROPOSALS DIRECTLY AFFECTING THE SUBJECT PROPERTY.

List any government approvals or permits that will be needed for your proposal, if known. If permits have been applied for, list application date and file numbers, if known.

1. CRITICAL AREAS LAND USE PERMIT (CITY OF BELLEVUE) - SUBMITTED CONCURRENTLY WITH THIS SEPA CHECKLIST
2. SHORELINE SUBSTANTIAL DEVELOPMENT PERMIT - SUBMITTED CONCURRENTLY WITH THIS SEPA CHECKLIST
3. BUILDING PERMIT (CITY OF BELLEVUE) - NOT YET APPLIED

Please provide one or more of the following exhibits, if applicable to your proposal.
(Please check appropriate box(es) for exhibits submitted with your proposal):

☐ Land Use Reclassification (rezone) Map of existing and proposed zoning

☐ Preliminary Plat or Planned Unit Development
Preliminary plat map

☐ Clearing & Grading Permit
Plan of existing and proposed grading
Development plans

☐ Building Permit (or Design Review)
Site plan
Clearing & grading plan

☐ Shoreline Management Permit
Site plan

A. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site: ☐ Flat ☐ Rolling ☐ Hilly ☒ Steep slopes ☐ Mountains ☐ Other

b. What is the steepest slope on the site (approximate percent slope)?
SLOPES ON THE SITE ARE MORE THAN 40%

c. What general types of soil are found on the site (for example, clay, sand, gravel, peat, and muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.
ACCORDING TO THE NATURAL RESOURCES CONSERVATION SERVICE (NRCS) SOIL MAPS, THE PROJECT SITE IS COMPRISED OF KITSAP KILT LOAM, 15 TO 30 PERCENT SLOPES. ACCORDING TO PANGEO, INC., THE SITE CONSISTS OF LOOSE TO MEDIUM DENSE FILL OVER MEDIUM TO DENSE SAND AND STIFF TO HARD SILT. THE DENSE TO VERY DENSE SAND ENCOUNTERED APPEARS TO BE CONSISTENT WITH THE MAPPED GEOLOGY AT THE SITE.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
ACCORDING TO PANGEO, INC. THERE ARE NO SURFACE INDICATIONS OF UNSTABLE SOILS ON THE PROJECT SITE.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

ALL PROPOSED CUT AND FILL ACTIVITIES ARE ASSOCIATED WITH A NEW SINGLE FAMILY RESIDENCE. APPROXIMATELY 950 CUBIC YARDS OF EXCAVATION WILL OCCUR WITH APPROXIMATELY 750 CUBIC YARDS OF FILL NEEDED. EXCAVATED SOILS WILL BE REUSED ON-SITE TO THE MAXIMUM EXTENT FEASIBLE, AS INDICATED BY THE PROJECT GEOTECHNICAL CONSULTANT (PANGEO, INC.).

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

EROSION COULD OCCUR IF EXPOSED SOILS ARE MOBILIZED BY RAINFALL. SHORT-TERM EROSION MAY OCCUR IN AREAS OF CLEARED VEGETATION. HOWEVER, ANY IMPACTS WOULD BE SHORT-TERM AND THE MEASURES DESCRIBED BELOW WOULD BE UTILIZED TO MINIMIZE EROSION.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

THE PROJECT PROPOSES APPROXIMATELY 7,711 SQUARE FEET OF IMPERVIOUS SURFACES WHICH IS APPROXIMATELY 34 PERCENT OF THE TOTAL SITE AREA.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

ALL CLEARING AND GRADING CONSTRUCTION WOULD BE IN ACCORDANCE WITH CITY OF BELLEVUE CLEARING + GRADING CODE (CHAPTER 23.76), PERMIT CONDITIONS AND ALL OTHER APPLICABLE CODES, ORDINANCES AND STANDARDS. WHERE NEEDED, TEMPORARY VERSION AND SEDIMENTATION CONTROL MEASURES WILL BE IMPLEMENTED SUCH AS SILT FENCING. A SILT FENCE WOULD BE INSTALLED AROUND EXPOSED SITS TO PREVENT SLOPE INSTABILITY OR SILT-LADEN WATER FROM LEAVING THE SITE DURING RAINFALL. FURTHER EROSION CONTROL MEASURES WILL BE CONDUCTED AS RECOMMENDED BY THE PROJECT'S GEOTECHNICAL CONSULTANT, PANGEO, INC.

2. AIR

a. What types of emissions to the air would result from the proposal (i.e. dust, automobile odors, and industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

MINIMAL EMISSIONS FROM VEHICLES AND CONSTRUCTION EQUIPMENT WOULD OCCUR DURING SITE CONSTRUCTION. AFTER PROJECT COMPLETION, EMISSIONS TO THE AIR WOULD OCCUR FROM VEHICLES ASSOCIATED WITH A SINGLE FAMILY RESIDENCE.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

NO OFF-SITE SOURCES OF EMISSIONS OR ODOR WOULD AFFECT THE PROPOSAL.

c. Proposed measures to reduce or control emissions or other impacts to the air, if any:

VEHICLES AND CONSTRUCTION EQUIPMENT WILL BE KEPT IN GOOD WORKING ORDER.

3. WATER

a. Surface

(1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

THE PROJECT IS LOCATED ADJACENT TO LAKE WASHINGTON. NO OTHER WATERBODIES ARE ON OR IN THE IMMEDIATE VICINITY.

(2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If Yes, please describe and attach available plans.

THE ENTIRETY OF THE PROJECT WILL OCCUR WITHIN 200 FEET OF LAKE WASHINGTON. NO STRUCTURES ARE PROPOSED WITHIN 72 FEET OF THE ORDINARY HIGH WATER MARK. THE EXISTING ACCESSORY STRUCTURE LOCATED WITHIN 50 FEET OF THE OHWM IS TO BE DEMOLISHED AND THE AREA RESTORED WITH NATIVE PLANTING. OTHER PROPOSED SITE WORK WITHIN 50 FEET OF THE OHWM WILL INCLUDE RESTORATIVE NATIVE PLANTING

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Improvements are proposed along the shoreline, in the stream buffer of Lake Washington

(3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

NONE.

(4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

THE PROPOSAL DOES NOT REQUIRE SURFACE WITHDRAWALS OR DIVERSIONS.

(5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

THE PROPOSAL DOES NOT LIE WITHIN A 100-YEAR FLOODPLAIN.

(6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

THE PROPOSAL DOES NOT INVOLVE ANY DISCHARGE OF WASTE MATERIALS TO SURFACE WATERS.

b. Ground

(1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description.

NO WITHDRAWAL OF GROUND WATER OR DISCHARGE OF WATER TO GROUND WATER WOULD OCCUR AS PART OF THIS PROJECT.

(2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.) Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

NO WASTE MATERIAL FROM SEPTIC TANKS OR OTHER SOURCE WOULD BE DISCHARGED INTO THE GROUND AS PART OF THIS PROJECT.

c. Water Runoff (Including storm water)

(1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

AN INCREASE IN ON-SITE IMPERVIOUS SURFACES WILL RESULT IN AN INCREASE IN STORM WATER RUNOFF. IF IT PROPOSED THAT ALL ROOF RUNOFF FROM THE NEW RESIDENCE BE COLLECTED VIA DOWNSPOUTS AND DIRECTED TO A DISPERSION TRENCH DESIGNED PER CIVIL ENGINEER AT THE LOWER BANK. PER PANGEO, INC., EXISTING SOIL CONDITIONS APPEAR TO CONSIST OF LOOSE TO MEDIUM DNSE FILL OVER MEDIUM DENSE TO DENSE SAND AND STIFF TO HARD SILT. BASED ON THESE SOIL CONDITIONS AN INFILTRATION RATE OF BETWEEN 1 AND 5 INCHES PER HOUR IS ASSUMED. THE PROJECT ALSO PROPOSES APPROX 2,100 SF OF DRIVEWAY AND AUTOCOURT. AS THE PROJECT DESIGN IS DEVELOPED, SHOULD ADDITIONAL STORMWATER MANAGEMENT CAPACITY BE REQUIRED, ADDITIONAL ON-SITE MANAGEMENT METHODS CAN BE CONSIDERED.

(2) Could waste materials enter ground or surface waters? If so, generally describe.

WASTE WATERS WOULD NOT ENTER GROUND OR SURFACE WATERS

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d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

THE EROSION CONTROL MEASURES DESCRIBED UNDER 1H WOULD BE IMPLEMENTED AS NECESSARY.

4. Plants

a. Check or circle types of vegetation found on the site:

- [x] deciduous tree: alder, maple, aspen, other
- [x] evergreen tree: fir, cedar, pine, other
- [ ] shrubs
- [x] grass
- [ ] pasture
- [ ] crop or grain
- [ ] wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
- [ ] water plants: water lily, eelgrass, milfoil, other
- [x] other types of vegetation

FOR A DETAILED LIST OF VEGETATION FOUND ONSITE, PLEASE SEE THE CRITICAL AREAS REPORT – BRYANT RESIDENCE, BELLEVUE, WA PREPARED BY MARK RIGOS, P.E. (AUGUST 2016)

b. What kind and amount of vegetation will be removed or altered?

THE PRIMARY TYPE OF VEGETATION TO BE REMOVED ARE NON-NATIVE INVASIVE SPECIES AND INCLUDE ENGLISH IVY, HIMALAYAN BLACKBERRY, MORNING GLORY BINDWEED, AND BAMBOO. A TOTAL OF APPROXIMATELY 8,000 SQUARE FEET OF NON-NATIVE VEGETATION WILL BE REMOVED. THE PROJECT PROPOSES THE REMOVAL AND MITIGATION OF 8 TREES ON THE PROPERTY. SELASCO + ASSOCIATES PERFORMED TREE RISK ASSESSMENTS ON THE THREE SIGNIFICANT TREES ON THE PROPERTY. ONE FIR TREE (TREE #6 IN THE ARBORIST REPORT) MEASURING 50 DBH WAS GIVEN A HIGH RISK RATING AND IS RECOMMENDED BY THE ARBORISTS TO BE REMOVED. THE SECOND FIR TREE (TREE #8) MEASURES 59 DBH AND WAS GIVEN A MODERATE RISK RATING. THE THIRD TREE (TREE #7) A PURPLE BEECH MEASURING 59 DBH, IS A NON-NATIVE TREE WITHIN 25 FEET OF THE SHORELINE AND WAS GIVEN A MODERATE RISK RATING.

c. List threatened or endangered species known to be on or near the site.

NO THREATENED OR ENDANGERED PLANT SPECIES ARE KNOWN TO BE ON OR NEAR THE PROJECT SITE.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

THE PROPOSAL INCLUDES THE PLANTING OF 6,745 SQUARE FEET OF NATIVE VEGETATION ON THE PROPERTY. PLANTINGS INCLUDE DOUGLAS FIR, BIG LEAF MAPLE, SHORE PINE, SCOULER'S WILLOW, OREGON ASH, BEAKED HAZELNUT, OCEAN SPRAY, BITTER CHERRY, RED FLOWERING CURRANT, EVERGREEN HUCKLEBERRY, HIGH BUSH CRANBERRY, SWORD FERN, OREGON GRAPE, SALAL, BEACH STRAWBERRY, AND KINNIKINNICK.

5. ANIMALS

a. Check or circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

- [x] Birds: hawk, heron, eagle, songbirds, other:
- [ ] Mammals: deer, bear, elk, beaver, other:
- [x] Fish: bass, salmon, trout, herring, shellfish, other:

Prior applications on this property documented eagle presence and use of the significant trees on the site.

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b. List any threatened or endangered species known to be on or near the site. ADULT AND JUVENILE CHINOOK SALMON AND STEELHEAD TROUT (LISTED AS THREATENED UNDER THE FEDERAL ENDANGERED SPECIES ACT) MIGRATE THROUGH LAKE WASHINGTON. LAKE WASHINGTON ALSO CONTAINS COHO SALMON (SPECIES OF CONCERN UNDER THE FEDERAL ESA) AND POTENTIALLY CONTAINS BULL TROUT, A SALMONID LISTED AS THREATENED UNDER THE FEDERAL ESA.

c. Is the site part of a migration route? If so, explain.

ADULT CHINOOK SALMON MIGRATE UPSTREAM TO REACH SPAWNING GROUNDS; JUVENILES MIGRATE DOWNSTREAM FROM THEIR NATAL STREAMS TO REACH THE OCEAN. MIGRATING WATERFOWL MAY USE THE LAKE AS RESTING AND FORAGING AREAS DURING SPRING AND FALL MIGRATIONS.

d. Proposed measures to preserve or enhance wildlife, if any:

THE PROPOSED PROJECT WILL ENHANCE WILDLIFE HABITAT THROUGH THE REMOVAL OF INVASIVE SPECIES AND THE PLANTING OF NATIVE SPECIES THROUGHOUT THE PROJECT SITE.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy need? Describe whether it will be used for heating, manufacturing, etc.

THE CURRENT FORMS OF ENERGY USED FOR THE EXISTING RESIDENCE WILL ALSO BE USED FOR THE PROPOSED RESIDENCE. NO ADDITIONAL FORMS OF ENERGY WILL BE NECESSARY FOR THE NEW RESIDENCE.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

THE PROJECT WOULD NOT EFFECT THE POTENTIAL USE OF SOLAR ENERGY BY ADJACENT PROPERTIES.

c. What kinds of energy conservation features are included in the plans of the proposal? List other proposed measures to reduce or control energy impacts, if any:

THE USE OF NATURAL DAYLIGHT AND PASSIVE COOLING ARE INCORPORATED IN THE PROPOSED DESIGN. OTHER TYPES OF ENERGY CONSERVATION MEASURES COMMON TO A NEW RESIDENCE WILL BE USED WHERE POSSIBLE.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

TYPICAL HAZARDS RELATED TO HEAVY EQUIPMENT FUELS AND FIRES ARE ASSOCIATED WITH CONSTRUCTION OF THE PROJECT. AFTER PROJECT COMPLETION, HAZARDS WOULD CONSIST OF THOSE RELATED TO A SINGLE FAMILY RESIDENCE.

(1) Describe special emergency services that might be required.

EMERGENCY SERVICES ARE NOT ANTICIPATED AT THE SITE. IN THE UNLIKELY EVENT THAT AN ACCIDENT (SPILL, FIRE, OTHER EXPOSURE) OCCURS INVOLVING TOXIC CHEMICALS OR HAZARDOUS WASTES, THE LOCAL FIRE DEPARTMENT'S HAZARDOUS MATERIALS TEAM WOULD RESPOND. IF NECESSARY, LOCAL MEDICAL SERVICES MIGHT ALSO BE REQUIRED. THE FULL RANGE OF SAFETY AND ACCIDENT RESPONSE SUPPLIES WOULD BE ON-SITE TO TREAT ANY EMERGENCY DURING CONSTRUCTION. AFTER COMPLETION, REQUIRED EMERGENCY SERVICES WOULD BE LIMITED TO THOSE TYPICAL OF A SINGLE FAMILY RESIDENCE.

(2) Proposed measures to reduce or control environmental health hazards, if any.

STANDARD PRECAUTIONS WOULD BE TAKEN TO ENSURE THE SAFETY OF THE WORK CREW. THE CONSTRUCTION MANAGER WOULD BE CONTACTED BY A CREW MEMBER IMMEDIATELY UPON DISCOVERY OF A SPILL. THE CONSTRUCTION MANAGER WOULD THEN ENSURE THAT THE SPILL IS CLEANED UP IN THE MANNER DICTATED BY THE CHEMICAL USE INSTRUCTIONS AND WOULD CONTACT THE APPROPRIATE AUTHORITIES.

b. Noise

(1) What types of noise exist in the area which may affect your project (for example, traffic, equipment, operation, other)?

THE TYPE OF NOISE IN THE AREA IS TYPICAL OF A SINGLE FAMILY RESIDENCE AND WOULD NOT AFFECT THE PROJECT.

(2) What types and levels of noise would be created by or associated with the project on a short-term or long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise would come from the site.

NOISE ASSOCIATED WITH THE PROJECT WOULD BE ON A SHORT TERM BASIS FOR THE DURATION OF CONSTRUCTION AND CONSISTENT WITH RESIDENTIAL CONSTRUCTION. CONSTRUCTION SITE NOISE AND HOURS OF OPERATION WILL BE REGULATED BY CITY OF BELLEVUE NOISE CODE, BCC 9.18. THERE WOULD BE NO LONG TERM NOISE ASSOCIATED WITH THE COMPLETED PROJECT OTHER THAN THAT TYPICAL OF RESIDENTIAL WATERFRONT USE.

(3) Proposed measures to reduce or control noise impacts, if any:

AS MENTIONED ABOVE, CONSTRUCTION NOISE WILL BE REGULATED BY THE CITY OF BELLEVUE'S NOISE CODE, BCC 9.18, AND LIMITED TO DAYLIGHT WEEKDAY HOURS. NO OTHER NOISE CONTROL MEASURES ARE NECESSARY.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

THE CURRENT USE OF THE SITE IS SINGLE FAMILY RESIDENTIAL. THE CURRENT USE OF THE PROPERTIES IMMEDIATELY ADJACENT TO THE NORTH, SOUTH AND EAST IS ALSO SINGLE FAMILY RESIDENTIAL. LAKE WASHINGTON IS LOCATED IMMEDIATELY WEST OF THE SITE.

b. Has the site been used for agriculture? If so, describe.

THE SITE HAS NOT BEEN USED FOR AGRICULTURE.

c. Describe any structures on the site.

A SINGLE FAMILY RESIDENCE WITH AN ATTACHED CARPORT, AN ACCESSORY STRUCTURE, AND A DOCK ARE CURRENTLY LOCATED ON-SITE.

d. Will any structures be demolished? If so, what?

THE EXISTING SINGLE FAMILY RESIDENCE, ATTACHED CARPORT AND ACCESSORY STRUCTURE ARE PROPOSED FOR DEMOLITION.

e. What is the current zoning classification of the site?

THE CURRENT ZONING CLASSIFICATION IS R-2.5 (SINGLE-FAMILY RESIDENTIAL).

f. What is the current comprehensive plan designation of the site?

THE CURRENT COMPREHENSIVE PLAN DESIGNATION IS SF-M (SINGLE-FAMILY, MEDIUM DENSITY).

g. If applicable, what is the current shoreline master program designation of the site?

RESIDENTIAL.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

STEEP SLOPES ON THE SITE HAVE BEEN CLASSIFIED AS 'ENVIRONMENTALLY SENSITIVE' AREAS. LAKE WASHINGTON IS ALSO CONSIDERED AN 'ENVIRONMENTALLY SENSITIVE' AREA.

I. Approximately how many people would reside or work in the completed project?

THE PROPOSED PROJECT IS A RESIDENCE FOR ONE FAMILY.

j. Approximately how many people would the completed project displace?

NO PEOPLE WILL BE DISPLACED AS A RESULT OF THIS PROJECT.

k. Proposed measures to avoid or reduce displacement impacts, if any:

NO MEASURES ARE NECESSARY.

i. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

THIS PROJECT DOES NOT AFFECT EXISTING LAND USE.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

A NEW SINGLE FAMILY RESIDENCE WILL REPLACE AN EXISTING SINGLE FAMILY RESIDENCE.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

ONE UNIT WOULD BE ELIMINATED AND REPLACED WITH ONE NEW UNIT.

c. Proposed measures to reduce or control housing impacts, if any:

NO MEASURES ARE NECESSARY.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

THE TOP OF THE RIDGE OF THE PITCHED ROOF OF THE PROPOSED BUILDING WILL BE NO GREATER THEN 35 FEET ABOVE AVERAGE EXISTING GRADE PER CITY OF BELLEVUE LUC 20.20.010.44. EXTERIOR MATERIALS ARE ANTICIPATED TO BE SHINGLE SIDING/ROOFING AND WOOD TRIM.

b. What views in the immediate vicinity would be altered or obstructed?

THE PROPOSED PROJECT REPLACES AN EXISTING SINGLE FAMILY RESIDENCE AND IS SITED TO STEP DOWN THE STEEP SLOPE TO MAINTAIN CURRENT VIEWS FROM THE NORTH AND EAST PROPERTIES. THE PROPOSED REMOVAL OF THE EXISTING ACCESSORY STRUCTURE WILL IMPROVE VIEWS FROM THE PROPERTY SOUTH OF THE PROJECT SITE.

c. Proposed measures to reduce or control aesthetic impacts, if any:

NO MEASURES ARE NECESSARY.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
LIGHT OR GLARE MAY INCREASE SLIGHTLY AS A RESULT OF A NEW SINGLE FAMILY RESIDENCE.

b. Could light or glare from the finished project be a safety hazard or interfere with views?
NO.

c. What existing off-site sources of light or glare may affect your proposal?
THE ONLY POTENTIAL OFF-SITE SOURCE OF GLARE IS LAKE WASHINGTON AND MAY REFLECT THE SUN DURING LATE AFTERNOON AND EVENING HOURS.

d. Proposed measures to reduce or control light or glare impacts, if any:
THE POTENTIAL REFLECTIONS OF GLARE FORM LAKE WASHINGTON ARE NATURAL AND POTENTIAL INCREASES IN GLARE FROM THE NEW RESIDENCE WOULD BE INSIGNIFICANT. THEREFORE, NO REDUCTION MEASURES ARE NECESSARY.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?
LAKE WASHINGTON PROVIDES BOATING, SWIMMING, FISHING AND WILDLIFE VIEWING OPPORTUNITIES. CHISM BEACH PARK IS LOCATED APPROXIMATELY 0.25 MILES SOUTH OF THE PROJECT SITE.

b. Would the proposed project displace any existing recreational uses? If so, describe.
THE PROPOSED PROJECT WOULD NOT DISPLACE ANY EXISTING RECREATIONAL ACTIVITIES.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
NO MEASURES ARE NECESSARY.

13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.
NO SUCH PLACES OR OBJECTS ARE KNOWN TO BE ON OR NEXT TO THE SITE.

b. Generally describe any landmarks or evidence of historic, archeological, scientific, or cultural importance known to be on or next to the site.
NO SUCH LANDMARKS OR EVIDENCE IS KNOWN TO BE ON OR NEXT TO THE SITE.

c. Proposed measures to reduce or control impacts, if any:
SHOULD HISTORIC, ARCHEOLOGICAL, SCIENTIFIC OR CULTURALLY SIGNIFICANT ITEMS BE ENCOUNTERED DURING IMPLEMENTATION OF THIS PROJECT WORK WOULD BE TEMPORARILY STOPPED WHILE THE APPROPRIATE AGENCIES ARE NOTIFIED.

14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.
THE SITE IS CURRENTLY ACCESSED VIA SE 11TH STREET. SITE ACCESS WOULD NOT BE CHANGED AS A RESULT OF THE PROPOSED PROJECT.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?
THE NEAREST KING COUNTY METRO TRANSIT STOP IS LOCATED AT THE CORNER OF 104TH AVENUE SE AND SE 16TH STREET, APPROXIMATELY ONE MILE AWAY.

c. How many parking spaces would be completed project have? How many would the project eliminate?
THE PROJECT PROPOSES THE REMOVAL OF THE EXISTING CARPORT WHICH PROVIDES FOUR PARKING SPACES. THE PROPOSED RESIDENCE INCLUDES A THREE CAR GARAGE AND THREE UNCOVERED PARKING SPACES.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

THE PROPOSAL WOULD NOT REQUIRE ANY NEW ROADS OR STREETS OR IMPROVEMENTS TO EXISTING ROADS OR STREETS.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

RAIL OR AIR TRANSPORTATION WOULD NOT BE UTILIZED BY THE PROPOSED PROJECT. BARGE ACCESS FOR DELIVERY AND REMOVAL OF CONSTRUCTION MATERIALS MAY BE UTILIZED TO MINIMIZE HEAVY EQUIPMENT IMPACT IN THE NEIGHBORHOOD AND ON THE EXISTING STREETS.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

THE PROPOSED PROJECT WOULD NOT INCREASE VEHICLE TRIPS ABOVE THOSE ALREADY GENERATED BY THE EXISTING RESIDENCE.

g. Proposed measures to reduce or control transportation impacts, if any:

NO MEASURES ARE NECESSARY.

15. Public Services

a. Would the project result in an increased need for the public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

NO INCREASE IN PUBLIC SERVICE NEEDS WOULD RESULT FROM THIS PROJECT. THE PROJECT WILL BE FULLY SPRINKLERED PER CITY OF BELLEVUE FIRE CODE, BCC 23.11. WATER PRESSURE AT THE SITE IS MORE THAN ADEQUATE FOR A SPRINKLER SYSTEM (148 PSI). THE CLOSEST FIRE HYDRANT (#124451) IS LOCATED APPROXIMATELY 150 FEET FROM THE DRIVEWAY ENTRANCE.

b. Proposed measures to reduce or control direct impacts on public services, if any:

NO MEASURES ARE NECESSARY.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

NO NEW UTILITIES ARE PROPOSED AS PART OF THIS PROJECT.

Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature.....Date Submitted.OCTOBER 11, 2016.....

RP

TOPOGRAPHIC & BOUNDARY SURVEY

SPECIAL EXCEPTIONS:

(PER CHICAGO TITLE COMPANY OF WASHINGTON, COMMITMENT NO. 0061282-ETU, DATED FEBRUARY 17, 2016)

ITEM 1
COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, INCLUDING BUT NOT LIMITED TO THOSE BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, OR SOURCE OF INCOME, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS SET FORTH ON THE CITY OF BELLEVUE SHORT PLAT NUMBER 81-24R:
RECORDING NO: 8302039001

ITEM 2
COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, INCLUDING BUT NOT LIMITED TO THOSE BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, OR SOURCE OF INCOME, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS SET FORTH ON SURVEY:
RECORDING NO: 9001089003

ITEM 3
EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: PUGET SOUND POWER AND LIGHT COMPANY, A MASSACHUSETTS CORPORATION
PURPOSE: ELECTRIC TRANSMISSION LINE
RECORDING DATE: FEBRUARY 8, 1924
RECORDING NO.: 1830235
AFFECTS: THE DESCRIPTION CONTAINED THEREIN IS NOT SUFFICIENT TO DETERMINE ITS EXACT LOCATION WITHIN THE PROPERTY HEREIN DESCRIBED.

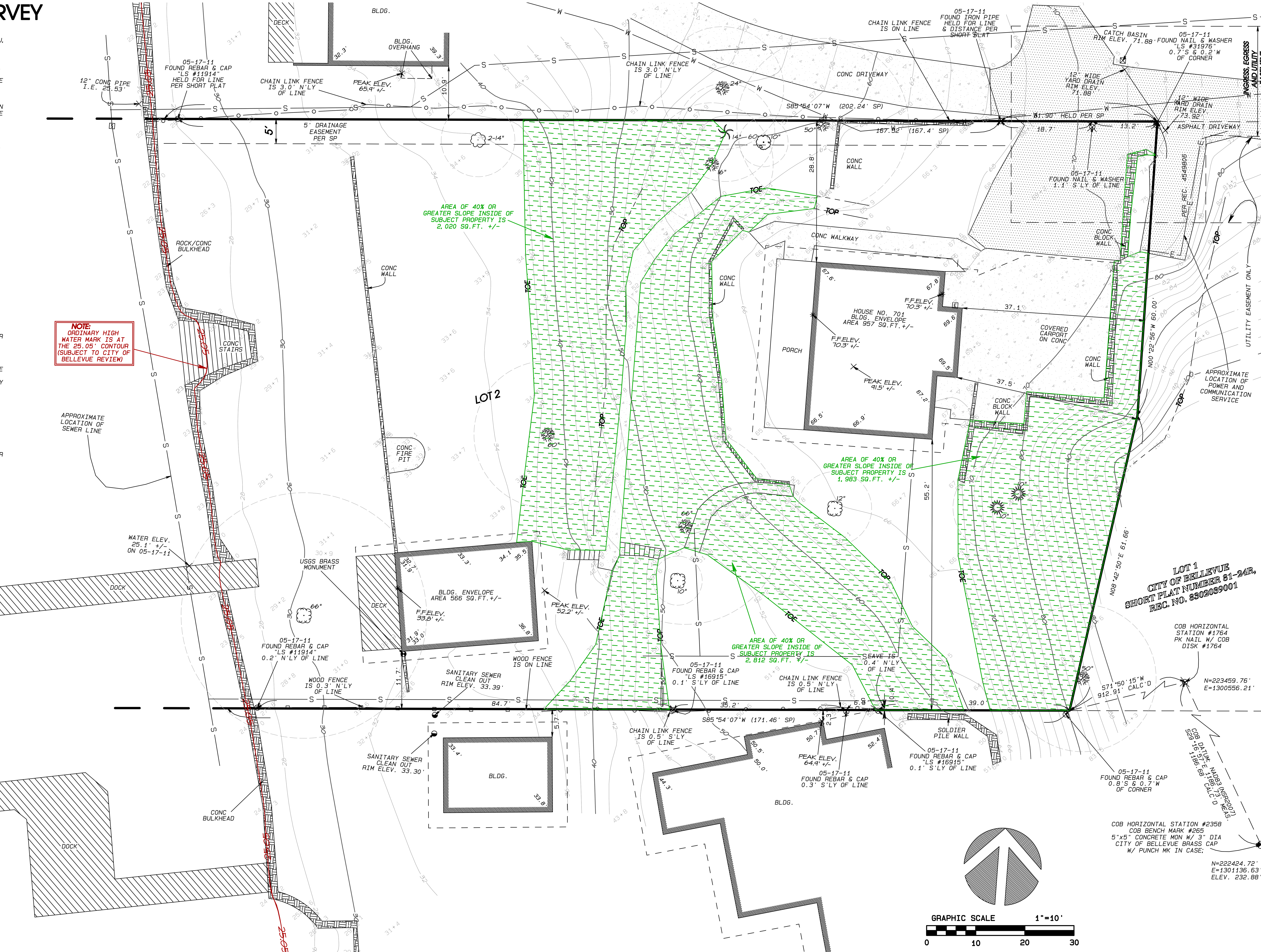
ITEM 4
EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
PURPOSE: ROADWAY AND UTILITIES
RECORDING DATE: MARCH 11, 1955 AND MARCH 16, 1955
RECORDING NO.: 4549806 AND 4550981
AFFECTS: PORTION OF SAID PREMISES AND OTHER PROPERTY
SAID INSTRUMENT CONTAINS PROVISIONS FOR BEARING THE COST OF MAINTENANCE, REPAIR OR RECONSTRUCTION OF THE ROADWAY BY THE USERS.
SAID EASEMENTS WERE AMENDED BY INSTRUMENT RECORDED UNDER RECORDING NUMBER 8210190492, BEING A RE-RECORDING OF INSTRUMENT RECORDED UNDER RECORDING NUMBER 8210010661.

ITEM 6
EXCEPTIONS AND RESERVATIONS CONTAINED IN DEED WHEREBY THE GRANTOR EXCEPTS AND RESERVES ALL OIL, GASES, COAL, ORES, MINERALS, FOSSILS, ETC., AND THE RIGHT OF ENTRY FOR OPENING, DEVELOPING AND WORKING THE SAME AND PROVIDING THAT SUCH RIGHTS SHALL NOT BE EXERCISED UNTIL PROVISION HAS BEEN MADE FOR FULL PAYMENT OF ALL DAMAGES SUSTAINED BY REASON OF SUCH ENTRY
GRANTOR: STATE OF WASHINGTON
RECORDING NO.: 695536
RIGHT OF THE STATE OF WASHINGTON OR ITS SUCCESSORS, SUBJECT TO PAYMENT OF COMPENSATION, TO ACQUIRE RIGHTS OF WAY FOR PRIVATE RAILROADS, SKID ROADS, FLUMES, CANALS, WATER COURSES OR OTHER EASEMENTS FOR TRANSPORTING AND MOVING TIMBER, STONE, MINERALS AND OTHER PRODUCTS FROM THIS AND OTHER LAND, AS RESERVED IN ABOVE-REFERENCED DEED.

ITEM 8
RIGHTS AND EASEMENTS FOR NAVIGATION AND FISHERY WHICH MAY EXIST OVER THAT PORTION OF SAID LAND LYING BENEATH THE WATERS OF LAKE WASHINGTON.

ITEM 9
ANY QUESTION THAT MAY ARISE DUE TO SHIFTING AND CHANGING IN THE COURSE, BOUNDARIES OR HIGH WATER LINE OF LAKE WASHINGTON.

ITEM 10
RESERVATIONS AND EXCEPTIONS IN UNITED STATES PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; INDIAN TREATY OR ABORIGINAL RIGHTS.



TOPOGRAPHIC & BOUNDARY SURVEY
SW 1/4 OF THE SE 1/4 OF SEC. 31, TWP. 25N., RGE. 5E., W.M.
CITY OF BELLEVUE, KING COUNTY, WA.

BRYANT RESIDENCE
701 SHORELAND DR SE

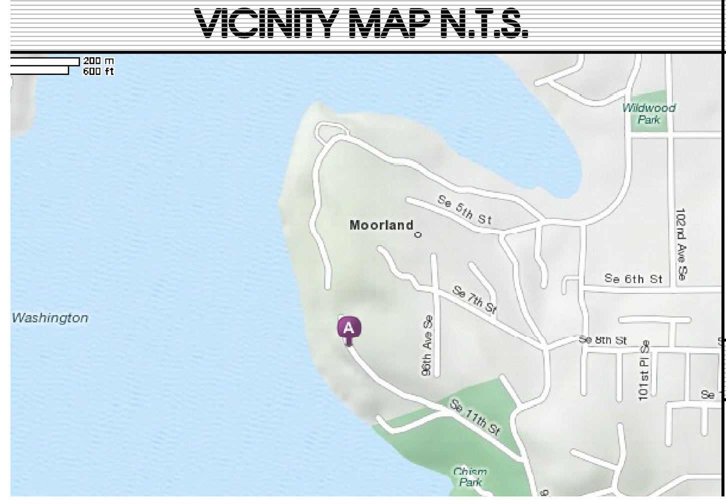
measure success

Terrane
10801 Main Street, Suite 102, Bellevue, WA 98004
phone 425.458.4488 support@terrane.net

EDWIN J. GREEN JR. — STATE OF WASHINGTON — 15025 — REGISTERED PROFESSIONAL LAND SURVEYOR

JOB NUMBER:	1121
DATE:	08/08/20
DRAFTED BY:	J.G-M
CHECKED BY:	E.J.G
SCALE:	1" = 1
REVISION HISTORY	
8-23-16	VARIOUS

VICINITY MAP N.T.S.



LEGAL DESCRIPTION

(PER CHICAGO TITLE COMPANY OF WASHINGTON, COMMITMENT NO. 0061282-ETU, DATED FEBRUARY 17, 2016)

LOT 2, CITY OF BELLEVUE SHORT PLAT NUMBER 81-24R, RECORDED UNDER RECORDING NUMBER 8302039001, BEING A PORTION OF LOTS 1 AND 2, BLOCK 4, AND LOTS 1 AND 2, BLOCK 11, MOORLAND, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 4 OF PLATS, PAGE 103, IN KING COUNTY, WASHINGTON.

TOGETHER WITH THOSE PORTIONS OF VACATED STREET ADJOINING SAID PREMISES; TOGETHER WITH SECOND CLASS SHORELANDS ADJOINING.

SITUATE IN THE CITY OF BELLEVUE, COUNTY OF KING, STATE OF WASHINGTON.

HORIZONTAL DATUM

(CITY OF BELLEVUE DATUM NAD83 (NSR2007) - WASHINGTON NORTH ZONE)

CITY OF BELLEVUE HORIZONTAL STATION #1764
PK NAIL W/ COB DISK #1764
N=223459.76'

BEARING MERIDIAN

(CITY OF BELLEVUE DATUM NAD83 (NSR2007) - WASHINGTON NORTH ZONE)

A BEARING OF S29°16'57"E BETWEEN COB HORIZONTAL STATION #1764 AND COB HORIZONTAL STATION #2358.

VERTICAL DATUM

CITY OF BELLEVUE BENCH MARK NO. 265
(NAVD 88) VISITED 05/17/2011

FOUND 5"X5" CONCRETE MON W/3" DIA CITY OF BELLEVUE BRASS CAP W/PUNCH MK IN CASE; TOP MON TO TOP RIM CASE 0.54 FEET, LOCATED INTERSECTION 97TH PL SE & 97TH AVE SE (NORTHERLY OF 2 MONS)

ELEVATION = 232.88'

METHOD OF SURVEY

SURVEYOR'S NOTES

1) THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN MAY 2011. THE FIELD DATA WAS COLLECTED AND RECORDED ON MAGNETIC MEDIA THROUGH AN ELECTRONIC THEODOLITE. THE DATA FILE IS ARCHIVED ON DISC OR CD. WRITTEN FIELD NOTES MAY NOT EXIST. CONTOURS ARE SHOWN FOR CONVIENENCE ONLY. DESIGN SHOULD RELY ON SPOT ELEVATIONS.

2) SUBJECT PROPERTY TAX PARCEL NO. 562730-0180.

3) SUBJECT PROPERTY UPLAND AREA PER THIS SURVEY IS 22,776 SQ.FT.±.

4) EASEMENTS SHOWN ARE PER CHICAGO TITLE COMPANY OF WASHINGTON, COMMITMENT NO. 0061282-ETU, DATED FEBRUARY 17, 2016.

5) THE BURIED SANITARY SEWER INFO SHOWN ON THIS MAP IS AN APPROX. LOCATION ONLY PER SANITARY SEWER CARD NO. LC 163, UPON CONSTRUCTION, IF ANY, PLEASE CONTACT A UTILITY UNDERGROUND LOCATION SERVICE.

6) THE TOP OF SLOPE SHOWN ON THIS SURVEY IS THE FIELD CREWS INTERPRETATION OF THE TOP OF SLOPE. THIS DOES NOT REPRESENT THE LIMITS OF A "40%" SLOPE AREA.

LEGEND

- FOUND MONUMENT AS NOTED
- FOUND IRON PIPE AS NOTED
- FOUND NAIL & WASHER AS NOTED
- FOUND REBAR & CAP AS NOTED
- CATCH BASIN
- SPOT ELEVATION
- ELECTRIC TRANSFORMER ON CONC PAD
- WATER METER
- PILING
- GREEN SEWER STAKE
- SIDE SEWER CLEAN OUT
- FINISHED FLOOR ELEVATION
- ELECTRIC METER
- SPOT ELEVATION
- ASPHALT SURFACE
- RET. WALL
- CONC SURFACE
- STAIRS
- DECK / DOCK
- SEWER LINE
- POWER & COMMUNICATION SERVICE
- BUILDING LINE
- SLOPE AS NOTED
- EAVES
- BUILDING OVERHANG
- CHAIN LINK FENCE
- WOOD FENCE
- WATER LINE
- DECIDUOUS TREE (NOT SHOWN TO SCALE) TRUNK DIA SHOWN IN INCHES.
- PINE TREE (NOT SHOWN TO SCALE) TRUNK DIA SHOWN IN INCHES.
- MAPLE TREE (NOT SHOWN TO SCALE) TRUNK DIA SHOWN IN INCHES.
- HOLLY TREE (NOT SHOWN TO SCALE) TRUNK DIA SHOWN IN INCHES.

AVERAGE GRADE CALCULATIONS:

PRIMARY RESIDENCE ELEVATION POINTS

ELEVATION @ POINT A: *64.20'*
ELEVATION @ POINT B: *62.01'*
ELEVATION @ POINT C: *60.58'*
ELEVATION @ POINT D: *58.10'*
ELEVATION @ POINT E: *53.82'*
ELEVATION @ POINT F: *48.56'*
ELEVATION @ POINT G: *46.82'*
ELEVATION @ POINT H: *47.00'*
ELEVATION @ POINT I: *44.00'*
ELEVATION @ POINT J: *43.78'*
ELEVATION @ POINT K: *45.78'*
ELEVATION @ POINT L: *44.88'*
ELEVATION @ POINT M: *43.92'*
ELEVATION @ POINT N: *46.94'*
ELEVATION @ POINT O: *45.72'*
ELEVATION @ POINT P: *44.19'*
ELEVATION @ POINT Q: *44.00'*
ELEVATION @ POINT R: *50.09'*
ELEVATION @ POINT S: *51.91'*
ELEVATION @ POINT T: *51.00'*
ELEVATION @ POINT U: *51.52'*
ELEVATION @ POINT V: *52.88'*
ELEVATION @ POINT W: *55.64'*
ELEVATION @ POINT X: *60.47'*
ELEVATION @ POINT Y: *65.80'*
ELEVATION @ POINT Z: *66.70'*
ELEVATION @ POINT AA: *66.70'*
ELEVATION @ POINT BB: *66.70'*
ELEVATION @ POINT CC: *71.86'*
ELEVATION @ POINT DD: *76.00'*
ELEVATION @ POINT EE: *75.89'*
ELEVATION @ POINT FF: *69.50'*
ELEVATION @ POINT GG: *69.50'*
ELEVATION @ POINT HH: *69.50'*
ELEVATION @ POINT II: *69.50'*
ELEVATION @ POINT JJ: *69.50'*
ELEVATION @ POINT KK: *69.50'*
ELEVATION @ POINT LL: *69.50'*
ELEVATION @ POINT MM: *69.50'*

TOTAL ELEVATIONS: 2,263.46 / 39 SPOT ELEVATIONS
AVERAGE EXISTING GRADE: 58.04'

TREE RETENTION CALCULATIONS:

SIGNIFICANT TREES:	DBH	RETAIN?
TREE #1 - DOUGLAS FIR (PSEUDOTSUGA MENZIESII)	52"	YES
TREE #3 - PINE (PINUS SABINIANA)	16"	YES
TREE #4 - NORWAY SPRUCE (PICEA ABIES)	20"	NO
TREE #5 - EUROPEAN BIRCH (BETULA PENDULA)	18"	YES
TREE #7 - PURPLE BEECH (FAGU SYLVATICA)	59"	NO
TREE #8 - DOUGLAS FIR (PSEUDOTSUGA MENZIESII)	59"	NO
TREE #9 - GOLDEN CHAIN (LABURNUM ANAGROIDES)	10"	NO
TREE #10 - FLOWERING DOGWOOD (CORNUS FLORIDA)	12"	NO
TREE #11 - BILEAF MAPLE (ACER MACROPHYLLUM)	10"	NO
TREE #12 - BILEAF MAPLE (ACER MACROPHYLLUM)	10"	NO

**TREE #6 EXCLUDED, HAZARDOUS PER ARBORIST REPORT*

TOTAL CALIPER OF SIGNIFICANT TREES 266"
PROPOSED CALIPER OF TREES TO REMAIN 86" (32%)

F.A.R. CALCULATIONS:

LOT AREA PER SURVEY: 22,890 FT²
0.5 F.A.R. THRESHOLD: 11,445 FT²

GROSS CABANA FLOOR AREA: 644 FT²
GROSS BASEMENT FLOOR AREA: 1,784 FT²
GROSS FIRST FLOOR AREA (INCL GARAGE): 3,492 FT²
TOTAL FLOOR AREA: 5,920 FT² (26%)

LOT COVERAGE CALCULATIONS:

LOT AREA: 22,890 FT²
STEEP SLOPE CRITICAL AREA: 5,875 FT²
REMAINING LOT AREA: 17,015 FT²
MAX ALLOWABLE BUILDING COVERAGE: 5,955 FT² (35%)

EXISTING RESIDENCE TO BE REMOVED: 957 FT²
EXISTING ACCESSORY STRUCTURE TO BE REMOVED: 566 FT²
TOTAL EXISTING BUILDING COVERAGE: 1,523 FT²

PROPOSED RESIDENCE: 5,143 FT²
TOTAL BUILDING COVERAGE UPON COMPLETION: 5,143 FT² (30%)

SITE NOTES:

1. ALL IMMEDIATE AREAS AFFECTED BY NEW DEVELOPMENT SHALL BE GRADED AWAY FROM FOUNDATIONS + ADJACENT PROPERTIES @ 10% AS POSSIBLE, 2% MIN.

IMPERVIOUS SURFACE CALCULATIONS:

LOT AREA: 22,890FT²
STEEP SLOPE CRITICAL AREA: 5,454 FT²
REMAINING LOT AREA: 17,166 FT²
ALLOWABLE IMPERVIOUS SURFACE: 8,583 FT² (50%)

PROPOSED NEW RESIDENCE: 5,143 FT²
PROPOSED DRIVES + WALKS IMPERVIOUS SURFACE: 2,568 FT²
TOTAL IMPERVIOUS SURFACE UPON COMPLETION: 7,711 FT² (45%)

GREENSCAPE CALCULATIONS:

FRONT YARD SETBACK AREA: 1,760 FT²
MIN REQUIRED GREENSCAPE: 880 FT² (50%)

IMPERVIOUS AREA WITHIN SETBACK: 328 FT²
PROPOSED GREENSCAPE: 1,432 FT² (81.4%)

VICINITY MAP:

Whalers Cove
Shoreline
SE 56th St
SE 58th St
SE 60th St
SE 61st St
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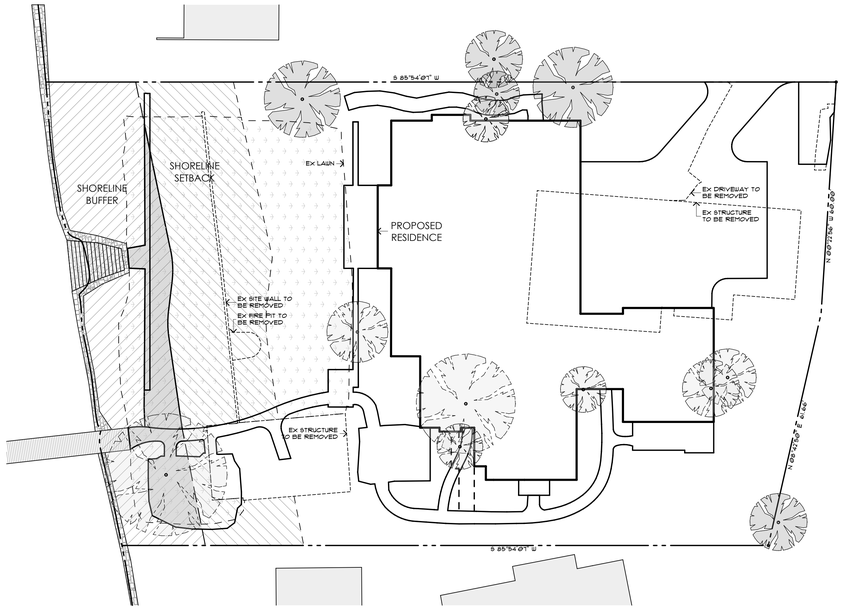
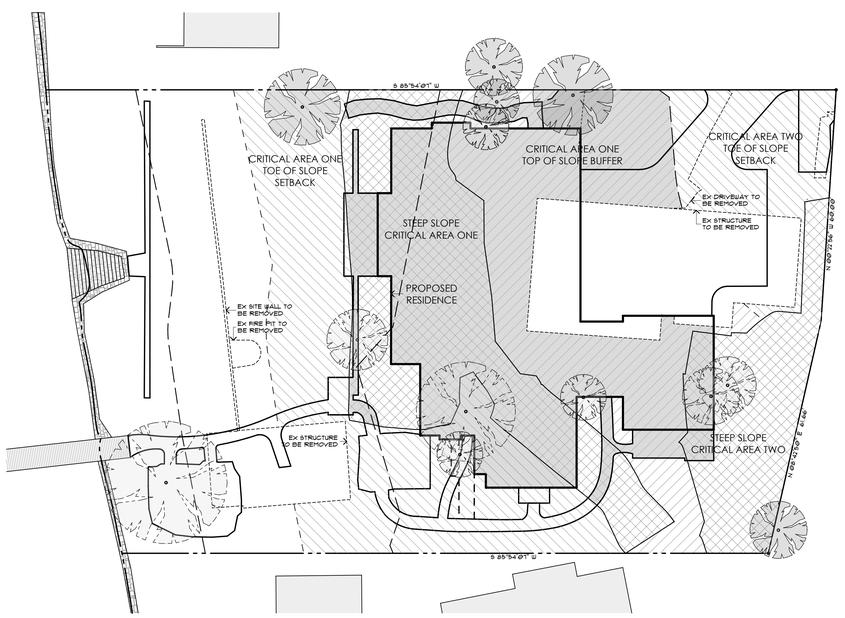


SHORELINE IMPACT PLAN

SCALE: 1/16" = 1'-0"

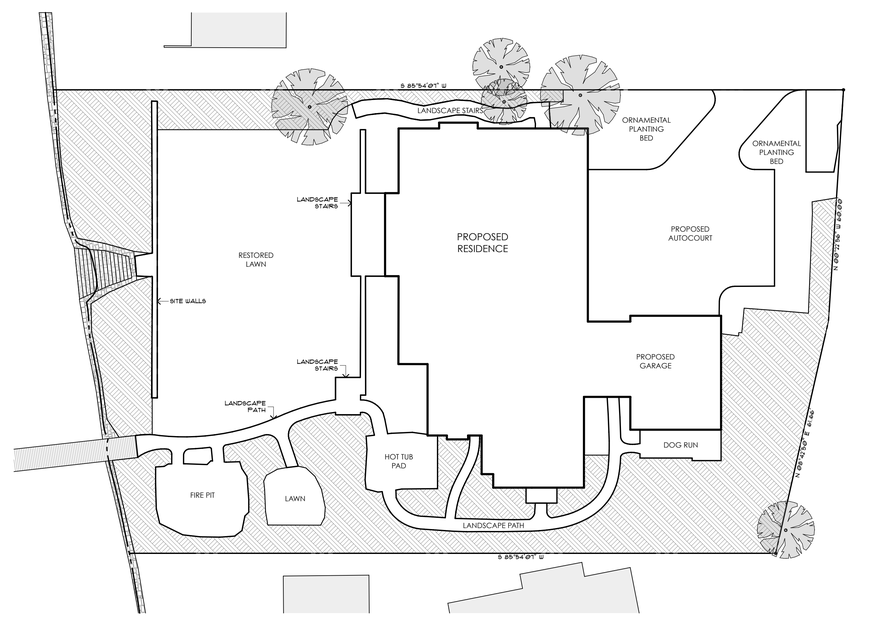
CRITICAL AREA PLAN

SCALE: 1/16" = 1'-0"



STEEP SLOPE IMPACT PLAN

SCALE: 1/16" = 1'-0"



MITIGATION PLAN

SCALE: 1/16" = 1'-0"

LEGEND:

- EXISTING STRUCTURE
- STEEP SLOPE CRITICAL AREA
- STEEP SLOPE CRITICAL AREA + SHORELINE BUFFER
- STEEP SLOPE CRITICAL AREA + SHORELINE STRUCTURE SETBACK
- PERMANENT STRUCTURE + LANDSCAPE IMPACT AREA
- MITIGATION AREA

CRITICAL AREA CALCULATIONS:

LOT AREA:	22,890 FT²
EXISTING RESIDENCE:	2,085 FT²
EXISTING ACCESSORY STRUCTURE:	719 FT²
SHORELINE CRITICAL AREA 25'-0" BUFFER:	2,986 FT²
SHORELINE CRITICAL AREA 25'-0" STRUCTURE SETBACK:	2,662 FT²
STEEP SLOPE CRITICAL AREA ONE:	3,694 FT²
STEEP SLOPE CRITICAL AREA ONE 50'-0" TOP-OF-SLOPE BUFFER:	3,504 FT²
STEEP SLOPE CRITICAL AREA ONE 75'-0" TOE-OF-SLOPE STRUCTURE SETBACK:	4,130 FT²
STEEP SLOPE CRITICAL AREA TWO:	1,760 FT²
STEEP SLOPE CRITICAL AREA TWO 75'-0" TOE-OF-SLOPE STRUCTURE SETBACK:	1,350 FT²
TOTAL ENCUMBERED PROPERTY AREA:	**20,086 FT² (88%)**

SHORELINE IMPACT CALCULATIONS:

RE: MITIGATION CALCULATIONS, CA.2, FOR RESTORATION / MITIGATION AREAS

SHORELINE CRITICAL AREA 25'-0" BUFFER	**2,986 FT²**
PROPOSED PERMANENT STRUCTURE DISTURBANCE:	360 FT²
PROPOSED PERMANENT LANDSCAPE DISTURBANCE:	385 FT²
(INCLUDES ALL ORNAMENTAL LANDSCAPE + HARDSCAPE AREAS)	
PROPOSED SHORELINE PERMANENT DISTURBANCE TOTAL:	**745 FT² (25%)**

STEEP SLOPE IMPACT CALCULATIONS:

RE: MITIGATION CALCULATIONS, CA.2, FOR RESTORATION / MITIGATION AREAS

STEEP SLOPE CRITICAL AREA	**5,454 FT²**
PROPOSED PERMANENT STRUCTURE DISTURBANCE:	2,090 FT²
PROPOSED PERMANENT LANDSCAPE DISTURBANCE :	315 FT²
(INCLUDES ALL ORNAMENTAL LANDSCAPE + HARDSCAPE AREAS)	
TOTAL STEEP SLOPE CRITICAL AREA PERMENANT DISTURBANCE:	**2,405 FT² (44%)**
STEEP SLOPE CRITICAL AREA 50'-0" BUFFER	**3,504 FT²**
PROPOSED PERMANENT STRUCTURE DISTURBANCE:	2,055 FT²
PROPOSED PERMANENT LANDSCAPE DISTURBANCE :	1,100 FT²
(INCLUDES ALL ORNAMENTAL LANDSCAPE + HARDSCAPE AREAS)	
TOTAL STEEP SLOPE CRITICAL AREA BUFFER PERMENANT DISTURBANCE:	**3,155 FT² (90%)**
STEEP SLOPE CRITICAL AREA 75'-0" STRUCTURE SETBACK	**5,480 FT²**
PROPOSED PERMANENT STRUCTURE DISTURBANCE:	395 FT²
TOTAL STEEP SLOPE CRITICAL AREA SETBACK PERMENANT DISTURBANCE:	**395 FT² (07%)**
PROPOSED STEEP SLOPE PERMANENT DISTURBANCE TOTAL:	**5,955 FT² (41%)**

MITIGATION CALCULATIONS:

PROPOSED SHORELINE PERMANENT DISTURBANCE TOTAL:	745 FT²
PROPOSED STEEP SLOPE PERMANENT DISTURBANCE TOTAL:	5,955 FT²
PROPOSED PERMANENT DISTURBANCE TOTAL:	**6,700 FT²**
PROPOSED LANDSCAPE MITIGATION:	**6,745 FT² (100%)**

LAWN CALCULATIONS:

SHORELINE CRITICAL AREA BUFFER + SETBACK	
EX LAWN AREA:	4,990 FT²
RESTORED LAWN AREA:	4,005 FT²

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IMPACT + MITIGATION PLANS

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DATE:
11 OCT 2016

REVISION:

CA.2

JOB: BRYANT

LANDSCAPE MITIGATION LEGEND:

- DOUGLAS FIR
- BIG LEAF MAPLE
- OREGON ASH
- SCOULER'S WILLOW
- SHORE PINE
- BEAKED HAZELNUT
- BITTER CHERRY
- MOCK ORANGE
- OCEAN SPRAY
- HIGH BUSH CRANBERRY
- SNOWBERRY
- RED FLOWERING CURRANT
- SWORD FERN
- OREGON GRAPE
- HUCKLEBERRY
- SALAL
- KINNIKINNICK
- BEACH STRAWBERRY

PLANTING SCHEDULE:

RE: MITIGATION PLAN FOR SPECIFICATIONS, NOTES + DETAILS

PLANTING TYPE	COMMON NAME	SCIENTIFIC NAME	SIZE	SPACING	QUANTITY	PLANTING NOTES
PLANTING TYPE 01	DOUGLAS FIR	PSUEDOTSUGA MENZIESII	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0" O.C.	4	PART SHADE - SUN, DRY - MOIST
PLANTING TYPE 02	BIG LEAF MAPLE	ACER MACROPHYLLUM	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0"	5	SUN - SHADE, DRY - MOIST
PLANTING TYPE 03	BEAKED HAZELNUT	CORYLUS CORNUTA	2 GA, MIN.	6'-0" O.C.	13	PART SHADE - SHADE, DRY - MOIST
PLANTING TYPE 04	SHOREPINE	PINUS CONTORTA CONTORTA	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0" O.C.	6	SUN - PART SHADE, DRY - MOIST
PLANTING TYPE 05	SCOULER'S WILLOW	SALIX SCOULERIANA	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0" O.C.	4	SUN - PART SHADE, MOIST - WET
PLANTING TYPE 06	BITTER CHERRY	PRUNUS EMARGINATA	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0" O.C.	8	SUN - PART SHADE, DRY - MOIST
PLANTING TYPE 07	SNOWBERRY	SYMPHORICARPOS ALBUS	2 GA, MIN.	4'-6' O.C.	40	SUN - SHADE, DRY - MOIST
PLANTING TYPE 08	OCEANSPRAY	HOLODISCUS DISCOLOR	2 GA, MIN.	4'-6' O.C.	39	PART SHADE, DRY
PLANTING TYPE 09	HIGH BUSH CRANBERRY	VIBURNAM EDULE	2 GA, MIN.	4'-6' O.C.	38	SUN - PART SHADE, MOIST
PLANTING TYPE 10	RED FLOWERING CURRANT	RIBES SANGUINEUM	2 GA, MIN.	4'-6' O.C.	137	SUN - PART SHADE, DRY - MOIST
PLANTING TYPE 11	EVERGREEN HUCKLEBERRY	VACCINIUM OVATUM	2 GA, MIN.	24" O.C.	167	PART SHDE -SHADE, DRY - MOIST
PLANTING TYPE 12	SALAL	GAULTHERA SHALLON	1 GA, MIN.	24" O.C.	189	PART-SHADE - SHADE, DRY - MOIST
PLANTING TYPE 13	SWORD FERN	POLYSTICHUM MUNITUM	2 GA, MIN.	24" O.C.	74	PART SHADE - SHADE, DRY - MOIST
PLANTING TYPE 14	OREGON GRAPE	MAHONIA NERVOSA	2 GA, MIN.	3'-0"	73	DRY - MOIST
PLANTING TYPE 15	OREGON ASH	FRAXINUS LATIFOLIA	5 GA, 4'-6' BALLED BURLAP OR SIM.	9'-0" O.C.	3	SUN - PART SHADE, MOIST - WET
PLANTING TYPE 16	MOCK ORANGE	PHILADELPHUS LEWISII	2 GA, MIN.	4'-6' O.C.	44	SUN - PART SHADE, DRY - MOIST
PLANTING TYPE 17	KINNIKINNICK	ARCTOSTAPHLOS UVA-URSI	1 GA	24" O.C.	950 SF	SUN, DRY
PLANTING TYPE 18	COASTAL STRAWBERRY	FRAGARIA CHILOENSIS	1 GA	24" O.C.	550 SF	PART-SHADE - SUN, DRY

LANDSCAPE MITIGATION PLAN

SCALE: 1/8" = 1'-0"

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LANDSCAPE MITIGATION PLAN

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DATE:
11 OCT 2016

REVISION:

CA.3

JOB: BRYANT

MITIGATION MONITORING, CONTINGENCY, AND MAINTENANCE PLAN (OWNER):

OVERVIEW

THIS MITIGATION MONITORING AND MAINTENANCE PLAN HAS BEEN PREPARED TO CONFORM TO THE LUC 20.25H.220(B). THE MITIGATION COVERED BY THIS PLAN INCLUDES THE ENHANCEMENT OF ON-SITE CRITICAL AREAS, BUFFERS, AND SETBACKS.

THE PROPOSED MITIGATION ADDRESSES CONSTRUCTION IMPACTS RELATED TO A NEW SINGLE FAMILY RESIDENCE WITHIN STEEP SLOPE AND BUFFER AREAS AS WELL AS VEGETATION MANAGEMENT ACTIVITIES TO OCCUR WITHIN DESIGNATED SHORELINE BUFFER AREAS.

THE PROPOSED ENHANCEMENT AREAS HAVE A HIGH POTENTIAL FOR IMPROVEMENT BECAUSE THE AREAS CURRENTLY COMPRISES DENSE NOXIOUS WEED AND NON-NATIVE ORNAMENTAL PLANT SPECIES, WHICH AFFORD LITTLE HABITAT VALUE TO NATIVE WILDLIFE.

PROPOSED MITIGATION INCLUDES: 1) THE REMOVAL OF NON-NATIVE/NOXIOUS WEED SPECIES; 2) THE AMENDMENT OF EXISTING SOIL CONDITIONS; AND 3) THE INSTALLATION OF DENSE NATIVE PLANTINGS COMPRISING TREES, SHRUBS, AND GROUNDCOVERS.

PLAN GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS:

MITIGATION PLAN GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS ARE OUTLINED IN THE TABLE 1 (BELOW). THE GOALS AND OBJECTIVES OF THIS PLAN ARE CONSIDERED ACHIEVED WHEN THE PERFORMANCE STANDARDS ARE SATISFIED.

MONITORING PLAN (5 YEAR):

AS-BUILT/BASELINE MONITORING

SCHEDULE: **IMMEDIATELY FOLLOWING CONSTRUCTION**

FOLLOWING COMPLETION OF THE WORK SHOWN ON THE APPROVED MITIGATION PLAN, AN AS-BUILT OF THE MITIGATION WORK SHALL BE COMPLETED. THE AS-BUILT SHALL SUMMARIZE THE COMPLETED MITIGATION WORK AS WELL AS ANY DEVIATIONS FROM THE APPROVED VERSION OF THIS PLAN.

AT THE TIME OF THE AS-BUILT, BASELINE MONITORING DATA SHALL ALSO BE COLLECTED AND PERMANENT PHOTO POINTS SHALL BE ESTABLISHED TO PHOTOGRAPHICALLY DOCUMENT REPRESENTATIVE CONDITIONS WITHIN THE MITIGATION AREAS. BASELINE MONITORING DATA COLLECTED AND REPORTED SHALL BE CONSISTENT WITH THAT DESCRIBED FOR A "DETAILED SITE ASSESSMENT" (SEE ANNUAL MONITORING BELOW).

AS-BUILT AND BASELINE MONITORING SHALL BE COMPLETED BY A "QUALIFIED PROFESSIONAL" AS DEFINED BY BELLEVUE MUNICIPAL CODE.

THE AS-BUILT SHALL BE SUBMITTED TO THE **CITY OF BELLEVUE** NO LATER THAN 30 DAYS FROM THE DATE THAT THE WORK SHOWN ON THIS PLAN HAS BEEN COMPLETED.

ANNUAL MONITORING

DURATION: **5 YEARS**

SCHEDULE: **ANNUAL MONITORING SHALL BE CONDUCTED IN AUGUST/SEPTEMBER OF THE FIRST THROUGH FIFTH YEARS FOLLOWING CONSTRUCTION (YEAR 1 THROUGH YEAR 5).**

FOLLOWING ACCEPTANCE OF THE AS-BUILT BY THE **CITY OF BELLEVUE**, ANNUAL MONITORING SHALL OCCUR PER THAT DESCRIBED IN "DETAILED SITE ASSESSMENT" (BELOW).

ANNUAL MONITORING SHALL BE COMPLETED BY A "QUALIFIED PROFESSIONAL" AS DEFINED BY BELLEVUE MUNICIPAL CODE.

THE RESULTS OF EACH MONITORING SHALL BE SUMMARIZED IN A WRITTEN REPORT AND SUBMITTED TO THE **CITY OF BELLEVUE** NO LATER THAN NO LATER THAN 30 DAYS FOLLOWING EACH MONITORING ASSESSMENT.

DETAILED SITE ASSESSMENT (YEAR 1 TO YEAR 5):

DETAILED SITE ASSESSMENTS SHALL BE CONDUCTED ANNUALLY FOR A PERIOD OF **5 YEARS**. THE PURPOSE OF EACH DETAILED SITE ASSESSMENT IS TO EVALUATE CONDITIONS WITHIN THE MITIGATION AREAS PER THE CURRENT YEAR'S PERFORMANCE STANDARDS. THE FOLLOWING INFORMATION SHALL BE COLLECTED WITHIN ALL MITIGATION AREAS AND ASSESSED RELATIVE TO THE PERFORMANCE STANDARDS ESTABLISHED FOR THE PROJECT:

- **THE PERCENT SURVIVAL OF INSTALLED PLANT STOCK - YEAR 1 AND YEAR 2 ONLY.** A DIRECT COUNT INVENTORY AND ASSESSMENT OF ALL INSTALLED PLANT STOCK SHALL BE USED TO EVALUATE PERCENT SURVIVAL. THE RATIONALE FOR POOR CONDITIONS, IF PRESENT, WILL BE DETERMINED TO THE EXTENT FEASIBLE.
- **THE PERCENT COVERAGE PROVIDED BY NATIVE PLANT SPECIES - ALL YEARS.** NATIVE PLANT SPECIES PERCENT COVERAGE SHALL BE ASSESSED USING APPROPRIATELY SIZED SAMPLE PLOTS OR LINE INTERCEPT TRANSECTS.
- **THE SPECIES COMPOSITION OF AND PERCENT COVERAGE PROVIDED BY NOXIOUS WEED SPECIES - ALL YEARS.** SPECIES COMPOSITION AND PERCENT COVERAGE BY NOXIOUS WEEDS SHALL BE ASSESSED USING SAMPLE PLOTS OR LINE INTERCEPT TRANSECTS.

IN ADDITION TO THE DATA COLLECTION AND ANALYSIS REGARDING PLANT COMMUNITY CONDITIONS, PHOTOGRAPHS OF THE MITIGATION AREAS SHALL BE TAKEN FROM THE PERMANENT PHOTO POINTS ESTABLISHED DURING THE AS-BUILT.

CONTINGENCY PLAN

SHOULD ANY COMPLIANCE MONITORING ASSESSMENT REVEAL THAT THE PERFORMANCE STANDARDS FOR THE RESPECTIVE YEAR ARE NOT SATISFIED, THE PERMITTEE SHALL WORK WITH THE **CITY OF BELLEVUE** TO DEVELOP A DETAILED CONTINGENCY PLAN TO ADDRESS THE DEFICIENCY(IES). CONTINGENCY PLANS CAN INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING ACTIONS:

- ADDITIONAL PLANT INSTALLATION;
- EROSION CONTROL;
- HERBIVORY PROTECTION;
- MODIFICATION TO ANY IRRIGATION REGIME; AND/OR
- PLANT SUBSTITUTIONS OF TYPE, SIZE, QUANTITY, AND LOCATION.

SUCH CONTINGENCY PLAN SHALL BE SUBMITTED TO THE **CITY OF BELLEVUE** NO LATER THAN JANUARY 31 OF ANY YEAR WHEN DEFICIENCIES ARE DISCOVERED. UNLESS OTHERWISE APPROVED BY THE **CITY OF BELLEVUE**, ACTIONS SPECIFIED ON AN APPROVED CONTINGENCY PLAN MUST BE COMPLETED WITHIN 60 DAYS. IF THE FAILURE IS SUBSTANTIAL, THE **CITY OF BELLEVUE** MAY EXTEND THE COMPLIANCE MONITORING PERIOD FOR THE MITIGATION WORK.

MAINTENANCE PLAN

THIS SECTION PROVIDES A GENERAL OVERVIEW OF THE MAINTENANCE PROGRAM NECESSARY TO ENSURE THE PERFORMANCE STANDARDS ESTABLISHED FOR THIS PLAN ARE SATISFIED.

NOXIOUS WEED AND NON-NATIVE CONTROL

FOLLOWING PLANT INSTALLATION AND AT REGULAR INTERVALS DURING THE MONITORING PERIOD, NOXIOUS WEED AND NON-NATIVE PLANT SPECIES CONTROL SHALL OCCUR ON A SPOT TREATMENT BASIS WITHIN ALL MITIGATION AREAS. TARGET NOXIOUS WEED SPECIES SHALL INCLUDE THE FOLLOWING:

- ALL CLASS "A", "B", AND "C" NOXIOUS WEEDS IDENTIFIED ON THE LATEST KING COUNTY NOXIOUS WEED LIST.
- THE FOLLOWING ADDITIONAL SPECIES: BAMBOO (ALL SPECIES), ENGLISH IVY (HEDERA HELIX), ENGLISH HOLLY (ILEX AQUIFOLIUM), KNOTWEED (POLYGONUM SPP.), HIMALAYAN BLACKBERRY (RUBUS ARMENIACUS), AND CUTLEAF (EVERGREEN) BLACKBERRY (R. LACINIATUS).
- ANY OTHER NON-NATIVE OR ORNAMENTAL PLANT SPECIES.

CONTROL WORK SHALL CONSIST OF THE CUTTING AND REMOVAL FROM THE SITE OF ALL ROOTS, STEMS, CANES, RUNNERS, SHOOTS, SEED PODS, FRUITING BODIES, AND LEAVES PER THE FOLLOWING METHODS:

- HAND PULLING.
- MANUALLY CUTTING USING MACHETES, LOPPERS, AND/OR CLIPPERS.

DURING CONTROL WORK, EXISTING OR PLANTED NATIVE VEGETATION SHALL BE PROTECTED FROM DAMAGE.

GENERAL MAINTENANCE

INSTALLED PLANTS SHALL BE MAINTAINED AT REGULAR INTERVALS DURING THE MONITORING PERIOD TO PROMOTE THE SUCCESSFUL ESTABLISHMENT AND VIGOROUS GROWTH OF INSTALLED PLANT STOCK.

GENERAL MAINTENANCE SHALL INCLUDE:

- WEEDING THE BASE OF EACH INSTALLED PLANT.
- RE-APPLYING BARK MULCH TO MAINTAIN A 6" MINIMUM APPLIED THICKNESS - YEAR 1 ONLY.
- THE PRUNING OF INSTALLED PLANTS TO REMOVE DEAD WOOD AND PROMOTE VIGOROUS PLANT GROWTH AND PROPER FORM.
- THE REPLACEMENT OF PLANTS IN DISTRESS AND/OR THAT ARE DISEASED.
- THE REMOVAL OF TRASH, LITTER, AND/OR OTHER NON-DECOMPOSING DEBRIS.

TEMPORARY IRRIGATION

TEMPORARY IRRIGATION SHALL BE PROVIDED FOR TWO (2) GROWING SEASONS FOLLOWING PLANT INSTALLATION PER THE SPECIFICATIONS SHOWN ON THESE PLANS.

TABLE 1: MITIGATION PLAN GOALS, OBJECTIVES, & PERFORMANCE STANDARDS

GOAL:	OBJECTIVE:	PERFORMANCE STANDARDS:
TO ENHANCE HABITAT FUNCTIONS AND VALUES BY PROVIDING A DENSE, STRUCTURALLY DIVERSE, AND SPECIES RICH NATIVE PLANT COMMUNITY WITHIN ON-SITE CRITICAL AREAS, BUFFERS, AND SETBACKS.	1. FULL INITIAL CONTROL OF NOXIOUS WEED SPECIES AND THEN TO MINIMIZE THE GENERAL PRESENCE OF NOXIOUS WEED SPECIES THROUGHOUT THE MONITORING PERIOD. 2. INSTALL AND SUCCESSFULLY ESTABLISHMENT DENSE NATIVE PLANTINGS (TREES, SHRUBS, AND GROUNDCOVER) WITHIN SHORELINE AND STEEP SLOPE BUFFERS AND SETBACKS.	*SURVIVAL* • **100% SURVIVAL** BY INSTALLED PLANT STOCK AFTER THE FIRST GROWING SEASON. THIS STANDARD CAN BE ACHIEVED STRICTLY THROUGH SURVIVAL OR THROUGH A COMBINATION OF SURVIVAL AND PLANT REPLACEMENT. • **80% SURVIVAL** BY INSTALLED PLANT STOCK AFTER THE SECOND GROWING SEASON. *NATIVE PLANT SPECIES COVERAGE* • **60% AVERAGE COVERAGE** BY NATIVE WOODY PLANT SPECIES AFTER THE FIFTH GROWING SEASON. COVERAGE MAY INCLUDE DESIRABLE NATIVE COLONIZING OR VOLUNTEER SPECIES. *NATIVE PLANT SPECIES DIVERSITY* • SUCCESSFULLY ESTABLISH A MINIMUM OF 2 TREE SPECIES, 6 SHRUB SPECIES, AND 2 GROUNDCOVER SPECIES BY THE END OF THE 5 YEAR MONITORING PERIOD. *NON-NATIVE OR NOXIOUS WEED COVERAGE* • **LESS THAN 10% COVERAGE** BY ALL CLASS "A", "B", AND "C" NOXIOUS WEEDS IDENTIFIED ON THE LATEST KING COUNTY NOXIOUS WEED LIST AND THE FOLLOWING ADDITIONAL SPECIES: BAMBOO (ALL SPECIES) ENGLISH IVY (HEDERA HELIX) ENGLISH HOLLY (ILEX AQUIFOLIUM KNOTWEED (POLYGONUM SPP.) HIMALAYAN BLACKBERRY (RUBUS ARMENIACUS), CUTLEAF (EVERGREEN) BLACKBERRY (R. LACINIATUS).

PLANT INSTALLATION SPECIFICATIONS (CONTRACTOR):

PART 1: GENERAL

ALL WORK SHALL CONFORM TO THE SPECIFICATIONS AND DETAILS SHOWN ON THESE DRAWINGS AND SHALL CONFORM TO ALL APPLICABLE CODES, LAWS, AND ORDINANCES.

CONTRACTOR SHALL FURNISH ALL MATERIALS, EQUIPMENT, LABOR, AND RELATED ITEMS NECESSARY TO COMPLETE THE WORK SHOWN ON THESE DRAWINGS AND SHALL INCLUDE ALL TOOLS, MATERIALS, PERMITS, INSPECTIONS, TESTS, AND OTHER RELATED ITEMS.

WORK SHALL BE COMPLETED BY PERSONS EXPERIENCED IN THE MITIGATION WORK SHOWN ON THESE DRAWINGS.

CONTRACTOR SHALL RECOGNIZE THAT ACTUAL SITE CONDITIONS MAY VARY BASED ON SEASON AND/OR TIME OF YEAR.

CONTRACTOR SHALL ACCOMMODATE REALIZED AND ANTICIPATED SITE CONDITIONS WHEN COMPLETING THE WORK SHOWN ON THESE DRAWINGS.

TAKE NECESSARY PRECAUTIONS TO PROTECT ALL PROPERTY, PERSONS, WORK IN PROGRESS, STRUCTURES, UTILITIES, WALKS, CURBS, AND PAVED SURFACES DURING WORK. FIELD LOCATE, VERIFY DEPTH OF, AND ADEQUATELY PROTECT ALL UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF WORK. DAMAGE TO UTILITIES INCURRED OR ARISING FROM THIS CONTRACT SHALL BE PAID BY CONTRACTOR.

ALL AREAS OF WORK SHALL BE KEPT CLEAN, NEAT, AND ORDERLY AT ALL TIMES. ALL PAVED AREAS ARE TO BE CLEANED DAILY FOLLOWING WORK.

OWNER SHALL BE NOTIFIED IN WRITING OF DEVIATIONS TO OR CONFLICTS WITHIN THESE DRAWINGS AND/OR SITE CONDITIONS. EXTRA WORK ARISING FROM FAILURE TO DO SO SHALL BE DONE AT THE CONTRACTOR'S EXPENSE.

PRIOR TO START OF ANY WORK, CONTRACTOR SHALL REQUEST AND ATTEND A PRE-CONSTRUCTION CONFERENCE WITH OWNER.

PRIOR TO PRE-CONSTRUCTION CONFERENCE, CONTRACTOR SHALL ACCURATELY FLAG PLANTING AREA LIMITS IN A HIGHLY VISIBLE MANNER. FLAGGING SHALL BE MAINTAINED THROUGHOUT WORK UNTIL FINAL INSPECTION BY OWNER.

PART 2: MATERIALS

2.1 GENERAL

PLANT MATERIAL SIZE, QUALITY, AND QUANTITY SHALL MEET THE STANDARDS LISTED ON THESE DRAWINGS.

PLANT MATERIAL SHALL BE OF ACCEPTED SIZE STANDARDS AND PROPORTIONS AS SPECIFIED IN AMERICAN STANDARD NURSERY STOCK (LATEST EDITION). ALL PLANTS SHALL BE OF NORMAL HABIT OF GROWTH AND SHALL BE HEALTHY, VIGOROUS, AND FREE OF DISEASE, INSECT EGGS, ADULTS, AND LARVAE.

SCIENTIFIC NOMENCLATURE SHALL CONFORM TO STANDARD PLANT NAMES, LATEST EDITION. NAMES NOT PRESENT IN THIS LISTING SHALL CONFORM TO ACCEPTED SCIENTIFIC NOMENCLATURE IN THE NURSERY TRADE. FOR TREES AND SHRUBS, NO LESS THAN 10 PERCENT OF EACH VARIETY OR SPECIES SHALL BE ACCURATELY LABELED AT THE TIME OF DELIVERY TO THE SITE. WHERE LABELED, PLANT MATERIALS SHALL HAVE DURABLE, LEGIBLE LABELS STATING THE CORRECT SCIENTIFIC PLANT NAME.

OVERSIZE PLANT MATERIALS ARE ACCEPTABLE WITH APPROVAL OF THE OWNER, BUT WITHOUT AN INCREASE IN THE CONTRACT PRICE. PLANT MATERIALS OF A SIZE REDUCED FROM THOSE SPECIFIED WILL NOT BE PERMITTED. ANY PLANT SIZE CHANGE SHALL BE APPROVED BY OWNER PRIOR TO PLANT DELIVERY TO SITE.

PLANT MATERIALS SHALL BE PACKAGED WITH CARE FOR TRANSIT TO THE SITE. BRANCHES SHALL BE TIED BACK, AND BARK SHALL BE PROTECTED TO PREVENT DAMAGE FROM CHAFING BY ROPES AND WIRES. PLANT MATERIALS IN STORAGE SHALL BE PROTECTED FROM WEATHER AND PACKED TO PROVIDE PROTECTION.

PLANT MATERIAL DELIVERY SHALL BE TIMED APPROPRIATELY WITH INSTALLATION TO AVOID EXTENDED STORAGE OF LIVE MATERIALS ON-SITE.

A MINIMUM OF SEVEN (7) DAYS NOTICE SHALL BE PROVIDED TO THE OWNER PRIOR TO PLANT MATERIAL DELIVERY TO THE SITE. THE OWNER SHALL INSPECT ALL PLANT MATERIALS AT THE TIME OF DELIVERY. THE OWNER RESERVES THE RIGHT TO REQUIRE SUBSTITUTION OR REPLACEMENT OF PLANT MATERIALS DETERMINED TO BE DAMAGED OR OTHERWISE UNSUITABLE AT THE TIME OF DELIVERY TO THE SITE. ALL REJECTED PLANT MATERIAL SHALL BE REMOVED FROM THE SITE IMMEDIATELY.

ONCE ACCEPTED ON-SITE, PLANT MATERIALS SHALL BE PROTECTED AT ALL TIMES FROM THEFT, VANDALISM, AND DAMAGE, INCLUDING BUT NOT LIMITED TO THAT CAUSED BY ANIMALS, HUMANS, DROUGHT, WATER, FROST OR FREEZING CONDITIONS, AND WIND.

2.2 PLANT MATERIAL SOURCE

PLANTS SHALL BE DERIVED FROM STOCK ACCLIMATED TO WESTERN WASHINGTON ENVIRONMENTAL CONDITIONS, HAVING BEEN CONSISTENTLY CULTIVATED AND GROWN UNDER SIMILAR CONDITIONS.

2.3 PLANT MATERIAL QUALITY

PLANT MATERIAL SHALL BE NORMAL IN PATTERN OF GROWTH, HEALTHY, WELL-BRANCHED AND HAVE ALL LEADERS AND BUDS INTACT. TREES SHALL NOT HAVE SUNSCALDS, DISFIGURING KNOTS, FRESH CUTS OF LIMBS, DAMAGED LEADERS, AND/OR DEFORMED TRUNKS.

PLANT MATERIALS SHALL BE NATIVE TO THE NORTHWEST, PREFERABLY THE PUGET SOUND REGION OF WASHINGTON STATE. PLANT MATERIALS SHALL BE PROPAGATED FROM NATIVE STOCK; NO CULTIVARS OR HORTICULTURAL VARIETIES ARE ALLOWED.

WHERE PROVIDED, CONTAINERIZED PLANT STOCK SHALL BE GROWN IN A CONTAINER LONG ENOUGH TO DEVELOP A ROOT SYSTEM THAT REACHES THE

EDGES OF THE CONTAINER IN WHICH IT HAS GROWN. TREES AND SHRUBS SHALL BE WELL ROOTED AND SHALL HAVE SUFFICIENT ROOT MASS TO HOLD TOGETHER THE SOIL, IN WHICH PLANT IS GROWING, WHEN REMOVED FROM THE POT.

CONSERVATION GRADE OR SALVAGED PLANT STOCK IS NOT ACCEPTABLE FOR USE.

2.4 MULCH

SEE PLANTING DETAILS.

PART 3: EXECUTION

3.1 GENERAL

INSTALLATION OF PLANT MATERIALS SHALL OCCUR BETWEEN NOVEMBER 15 AND JANUARY 15. IF SCHEDULE OF PLANT PROCUREMENT OR SITE CONDITIONS REQUIRE INSTALLATION DURING ALTERNATIVE DATES, WRITTEN AUTHORIZATION SHALL BE OBTAINED FROM OWNER PRIOR TO PLANT INSTALLATION.

PLANT MATERIAL INSTALLATION SHALL NOT OCCUR DURING FREEZING WEATHER OR WHEN THE GROUND IS FROZEN OR EXCESSIVELY WET. PLANT MATERIALS HAVING FROZEN ROOTBALLS SHALL NOT BE INSTALLED UNTIL CONDITIONS ARE SUCH THAT PLANTS ARE EASILY REMOVED FROM CONTAINERS.

PLANT MATERIAL STORED ON-SITE SHALL BE ORGANIZED IN ROWS AND MAINTAINED AND PROTECTED AT NO ADDITIONAL COST.

PLANT MATERIAL THAT CANNOT BE PLANTED WITHIN ONE (1) DAY AFTER DELIVERY TO THE SITE SHALL BE "HEELED-IN" OR OTHERWISE STORED TEMPORARILY IN ACCORDANCE WITH ACCEPTED HORTICULTURAL PRACTICES IN A MANNER THAT DOES NOT COMPROMISE THE HEALTH OF THE PLANT MATERIALS. PLANT STORAGE SHALL NOT BE LONGER THAN FOUR (4) WEEKS.

PLANT MATERIALS STORED UNDER TEMPORARY CONDITIONS SHALL BE KEPT MOIST AND PROTECTED FROM ADVERSE WEATHER CONDITIONS.

A MINIMUM OF SEVEN (7) DAYS NOTICE SHALL BE PROVIDED TO THE OWNER PRIOR TO PLANT INSTALLATION. THE OWNER SHALL BE KEPT INFORMED AS TO DAILY WORK PROGRESS THROUGHOUT PLANT INSTALLATION.

PLANT LOCATIONS SHALL BE AS DEPICTED ON SHEET 4, SUBJECT TO RELATED DRAWING NOTES. THE OWNER SHALL REVIEW ALL PLANT LOCATIONS PRIOR TO PLANT MATERIAL INSTALLATION. THE OWNER RESERVES THE RIGHT TO ADJUST PLANT MATERIAL LOCATION(S) WITHIN PLANTING AREAS PRIOR TO PLANT MATERIAL INSTALLATION.

PLANT MATERIALS SHALL NOT BE DRAGGED WITHOUT PROPER ROOT AND/OR BRANCH PROTECTION. CONTAINERIZED PLANT MATERIALS SHALL BE LIFTED BY CONTAINER ONLY. PLANT MATERIALS SHALL NOT BE DROPPED OR ROOT SYSTEMS DAMAGED.

PLANT MATERIALS SHALL BE INSTALLED AS PER APPLICABLE NOTES AND DETAILS DEPICTED ON THIS DRAWING SET.

ALL PLANTS SHALL BE THOROUGHLY WATERED WITHIN 24 HOURS AFTER PLANTING.

ALL PLANTS SHALL BE MARKED WITH HIGH VISIBILITY FLAGGING AFTER INSTALLATION. FLAGGING SHALL BE ATTACHED TO THE MAIN STEM, LEADER, OR BRANCH OF THE AFFECTED PLANT.

3.2 INSTALLATION

EXCAVATE A PLANTING HOLE PER THE APPLICABLE DETAILS SHOWN ON THESE DRAWINGS.

REMOVE PLANT FROM CONTAINER WITH ROOTBALL COMPLETELY INTACT. IF CONTAINER STOCK IS ROOTBOUND, SLASH ROOTS VERTICALLY WITH A SHARP KNIFE ALONG THE OUTSIDE OF ROOTBALL A MINIMUM OF THREE (3) PLACES BEFORE PLANTING. IF PLANT HAS MINOR ROOT DAMAGE, ROOT-PRUNE AS NECESSARY TO REMOVE BROKEN OR DAMAGED ROOTS.

INSERT ROOTBALL INTO PLANTING HOLE WITHOUT BENDING OR DAMAGING THE ROOTS. SPREAD OR "BUTTERFLY" ROOTBALL AND PLACE ROOT COLLAR 1" ABOVE THE FINISHED GRADE.

USE MOIST, PULVERIZED, NATIVE SOIL FOR BACKFILLING, ENSURING THAT GOOD CONTACT WITH ROOTBALL IS MADE. FROZEN, MUDDY, AND/OR EXCESSIVELY ROCKY MIXTURES SHALL NOT BE USED FOR BACKFILLING. IF BACKFILL IS UNSUITABLE, COMMERCIALLY AVAILABLE TOPSOIL WITH A HIGH ORGANIC CONTENT MAY BE USED TO PROPERLY BACKFILL PLANTING HOLE.

MIDWAY THROUGH THE BACKFILL PROCESS, WATER THOROUGHLY TO SETTLE SOIL.

COMPLETE BACKFILL AT FINISHED GRADE AND ENSURE THE PLANT IS AT PROPER ALIGNMENT. WATER AGAIN TO SETTLE SOIL AND ADD ADDITIONAL BACKFILL AS NECESSARY IF ROOTS BECOME EXPOSED.

FLAG EACH INSTALLED PLANT.

3.3 MULCH

SEE DETAILS.

PART 4: PROVISIONAL ACCEPTANCE

AFTER COMPLETION OF THE PLANT INSTALLATION WORK COVERED BY THESE DRAWINGS, AN INSPECTION SHALL BE REQUESTED FROM THE OWNER. WHEN WORK COVERED BY THESE DRAWINGS IS COMPLETE AS DETERMINED BY OWNER, PROVISIONAL ACCEPTANCE WILL BE CERTIFIED IN WRITING BY THE OWNER.

PART 5: MAINTENANCE

CONTRACTOR SHALL MAINTAIN PLANTED AREAS UNTIL GUARANTEE PERIOD ACCEPTANCE IS GIVEN. MAINTENANCE SHALL INCLUDE, WEEDING AROUND THE BASE OF INSTALLED PLANTS, PRUNING OF INSTALLED PLANTS, AND REPLACEMENT OF PLANTS THAT APPEAR TO BE IN DISTRESS. CONTROL IS REQUIRED OF ALL CLASS "A", "B" AND "C" NOXIOUS WEEDS IDENTIFIED ON THE LATEST KING COUNTY NOXIOUS WEED CONTROL LIST AS WELL AS THE FOLLOWING ADDITIONAL SPECIES: ENGLISH IVY (*HEDERA HELIX*), ENGLISH HOLLY (*ILEX AQUIFOLIUM*), HIMALAYAN BLACKBERRY (*RUBUS ARMENIACUS*), AND CUTLEAF BLACKBERRY (*R. LACINIATUS*). A MAINTENANCE PLAN SHALL BE PROVIDED BY CONTRACTOR THAT DESCRIBES, IN DETAIL, THE SPECIFIC MAINTENANCE PROGRAM DEVELOPED TO SATISFY THE MAINTENANCE REQUIREMENTS OF THIS PLAN. A MAINTENANCE PLAN SHALL BE APPROVED BY OWNER PRIOR TO ISSUANCE OF PROVISIONAL ACCEPTANCE.

PART 6: GUARANTEE

6.1 GENERAL

PLANTS SHALL BE GUARANTEED FOR ONE YEAR AGAINST DEFECTS OF MATERIALS AND WORKMANSHIP. THE GUARANTEE PERIOD BEGINS AT THE DATE OF THE PROVISIONAL ACCEPTANCE AND SHALL EXTEND FOR ONE YEAR.

THE GUARANTEE REQUIREMENTS SHALL BE APPLICABLE TO ANY GROWING CONDITIONS THROUGH WHICH PLANTS OF LIKE KIND COULD BE EXPECTED TO SURVIVE AND ANY DEFORMITY OR CAUSE OF DEATH, WHICH COULD BE ATTRIBUTED TO, OR AFFECTED BY, THE PHYSIOLOGICAL CONDITIONS OF THE INSTALLED PLANT. THIS GUARANTEE SHALL NOT APPLY TO PLANT LOSSES DUE TO ABNORMAL WEATHER CONDITIONS SUCH AS FLOODS, EXCESSIVE WIND DAMAGE, DROUGHT, SEVERE FREEZING, OR ABNORMAL RAINS, AS DETERMINED BY THE OWNER. INSTALLED PLANT MATERIALS SHALL BE MAINTAINED DURING THE GUARANTEE PERIOD IN GENERAL ACCORDANCE WITH THE APPROVED MAINTENANCE PLAN PROVIDED BY THE CONTRACTOR.

THE OWNER MAY REQUIRE REPLACEMENT OF DEAD OR DEFECTIVE PLANTS PRIOR TO THE END OF THE GUARANTEE PERIOD AT NO ADDITIONAL COST. WHERE REQUIRED, PLANTS SHALL BE REPLACED WITH THE SPECIES AND SIZE AS INDICATED IN THE PLANT SCHEDULE AND ACCORDING TO THE PLANTING DETAILS AND SPECIFICATIONS SHOWN ON THESE DRAWINGS UNLESS OTHERWISE DIRECTED IN WRITING BY THE OWNER. UNLESS OTHERWISE APPROVED, REPLACEMENT PLANTS SHALL BE MADE WITHIN SEVEN (7) DAYS OF NOTIFICATION FROM OWNER.

THE CONTRACTOR HAS THE RIGHT DURING THE ENTIRE WARRANTY PERIOD TO ENTER UPON THE PROPERTY FOR INSPECTION AND CURATIVE TREATMENT OF ANY MATERIAL NEEDING SUCH AND WHICH ARE STILL UNDER WARRANTY. THE OWNER SHALL BE NOTIFIED IN ADVANCE OF ANY CORRECTIVE TREATMENT MEASURES SO AS TO ARRANGE FOR CONVENIENT ACCESS TO THE AREA. CURATIVE WORK SHALL OCCUR AS SOON AS POSSIBLE AFTER DEFICIENCIES BECOME APPARENT AND WEATHER AND SEASON PERMIT.

AFTER EACH PLANT REPLACEMENT, IF ANY, A MARKED PLANTING PLAN SHOWING THE LOCATION OF EACH ITEM REPLACED AT THAT TIME SHALL BE PROVIDED TO OWNER. REPLACEMENT PLANTS SHALL BE MARKED WITH COLORED SURVEY FLAGGING AND SHALL BE GUARANTEED FOR ONE FULL YEAR FOLLOWING PLANTING.

6.2 SURVIVORSHIP

ANY INSTALLED TREE OR SHRUB THAT IS GREATER TO OR EQUAL TO 25 PERCENT DEAD OR DISFIGURED WILL BE CONSIDERED DEAD AND MUST BE REPLACED AT NO ADDITIONAL CHARGE. A TREE WILL BE CONSIDERED DEAD WHEN THE MAIN LEADER HAS DIED BACK OR WHEN A MINIMUM OF 25 PERCENT OF THE CROWN IS DEAD. PLANTS WILL BE CONSIDERED DISFIGURED WHEN EXCESSIVE DEAD WOOD HAS BEEN REMOVED OR WHEN THE SYMMETRY OR TYPICAL HABIT OF GROWTH HAS BEEN IMPAIRED BY THE REMOVAL OF THE DEAD WOOD.

6.3 GUARANTEE PERIOD ACCEPTANCE

ONE YEAR AFTER PROVISIONAL ACCEPTANCE, A FINAL INSPECTION OF THE WORK COVERED BY THIS CONTRACT SHALL BE REQUESTED BY CONTRACTOR FROM OWNER. INSTALLED PLANTS THAT ARE DETERMINED TO BE DEAD OR OTHERWISE NOT IN SATISFACTORY CONDITION, AS DETERMINED BY THE OWNER, SHALL BE REMOVED FROM THE SITE AND SHALL BE REPLACED AS SOON AS CONDITIONS PERMIT. UPON COMPLETION OF THESE REQUIREMENTS, GUARANTEE PERIOD ACCEPTANCE WILL BE CERTIFIED IN WRITING BY THE OWNER.

GENERAL NOTES:

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL CODES, ORDINANCES, AND LAWS.
2. A COPY OF THESE APPROVED DRAWINGS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
3. THE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THESE DRAWINGS, IF ANY, ARE THE MINIMUM REQUIRED. ADJUST, AMEND, AND/OR ADD TO THE MEASURES SHOWN TO ACCOMMODATE SITE AND WEATHER CONDITIONS AND/OR AS OTHERWISE DIRECTED BY THE CITY OF BELLEVUE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH, AND SAFETY OF THE PUBLIC, AND TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF THE WORK SHOWN ON THESE DRAWINGS.
5. UTILITY LOCATIONS AND CHARACTERISTICS SHOWN ON THESE DRAWINGS, IF ANY, ARE BASED ON THE FIELD LOCATION OF THE APPARENT SURFACE EVIDENCE OF EXISTING STRUCTURES. THE UNDERGROUND ROUTING AND CONDITION OF BURIED UTILITIES HAS NOT BEEN VERIFIED OR CONFIRMED. FELID LOCATE, VERIFY DEPTH OF, AND ADEQUATELY PROTECT ALL UTILITIES.
6. SITE CONDITIONS MAY VARY BASED ON SEASON AND/OR TIME OF YEAR. CONTRACTOR SHALL ACCOMMODATE REALIZED AND ANTICIPATED SITE CONDITIONS WHEN COMPLETING THE WORK SHOWN ON THESE DRAWINGS.

RECOMMENDED CONSTRUCTION SEQUENCE:

CONTRACTOR:

1. FLAG OR OTHERWISE MARK WORK AREA LIMITS.
2. FIELD LOCATE, VERIFY DEPTH OF, AND ADEQUATELY PROTECT ALL UNDERGROUND UTILITIES AS WELL AS ROOF AND FOOTING DRAINS.
3. REQUEST AND ATTEND A PRE-CONSTRUCTION MEETING WITH OWNER AND PLAN DESIGNER.
4. CONTROL NOXIOUS WEEDS AND NON-NATIVE PLANTS WITHIN ALL PLANTING AREAS PER THE SPECIFICATIONS SHOWN ON THESE PLANS.
5. REMOVE ALL FOREIGN MATERIALS, CONSTRUCTION SUPPLIES, EXISTING PATHS, WALKWAYS, AND STAIRS.
6. DECOMPACT AND AMEND SOIL PER THE SPECIFICATIONS SHOWN ON THESE PLANS.
7. INSTALL NATIVE PLANTS PER THE SPECIFICATIONS SHOWN ON THESE PLANS.
8. INSTALL IRRIGATION SYSTEM PER THE SPECIFICATIONS SHOWN ON THESE PLANS.
9. INSTALL MULCH PER THE SPECIFICATIONS SHOWN ON THESE PLANS.
10. CLEAN-UP AND DEMOBILIZE FROM SITE.
11. REQUEST FROM AND ATTEND FINAL INSPECTION WITH OWNER.
12. PROVIDE 1 YEAR OF MAINTENANCE UNDER DIRECTION OF OWNER.

OWNER:

1. OWNER TO COMPLETE 5 YEARS OF MONITORING AND REPORTING TO THE CITY OF BELLEVUE.

SOIL DECOMPACTION AND AMENDMENT SPECIFICATIONS:

SOIL DECOMPACTION AND AMENDMENT SHALL NOT OCCUR DURING FREEZING WEATHER OR WHEN THE SOIL OR COMPOST IS FROZEN OR EXCESSIVELY WET.

PRIOR TO PLANT INSTALLATION, DECOMPACT AND AMEND SOILS PER THE FOLLOWING SPECIFICATIONS:

NON-STEEP SLOPE AREAS

- MECHANICALLY DECOMPACT SOIL TO A MINIMUM DEPTH OF 12 INCHES.
- APPLY 4 INCHES OF ORGANIC COMPOST COMPRISING **CEDAR GROVE COMPOSTING "BUILDERS BLEND" (WWW.CEDAR-GROVE.COM; 1-877-SOILS4U)** OR APPROVED EQUAL TO THE GRADED AREA.
- TILL IN COMPOST TO ACHIEVE A UNIFORM MIXTURE OF EXISTING SOIL AND COMPOST WITHIN THE UPPER 8 INCHES OF THE DECOMPACTED SOIL.
- RAKE/GRADE FINAL SURFACE TO PROVIDE A UNIFORM APPEARANCE.

STEEP SLOPE AREAS

- MIX ORGANIC COMPOST COMPRISING **CEDAR GROVE COMPOSTING "BUILDERS BLEND" (WWW.CEDAR-GROVE.COM; 1-877-SOILS4U)** OR APPROVED EQUAL BY HAND AS NEEDED TO ACHIEVE A 50/50 MIX OF SOIL AND COMPOST WITHIN PLANTING PIT BACKFILL.

NOXIOUS WEED & NON-NATIVE PLANT CONTROL SPECIFICATIONS:

NOXIOUS WEED AND NON-NATIVE PLANT CONTROL WORK SHALL BE TIMED APPROPRIATELY TO AVOID VEGETATION CLEARING DURING THE WET SEASON AND/OR WHEN SIGNIFICANT OR PROLONGED RAINFALL IS EXPECTED.

PRIOR TO SOIL AMENDMENT AND PLANT INSTALLATION, CONTROL NOXIOUS WEEDS AND NON-NATIVE PLANTS WITHIN EACH PLANTING AREA. TARGET NOXIOUS WEED SPECIES SHALL INCLUDE THE FOLLOWING:

- **ALL CLASS "A", "B", AND "C" NOXIOUS WEEDS IDENTIFIED ON THE LATEST KING COUNTY NOXIOUS WEED LIST.**
- **ENGLISH IVY (*HEDERA HELIX*)**
- **ENGLISH HOLLY (*ILEX AQUIFOLIUM*)**
- **HIMALAYAN BLACKBERRY (*RUBUS ARMENIACUS*)**
- **CUTLEAF BLACKBERRY (*R. LACINIATUS*)**
- **ALL NON-NATIVE AND ORNAMENTAL PLANT SPECIES.**

CONTROL WORK SHALL CONSIST OF THE CUTTING AND REMOVAL FROM THE SITE OF ALL ROOTS, STEMS, CANES, RUNNERS, SHOOTS, SEED PODS, FRUITING BODIES, AND LEAVES PER THE FOLLOWING METHODS:

DURING NOXIOUS WEED CONTROL WORK, EXISTING NATIVE VEGETATION SHALL BE PROTECTED FROM DAMAGE. ALL NOXIOUS WEED CONTROL CUTTINGS AND DEBRIS SHALL BE REMOVED FROM THE SITE.

CONTROL METHODS:

REDUCE TOP GROWTH. ACCEPTABLE METHODS INCLUDE: WALK BEHIND OR TRACTOR MOUNTED MOWER, EXCAVATOR WITH BUCKET AND THUMB, POWER SAW, BRUSH HOG, LINE TRIMMER, LOPPERS, CLIPPERS, HAND PULLING, OR APPROVED EQUAL.

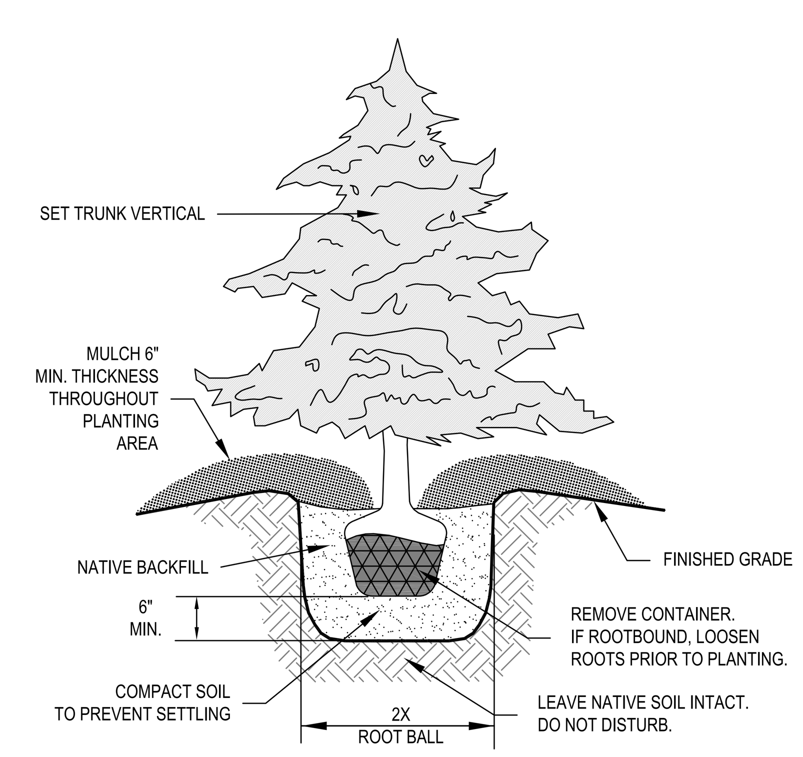
GRUB OUT LARGE ROOT CROWNS AND MAJOR ROOTS BY HAND USING CLAW MATTOCK, PULASKI, OR APPROVED EQUAL.

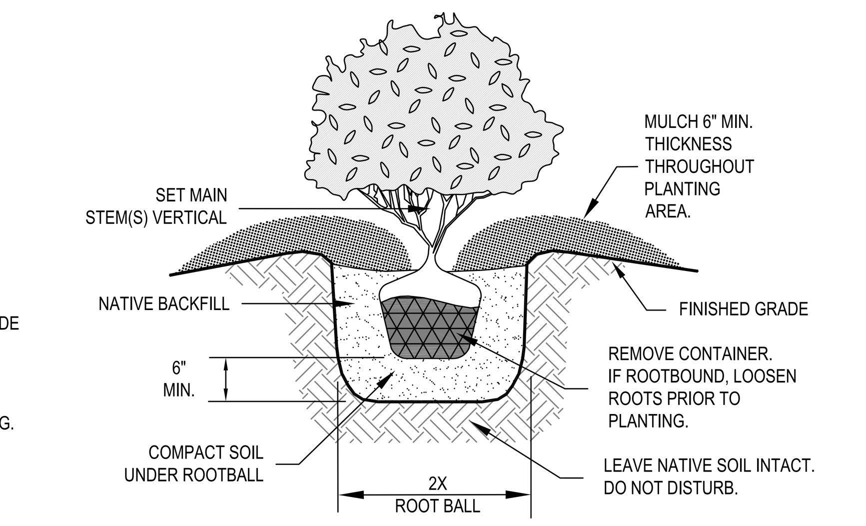
TEMPORARY IRRIGATION CONTROL SPECIFICATIONS:

IRRIGATION SHALL BE PROVIDED FOR **2 GROWING SEASONS** FOLLOWING PLANT INSTALLATION. IRRIGATION SHALL BE PROVIDED BY AN AUTOMATIC SPRINKLER OR AUTOMATIC DRIP SYSTEM THAT PROVIDES A MINIMUM RAINFALL EQUIVALENT OF 1 INCH PER WEEK FROM **JUNE 15 THROUGH SEPTEMBER 15**. IRRIGATION SHALL BE APPLIED IN A MANNER THAT MAINTAINS PLANT HEALTH, PREVENTS WILTING, AND PROMOTES DEEP PLANT ROOT SYSTEMS.

MULCH SPECIFICATION:

FOLLOWING PLANT INSTALLATION, PLACE MULCH THROUGHOUT THE PLANTING AREA TO A UNIFORM APPLIED DEPTH OF 6 INCHES. MULCH SHALL BE COMMERCIALLY AVAILABLE **"DOT WOOD CHIP MULCH" (WWW.PACIFICTOPSOILS.COM; 425-337-2700)**, **"MEDIUM/FINE BARK" (WWW.PACIFICTOPSOILS.COM; 425-337-2700)**, ARBORIST CHIPS, OR APPROVED EQUAL. MULCH SHALL NOT CONTAIN RESIN, TANNIN, OR OTHER COMPOUNDS IN QUANTITIES THAT WOULD BE DETRIMENTAL TO PLANT LIFE. MULCH SHALL NOT BE DERIVED FROM STUMP GRINDINGS AND SHALL NOT CONTAIN SOIL. HOG FUEL OR EQUAL IS NOT ACCEPTABLE. SUBJECT TO REVIEW BY THE PLAN DESIGNER, LOCAL ARBORIST AND/OR COMMERCIAL TREE TRIMMING COMPANIES MAY BE ALTERNATIVE ACCEPTABLE MATERIAL SOURCES.





1/1 **PLANT INSTALLATION DETAILS**

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BRYANT RESIDENCE

Site Address: 701 Shoreland DR SE, Sammamish, Washington

Client: Ripple Design Studio, Inc., 4214 Stone Way North, Seattle, Washington 98103

Know what's **below.** **Call** before you dig.

NO.	DATE	NOTES

DATE: 10/11/2016
JOB NUMBER: 16026

Monitoring Plan, Specifications, Notes, & Details

SHEET: 1 OF 1

Critical Area Report:
Proposed Bryant Residence

701 Shoreland Drive SE
Bellevue, Washington

Prepared for:

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October 11, 2016

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October 11, 2016
Project Number 16026

Ripple Design Studio, Inc.
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Critical Area Report
Proposed Bryant Residence
701 Shoreland Drive SE – Bellevue, Washington

Evergreen Aquatic Resource Consultants, LLC is pleased to present this report that demonstrates how a proposed residential project located at 701 Shoreland Drive SE in Bellevue, Washington complies with Bellevue Land Use Code ("LUC") 20.25H (*Critical Areas Overlay District*).

The proposed project includes the demolition of an existing single-family residence and a detached accessory structure as well as the construction of a new single family residence, various landscape improvements, and on-site critical area enhancement. Work is proposed within shoreline and steep slope critical areas, buffers, and related structure setbacks. It is our opinion that the proposed project results in a net improvement in critical area functioning when compared to existing conditions.

This report is based on an analysis of conditions within and adjacent to the 22,890 sf (0.53 acre) project site, an evaluation of the development standards contained within LUC 20.25H, and a review of the best available science regarding critical area functions.

We understand that report will be used in part to obtain a "Critical Area Land Use Permit" ("CALUP") from the City of Bellevue.

I trust that this report meets your present needs. If you have any questions regarding this report or require additional assistance with this project, please do not hesitate to call or email.

Sincerely,
Evergreen Aquatic Resource Consultants, LLC

Peter P. Super
Professional Wetland Scientist

Critical Area Report

Proposed Bryant Residence

October 11, 2013

Prepared for:

Ripple Design Studio, Inc.
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Prepared by:
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Project No. 16026

1.0 Introduction 1
2.0 Project Site 1
3.0 Critical Areas, Buffers, and Setbacks 1
3.1 Shorelines 2
3.2 Geologic Hazards 2
3.3 Species of Local Importance 2
4.0 Project Description 2
4.1 Proposed Project 2
4.2 Purpose and Need 3
4.3 Project Site Limitations 3
4.4 Proposed Mitigation 4
4.5 Minimum Necessary Impact 4
4.6 Alternatives Considered 4
5.0 Habitat Assessment 5
5.1 Overview 5
5.2 Habitat Types Present 6
5.3 Functional Assessment Tool for Upland Habitat 6
5.4 Species of Local Importance 7
6.0 Critical Area Impact Assessment and Functional Lift Analysis 9
6.1 Project Impacts 9
6.2 Functional Lift Analysis 10
7.0 Mitigation Plan Requirements 12
7.1 Mitigation Sequencing 12
7.2 Mitigation Plan Phases 12
7.3 Mitigation Goals/Objectives/Performance Standards 12
7.4 Mitigation Specifications/Description of the Work to be Performed 13
7.5 Mitigation Timing 13
7.6 Mitigation Compliance Monitoring Program 13
7.7 Mitigation Contingency Plan 13
7.8 Mitigation Assurance Devices 13
8.0 Critical Area Report Criteria 13
8.1 General – LUC 20.25H.255(B) 13
8.2 Shoreline Mitigation and Monitoring Provisions – LUC 20.25H.118 15
8.3 Steep Slope Hazard Performance Standards – LUC 20.25H.125 15
9.0 Summary 17
10.0 References 17

List of Appendices

Appendix A – Aerial & Existing Conditions Photographs
Appendix B – Functional Assessment Tool for Upland Habitat

1.0 Introduction

This report has been prepared to demonstrate that a proposed residential project located at 701 Shoreland Drive SE in Bellevue, Washington complies with Bellevue Land Use Code ("LUC") 20.25H (*Critical Areas Overlay District*). The proposed project includes the demolition of an existing single-family residence and a detached accessory structure as well as the construction of a new single family residence, various landscape improvements, and on-site critical area enhancement. Work is proposed within shoreline and steep slope critical areas, buffers and related structure setbacks. The proposed project results in a consolidated development envelope, removes an existing non-conforming shoreline structure, and provides for enhancement of existing degraded habitat. The proposed project requires modification to the following LUC code sections:

- LUC 20.25H.115(B)(1)(a)(ii) – 25 ft shoreline buffer
- LUC 20.25H.120(B)(1)(b) – 50 ft top-of-slope buffer
- LUC 20.25H.120(C)(2)(b) – 75 ft toe-of-slope setback

2.0 Project Site

The project site is a rectangular-shaped, developed 22,890 sf (0.53 acre) residential parcel located at 701 Shoreland Drive SE in Bellevue, Washington. The site is situated in the SE ¼ of Section 31, Township 25 North, Range 5 East, W.M. The King County Tax Parcel Number for the site is 5627300180. Current zoning for the site is "R-2.5" (residential-2.5 dwelling units per acre). The comprehensive plan designation for the site is "SF-M" (single-family-medium density).

The site measures approximately 120 ft wide (north to south) by approximately 205 ft deep (east to west). The site is bordered by Lake Washington to the west and developed residential properties to the north, east, and south. Improvements located within the site include a two story single-family residence with attached carport, a driveway, a detached accessory structure, a residential dock, and a rockery bulkhead along the entire length of the lake shoreline. Access to the site is via a series of private access easements.

Site aspect is to the west. The site slopes downward from Shoreland Drive SE to Lake Washington, with the steepest portion of the site located in roughly the center of the site. Relatively flat terraces exist in the eastern portion of the site near the existing residence as well as in the western portion of the site near Lake Washington. Total fall across the site is approximately 75 ft.

An aerial photograph of the site as well as photographs showing existing conditions with the site are included in Appendix A of this report.

3.0 Critical Areas, Buffers, and Setbacks

This section describes the critical areas present within the project site. Critical areas, buffers, and setbacks encumber 20,086 sf, or approximately 88% of the site.

3.1 Shorelines

The project site maintains approximately 120 lf of shoreline frontage on Lake Washington. The ordinary high water mark ("OHWM") of Lake Washington is horizontally confined within the site by a low rock bulkhead located along the western property line. Lake Washington is classified as a "Type S Water". A 25 ft buffer is required from the OHWM and a 25 ft setback is required from the outer limits of the shoreline buffer for buildings and other structures. The shoreline buffer and related structure setback encumber much of the relatively flat lower terrace area located in the western portion of the site. Total site area encumbered by shoreline critical area buffers and setbacks is 5,648 sf, or approximately 25% of total site area.

3.2 Geologic Hazards

Steep slope hazards exist within the eastern and central portions of the project site. The two steep slope hazard areas comprise 5,875 sf in total area. A 50 ft buffer is required from the top of each steep slope hazard and a 75 ft setback is required from the toe of each steep slope hazard for buildings and other structures. Total site area encumbered by the steep slope hazards, buffers, and setbacks is 14,438 sf, or approximately 63% of the site. A portion of the steep slope hazard toe-of-slope setback overlaps the shoreline buffer and setback in the western portion of the site. The project site is also located within a mapped erosion hazard area and the western portion of the site is located within a mapped seismic hazard area.

PanGEO, Inc. (2016) determined that there was no evidence of past slope instability, the site is "…globally stable in its current configuration…", soils within the site "…are anticipated to exhibit low to moderate erosion potential when disturbed and left unprotected…", and the potential for soil liquefaction within the seismic hazard area "…is considered low…".

3.3 Species of Local Importance

A general assessment of species of local importance is included in Section 5 of this report. A site-specific bald eagle (*Hiliaeetus leucocephalus*) study was completed by Chris Holcomb (2016), which determined that the closest bald eagle nest is located approximately 0.5 miles south of the project site and that a Douglas-fir (*Pseudotsuga menziesii*) located within central portion of the site was a potential regular bald eagle perch. The on-site Douglas-fir tree, referred to as "Tree 1" by Holcomb (2016) and "Tree 8" by Selasco & Associates, LLC (2016a), is used occasionally by bald eagles and was determined to be less important than other perch trees within the local area. A large Douglas-fir located at approximately 901 Shoreland Drive SE, referred to as "Tree 3" by Holcom (2016), was identified as an especially important bald eagle perch. It was determined that if removed "Tree 1" "…won't likely be missed…" by bald eagles (Holcomb, 2016).

4.0 Project Description

4.1 Proposed Project

The proposed project includes the demolition of the existing single-family residence and attached carport located in the eastern portion of the site as well as demolition of the existing accessory structure located in the western portion of the site. A new three story single family residence with attached three car garage and auto court will be

constructed in the central and eastern portion of the site. Various landscape improvements are also proposed throughout the site, including in shoreline buffer areas.

The proposed residence will be constructed within steep slopes, buffers, and related structure setbacks. The residence has a total floor area of 5,500 sf and a footprint area of 5,000 sf, which includes the garage and a series of covered and uncovered terraces. The residence has been designed to minimize alteration to existing contours by encompassing the footprint of the existing residence and by stepping down sloping topography on a tiered foundation. The proposed foundation will serve as the primary retaining wall system, thus reducing the need for additional retaining walls to stabilize the hillside.

Landscaped areas within the site will be reduced in overall scale and improved to facilitate better use of the site. Improvements include the installation of a hot tub, fire pit, and various hardscape surfaces, rockeries, and stairs needed to access and support landscape amenities. Most landscape improvements occur within structure setbacks, but a new retaining wall, grade changes on the non-water side of the retaining wall, and the construction of a fire pit, associated patio, and low rockery will occur with shoreline buffer areas. Although much of the shoreline buffer work occurs within areas of existing lawn, the improvements are not considered "routine maintenance" per LUC 20.25H.055.C.3.h. The proposed shoreline buffer improvements result in the enhancement and preservation of much of the shoreline buffer area.

The proposed project requires 6,700 sf of vegetation removal or alteration as well as the elimination of 8 significant trees. Three significant trees will be retained on the site.

4.2 Purpose and Need

The purpose of the proposed project is to re-develop the project site for single-family residential use by replacing an outdated and undersized single family residence and improving existing landscaped areas. The overall goal of the project is to improve the site in a similar scope and scale to that of other properties within the local area.

Residence:

The proposed residence will have all of the essential components of a modern day residence. The existing residence measures approximately 2,085 sf (including carport) and is in poor condition.

Shoreline Improvements:

The proposed landscape improvements within the shoreline buffer allow for reasonable recreational use within the project site and present an overall reduction in impact within on-site shoreline buffer areas. Movement of the retaining wall within shoreline buffer areas is needed to improve grades and overall usability of existing lawn areas. The new retaining wall will be structurally sound, reducing the need for future maintenance or re-construction.

4.3 Project Site Limitations

Development opportunities within the project site are significantly constrained by the relatively small lot size, topography, and the presence of critical areas. The site measures slightly more than 0.5 acres and includes

shoreline and steep slope critical areas. In addition, an access easement encumbers the northeast corner of the site and elevation changes limit vehicle turnaround within the eastern upper terrace area. Excluding the existing residence, carport, and accessory structure, the entire site comprises critical areas, buffers, and related setbacks. It is not possible to re-develop the site without encroaching into critical areas, buffers, and setbacks.

4.4 Proposed Mitigation

As compensation for locating the new residence and landscape improvements within critical areas, buffers, and related setbacks, 6,745 sf of the project site will be enhanced using native trees, shrubs, and groundcovers. The proposed mitigation is provided roughly at a ratio of 1:1 (mitigation area:impact area). The overall mitigation goal is to enhance critical area functions by providing a dense, structurally diverse, and species rich native plant community. The proposed mitigation results in a net improvement in several critical area functions.

The proposed mitigation includes site-specific application of the following mitigation design standards described in the City of Bellevue's *Critical Areas Handbook* (The Watershed Company, undated):

- Removal of non-native and noxious weed species. Existing ornamental (landscape) varieties and noxious weeds will be removed from planting areas.
- Soil amendments and mulches: Existing soils within planting areas will be amended prior to plant installation and mulch will be installed throughout planting areas following plant installation.
- Use of appropriate native plant species. Proposed plant species are generally consistent with those outlined for both geologic hazards and shorelines and are found on the City of Bellevue's "Master Plant List".
- Irrigation: A minimum of two years of temporary irrigation will be provided to ensure installed plants are properly established.
- Maintenance and Monitoring: A five-year maintenance and monitoring program is included to ensure the mitigation performs as designed.

4.5 Minimum Necessary Impact

The proposed project strikes an appropriate balance between the landowner's responsible use of the site and the specific environmental protection objectives established by LUC 20.25H. The proposed project results in a consolidated development envelope, removes an existing non-conforming shoreline structure, and provides for enhancement of existing degraded habitat.

4.6 Alternatives Considered

The development activities planned for the project site achieve the overall purpose and goals of the project while at the same time complement the character of the existing development within the local area and improve critical area functions. No alternative location exists within the site that presents less environmental impact and achieves the same development objectives. Alternatives considered to the proposed project include the following:

- Underground Parking

  A site design with parking located below the first floor of the residence was strongly considered, but was not

feasible because of driveway slope limitations.

- Detached Garage

  This alternative included locating a detached garage into the toe-of-slope of the smaller steep slope area located near the eastern property line. This alternative was not feasible because the garage location limited access to the property and required that the proposed residence encroach further into the larger steep slope to provide adequate back-up area for the detached garage.

One of the primary design considerations included in the final design was connection of the residence to the shoreline environment. This was achieved through the structure, which eliminated the need for substantial landscaping and grading as well as an additional accessory structure within the shoreline area.

5.0 Habitat Assessment

5.1 Overview

The project site is located within the western hemlock (*Tsuga heterophylla*) forest zone as described by Franklin and Dyrness (1973). Mid- to late-successional forest conditions typical of this forest type include a dominance by conifers such as Douglas-fir, western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*), with the species present depending upon the specific site hydrologic and stand age characteristics. Persistent understory species would typically include vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), Oregon grape (*Mahonia nervosa*), devil's club (*Oplopanax horridus*), western swordfern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), and red huckleberry (*Vaccinium parvifolium*).

The project site includes both terrestrial (non-aquatic upland) and lake shoreline habitat. Approximately 120 lf of gravel beach exists along the western property line adjacent to a low rock bulkhead. Approximately 5 ft of the beach is exposed during winter low water periods. No gravel is exposed during the summer high water period.

Upland portions of the project site comprise relatively simple plant communities characterized by scattered trees of various species and ages as well as a variable understory ranging from dense shrubs to turf grass (lawn). Shrub and groundcover is primarily non-native, comprising either overgrown ornamental plants or dense noxious weeds, with only scattered native plants present. Downed woody debris, snags, or other habitat features are not present.

Overall habitat quality within the project site has been significantly degraded by past clearing, residential uses, and the site-wide introduction of non-native plant species. On-site habitats likely provide limited seasonal foraging opportunities and escape cover for small mammals and passerine birds accustomed to suburban environments. The site is located within the home range of larger mammals; however, use of the project site by larger mammals is likely larger mammals is likely limited to non-existent because of existing plant community characteristics and the proximity and density of surrounding residential development.

The project site is not known to and does not appear to provide habitat unique to the local vicinity and/or broader region.

5.2 Habitat Types Present

This section describes the habitat types present within the project site. A map showing the location and limits of each habitat type is included in Appendix B.

- Open Mixed Coniferous-Deciduous Forest

  This habitat type is located south and east of the existing residence as well as along the northern property line. Plant species richness is low to moderate and dominant plant species are non-native or noxious weed species. All but one of the significant trees inventoried by Selasco & Associates, LLC (2016a) in the project site occur within this habitat type. Significant trees include large diameter Douglas-fir as well as single occurrences each of European birch (*Betula pendula*), flowering dogwood (*Cornus florida*), golden chain (*Laburnum anagyroides*), Norway spruce (*Picea abies*), and pine (*Pinus* sp.). Two topped bigleaf maple (*Acer macrophyllum*) are located in the southeast corner of the site. English ivy (*Hedera helix*) is the dominant shrub/groundcover plant in areas south of the residence. English ivy and overgrown taller hedge shrubs such as English laurel (*Prunus laurocerasus*) are co-dominant in areas along the northern property line. Where present, native shrubs and groundcovers are scattered in distribution and include bitter cherry (*P. emarginata*), beaked hazelnut (*Corylus cornuta*), thimbleberry (*R. parviflorus*), and western swordfern.

- Scrub-shrub (non-native dominant)

  This habitat type is located on the sloped area in the central portion of the site as well as in a narrow band along the shoreline of Lake Washington. Plant species richness is low and dominant plant species are non-native or noxious weed species. No significant habitat features or vegetation structure is present. Vegetation is dominated by dense English ivy and, depending upon location, also includes scattered ornamental landscape shrubs and occasional native shrubs such as beaked hazelnut, salal, Oregon grape, and western swordfern. Small stands of Himalayan blackberry (*R. armeniacus*) and bamboo (species unknown) are also present.

- Lawn and Ornamental Landscaping

  This habitat type is located adjacent to the existing residence as well as in the lower terrace area located in the western portion of the site. Vegetation within this habitat type includes turf grass (lawn) and a mix of ornamental and native shrubs and groundcovers such as rhododendron, azalea, lily-of-the-valley shrub (*Pieris japonica*), yew (*Taxus* sp.), rose (*Rosa* sp.), creeping St. John's Wort (*Hypericum calycinum*), English ivy, Oregon grape, and western swordfern. Shrub species richness is high, but non-native or noxious weeds species are dominant. No significant habitat structures are present.

5.3 Functional Assessment Tool for Upland Habitat

The project site scored 34 points when assessed using the City of Bellevue's *Draft Functional Assessment Tool for Upland Habitat*. In general, sites that score between 26 to 40 points provide "…both actual habitat and likely the opportunity for wildlife to use the habitat on the site…" (The Watershed Company 2010). The project site received high scores for the number of habitat types present, vegetation coverage, plant species richness, and

proximity to year-round water. Habitat within the site is limited due to the surrounding residential land use, a lack of connectivity between the project site and off-site habitat areas, the extensive presence of non-native plants species, and poor vegetative structural diversity. The completed functional assessment tool form and supporting information is included with this report in Appendix B.

5.4 Species of Local Importance

The project site exists within the known range of numerous wildlife species identified by LUC 20.25H.150 as "Species of Local Importance"; however, the likelihood that these species utilize the project site is generally limited by the small patch size and the degraded conditions of on-site habitat types as well as the urbanized landscape in which the project site exists.

Below is a listing of potential site utilization by "Species of Local Importance" as defined by LUC 20.25H.150. A species was determined to maintain a "primary association" with the project site if the species is known to use the site or has the potential to use the site for rearing young, roosting, breeding, or foraging on a regular basis.

- Bald eagle (*Haliaeetus leucocephalus*): A site specific study completed by Holcomb (2016) determined that a 59 inch diameter-at-breast-height ("DBH") Douglas-fir located within the central portion of the site is a potential regular bald eagle perch. This tree was referred to as "Tree 1" by Holcomb (2016) and "Tree 8" by Selasco & Associates, LLC (2016a). The tree was determined to be less important than other perch trees within the local area. The closest bald eagle nesting site is approximately ½ mile to the south. Primary association: Yes - used on a regular basis for perching related to foraging.

- Peregrine falcon (*Falco peregrinus*): Species prefers coastal cliffs and shorelines associated with large seabird colonies, waterfowl concentrations, and other prey species. Prominent cliffs, tall buildings, or steel bridges are most commonly associated with nesting and perching sites. Primary association: No

- Common Loon (*Gavia immer*): Species prefers undisturbed and secluded forested lakes, with deep inlets and bays, as well as islands or logs and other floating debris for nest sites. In western Washington, the species is commonly associated with saltwater bays and inlets along the coast. Primary association: No.

- Pileated woodpecker (*Dryocopus pileatus*): Species prefers old-growth conifer forests and second-growth conifer forests with large snags and fallen trees. Nest tree characteristics can be variable, but generally include large diameter hard conifer snags with intact bark and broken tops and/or live conifer trees with dead tops. Roost trees are typically characterized by hollow trees or trees having vacated nest cavities. Primary association: No.

- Vaux's swift (*Chaetura vauxi*): Species is strongly associated with old growth and mature forests in western Washington and is highly dependent on large hollow trees and snags for breeding and roosting. Species is present in western Washington as a spring and summer migrant as well as a summer resident. Primary association: No

- Merlin (*Falco columbarius*): Species is generally associated with coastal or high elevation forests and is uncommon in suburban areas of western Washington. Primary association: No

- Purple martin (*Progne subis*): Species generally requires snags near or over permanent water for nesting. Primary association: No

- Western grebe (*Aechmophorus occidentalis*): In western Washington, species occupies nearshore marine environments during the winter. Primary association: No.

- Great blue heron (*Ardea herodias*): Species is associated primarily with wetlands, forests, and estuaries. Some limited potential foraging possible along shorelines, but no roosts observed on or to adjacent site. Primary association: No.

- Osprey (*Pandion haliaetus*): Perch availability adjacent to large water body, but bald eagle presence may limit presence. Primary association: No.

- Green heron *(Butorides striatus)*: Species associated primarily with freshwater wetlands and nests in wetlands with thick shrub vegetation. Primary association: No.

- Red-tailed hawk (*Buteo jamaicensis*): Species prefers open areas with scattered elevated perches – agricultural areas, fields, pasture, parkland, broken woodland, and scrub desert. In western Washington, nest trees are usually black cottonwood or red alder trees. Primary association: No.

- Western big-eared bat (*Plecotus townsendii*): Species distribution widespread within Washington. Snags and large trees may be important roost sites. No known nearby hibernacula, caves, or significant concentration of cavities within local area. Primary association: No.

- Keen's myotis (*Myotis keenii*): Species is not known to occur in King County. Species is closely associated with moist coastal forests at low elevations and roosts in caves, rock crevices, large trees, snags, and building. Primary association: No.

- Long-legged myotis (*Myotis volans*): Species distribution is widespread in Washington. Species is strongly associated with moist to dry conifer forests as well as riparian forests and dry rangeland. Roost sites include snags and live trees with loos bark, long vertical cracks, or hollows, cracks and crevices in rocks, stream banks, and the ground. Primary association: No.

- Long-eared myotis (*Myotis evotis*): Species distribution is widespread in Washington. Species is associated with larger coniferous forests ranging from drier ponderosa pine to humid coastal and montane forests. Roosts are located in stumps, conifer snags, under loose bark on trees, downed logs, as well as buildings, crevices in ground-level rocks and cliffs. Primary association: No.

- Oregon spotted frog (*Rana pretiosa*): Species is believed to be extirpated from nearly all of western Washington. Species spends nearly its entire life in aquatic habitat (wetlands, lakes, ponds, and slow moving streams). Primary association: No.

- Western toad (*Bufo boreas*): Species occupies a wide variety of terrestrial habitats including prairies, forests, canyon grasslands, and ponderosa pine-Oregon Oak habitat. Breeding waters are usually

permanent and include wetlands, ponds, lakes, reservoir coves and the stillwater off-channel habitats of rivers. Primary association: No.

- Western pond turtle (*Clemmys marmora*ta): Distribution extremely limited in Washington. Species is a highly aquatic turtle that occurs in streams, ponds, small lakes, and permanent and ephemeral wetlands. Species spends most of their time in water, but does require terrestrial habitats for nesting, overwintering, and dispersal. Primary association: No.

- Chinook salmon (*Oncorhynchus tshawytscha*): Species utilizes Lake Washington as a migration corridor. Use of the portion of Lake Washington adjacent to the project is possible, but use by this species is likely not extensive. Primary association: No.

- Coho salmon (*Oncorhynchus kisutch*): Species utilizes Lake Washington as a migration corridor. Use of the portion of Lake Washington adjacent to the project is possible, but use by this species is likely not extensive. Primary association: No.

- Bull trout (*Salvelinus confluentus*): Species is rare to non-existent in Lake Washington. Use of project site by this species is unlikely. Primary association: No.

- River lamprey (*Lampetra ayresi*): Species is present within Lake Washington, but little is known about their biology. Use of project site by this species is unlikely. Primary association: No.

6.0 Critical Area Impact Assessment and Functional Lift Analysis

6.1 Project Impacts

Project impacts vary per location, but generally include direct impacts to critical areas, buffers, and related structure setbacks. Based on the scope of the project and existing conditions within the project site, indirect or cumulative impacts are not expected. This section provides a description of project impacts.

Table 1 (below) summarizes critical area impacts resulting from the proposed project:

Table 1 – Critical Area Impact Summary

Impact Type	Impact Area*
Steep Slopes	2,405 sf
Toe of Slope Buffer	3,155 sf
Toe of Slope Setback	395 sf
Shoreline Buffer	745 sf
Total	**6,700 sf**

* Excludes footprints of existing residence, carport, and accessory structure.

Proposed Residence

The proposed residence will be located in the eastern and central portions of the project site and will incorporate the footprint of the existing residence, carport, and driveway. Impacts resulting from the new residence include vegetation removal and grade modification within steep slopes, buffers, and related setbacks. Vegetation removal includes 5,560 sf of shrub and groundcover plant species comprising primarily over-grown ornamental landscape or noxious weed species as well as seven significant trees.

Significant tree removal includes a mix of native and non-native species. "Tree 1" referred to by Holcom (2016) is a potential bald eagle perch. Retaining the trees is not feasible because of the location of the proposed site work.

Steep slopes, buffers, and related setbacks located outside of the development envelop will be enhanced using native plants that will provide for a net improvement in critical area functions.

Proposed Shoreline Improvements

Although much of the landscape improvements will occur within structure setbacks, a small amount of work is required within the on-site shoreline buffer area. Shoreline buffer impacts include 745 sf of vegetation removal and grade modifications related to the construction of a new retaining wall, a fire pit, associated patio, and low rockery. The proposed improvements require excavation and soil placement, the removal and replacement of a portion of the existing lawn, and the removal of one non-native purple beech (*Fagus sylvatica*) tree.

The purple beech is a mature, possibly over mature, non-native tree that is particularly intolerant of construction impacts (Selasco & Associates, LLC, 2016b). The tree is not used by bald eagles for perching, nesting, or roosting because of its thin branches and dense foliage (Holcom, 2016). Retention of the tree was not possible because demolition activities associated with removal of the existing accessory structure would compromise the health and structural integrity of the tree (Selasco & Associates, LLC, 2016b).

Shoreline buffer areas located closest to Lake Washington will be fully enhanced using native plants that will provide for a net improvement in critical area functions.

6.2 Functional Lift Analysis

The critical area functional assessment presented in this section is qualitative in nature and applies the best available science regarding critical area function described within the *2005 Best Available Science Review: City of Bellevue's Critical Areas Update* (Herrera Environmental Consultants, Inc. 2005). The assessment is provided at a site-specific scale and therefore does not address the influence of broader policies or land use actions that may affect critical area functioning on a watershed scale. Given the size and landscape position of the project site, many of the critical are functions provided by the project site are determined by processes and land use conditions that occur on scale much larger than the project site

For purposes of this assessment, geologic hazard functions have been assessed only with regard to the wildlife habitat and the corridor linkages they provide. All other aspects of geologic hazards related to the protection of life and property have been addressed by PanGEO, Inc. (2016).

Shorelines provide both important ecological functions as well as valuable recreational uses. Vegetation within steep slopes can stabilize erosive or unstable soils, can provide important wildlife habitat and corridor linkages, and can provide aesthetic values such as a "green" background for surrounding development.

Table 2 (below) presents an evaluation of the critical area functional lift provided by the proposed project.

Table 2 – Critical Area Functional Lift Analysis

FUNCTION	EXISTING CONDITIONS	PROPOSED MODIFICATION	FUNCTIONAL LIFT
Sediment and Pollutant Retention	Sloping topography, erosion hazards, and dense non-native species present. Stormwater runoff is generally uncontrolled.	Proposed residence foundation will stabilize steep slope areas. Runoff control will conform to current code. 6,745 sf of enhancement plantings will be provided – includes soil de-compaction and amendment as well as deep rooting native plants.	**Somewhat Improved** Runoff control will be increased and native plants will stabilize on-site soils. Opportunity to provide function is limited due to the small amount of stormwater and pollutants directed towards critical areas.
Water Temperature Moderation	Site aspect is to west and lake temperature is provided by macroclimate controls such as air temperature and surface water inputs. Only scattered mature trees exist within the site and none overhang the lake.	Enhancement plantings will include trees.	**No Change** Aspect is to west. Opportunity to provide function is limited because lake water temperature is controlled primarily by air and surface water inputs.
General Wildlife Habitat and Corridors	Dense non-native and noxious weed plant species are present, limited native plant species richness, little forage or escape cover. Site is relatively isolated from large upland corridors.	6,745 sf of enhancement plantings will be provided – includes non-native and noxious weed control, soil de-compaction/ amendment and the installation of dense native plants.	**Significantly Improved** Enhancement will provide high functioning forage and escape habitat comprising high species diversity and complex vertical structure, with valuable edge habitat
LWD Recruitment and Snag Development	Scattered trees exist throughout site, but only 1 non-native tree in shoreline area.	Enhancement plantings will include trees.	**Somewhat Improved** Mitigation provides for a slight increased function potential, but opportunity to provide function is moderated by normal use of Lake Washington shoreline
Insect and Nutrient Export (gen. Food Chain Support)	Dense non-native, invasive plant species, limited native plant species richness and vertical complexity.	6,745 sf of enhancement plantings will be provided – includes non-native and noxious weed control, soil de-compaction/ amendment and the installation of dense native plants.	**Improved**

7.0 Mitigation Plan Requirements

This section describes how the proposed mitigation conforms to the mitigation plan requirements outlined in LUC 20.25H.215 (*Mitigation Sequencing*) and LUC 20.25.220 (*Mitigation and Restoration Plan Requirements*).

7.1 Mitigation Sequencing

LUC 20.25H.215 requires that proposed critical area, buffer, and setback modifications undertake all reasonable efforts to ensure that the proposed modification avoids, minimizes, mitigates, and monitors impacts to critical areas and/or their respective buffers. Table 3 (below) summarizes how the proposed project demonstrates compliance with the requirements of LUC 20.25H.215.

Table 3 – Mitigation Sequencing Summary

LUC 20.25H.125 Requirement	How Proposed Project Complies with Requirement
Avoidance	The proposed residence avoids the shoreline buffer setback and avoids much of the smaller steep slope area located along the eastern property line. The proposed landscape improvements avoid the majority of the shoreline buffer. Yard areas are located in the lower terrace area, which avoids steep slope hazards.
Minimization	The proposed project has been significantly re-configured from a similar project approved in 2011. Project elements have been reduced to consolidate development activities into the smallest configuration possible, which still provides for beneficial use of the project site. Access to the shoreline area is largely through the proposed residence, which eliminated the need for an accessory structure within the shoreline area. The existing accessory structure will be removed.
Mitigation	The proposed project includes 6,745 sf of critical area enhancement at a ratio of roughly 1:1. Mitigation will be provided on-site adjacent to the proposed site development activities.
Monitoring	The proposed project includes a five years of post-construction monitoring program.

7.2 Mitigation Plan Phases

The proposed mitigation will be completed as a single phase. The mitigation plan prepared for the project is a "detailed plan" for purposes of the phasing allowances included in LUC 20.25H.220A.

7.3 Mitigation Goals/Objectives/Performance Standards

The overall mitigation plan goal is to enhance critical area functions within the project site by providing a dense, structurally diverse, and species rich native plant community. The proposed mitigation utilizes best management practices (BMP's) in design and future construction to ensure a diverse assemblage of native plants, high native plant coverage, a low occurrence of non-native plant species, and an appropriate mitigation monitoring program. Specific goals, objectives, and performance standards are detailed on the mitigation plan.

7.4 Mitigation Specifications/Description of the Work to be Performed

The proposed mitigation includes site preparation (e.g., existing vegetation removal, soil de-compaction, and soil amendment) as well as the installation of a diverse assemblage of native plant species. A detailed description of the work to be performed is included on the mitigation plan.

7.5 Mitigation Timing

The proposed mitigation will be completed prior to issuance of a certificate of occupancy for the residence.

7.6 Mitigation Compliance Monitoring Program

A five year compliance monitoring program is included as a critical component of the project and is described on the mitigation plan. In addition to completing as-built documentation, compliance monitoring will include an annual site assessment to ensure that the proposed mitigation is achieving the established performance standards.

7.7 Mitigation Contingency Plan

Should monitoring reveal that the performance standards for the respective year are not met, appropriate contingency plans will be developed by the landowner to address any deficiency. A detailed contingency plan is described on the mitigation plan.

7.8 Mitigation Assurance Devices

A mitigation bond or similar assurance device will be provided by the landowner for the proposed mitigation.

8.0 Critical Area Report Criteria

A critical areas report is intended to provide flexibility for sites where the expected critical area functions and values are not present due to degraded conditions or other unique site characteristics, or for proposals providing unique design or protection of critical area functions and values not anticipated by code.

Applicable LUC sections to be modified: LUC 20.25H.115(B)(1)(a)(ii) – 25 ft shoreline buffer
LUC 20.25H.120(B)(1)(b) – 50 ft top-of-slope buffer
LUC 20.25H.120(C)(2)(b) – 75 ft toe-of-slope setback

This section describes how this report conforms to the critical area reporting requirements established for shorelines and and steep slopes.

8.1 General – LUC 20.25H.255(B)

An analysis of the proposed project per the critical area report decisional criteria to reduce regulated critical area buffers (LUC 20.25H.255[B]) is provided below:

1. **The proposal includes plans for restoration of degraded critical area or critical area buffer functions which demonstrate a net gain in OVERALL critical area or critical area buffer functions.**

The project conforms to this decisional criteria. Existing critical areas, buffers and setbacks located within the project site provide low ecological functioning because of a lack of native vegetation, minimal habitat complexity, and limited forage and cover for wildlife. The project provides 6,745 sf of mitigation and results in a net improvement in the following critical area buffer functions: sediment and pollutant retention, general wildlife habitat, large woody debris recruitment, and general food chain support. See Section 4.4 and Section 6.0 of this report.

2. **The proposal includes plans for restoration of degraded critical area or critical area buffer functions which demonstrate a net gain in the most important critical area or critical area buffer functions to the ecosystem in which they exist.**

   The project conforms to this decisional criteria. The project provides 6,745 sf of mitigation. General wildlife habitat suitability is the most important ecological function provided by the project site. General wildlife habitat suitably functions will be improved by providing a multilayered plant community supporting high species richness and complex vertical structure with valuable edge habitat. See Section 4.4 and Section 6.0 of this report.

3. **The proposal includes a net gain in stormwater quality function by the critical area buffer or by elements of the development proposal outside of the reduced critical area buffer.**

   The project conforms to this decisional criteria. Because stormwater directed to the critical areas is limited to sheet flow from existing yards and structures, the opportunity to provide significant stormwater functions is extremely limited under existing and/or future conditions. The project provides 6,745 sf of mitigation that increases soil infiltration through soil decompaction and amendment. The mitigation also binds soil particles using the aggressive root systems of native plants.

4. **Adequate resources to ensure completion of any required restoration, mitigation, and monitoring efforts.**

   The project conforms to this decisional criteria. The landowner is committed to the proposed mitigation and will post a bond or similar surety device for the full cost of proposed mitigation as well as the five years of maintenance and monitoring.

5. **The modification and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site.**

   The project conforms to this decisional criteria. There are no known off-site critical areas. The proposed mitigation will have a synergistic effect by creating a continuous corridor of native vegetation from the lake to upland locations that currently does not exist.

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

   The project conforms to this decisional criteria. Land use surrounding the project site is residential in nature and similar in character to that proposed for the project site. The proposed project provides reasonable and

appropriate use of the site, including shoreline access and use, which are consistent with and similar in scope and scale to those uses found on neighboring parcels. The proposed project does not present a substantial change in use when compared to existing conditions. Adjoining parcels are similarly developed.

8.2 Shoreline Mitigation and Monitoring Provisions – LUC 20.25H.118

An analysis of the proposed project per the performance standards established in LUC 20.25H.118 is provided below:

A. Mitigation Preference

The project conforms to this provision. The proposed mitigation provides for on-site enhancement. Because of a relatively small lot area, replacement of lost critical area buffer area is not technically feasible through buffer averaging or a similar method.

B. Buffer Mitigation Ratio

T The project conforms to this provision. Mitigation is proposed at a ratio of roughly 1:1 (mitigation area:impact area). The total impact area resulting from the proposed project is 6,700 sf. The total enhancement area is 6,745 sf.

8.3 Steep Slope Hazard Performance Standards – LUC 20.25H.125

An analysis of the proposed project per the performance standards established in LUC 20.25H.125 is provided below:

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 project conforms to this standard. The residence has been designed to minimize alteration to the existing topography by encompassing the footprint of the existing residence and by stepping down the hillside using a tiered foundation.

B. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;

The project conforms to this standard. A custom, non-standard house design has been developed to consolidate the proposed development and to minimize alteration to the existing topography.

C. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;

The project conforms to this standard. The proposed project incorporates appropriate design BMP's to minimize risk to neighboring properties. The project does not change the location of critical areas and does not require additional buffers on neighboring properties. See geotechnical report for more information.

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 project conforms to this standard. Existing natural slope areas are maintained to the maximum degree possible. The proposed foundation will serve as the primary retaining wall system, thus reducing the need for additional retaining walls to stabilize the hillside. See geotechnical report for more information.

E. Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer;

The project conforms to this standard. The proposed impervious surfacing is the minimum required to achieve the development objectives. All stormwater control will be per current codes.

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;

The project conforms to this standard. Grade changes beyond the building footprint are minimal and have been designed to minimize site topographic changes. The proposed foundation will serve as the primary retaining wall system, thus reducing the need for additional retaining walls to stabilize the hillside. Yard areas are reduced from the current condition and located primarily in the lower terrace and in the northeast corner of the site, both of which are located outside of steep slope hazards.

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;

The project conforms to this standard. The proposed foundation will serve as the primary retaining wall system, thus reducing the need for additional retaining walls to stabilize the hillside. See geotechnical report for more information.

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;

The project conforms to this standard. Pole-type construction is not feasible. The residence steps down the hillside using a tiered foundation. See geotechnical report for more information.

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

The project conforms to this standard. Not applicable.

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.

The project conforms to this standard. A detailed site landscaping and mitigation plan has been prepared for the project.

9.0 Summary

The proposed Bryant residence includes the construction of a new single family residence, various landscape improvements, and on-site critical area enhancement within shoreline and steep slope critical areas, buffers, and related structure setbacks. The project site is fully encumbered by critical areas and all reasonable steps have been taken to avoid, minimize, and mitigate project impacts. 6,700 sf of impact and 6,745 sf of on-site critical area enhancement is proposed. Existing critical areas, buffers and setbacks located within the project site provide low ecological functioning because of a lack of native vegetation, minimal habitat complexity, and limited forage and cover for wildlife. The proposed project results in a net improvement in the following critical area buffer functions: sediment and pollutant retention, general wildlife habitat, large woody debris recruitment, and general food chain support.

10.0 References

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The Watershed Company. 2010. Guidance: Using the Bellevue Urban Wildlife Functional Assessment Model. Prepared for the City of Bellevue Development Services Department. Latest revision February 2010.

The Watershed Company. undated. Critical areas handbook – Restoring, enhancing, and preserving. Prepared for the City of Bellevue. Obtained from compact disk distributed at June 4, 2009 Critical Areas Training for Professionals. 119 p.

Appendix A

Aerial & Existing Conditions Photographs

N

No Scale

Legend:

Project Site Limits

Figure References and Notes:

1. King County iMAP, accessed 09/28/2016.

Aerial Photograph Showing Project Site

701 Shoreland DR SE
Bellevue, Washington

Evergreen Aquatic
Resource Consultants, LLC
Wetland Delineation • Mitigation Design • Compliance Monitoring

10/10/2016

Appendix A-1

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Figure References and Notes:
1. Existing residence from NE property corner.
2. Existing residence, large steep slope area, shoreline buffer from lake shoreline.
3. Existing accessory structure from path on steep slope.
4. Existing accessory structure from shoreline
5. Landscaped areas located north of residence.
6. Landscaped areas located west of residence.

Date of all photographs: September 27, 2016

Photo Page 1

701 Shoreland DR SE
Bellevue, Washington

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Appendix A-2

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Figure References and Notes:
7. Existing shoreline.
8. Existing lawn in lower terrace.
9. Purple beech.
10. Mature Douglas-firs
11. Mature deciduous and conifer trees.

Date of all photographs: September 27, 2016

Photo Page 2

701 Shoreland DR SE
Bellevue, Washington

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Appendix A-3

Appendix B

Draft Functional Assessment Tool for Upland Habitat

City of Bellevue

DRAFT FUNCTIONAL ASSESSMENT TOOL

for Upland Habitat

Property address_____ Project name _____

Location___ Range___ Township___ Section___ Project contact_____

Parcel number_____ Telephone number(_____) -_____-_____

Property owner_____ Address_____

Telephone number (_____) -_____-_____

Staff_____ Date(s) of site visit(s)_____

Washington Department of Fish and Wildlife Priority Habitat and Species (PHS) data obtained? Y/N_____

1.0	**PROPERTY DESIGNATION**	**Zone A**	**Zone B**	**Zone C**	**Zone D**		**Zone**
1.1	**Existing impervious surface**	>90%	50-90%	20-50%	0-20%		
2.0	**LANDSCAPE PARAMETERS**	**No points**	**1 point**	**2 points**	**3 points**	**Additional points**	**Total**
2.1	**Land use/development density**	Zone A	Zone B	Zone C	Zone D		
2.2	***Occurrence (number) of habitat types**	0	1	2	3+		
2.3	****Proximity of known critical areas (distance to edge)**	>2,500 ft	<2,500 ft	<1,200 ft	<100 ft	+1 point if contiguous with critical area	
2.4	**Habitat connectivity and corridors**	No connection to other habitat areas	≥50-foot-wide connection to vegetated areas of at least 1 acre	≥50-foot-wide connection to vegetated areas of at least 50 acres but not listed parks***	≥50-foot-wide connection King County wildlife network or listed parks***	+1 point for ≥150-foot-wide connection King County wildlife network or listed parks***	
2.5	**Patch size**	<0.-1.0 ac	1.0-5.0 ac	>5-10 ac	10-42 acres	>42 acres = 4 points	

City of Bellevue

DRAFT FUNCTIONAL ASSESSMENT TOOL

for upland habitat

2.0	LANDSCAPE PARAMETERS	No points	1 point	2 points	3 points	Additional points	Total
2.6	***Interspersion of habitat patches (excluding patches <1 ac in area)**	No or isolated patch (no others within 0.5-ac circle)	Low	Moderate	High	+1 point if wildlife network or listed park is included	
3.0	**LOCAL PARAMETERS**	**No points**	**1 point**	**2 points**	**3 points**	**Additional points**	**Total**
3.1	**Size of native trees on site**	No significant trees on site	6-12" dbh tree(s) present	12-20" dbh tree(s) present	>20" dbh tree(s) present	+1 point if tree(s) >30" dbh are present	
3.2	**Coniferous component**	No conifers on site	Conifers very sparse or present in understory only	Conifers co- or sub-dominant in overstory	Conifers dominant	+1 point if conifers >30" dbh are present	
3.3	**Percent cover (sample vegetated areas only)**						
	Ground layer (0-2.3 ft) (5-ft radius)	0%	0-25%	25-50%	50%+	+1 point for cover >75%; -1 point if mowed grass is >50%	
	Shrub layer (2.3-25 ft) (10-ft radius)	0%	0-25%	25-50%	50%+	+1 point for cover >75%	
	Canopy (>25 ft) (30-ft radius)	0%	0-25%	25-50%	50%+	+1 point for cover >75%	
3.4	**Vegetative vertical structural diversity (foliage height diversity)**	FHD = 0	FHD < 0.70	FHD = 0.70-0.90	FHD > 0.90		
3.5	**Vegetative species richness**	0-1 species	2-5 species	6-19 species	20+ species		
3.6	**Invasive species component**	>75% cover	25-75% cover	10-25%cover	<10% cover		

City of Bellevue

DRAFT FUNCTIONAL ASSESSMENT TOOL

for Upland Habitat

3.0	LOCAL PARAMETERS	No points	1 point	2 points	3 points	Additional points	Total
3.7	**Proximity to year-round water**	>1.0 mi or artificial feature with maintained /invasive buffer present within 0.3-1 mi	0.3-1.0 mi or artificial feature with maintained/ invasive buffer present within <0.3 mi	<0.3 mi or artificial feature with maintained/ invasive buffer present within patch	Natural water feature present within patch with native buffer		
3.8	**Snags (≥4 in dbh)**	No snags on site	1/ac or fewer	2-6/ac	>7/ac	Add 0.5 point for each >20 in dbh and 1 point for each >30 in dbh	
3.9	**Other habitat features**	None	1	2-4	5 or more		
Landscape parameters points							12
Local parameters points							22
TOTAL POINTS							34

* Use circle of the appropriate size for the property's zone:

Zone A – 0.5 ac
Zone B – 5.0 ac
Zone C – 100 ac
Zone D – 250 ac

** PHS data required for sites in Zone D

***Parks: Mercer Slough, Phantom Lake wetland complex, Larson Lake wetland complex, Cougar Mountain Regional Wildland Park, Weowna Park; King County wildlife network

N

No Scale

Legend:

- Project Site Limits
- Lawn + ornamental landscaping
- Mixed Coniferous - Deciduous Forest
- Scrub-Shrub

Figure References and Notes:

1. King County iMAP, accessed 09/28/2016.
2. All locations and buffers shown should be considered approximate.
3. Habitat type classification is per *Using the Bellevue Urban Wildlife Habitat Functional Assessment Model* (The Watershed Company 2001).

Habitat Types

701 Shoreland DR SE
Bellevue, Washington

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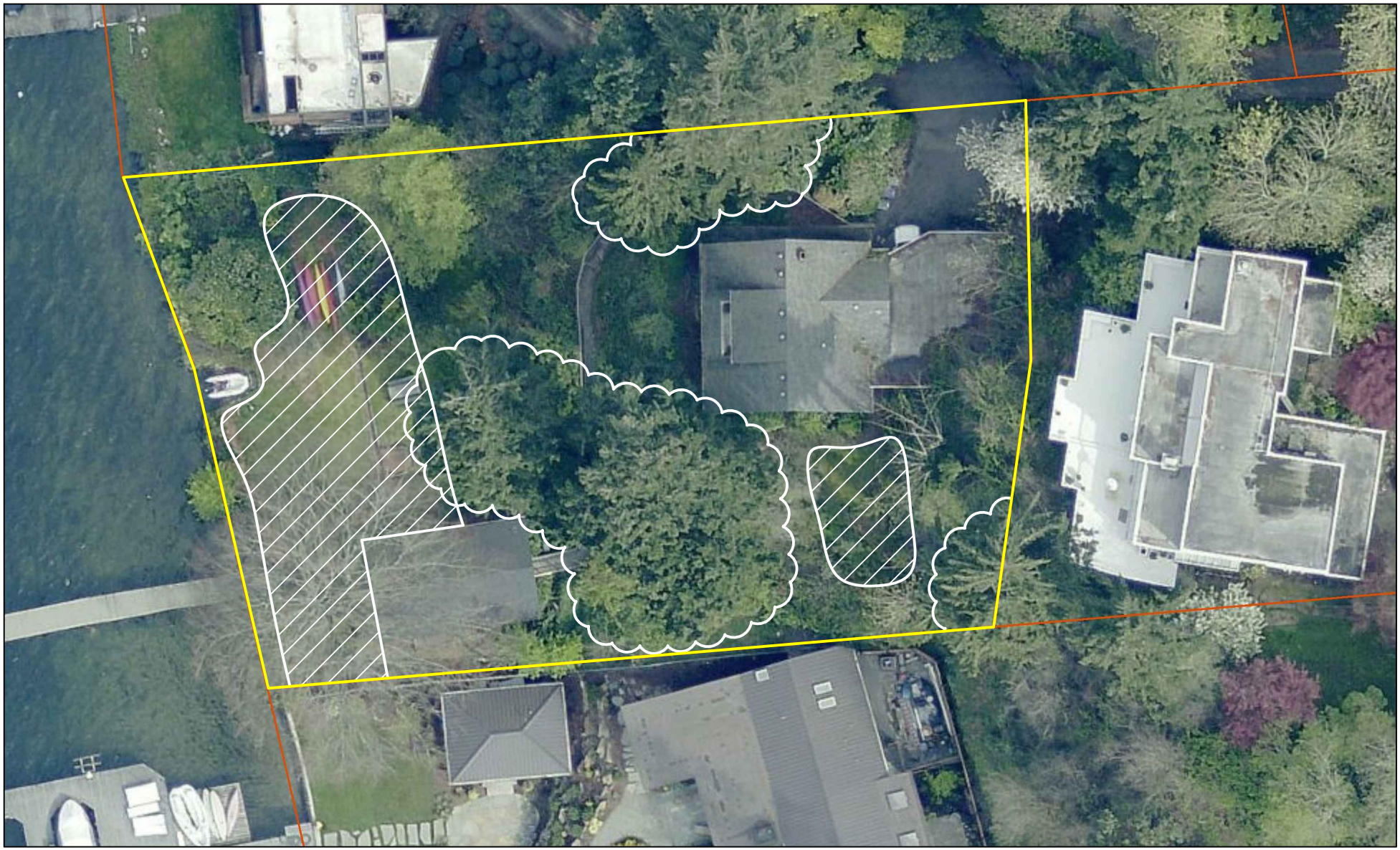
Appendix B-1



N

No Scale

Legend:

- Project Site Limits
- Conifer Tree Coverage
- Mowed grass

Figure References and Notes:

1. King County iMAP, accessed 09/28/2016.
2. All locations and buffers shown should be considered approximate.
3. Conifer coverage within the site is greater than 25%, but less 50% coverage (subdominant per assessment model methodology).

Conifer Tree and Mowed Grass Coverage

701 Shoreland DR SE
Bellevue, Washington

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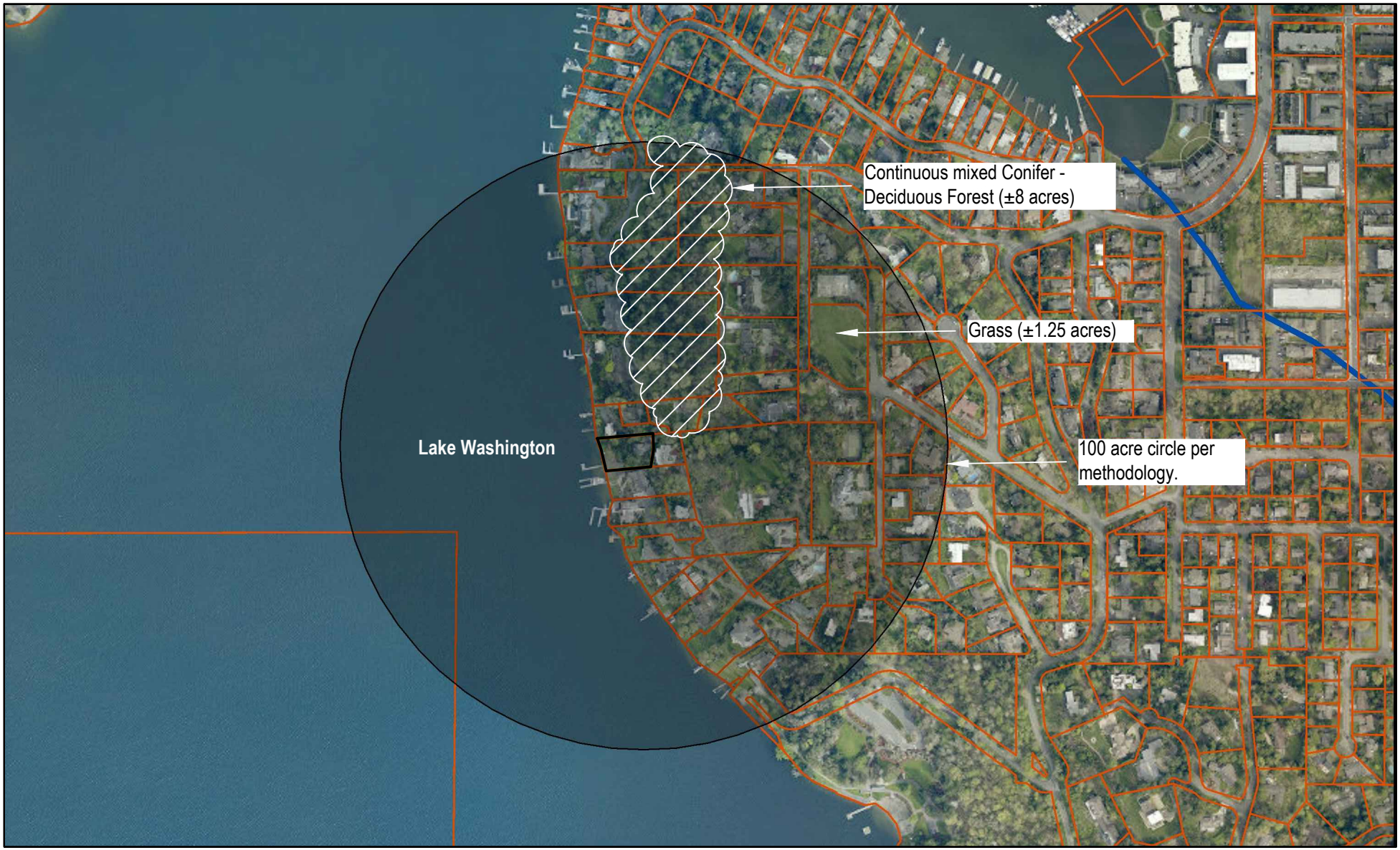
Appendix B-2



N

No Scale

Legend:

Project Site Limits

Figure References and Notes:

1. King County iMAP, accessed 09/28/2016.
2. All locations and buffers shown should be considered approximate.
3. Except for as noted on this drawing, all habitat patches measure less than 0.5 acres.

Landscape Attribute Circle and Habitat Interspersion

701 Shoreland DR SE
Bellevue, Washington

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Appendix B-3

April 4, 2016 (Original)
October 5, 2016 (Updated)

Jim Dearth, Principal
Ripple Design Studio
4303 Stone Way North
Seattle, Washington 98103
(206) 913-2333

RE: Bald Eagle Use Assessment on Tax Parcel 562730-0180; located at 701 Shoreland Drive SE, Bellevue, WA 98004

Dear Mr. Dearth:

On April 3, 2016, I (Chris Holcomb) assessed the presence of bald eagles (*Hiliaeetus leucocephalus*) on the above-noted tax parcel. On this date, the weather was clear with an occasional slight breeze. The results of my assessment, summary of background data and recommendations for site development are as follows:

I. Background and Methods:

1. Tax parcel number 562730-0180 is 0.52 acres in area and includes an older house (address 701 Shoreland Drive SE, Bellevue, WA 98004) and a cabin (see Figures 1 and 2). The site is located on the east shoreline of Lake Washington (see Figure 3). In April, the house was being rented. This parcel contains three sizable trees that appear to be healthy. A Douglas fir that is approximately 80 feet tall is located in the south central part of the parcel and will be designated Tree 1 in this letter. A smaller Douglas fir that is approximately 65 feet tall is located west of the home and will be designated Tree 2. The third tree is a non-native deciduous tree located near the shoreline. This third tree does not provide good raptor perching habitat due to its thin branches and dense foliage.

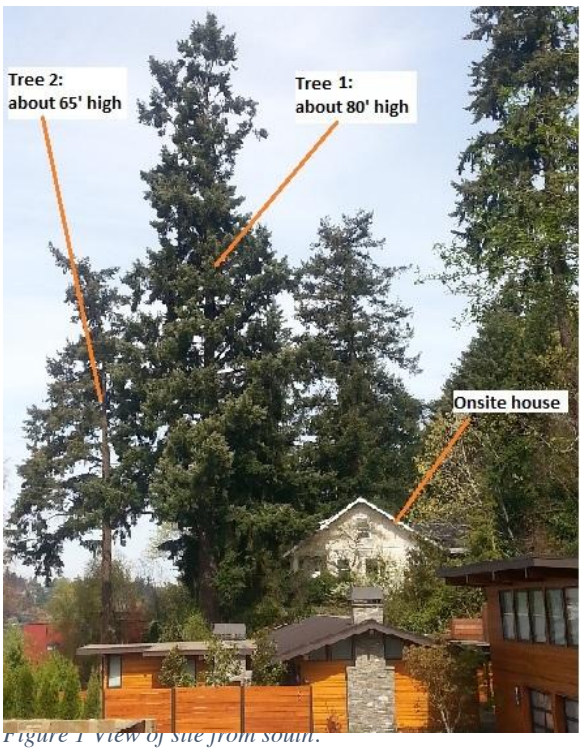

Figure 1 View of site from south.

Figure 2 View of site from dock.

2. From 1995 through 2007, bald eagles were listed as 'Threatened' on the US Endangered species list. Now, they are abundant and reaching carrying capacity in many parts of Western Washington. Nonetheless, activities near eagle nest sites are regulated. The United States Fish and Wildlife Service (USFWS) monitors eagle populations and recommends land use regulation to protect bald eagles. Construction activities within 660 feet of a nest are subject to consultation with USFWS who may require alternative development strategies (Source: http://wdfw.wa.gov/conservation/bald_eagle/). Per Bellevue Municipal Code (BMC) 20.25H.150.A, bald eagles are considered a 'Species of Local Importance' in the City of Bellevue. Aside from nests, areas that have wintertime concentrations of bald eagles are a priority for protection (Mark Miller, USFWS, personal communication). Generally, eagle perch trees are considered to be lower priorities for protection (Michelle Tirhi, District Biologist, WDFW, personal communication) than nest sites. If trees used for perching are considered to be 'hazard trees', then USFWS recommends removing the tree to protect human safety (Mark Miller, USFWS, personal communication).

3. Washington State Department of Fish and Wildlife's (WDFW) Priority Habitats and Species online tool was checked on April 1, 2016. According to this source, a bald eagle nest is located approximately one half mile southeast of the site in Chism Park. The source record of this nest is 62821 and its territory number is 1033; the nest was last monitored by WDFW staff in 2006 when the nest produced 2 juveniles. Prior to that time, the nest was quite active. It's likely that the nest has not been monitored since 2006 due to the species being removed from the Endangered Species List. Eagles from this nest likely hunt along the Lake Washington shore. The home's renter and other property owners in the area indicated that bald eagles frequently perch on the docks, perch in the various trees in the area, and catch fish in Lake Washington. They indicated that the tree that gets the most use in the area is a large Douglas fir located approx. 400 ft. south of the site near address 901 Shoreland Drive SE. This will be designated Tree 3 in this letter (see Figure 3). Margo Jolley, a longtime resident of 817 Shoreland Drive SE, said that eagles are usually in the neighborhood for a few consecutive days at a time and then absent for up to one week.

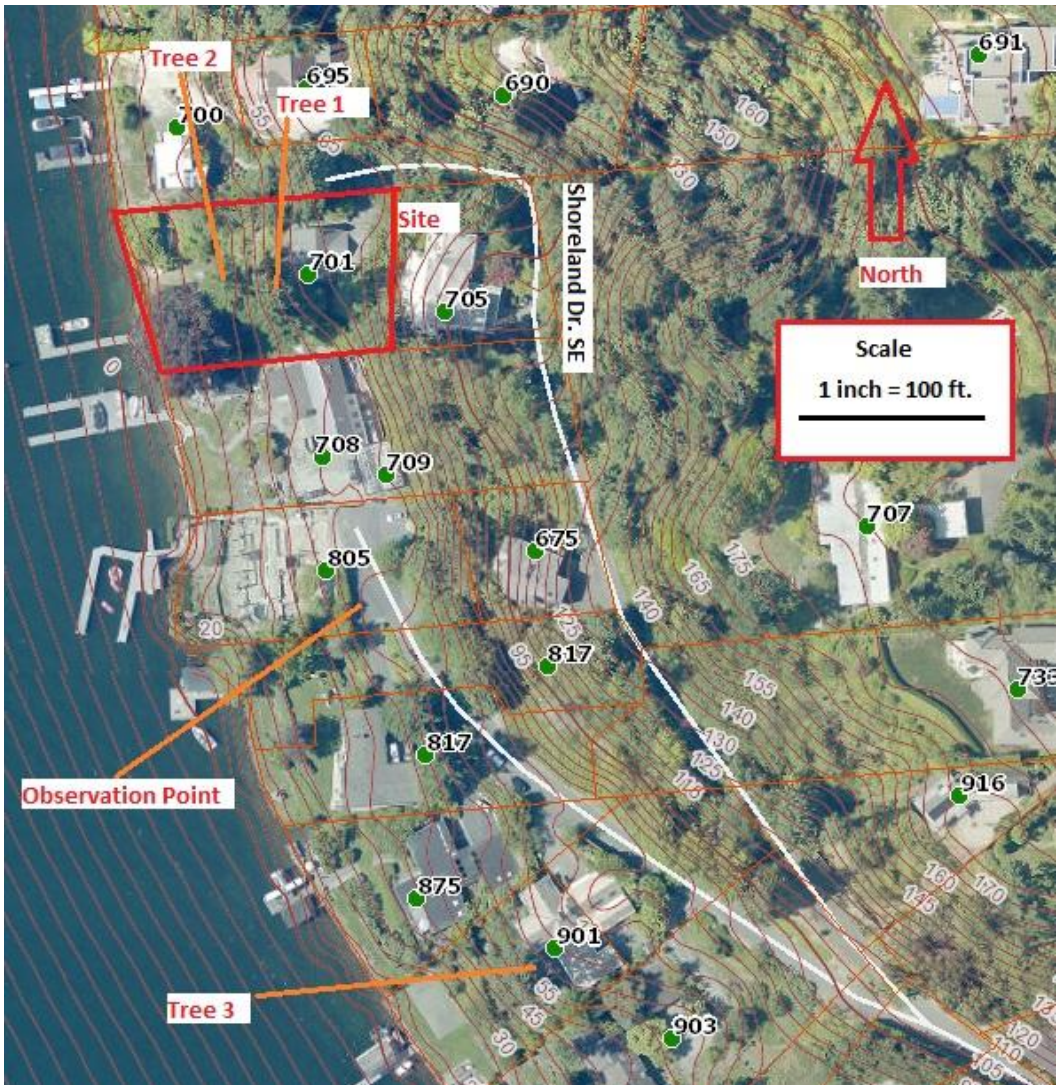

Figure 3 Map of site and observation area.

4. Prior to the field work, I spoke with Michelle Tirhi, District Biologist for WDFW and Mark Miller, an eagle biologist with USFWS to devise a survey strategy for the site. Tirhi informed me that a full day of observation would be required to establish if a tree was used as a regular perch by bald eagles. I selected an observation point approx. 175 feet south of the site to observe Trees 1 and 2. This observation site was located on a shared paved driveway off of Shoreland Drive SE. I observed the site from 8:00 AM to 6:00 PM on April 3 by listening and watching for bald eagles.

II. Results

5. The only eagle activity that was observed in the area occurred at 5:40 PM on April 3. An adult flew from the south and perched on Tree 1 for five minutes before flying northward.

III. Conclusions and Recommendations:

6. It's possible that Tree 1 is used as a regular perch, based on the observation and on Tirhi's recommendation of allowing a full day for the study. Several nearby property owners stated that Tree 3, located offsite, is especially important as a perch. They also stated that eagles are not seen or heard in the area on a daily basis, which calls into question if any of the trees can be considered a regular perch. Nonetheless, the property owners did not devote an entire day to observing.

7. Removing either Tree 1 or Tree 2 could pose a mild adverse impact for a bald eagle's ability to fish hunt in the area. But, other trees in the area can be used for perching. Additionally, bald eagles utilize a wide area for fish hunting.

8. The property owner should have an arborist examine if Trees 1 or 2 are a potential safety hazard by being blown over in a windstorm. Both trees are exposed to the wind and surrounded by homes. If they are deemed hazardous or in danger of falling over, then that would provide good justification for removing them, even if they are used as bald eagle perches.

9. It's our understanding that Tree 1 and/or Tree 2 may be considered for removal. Recommended mitigation for the tree removal could include new plantings of native trees and shrubs along the shoreline which would provide valuable wildlife habitat functions for smaller birds in the area throughout the day and night, and additionally small mammals and reptiles. Hydrophytic vegetation such as scouler willow, lady fern, and salmonberry may be good options to plant close to the shoreline. Non-hydrophytic vegetation such as beaked hazelnut, snowberry and sword fern may be good options to plant slightly further away from the shoreline. The proximity of offsite Tree 3 will likely continue to be used as an occasional perch site for eagles in the area, and Trees 1 and 2 won't likely be missed. I can provide a detailed planting plan if necessary.

If you have any questions or concerns regarding this letter, please contact Mark Rigos at markrigos@hotmail.com.

Sincerely,

CHRIS HOLCOMB

Chris Holcomb, MES
Bachelor of Science, Evergreen University
Red Wing Environmental
1711 Willow Street, Apartment 2
Yakima, WA 98902

MARK RIGOS

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Wetland Biologist
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440 SE Darst Street
Issaquah, WA 98027
(425) 652-6013

Arborist Report

701 Shoreland Dr. SE
Bellevue, WA 98004

October 3, 2016

Prepared for:
Brie Nakamura
Ripple Design Studio Inc.

Prepared by:
Martin Selasco
ISA Certified Arborist, PN-7637A
ISA Tree Risk Assessment Qualified
Member: American Society of Consulting Arborists

Table of Contents

Introduction 1
- Background and History 1
- Assignment 1
- Limitations 1
- Purpose and Use of the Report 1

Observations 1

Analysis and Testing 3

Discussion 3

Conclusions 4

Recommendations 5

Glossary 7

Bibliography 8

Appendix A: Site Map 9

Appendix B: Table of Trees 10

Appendix C: Photographs 11
- Figure 1 11
- Figure 2 12
- Figure 3 13
- Figure 4 14
- Figure 5 15

Appendix D: Resistance Drilling Measurements 16

Appendix E: ISA Basic Tree Risk Assessment Forms 17
- Tree 6 17
- Tree 7 19
- Tree 8 21
- Tree 11 23
- Tree 12 25

Appendix F: Assumptions and Limiting Conditions 27

Appendix G: Certification of Performance 28

Introduction

Background and History

In late July, Brie Nakamura contacted me and asked me to prepare an arborist report for 701 Shoreland Drive SE. She asked me to prepare a tree inventory that would include species, size, location, and overall health of each tree. In addition to this, she requested that I perform a **tree risk assessment** for five trees on the property and include general tree protection guidelines protecting trees during construction.

Assignment

My Assignment was to:

- Visit the site
- Prepare a tree inventory
- Perform five tree risk assessments
- Provide basic tree protection guidelines
- Submit a written report summarizing my findings

Limitations

The observations and recommendations made here are based on a visual assessment of the trees, resistance drilling measurements, and an **aerial inspection** of one tree. No lab tests or excavation was performed.

Purpose and Use of the Report

The purpose of my investigation is to evaluate the trees in preparation for planning development activities onsite. This report is intended to be used by Brie Nakamura and her associates, tree care services, and any other professionals involved in the maintenance or management of the subject trees.

Observations

I visited the site on July 26, 2016 at 11:00 AM and prepared a tree inventory of all the significant trees onsite. I numbered the trees according to the Site Map (Appendix A) and listed them in the Table of Trees (Appendix B). I included species, **diameter at breast height (DBH)**, estimated height, average **drip line** radius, and ratings on health and structure for each tree.

I returned to the site on July 29, 2016 at 11:00 AM to perform an advanced tree risk assessment on the three trees Brie Nakamura asked me to evaluate: tree #6, tree #7 and tree #8.

Tree #6 was a Douglas fir (*Pseudotsuga menziesii*) with a DBH of 50 inches and an estimated height of 90 feet. It had dark green **foliage** and a single trunk with a broad base. There were a few dead branches about three-inches in diameter on the east side. I noticed a bulge with discolored bark about six feet high on the west side of the trunk. Suspecting some internal **decay** around this area, I took three **resistance-drilling** measurements (Appendix C: Figure 1). Lastly, I filled out an ISA Basic Tree Risk Assessment form and identified four main **targets**: the upper house, the lake house, the dock, and people in the yard.

Tree #7 was a purple beech (*Fagus sylvatica*) with a DBH of 59 inches and an estimated height of 55 feet. Overall, the foliage was healthy, with some minor deadwood less than one-inch diameter near the ends of a few branches. The tree had been pruned significantly throughout its life, and it appeared to have a well-balanced structure. There were a few large branches overhanging the lake house that were supporting a tremendous amount of weight (Appendix C: Figure 2). I climbed the tree to examine these branches more closely. I discovered a pool of water at the union of a 26-inch diameter branch (Appendix C: Figure 3). Using a metal inspection rod, I measured the depth of the cavity to be about 16 inches. The wood of the branch appeared to be solid and free of decay. I noticed some minor **bark inclusion** along the **branch bark ridge**. I filled out an ISA Basic Tree Risk Assessment form and identified three main targets for this tree: the lake house, the dock, and people in the yard.

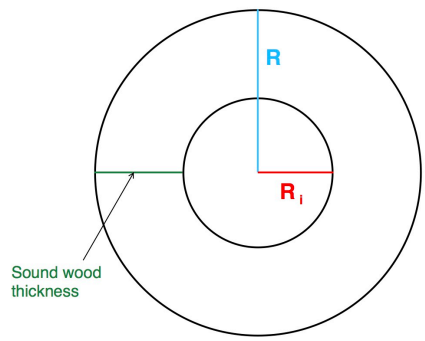
Tree #8 was a Douglas fir (*Pseudotsuga menziesii*) with a DBH of 59 inches and an estimated height of 120 feet. The tree had a broad base and the lower portion of the trunk appeared to be healthy. Looking up into the **crown**, I noticed a few structural abnormalities including a kinked top and multiple vertical stems. I climbed the tree to take a closer look. As I ascended, I counted five dead hanging branches about 4 inches in diameter. At about 85 feet, the trunk developed three additional **leaders** (Appendix C: Figure 4). While the main trunk maintained its dominance, sap oozed out of the attachment point for the three new leaders. One of these leaders crossed over and was rubbing against the main trunk. After descending, I filled out an ISA Basic Tree Risk Assessment form and identified three main targets for this tree: the upper house, people in the yard, and the lake house.

I returned to the site on October 3, 2016 at 10:30 AM to perform a basic tree risk assessment on trees #11 and #12. These two trees were adjacent to each other and in similar condition. The crown appeared to be in relatively good health, but had poor structure. They had been previously topped at about 15 feet, and now had about 5 feet of vigorous new growth (Appendix C: Figure 5). I filled out an ISA Basic Tree Risk Assessment Form and identified three main targets for these two trees: the carport, the house, and people in the yard.

Analysis and Testing

The resistance-drilling measurements on tree #6 revealed some loss of structure in the wood after 8 inches of drilling depth (Appendix D). I calculated the percentage of decay to be 68% of the total radius through the formula R_i / R (internal radius / external radius).

Diameter = 50 inches
R = Diameter / 2 = 25 inches
R_i = R - sound wood thickness = 17 inches
R_i / R = 17 / 25 = 68%



Using the ISA Basic Tree Risk Assessment form, I determined overall risk ratings for trees numbered 6, 7, and 8. My evaluations were based on a 1-year time frame. Tree #6 had an overall *high* risk rating and a *moderate* residual risk rating. Tree #7 had an overall *moderate* risk rating and a *low* residual risk rating. Tree #8 had an overall *moderate* risk rating and a *low* residual risk rating. Trees #11 and #12 both had an overall *low* risk rating and a *low* residual risk rating. (Appendix E).

Discussion

Resistance drilling is a way of measuring wood density as an indicator of decay. A specialized drilling needle bores into the trunk of a tree and records the energy needed to drive the needle forward. Changes in wood structure may indicate early or advanced stages of decay. The resistance drilling measurements in tree #6 show a loss of structure after about 8 inches of drilling depth. While there is still some wood adding resistance to the needle, the natural fluctuations in density (due to the annual growth rings) start to fade (Appendix D). This suggests early stages of **heartwood** decay.

Studies of hollow trees around the world have shown that failure rates increase rapidly above 70% decay of the radius (Mattheck, 2015). Tree #6 has an estimated 68% of the radius in early stages of decay. Taking into account the tree's exposure to wind loads and its **live crown ratio**, I found the likelihood of trunk failure to be *probable*. With the prevailing winds coming from the Southwest, I determined the likelihood of the tree impacting the upper house to be *high* and the consequences *severe*. The tree can be thinned and shortened to reduce the overall load on the decaying trunk. However, this would only offer short-term risk mitigation, and the **residual risk** would still be considered *moderate*. As the tree grows back and decay continues to spread, the risk rating for this tree can be expected to increase.

Pools of water that form in terrestrial plants are called phytotelmata. They are not believed to increase the risk of decay or stem breakage when located in the cavity of a tree (Roloff, 2016). The phytotelm at the branch union of tree #7 does not increase the branch's likelihood of failure. Nevertheless, the branch has a *possible* likelihood of failure due to the location and depth of the cavity, the minor bark inclusion at the attachment point, and the distribution of weight along the branch. Through careful pruning, the load on these defects can be significantly reduced, and the overall branch architecture can be improved. The branch can be further stabilized through the installation of a cabling support system. If these measures are properly implemented, the residual risk rating for this tree could be *low*.

The broken and hanging branches in tree #8 have a *probable* likelihood of failure. In the event of a failure, there are many large branches beneath these "hangers" that would slow down or stop the falling branch. Under these circumstances, the likelihood of a falling "hanger" impacting the upper house is considered *medium*, and the consequences are considered to be *minor*. Similarly, the three weakly attached leaders at 85 feet have a *probable* likelihood of failure. With the presence of lower branches, the likelihood of one of these broken leaders impacting the house is *medium*. In this case, however, a falling leader 12-inches in diameter would have greater consequences upon impacting the house. In this scenario, the consequences are considered to be *significant*, and the overall risk rating of the tree is considered *moderate*. Nevertheless, the risks associated with the hangers and weakly attached leaders in tree #8 can be mitigated through careful pruning by a certified arborist.

Any trees to be retained should be protected from construction impacts in order to ensure their long-term health and stability. Cutting or disturbing a significant number of tree roots during construction can result in the tree's failure or death. In order to protect trees during construction, it is important to establish a Critical Root Zone (CRZ) and prohibit disturbances within this area. A common way of defining the CRZ is to use the tree's drip line. However, tree roots can extend far beyond the drip line, and in some cases this method may not provide enough protection. Another method that can be used is to establish an area with a 1-foot radius from the base of the trunk for each inch of the tree's DBH.

Conclusions

Tree #6 has a *high* risk rating. Thinning or topping the tree can help mitigate the short-term risks associated with this tree by reducing the loads on the decaying trunk. These activities may result in a temporary *moderate* risk rating. Removal offers the best long-term risk management strategy for this tree.

Tree #7 has a *moderate* risk rating. Pruning and cabling can help reduce the risks associated with the large branches over the pool house. Proper implementation of these maintenance activities may result in a *low* residual risk rating. This tree can be retained and managed for long-term health and stability.

Tree #8 has a *moderate* risk rating. Pruning the weakly attached leaders and removing all dead hanging branches can help reduce the risks associates with this tree. These activities may result in a *low* residual risk rating. This tree can be retained and managed for long-term health and stability.

Trees #11 and 12 have a *low* risk rating. The structural integrity of these trees can be can be improved through restorative pruning, reducing the likelihood of developing future risks.

Recommendations

I recommend removing tree #6 and, if possible, retaining tree #7 and tree #8. The retained trees must be protected from construction impacts in order to ensure their long-term health and stability. At a minimum, there should be no disturbance within the drip lines of the protected trees. Wherever possible, a larger CRZ should be considered. Protective fencing should be erected around a defined Tree Protection Zone (TPZ) and there should be no excavation, washout, dumping, storage of materials, or heavy machinery within this area. Any disturbances planned within the drip lines should be approved and supervised by an ISA certified arborist. These recommendations are meant as general guidelines for developing a tree protection plan, and do not guarantee the survival or stability of the subject trees. If the root structures of the trees are significantly compromised during demolition or excavation, removal should be considered to eliminate future risks.

In order to mitigate the existing risks for the trees to be retained, I recommend hiring a tree-service with an ISA certified arborist on-staff to perform the following activities. The use of climbing **spurs** should be prohibited from pruning operations, and all pruning should be performed to ANSI A300 pruning standards.

<u>Tree #7</u>

Objective:

- Reduce load on heavy and weakly attached branches over the lake house

Specifications:

- Reduce large and overextended horizontal branches by 15-25%, cutting them back to lateral branches large enough to assume the terminal role
- Pruning shall be allowed in the months of July, August, November, December, January, or February
- The arborist may install a dynamic cabling system (Tree Guard, Cobra, etc.) to support weakly attached branches

Tree #8

Objective:

- Reduce risks by removing weak, dead, and broken branches

Specifications:

- Remove all dead branches greater than two inches in diameter
- Prune, reduce, or remove weakly attached branches (Appendix C: Figure 4)
- Additional branches may be removed at the arborist's discretion
- No more than 25% percent of the tree's live crown shall be removed per year
- The arborist may install a dynamic cabling system (Tree Guard, Cobra, etc.) to support weakly attached branches

The retained trees should be evaluated annually by an ISA certified arborist to ensure their continued health and stability.

Glossary

Aerial Inspection	Climbing, or otherwise accessing, the crown of a tree in order to examine something that may not be clearly observable from the ground.
Bark Inclusion	Bark that has grown inwards on itself, usually between co-dominant stems.
Branch Bark Ridge	A ridge of bark in a branch crotch that indicates where the trunk and branch tissues meet.
Crown	The top part of a tree, which contains the branches and leaves that extend from the main trunk.
Decay	Fungal and bacterial decomposition of wood.
Diameter at Breast Height	The diameter of a tree measured 4.5 feet above ground.
Drip line	The perimeter of the area underneath a tree.
Foliage	The leaves of a plant.
Heartwood	Non-living wood in the center of a tree, usually darker in color.
Leader	A large upright stem.
Live Crown Ratio	The ratio of crown length to total tree length.
Residual Risk	Remaining risk after mitigation.
Resistance Drilling	The use of specialized tool that bores into the trunk of a tree and records the energy needed to drive the drilling needle forward.
Spurs	A spike attached to a climber's boot used to ascend a tree during removal.
Targets	People, property, or activities that could be injured, damaged, or disrupted by a tree.
Tree Risk Assessment	A systematic process used to identify, analyze, and evaluate tree risk.

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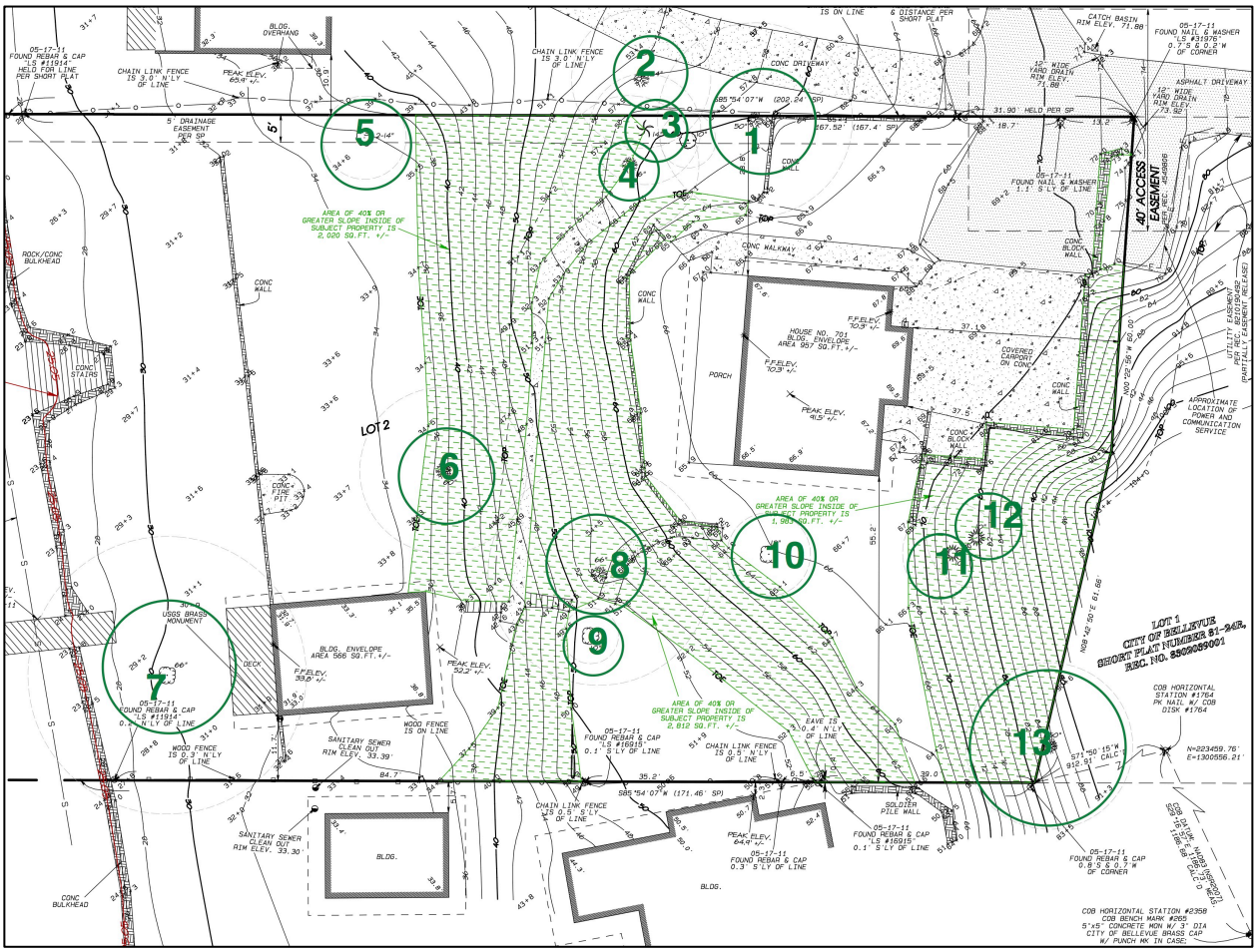
Appendix A

Site Map



This map is intended as an identification key and may not be drawn to scale. Green circles indicate approximate tree location.

Appendix B

Table of Trees

Tree #	Scientific Name	Common Name	DBH (inches)	Height (feet)	Drip line radius (feet)	Health condition	Structural condition	Notes
1	*Pseudotsuga menziesii*	Douglas fir	52	95	21	Good	Good	None
2	*Pseudotsuga menziesii*	Douglas fir	26	80	15	Good	Good	None
3	*Pinus sp.*	Pine	16	50	12	Good	Fair	Lean
4	*Picea abies*	Norway spruce	20	55	12	Good	Good	None
5	*Betula pendula*	European birch	18*	30	20	Good	Fair	Codominant stems
6	*Pseudotsuga menziesii*	Douglas fir	50	90	16	Fair	Fair	Bugle, sap ooze
7	*Fagus sylvatica*	Purple beech	59	55	32	Good	Good	Large branches
8	*Pseudotsuga menziesii*	Douglas fir	59	120	26	Good	Fair	None
9	*Laburnum anagyroides*	Golden chain	10	15	12	Fair	Fair	Poorly pruned
10	*Cornus florida*	Flowering dogwood	12	15	12	Poor	Fair	Disease and decay
11	*Acer macrophyllum*	Bigleaf maple	10	20	15	Good	Poor	Topped
12	*Acer macrophyllum*	Bigleaf maple	10	20	15	Good	Poor	Topped
13	*Pseudotsuga menziesii*	Douglas fir	35	75	15	Good	Good	None

Diameter at Breast Height (DBH) is measured 4.5 feet above ground level.
Trees are numbered according to the site map.
**Diameter measurements for trees with multiple trunks are calculated by taking the square root of the sum of each DBH squared.*

This table was prepared on July 26, 2016. Notes on health and structure do not include the observations made during the advanced risk assessments on July 29, 2016 or the basic risk assessments on October 3, 2016.

Appendix C

Photographs

Figure 1. Resistance-drilling near the bulge with discolored bark on tree #6.

Appendix C

Photographs

Figure 2. The large beech (tree #7) overhangs the lake house.

Appendix C

Photographs

Figure 3. The large limb on tree #7 has a deep cavity and a weak attachment point at the branch union.

Appendix C

Photographs

Figure 4. About 85 feet up, tree #8 has three vertical stems. The main trunk remains dominant, while the other two have poor structure and are weakly attached.

Appendix C

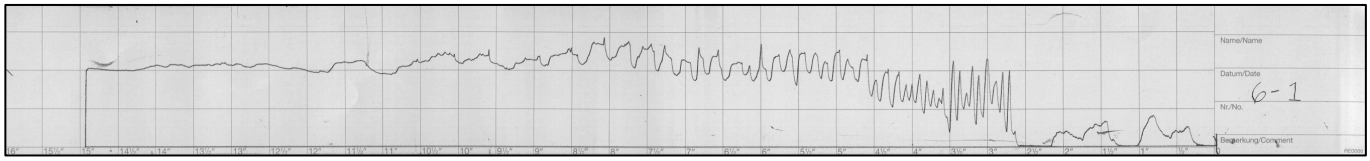
Photographs

Figure 5. Trees #11 and #12 have been previously topped at about 15 feet, leading to the formation of numerous weakly attached upright sprouts.

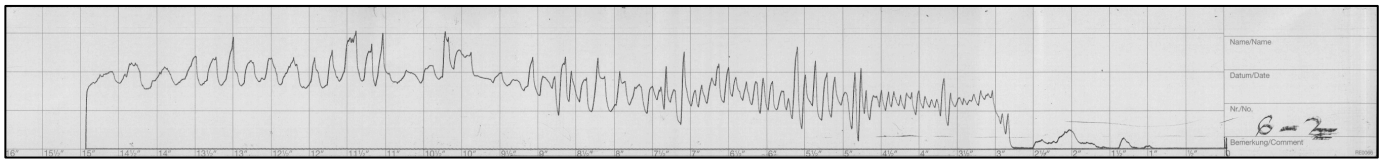
Appendix D

Resistance-Drilling Measurements

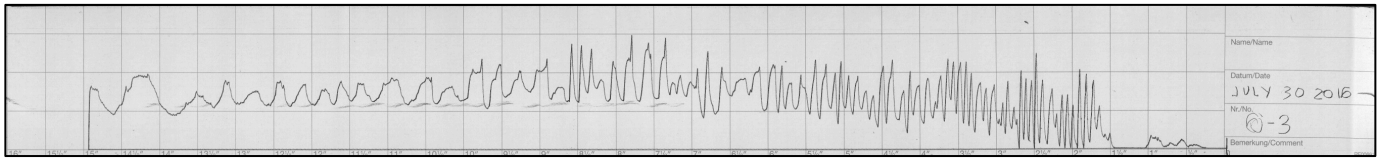
Tree #6 – North



Tree #6 – East



Tree #6 – South



Measurements were obtained using an IML – Resi F400S. The device was last calibrated on 7/7/16.

Appendix E

Basic Tree Risk Assessment Form

Client Ripple Design Studio Inc. Date July 30, 2016 Time 11:30 AM
Address/Tree location 701 Shoreland Dr. SE Tree no. 6 Sheet 1 of 3
Tree species Douglas Fir dbh 50" Height 90' Crown spread dia. 30'
Assessor(s) Martin Selasco Time frame 1 year Tools used Probe, resistograph

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.	Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?	Restriction practical?
1	Upper house		✔		4	No	No
2	Lake house	✔			4	No	No
3	Boat/dock		✔		4	No	No
4	People in yard	✔			1	No	No

Site Factors

History of failures No **Topography** Flat☐ Slope■ 70 % **Aspect** W
Site changes None■ Grade change☐ Site clearing☐ Changed soil hydrology☐ Root cuts☐ Describe
Soil conditions Limited volume☐ Saturated☐ Shallow☐ Compacted☐ Pavement over roots☐ ____% Describe
Prevailing wind direction SW **Common weather** Strong winds■ Ice☐ Snow☐ Heavy rain■ Describe

Tree Health and Species Profile

Vigor Low☐ Normal☐ High☐ **Foliage** None (seasonal)■ None (dead)☐ Normal 100 % Chlorotic ____% Necrotic ____%
Pests None **Abiotic**
Species failure profile Branches☐ Trunk■ Roots■ Describe Root/butt decay

Load Factors

Wind exposure Protected☐ Partial■ Full☐ Wind funneling☐ **Relative crown size** Small☐ Medium■ Large☐
Crown density Sparse☐ Normal■ Dense☐ **Interior branches** Few☐ Normal■ Dense☐ **Vines/Mistletoe/Moss** ☑ Ivy on trunk to 20 ft.
Recent or planned change in load factors None

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown■ LCR 60 %
Dead twigs/branches■ 5 % overall Max. dia. 3 in.
Broken/Hangers Number 0 Max. dia. N/A
Over-extended branches☐
Pruning history
Crown cleaned☐ Thinned☐ Raised☐
Reduced☐ Topped☐ Lion-tailed☐
Flush cuts☐ Other
Cracks☐ Lightning damage☐
Codominant☐ Included bark☐
Weak attachments☐ Cavity/Nest hole ____% circ.
Previous branch failures■ Similar branches present■
Dead/Missing bark☐ Cankers/Galls/Burls☐ Sapwood damage/decay☐
Conks☐ Heartwood decay☐
Response growth
Main concern(s) Failure of dead branches

Load on defect N/A☐ Minor■ Moderate☐ Significant☐
Likelihood of failure Improbable☐ Possible■ Probable☐ Imminent☐

— Trunk —

Dead/Missing bark■ Abnormal bark texture/color■
Codominant stems☐ Included bark☐ Cracks☐
Sapwood damage/decay☐ Cankers/Galls/Burls■ Sap ooze■
Lightning damage☐ Heartwood decay■ Conks/Mushrooms☐
Cavity/Nest hole ____% circ. Depth ____ Poor taper☐
Lean ____° Corrected?
Response growth
Main concern(s) Heartwood decay

Load on defect N/A☐ Minor☐ Moderate☐ Significant■
Likelihood of failure
Improbable☐ Possible☐ Probable■ Imminent☐

— Roots and Root Collar —

Collar buried/Not visible☐ Depth____ Stem girdling☐
Dead☐ Decay■ Conks/Mushrooms☐
Ooze☐ Cavity☐ ____% circ.
Cracks☐ Cut/Damaged roots☐ Distance from trunk ____
Root plate lifting☐ Soil weakness☐
Response growth
Main concern(s) Decay in lower trunk indicates possible decay in roots.

Load on defect N/A☐ Minor☐ Moderate☐ Significant■
Likelihood of failure
Improbable☐ Possible■ Probable☐ Imminent☐

Page 1 of 2

Appendix E

Risk Categorization

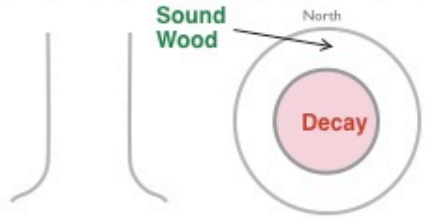
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Branches	Dead branches	3"	50'	1	None	○	●	○	○	○	○	●	○	●	○	○	○	○	●	○	○	Low
			3"	50'	2	None	○	●	○	○	●	○	○	○	●	○	○	○	○	●	○	○	Low
			3"	50'	4	None	○	●	○	○	○	●	○	○	●	○	○	○	○	○	●	○	Low
2	Trunk	Heartwood decay	28"	60'	1	None	○	○	●	○	○	○	○	●	○	○	●	○	○	○	○	●	High
			28"	60'	2	None	○	○	●	○	○	○	●	○	○	●	○	○	○	○	○	●	Mod.
			28"	60'	4	None	○	○	●	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
3	Roots	Root decay	30"	50'	1	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	○	●	Mod.
			30"	50'	2	None	○	●	○	○	○	○	●	○	●	○	○	○	○	○	○	●	Low
			30"	50'	4	None	○	●	○	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low



Notes, explanations, descriptions Resistance drilling 6' aboveground revealed loss of structure in the heartwood. Decay in the lower trunk often correlates with decay in roots.

Mitigation options Thin to reduce the wind loads — **Residual risk** Mod

Removal — **Residual risk** Low

Residual risk _____

Residual risk _____

Overall tree risk rating Low ☐ Moderate ☐ High ■ Extreme ☐ **Work priority** 1 ■ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ■ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason _____

Inspection limitations ☐ None ■ Visibility ☐ Access ■ Vines ☐ Root collar buried Describe Steep slope and blackberries

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

Appendix E

Basic Tree Risk Assessment Form

Client Ripple Design Studio Inc. Date July 30, 2016 Time 11:45 AM
Address/Tree location 701 Shoreland Dr. SE Tree no. 7 Sheet 2 of 3
Tree species Purple Beech dbh 59" Height 55" Crown spread dia. 55'
Assessor(s) Martin Selasco Time frame 1 year Tools used Climbing gear, probe

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.	Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?	Restriction practical?
1	Lake house	✔			4	No	No
2	People in yard	✔			1	No	No
3	Boat/dock		✔		4	No	No
4							

Site Factors

History of failures None **Topography** Flat ■ Slope ☐ _____% **Aspect** _____
Site changes None ■ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe _____
Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ _____% Describe _____
Prevailing wind direction SW **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe _____

Tree Health and Species Profile

Vigor Low ☐ Normal ■ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 100 % Chlorotic _____% Necrotic _____%
Pests None **Abiotic** None
Species failure profile Branches ■ Trunk ☐ Roots ☐ Describe _____

Load Factors

Wind exposure Protected ☐ Partial ☐ Full ■ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ■ Large ■
Crown density Sparse ☐ Normal ☐ Dense ■ **Interior branches** Few ☐ Normal ■ Dense ☐ **Vines/Mistletoe/Moss** ☐ None
Recent or planned change in load factors None

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ■ LCR 80 %
Dead twigs/branches ■ 5 % overall Max. dia. _____
Broken/Hangers Number _____ Max. dia. _____
Over-extended branches ■
Pruning history
Crown cleaned ☐ Thinned ■ Raised ■
Reduced ☐ Topped ☐ Lion-tailed ☐
Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ■
Weak attachments ■ _____ Cavity/Nest hole ____% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ■ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____

Main concern(s) Lowest Northeast branch weakly attached and pooling water in cavity at branch union

Load on defect N/A ☐ Minor ☐ Moderate ■ Significant ☐
Likelihood of failure Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole _____% circ. Depth _____ Poor taper ☐
Lean _____° Corrected? _____
Response growth _____
Main concern(s) None

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth_____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ _____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____
Root plate lifting ☐ Soil weakness ☐
Response growth _____
Main concern(s) None

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

Page 1 of 2

Appendix E

Risk Categorization

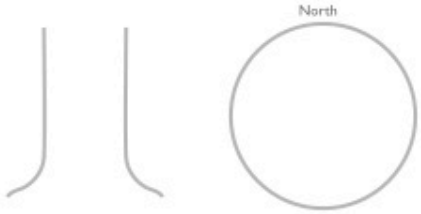
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Possible	Probable	Imminent	Impact: Very low	Low	Medium	High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Branches	Heavy and weakly attached branches	26"	20'	1	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	●	○	Mod.
			26"	40'	2	None	○	●	○	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
			26"	40'	3	None	○	●	○	○	●	○	○	○	●	○	○	○	○	●	○	○	Low
2							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low



Notes, explanations, descriptions _____

Mitigation options Cable + prune to reduce the load on overweighted and weakly attached branches — **Residual risk** Low

Remove lowest northeast branch + crown clean — **Residual risk** Low

Residual risk _____

Residual risk _____

Overall tree risk rating Low ☐ Moderate ■ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ■ 3 ☐ 4 ☐

Overall residual risk Low ■ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** 1 year

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason _____

Inspection limitations ■ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

Appendix E

ISA Basic Tree Risk Assessment Form

Client Ripple Design Studio Inc. Date July 30, 2016 Time 12:15 PM
Address/Tree location 701 Shoreland Dr. SE Tree no. 8 Sheet 3 of 3
Tree species Douglas fir dbh 59" Height 120' Crown spread dia. 50'
Assessor(s) Martin Selasco Time frame 1 year Tools used Climbing gear, clinometer, measuring tape

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.	Occupancy rate (1 – rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Upper house	✔			4	No	No
2	People in yard		✔		1	No	No
3	Lake house		✔		4	No	No
4							

Site Factors

History of failures None **Topography** Flat ☐ Slope ■ 90 % **Aspect** W
Site changes None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe
Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ ____% Describe
Prevailing wind direction SW **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe

Tree Health and Species Profile

Vigor Low ☐ Normal ■ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 100 % Chlorotic ____% Necrotic ____%
Pests **Abiotic**
Species failure profile Branches ☐ Trunk ■ Roots ■ Describe Root / butt decay

Load Factors

Wind exposure Protected ☐ Partial ☐ Full ■ Wind funneling ☐ **Relative crown size** Small ☐ Medium ☐ Large ■
Crown density Sparse ☐ Normal ■ Dense ☐ **Interior branches** Few ☐ Normal ■ Dense ☐ **Vines/Mistletoe/Moss** ☐
Recent or planned change in load factors

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR ____%
Dead twigs/branches ☐ ____% overall Max. dia. ____
Broken/Hangers Number 5 Max. dia. 4
Over-extended branches ■
Pruning history
Crown cleaned ■ Thinned ☐ Raised ■
Reduced ☐ Topped ☐ Lion-tailed ☐
Flush cuts ☐ Other
Cracks ☐ Lightning damage ☐
Codominant ☐ Included bark ☐
Weak attachments ■ 2 leaders Cavity/Nest hole ____% circ.
Previous branch failures ■ Similar branches present ■
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐
Response growth
Main concern(s) Three large weakly attached leaders at 85 feet, Hangers
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ■ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ■
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole ____% circ. Depth ____ Poor taper ☐
Lean ____° Corrected?
Response growth
Main concern(s) None
Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ ____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk ____
Root plate lifting ☐ Soil weakness ☐
Response growth
Main concern(s) None
Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

Page 1 of 2

Appendix E

Risk Categorization

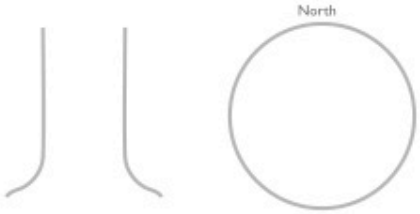
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Branches	Hangers	4"	70'	1	Branches	○	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	Low
			4"	70'	2	Branches	○	○	●	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
			4"	70'	3	Branches	○	○	●	○	●	○	○	○	●	○	○	○	○	●	○	○	Low
2	Crown	3 weakly attached leaders	12"	85'	1	Branches	○	○	●	○	○	○	●	○	○	●	○	○	○	○	●	○	Mod.
			12"	85'	2	Branches	○	○	●	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
			12"	85'	3	Branches	○	○	●	○	●	○	○	○	●	○	○	○	○	○	●	○	Low
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low



Notes, explanations, descriptions _____

Mitigation options Trim/remove weakly attached leaders and crown clean _____ **Residual risk** Low

_____ **Residual risk** _____

_____ **Residual risk** _____

_____ **Residual risk** _____

Overall tree risk rating Low ☐ Moderate ■ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ■ 4 ☐

Overall residual risk Low ■ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason _____

Inspection limitations ■ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

Appendix E

ISA Basic Tree Risk Assessment Form

Client Ripple Design Studio Inc. Date October 3, 2016 Time 10:30 AM
Address/Tree location 701 Shoreland Dr. SE Tree no. 11 Sheet 1 of 2
Tree species Big leaf maple dbh 10" Height 20' Crown spread dia. 30'
Assessor(s) Martin Selasco Time frame 1 year Tools used Diameter tape, camera

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target within 1 x Ht.	Target within 1.5 x Ht.	Occupancy rate (1 – rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Carport	✔			4	No	No
2	House	✔			4	No	No
3	People in yard	✔			1	No	No
4							

Site Factors

History of failures _____ **Topography** Flat ☐ Slope ■ 100 % **Aspect** W
Site changes None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe _____
Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ ____% Describe _____
Prevailing wind direction SW **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ☐ Describe _____

Tree Health and Species Profile

Vigor Low ☐ Normal ■ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 90 % Chlorotic 10 % Necrotic ____%
Pests _____ **Abiotic** _____
Species failure profile Branches ■ Trunk ☐ Roots ☐ Describe Failure of codominant branches

Load Factors

Wind exposure Protected ■ Partial ☐ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ■ Medium ☐ Large ☐
Crown density Sparse ☐ Normal ☐ Dense ■ **Interior branches** Few ☐ Normal ■ Dense ☐ **Vines/Mistletoe/Moss** ☑ 30% of trunk
Recent or planned change in load factors Construction planned onsite

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 60 %
Dead twigs/branches ■ 5 % overall Max. dia. 1"
Broken/Hangers Number 0 Max. dia. ____
Over-extended branches ■
Pruning history
Crown cleaned ☐ Thinned ☐ Raised ☐
Reduced ☐ Topped ■ Lion-tailed ☐
Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ☐
Weak attachments ■ _____ Cavity/Nest hole ____% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____

Main concern(s) Topped branches with new sprouts

Load on defect N/A ☐ Minor ☐ Moderate ■ Significant ☐
Likelihood of failure Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole ____ % circ. Depth ____ Poor taper ☐
Lean ____° Corrected? _____
Response growth _____
Main concern(s) _____

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth ____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ ____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk ____
Root plate lifting ☐ Soil weakness ☐

Response growth _____
Main concern(s) _____

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

Page 1 of 2

Appendix E

Risk Categorization

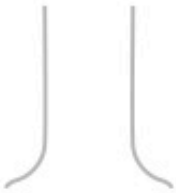
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Branches	Topped branches	2"	10'	1	None	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	○	Low
			2"	10'	2	None	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	○	Low
			2"	20'	3	None	○	●	○	○	●	○	○	○	●	○	○	○	○	●	○	○	Low
2							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

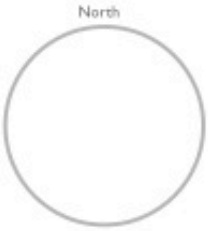
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions _____

Mitigation options Restorative pruning to improve structure and natural form — **Residual risk** Low

Residual risk _____

Residual risk _____

Residual risk _____

Overall tree risk rating Low ■ Moderate ☐ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ■

Overall residual risk Low ■ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason _____

Inspection limitations ☐ None ☐ Visibility ☐ Access ■ Vines ☐ Root collar buried Describe Steep slope

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

Page 2 of 2

Appendix E

Basic Tree Risk Assessment Form

Client Ripple Design Studio Inc. Date October 3, 2016 Time 10:30 AM
Address/Tree location 701 Shoreland Dr. SE Tree no. 12 Sheet 2 of 2
Tree species Big leaf maple dbh 10" Height 20' Crown spread dia. 30'
Assessor(s) Martin Selasco Time frame 1 year Tools used Diameter tape, camera

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1 – rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Carport	✔			4	No	No
2	House	✔			4	No	No
3	People in yard	✔			1	No	No
4							

Site Factors

History of failures _____ **Topography** Flat☐ Slope■ 100 % **Aspect** W
Site changes None☐ Grade change☐ Site clearing☐ Changed soil hydrology☐ Root cuts☐ Describe _____
Soil conditions Limited volume☐ Saturated☐ Shallow☐ Compacted☐ Pavement over roots☐ ____% Describe _____
Prevailing wind direction SW **Common weather** Strong winds■ Ice☐ Snow☐ Heavy rain☐ Describe _____

Tree Health and Species Profile

Vigor Low☐ Normal■ High☐ **Foliage** None (seasonal)☐ None (dead)☐ Normal 90 % Chlorotic 10 % Necrotic ____%
Pests _____ **Abiotic** _____
Species failure profile Branches■ Trunk☐ Roots☐ Describe Failure of codominant branches

Load Factors

Wind exposure Protected■ Partial☐ Full☐ Wind funneling☐ _____ **Relative crown size** Small■ Medium☐ Large☐
Crown density Sparse☐ Normal☐ Dense■ **Interior branches** Few☐ Normal■ Dense☐ **Vines/Mistletoe/Moss** ☑ 30% of trunk
Recent or planned change in load factors Construction planned onsite

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 60 %
Dead twigs/branches■ 5 % overall Max. dia. 1"
Broken/Hangers Number 0 Max. dia. ____
Over-extended branches ■
Pruning history
Crown cleaned ☐ Thinned ☐ Raised ☐
Reduced ☐ Topped ■ Lion-tailed ☐
Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ☐
Weak attachments ■ _____ Cavity/Nest hole ____% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____

Main concern(s) Topped branches with new sprouts

Load on defect N/A ☐ Minor ☐ Moderate ■ Significant ☐
Likelihood of failure Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole ____ % circ. Depth _____ Poor taper ☐
Lean ____° Corrected? _____
Response growth _____
Main concern(s) _____

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ ____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____
Root plate lifting ☐ Soil weakness ☐

Response growth _____
Main concern(s) _____

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ■ Possible ☐ Probable ☐ Imminent ☐

Page 1 of 2

Appendix E

Risk Categorization

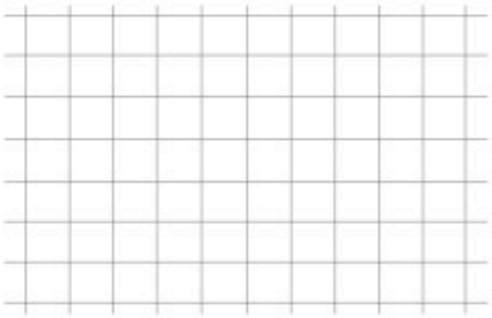
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Branches	Topped branches	2"	10'	1	None	○	●	○	○	○	○	●	○	●	○	○	○	●	○	○	○	Low
			2"	10'	2	None	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	○	Low
			2"	20'	3	None	○	●	○	○	●	○	○	○	●	○	○	○	○	●	○	○	Low
2							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

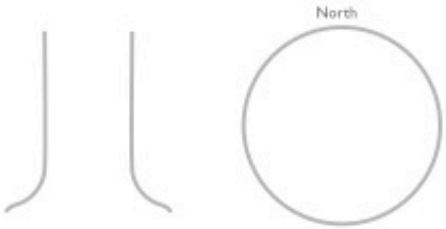
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions _____

Mitigation options Restorative pruning to improve structure and natural form **Residual risk** Low

Residual risk _____

Residual risk _____

Residual risk _____

Overall tree risk rating Low ■ Moderate ☐ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ■

Overall residual risk Low ■ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason _____

Inspection limitations ☐ None ☐ Visibility ☐ Access ■ Vines ☐ Root collar buried Describe Steep slope

This datasheet was produced by the International Society of Arboriculture (ISA) and is intended for use by Tree Risk Assessment Qualified (TRAQ) arborists – 2013

Page 2 of 2

Appendix F

Assumptions and Limiting Conditions

1. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

2. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee.

3. Loss or alteration of any part of this report invalidates the entire report.

4. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant.

5. Sketches, diagrams, graphs, and photographs in this report are intended as visual aids. They are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

6. The information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection. Any risk assessment is done on the basis of "normal conditions" and cannot take into account extreme or unusual conditions. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

7. This report represents the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

Appendix G

Certification of Performance

I, Martín Selasco, certify that:

1. I have personally inspected the tree and property referred to in this report and have stated my findings accurately.

2. I have no current or prospective interest in the tree or property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

3. The analysis, opinions, and conclusions stated herein are my own and are based on current scientific procedures and facts.

4. My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices.

5. No one provided significant professional assistance to me, except as indicated within the report.

6. My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party nor upon the results of the assessment, attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing of the American Society of Consulting Arborists. I have been an ISA Certified Arborist since 2013 and have been involved in the practice of arboriculture and the study of trees for over 5 years.

Signed _____

Date: 10/3/2016

Tree Hazard Declaration

9/13/07

Department of Planning & Community Development

This form is required for the removal of hazardous trees within:

- Critical or Protected Areas as defined by Bellevue Land Use Code (LUC 20.25H), i.e. stream corridors, wetlands, steep slopes and floodplains.
- A Native Growth Protection Area (NGPA) or Native Growth Protection Easement (NGPE)
- A Retained Vegetation Area (RVA) (Including Significant Trees required to be retained on non-residential sites).

All the statements below must be checked and attested to by an International Society of Arboriculture CERTIFIED ARBORIST prior to the removal of any tree(s) in the areas listed above.

☒ The tree(s) proposed for removal have been certified as hazardous.

☒ The potential target(s) cannot be moved.

☒ Pruning, partial removal of parts of the tree(s) or other risk mitigation measures will not alleviate the hazard or are not feasible. (Explain what measures were considered and why they were not feasible.)

☒ A COPY OF A COMPLETED INTERNATIONAL SOCIETY OF ARBORICULTURE "TREE HAZARD EVALUATION FORM" OR AN EQUIVALENT TREE RISK ASSESSMENT MUST BE INCLUDED WITH THIS FORM. ONE TREE HAZARD EVALUATION OR ASSESSMENT MUST BE COMPLETED PER TREE.

Comments: This form addresses Tree #6 according to the arborist report for 701 Shoreland Dr. SE, prepared by Martin Selasco on August 3, 2016. While thinning or topping the tree may temporarily reduce the HIGH risk rating to MODERATE by reducing wind loads, this option is not reasonable because sprouting and regrowth would eventually increase loads as internal decay continues to spread, returning the tree to a HIGH risk rating in just a few years. Removal offers the best option for risk management in this case.

Arborist Contact Information:

Name(Print): Martin Selasco Arborist Certification #: PN-7637A

Company: Selasco & Associates LLC

Phone #: 425-241-1971

Signature of Arborist: Date:

9/13/16

PLEASE NOTE: If the City of Bellevue does not agree with the Tree Hazard Evaluation provided by your Certified Arborist, the City of Bellevue may contract with a third-party, consulting arborist to evaluate the relative risk of the tree(s), prior to taking action on the permit. The applicant may be responsible for the cost of the third-party evaluation.

Tree Retention Evaluation

701 Shoreland Dr. SE
Bellevue, WA 98004

October 6, 2016

Prepared for:
Brie Nakamura
Ripple Design Studio Inc.

Prepared by:
Martin Selasco
ISA Certified Arborist, PN-7637A
ISA Tree Risk Assessment Qualified
Member: American Society of Consulting Arborists

Selasco & Associates LLC
www.selasco.consulting

Table of Contents

Introduction 1
- Background and History 1
- Assignment 1
- Limitations 1
- Purpose and Use of the Report 1

Observations 1

Analysis and Testing 2

Discussion 2

Conclusions 3

Recommendations 3

Glossary 4

Bibliography 5

Appendix A: Site Map 6

Appendix B: Photographs 7
- Figure 1 7
- Figure 2 8

Appendix C: Site Plan Details 9
- Tree #7 9
- Tree #12 10

Appendix D: Conservation Suitability Worksheet 11
- Tree #7 11
- Tree #12 12

Appendix F: Assumptions and Limiting Conditions 13

Appendix G: Certification of Performance 14

Introduction

Background and History

In early October, I submitted an arborist report containing five tree risk assessments and a tree inventory for 701 Shoreland Drive SE. Brie Nakamura asked me to follow up this report with an evaluation of whether or not two specific trees would be suitable for retention given the proposed site plans. The two trees in question were trees #7 and #12.

Assignment

My Assignment was to:

- Review the site plans.
- Evaluate the impacts of the proposed development activity to trees #7 and #12.
- Discuss the subject trees' suitability for retention given the proposed disturbances.
- Submit a written report summarizing my findings.

Limitations

The observations and recommendations made here are based on a visual assessment of the trees and careful review of the site plans. No excavation or lab tests were performed.

Purpose and Use of the Report

The purpose of my investigation is to evaluate the trees in preparation for planning development activities onsite. This report is intended to be used by Brie Nakamura and her associates, tree care services, and any other professionals involved in the maintenance or management of the subject trees.

Observations

Many of the observations used here were originally noted in the report I prepared for this site on October 3, 2016 (Selasco, 2016). I first visited the site on July 26, 2016 at 11:00 AM and numbered the trees according to the site map (Appendix A). I measured the trees' dimensions and took notes on their overall health. I returned to the site on July 29, 2016 at 11:00 AM and made additional observations regarding structural stability and tree-related risks. On October 3, 2016, I returned to the site to make observations and take measurements regarding the potential construction impacts to the subject trees.

Tree #7 was a purple beech (*Fagus sylvatica*) with a **diameter at breast height (DBH)** of 59 inches, an estimated height of 55 feet, and an average **drip line** radius of 32 feet. Its **foliage** looked healthy overall, with some minor deadwood less than one-inch diameter near the ends of a few branches.

There was an accessory structure located within the drip line of tree #7. This structure had a deck that extended further into the drip line of the tree (Appendix B: Figure 1). I measured the distance between the trunk of the tree and the deck post footings to be 9 feet and 3 inches, or 111 inches. I then measured the distance between the trunk of the tree and the building foundation to be 16 feet and 10 inches, or 202 inches.

The site plans propose the removal of this structure and its foundation, including the deck post footings (Appendix C: Tree #7). According to the site plans and my conversations with Brie Nakamura, the structure will be replaced with rockery, native plants, and a fire pit.

Tree #12 was a bigleaf maple (*Acer macrophyllum*) with a DBH of 10 inches, an estimated height of 20 feet, and an average drip line radius of 15 feet. The crown appeared to be in relatively good health, but had poor structure. It had been previously **topped** at about 15 feet, and now had about 5 feet of vigorous new growth. It stood adjacent to tree #11, a tree of the same species similar in size and condition (Appendix B: Figure 2).

The site plans show a new structure within a few feet of the trunk of tree #12 (Appendix C: Tree #12). Looking at the plans, the structure appears to encroach significantly into the drip line of the tree, and will require the removal of the adjacent tree. While the site plans show tree #12 as being significantly east of tree #11, my observations in the field suggest that they may be more closely aligned along a north-south axis.

Analysis and Testing

I contacted Brie Nakamura and asked her to calculate the distance between the proposed structure and tree #12. Based on the tree diameter measurements I provided in my report, she calculated the distance between the proposed wall and the tree to be about 2 feet and 3 inches, or 27 inches.

I used the conservation suitability worksheet found in *Best Management Practices: Managing Trees During Construction* (Fite and Smiley, 2016) to determine suitability ratings for the subject trees. Out of 100 possible points, tree #7 scored 45 points, and tree #12 scored 54 points (Appendix D: Conservation Suitability Worksheet).

Discussion

With a DBH of 59 inches, tree number #7 is considered **mature**, and possibly even **over-mature** for its species. Mature beech trees are particularly intolerant of construction impacts (Matheney and Clark, 1998), and significant root loss could result in the dramatic decline of the tree's health and structural stability. Demolition and removal of the accessory structure near tree #7 would require the use of heavy machinery within the drip line of the tree. In order to remove the deck's post footings, root disturbances would, at a minimum, come within 111 inches of the trunk of the tree. In reality, even if executed

with great care, the removal of the post footings would require additional room, increasing the amount of actual disturbance to the tree's roots.

Matheney and Clark (1998) recommend establishing a tree protection area with a radius of 1.25 feet per every inch in DBH for mature trees with poor tolerance to construction impacts. The proposed disturbances would only allow for a tree protection area with a radius of 1.9 inches per every inch DBH. With such a small tree protection area, the beech tree would be severely impacted by construction activity. Furthermore, when there is significant root damage within 3x the trunk diameter, tree stability becomes a major concern (Dunster, 2013). The beech tree's low suitability score on the conservation suitability worksheet reflects the severity of these construction impacts and the tree's intolerance to construction impacts.

Tree #12 is fairly young for its species, and bigleaf maples have relatively 'good' tolerance to construction impacts (Matheney and Clark, 1998). Nevertheless, the proposed root disturbances are severe. The proposed wall is estimated to be only 27 inches from the trunk, and installation of the wall would require cutting roots along this edge. Disturbances are likely to exceed this edge by at least a few inches.

Matheney and Clark (1998) recommend establishing a tree protection area with a radius of 6 inches per every inch in DBH for young trees with good tolerance to construction impacts. The proposed disturbances would only allow for a tree protection area with a radius of 2.7 inches per every inch DBH. With such a small tree protection area, the bigleaf maple would be significantly impacted by construction activity. Lastly, as with the beech tree, root damage within 3x the trunk diameter is likely to compromise the tree's structural stability (Dunster, 2013). The maple's low suitability score on the conservation suitability worksheet reflects the severity of these construction impacts and the tree's poor structural condition due to previous topping.

Conclusions

Given the proposed site plans, trees #7 and #12 are not considered suitable for retention. The proposed demolition and construction activity would significantly compromise the health and structural integrity of the subject trees.

Recommendations

I recommend either removing the subject trees or redesigning the site plans to allow for adequate tree protection. If the trees are to be removed, I recommend replacing them with native species. If the subject trees are to be protected, the plans should allow for a tree protection area with a radius of 74 feet for tree #7 and 10 feet for tree #12

Glossary

Diameter at Breast Height	The diameter of a tree measured 4.5 feet above ground.
Drip line	The perimeter of the area underneath a tree.
Foliage	The leaves of a plant.
Mature	Describes a full-grown tree, whose age is somewhere between 1/3 and 2/3 of the average species lifespan.
Over-mature	Describes a tree in a stage of its life where growth slows down significantly, and whose age is usually greater than 2/3 of the average species lifespan.
Topped	Of a tree) having had the top removed through the inappropriate use of non-selective heading cuts.

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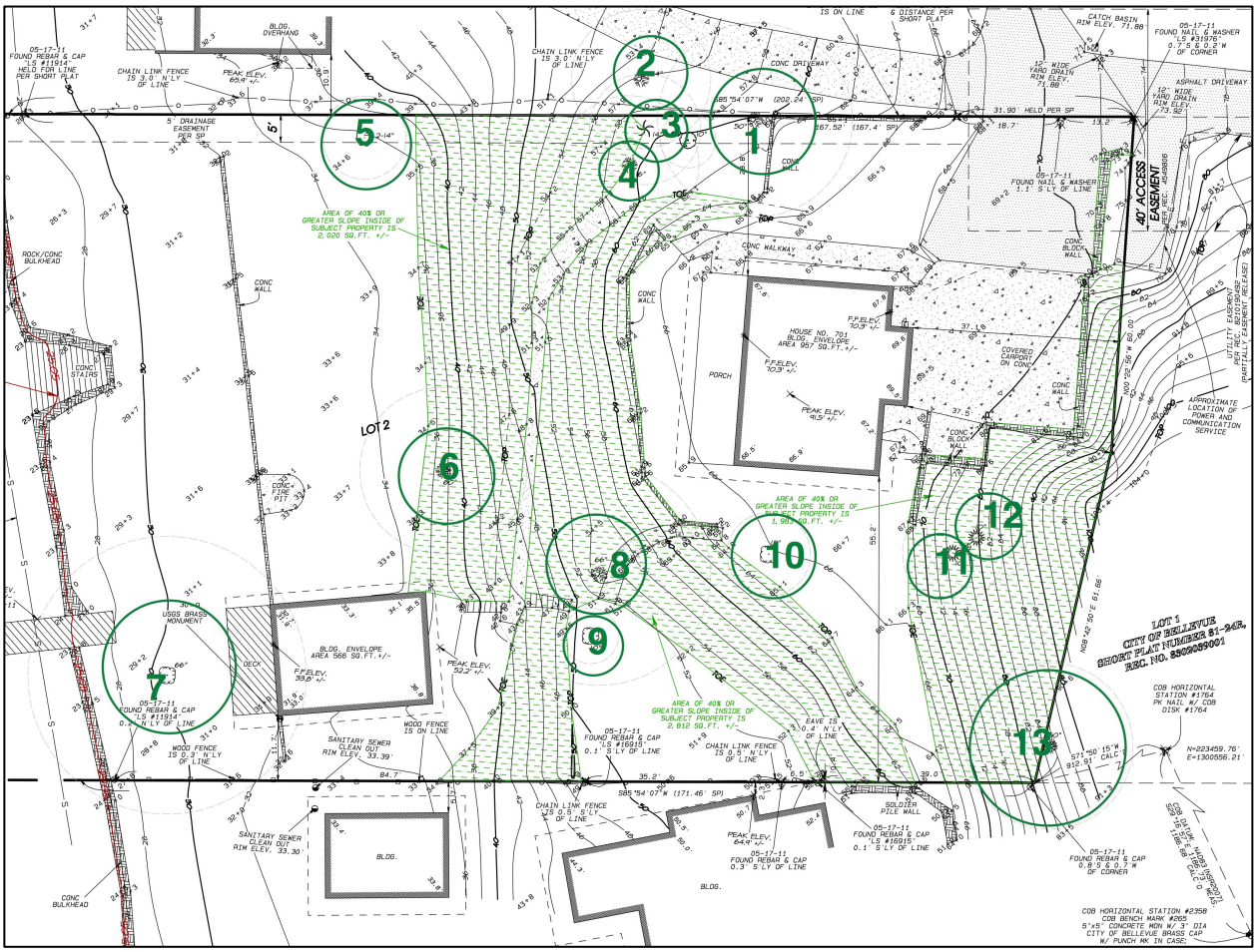
Appendix A

Site Map



This map is intended as an identification key and may not be drawn to scale. Green circles indicate approximate tree location.

Appendix B

Photographs

Figure 1. The accessory structure extends well into the drip line of tree #7.

Appendix B

Photographs

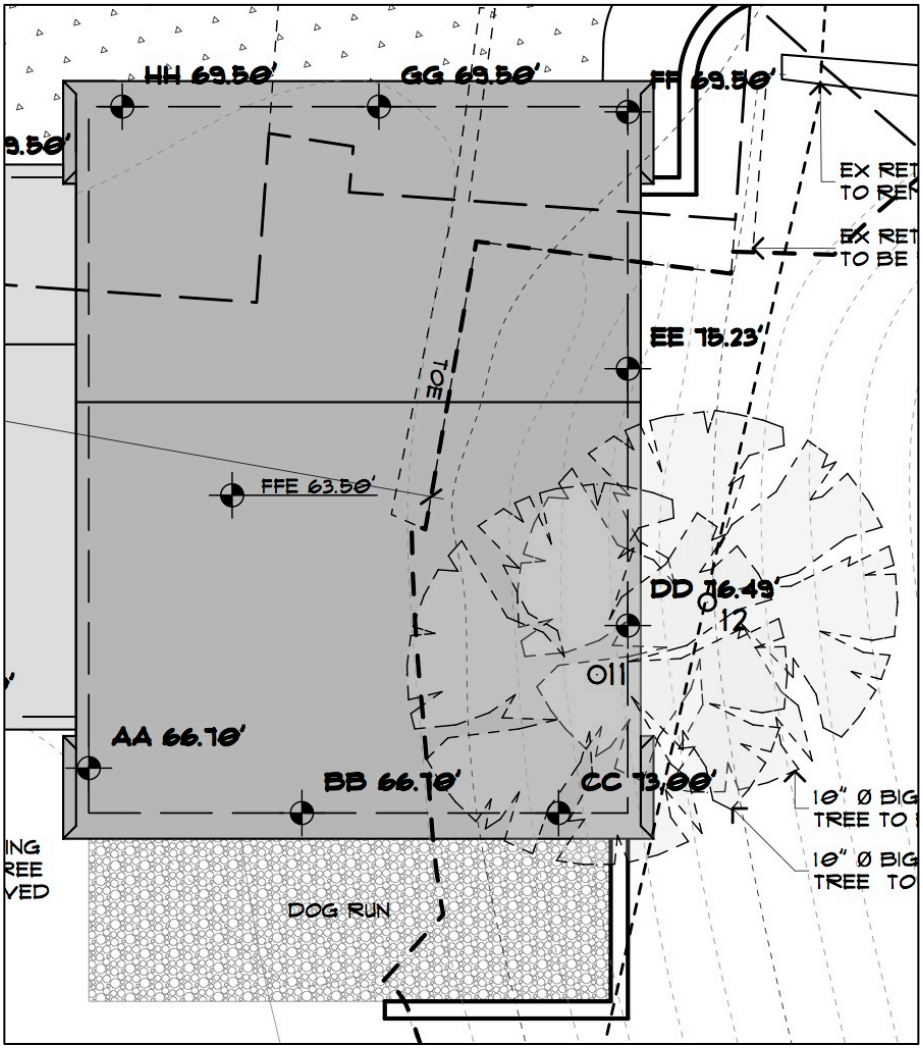
Figure 2. Trees #11 and #12, directly adjacent to one another, have been previously topped at about 15 feet, leading to the formation of numerous weakly attached upright sprouts.

Appendix C

Site Plan Details - Tree #7

Appendix C

Site Plan Details - Tree #12



Appendix D

Conservation Suitability Worksheet – Tree #7

Category	Point system					Score
Health* (1-15)	Decline……Vigorous					12
	1……15					
Root Cut/ Fill Distance From Trunk* (1-15)	<6” per 1” DBH	6-12” per 1” DBH	1-1.5’ per 1” DBH	>1.5’ per 1” DBH		1
	1	5	10	15		
Structural Defects** (1-15)	Many	Some	Few	None		10
	1	5	10	15		
Construction Tolerance of Species[1] (1-15)	Poor	Poor/Mod	Moderate	Mod/Good	Good	1
	1	3	7	11	15	
Age (relative to typical species lifespan) (1-10)	Overmature	Mature	Young			3
	1	5	10			
Location of Construction Activity (1-10)	Within 3x DBH…..……... >2x Drip Line					1
	1……10					
Soil Quality / Characteristics (1-10)	Poorly-drained, low organic matter ……		Well-drained, high organic matter			8
	1 …… 10					
Species Desirability[2] (1-10)	Low……..……High					9
	1……10					
					Total	**45**

*If less than 5, generally this tree would not be a candidate for preservation.
**If less than 10, be aware of the risks surrounding preservation. If less than 5 generally this tree would not be a candidate for preservation.
[1] According to *Trees and Development* by Matheney and Clark, 1998
[2] According to *Species Ratings for Landscape Tree Appraisal* by PNWISA, 2007.

Suitability ratings:
>80 = Good: High potential for longevity on the site after construction.
60-79 = Moderate: May require more in-depth management and monitoring, before, during, and after construction, and may have a shorter lifespan than those in the “good” category.
<59 = Poor: These trees can be expected to decline during or after construction regardless of management

Appendix D

Conservation Suitability Worksheet – Tree #12

Category	Point system					Score
Health* (1-15)	Decline……Vigorous					12
	1……15					
Root Cut/ Fill Distance From Trunk* (1-15)	<6” per 1” DBH	6-12” per 1” DBH	1-1.5’ per 1” DBH	>1.5’ per 1” DBH		1
	1	5	10	15		
Structural Defects** (1-15)	Many	Some	Few	None		1
	1	5	10	15		
Construction Tolerance of Species[1] (1-15)	Poor	Poor/Mod	Moderate	Mod/Good	Good	15
	1	3	7	11	15	
Age (relative to typical species lifespan) (1-10)	Overmature	Mature	Young			10
	1	5	10			
Location of Construction Activity (1-10)	Within 3x DBH…..……... >2x Drip Line					1
	1……10					
Soil Quality / Characteristics (1-10)	Poorly-drained, low organic matter ……		Well-drained, high organic matter			8
	1 …… 10					
Species Desirability[2] (1-10)	Low……..……High					6
	1……10					
					Total	**54**

*If less than 5, generally this tree would not be a candidate for preservation.
**If less than 10, be aware of the risks surrounding preservation. If less than 5 generally this tree would not be a candidate for preservation.
[1] According to *Trees and Development* by Matheney and Clark, 1998
[2] According to *Species Ratings for Landscape Tree Appraisal* by PNWISA, 2007.

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Appendix F

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4. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant.

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7. This report represents the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

Appendix G

Certification of Performance

I, Martín Selasco, certify that:

1. I have personally inspected the tree and property referred to in this report and have stated my findings accurately.

2. I have no current or prospective interest in the tree or property that is the subject of this report and have no personal interest or bias with respect to the parties involved.

3. The analysis, opinions, and conclusions stated herein are my own and are based on current scientific procedures and facts.

4. My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices.

5. No one provided significant professional assistance to me, except as indicated within the report.

6. My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party nor upon the results of the assessment, attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing of the American Society of Consulting Arborists. I have been an ISA Certified Arborist since 2013 and have been involved in the practice of arboriculture and the study of trees for over 5 years.

Signed _____

Date: 10/6/2016

GEOTECHNICAL REPORT

BRYANT RESIDENCE
701 SHORELAND DROVE SE
BELLEVUE, WASHINGTON

Project No. 11-016
September 2016

Prepared for:

Peter and Tobey Bryant

PanGEO INCORPORATED
2021A Minor Avenue East
Seattle, Washington 98102-3513
Tel: 206.262.0370 Fax: 206.262.0374

Geotechnical & Earthquake Engineering Consultants

PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

September 9, 2016
PanGEO Project No. 11-016.400

Peter and Tobey Bryant
9345 Overlake Drive West
Medina, WA 98039

Subject: Geotechnical Report
Bryant Residence
701 Shoreland Drive SE, Bellevue, Washington

Dear Peter and Tobey:

Please fine attached our geotechnical report for the proposed single-family residence in Bellevue, Washington. This report documents the subsurface conditions at the site and our geotechnical recommendations for the proposed project.

In summary, based on our review of the previously completed test borings, the project site is generally underlain by a sequence of granular soil consisting of fill, ice-contact, advance outwash deposits over very stiff, fine-grained glaciolacustrine deposits.

Based on the subsurface conditions and current design plans, it is our opinion that the proposed house should be supported on small dimeter steel pipe piles (pin pile). In addition, a single row of helical anchors will be needed along the upslope basement wall footing in order to provide adequate long-term overall stability of the site.

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

Sincerely,

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

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

TABLE OF CONTENTS

Section Page

1.0 GENERAL 1
2.0 SITE AND PROJECT DESCRIPTION 1
3.0 EXISTING DATA REVIEW 3
3.1 SITE GEOLOGY 3
3.2 SUBSURFACE EXPLORATIONS 5
3.3 SUBSURFACE CONDITIONS 5
4.0 GEOLOGIC HAZARDS ASSESSMENT 7
4.1 LANDSLIDE HAZARDS AND STEEP SLOPES EVALUATION 7
4.2 EROSION HAZARDS EVALUATION 9
4.3 SEISMIC HAZARDS EVALUATION 9
5.0 GEOTECHNICAL RECOMMENDATIONS 10
5.1 SEISMIC DESIGN PARAMETERS 10
5.2 BUILDING FOUNDATIONS 10
5.3 FOOTING DRAINS 14
5.4 FLOOR SLABS 14
5.5 RETAINING AND BELOW-GRADE WALL DESIGN PARAMETERS 15
5.5.1 Wall Foundations 15
5.5.2 Lateral Earth Pressures 15
5.5.3 Surcharge Loads 16
5.5.4 Lateral Resistance 16
5.5.5 Wall Drainage 16
5.5.6 Wall Backfill 16
5.6 HELICAL ANCHORS 17
5.7 PERMANENT CANTILEVERED SOLDIER PILE WALL 17
5.8 BUILDING SETBACK REDUCTION 20
6.0 CONSTRUCTION CONSIDERATIONS 20
6.1 SITE PREPARATION 20
6.2 TEMPORARY EXCAVATIONS 20
6.3 MATERIAL REUSE 21
6.4 STRUCTURAL FILL PLACEMENT AND COMPACTION 21
6.5 SURFACE DRAINAGE AND EROSION CONSIDERATIONS 22
6.6 WET WEATHER CONSTRUCTION 22
7.0 ADDITIONAL SERVICES 23
8.0 CLOSURE 24
9.0 REFERENCES 26

ATTACHMENTS:

Figure 1 Vicinity Map
Figure 2 Site and Exploration Plan
Figure 3 Geologic Map
Figure 4 Generalized Subsurface Cross-Section A
Figure 5 Generalized Subsurface Cross-Section B
Figure 6 Generalized Subsurface Cross-Section D
Figure 7 Generalized Subsurface Cross-Section F
Figure 8 Static Global Stability Analysis, Section A, Proposed Condition
Figure 9 Pseudo-Static Global Stability Analysis, Section A, Proposed Condition

Figure 10 Static Global Stability Analysis, Section B, Proposed Condition
Figure 11 Pseudo-Static Global Stability Analysis, Section B, Proposed Condition
Figure 12 Static Global Stability Analysis, Section D, Proposed Condition
Figure 13 Pseudo-Static Global Stability Analysis, Section D, Proposed Condition
Figure 14 Design Lateral Pressures – Permanent Cantilevered Soldier Pile Wall

APPENDICES:

Appendix A Summary Boring Logs
Figure A-1 Terms and Symbols for Boring and Test Pit Logs
Figure A-2 Log of Test Boring BH-1
Figure A-3 Log of Test Boring BH-2
Figure A-4 Log of Test Boring BH-3

GEOTECHNICAL REPORT
BRYANT RESIDENCE
701 SHORELAND DRIVE SE, BELLEVUE, WASHINGTON

1.0 GENERAL

As requested, PanGEO, Inc. is pleased to present this geotechnical report to assist the project team with the design and construction of a single-family residence at 701 Shoreland Drive SE in Bellevue, Washington. Our study was performed in general accordance with our mutually agreed scope of services outlined in our proposal dated August 23, 2016. Our scope of services included reviewing readily available geologic and geotechnical data, which includes three test borings PanGEO previously completed at the site, conducting a site reconnaissance, and developing the conclusions and recommendations presented in this report.

2.0 SITE AND PROJECT DESCRIPTION

The subject site is an approximately 0.52-acre lot located at 701 Shoreland Drive SE in Bellevue, Washington (see Vicinity Map, Figure 1). The subject property is roughly rectangular in shape, and is bordered to the west by Lake Washington, to the east, north and south by existing single-family dwellings. An existing one-story house with a daylight basement and carports currently occupies the eastern portion of the lot (see plates 1 thru 3). A shed is located at the southwest corner of the lot with its lower floor near lake level. Based on our review of the topographic survey map and our field observations, the existing grade of the eastern and western portions of the site are relatively level. The middle portion the site slopes down from the east to west with gradients of approximately 45 percent. The total vertical relief from the east property line to the west property line is about 70 feet. The lower terrace is covered with short grass, and the slope portion of the lot is covered with bushes and several large diameter, mature evergreen trees (see Plates 2 and 3). The existing conditions of the site and its immediate vicinity are shown on Plate 1 and attached Figure 2, Site and Exploration Plan.

We understand that you plan to remove the exiting house and carport, and to construct a new single-family residence in the eastern portion of the site (see Figure 2). Based on review of the preliminary design plans, we understand that the proposed residence will be a 2-story wood frame structure with a two-level daylight basement (see Plate 4). We anticipate that the site grading for the proposed project will have cuts and fill up to 10 to 12 feet deep for the basement and foundation construction.

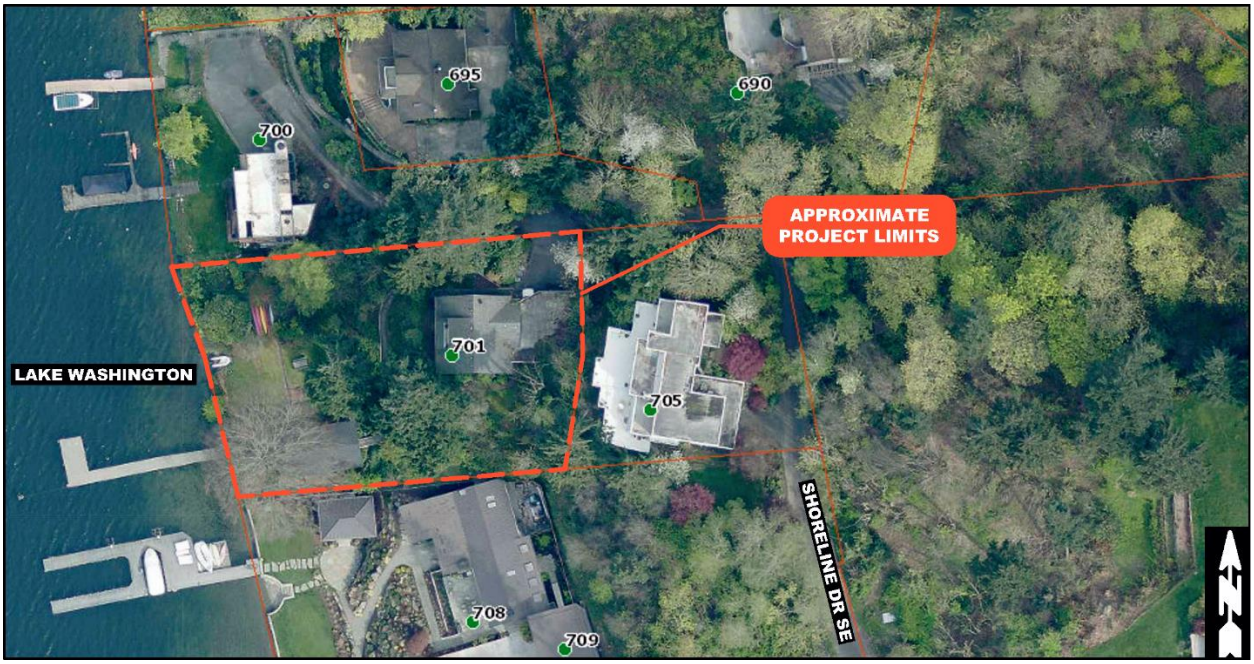


Plate 1 – Aerial view of the project site and surrounding parcels. (King County 2015 Aerial Photograph)

Plate 2 – Partial view of the existing house and steep slope, looking east from lakeshore.

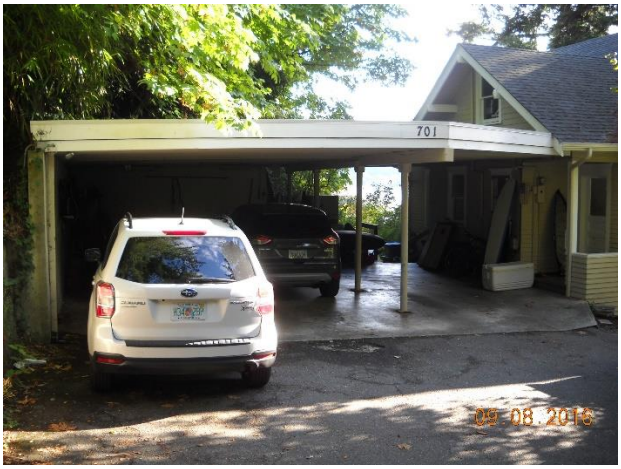


Plate 3 – Partial view of the existing house and carport, looking southwest.

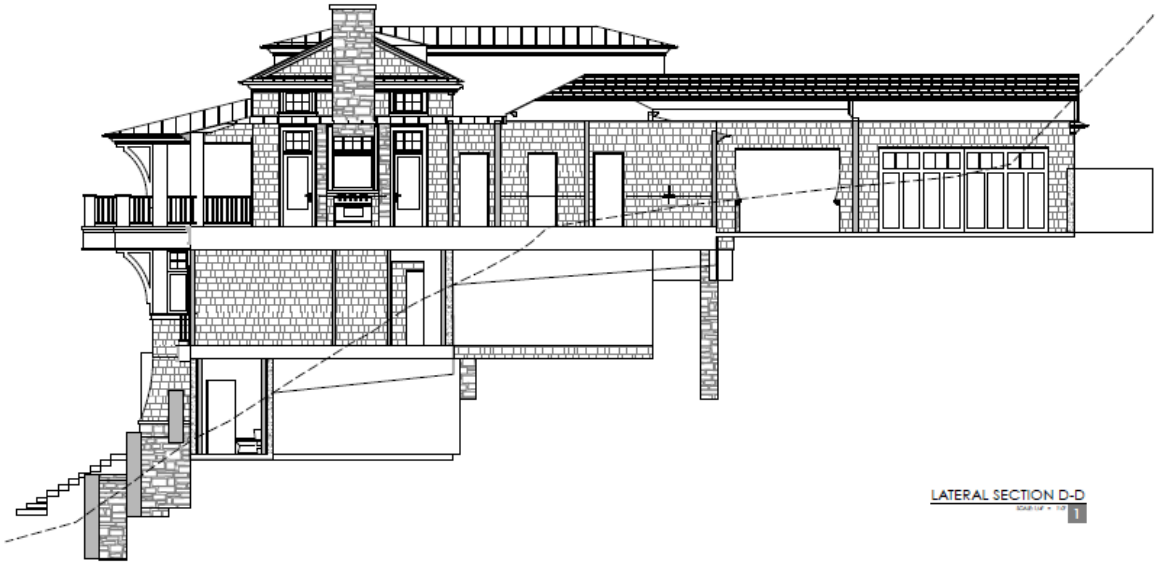


Plate 4 – Preliminary schematic west-east building cross-section, looking north.

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 EXISTING DATA REVIEW

As part of our study we reviewed geologic maps of the area to better understand the subsurface conditions at the site. In addition, we reviewed available on-line databases and in-house records to determine if previous subsurface investigations have been performed in the vicinity of the site. Additionally, we also review the City of Bellevue Critical Area maps to check for the presence of mapped Critical areas within the project parcel and evidence of past instability at, or near the site.

3.1 SITE GEOLOGY

Based on review of *The Geologic Map of King County* (Booth, et. al. 2007), the project site is underlain by Advance Outwash (Qva) of the Vashon Stade of the Fraser Glaciation (see Figure 3). The geology map also indicates the area immediately to the east of the project site is map as glacial till (Qvt). In addition to the mapped geologic units listed above, our previously advanced test

borings also encountered ice-contact (Qvi) and Lawton Clay / Glaciolacustirne (Qvlc) deposit. The following is a brief description of each geologic soil units mapped in close proximity to the project site, from youngest to oldest.

- **Vashon ice-contact deposits (Qvi) –** Typically consists of irregularly-shaped, intercalated till and coarse-grained outwash sediments deposited or modified by meltwater directly in contact with or in close proximity to the glacial ice. The till portion consists of a matrix of clay, silt, sand and gravel. The outwash portion typically consist of medium-grained sand and gravel with varying amounts of silt.

  Ice-contact deposits were deposited at the margin of the ice sheet by streams and/or mass wasting processes and may or may not have been glacially overridden. Where glacially overridden, the ice contact deposits are typically dense to very dense. Where they have not been override, the ice-contact deposits may range from loose to dense.
- **Vashon glacial till deposits (Qvt) –** Typically consists of a over-consolidated heterogeneous mixture of clay, silt, sand and gravel that has been deposited directly below the glacial ice sheet during the Vashon Stade of the Fraser Glaciation. Additionally, glacial till typically exhibits low compressibility and high strength characteristics.
- **Vashon advance outwash deposits (Qva) –** Typically consists of dense to very dense, moderately to well sorted, slightly oxidized, medium-grained sand and gravel with some silt lenses deposited in front of the advancing ice sheet by glacial meltwater (glaciofluvial) and subsequently overridden by the glacial ice. Additionally, advance outwash typically exhibits low compressibility and high strength characteristics in its undisturbed state.
- **Vashon Lawton Clay / Glaciolacustrine (Qvlc) –** Typically consists of fine-grained glacial flour that accumulated in a proglacial lake in the Puget Lowland. Deposits predominantly consist of laminated to massive, very stiff to hard, silty clay and clayey wilt with trace amounts of sand and gravel. Scattered to abundant sheared and slickensided zone are common within this unit. Gravel, cobbles and boulders (drop stones) may be encountered within this unit. Additionally, glaciolacustrine silts typically exhibits low compressibility and high strength characteristics in its undisturbed state. However, zones of low strength material have been well documented within the highly fractures zones with well-defined slickenside planes.

The surface soil in the project area is mapped as Kitsap silt loam (KpD) based on the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) 2015 Soil Survey of the King County Area (USDA 2015). Kitsap silt loams are moderately

well-drained soils that formed in glacial lake deposits and are found on terraces and strongly dissected terrace fronts. Permeability is moderate above the substratum and very slow within. Erosion potential for Kitsap silt loams is considered to be slight to moderate.

3.2 SUBSURFACE EXPLORATIONS

Three test borings (BH-1 to BH-3) were drilled on February 7, 2011, at the approximate locations indicated on Figure 2. The borings were drilled to depths between approximately 16½ and 19 feet below existing grade, using a limited access hand-portable drill rig owned and operated by CN Drilling of Seattle, Washington. The drill rig was equipped with 4-inch diameter hollow stem augers. Soil samples were obtained from the borings at 2½- and 5-foot depth intervals. Standard penetration tests were performed in the borings using a 2-inch outside diameter split-spoon sampler. The sampler was generally driven into the soil a distance of 18 inches using a 140-pound hammer falling a distance of 30 inches (cat-head mechanism). The number of blows required for each 6-inch increment of sampler penetration was recorded, and the blowcounts required for the last 12 inches of penetration is termed the SPT N-value. The SPT N-value provides an empirical measure of the relative density of cohesionless soil, or the relative consistency of fine-grained soils.

An engineer 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 Figures A-2 through A-4. 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 description of groundwater conditions and depth are likewise approximate.

3.3 SUBSURFACE CONDITIONS

In general, the soil encountered in our test borings conducted in 2011 can be grouped into four units: fill, ice-contact deposits, advance outwash deposits and glaciolacustrine deposits, as discussed below. Please refer to the boring logs (Figures A-2 through A-4) for a detailed description of the conditions encountered at each boring location. Additionally, we developed two generalized soil profile cross-sections A and B, see Figures 4 and 5, based on the surface

topography, preliminary building schematics and subsurface conditions encountered in our test borings. The locations of the cross-section are indicated on Figure 2.

- ***Unit 1: Fill –*** All three borings encountered a layer of fill generally consisting of loose silty sand and sandy gravel with some roots and organic material. This soil unit was generally about 2 feet thick in borings BH-1 and about 5 to 7 feet thick in borings BH-2 and BH-3. This unit appeared to be undocumented fill, based on the disturbed structure of the soil and the presence of organic material.
- ***Unit 2: Ice-Contact Deposits –*** Below the Fill, approximately 5 and 6½ feet of loose to medium dense silty sand and stiff sandy silt was encountered in BH-1 and BH-3 respectively. We interpret this unit as Ice-Contact Deposits. This unit was note encountered in BH-2.
- ***Unit 3: Advance Outwash –*** Below the Fill, in BH-2 and ice-contact deposits in BH-3, dense to very dense sand and silty sand was encountered and extended to at least the maximum depth drilled of these two borings at about 16 ½ feet. We interpret this unit as Advance Outwash deposits. This unit was not encountered in boring BH-1.
- ***Unit 4: Glaciolacustrine –*** Below the Ice-Contact deposit, boring BH-1 encountered very stiff to very hard, sandy silty, silt, and clayey silt extended to the bottom of the boring at about 19 feet below the surface. We interpret this soil unit as Glaciolacustrine deposits. in boring BH-1.

Groundwater: At the time of drilling, perched groundwater was encounter about 5½ feet below the ground surface in test boring BH-1. Groundwater was not encountered in borings BH-2 and BH-3 at the time of drilling. It should be noted that groundwater elevations and seepage rates are likely to vary depending on the season, local subsurface conditions, and other factors. Groundwater levels are normally highest during the winter and early spring.

Our descriptions of subsurface conditions 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.

4.0 GEOLOGIC HAZARDS ASSESSMENT

We conducted a geologic hazards assessment for the proposed development as part of our study. The assessment included evaluation of Landslide Hazards, Seismic (Earthquake) Hazards, and Erosion Hazards. Based on our review of the City of Bellevue's Geologic Hazards Map and the site topographic map, the project contains steep slopes (40 percent and greater) and is mapped with an erosion hazard area. The west edge of the site is also mapped within a seismic hazard area. The following sections contain our assessment of potential Geologic hazards and their possible effect on the proposed development.

4.1 LANDSLIDE HAZARDS AND STEEP SLOPES EVALUATION

A site reconnaissance of the subject property was conducted on September 8, 2016 as part of our study. 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 or uneven ground surfaces. We did not observe any obvious evidence of past slope instability during out site visit. Based on our observations of ground features and the subsurface conditions, 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 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.

Slope Stability Analysis -To evaluate the factor of safety against potential future slope instability, we performed slope stability analysis using the computer program *Slide v6.0* (Rocscience, 2010) based on the post-construction conditions, as currently planned.

Global stability analyses were conducted to evaluate the impact of the proposed structure on the steep slope. In particular, analyses were conducted to determine if the proposed development has adequate factors-of-safety under both static and pseudo-static (seismic) conditions or if remedial measure would be required to improve the performance of the slope.

We developed four representative cross-sections, see Figures 4 through 7, based on the surface topography, preliminary building schematics and subsurface conditions encountered in our test borings. The locations of the design cross-section are indicated on Figure 2.

All global stability analyses (i.e. external) were completed using the computer program SLIDE v.6, by RocScience using limit equilibrium methods. Spencer's method which solves for both force

and moment equilibrium was use to analyze circular and non-circular failure surfaces using effective strength parameters for all layers.

The seismic stability was analyzed using pseudo-static procedures, where the effect of earthquake ground shaking is represented by the use of a "seismic coefficient" in the stability calculations. One-half of the peak ground acceleration (PGA) consistent with 2012/2015 IBC was used for the seismic coefficient in our pseudo-static analyses. Accordingly, a seismic coefficient of 0.27g was used in our pseudo-static stability analysis.

The soil parameters for the soil units were assigned based on empirical correlations using SPT blowcount values measured in the borings, and our experience with similar soil conditions and published literatures. The profiles and soil parameters used in our slope stability analysis are shown in Figures 8 and 13.

Based on our analyses, without improvements/mitigations, the factors-of-safety for the static and pseudo-static (seismic) conditions are not adequate for the proposed post-construction conditions, as currently envisaged. Therefore, mitigation measures will be needed to stabilize the site as part of the proposed development.

To improve the site slope stability for the post-construction condition, we recommended that a single row of helical anchors be installed along the upslope basement wall footings (see Figures 8 through 13). The anchors should have a maximum horizontal spacing of 8 feet, an allowable tension capacity of 30 kips per anchor and installed at an inclination of 20 degrees below horizontal.

The results of our post-construction global stability analyses with a single row helical anchors are summarized on Figures 8 through 13. Based on the results of our analyses, it is our opinion that with the recommended site stabilization measures that the post-construction site slope has adequate long-term factors-of-safety against failures under static and pseudo-static loading conditions.

Qualifications – Based on the results of our study, it is our opinion that the proposed development as planned will have adequate factors of safety against slope instability and will not have adversely impacts the subject and surrounding properties, provided that the recommendations presented in this report are properly incorporated into the design of the project, and the project is properly constructed per design and standard practice. However, it should be noted that any development on or near a steep slope or a potential landslide area always involves some level of risk. In addition, future activities on and off the site could also affect the stability of the site.

4.2 EROSION HAZARDS EVALUATION

The site is mapped within a potential erosion control area in accordance with the City of Bellevue's Surface Geology and Soils with Severe Erosion Potential Map (see Figure 3). Based on our test borings, the site soils are anticipated to exhibit low to moderate erosion potential when disturbed and left unprotected. However, 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 SEISMIC HAZARDS EVALUATION

The City of Bellevue defines seismic hazard areas as those areas subject to severe risk of earthquake damage as a result of seismically induced settlement or soil liquefaction. According to the City of Bellevue's Geologic Hazards Map, the western flat portion of the site is mapped within a seismic hazard area. As such, a seismic hazards evaluation was conducted as part of our study.

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.

Based on the fine-grained nature of the site soils at shallow depths and dense sand encountered during our field exploration, in our opinion, the potential for soil liquefaction at the site during a design earthquake is considered to be low, and associated seismic settlement should be negligible. As such, special considerations associated with soil liquefaction are not needed for this project.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 SEISMIC DESIGN PARAMETERS

The 2012 International Building Code (IBC) seismic design section provides a basis for seismic design of structures. Table 1 on page 9 provides seismic design parameters for the site that are in conformance with the 2012 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 the USGS Earthquake Hazards Program Interpolated Probabilistic Ground Motion website (2008 data) for the project latitude and longitude.

Table 1 – Seismic Design Parameters per 2012 IBC

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	1.334	0.514	1.000	1.500	0.889	0.514

5.2 BUILDING FOUNDATIONS

Based on the subsurface conditions anticipated at the site and our understanding of the design, it is our opinion that a deep foundation system consisting of driven, small diameter steel piles (pin piles) is considered appropriate to support the proposed building. Use of conventional continuous/spread footings could lead to unacceptable foundation differential settlement without substantial over-excavations and temporary shoring, and therefore is not recommended for this project. The following sections present our design recommendations for pin pile foundations. PanGEO should review the design plans and make necessary modifications to the recommendations contained in this report once more advanced project plans are developed.

Pin Pile Sizes - In our opinion, 3-, 4-, or 6-inch diameter, Schedule 40, galvanized, steel pipes (pin piles) may be used to support the new structure. Three, four, and six-inch diameter pin piles are typically installed using small hammers mounted on a small excavator.

***Pin Pile Capacity* -** The number of piles required depends on the magnitude of the design load. Allowable axial compression capacities of 6, 10, and 15 tons may be used for the 3-, 4-, and 6-inch diameter pin piles, respectively, with an approximate factor of safety of 2. Penetration resistance required to achieve the capacities will be determined based on the hammer used to install the pile. Tensile capacity of pin piles should be ignored in design calculations.

It is our experience that the driven pipe pile foundations should provide adequate support with total settlements on the order of ½-inch or less.

Pile splices may be made with compression fitted sleeve pipe couplers (see Typical Splicing Detail on page 12). Splicing using welding of pipe joints should not be used, as welds will typically be broken during driving.

Three-, four-, and six-inch diameter piles are typically installed using small (approximately 850 to 3,000 pound) hammers mounted to a small excavator. The criterion for driving refusal is defined as the minimum amount of time (in seconds) required to achieve one inch of penetration, and it varies with the size of hammer used for pile driving. For 3-, 4-, and 6-inch pin piles, the Table 2 below is a summary of driving refusal criteria for different hammer sizes that are commonly used:

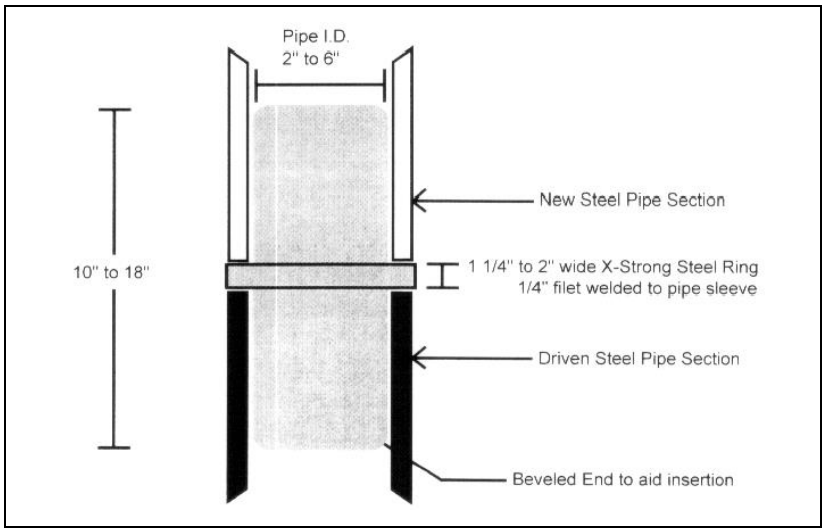
Table 2 - Summary of Commonly-Accepted Driving Criteria for 3-, 4-, and 6-inch Pin Pile with a 6, 10, and 15-ton Allowable Axial Compression Load

Hammer Model	Hammer Weight (lb) / Blows per minute	3” Pile Refusal Criteria (seconds per inch of penetration)	4” Pile Refusal Criteria (seconds per inch of penetration)	6” Pile Refusal Criteria (seconds per inch of penetration)
Hydraulic TB 325	850 / 900	10	16	N/A
Hydraulic TB 425	1,100 / 900	6	10	20
Hydraulic TB 725X	2,000 / 600	3	4	10
Hydraulic TB 830X	3,000 / 500	N/A	N/A	6

Please note that these refusal criteria were established empirically based on previous load tests on 3-, 4-, and 6-inch pin piles. Contractors may select a different hammer for driving these piles, and propose a different driving criterion. In this case, it is the contractor's responsibility to demonstrate to the Engineer's satisfaction that the design load can be achieved based on their selected equipment and driving criteria.

Pin Pile Specifications **-** We recommend that the following specifications be included on the foundation plan:

1. Three-, four-, or six-inch diameter piles should consist of galvanized Schedule-40, ASTM A-53 Grade "A" pipe.
2. The piles shall be driven to refusal as shown in Table 2 above.
3. Piles shall be driven in nominal sections and connected with compression fitted sleeve couplers (see detail below – Courtesy of McDowell Pile King, Kent, WA). We discourage welding of pipe joints, particularly when galvanized pipe is used, as we have frequently observed welds broken during driving.
4. The geotechnical engineer of record or his/her representative shall observe pin pile installation.



The quality of a pin pile foundation is dependent, in part, on the experience and professionalism of the installation company. We recommend that a company with experienced personnel be selected to install the piles.

Lateral Forces - The capacity of pin pipes to resist lateral loads is very limited and should not be used in design. Therefore, lateral forces from wind or seismic loading should be resisted by the passive earth pressures acting against the pile caps and below-grade walls or from battered piles (batter no steeper than 3(H):12(V)). ***Friction at the base of pile-supported concrete grade beam should be ignored in the design calculations.*** Passive resistance values may be determined using an equivalent fluid weight of 150 pounds per cubic foot (pcf) for sloping grounds or 300 pcf for the level ground (at least 10 feet level ground). These values include a safety factor of about 1.5 assuming that properly compacted granular fill will be placed adjacent to and surrounding the pile caps and grade beams.

Grade Beam/Pile Cap Embedment - We recommend that the grade beams and pile caps located around the perimeter of the structure be embedded such that the bottom of the grade beam is at least 16 inches below the adjacent ground surface.

Estimated Pile Length – The subsurface conditions at the site will likely vary substantially across the site. Based on the soil conditions at the site and our experience in the project area, for planning and cost estimating purposes, we estimate that pile length may range from about 15 to 20 feet.

Where possible, the obstructions should be removed by pre-drilling or excavating to facilitate the pile driving. If obstructions cannot be removed, the structural engineer of record should be notified to revise the pile layout to accommodate moving the piles.

Pile Installation Monitoring: The quality of a pipe pile foundation is dependent, in part, on the experience and professionalism of the installation company. We recommend that a company with personnel experienced in the successful installation of pipe piles be selected to install the piles.

As it is not possible to observe the completed pile below the ground, judgment and experience must be used as the basis for determining the acceptability of a pile. Therefore, all piles should be installed under the full-time observation of a representative of PanGEO. This will allow us to fully evaluate the contractor's operation, collect and interpret the installation data, and verify bearing stratum elevations.

Furthermore, we will also understand the implications of variations from normal procedures with respect to the design criteria. The contractor's equipment and procedures should be reviewed by PanGEO before the start of construction.

5.3 FOOTING DRAINS

Footing drains should be installed around the perimeter of the building and behind the basement walls, at or just below the invert of the footings to promote the subsurface drainage around the footings. Under no circumstances should roof downspout drain lines be connected to the footing drain systems. Roof downspouts must be separately tightlined to a suitable discharge point. Cleanouts should be installed at strategic locations to allow for periodic maintenance of the footing drain and downspout tightline systems.

5.4 FLOOR SLABS

In our opinion, conventional concrete slab-on-grade floors may be used in combination with the pin pile foundations. In areas where existing fill is present, we recommend at least one foot of over-excavation and replacement with properly compacted structural fill. The exposed bottom of the excavation should be compacted to a dense condition before placing structural fill. For long-term performance, a minimum of 6-inches of structural fill is recommended below the slab.

Additionally, the slabs should be constructed on a minimum 4-inch thick capillary break placed on the compacted native subgrade soil or structural fill. The capillary break material should consist of free-draining, crushed rock compacted to a firm and unyielding condition. The capillary break material should meet the gradations provided in Table 3, below.

Table 3 – Capillary Break Gradation

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

We also recommend that a minimum 10-mil polyethylene vapor barrier be placed below the slab. We also recommend that construction joints be incorporated into the floor slab to control cracking. If needed, the floor slab design may be accomplished using a modulus of subgrade reaction of 150 pci.

5.5 Retaining and Below-Grade Wall Design Parameters

Retaining and below-grade walls 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 walls. Our geotechnical recommendations for the design and construction of the retaining/below-grade walls are presented below.

5.5.1 Wall Foundations

In our opinion, wall foundations should consist of conventional shallow footings. An allowable soil bearing pressure of 2,500 pounds per square feet (psf) may be used for sizing the wall footings. 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 seismic forces. For allowable stress design, the recommended bearing pressure may be increased by one-third for transient loading, such as wind or seismic forces. The wall footings should have a minimum width of 24 inches.

Wall footing subgrades should be compacted to a dense and unyielding condition prior to concrete pour. If the footing subgrade soil is still loose and yielding after re-compaction, they should be over-excavated down to dense bearing soil and the over-excavation should be replaced with compacted structural fill or lean-mix concrete. The over-excavation width should extend at least one-half the over-excavation depth beyond the edge of footing.

5.5.2 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, such as basement walls, equivalent fluid pressures of 45 pcf should be used for level backfills behind the walls. Walls with a maximum 2H:1V backslope should be designed for an active and at rest earth pressure of 45 and 55 pcf, respectively.

Permanent walls should be designed for an additional uniform lateral pressure of 7H 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.

5.5.3 Surcharge Loads

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.

5.5.4 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 on the upslope side of the wall foundations may be determined using an equivalent fluid weight of 300 pounds per cubic foot (pcf). The passive soil resistance on the down slope side of the wall foundations should be reduced to 150 pcf. These values include a factor-of-safety of 1.5, assuming the footing is poured against dense native sand and stiff silt 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.

5.5.5 Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe behind and at the base of the wall footings, embedded in 12 to 18 inches of clean crushed rock and 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 composite drainage material should be installed per the manufacturer's recommendations. The drainpipe at the base of the wall should be graded to direct water to a suitable outlet.

5.5.6 Wall Backfill

In our opinion, the existing on-site sandy soil may be re-used as wall backfill provided they can be compacted to a dense condition. However, the existing on-site fine-grained soil (silt and clay) are moisture sensitive and should not be used as wall backfill. Use of on-site soil as wall backfill should be approved by the project geotechnical engineer. If imported wall backfill is needed, they should consist of free draining granular soils, such as City of Seattle Type 17, crushed rock, or soils meeting the requirements of Gravel Borrow as defined by Section 9-03.14(1) of the WSDOT

Standards Specifications for Road, Bridge and Municipal Construction (WSDOT, 2016). 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.

5.6 HELICAL ANCHORS

We recommend that a single row of helical anchors be installed along the upslope basement wall footing to improve the overall stability of the site (see Figures 4 through for locations). The anchors should have a maximum horizontal spacing of 8 feet, minimum length of 15 feet, an allowable tension capacity of 30 kips per anchor and installed at an inclination of 20 degrees below horizontal.

Based on anticipated subsurface conditions of the dense advance outwash sands and very stiff glaciolacustrine silts, we recommend use of helical anchors such as Chance SS-5 (1.5" square bar) or equivalent anchors with a minimum double helix with 8" and 10" plates on the lead flight. The anchors should be installed to a minimum torque of 5,000 ft.-lbs. to provide an allowable tension capacity load of 30 kips. In our opinion, helical anchors on the order of 15 to 30 feet long may be required to achieve the required achieve the desire capacity.

The anchor construction should be contracted under a performance specification where the structural engineer specifies the minimum required ultimate anchor load and embedment details into the pile cap. The successful bidding contractor would then install and test two anchors to 200% of the allowable load to confirm the adequacy of the contractor's design and installation procedure. PanGEO should observe the installation and testing of all helical anchors.

5.7 PERMANENT CANTILEVERED SOLDIER PILE WALL

A permanent cantilevered soldier pile wall is likely the most viable option to retain the cuts in the steep slope along the eastern portion the site which will be required to facilitate the construction of the proposed attached garage. A cantilevered soldier pile wall consists of vertical steel beams,

typically spaced from 6 to 8 feet apart along the proposed wall alignment, spanned by lagging. Prior to the start of excavation, the steel beams are installed into holes drilled to a design depth and then backfilled with lean mix or structural concrete. After the solder piles are installed, the excavation proceeds downward and the steel piles are subsequently exposed, pressure-treated timber lagging is installed between the piles and nay voids backfilled with free-draining material or controlled density fill (CDF).

Corrosion Protection **–** The exposed portions of the soldier piles will need to be treated for corrosion. The corrosion protection should extent at least 2 feet below the bottom of the excavation. Alternatively, the piles may be upsized to account for the potential steel loss due to corrosion.

The exposed lagging should be pressure-treated to resist decay. Additionally, the cut ends of the lagging will also need to be treated to resist decay. Alternatively, a structural concrete facing may be constructed against the timber lagging.

Design Lateral Pressures **–** The lateral pressures depicted on Figure 14 should be used for designing a cantilever soldier pile wall. The lateral earth pressures shown on Figure 14 should be increased for any surcharge loads resulting from construction equipment, traffic, or structures, if they are located within the height dimension of the wall. As indicated in Figure 14, the soldier pile wall should be designed for an active earth pressure with an equivalent fluid weight of 40 pcf for a level backslope condition, and for an equivalent fluid weight of 60 pcf for a 1.5(H):1(V) backslope.

Above the bottom of excavation, the recommended active earth and surcharge pressures should be applied over the full width of the pile spacing. Below the bottom of excavation, the active and surcharge pressures should be applied over one pile diameter, and the passive resistance should be applied over twice the pile diameter.

For a permanent wall, the recommended seismic pressure of 8H should also be included in the pile design. For the seismic condition, the recommended passive pressure may be increased by one third.

The soldier pile system should be designed to provide adequate protection for the workers during construction, adjacent structures, utilities, and other facilities. Excavations should be performed in accordance with the current requirements of WISHA. Construction should proceed as rapidly as feasible, to limit the time temporary excavations are open.

Lagging – We recommend that the lagging design consider 50% of the recommended lateral earth pressure, to account for the effects of arching.

Performance - Solider pile walls designed in accordance with the recommendations discussed above may be expected to deflect laterally and vertically about 1 inch or less. Ground settlements behind the wall are expected to be less than 1 inch and practically negligible beyond two times the height dimension of the wall.

Performance Monitoring - Because ground deformations may occur due to the excavation, we recommend that existing conditions on the adjacent private properties be photo-documented prior to the start of the project. We also recommend that survey points be installed on every other soldier pile and on adjacent structures. The survey points on the piles should be monitored at least weekly by the project surveyor until one week after the excavation has been completed to determine potential deformations. The monitoring program should include changes in both the horizontal (x and y directions) and vertical deformations to the nearest 0.01-foot, and the results be promptly submitted to PanGEO for review. After the initial baseline readings, which should be taken prior to the start of pile installations, the monitoring points on the adjacent structures only need to be shot if excessive soldier pile deflections are noted. The results of the monitoring will allow the design team to confirm design parameters, and for the contractor to make adjustments if necessary.

Soldier Pile Installation Considerations – We estimate that the soldier piles will be installed through about five feet of loose to medium dense silty sand with some gravel which may be prone to caving. The contractor should be prepared to utilize temporary casing if caving conditions are encountered. PanGEO shall verify the suitability of all soldier pile holes before concrete placement.

Although significant amounts of fill are not anticipated at the site, debris or obstructions can occur at previously developed sites. A backhoe should be used to remove any obstructions at shallow depths that preclude installation of the soldier piles.

Although groundwater was not encountered in the explorations, zones of seepage may be present at greater depths in sandy or gravely layers of the native soil deposits. If more than 3 inches of accumulated water is present in the bottom of the drill holes, the concrete should be placed using tremie methods. All soldier pile holes drilled shall be filled with concrete on the same day.

5.8 Building Setback Reduction

We reviewed City of Bellevue's Land Use Code (LUC) 20.25H.120, LUC 20.25H.125, LUC 20.25H.140, LUC 20.25H.145. In our opinion, based on site conditions and preliminary design plans, the building setback may be waived for the proposed project provided that the recommendations presented in this report are properly incorporated into the design and construction of the project.

Based on the subsurface data, it is our opinion that the proposed improvements will not increase the threat of the site geological hazards to adjacent properties and will not adversely impact other critical areas, provided that the proposed project is properly designed and constructed.

With the proposed structure benched into the existing slope, installation of helical anchors along the upslope wall footing and subsurface drainage, the geologic hazards of the proposed improvements will be mitigated to a level equal to or less than the existing conditions.

PanGEO should review the more advanced design plans and provide additional geotechnical design recommendations as needed.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation

Site preparation for the proposed project mainly includes removing existing buildings, site clearing, and excavations to the design subgrade. All stripped surface materials should be properly disposed off-site or be "wasted" on site in non-structural landscaping areas. Following site clearing and excavations, the adequacy of the subgrade where structural fill, foundations, slabs, or pavements are to be placed should be verified by a representative of PanGEO. Soft, organic rich soils, if encountered in the improvement areas, should be over-excavated and replaced with compacted structural fill.

6.2 Temporary Excavations

Where space is available, unsupported cuts may be incorporated into the excavation plan. All temporary excavations should be performed in accordance with Part N of WAC (Washington Administrative Code) 296-155. For planning purposes, the unsupported slope cut could be sloped to as steep as 1H:1V (Horizontal : Vertical).

The contractor is responsible for maintaining safe excavation slopes. The stability of the temporary excavation slopes should be evaluated in the field during construction based on actual observed soil conditions. If seepage is encountered, excavation slope inclinations may need to be reduced. During wet weather, the cut slopes may need to be flattened to reduce potential erosion or should be covered with plastic sheeting.

Heavy construction equipment, building materials, excavated soil and vehicle traffic should not be allowed within a distance equal to 1/3 the slope height from the top of the temporary slope to the base of the excavation.

6.3 Material Reuse

In our opinion, the on-site fine-grained soil (silt and clay) should not be used as structural fill but may be used as general fill in the non-structural landscape areas. However, the on-site relatively clean sand may be considered as a resource for structural fill provided they can be compacted to a dense condition.

It should be noted that on-site sandy soil is poorly graded and may be difficult to compact to the required degree because of the poor gradation and over-optimum moisture content. If the on-site sand cannot be compacted to a dense condition, imported granular soils, such as City of Seattle Type 17, crushed rock, or soils meeting the requirements of Gravel Borrow as defined by Section 9-03.14(1) of the WSDOT *Standards Specifications for Road, Bridge and Municipal Construction* (WSDOT, 2016) should be used as structural fill. Recycled concrete may also be considered as a source of structural fill.

Use of on-site soil and recycled concrete as structural fill should be approved by the project geotechnical engineer. If use of the existing sandy soils is planned, the excavated soil should be stockpiled and protected with plastic sheeting to prevent it from becoming saturated by precipitation or runoff.

6.4 Structural Fill Placement and Compaction

Structural fill and wall backfill, where needed, should consist of Gravel Borrow or Crushed Surfacing Base Course as specified in WSDOT Section 9-03.9(3) (WSDOT, 2016), or an approved similar material.

Structural fill and wall backfill should be moisture conditioned to near its optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and compacted to a dense

and unyielding condition, or to at least 95 percent maximum density, determined using ASTM D-1557 (Modified Proctor). The procedure to achieve proper density of a compacted fill depends on the size and type of compacting 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. Silty or clayey 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.

6.5 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 to collect runoff and prevent water from entering the excavation. All collected water should be directed to a positive and permanent discharge system such as a storm sewer. It should be noted that some of the site soils are prone to surficial erosion. Special care should be taken to avoid surface water on open cut excavations, and exposed slopes should be protected with visqueen.

Permanent control of surface water and roof runoff should be incorporated in the final grading design. In addition to these sources, irrigation and rain water infiltrating into landscape and planter areas adjacent to paved areas or building foundations should also be controlled. All collected runoff should be directed into conduits that carry the water away from the pavement or structure and into storm drain systems or other appropriate outlets. Adequate surface gradients should be incorporated into the grading design such that surface runoff is directed away from structures.

6.6 Wet Weather Construction

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. The following procedures are best management practices recommended for use in wet weather construction:

- Site stripping, excavation and subgrade preparation should be followed promptly by the placement and compaction of clean structural fill or CDF;
- 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.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- 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 ¾-inch sieve. The fines should be non-plastic.
- Geotextile silt fences should be strategically located to control erosion and the movement of soil. Erosion control measures should be installed along all the property boundaries.
- Excavation slopes and soils stockpiled on site should also be covered with plastic sheets.

7.0 ADDITIONAL SERVICES

Once more advanced design plans are developed, PanGEO should review the project design and modify our recommendations contained in this report if needed. PanGEO should also be retained to monitor the construction of geotechnical elements. The City of Bellevue, as part of the permitting conditions, 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 during permitting and construction:

- Review project design plans and provide additional recommendations as needed;
- Verify implementation of erosion control measures;

- Evaluate and confirm the stability of temporary excavation slopes;
- Observe foundation construction including pin pile and helical anchor installation;
- Verify the adequacy of subsurface drainage installation;
- Confirm the adequacy of the compaction of structural

8.0 CLOSURE

We have prepared this report for Peter and Tobey Bryant 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.

Nicholas T. Weikel, E.I.T.
Staff Geotechnical Engineer

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

9.0 REFERENCES

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

City of Bellevue GIS Map, 2007, Surface Geology and Soils with Sever erosion Potential Map

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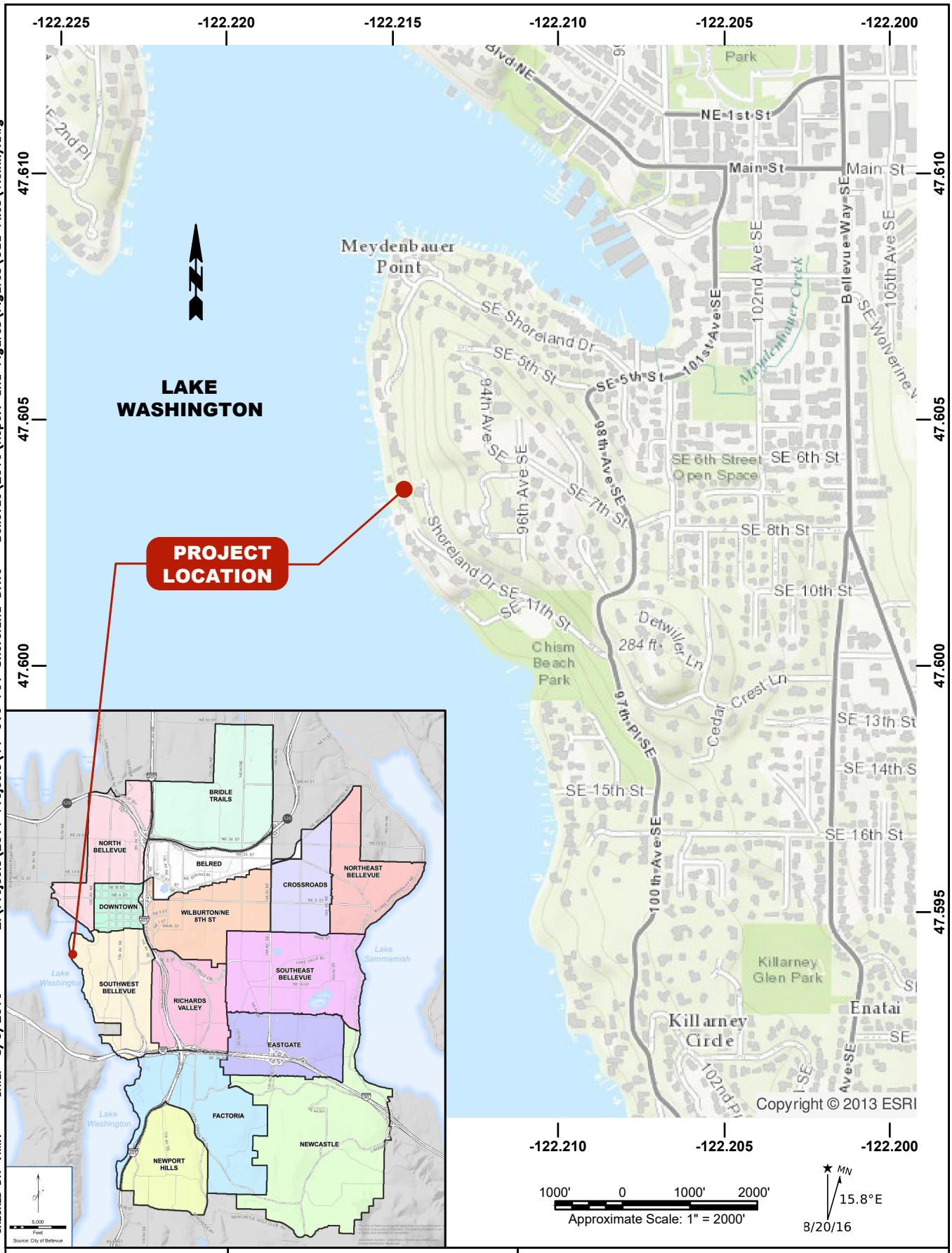
United States Geological Survey, *Earthquake Hazards Program, Interpolated Probabilistic Ground Motion for the Conterminous 48 States by Latitude and Longitude, 2008 Data*, accessed via:
http://earthquake.usgs.gov/designmaps/us/application.php

WSDOT, 2016, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10.*



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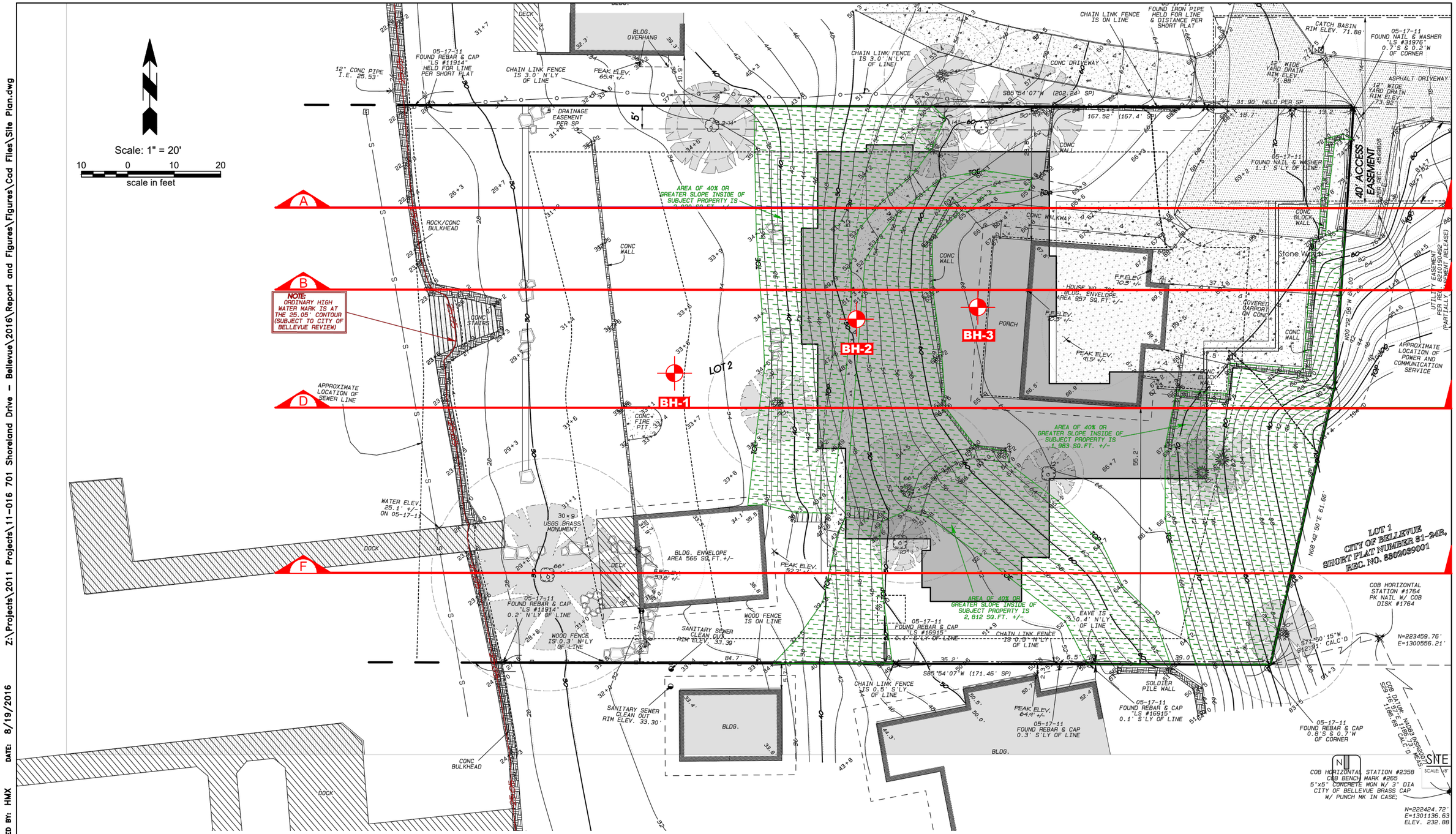
Bryant Residence
701 Shoreland Drive SE
Bellevue, Washington

VICINITY MAP

PROJECT NO.	FIGURE NO.
11-016	1



LEGEND

BH-# Soil Boring by PanGEO, Inc.

A Study Cross-section

NOTES

1. Basemap modified from Topographic & Boundary Survey, dated 6/29/2011, by GeoDimensions, Inc. and preliminary Site Plan Sheet A1.1, dated 8/5/2016 by Ripple Design Studios, Inc.
2. Map features are provided for relative information only and are not a substitution for field survey.
3. Location of borings are approximate and based on the relative locations of known site features.

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Bryant Residence
701 Shoreland Drive SE
Bellevue, Washington

SITE AND EXPLORATION PLAN

PROJECT NO.	FIGURE NO.
11-016	2

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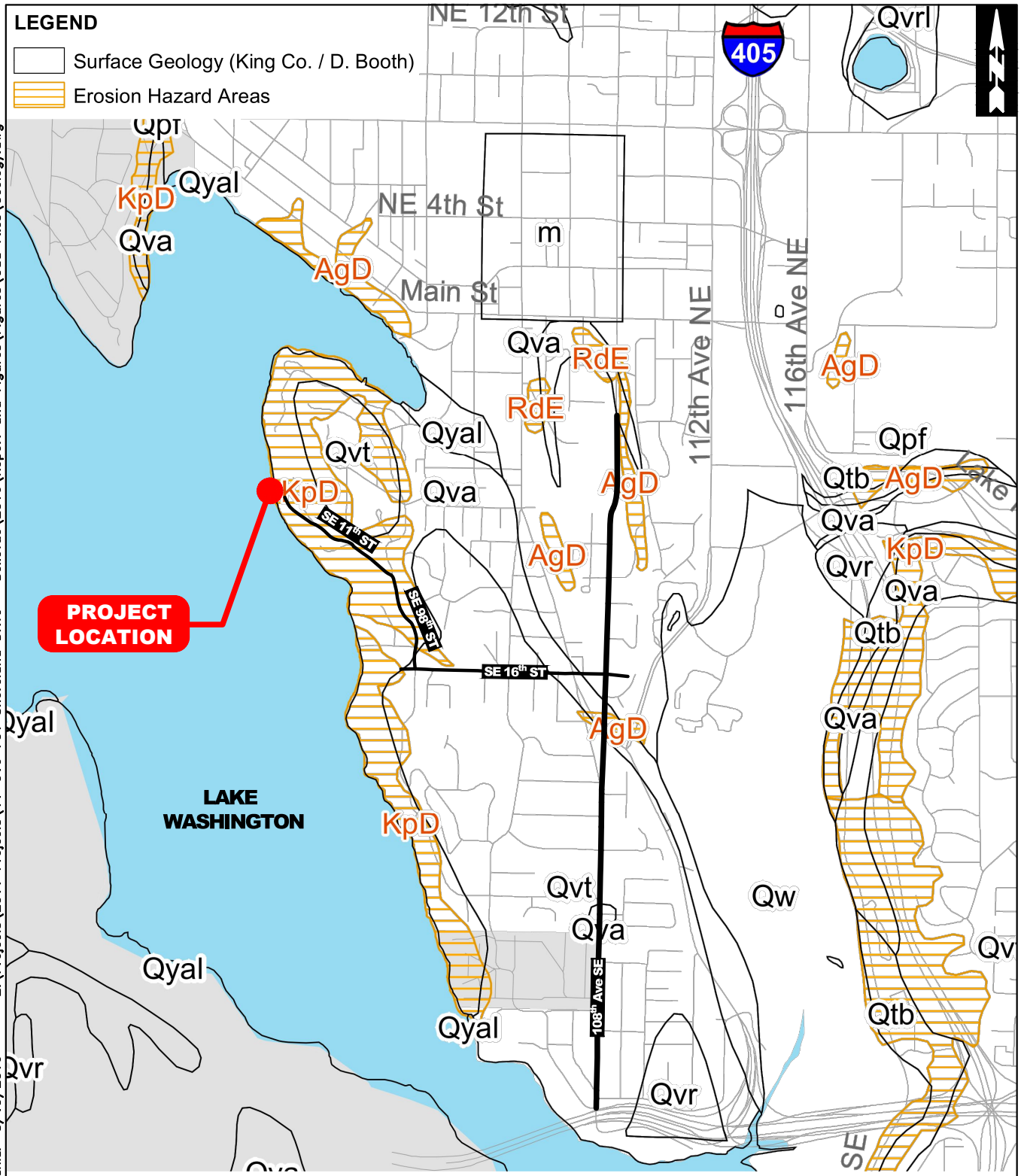

GEOLOGIC UNITS

Qw	Wetland deposits
Qyal	Younger alluvium deposits
Qvr	Recessional outwash deposits
Qvt	Glacial till
Qva	Advance outwash deposits
Qtb	Transitional beds

SOIL UNITS W/ EROSION POTENTIAL

Agd	Alderwood gravelly sandy loam, 15% to 30% slopes
KpD	Kitsap silt loam, 15% to 30% slopes
RdE	Ragnar-Indianola association, moderately steep

1000' 0 1000' 2000'

Approximate Scale: 1" = 2000'

NOTES

1. Basemap derived from City of Bellevue Figure G-1 Surface Geology and Soils with Severe Erosion Potential.
2. City of Bellevue GIS 2001, King County GIS 2001; Booth, D.B., Haungerud, R.A., and Sackett, J.
3. Detailed descriptions of the geologic units can be found in the text of the report.
4. Only the applicable geologic units are listed.

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Bryant Residence
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Bellevue, Washington

GEOLOGIC MAP

PROJECT NO. 11-016

FIGURE NO. 3

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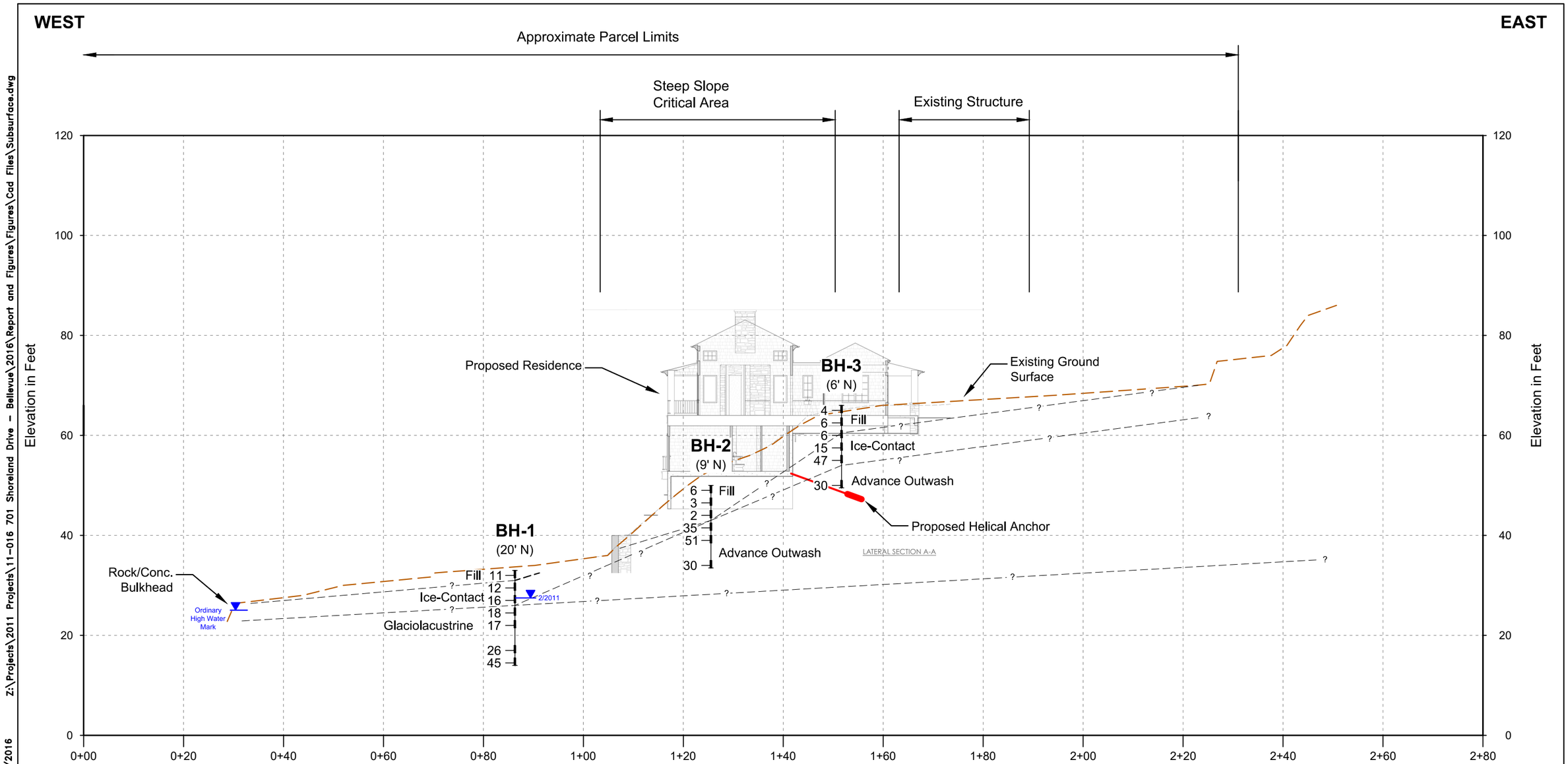
Tb



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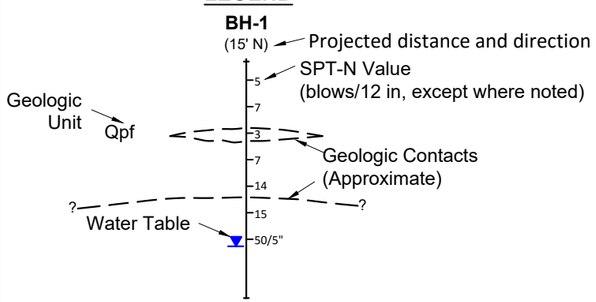

NOTES

1. Location of borings are approximate and based on the relative locations of known site features.
2. Existing ground surface based on Topographic & Boundary Survey, dated 6/29/2011 by GeoDimensions, Inc.
3. Building schematic is provided for relative information only.
4. Geologic contacts between borings are inferred
5. Vertical Datum: NAVD '88

H. Scale: 1" = 20'
10 0 10 20
10 0 10 20
V. Scale: 1" = 20'

PanGEO INCORPORATED

Bryant Residence
701 Shoreland Drive SE
Bellevue, Washington

GENERALIZED
SUBSURFACE PROFILE
CROSS-SECTION A

PROJECT NO.	FIGURE NO.
11-016	4

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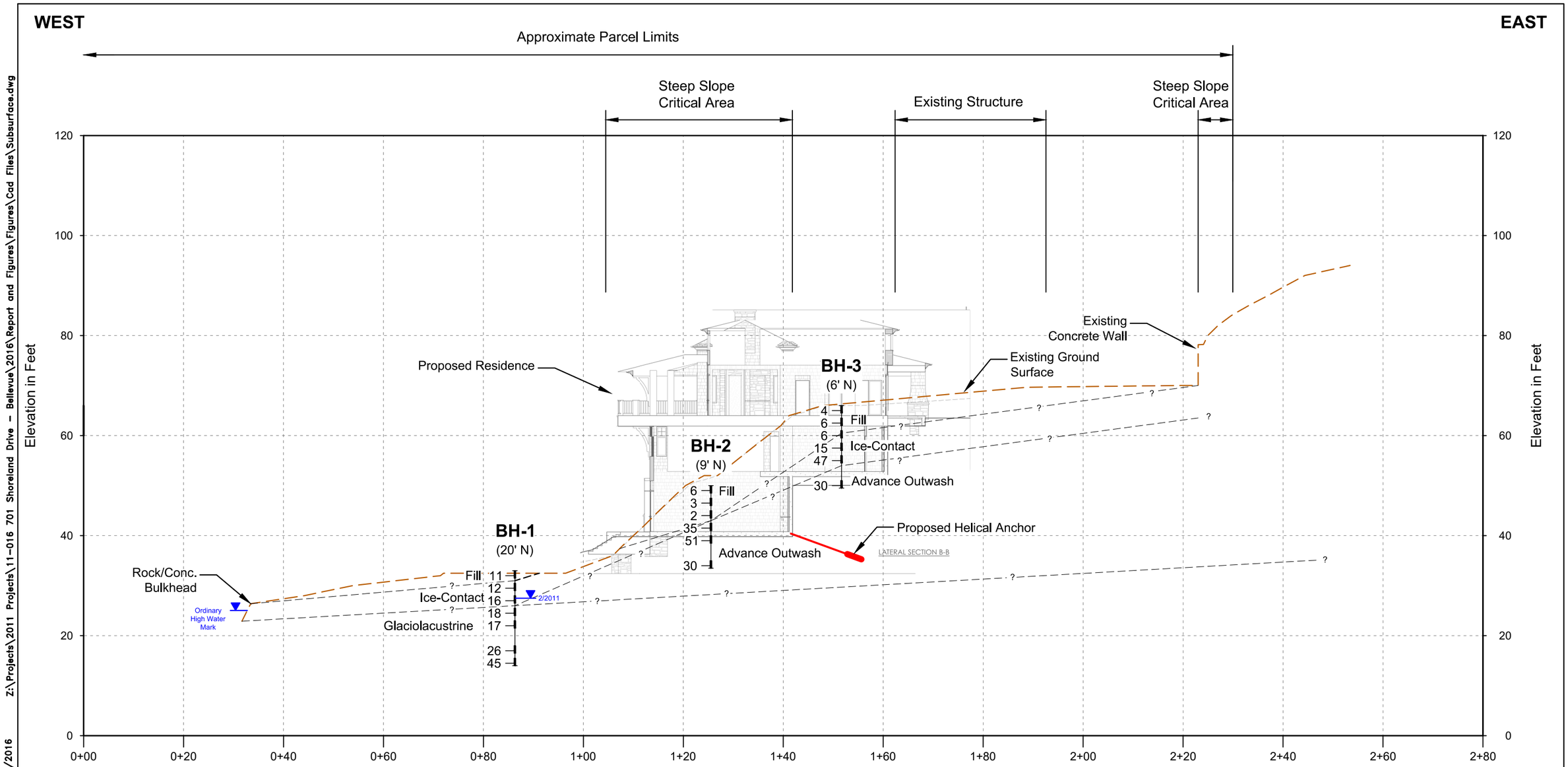

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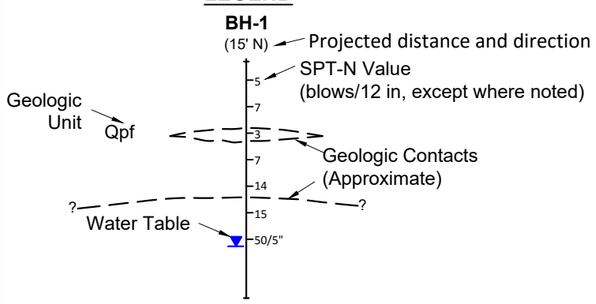

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3. Building schematic is provided for relative information only.
4. Geologic contacts between borings are inferred
5. Vertical Datum: NAVD '88

H. Scale: 1" = 20'
10 0 10 20
10 0 10 20
V. Scale: 1" = 20'

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701 Shoreland Drive SE
Bellevue, Washington

GENERALIZED SUBSURFACE PROFILE CROSS-SECTION B

PROJECT NO.	FIGURE NO.
11-016	5

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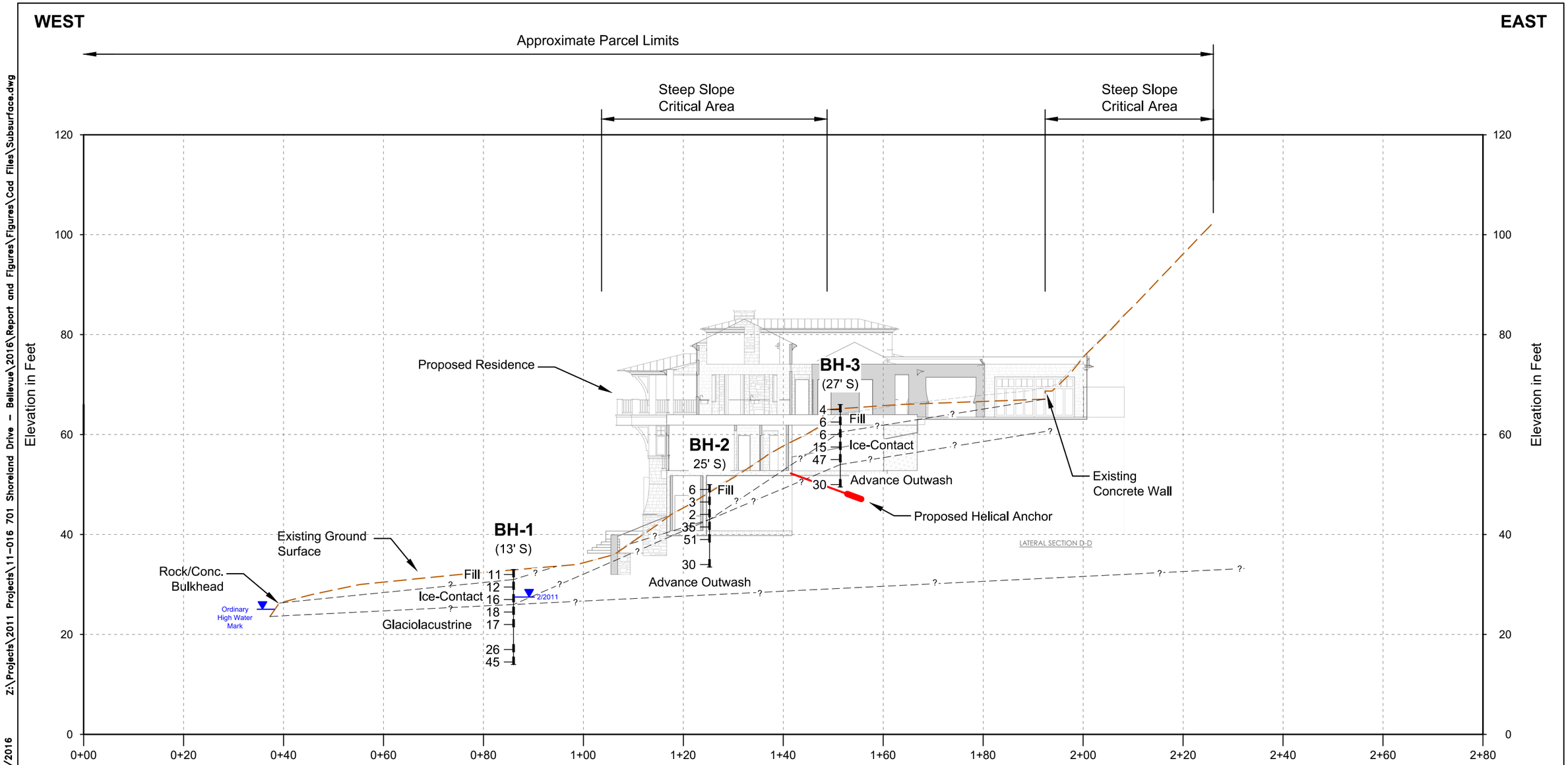

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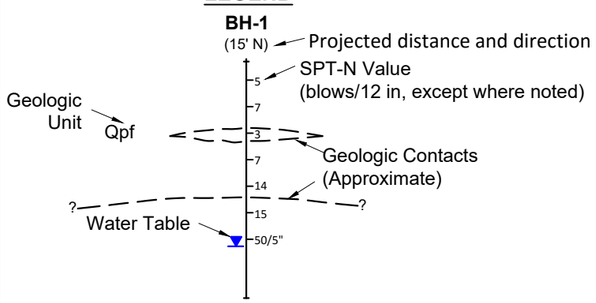

NOTES

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3. Building schematic is provided for relative information only.
4. Geologic contacts between borings are inferred
5. Vertical Datum: NAVD '88

H. Scale: 1" = 20'
10 0 10 20
10 0 10 20
V. Scale: 1" = 20'

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Bryant Residence
701 Shoreland Drive SE
Bellevue, Washington

GENERALIZED SUBSURFACE PROFILE CROSS-SECTION D

PROJECT NO.	FIGURE NO.
11-016	6

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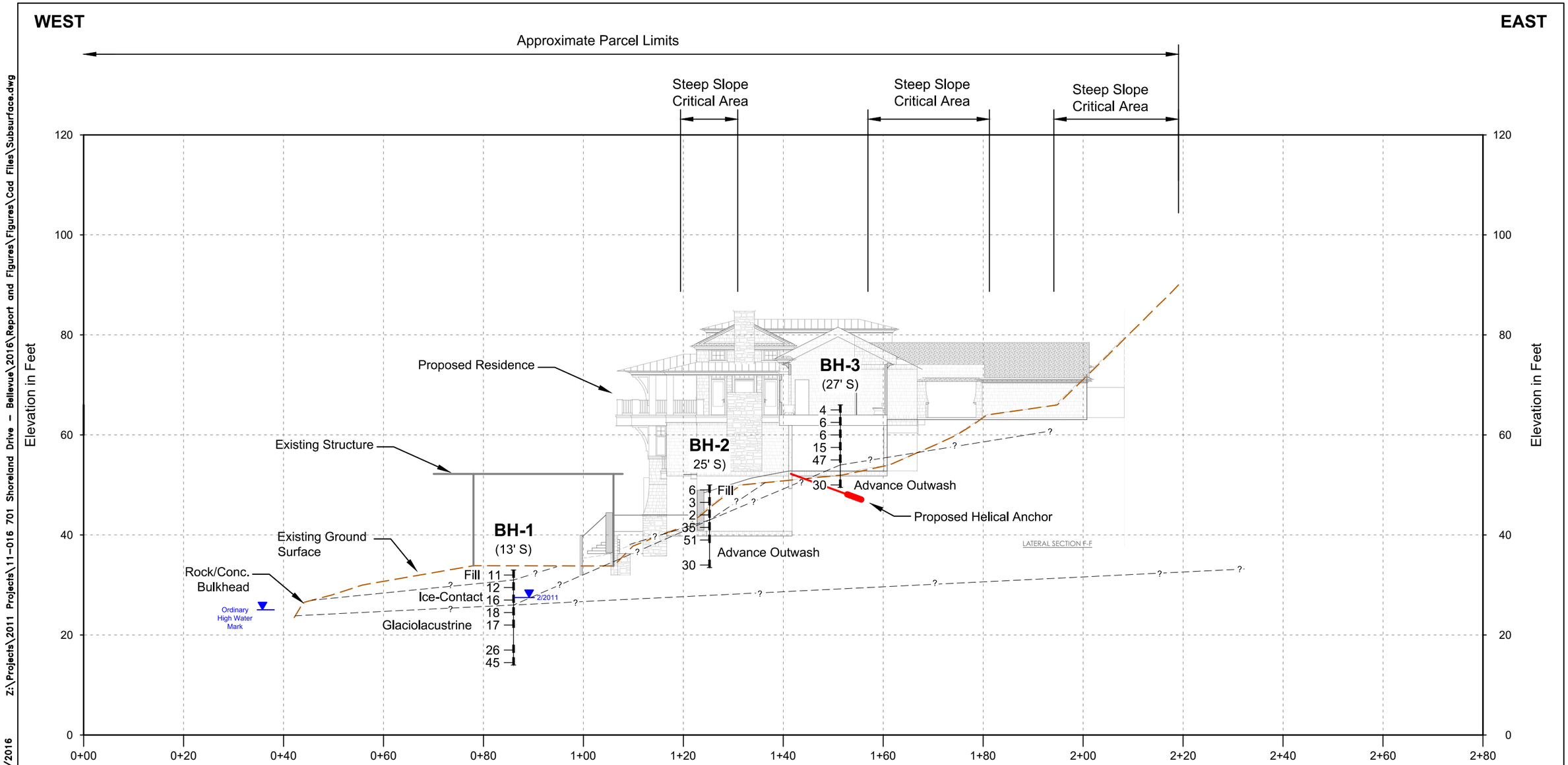

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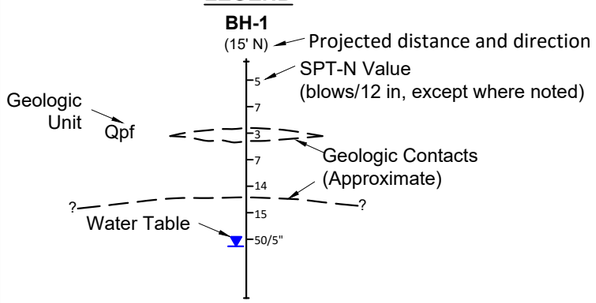

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3. Building schematic is provided for relative information only.
4. Geologic contacts between borings are inferred
5. Vertical Datum: NAVD '88

H. Scale: 1" = 20'
V. Scale: 1" = 20'

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Bryant Residence
701 Shoreland Drive SE
Bellevue, Washington

GENERALIZED SUBSURFACE PROFILE CROSS-SECTION F

PROJECT NO. 11-016

FIGURE NO. 7

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DATE: 8/19/2016

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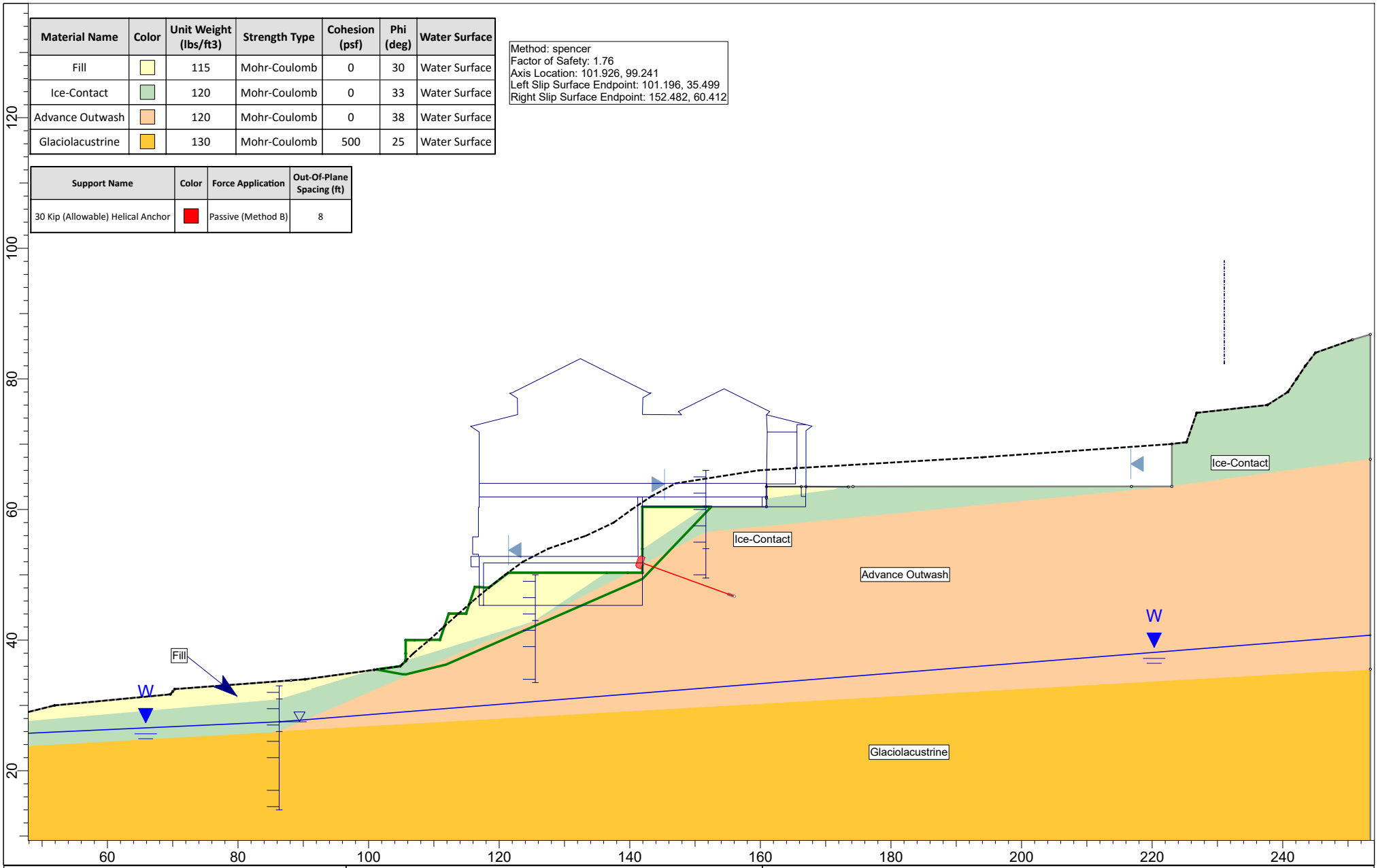
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	500	25	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.76
Axis Location: 101.926, 99.241
Left Slip Surface Endpoint: 101.196, 35.499
Right Slip Surface Endpoint: 152.482, 60.412



PanGEO INCORPORATED

SLIDEINTERPRET 6.039

Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Static Global Stability Analysis

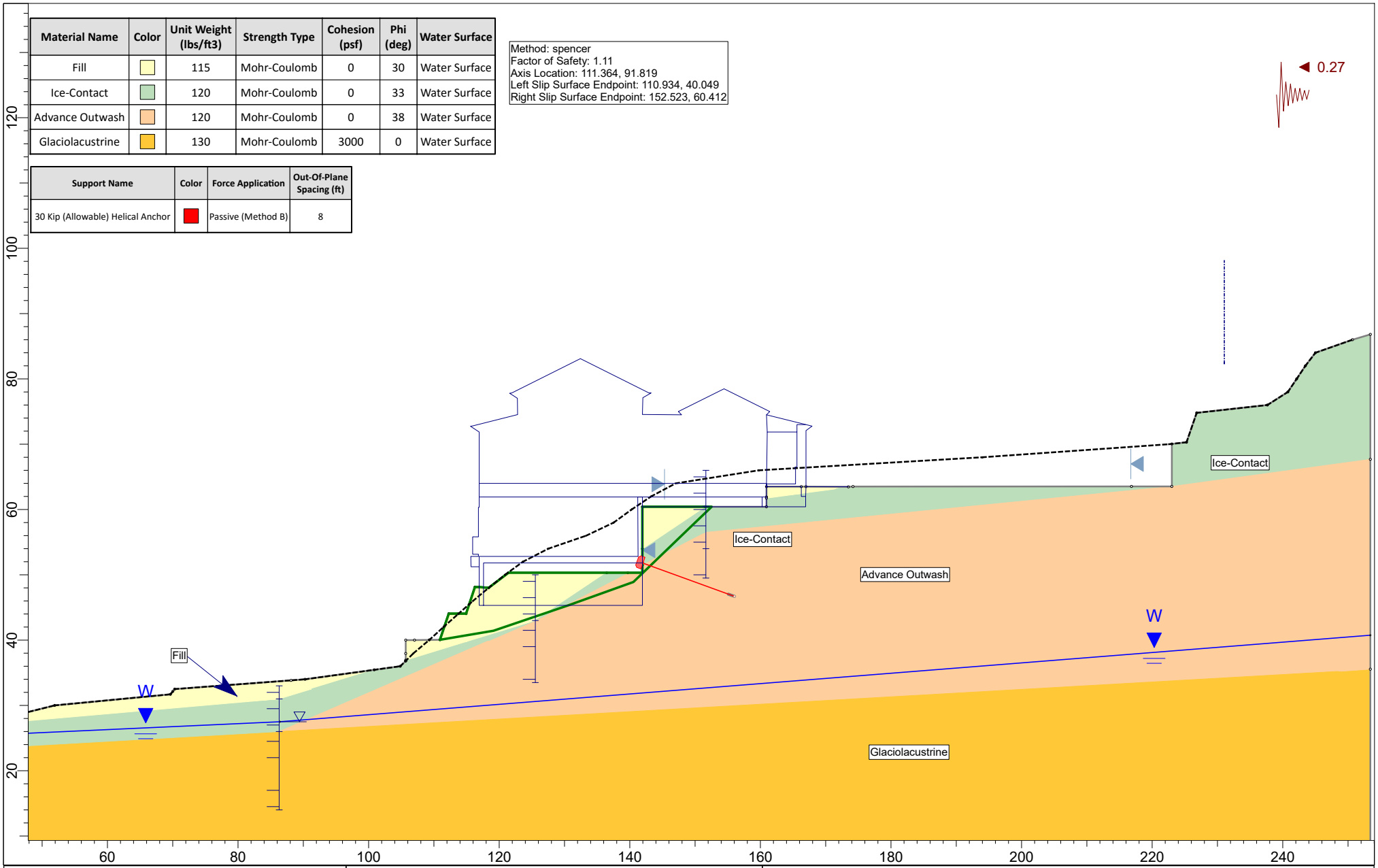
Section A - Proposed Condition

Project No.	Figure No.
11-016	8

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	3000	0	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.11
Axis Location: 111.364, 91.819
Left Slip Surface Endpoint: 110.934, 40.049
Right Slip Surface Endpoint: 152.523, 60.412



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SLIDEINTERPRET 6.039

Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Pseudo-Static (Seismic) Global Stability Analysis

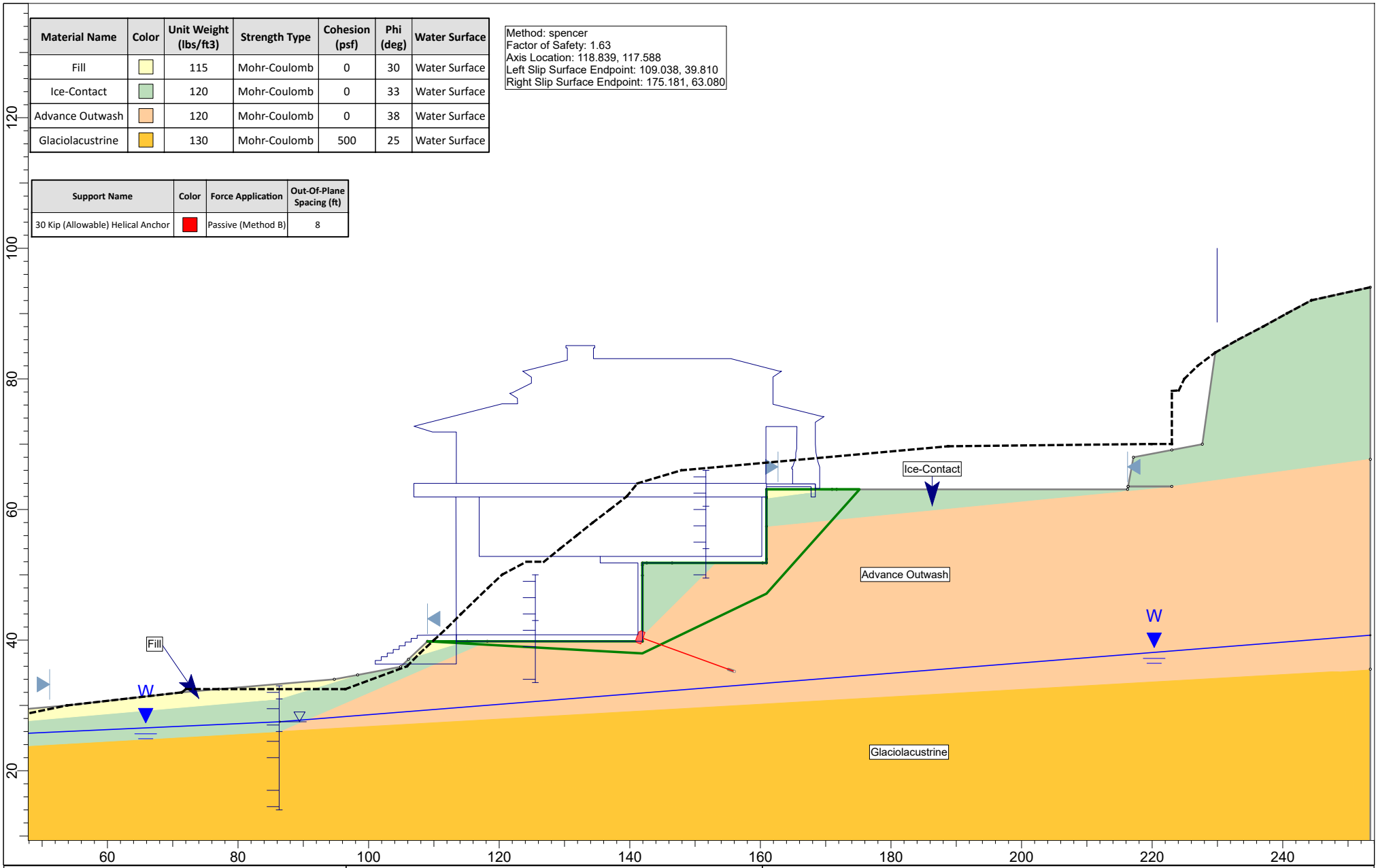
Section A - Proposed Condition

Project No.	Figure No.
11-016	9

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	500	25	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.63
Axis Location: 118.839, 117.588
Left Slip Surface Endpoint: 109.038, 39.810
Right Slip Surface Endpoint: 175.181, 63.080



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Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Static Global Stability Analysis

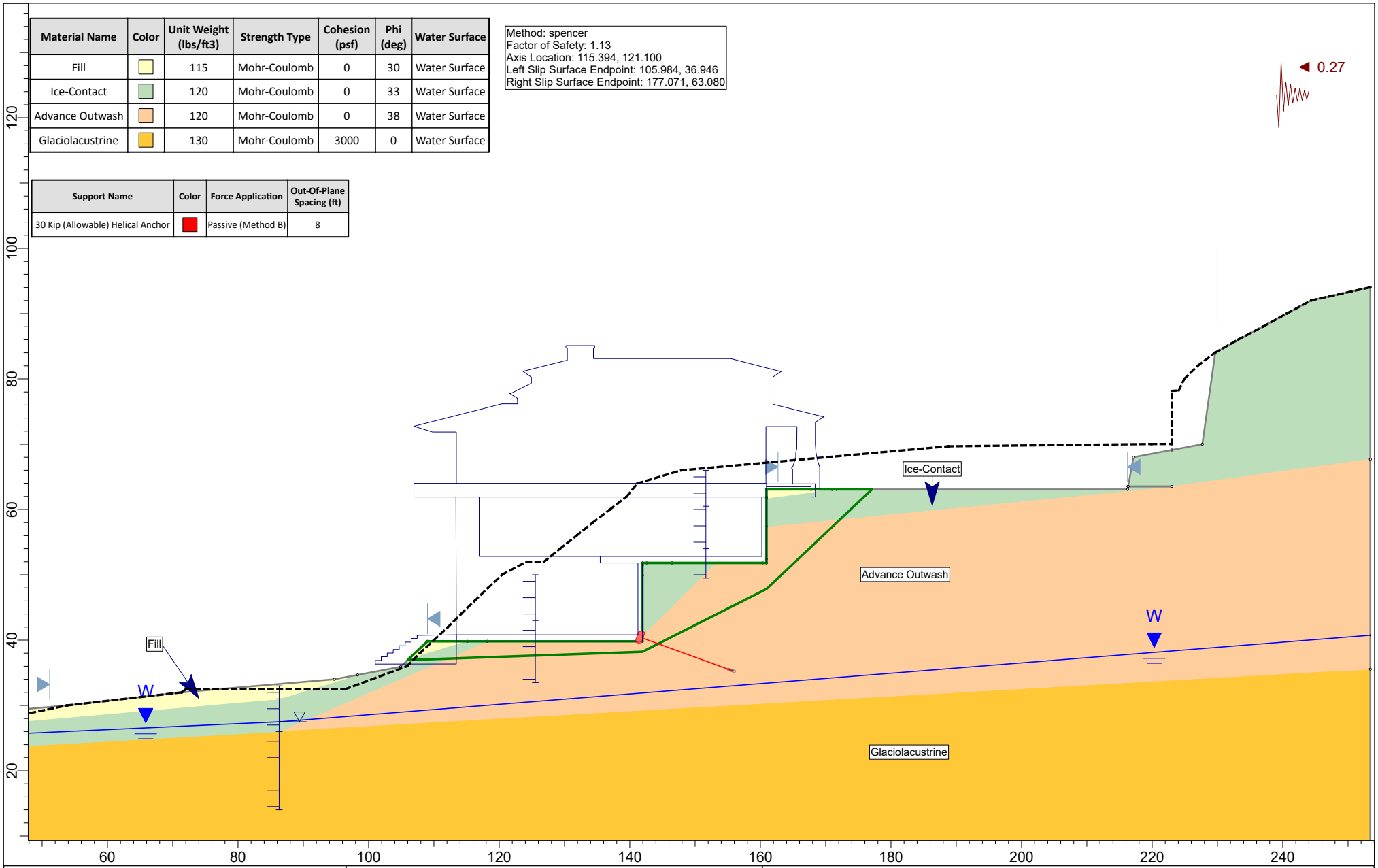
Section B - Proposed Condition

Project No.	Figure No.
11-016	10

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	3000	0	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.13
Axis Location: 115.394, 121.100
Left Slip Surface Endpoint: 105.984, 36.946
Right Slip Surface Endpoint: 177.071, 63.080



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Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Pseudo-Static (Seismic) Global Stability Analysis

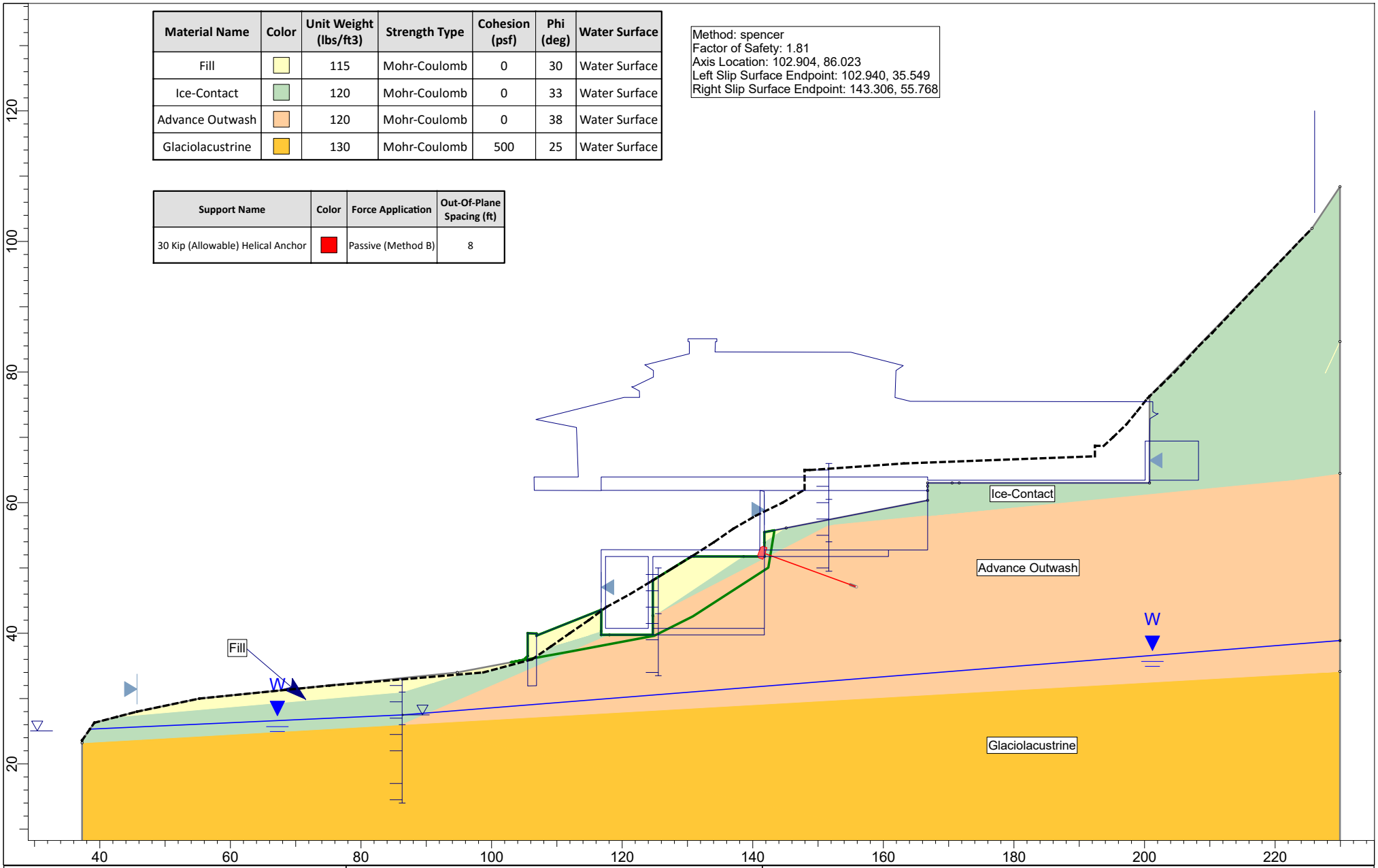
Section B - Proposed Condition

Project No.	Figure No.
11-016	11

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	500	25	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.81
Axis Location: 102.904, 86.023
Left Slip Surface Endpoint: 102.940, 35.549
Right Slip Surface Endpoint: 143.306, 55.768



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Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Static Global Stability Analysis

Section D - Proposed Condition

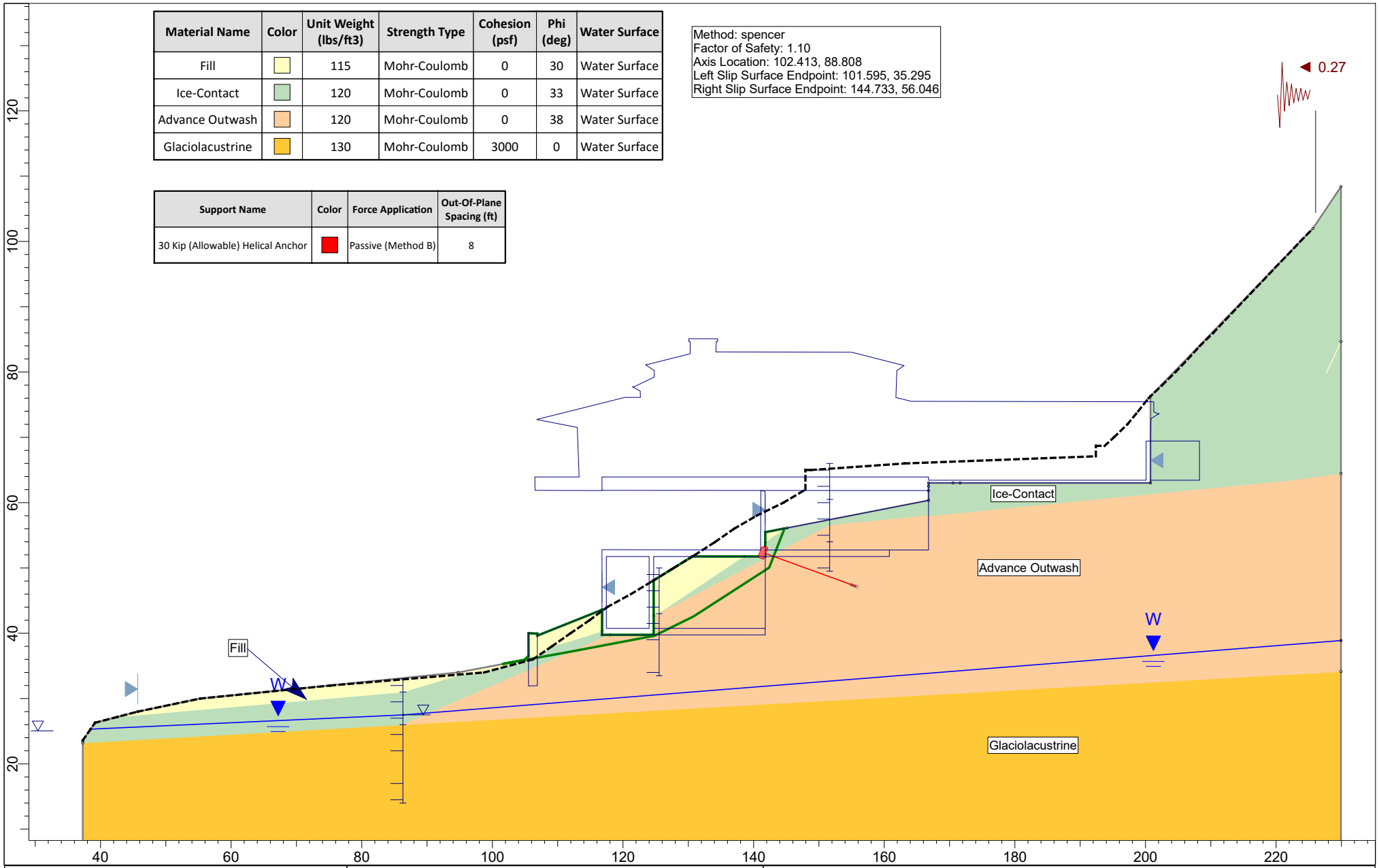
Project No. **11-016**

Figure No. **12**

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill		115	Mohr-Coulomb	0	30	Water Surface
Ice-Contact		120	Mohr-Coulomb	0	33	Water Surface
Advance Outwash		120	Mohr-Coulomb	0	38	Water Surface
Glaciolacustrine		130	Mohr-Coulomb	3000	0	Water Surface

Support Name	Color	Force Application	Out-Of-Plane Spacing (ft)
30 Kip (Allowable) Helical Anchor		Passive (Method B)	8

Method: spencer
Factor of Safety: 1.10
Axis Location: 102.413, 88.808
Left Slip Surface Endpoint: 101.595, 35.295
Right Slip Surface Endpoint: 144.733, 56.046



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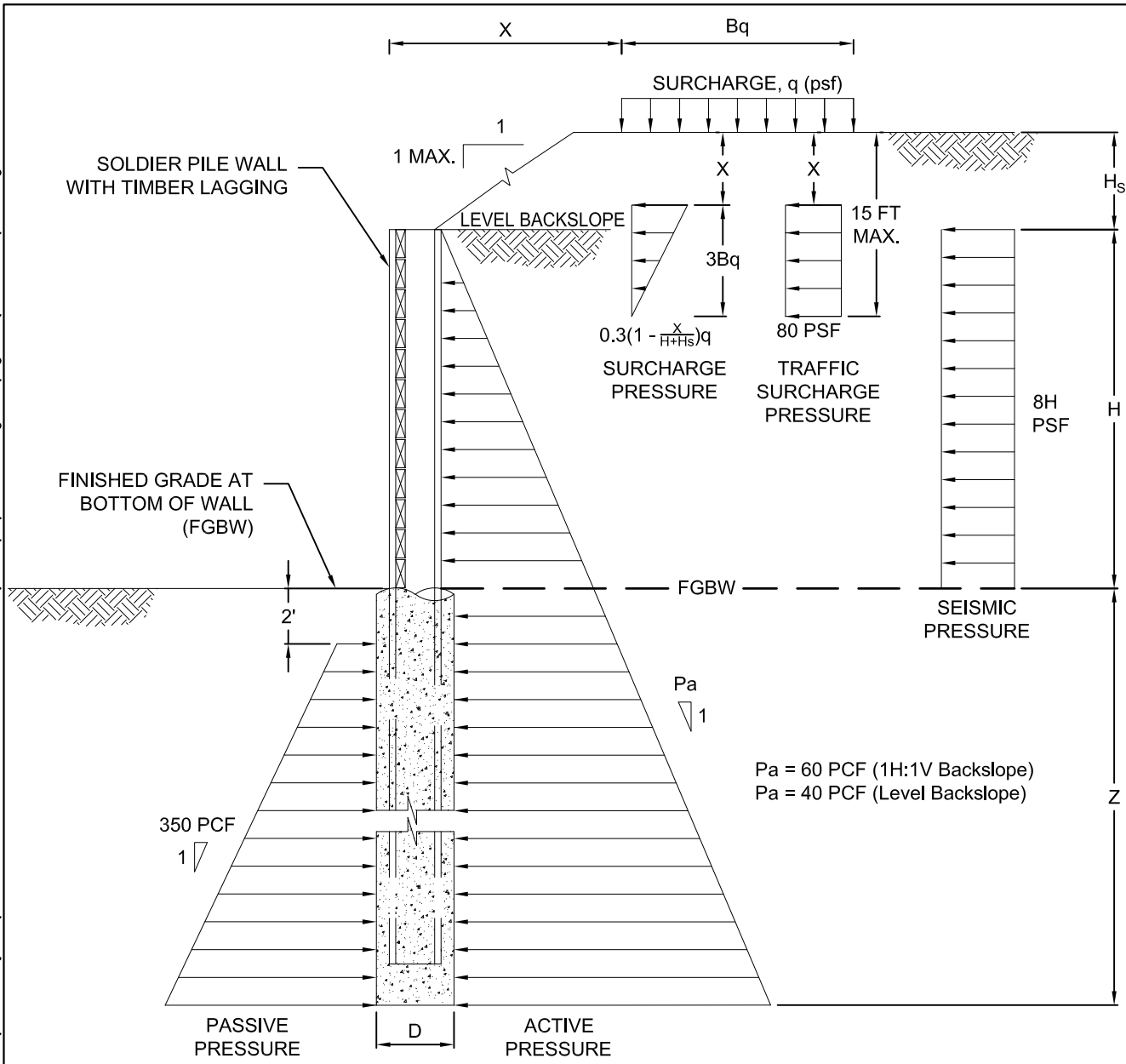
Bryant Residence
701 Shoreland Drive SE
Belleuve, Washington

Pseudo-Static (Seismic) Global Stability Analysis

Section D - Proposed Condition

Project No.	Figure No.
11-016	13



NOTES:

1. Embedment (Z) should be determined by summation of moments at the bottom of the soldier piles. Minimum pile embedment shall be 10 feet, or deeper as determined by structural analysis.
2. A factor of safety of 1.5 has been applied to the recommended passive earth pressure value. No factor of safety has been applied to the recommended active earth pressure values.
3. Spacers ($\frac{1}{8}$ inch) should be provided between timber lagging boards to promote drainage.
4. Apply active and surcharge pressures over the full width of the pile spacing above the base of the excavation and over one pile diameter below the base of the excavation.
5. Apply passive pressures over two times the pile diameter (D) below the base of the excavation.
6. Use 50% of the active and surcharge pressures for lagging design with soldier piles spaced at 8-ft or less.
7. For seismic condition, combine the Seismic Active Earth Pressure with the Static Active earth Pressure. The passive pressure may be increased by one-third for the seismic condition.
8. Refer to the report text for additional discussions.

PanGEO INCORPORATED	Bryant Residence 701 Shoreland Drive SE Bellevue, Washington	DESIGN LATERAL PRESSURES PERMANENT CANTILEVERD SOLDIER PILE WALL
		PROJECT NO. 11-016 / FIGURE NO. 14

DRAWN BY: NTW CHECKED BY: HMX DATE: 09.07.2016 Z:\Projects\2011 Projects\11-016 701 Shoreland Drive - Bellevue\2016\Report and Figures\Figures\Cad Files\EPD.dwg

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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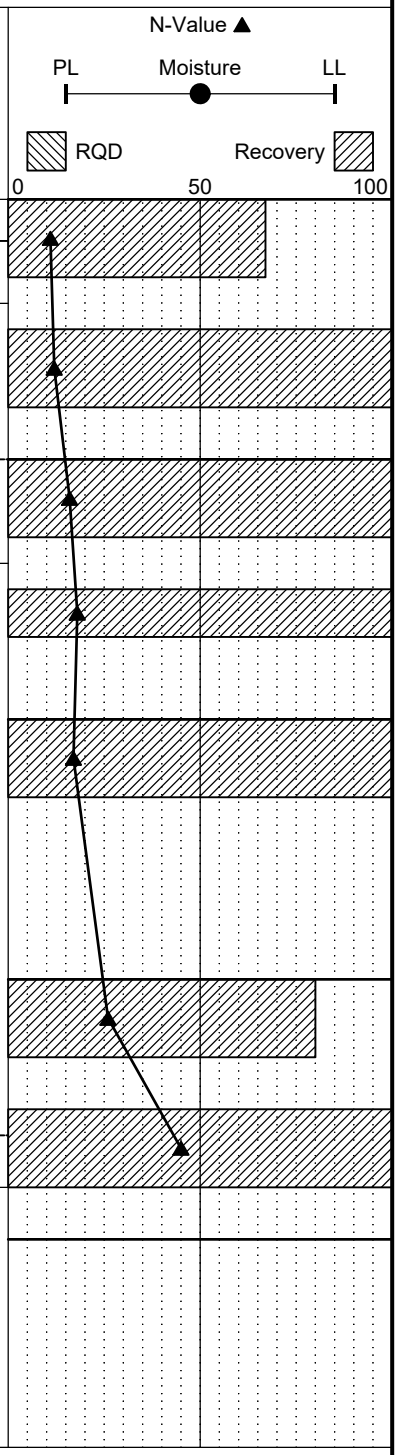
Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	701 Shoreland Drive SE	Surface Elevation:	~33
Job Number:	11-016	Top of Casing Elev.:	
Location:	Bellevue, Washington	Drilling Method:	Hollow Stem Auger
Coordinates:	Northing: , Easting:	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1		2 5 6			Medium Stiff, dark brown, sandy SILT, some organics and roots, very moist **(Fill).**
						Medium dense, brown-dark brown, slightly silty sandy GRAVEL, moist.
	S-2		3 5 7			Stiff, gray mottled with rusty brown, sandy SILT/silty fine SAND, some iron-oxide stains, moist **(Ice-Contact Deposits?).**
5	S-3		5 8 8			Medium dense, gray-light gray, silty fine SAND, very moist to wet.
	S-4		4 6 12			Very stiff, gray-light gray, slightly sandy SILT, moist **(Glaciolacustrine Deposits).**
10	S-5		4 7 10			-becomes gray, SILT/cleyey SILT, very stiff, moist.
15	S-6		4 10 16			-becomes clayey SILT with trace fine sand, very stiff, moist.
	S-7		10 21 24			Hard, gray, sandy SILT/silty fine SAND, very moist.
20						Bottom of Boring at about 19 ft. Groundwater was observed at about 5.5 feet about two hour after drilling.



Completion Depth:	19.0ft
Date Borehole Started:	2/7/11
Date Borehole Completed:	2/7/11
Logged By:	HMX
Drilling Company:	CN Drilling, Inc.

Remarks: Acker Portable Drill. Standard Penetration Test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism.

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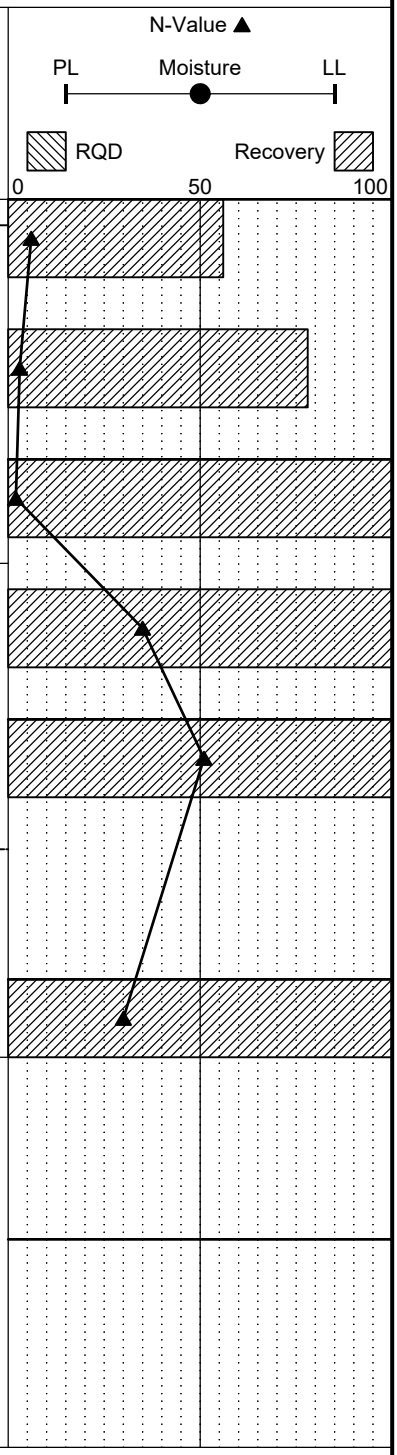
LOG OF TEST BORING BH-1

Figure A-2

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

Project:	701 Shoreland Drive SE	Surface Elevation:	~50'
Job Number:	11-016	Top of Casing Elev.:	
Location:	Bellevue, Washington	Drilling Method:	Hollow Stem Auger
Coordinates:	Northing: , Easting:	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1		6 4 2			Loose, gray, crushed rock, moist **(Fill).**
						Loose, brown, fine to medioum SAND, moist.
	S-2		1 1 2			-becomes brown, silty fine SAND, trace roots, loose, moist.
5	S-3		2 1 1			-becomes brown, fine SAND, some silt, very loose, moist.
						Dence, brown-gray, fine SAND, some silt, moist **(Advance Outwash).**
	S-4		5 17 18			
10	S-5		12 23 28			-becomes gray-brown, fine SAND with some silt to slightly silty SAND, very dense, moist.
						Dense, gray-brown, silty fine SAND, occosional thin silt layers, moist to very moist.
15	S-6		7 13 17			
						Bottom of Boring at about 16.5 ft. Groundwater was not observed during drilling.
20						



Completion Depth:	16.5ft
Date Borehole Started:	2/7/11
Date Borehole Completed:	2/7/11
Logged By:	HMX
Drilling Company:	CN Drilling, Inc.

Remarks: Acker Portable Drill. Standard Penetration Test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism.

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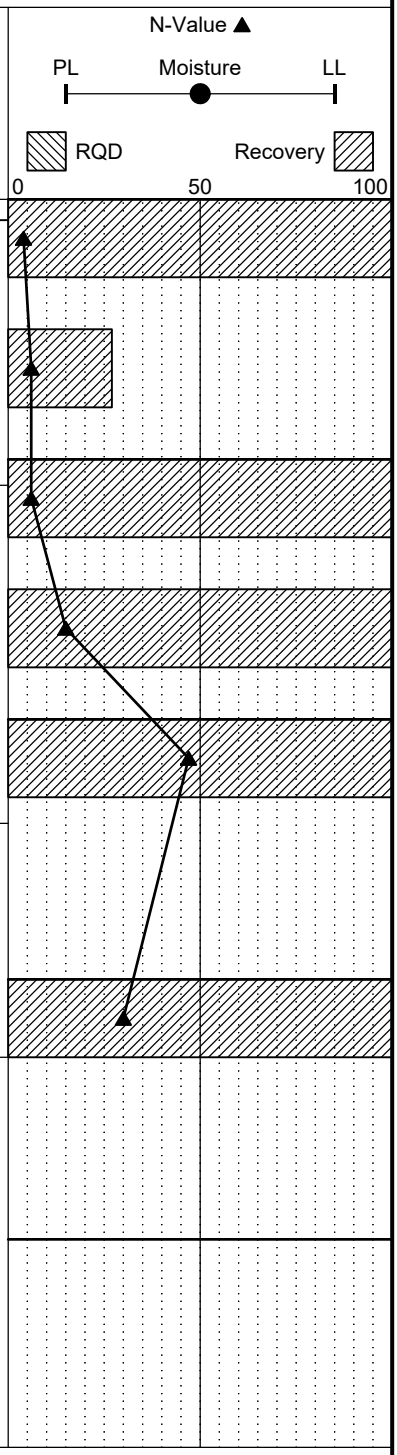
LOG OF TEST BORING BH-2

Figure A-3

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

Project:	701 Shoreland Drive SE	Surface Elevation:	~66'
Job Number:	11-016	Top of Casing Elev.:	
Location:	Bellevue, Washington	Drilling Method:	Hollow Stem Auger
Coordinates:	Northing: , Easting:	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1		2 2 2			Approximately 5-inch bark and tree leaves. Loose, brown-dark brown, silty SAND, some gravel and roots, trace brick gragments, very moist **(Fill).**
	S-2		2 2 4			-becomes brown, silty gravelly SAND, loose, very moist.
5	S-3		2 2 4			Loose, gray-brown, silty fine SAND/sandy SILT, moist **(Ice-Contact Deposits?).**
	S-4		6 8 7			Stiff, light brown-light gray, sandy SILT/silty fine SAND, damp.
10	S-5		9 21 26			-grades to hard.
						Dense, gray-brown, fine SAND, some silt, moist **(Advance Outwash).**
15	S-6		11 13 17			
						Bottom of Boring at about 16.5 ft. Groundwater was not observed during drilling.
20						



Completion Depth:	16.5ft
Date Borehole Started:	2/7/11
Date Borehole Completed:	2/7/11
Logged By:	HMX
Drilling Company:	CN Drilling, Inc.

Remarks: Acker Portable Drill. Standard Penetration Test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism.

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LOG OF TEST BORING BH-3

Figure A-4

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