



# CITY OF MUKILTEO

## REQUEST FOR COMMENTS

DATE: August 7, 2018

	Alderwood Water District – (Dan Sheil / Scott Smith)		Puget Sound Clean Air Agency (Beth Carper)
	Burlington Northern Santa Fe Railway (Marvinique Hill)	X	Puget Sound Energy (Dom Amor)
	City of Edmonds (Rob Chave)		Puget Sound Regional Council
	City of Everett (Allan Giffen)		Seattle Dist. Corps of Engineers (Dept. Army-Reg. Branch)
	City of Everett (Steve Ingalsbe)		Snohomish Co. Airport/Paine Field (A. Rardin/R. Zulauf)
	City of Lynnwood (Paul Krauss)		Snohomish Co. Assessor's Office ( <i>Ordinances Only</i> )
	City of Mill Creek (Tom Rogers)		Snohomish Co. Conservation District
X	City of Mukilteo (Building Official)		Snohomish Co. Environmental (Cheryl Sullivan)
X	City of Mukilteo (Fire Chief)		Snohomish Co. Fire District #1 (Kevin Zweber)
X	City of Mukilteo (Fire Marshal)		Snohomish Co. Marine Res. Comm. (Kathleen Herrmann)
X	City of Mukilteo (Engineering "In-Box")		Snohomish Co. Planning & Dev. Svc. (Darryl Easton)
X	City of Mukilteo (Com. Dev. Dir.) ( <i>Postcard/Notice only</i> )		Snohomish Co. Public Works (Shannon Flemming)
X	City of Mukilteo ( Police, Cheol Kang, Myron Travis)	X	Snohomish Co. PUD: Dist. Eng. Services (Mary Wicklund)
X	Comcast of Washington (Casey Brown, John Warrick)		Snohomish Health District (Bruce A. Straughn)
X	Community Transit (Kate Tourtellot)	X	Sound Transit Authority (Perry Weinberg)
X	Dept. of Commerce (Growth Mgmt. Svcs Rev. Team)	X	Tulalip Tribes – (Zachary Lamebull)
	Dept. of Natural Resources (James Taylor)	X	Tulalip Tribes – (Richard Young)
	FAA/Air Traffic Division, ANM-0520 (Daniel Shoemaker)	X	United States Postal Service (Soon H. Kim)
	FEMA (John Graves)	X	Verizon Company of the NW, Inc. (Tim Rennick.)
	Island County MRC (Rex Porter) ( <i>Shoreline Only</i> )	X	Washington Dept. of Ecology (Peg Plummer)
	Master Builders King/Sno. Counties (Mike Pattison)		Washington Dept of Fish & Wildlife (Jamie Bails)
X	Mukilteo Beacon (Editor) ( <i>Postcard/Notice only</i> )	X	WSDOT (Scott Rodman)
X	Mukilteo School District (Cindy Steigerwald)	X	WSDOT (Ramin Pazooki)
X	Mukilteo School District (Josette Fisher)		WSDOT Ferries(Kojo Fordjour) ( <i>Shoreline Only</i> )
X	Mukilteo Tribune (Editor) ( <i>Postcard/Notice only</i> )	X	WRIA 7 Water Resources
X	Mukilteo Water & Wastewater District (Jim Voetberg, Manager; Rick Matthews; Kendra Chapman)	X	Planning Commission ( <i>Postcard Only</i> )
	National Marine Fishery Service		Adjacent Property Owners
X	Office of Archaeology & Historic Pres. (Allyson Brooks)	X	Applicant/Contact Person ( <i>Notice Only</i> )
	Ogden, Murphy, Wallace (Angela Summerfield) ( <i>Ordinances Only</i> )	X	Parties of Interest
X	Pilchuck Audubon Society (President)		Parties of Record
	Port of Everett (Graham Anderson)	X	Property Owners within 300' ( <i>Postcard/Notice Only</i> )
			Other:

FILE NO.: SFR-RUP-HE-003

PROPONENT: Asghar Ramfar on behalf of  
Horizon Ridge LLC

PROJECT NAME: Ramfar Single-Family Reasonable Use Permit/Variance

PROJECT DESCRIPTION: Construction of a single-family residence with associated grading, driveway access and storm drainage system on an existing 8,079 square foot lot in the RD 7.5 zoning district. The property is encumbered with steep slopes therefore the applicant is asking for a reduction in the required setbacks.

FILE NO.: SFR-RUP-HE-003

PROPONENT: Asghar Ramfar on behalf of  
Horizon Ridge LLC

PROJECT NAME: Ramfar Single-Family Reasonable Use Permit/Variance

ATTACHED IS:

X	Notice of Application		Plat Map (Reduced)
	DNS ( )	X	Site Plan (Reduced)
X	Environmental Checklist	X	Location Map
X	Application		Vicinity Map
X	Narrative Statement(s)	X	Geotechnical Engineering Evaluation prepared by NGA dated March 16, 2018
X	Civil Plans		

NOTE: \_\_\_\_\_  
\_\_\_\_\_

\*\*\*\*\*

Please review this project as it relates to your area of concern and return your comments with this cover sheet by, Friday, August 24, 2018 to Linda Ritter, Senior Planner, City of Mukilteo, 11930 Cyrus Way, Mukilteo, WA 98275.

  
Linda Ritter  
Senior Planner

8/7/18  
Date

\*\*\*\*\*

RESPONSE SECTION:

\_\_\_\_ Comments Attached

\_\_\_\_ No Comments

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Company

**DO YOU WANT A COPY OF OUR NOTICE OF DECISION**

**YES \_\_ NO \_\_**



11930 Cyrus Way  
Mukilteo, WA 98275  
(425) 263-8000

**Notice of Application  
for Ramfar Single-Family  
Reasonable Use Permit/Variance  
at 1021 13<sup>th</sup> Court  
by Asghar Ramfar on behalf of  
Horizon Ridge LLC**

**Asghar Ramfar** on the behalf of **Horizon Ridge LLC** applied for a Reasonable Use Permit/Variance with the City of Mukilteo on July 19, 2018. The application became complete on July 27, 2018. This application and all supporting documents are available at City Hall for public viewing (File No. SFR-RUP-HE-003).

**Description of Proposal:** Construction of a single-family residence with associated grading, driveway access and storm drainage system on an existing 8,079 square foot lot in the RD 7.5 zoning district. The property is encumbered with steep slopes therefore the applicant is asking for a reduction in the required setbacks.

**Location of Proposal:** Section 28 Township 04 Range 04 Quarter SE MUKILTEO PLAT OF BLK 071 D-01 LOT 8 CITY OF MUK BLA REC AFN 200502085001 TGW TH PTN LOT 9 CITY OF MUK BLA REC AFN 200502085001 LY ELY OF FDL: BEG SWCOR TR "A" CITY OF MUK BLA REC AFN 200502085001 TH S01\*35 49W 42.63FT TAP ON ELY LN SD LOT 8 LY N29\*45 10E 65.62FT FR SW COR THOF & TERM OF HRIN DESC LN AKA PAR A CITY OF MUK LLA REC AFN 200807020129& ROS REC AFN 200807025001 BEING PTNS LOTS 11-15 IN BLK 71 SD PLAT; otherwise known as 1021 13<sup>th</sup> Court, Mukilteo, Washington.

**Environmental Documents Prepared for the Proposal:**

- Environmental Checklist prepared by Asghar Ramfar dated March 3, 2018
- Geotechnical Engineering Evaluation prepared by Nelson Geotechnical Associates, Inc. dated March 16, 2018

**List of Required Permits:**

- Reasonable Use Permit
- Variance
- Building Permit
- Engineering Permit
- Any State and Federal Permits, if applicable

## Applicable Policies and Requirements

The project will be reviewed for consistency with the following policies, standards and regulations:

- |  |  |
|--|--|
| <input type="checkbox"/> Possession Shores Master Plan                         | <input type="checkbox"/> Sector Plan & Amendments                          |
| <input checked="" type="checkbox"/> Comprehensive Plan, Shoreline Master Plan  | <input checked="" type="checkbox"/> Mukilteo Municipal Code                |
| <input checked="" type="checkbox"/> International Building Code (2015 Edition) | <input checked="" type="checkbox"/> City of Mukilteo Development Standards |
| <input checked="" type="checkbox"/> International Fire Code (2015 Edition)     |  |

## Optional DNS Process to be Used:

The City of Mukilteo, as lead agency for this proposal expects to issue a Mitigated Determination of Non-Significance (MDNS) for the proposal. Therefore, the optional DNS process allowed by WAC 197-11-355 is being used. This may be the only opportunity to comment on the environmental impacts of the proposal. Project approval may include mitigation measures under Mukilteo Municipal Code (MMC)13.12 – Drainage Management and MMC 17.52 – Critical Areas Regulations. Also, the project review process may incorporate or require mitigation measures regardless of whether an environmental impact statement (EIS) is prepared.

Conditions being considered to mitigate environmental impacts if a MDNS is issued include:

1. Under MMC 17.52A.040, the applicant shall prepare a landscape or re-vegetation plan that follows the Department of Ecology publications, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners* and *Slope Stabilization and Erosion Control Using Vegetation* or other methodology as approved by the Planning and Public Works Directors. The final re-vegetation plan shall include:
  - Measures to be taken for protection and replacement of the natural vegetative cover with appropriate plants;
  - A phased schedule, with estimated starting and completion dates, showing when each stage of the project will be re-vegetated.
2. Construction, grading, and associated site development must follow recommendations presented in the geotechnical report prepared by Nelson Geotechnical Associates, Inc. and the stormwater report prepared for the proposed development.

**Comment Period**

The application and supporting documents are available for review at the City of Mukilteo, 11930 Cyrus Way, Mukilteo, WA 98275. Contact: Linda Ritter, Senior Planner at (425) 263-8043. The public is invited to comment on the project by submitting written comments to the Planning Department at the above address by 4:30 p.m. on the date noted below.

**Notice of Application Issued:** Friday, August, 10, 2018

**End of Comment Period:** Friday, August 24, 2018

The City will not act on this application until the end of the 14 day public comment period. Upon completion of project review a public hearing will be scheduled with the Mukilteo Hearing Examiner who will approve, approve with conditions, or deny the project. You may request a copy of the final decision on the project by making a written request to the City contact person named below.

**Public Hearing**

There will be a public hearing conducted on this project. You have the right to request notice of and to participate in the public hearing. If you want to receive notice of the hearing, you may make a written request to the City contact person named below.

**Appeals**

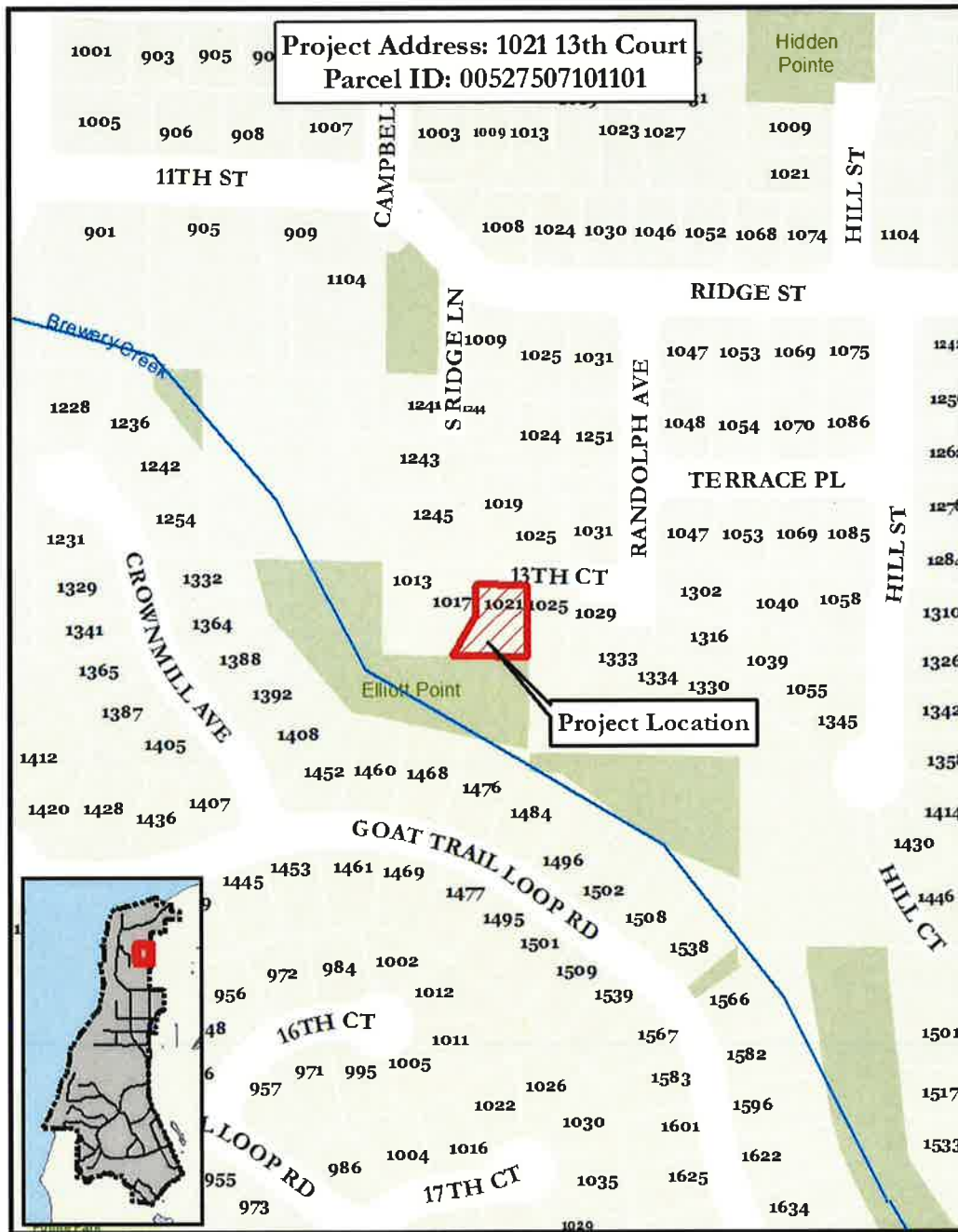
The final decision on this project is not administratively appealable. An appeal must be filed within 21 days with Snohomish County Superior Court after the final decision on the project is issued. Only persons who file written comments on the project in response to the Notice of Application are considered parties of record who may appeal the decision. If you do not file written comments within the comment period, you may not appeal the final decision.

**Contact Person:** Linda Ritter, Senior Planner

(425) 263-8043

Signature:   
Linda Ritter, Senior Planner

Date: 8/7/18



**Location Map**

**Date Issued: Friday, August 10, 2018**  
**Date Advertised: Friday, August 10, 2018**  
**End Comment Period: Friday, August 24, 2018**

pc:	Applicant/Representative	CDD Director	Property File
	Reviewing Agencies	Permit Services Supervisor	
	Interested Parties	Permit Services Assistants (2)	

P12. RUP-HE-2018-001  
SFR-RUP-2018-003

CITY OF MUKILTEO



11930 Cyrus Way Mukilteo, WA 98275  
Fax (425) 212-2068

Date stamp

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JUL 19 2018

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## Land Use Permit Application

PPR # \_\_\_\_\_  
SEPA # \_\_\_\_\_  
Misc # \_\_\_\_\_

Applicant: HORIZON RIDGE LLC Owner: HORIZON RIDGE LLC  
Address: 9410 63rd PL W Address: 9410 63rd PL W  
MUKILTEO, WA 98275 MUKILTEO, WA 98275  
Phone: 425-218-5952 Phone: 425-218-5952  
Project Address: 13rd CRT MUKILTEO, WA 98275

Legal Description of Property: SECTION 28 TOWNSHIP 04 Range 04 OUGRTER  
SE. MUKILTEO PLATE OF BLK 071-DOI LOT 8 CITY OF MUKILTEO BLA  
200502085001  
Key Contact Person: ASGHAR RAMFAR Phone: 425-218-5952  
Fax: 425-348-5893

### Project Type:

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> Commercial           | <input type="checkbox"/> Preliminary Subdivision*           | <input type="checkbox"/> Special Use Permit*       |
| <input type="checkbox"/> Multi-Family         | <input type="checkbox"/> Final Subdivision*                 | <input checked="" type="checkbox"/> Reasonable Use |
| <input type="checkbox"/> Industrial           | <input type="checkbox"/> Preliminary Short Plat*            | <input type="checkbox"/> Lot Line Adjustment*      |
| <input type="checkbox"/> Shoreline* (JARPA)   | <input type="checkbox"/> Final Short Plat*                  | <input type="checkbox"/> Grading*                  |
| <input type="checkbox"/> Conditional Use*     | <input type="checkbox"/> Sector Plan Amendment              | <input type="checkbox"/> Binding Site Plan         |
| <input checked="" type="checkbox"/> Variance* | <input type="checkbox"/> Waterfront Development             | <input type="checkbox"/> Project Rezone            |
|   | <input checked="" type="checkbox"/> Single Family Residence | <input type="checkbox"/> Other, Specify _____      |

\* Need to fill out supplemental application form with project.

### Project Resume:

Existing Use: VACANT LAND Proposed Use: SINGLE FAMILY RES.  
Total Site Area: .18 ACRES 7740' <sup>2</sup> Water District: OLYMPIUS TERECE  
Building Foot Print Area: 30x55 = 1650' <sup>2</sup> Sewer District: OLYMPIUS TERECE  
Lot Coverage: 20% # of Proposed Units: 1  
No. of Parking Stalls Provided: 2 Building Height: 30 FT  
Comp Plan Designation: \_\_\_\_\_ Zoning: 7500' <sup>2</sup>  
Gross Floor Area by Uses: \_\_\_\_\_  
Electric Vehicle Charging Units Provided: Yes \_\_\_\_\_ No ✓ If Yes, How Many? \_\_\_\_\_  
Solar Panels being installed: Yes \_\_\_\_\_ No ✓ If Yes, How Many \_\_\_\_\_  
Pre-application Meeting Held: (Y/N; date) N

The information given is said to be true under the penalty of perjury by the laws of the State of Washington.

A. Ramfar  
Applicant/Authorized Agent Signature

5/18/18  
Date

Owners Signature

Date

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11930 Cyrus Way, Mukilteo, WA 98275  
(425) 263-8000  
Fax (425) 212-2068

## Variance Supplemental Application Form

Date: \_\_\_\_\_ Application Number: \_\_\_\_\_

Fee Received: \$ \_\_\_\_\_ ☐ Cash ☐ Check ☐ Other Receipt #: \_\_\_\_\_

### APPLICANT/OWNER INFORMATION

Applicant: HORIZON RIDGE LLC

Address: 9410 63rd PLW  
MUKILTEO, WA 98275

Phone:(Home) @ 425-218 5952

(Office) \_\_\_\_\_

(Fax) \_\_\_\_\_

Legal Property  
Owner(s): HORIZON RIDGE LLC

Address: 9410 63rd PL W  
MUKILTEO, WA 98275

Phone:(Home) 425-218-5952

(Office) \_\_\_\_\_

(Fax) \_\_\_\_\_

Applicant is: ☒ Owner in fee simple ☐ Contract purchaser ☐ Agent for Owner

### PRIMARY CONTACT PERSON

Name: ASGHAR RAMFAR

Address: SEE ABOVE

Phone:(Home) \_\_\_\_\_

(Office) \_\_\_\_\_

(Fax) \_\_\_\_\_

Date of Present Ownership of Property: \_\_\_\_\_

Date of Contract if Now Purchasing Property: \_\_\_\_\_

Please provide a copy of the contract.

### PROPERTY/LOT INFORMATION

Legal Description of property (attach): SEE ATTACHMENT

Assessor's Tax Account Number: 00527507101101

Location/Street Address of Property: RANDOLPH AVE MUKILTEO 98275

Zoning District: \_\_\_\_\_

Comprehensive Plan Designation: \_\_\_\_\_

Lot Area (Square Feet) 7740

1021  
13th Ct.



BUILDING INFORMATION

Area of all Existing Building(s) (Square Feet): 0

Area of all Proposed Building(s) (Square Feet): 16500'

Area of all Proposed Additions: 0

VARIANCE REQUEST INFORMATION

Cite Code Section for Which Variance Use is Being Requested: \_\_\_\_\_

NARRATIVE EXPLANATION OF REQUEST: Please submit a written detailed explanation of the purpose of the request and discuss how the Variance application meets the criteria for approval and the project's relationship to current plans, policies, and regulations. Refer to the Variance brochure for the criteria.

REQUIRED SIGNATURES

THE INFORMATION GIVEN IS SAID TO BE TRUE UNDER THE PENALTY OF PERJURY BY THE LAWS OF THE STATE OF WASHINGTON.

A. P. R.  
Applicant/Authorized Agent

5/20/19  
Date

\_\_\_\_\_  
Legal Property Owner\*

\_\_\_\_\_  
Date

\_\_\_\_\_  
Legal Property Owner\*

\_\_\_\_\_  
Date

\* NOTE: If legal owner is a corporation or partnership, proof of ability to sign for the corporation or partnership shall be submitted to the City of Mukilteo with this application.

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JUL 19 2018  
CITY OF MUKILTEO



CITY OF

MUKILTEO

## ENVIRONMENTAL CHECKLIST

### ***Purpose of checklist:***

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

### ***Instructions for applicants:***

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

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. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

### ***Instructions for Lead Agencies:***

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

### ***Use of checklist for nonproject proposals:*** [\[help\]](#)

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements—that do not contribute meaningfully to the analysis of the proposal.

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**A. Background** [\[help\]](#)

1. Name of proposed project, if applicable: [\[help\]](#) 13TH CRT-8
2. Name of applicant: [\[help\]](#) ASGHAR RAMFAL
3. Address and phone number of applicant and contact person: [\[help\]](#) 9410 63rd PL WEST MUKILTEO, WA 98275
4. Date checklist prepared: [\[help\]](#) 3/15/18
5. Agency requesting checklist: [\[help\]](#) CITY OF MUKILTEO
6. Proposed timing or schedule (including phasing, if applicable): [\[help\]](#)
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. [\[help\]](#) NO
8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [\[help\]](#) GEOTECHNICAL REPORT
9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. [\[help\]](#) NO  
NO
10. List any government approvals or permits that will be needed for your proposal, if known. [\[help\]](#) NO  
NO
11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) [\[help\]](#) SINGLE FAMILY RESIDENCE APPROX. 2000 SQ'
12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. [\[help\]](#)  
OFF OF RANDOLPH AVE, 13 CRT LOT NO 8  
MUKILTEO, WA

## B. ENVIRONMENTAL ELEMENTS [\[help\]](#)

### 1. Earth [\[help\]](#)

#### a. General description of the site: [\[help\]](#)

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other \_\_\_\_\_

#### b. What is the steepest slope on the site (approximate percent slope)? [\[help\]](#)

40%

#### c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [\[help\]](#)

SEE GEOTECH REPORT  
FOR SOIL TYPE

#### d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [\[help\]](#)

NO

#### e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [\[help\]](#)

EXCAVATION FOR FOUNDATION TOTAL AREA 16000' NO FILLING

#### f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [\[help\]](#)

NO

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

APPROX. 20000'

#### h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [\[help\]](#)

N/A

### 2. Air [\[help\]](#)

#### a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. [\[help\]](#)

N/A, NONE

#### b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [\[help\]](#)

NO

#### c. Proposed measures to reduce or control emissions or other impacts to air, if any: [\[help\]](#)

N/A

3. **Water** [\[help\]](#)

a. Surface Water:

- 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. [\[help\]](#)

N/A

- 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. [\[help\]](#)

N/A

- 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. [\[help\]](#)

NONE

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

N/A

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

N/A

- 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. [\[help\]](#)

N/A

b. Ground Water:

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [\[help\]](#)

N/A

- 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. [\[help\]](#)

N/A

c. Water runoff (including stormwater):

- 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. [\[help\]](#)

RUNOFF WILL BE COLLECTED AT THE SIDE  
AND RELEASED INTO EXISTING WAIR DETENTION

- 2) Could waste materials enter ground or surface waters? If so, generally describe. [\[help\]](#)

NO

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. [\[help\]](#)

NO

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: [\[help\]](#)

N/A

4. Plants [\[help\]](#)

- a. Check the types of vegetation found on the site: [\[help\]](#)

☐ deciduous tree: alder, maple, aspen, other  
☒ evergreen tree: fir, cedar, pine, other  
☒ shrubs  
☐ grass  
☐ pasture  
☐ crop or grain  
☐ Orchards, vineyards or other permanent crops.  
☐ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other  
☐ water plants: water lily, eelgrass, milfoil, other  
☐ other types of vegetation

- b. What kind and amount of vegetation will be removed or altered? [\[help\]](#)

VERY FEW SHRUBS

- c. List threatened and endangered species known to be on or near the site. [\[help\]](#)

NONE

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [\[help\]](#)

NATIVE PLANTS

- e. List all noxious weeds and invasive species known to be on or near the site. [help]

NOT KNOWN

5. **Animals** [help]

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. [help]

SMALL BIRDS

Examples include:

(birds) hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other \_\_\_\_\_

- b. List any threatened and endangered species known to be on or near the site. [help]

NOT KNOWN

- c. Is the site part of a migration route? If so, explain. [help]

NO

- d. Proposed measures to preserve or enhance wildlife, if any: [help]

N/A

- e. List any invasive animal species known to be on or near the site. [help]

NOT KNOWN

6. **Energy and Natural Resources** [help]

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

ELECTRIC & GAS

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

NO

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

BASIC CONSERVATION

7. **Environmental Health** [\[help\]](#)

- 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. [\[help\]](#) **NO**

- 1) Describe any known or possible contamination at the site from present or past uses. [\[help\]](#) **NO, N/A**
- 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. [\[help\]](#) **N/A**
- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project. [\[help\]](#) **N/A**
- 4) Describe special emergency services that might be required. [\[help\]](#) **N/A**
- 5) Proposed measures to reduce or control environmental health hazards, if any: [\[help\]](#) **N/A**

b. **Noise** [\[help\]](#)

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [\[help\]](#) **N/A**
- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. [\[help\]](#) **N/A**
- 3) Proposed measures to reduce or control noise impacts, if any: [\[help\]](#) **N/A**

8. **Land and Shoreline Use** [\[help\]](#)

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [\[help\]](#) **NONE**



b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? [\[help\]](#)

N O

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: [\[help\]](#)

N/A

c. Describe any structures on the site. [\[help\]](#)

NONE

d. Will any structures be demolished? If so, what? [\[help\]](#)

N/A

e. What is the current zoning classification of the site? [\[help\]](#)

SINGLE FAMILY RESIDENCE

f. What is the current comprehensive plan designation of the site? [\[help\]](#)

N/A

g. If applicable, what is the current shoreline master program designation of the site? [\[help\]](#)

N/A

h. Has any part of the site been classified as a critical area by the city or county? If so, specify. [\[help\]](#)

YES , STEEP SLOPE

i. Approximately how many people would reside or work in the completed project? [\[help\]](#)

DONT KNOW

j. Approximately how many people would the completed project displace? [\[help\]](#)

NONE

k. Proposed measures to avoid or reduce displacement impacts, if any: [\[help\]](#)

N/A

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: [\[help\]](#)

N/A

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any: [\[help\]](#)

N/A

9. **Housing** [\[help\]](#)

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [\[help\]](#) ONE

MIDDLE INCOME

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [\[help\]](#) NONE

- c. Proposed measures to reduce or control housing impacts, if any: [\[help\]](#)

N/A

10. **Aesthetics** [\[help\]](#)

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

30 FT

- b. What views in the immediate vicinity would be altered or obstructed? [\[help\]](#)

NONE

- b. Proposed measures to reduce or control aesthetic impacts, if any: [\[help\]](#)

N/A

11. **Light and Glare** [\[help\]](#)

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [\[help\]](#)

N/A

- b. Could light or glare from the finished project be a safety hazard or interfere with views? [\[help\]](#)

NO

- c. What existing off-site sources of light or glare may affect your proposal? [\[help\]](#)

N/A

- d. Proposed measures to reduce or control light and glare impacts, if any: [\[help\]](#)

N/A

12. **Recreation** [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity? [\[help\]](#)

NONE

- b. Would the proposed project displace any existing recreational uses? If so, describe. [\[help\]](#)

NO

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [\[help\]](#)

N/A

13. **Historic and cultural preservation** [\[help\]](#)

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [\[help\]](#)

NO

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [\[help\]](#)

NO

- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [\[help\]](#)

N/A

NO

- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required. [\[help\]](#)

N/A

14. **Transportation** [\[help\]](#)

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [\[help\]](#)

EXISTING PUBLIC STREETS WILL BE USED

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [\[help\]](#)

NO

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? [\[help\]](#)

NONE

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [\[help\]](#)

NO

- e. Describe the existing condition of the proposed access road, including width of easement, width of pavement or roadway, curbs, gutters, and/or sidewalks. [\[help\]](#)

Good

- f. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [\[help\]](#)

NO

- g. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? [\[help\]](#)

VERY FEW

NOT KNOWN AT THIS TIME

- h. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. [\[help\]](#)

NO

- i. Proposed measures to reduce or control transportation impacts, if any: [\[help\]](#)

N/A

#### 15. Public Services [\[help\]](#)

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

YES NORMAL SERVICES FOR SINGLE FAMILY.

- b. Proposed measures to reduce or control direct impacts on public services, if any. [\[help\]](#)

N/A

#### 16. Utilities [\[help\]](#)

- a. Circle utilities currently available at the site: [\[help\]](#)

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. [\[help\]](#)

N/A

### C. Signature [\[help\]](#)

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: \_\_\_\_\_

*A. Ram*

Name of signee \_\_\_\_\_

*ASGHAR RAMFAR*

Position and Agency/Organization \_\_\_\_\_

Date Submitted: \_\_\_\_\_

## D. supplemental sheet for nonproject actions [\[help\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

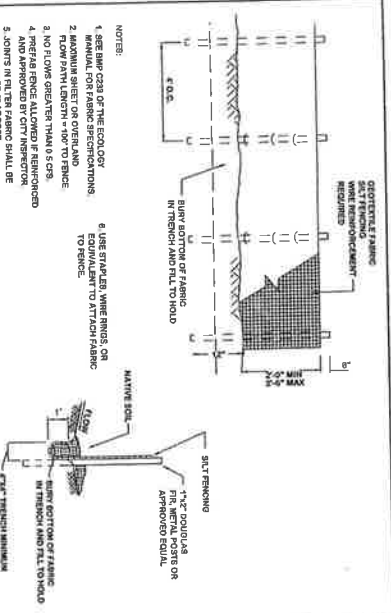
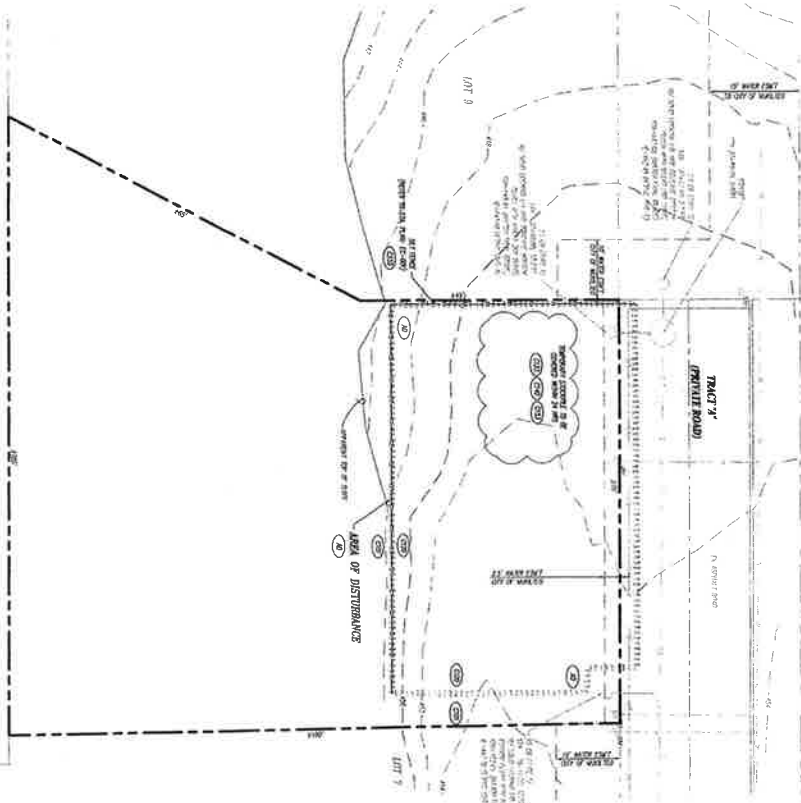


**EROSION CONTROL CONCEPT**  
AN EROSION CONTROL PLAN (ECP) IS REQUIRED AND APPROVED BY THE DISTRICT ENGINEER PRIOR TO ANY EROSION CONTROL MEASURES BEING INITIATED. THE ECP MUST BE CARRIED OUT IN ACCORDANCE WITH THE EROSION CONTROL MANUAL.

**TEMPORARY EROSION CONTROL NOTE:**  
EROSION CONTROL MEASURES MUST BE IN PLACE FOR ANY CONSTRUCTION OF A NEW EROSION CONTROL MEASURE. THE EROSION CONTROL MEASURE MUST BE IN PLACE FOR THE DURATION OF THE CONSTRUCTION OF THE EROSION CONTROL MEASURE.

TEMPORARY EROSION CONTROL NOTE:

NOTE:  
APPLIES TO CATIONS ONLY



DATE	REVISED	PROJECT NO.
07/07/18		180438
DESIGN		DWG
		<b>C2</b>
		OF 3



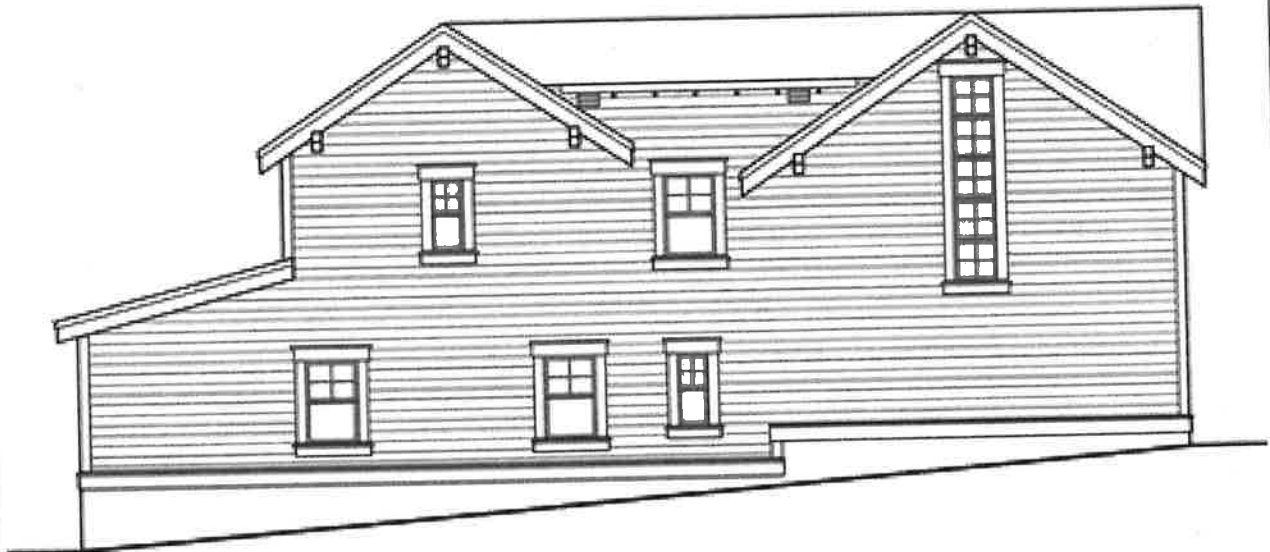




## Building Elevations



FRONT ELEVATION



REAR ELEVATION



LEFT ELEVATION



RIGHT ELEVATION

**Property Account Summary**

**5/24/2018**

**Parcel Number**

**00527507101101**

**Property Address**

**RANDOLPH AVE , MUKILTEO, WA 98275**

**General Information**

**Property Description**

**Section 28 Township 04 Range 04 Quarter SE MUKILTEO PLAT OF BLK 071 D-01 LOT 8 CITY OF MUK BLA REC AFN 200502085001 TGW TH PTN LOT 9 CITY OF MUK BLA REC AFN 200502085001 LY ELY OF FDL: BEG SWCOR TR "A" CITY OF MUK BLA REC AFN 200502085001 TH S01\*35 49W 42.63FT TAP ON ELY LN SD LOT 8 LY N29\*45 10E 65.62FT FR SW COR THOF & TERM OF HRIN DESC LN AKA PAR A CITY OF MUK LLA REC AFN 200807020129& ROS REC AFN 200807025001 BEING PTNS LOTS 11-15 IN BLK 71 SD PLAT**

**Property Category**

**Land and Improvements**

**Status**

**Active, Locally Assessed**

**Tax Code Area**

**00667**



**NELSON GEOTECHNICAL  
ASSOCIATES, INC.**  
**GEOTECHNICAL ENGINEERS & GEOLOGISTS**

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March 16, 2018

**RECEIVED**

**JUL 19 2018**

**CITY OF MUKILTEO**

Asghar Ramfar  
9410 – 63<sup>rd</sup> Place West  
Mukilteo, Washington 98275

Geotechnical Engineering Evaluation  
**Residential Development**  
**Lot 8: 1021 Randolph Avenue**  
**Mukilteo, Washington**  
NGA Job No. 3852C18

Dear Mr. Ramfar:

We are pleased to submit the attached report titled "Geotechnical Engineering Evaluation – Residential Development – Lot 8: 1021 Randolph Avenue – Mukilteo, Washington." This report summarizes our observations of the existing surface and subsurface conditions within the site, and provides general recommendations for the proposed site development. Our services were completed in general accordance with the proposal signed by you on January 31, 2018.

We originally completed geotechnical work on the site for the surrounding development in December 2003, releasing the results of our study in a geotechnical report, dated January 22, 2004. We later followed up with a memorandum regarding structure setbacks within the 10-lot subdivision on June 9, 2006. Recently, we visited the site on February 15, 2018 to observe the current site conditions and complete updated explorations of the subsurface conditions. The property consists of a convex, pentagonally-shaped parcel covering approximately 0.18 acres, located at the above address. The proposed development areas of the site are located to the south of a private road extending west from Randolph Avenue. Topographically, the upper portion of the site is relatively level within areas adjacent to the driveway, and slopes steeply to the south approximately thirty feet south of the driveway, toward a forested ravine containing Brewery Creek. The parcel is currently vacant but contains subsurface utilities within the level portion of the site, adjacent to the driveway. We understand that the proposed development plan will include construction of a new residence with a daylight basement and associated utilities within the north-central portion of the property, within the steeply sloping topography. Specific grading and stormwater handling plans were not available at the time this report was prepared.

We completed two test pit explorations within the site on February 15, 2018. Our explorations indicated that the site was underlain by competent, native soils at depth, below a surficial layer of undocumented fill.

It is our opinion that the planned development is feasible from a geotechnical standpoint, provided that our recommendations are incorporated into the design and construction of this project. Due to the close proximity of the proposed structures to the steep slopes, we have recommended that the downhill southern side of the residence located within the moderate to steep southwest-facing ravine slope be supported on drilled piers extending down so that a minimum effective setback of 25 feet from the face of the slope is maintained. We recommend that the remainder of the residence foundations be designed to utilize

conventional spread footings extending down to medium dense or better native soils for bearing capacity and settlement considerations. These soils should generally be encountered approximately three to five feet below the existing ground surface, based on our explorations. We should note that deeper areas of unsuitable soils and/or undocumented fill could be encountered in the unexplored areas of the site.

It is also our opinion that the soils that underlie the site and form the core of the site slopes should be stable with respect to deep-seated earth movements, due to their inherent strength and slope geometry. However, there is a potential for shallow sloughing and erosion events to occur on the steep slopes below the proposed residence. The proposed residence location within the moderate to steep southwest-facing slope should be feasible provided that all foundations for the structure are supported on drilled piers as described above. Specific recommendations for design and installation of the deep foundation systems, as well as recommendations for permanent basement retaining walls, site grading, subgrade preparation, drainage, and erosion control are further discussed in the attached report.

We recommend that **NELSON GEOTECHNICAL ASSOCIATES, INC. (NGA)** be retained to review the geotechnical aspects of the project plans prior to construction. We also recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications.

It has been a pleasure to provide service to you on this project. Please contact us if you have any questions regarding this report or require further information.

Sincerely,

**NELSON GEOTECHNICAL ASSOCIATES, INC.**



Khaled M. Shawish, PE  
**Principal**

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**Geotechnical Engineering Evaluation  
Residential Development  
Lot 8: 1021 Randolph Avenue  
Mukilteo, Washington**

**INTRODUCTION**

This report presents the results of our geotechnical engineering investigation and evaluation of the proposed Residential Development project in Mukilteo, Washington. The project site is located at 1021 Randolph Avenue, Mukilteo, Washington, as shown on the Vicinity Map in Figure 1. The purpose of this study is to explore and characterize the site's surface and subsurface conditions and to provide geotechnical recommendations for the proposed site development.

The site consists of a convex, pentagonally-shaped parcel covering approximately 0.18 acres. The proposed development areas of the site are located to the south of a private road extending west from Randolph Avenue, relatively level within areas adjacent to the driveway, and sloping steeply to the south approximately thirty feet south of the driveway toward a forested ravine containing Brewery Creek. The parcel is currently vacant but contains subsurface utilities within the level portion of the site, adjacent to the driveway. We understand that the proposed development plan will include construction of a new residence with a daylight basement and associated utilities within the north-central portion of the property, within the steeply sloping topography. Specific grading and stormwater handling plans were not available at the time this report was prepared. The existing site layout is shown on the Site Plan in Figure 2.

**SCOPE**

The purpose of this study is to explore and characterize the site surface and subsurface conditions and provide general recommendations for site development. Specifically, our scope of services included the following:

1. A review of our previous work for this site and neighboring lots.
2. Visit the site to observe current conditions and performing test pit explorations.
3. Performing engineering analyses on current site conditions as they differ from the original site conditions.
4. Documenting our analysis, conclusions, and recommendations in a new, written geotechnical engineering report.

## **SITE CONDITIONS**

### **Surface Conditions**

The site consists of a convex, pentagonally-shaped parcel covering approximately 0.18 acres. The site is currently vacant. Topographically, the upper portion of the site is relatively level within areas adjacent to the driveway, and slopes steeply to the south at gradients between 27 and 29 degrees (51 and 58 percent grade) approximately thirty feet south of the driveway, toward a forested ravine containing Brewery Creek as shown on Cross Section A-A' in Figure 3. The site is bordered to the north by an access driveway extending west from Randolph Road, to the south by forested property containing Brewery Creek, to the west by a moderately spaced single-family residence, and to the east by another vacant lot. Vegetation on the relatively level portion of the property consists of very sparsely distributed young trees, and grasses with weeds, and the slope is occupied by a moderate distribution of mature trees, ferns, and groundcover. At the time of our visit, we did not observe surface water on the site; however, we noted the presence of burrows and disturbance consistent with mountain beaver activity within the south-facing slope.

### **Subsurface Conditions**

**Geology:** The geologic units for this area are shown in the Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington, by James P. Minard (USGS, 1982). The project site is mapped as surficial deposits of the Fraser Glaciation, consisting of Vashon Stade glacial till (Qvt). This unit is described as a non-sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders, all in variable amounts. Our explorations generally encountered a surficial layer of undocumented fill, underlain by a layer of increasingly dense, silty, fine to medium sand with varying amounts of gravel, cobbles, and boulders, generally consistent with the description of the Vashon till at depth.

**Explorations:** The subsurface conditions within the site were explored on February 15, 2018 by completing two test pit explorations within the upper areas of the property to depths of 5.7 and 6.8 feet, respectively. The approximate locations of our explorations are shown on the Site Plan in Figure 2. A geologist from NGA was present during the explorations, examined the soils and geologic conditions encountered, obtained samples of the different soil types, and maintained logs of the explorations.

The soils were visually classified in general accordance with the Unified Soil Classification System, presented in Figure 4. The logs of our explorations are attached to this report and are presented as Figure 5. We generally encountered a surficial layer of 3.6 to 3.8 feet of mixed material containing anthropogenic and organic debris, varying in color from dark brown to tan and gray. The surficial materials were encountered in a loose to medium dense condition, and were interpreted as undocumented fill based on our understanding of the site history since our previous explorations. Underlying the surficial fill, we encountered gray, silty, fine to medium sand with gravel and cobbles or boulders to the depths explored.

The latter material was encountered in a dense condition and was interpreted to be the unweathered Vashon till mapped on the site. Test Pits were completed near the top of the slope and were terminated at depths of 5.7 and 6.8 feet within the native glacial soils, respectively. Test pit logs should be referenced for precise soil descriptions.

### Hydrogeologic Conditions

No groundwater seepage was observed in any of our soil explorations, nor was observed to be seeping from the site slopes during our visit. If groundwater were to be observed within the soils on this site, we would interpret it to be perched water and not a regional groundwater table. Perched water occurs when surface water infiltrates through less dense, more permeable soils and accumulates on top of a relatively low permeability material. Perched water does not represent a regional groundwater "table" within the upper soil horizons. Perched water tends to vary spatially and is dependent upon the amount of rainfall. We would expect the amount of perched groundwater to decrease during drier times of the year and increase during wetter periods.

## SENSITIVE AREA EVALUATION

### Seismic Hazard

We reviewed the 2015 International Building Code (IBC) for seismic site classification for this project. Since very dense glacial soils are interpreted to underlie the site at depth, the site best fits the IBC description for Site Class C.

Table 1 below provides seismic design parameters for the site that are in conformance with the 2015 IBC, which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years), and the 2008 USGS seismic hazard maps.

**Table 1 – 2015 IBC Seismic Design Parameters**

Site Class	Spectral Acceleration at 0.2 sec. (g) $S_s$	Spectral Acceleration at 1.0 sec. (g) $S_1$	Site Coefficients		Design Spectral Response Parameters	
			$F_a$	$F_v$	$S_{DS}$	$S_{D1}$
C	1.400	0.498	1.200	1.500	1.120	0.498

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.

The site, and the greater Mukilteo area, is contained within the South Whidbey Island Fault Zone (SWIFZ): an active, shallow region of seismicity within central Puget Sound stretching from the Strait of Juan de Fuca to North Bend. Information published in 2013 by the Department of Natural Resources suggests the

SWIFZ last ruptured less than 2,700 years ago, and that the fault zone can produce a M7.5 earthquake. In our opinion, the risk of a surface fault rupture within this specific site is low, given available data.

Hazards associated with seismic activity also include liquefaction potential and amplification of ground motion. Liquefaction is caused by a rise in pore pressures in a loose, fine sand deposit beneath the groundwater table. It is our opinion that the very dense glacial deposits interpreted to underlie the site have a low potential for liquefaction or amplification of ground motion.

### **Erosion Hazard**

The criteria used for determination of the erosion hazard for affected areas include soil type, slope gradient, vegetation cover, and groundwater conditions. The erosion sensitivity is related to vegetative cover and the specific surface soil types, which are related to the underlying geologic soil units. The Soil Survey of Snohomish County Area, Washington by the Soil Conservation Service (SCS) classifies the site as Alderwood-Everett gravelly sandy loams, 25 to 70 percent slopes. The erosion hazard for this material is listed as severe, primarily due to the steepness of slopes. Based on our experience in the area and our observations in the field, it is our opinion that the site would have a moderate erosion hazard for areas where the soils are exposed. It is our opinion that the erosion hazard for site soils should be low in areas where vegetation is not disturbed.

### **Landslide Hazard/Slope Stability**

The criteria used for evaluation of landslide hazards include soil type, slope gradient, and groundwater conditions. A steep, south-facing slope occupies the south and south-central portion of the property, where it steps down at gradients between 27 and 29 degrees (51 and 58 percent grade) and terminates at Brewery Creek within the neighboring property to the South. The slope meets the definition of a 'Steep Slope Critical Area' by the City of Mukilteo, in that it has a gradient of more than 40 percent with vertical relief of more than 10 feet (MMC 17.52A.020). We did not observe evidence of significant slope instability during our investigation, such as deep-seated landsliding, nor did we observe groundwater seepage from the slope within the vicinity of the property.

The core of the slopes is inferred to consist primarily of dense or better native soils. Relatively shallow sloughing failures as well as surficial erosion are natural processes and should be expected on the slopes during extreme environmental conditions. This is especially true within the loose surficial and undocumented fill soils on the slopes. It is our opinion that while there is potential for erosion, soil creep, and shallow failures within the loose surficial soils on the steep slope, there is not a significant potential for deep-seated slope failures under current site conditions. Proper slope stabilization measures, retaining wall construction, site grading and drainage as well as foundation placement as recommended in this report should help maintain and enhance current stability conditions.

## CONCLUSIONS AND RECOMMENDATIONS

### General

It is our opinion from a geotechnical standpoint that the site is compatible with the proposed residence development provided all recommendations provided in this report are incorporated into the development plans and strictly implemented during construction. It is also our opinion that the soils that underlie the site and form the core of the site slope should be stable with respect to deep-seated earth movements, due to their inherent strength and slope geometry. However, shallow failures could occur on the slopes in the loose surficial and undocumented fill soils, especially during adverse weather or a significant seismic event.

Specific development plans for the site were not available at the time this report was prepared. Buffers of 25 feet for the 'Steep Slope Critical Area' are applicable to the site, as outlined by the City of Mukilteo Geologically Sensitive Areas Code MMC 17.52A.050. It is our professional opinion that there is a potential for shallow sloughing and serious erosion events to occur on the steeper site slopes within the property if disturbed. We have provided recommendations for structure setback and foundation embedment to lessen the impacts of the proposed development on the slope and to allow for some slope recession during a reasonable life span of the structure. This is further discussed in the **Structure Setback** section.

Our explorations and observations indicate that the site is underlain by dense to very dense glacial soils at depth. These glacial soils should provide adequate support for foundation, slab, and pavement loads. We understand that the proposed residence will be located within both the relatively level portion and on top of the steep south-facing ravine slope below the proposed development area. To protect the structure against potential failures on the slope and to limit impact to the slope areas, we recommended that the downhill southern side of the residence within the moderate to steep ravine slope area be supported on drilled piers extending down a minimum of 15 feet. We recommend that the remainder of the residence foundations be designed to utilize conventional spread footings extending down to medium dense or better native soils for bearing capacity and settlement considerations. These soils should generally be encountered approximately three to four feet below the existing ground surface, based on our explorations. We should note that deeper areas of unsuitable soils and/or undocumented fill could be encountered in the unexplored areas of the site. We recommend the drilled piers consist of a minimum of 16-inch diameter cast-in place reinforced concrete piles. We recommend that the remaining foundations be designed utilizing shallow foundations. Recommendations for design and installation of the deep and shallow foundations are presented in the **Foundation Support** subsection of this report.

Tall cuts up to approximately 10 to 12 feet may be needed along the northern side of the proposed residence for the construction of the daylight basement. These cuts may not be able to be safely sloped back due to site constraints such as the shared access driveway and utility lines. If these temporary cuts are not able to be safely sloped as recommended in this report, we recommend that the cuts be shored with a soldier pile

retaining wall. This wall should be designed as a permanent wall and incorporated into the building. We provide recommendations for temporary and permanent cut slopes in the **Temporary and Permanent Slopes** section of this report. We also provide recommendations for the soldier pile shoring wall in the **Shoring Wall** subsection of this report.

All grading operations and drainage improvements planned as part of this development should be planned and completed in a manner that enhances the stability of the steep slopes, not reduces it. Excavation spoils associated with the building excavations should not be stockpiled near the slope or be allowed to encroach on the slope. Also, runoff generated within the site should be collected and routed into a permanent discharge system and not be allowed to flow over the slope. Future vegetation management on the slope should be the subject of a specific evaluation and a plan approved by the City of Mukilteo. The slope should be monitored on an ongoing basis, especially during the wet season, for any signs of instability, and corrective actions promptly taken should any signs of instability be observed. Lawn clipping and any other household trash or debris should never be allowed to reach the slope.

The soils encountered on this site are considered moisture-sensitive and will disturb easily when wet. To lessen the potential impacts of construction on the steep slope and to reduce cost overruns and delays, we recommend that construction take place during the drier summer months. If construction takes place during the rainy months, additional expenses and delays should be expected. Additional expenses could include the need for placing erosion control and temporary drainage measures to protect the slopes, the need for placing a blanket of rock spalls on exposed subgrades and construction traffic areas prior to placing structural fill, and the need for importing all-weather material for structural fill.

Under no circumstances, should water be allowed to flow over, or concentrate on the site slopes, both during construction and after construction has been completed. We recommend that stormwater runoff from the roof drains be collected and tightlined to a suitable discharge point. The slopes should be protected from erosion. We recommend that all disturbed areas be replanted with vegetation to re-establish vegetation as soon as possible. The eastern steep slope should not be disturbed or graded for residence placement. No fills of any sort should be planned at the top of this slope. Stormwater runoff should not be allowed to concentrate and flow over the slope down to the wetland area. Specific recommendations for erosion control are presented in the **Erosion Control and Slope Protection Measures** subsection of this report.

We recommend that NGA be retained to review final project plans and provide consultation regarding structure placement, site grading, and foundation support. We also recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate

whether or not earthwork and foundation installation activities comply with contract plans and specifications.

### **Erosion Control and Slope Protection Measures**

The erosion hazard for the on-site soils is listed as severe for exposed soils, but actual erosion potential will be dependent on how the site is graded and how water is allowed to concentrate. Best Management Practices (BMPs) should be used to control erosion. Areas disturbed during construction should be protected from erosion. Erosion control measures may include diverting surface water away from the stripped or disturbed areas. Silt fences and/or straw bales should be erected to prevent muddy water from leaving the site or flowing over the slopes. Stockpiles should be covered with plastic sheeting during wet weather. Disturbed areas should be planted as soon as practical, and the vegetation should be maintained until it is established. The erosion potential for areas not stripped of vegetation should be low.

Protection of the setback and steep slope area should be performed as required by the City of Mukilteo. Specifically, we recommend that the setback area and top of slope not be disturbed or modified through placement of any fill or removal of the existing vegetation as part of site preparations. Vegetation may be cleared from these areas when the site is landscaped after construction is completed provided the cleared areas are immediately replanted (subject to proper weather conditions) and covered with erosion-resistant material (wood chips, jute netting, straw, etc.) No additional material of any kind should be placed on the slope or be allowed to reach the slope, such as excavation spoils, lawn clippings, and other yard waste, trash, and soil stockpiles. Trees should not be cut down or removed from the steep southern slope unless a mitigation plan is developed, such as the replacement of vegetation for erosion protection. Vegetation should not be removed from the slopes. Replacement of vegetation should be performed in accordance with the City of Mukilteo code. Any further proposed development within the slope setback area should be the subject of a specific geotechnical evaluation. Under no circumstances should water be allowed to concentrate on the slopes.

### **Site Preparation and Grading**

After erosion control measures are implemented, site preparation should consist of stripping any loose soils and undocumented fill to expose medium dense or better native soil in foundation, slab-on-grade, and pavement areas. Stripped materials should be removed from the site or stockpiled for later landscaping fill. Stockpiles should be kept away from the top of the steep slopes and should be covered with plastic.

If the ground surface, after site stripping, should appear to be loose, it should be compacted to a non-yielding condition. Areas observed to pump or weave during compaction should be over-excavated and replaced with properly compacted structural fill or rock spalls. If loose soils are encountered in any slab areas, the loose soils should be removed and replaced with rock spalls or granular structural fill. If significant surface

water flow is encountered during construction, this flow should be diverted around areas to be developed, and the exposed subgrades should be maintained in a semi-dry condition.

If wet conditions are encountered, alternative site grading techniques might be necessary. These could include using large excavators equipped with wide tracks and a smooth bucket to complete site grading and covering exposed subgrade with a layer of crushed rock for protection. If wet conditions are encountered or construction is attempted in wet weather, the subgrade should not be compacted as this could cause further subgrade disturbance. In wet conditions it may be necessary to cover the exposed subgrade with a layer of crushed rock as soon as it is exposed to protect the moisture sensitive soils from disturbance by machine or foot traffic during construction. The prepared subgrade should be protected from construction traffic and surface water should be diverted around areas of prepared subgrade.

The site soils are considered to be moisture-sensitive and will disturb easily when wet. We recommend that construction take place during the drier summer months if possible. However, if construction takes place during the wet season, additional expenses and delays should be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls on exposed subgrades, construction traffic areas, and paved areas prior to placing structural fill. Wet weather grading will also require additional erosion control and site drainage measures. Some of the on-site soils may be suitable for use as structural fill, depending on the moisture and organic content of the soil at the time of construction. NGA should be retained to evaluate the suitability of all on-site and imported structural fill material during construction.

### **Structure Setbacks**

Uncertainties related to building along the top of steep slopes are typically addressed by the use of building setbacks. The purpose of the setback is to establish a "buffer zone" between the structure and the top of the slope so that ample room is allowed for normal slope recession during a reasonable life span of the structure. In a general sense, the greater the setback, the lower the risk of slope failures to impact the structure. From a geological standpoint, the setback dimension is based on the slope's physical characteristics, such as slope height, slope gradient, soil type, and groundwater conditions. Other factors such as historical slope activity, rate of regression, and the type and desired life span of the development are important considerations as well.

Based upon the conditions described above, it is our opinion that the potential for shallow sloughing-type failures exist on the steep slopes. This condition can be exacerbated where water is present or where the slopes become locally very steep. Backwasting through sloughing of steep slopes can occur up the slope, such that a loss of ground could occur. It is also our opinion that the core of the slope is stable. We understand that the proposed residence will likely extend from the northern, relatively flat portion of the



property and out onto the moderate to steep south-facing ravine slope. To reduce the risk of potential slope failures affecting the structure and reduce the impacts to the slope from the proposed development, the southern downhill foundation lines of the residence structure should be supported on drilled piers extending at least 15 feet below the existing ground surface, such that a minimum 25-foot wide effective setback is maintained from the bottom of the foundation element to the face of the slope. All other foundations could be supported on shallow conventional spread foundations. Loose material should not be stockpiled in any area between the top of the slope and the setback line.

We should be retained to evaluate the residence foundation setback distances and subgrade soil prior to placing foundation forms. Any proposed development within the setback area or on the slope should be the subject of a specific geotechnical evaluation. Under no circumstances should water be allowed to concentrate on the slopes, during or after construction.

### **Temporary and Permanent Slopes**

Temporary cut slope stability is a function of many factors, including the type and consistency of soils, depth of the cut, surcharge loads adjacent to the excavation, length of time a cut remains open, and the presence of surface or groundwater. It is exceedingly difficult under these variable conditions to estimate a stable, temporary, cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe slope configurations at all times as indicated in OSHA guidelines for cut slopes.

The following information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Nelson Geotechnical Associates, Inc. assumes responsibility for job site safety. Job site safety is the sole responsibility of the project contractor.

For planning purposes, we recommend that temporary cuts in the upper surficial weathered till and/or undocumented fill soils should be no steeper than 2 Horizontal to 1 Vertical (2H:1V). Temporary cuts in competent, native soils at depth should be no steeper than 1.5H:1V. If significant groundwater seepage or surface water flow were encountered, we would expect that flatter inclinations would be necessary. We recommend that cut slopes be protected from erosion. The slope protection measures may include covering cut slopes with plastic sheeting and diverting surface runoff away from the top of cut slopes. We do not recommend vertical slopes for cuts deeper than four feet, if worker access is necessary. We recommend that cut slope heights and inclinations conform to appropriate OSHA/WISHA regulations.

Permanent cut and fill slopes should be no steeper than 2H:1V, unless specifically approved by NGA. Also, flatter inclinations may be required in areas where loose soils are encountered. Permanent slopes should be vegetated and the vegetative cover maintained until established. We should specifically review any future plans for development within the setback back area, including landscaping walls, patios, or decks.

## **Foundation Support**

**General:** To protect the structure against potential failures on the slope and to limit impact to the slopes, we recommended that the downhill southern foundation lines of the residence structure should be supported on drilled piers extending at least 15 feet below the existing ground surface, such that a minimum 25-foot wide effective setback is maintained from the bottom of the foundation element to the face of the slope. We recommend that the remainder of the residence foundations be designed to utilize conventional spread footings extending down to medium dense or better native soils for bearing capacity and settlement considerations. Detailed recommendations discussing each type of foundation are described in the paragraphs below.

**Drilled Piers:** We recommend that the southern foundation lines of the residence be supported on 16-inch diameter drilled reinforced concrete piers, extending a minimum of 15 feet below existing ground surface. The remainder of the foundations should be supported on native, competent material or structural fill extending to that material.

Based on the conditions encountered in our explorations, an open-hole drilling should be feasible. If caving conditions are encountered, pile casing will be required. If large obstacles are encountered, more elaborate drilling and/or rock coring methods would be needed. The holes should be cleaned of any slough or water prior to pouring concrete. We recommend that the concrete be readily available on site at the time of drilling. The holes should not be left open for any extended period of time, as sloughing debris and/or groundwater seepage into the excavations may hamper pier installation.

For a 15-foot deep, 16-inch diameter drilled pier installed successfully as described above, we recommend using a design axial compression capacity of 20 tons for each pier. We should be consulted if higher capacities are needed. Lateral resistance on the piers should be calculated based on an equivalent fluid density of 250 pounds per cubic foot (PCF) applied on two pile diameters. The upper four feet should be neglected for the purpose of calculating the lateral resistance. Friction on the bottom of the grade beams supported on the piers should also be neglected. A qualified structural engineer licensed in the State of Washington should design the piers. We should be retained to review the design.

**Shallow Spread Foundations:** For the portions of the structure supported on shallow spread footings, these footings should be placed on native medium dense or better soils, or structural fill extending to these soils. The foundation subgrade should be prepared as described in the **Site Preparation and Grading** subsection. If footings are supported on structural fill, the fill zone should extend outside the edges of the footings a distance equal to one-half of the depth of the over-excavation below the bottom of the footings. The transition zone from pile-supported grade beams to regular foundations should be heavily reinforced.

Footings should extend at least 18 inches below the lowest adjacent finished ground surface for frost protection and bearing capacity considerations. Minimum foundation widths of 18 and 24 inches should be used for continuous and isolated spread footings, respectively, but footings should also be sized based on anticipated loads and allowable soil bearing pressure. Standing water should not be allowed to accumulate in footing trenches. All loose or disturbed soil should be removed from the foundation excavation prior to placing concrete.

For foundations constructed as outlined above, we recommend an allowable design bearing pressure of not more than 2,000 pounds per square foot (psf) be used for the footing design for footings founded on the medium dense or better glacial soils or structural fill extending to the native competent material. The foundation bearing soil should be evaluated by a representative of NGA. We should be consulted if higher bearing pressures are needed. Current International Building Code (IBC) guidelines should be used when considering increased allowable bearing pressure for short-term transitory wind or seismic loads. Potential foundation settlement using the recommended allowable bearing pressure is estimated to be less than one inch total and 1/2 inch differential between adjacent footings or across a distance of about 30 feet, based on our experience with similar projects.

Lateral loads may be resisted by friction on the base of the footing and passive resistance against the subsurface portions of the foundation. A coefficient of friction of 0.35 may be used to calculate the base friction and should be applied to the vertical dead load only. Passive resistance may be calculated as a triangular equivalent fluid pressure distribution. An equivalent fluid density of 250 pcf should be used for passive resistance design for a level ground surface adjacent to the footing. This level surface should extend a distance equal to at least three times the footing depth. These recommended values incorporate safety factors of 1.5 and 2.0 applied to the estimated ultimate values for frictional and passive resistance, respectively. To achieve this value of passive resistance, the foundations should be poured “neat” against the native medium dense soils, or compacted fill should be used as backfill against the front of the footing. We recommend that the upper one foot of soil be neglected when calculating the passive resistance. Frictional resistance should be neglected for footings supported on drilled piers.

### **Structural Fill**

**General:** Fill placed beneath foundations, slabs, pavements, or other settlement-sensitive structures should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is monitored by an experienced geotechnical professional or soils technician. Field monitoring procedures would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction. The area to receive the fill should be suitably prepared as described in the **Site Preparation and Grading** subsection prior to beginning fill

placement. Sloping ground to receive fill should be benched to allow for fill placement. The benches should be level and at least eight feet wide.

**Materials:** Structural fill should consist of a good quality, granular soil, free of organics and other deleterious material, and be well graded to a maximum size of about three inches. All-weather structural fill should contain no more than five-percent fines (soil finer than U.S. No. 200 sieve, based on that fraction passing the U.S. 3/4-inch sieve). The use of some of the on-site soils as structural fill should generally be feasible, but we should be retained to evaluate proposed structural fill material prior to construction.

**Fill Placement:** Following subgrade preparation, placement of structural fill may proceed. All filling should be accomplished in uniform lifts up to eight inches thick. Each lift should be spread evenly and be thoroughly compacted prior to placement of subsequent lifts. All structural fill should be compacted to a minimum of 95 percent of its maximum dry density. Maximum dry density, in this report, refers to that density as determined by the ASTM D-1557 Compaction Test procedure. The moisture content of the soils to be compacted should be within about two percent of optimum so that a readily compactable condition exists. It may be necessary to over-excavate and remove wet soils in cases where drying to a compactable condition is not feasible. All compaction should be accomplished by equipment of a type and size sufficient to attain the desired degree of compaction.

### **Slab-on-Grade**

Slabs-on-grade should be supported on subgrade soils prepared as described in the **Site Preparation and Grading** subsection of this report. We recommend that all floor slabs be underlain by at least six inches of free-draining gravel with less than three percent by weight of the material passing Sieve #200 for use as a capillary break. We recommend that the capillary break be hydraulically connected to the footing drain system to allow free drainage from under the slab. A suitable vapor barrier, such as heavy plastic sheeting (6-mil minimum), should be placed over the capillary break material. An additional 2-inch thick moist sand layer may be used to cover the vapor barrier. This sand layer is optional and is intended to protect the vapor barrier membrane during construction.

### **Shoring Wall**

**General:** In order to protect existing infrastructure to the north of the proposed residence, including the access driveway and utilities, we anticipate that a shoring wall may be needed to support temporary cuts along the northern property line to facilitate the construction of a daylight basement. The shoring wall should consist of a cantilevered soldier pile shoring wall. This wall should be incorporated permanently into the residence foundations.

A soldier pile wall typically consists of a series of steel H-beams placed vertically at a certain spacing from one another (typically six to ten feet). The beams are usually placed in drilled shafts that are filled with structural concrete or a lean mix. The concrete shafts are typically embedded below the bottom of the planned excavation a distance equals 1.5 to 2.0 times the exposed height of the wall. The steel beams are extended above finished ground surface to provide shoring capabilities for the area to be retained. The beams are typically spanned by pressure treated timber lagging or concrete panels. The H-beam size, shaft diameter, shaft embedment, and pile spacing are dependent on the nature of the soils anticipated to be retained by the wall and the soils at depth, wall height, drainage conditions, and the final geometry. A schematic detail of the wall is shown on the Conceptual Soldier Pile Wall Detail in Figure 6.

**Wall Design:** The shoring wall should be designed by an experienced structural engineer licensed in the State of Washington. The lateral earth pressure acting on the shoring wall will be dependent on the nature and density of the soil behind the wall, structure and traffic loads on the wall, and the amount of lateral wall movement that may occur as material is excavated from the front of the wall. If the shoring wall is free to yield at least one-thousandth of the retained height, an “active” loading condition develops. If the wall is restrained from movement by stiffness or bracing, the wall is considered in an “at-rest” loading condition. Active and at-rest earth pressure can be calculated based on equivalent fluid densities.

The permanent shoring wall should be designed to resist a lateral load resulting from a fluid with a unit weight of 40 and 60 pounds per cubic foot (pcf) for the active and at-rest loading conditions, respectively. These loads should be applied across the pile spacing above the excavation line. These loads can be resisted by a passive pressure of 200 pcf for the medium dense or better soils. The passive pressure should be applied on two-pile diameters under the excavation line. These values of the passive pressure incorporate a factor of safety of 2.0. The upper one-foot of wall embedment should be neglected when calculating the passive resistance. If the shoring wall is designed to be permanent, we recommend that a uniform surcharge of  $8H$  should be applied to the wall design to account for seismic loading, where  $H$  is the exposed height of the wall.

The above active and at-rest loads should be applied on the full center-to-center pile spacing above the base of the exposed portion of the wall. A 50 percent reduction of this value can be applied for the purpose of designing the wall lagging. The below-grade portion of the wall should not be shorter than 1.5 times the wall stick-up height.

The above pressures assume that the on-site soils retained by the shoring wall are mostly granular in nature and that hydrostatic forces are not allowed to build up behind the wall. These values do not include the effects of surcharges; such as due to foundation loads, traffic, or other surface loads. Surcharge effects should be considered where appropriate. The retained soils should be readily drained and collected water

should be routed into a permanent storm system. Adequate gaps should be maintained between the lagging elements to allow for water seepage through the wall.

The wall designer should calculate the predicted wall deflection, including deflection resulting from the below-grade movement of the piles. The predicted deflection values should be confirmed in the field through a survey monitoring program. Also, the shoring wall existing surrounding structures should be monitored for any adverse effects resulting from shoring wall installation. Settlement monitoring survey points should be installed and monitored on the surrounding structures and monitored at least once a week until it is confirmed that no movement is occurring. We should be retained to discuss wall and surrounding structure monitoring plans as plans are developed. Additional photographic and visual pre-existing surveys of the project vicinity and neighboring structures prior to construction activities should also be performed to document existing conditions within the vicinity of the property.

**Shoring Wall Installation:** The shoring wall should be installed by a shoring contractor experienced with this type of system. We anticipate that an open-hole drilling method may prove difficult to achieve for installing the soldier piles in the on-site soils, and therefore we recommend that the shoring contractor be capable of casing the holes as sloughing and/or water seepage will likely be encountered. It might be prudent to perform one or more “test” holes to confirm installation conditions prior to finalizing budget and work plans. Any sloughing or water that may collect in the drilled holes should be removed prior to pouring grout. Grout should be readily available on site at the time the holes are drilled and cased.

If groundwater seepage is encountered, we recommend that water be pumped out of the holes and the concrete be tremied from the bottom of the excavations to displace the groundwater to the surface. Extra Portland Cement may also be placed in the bottom of the excavations to reduce the effects of seepage. The spoils from the soldier pile excavations are expected to be moisture-sensitive materials and should be removed from the site. We should be retained to monitor on site activities during the shoring wall installation on a full-time basis.

The wall should be lagged using pressure-treated timber. Adequate gaps, typically by placing lagging nails between the boards, should be maintained between the lagging elements to allow water flow through the face of the wall. Gaps left behind the wall should be backfilled with pea gravel.

## **Site Drainage**

**Surface Drainage:** Final site grades should allow for drainage away from the top of the slopes and away from the planned residence. We suggest that the finished ground be sloped at a minimum gradient of three percent for a distance of at least 10 feet away from the building and top of the slope. All runoff generated on this site should be collected and routed into an approved stormwater system away from the site slopes. This should include all downspouts and runoff generated on all hard surfaces and yards areas. Under no circumstances should water be allowed to flow uncontrolled over the slopes. Water should not be allowed to collect in any area where footings or slabs are to be constructed.

**Subsurface Drainage:** If groundwater is encountered during construction, we recommend that the contractor slope the bottom of the excavation and collect the water into ditches and small sump pits where the water can be pumped out of the excavation and routed into a suitable outlet. We recommend that the residence down spouts and footing drains be tightlined to an appropriate discharge location.

We recommend the use of footing drains around structures. Footing drains should be installed at least one foot below planned finished floor elevation. The drains should consist of a minimum four-inch-diameter, rigid, slotted or perforated, PVC pipe surrounded by free-draining material wrapped in a filter fabric. We recommend that the free-draining material consist of an 18-inch-wide zone of clean (less than three-percent fines), granular material placed along the back of walls. Washed rock is an acceptable drain material, or drainage composite may be used instead. The free-draining material should extend up the wall to one foot below the finished surface. The top foot of soil should consist of low permeability soil placed over plastic sheeting or building paper to minimize the migration of surface water or silt into the footing drain. Footing drains should discharge into tightlines leading to an appropriate collection and discharge point with convenient cleanouts to prolong the useful life of the drains. Roof drains should not be connected to wall or footing drains.

## **CONSTRUCTION MONITORING**

We should be retained to provide construction monitoring services during the earthwork phase of the project to evaluate subgrade conditions, temporary cut conditions, fill compaction, and drainage system installation.

## USE OF THIS REPORT

NGA has prepared this report for Mr. Asghar Ramfar and his agents, for use in the planning and design of the development on this site only. The scope of our work does not include services related to construction safety precautions and 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. There are possible variations in subsurface conditions between the explorations and also with time. Our report, conclusions, and interpretations should not be construed as a warranty of subsurface conditions. A contingency for unanticipated conditions should be included in the budget and schedule.

We recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications. We should be contacted a minimum of one week prior to construction activities and could attend pre-construction meetings if requested.

All people who own or occupy homes on hillsides should realize that landslide movements are always a possibility. The landowner should periodically inspect the slope, especially after a winter storm. If distress is evident, a geotechnical engineer should be contacted for advice on remedial/preventative measures. The probability that landsliding will occur is substantially reduced by the proper maintenance of drainage systems at the site. Therefore, the homeowner should take responsibility for performing such maintenance. Consequently, we recommend that a copy of our report be provided to any future homeowners of the property if the home is sold.

Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time this report was prepared. No other warranty, expressed or implied, is made. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the owner.

O-O-O



It has been a pleasure to provide service to you on this project. If you have any questions or require further information, please call.

Sincerely,

**NELSON GEOTECHNICAL ASSOCIATES, INC.**

*Carston T. Curd*

Carston T. Curd, GIT  
Staff Geologist



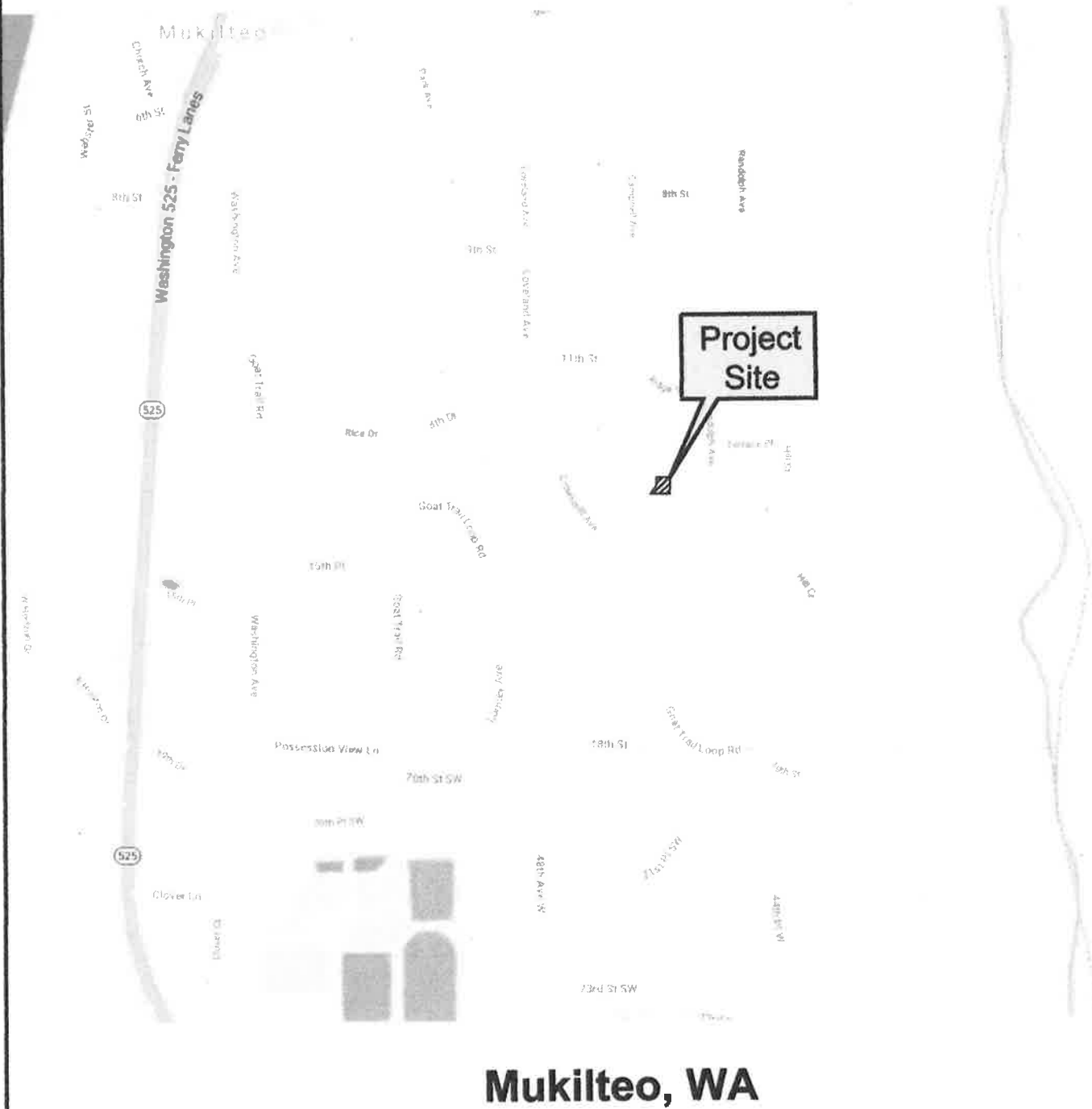
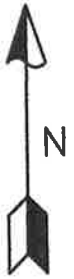
Khaled M. Shawish, PE  
Principal

CTC:KMS:dy

Six Figures Attached

# VICINITY MAP

Not to Scale



Mukilteo, WA

Project Number  
3852C18

Figure 1

1021 Randolph Ave  
Residential Development  
Vicinity Map



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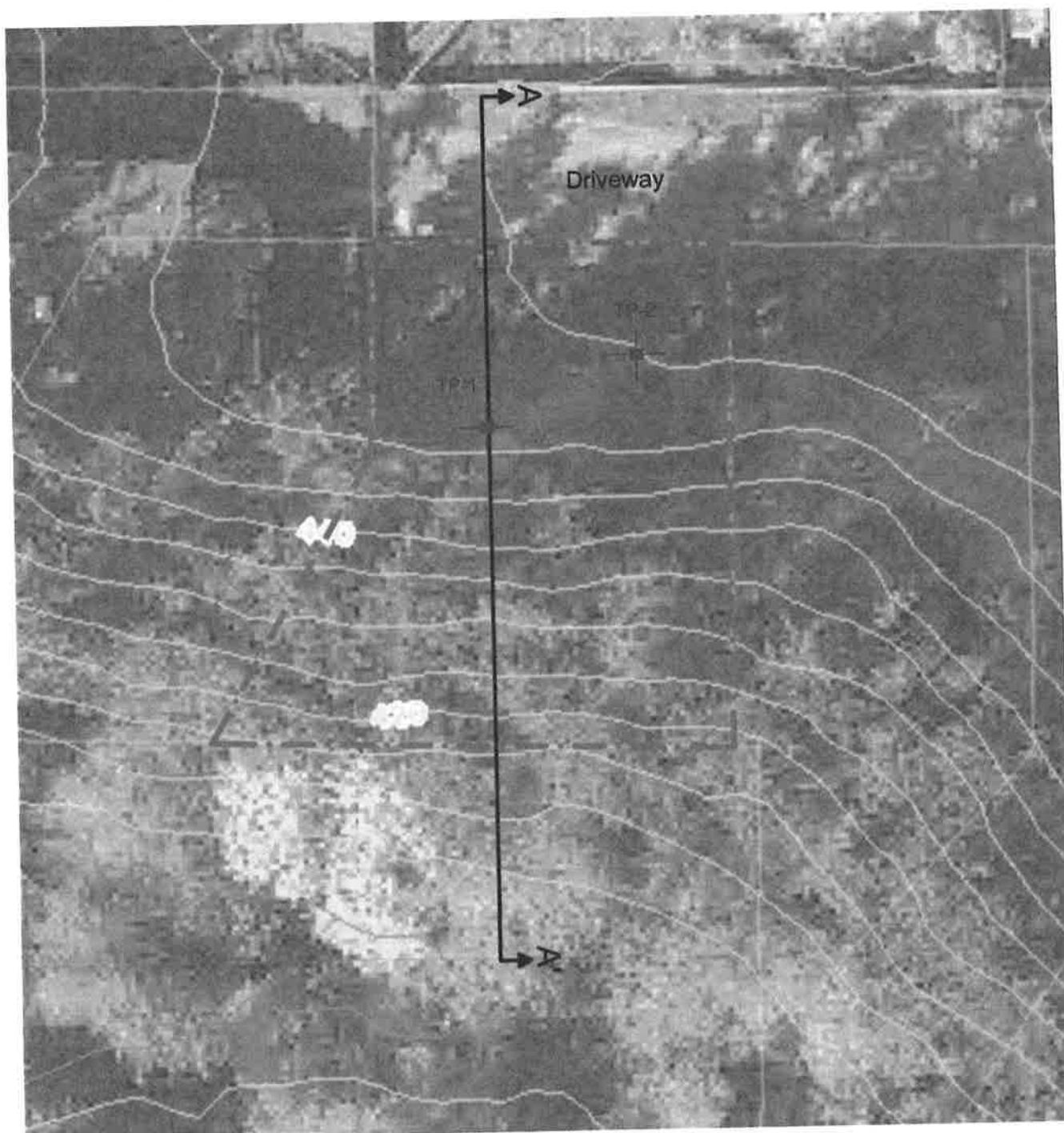
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1	3/5/18	Original	DPN	CTC



## LEGEND



Property line

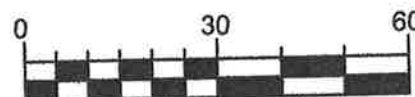
TP-1



Number and approximate location of test pit



Approximate location of cross-section



Approximate Scale: 1 inch = 30 feet

Reference: Site Plan based on field measurements, observations, and aerial parcel map review.

Project Number  
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1021 Randolph Ave  
Schematic Site Plan

Figure 2



**NELSON GEOTECHNICAL  
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No.	Date	Revision	By	CK
1	3/5/18	Original	DPN	CTC

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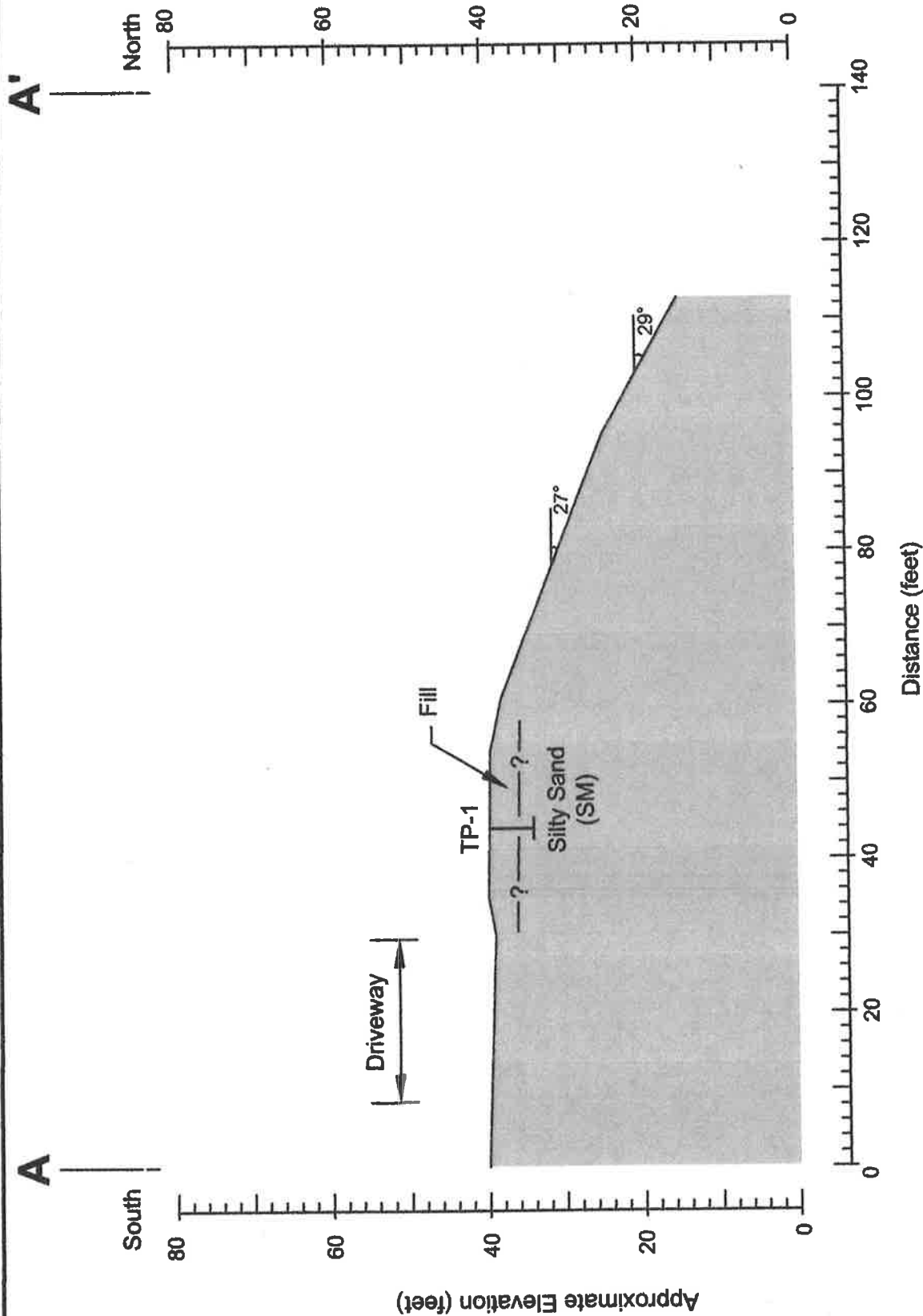
Figure 3

1021 Randolph Ave  
Residential Development  
Cross-Section A-A'



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No.	Date	Revision	By	CK
1	3/5/18	Original	DPN	CTC



## Exploration

Test Pit Designation → TP-1

Groundwater Level →  
During Exploration

Geologic Contact → ?  
(approximate)

- NOTES:**
- 1) Stratigraphic conditions are interpolated between the explorations. Actual conditions may vary.
  - 2) Elevations are approximate.

Reference: Cross Section is based on field measurements using a hand-held clinometer and 100-ft tape measure.

# UNIFIED SOIL CLASSIFICATION SYSTEM

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

## NOTES:

- 1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
- 2) Soil classification using laboratory tests is based on ASTM D 2488-93.
- 3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

## SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water.

Wet - Visible free water or saturated, usually soil is obtained from below water table

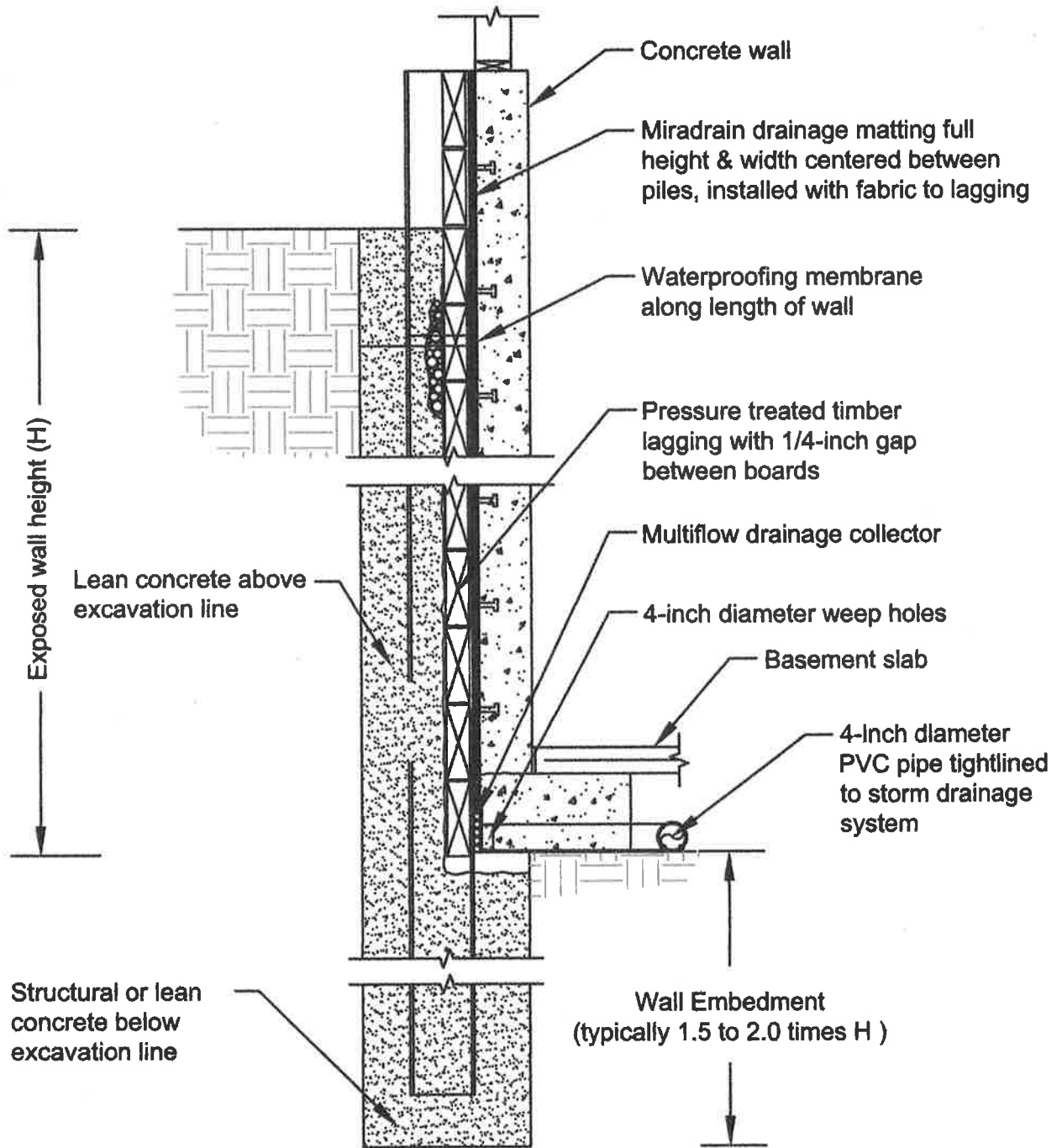
Project Number 3852C18	1021 Randolph Ave Residential Development Soil Classification Chart	 <b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> <b>GEOTECHNICAL ENGINEERS &amp; GEOLOGISTS</b> <small>Woodinville Office: 17311-135th Ave. NE, A-500, Woodinville, WA 98072 (425) 486-1889 / Fax: 481-2510  East Wenatchee Office: 5928 Industry Lane, #2, East Wenatchee, WA 98802 (509) 665-7696 / Fax: 665-7692</small>	No.	Date	Revision	By	CK
Figure 4			1	3/5/18	Original	DPN	CTC

## LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
<b>TEST PIT ONE</b>		
0.0 – 1.5		GRAY-BROWN SILTY FINE TO MEDIUM SAND WITH GRAVEL (LOOSE-MEDIUM DENSE, MOIST) ( <u>FILL</u> )
1.5 – 2.4		TAN-BROWN SILTY FINE TO MEDIUM SAND WITH GRAVEL AND TRACE IRON OXIDATION STAINING (MEDIUM DENSE, MOIST) ( <u>FILL</u> )
2.4 – 3.8		DARK BROWN SILTY FINE TO MEDIUM SAND WITH ROOTS AND TRACE GRAVEL (LOOSE, MOIST) ( <u>FILL</u> )
3.8 – 5.7	SM	GRAY SILTY FINE TO MEDIUM SAND WITH GRAVEL AND BOULDERS (DENSE, MOIST-DRY)  SAMPLES WERE COLLECTED AT 2.0, 3.0, AND 4.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS TERMINATED AT 5.7 FEET ON 2/15/2018
<b>TEST PIT TWO</b>		
0.0 – 1.6		GRAY-BROWN SILTY FINE TO MEDIUM SAND WITH GRAVEL AND ANTHROPOGENIC DEBRIS (LOOSE-MEDIUM DENSE, MOIST) ( <u>FILL</u> )
1.6 – 2.2		TAN-BROWN TO BLUE-GRAY SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE, MOIST) ( <u>FILL</u> )
2.2 – 3.6		BROWN-DARK BROWN SILTY FINE TO MEDIUM SAND WITH ROOTS AND TRACE GRAVEL (LOOSE, MOIST) ( <u>FILL</u> )
3.6 – 6.8	SM	GRAY SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (VERY DENSE, MOIST-DRY)  SAMPLES WERE COLLECTED AT 2.0, 3.0, AND 6.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS TERMINATED AT 6.8 FEET ON 2/15/2018

# Conceptual Soldier Pile Wall Detail

NOT FOR CONSTRUCTION USE



NOT TO SCALE

Project Number  
3852C18

Figure 6

1021 Randolph Ave  
Residential Development  
Soldier Pile Wall Detail



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No.	Date	Revision	By	CK
1	3/16/18	Original	DPN	KMS

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