Mark Dodds, P.E.

Mr. and Mrs. Kou
c/o Lance Richert
4345 Island Crest Way
Mercer Island, WA 98040

Job Number 10206

February 25, 2021

Subject: Geotechnical Engineering Report
Proposed Home Addition
4345 Island Crest Way
Mercer Island, Washington 98040

Dear Mr. and Mrs. Kou:

This report presents the results of our work for the proposed addition to the west side of the existing residence at 4345 Island Crest Way in Mercer Island, Washington. The purposes of our work were focused towards evaluating the subsurface conditions and providing geotechnical engineering design recommendations regarding foundation design for the new addition.

The scope of our work consisted of: 1) Excavating and logging two test pits excavated to a maximum depth of 6.0 feet below existing grades, 2) Engineering analysis of the collected fieldwork data, and 3) Preparation of this summary report with our observations and recommendations. For guidelines on how to use and apply this report to this site and your project, please refer to Plate 1.

1.0 PROPOSED CONSTRUCTION

Development plans are to demolish the existing wooden deck and construct a two story addition to the existing residence in approximately the same location. Only shallow cuts (less than four feet deep) are anticipated. We anticipate finish grades will remain near existing grades.

2.0 EXISTING CONDITIONS

The intended addition site is covered over by a wooden deck that is in fair condition. Peering under the deck it appears that there is around three feet or more of unengineered (not compacted) soil under the deck. The proposed building site has a slight downward gradient towards the west. The neighborhood is established and fully developed with houses and landscaping. Overall, the property has a moderate slope down to the west.

3.0 FIELD EXPLORATIONS

Two test pits were excavated on the site near the existing deck as close to the intended addition as practical The pits were excavated to a maximum depth of 6.0 feet below existing grades. The test pits were observed, smapled and logged by the undersigned engineer during the fieldwork.

4.0 SUBSURFACE DESCRIPTION

The final Test Pit Logs attached to this report are our interpretations of the field data. The stratification lines on the logs represent approximate boundaries between soil types at the exploration locations. In actuality, the transition may be gradual. The relative densities and moisture descriptions on the Test Pit Logs are interpretive descriptions based on observed conditions during excavation.

The data described above and in previous sections was used to prepare an overall description of the subsurface soil conditions underlying the property. Although there may very well be variations from the following, we expect the subsurface soil description below to apply to much of the site:

The site is generally underlain with loose to medium-dense silty sand with some gravel. There is some apparent fill placed atop these native soils where the addition is to be constructed. The native soils became more gravelly and denser with depth. Subsurface soils were generally very moist to wet. Water was extruding from the side of the test pit walls during excavation. We estimate that the standing groundwater table was near four feet during test pit excavation, which is probably due to the wet winter weather.

5.0 DISCUSSION & RECOMMENDATIONS

5.1 FOUNDATIONS

The proposed new addition may be founded on conventional continuous and spread footings bearing directly on a minimum of 1 foot of structurally compacted gravelly fill soils as specified below. A minimum footing embedment of 18 inches below outside finish grades should be maintained.

All unengineered (not compacted or inspected) fill soils in the immediate area of the addition should be removed prior to construction. We estimate this will require removal of at least three feet of material.

To minimize footing settlements, we recommend the footing excavated be deepened an additional twelve inches below proposed bearing elevation, the exposed native sandy soils compacted to a dense unyielding condition, and then these twelve inches of over-excavated soils be replaced with clean compacted sand and gravel (with perhaps a trace (up to 5%) silt) that is compacted to a 95% of ASTM D-1557 (Modified Proctor) maximum density. The new footings may bear directly on the compacted sand and gravel.

A bearing pressure of 2000 pounds per square foot may be assumed for footings bearing as described above. Some additional work on the bearing surface may be required prior to placing concrete, depending upon the results of our field inspection.

The design bearing pressure may be increased by one-third (1/3) to accommodate short-term wind and seismic loads. To provide protection against shear failure, we recommend continuous and spread footings have a minimum width of sixteen inches (16") and twenty-four inches (24"), respectively.

We estimate the foundations bearing as described above will settle approximately ½ of an inch for every forty feet of continuous footing and between adjacent isolated footings. Minimum differential settlements between building corners of ½ inch should be anticipated in design.

Lateral Loads such as wind and seismic forces are resisted by friction between the foundation elements and the bearing soils and the passive earth pressure against the

foundation walls. However, passive earth pressure should not be relied upon to provide resistance unless the walls are poured directly against the existing native soils or structural fill is compacted against the buried foundation walls. A coefficient of 0.35 may be used in design between the foundation elements and the underlying native soils. The passive resistance of existing native soils and compacted fill may be assumed in design as an equivalent fluid having a density of 275 pounds per cubic foot (pcf). The seismic soil type is Class D.

5.2 SITE DRAINAGE

The site should be graded during construction so that surface water is directed away from the excavation. Water should not be allowed to pond where foundations, pavements or slabs are to be constructed.

Final site grades adjacent to the building should be sloped away from the building for a minimum distance of five feet.

We recommend installing footing drains around the new addition. Footing drains should consist of a minimum four-inch-diameter pvc slotted pipe that is bedded in, and covered with minimum of six inches of drain rock or pea gravel. The top of the drain pipe should be placed at least six inches below the elevation of the adjacent floor slab. A non-woven geotextile fabric (Mirafi 140N, Supac 4NP or other equivalent) should be wrapped around the drain rock. The pipe should be sloped to drain, and may be connected to the roof and surface water discharge pipes down-gradient and away from the structure.

All drains (roof, surface water and footing drains) should discharge to an appropriate discharge facility. If at all practical, gravity drainage is preferred over utilization of a pump to achieve drainage.

5.3 EXCAVATIONS AND SLOPES

Temporary and permanent excavations and slopes for this project must meet all applicable government safety regulations and standards. Temporary cuts to a depth of four feet may be attempted vertical, but will probably not hold for long. Contractors working in excavations should use caution at all times as sudden caving of side slopes is possible. Any

temporary cuts that must remain stable for some time should be cut no steeper than 1:1 (Horizontal:Vertical).

Permanent cut and fill slopes which are not otherwise reinforced should not exceed 2:1 (Horizontal:Vertical).

5.4 EARTHWORK AND STRUCTURAL FILL

Site work should begin by removing the deck, the existing fill soil, and any other deleterious material from the building site. Stripped materials may have to be removed from the property. This office can be contacted after the site has been stripped to inspect exposed conditions and make remedial recommendations, as necessary.

Structural fill is defined as any fill placed below structures, including slabs, where the fill soils need to support loads without unacceptable deflections or shearing. For this project, structural fill should have a maximum particle size of ¾ inch. Regular Structural fill should be placed above unyielding subgrade soils in maximum eight-inch-thick lifts and compacted to a minimum of 95% of Modified Proctor (ASTM D-1557). Soil is typically difficult to place and compact as structural fill if the moisture content at the time of compaction is more or less than 3% from the Optimum Moisture Content. During wet weather or under wet conditions, structural fill should consist of a granular soil having less than five percent silt or clay (measured relative to that portion which passes a ¾ inch sieve). During dry weather, water may have to be added to the soil to achieve the required density.

6.0 WET WEATHER CONSIDERATIONS

If the site is developed during extended periods of wet weather or in the winter, the following are anticipated additional costs and changes which should be anticipated:

1) Excavated slopes and any fill piles will have to be protected with plastic.

2) It may be more difficult to compact excavated soils from this site.

3) Additional site visits will be required by this office to meet city requirements, evaluate conditions, confer with the contractor, and make remedial recommendations.

4) Costs of maintaining the site and adjacent streets/properties may increase.

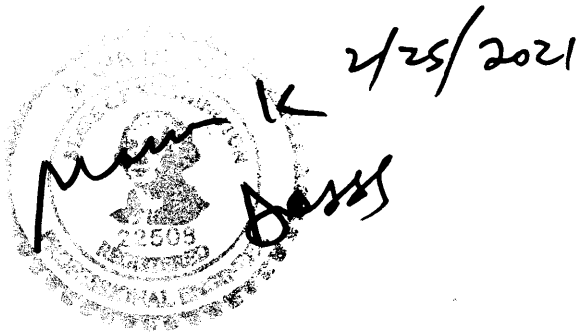
5) Standard erosion control measures will be necessary and require additional maintenance.

7.0 QUALITY CONTROL AND CLOSURE

This office should also be retained to provide geotechnical engineering consultation and observation services during design and construction. This will allow us to: 1) Confirm that the design conforms to encountered subsurface conditions; 2) Confirm that subsurface soils exposed during excavation are consistent with those anticipated; 3) Evaluate whether earthwork, subgrade preparation, and any subsurface drainage installation conform to the intent of the contract specifications and plans; and, 4) Provide recommendations for design changes in the event of changed conditions. While on the site during construction, we will not direct or supervise the contractor or the work, nor will we be responsible for providing on-site safety or dimensional measurements.

It has been a distinct pleasure providing you with our professional services. If we can be of further service on this or other projects, please don't hesitate to call.

Sincerely,



Mark K. Dodds, P.E.

PLATE 1

Guidelines in the Use and Application of this Geotechnical Engineering Report

This report for Job No. 10206 was prepared in accordance with local, generally accepted engineering principles, practices, and standards. No warranty is expressed or implied.

The findings and recommendations in this report are based upon the limited services which you authorized. Geotechnical engineering requires the application of professional judgment, as no study can completely quantify subsurface soil conditions under a property with limited explorations at isolated locations. The owner should comply with any recommendations for additional work which this report recommends, as it is our professional opinion that this additional work is necessary to augment and/or fulfill project plans and site specific requirements.

This report is an informational document and is not to be used for contractual purposes. Any interpretation of subsurface conditions in this report, including test logs and/or text discussions are based upon our testing, observations, analysis, experience, and/or judgment. There is no warranty that the subsurface conditions will be as described, except at the exact locations tested at the time of our fieldwork. Groundwater levels can be especially sensitive to seasonal changes. This firm is not responsible for interpretations other's may make using this report.

The conclusions and recommendations in this report assume that the field tests that were conducted accurately represent subsurface conditions of the site. If, during construction, significantly different conditions are encountered from those described herein, our firm should be notified at once to review those conditions and revise our recommendations as necessary. Also, if there is a significant lapse of time between report submittal and the start of work on the site, our firm should be retained to review and verify site conditions have not changed significantly before site work begins.

Unanticipated subsurface soil and groundwater conditions are commonly encountered during excavation and construction, and simply cannot be fully analyzed and explained through periodic soil and/or rock sampling at widely-spaced testing locations. The owner should be prepared to accommodate potential extra costs through the development of a suitable contingency fund.

Mark Dodds, P.E. cannot be held responsible for any deviation from the intent of this report including, but not limited to the nature of the project, the construction timetable, and any construction methods discussed in the report. The recommendations contained in the report are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as may be specifically described in the report. This firm will not be responsible for any construction activity or site safety, nor are we responsible if others attempt to apply this report to other sites or locations.

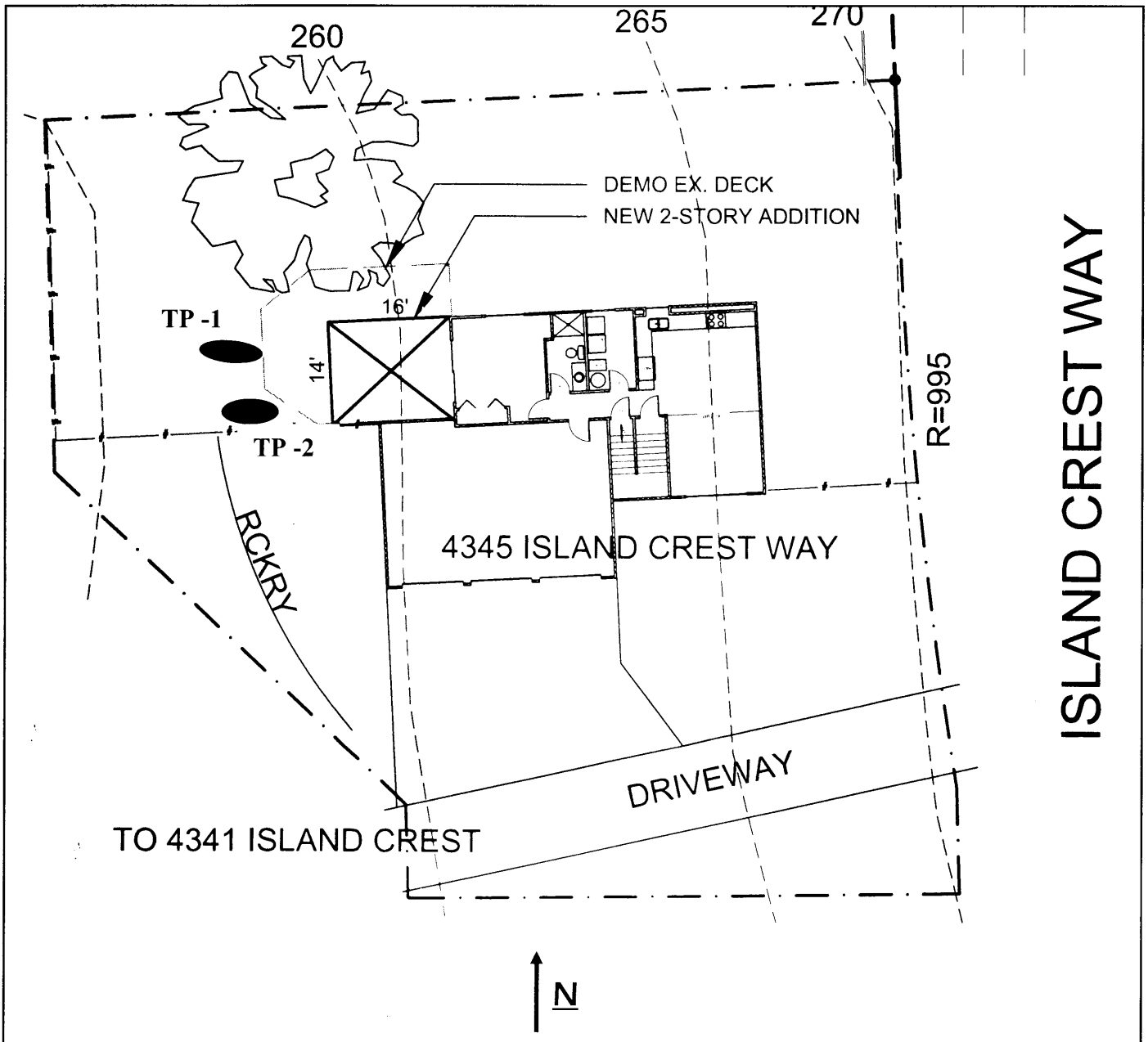


PLATE 2
Site Plan

4345 Island Crest Way
Mercer island, Washington

RECORD OF TEST PIT 1

PROJECT NAME:	Kou Addition Project	PROJECT NO.	010206
ADDRESS:	4345 Island Crest Way	DATE:	2/25/2021
CITY, STATE	Mercer Island, Washington	LOGGED BY:	MKD

TEST PIT NO. TP-1 ELEVATION: 257 PAGE NO. 1 of 1

	Grass/Eight inches of organic-rich dark brown Silty Sand with some Clay, wet, loose.
5	Brown Silty Sand with some Gravel, very moist, loose to medium dense. Becomes medium dense. Becomes dense with more Gravel and trace Cobbles.
10	Stopped at 6.0 feet. Standing groundwater table near 4.0 feet during test pit excavation.
15	

Test Pit Log #1
Kou Addition Project
Mercer Island, Washington

RECORD OF TEST PIT 2

PROJECT NAME:	Kou Addition Project	PROJECT NO.	010206
ADDRESS:	4345 Island Crest Way	DATE:	2/25/2021
CITY, STATE	Mercer Island, Washington	LOGGED BY:	MKD

TEST PIT NO. TP-2 ELEVATION: 258 PAGE NO. 1 of 1

	Gravel fill (4 inches) over organic-rich dark brown Silty Sand with some Clay, wet, loose.
	Brown Silty Sand with some Gravel, very moist, loose to medium dense.
	Becomes medium dense.
	Becomes dense with more Gravel.
5	Stopped at 4.0 feet. No groundwater table noted during test pit excavation.
10	
15	

Test Pit Log #2
Kou Addition Project
Mercer Island, Washington