GEOTECH
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June 5, 2025

JN 24239

Shihang Zhang
4103 – 78th Avenue Southeast
Mercer Island, Washington 98040

via email: zhshihang@gmail.com

Subject: **Transmittal Letter – Geotechnical Engineering Study and Critical Area Study**
Proposed Addition
4103 – 78th Avenue Southeast
Mercer Island, Washington

Greetings:

Attached to this transmittal letter is our combined geotechnical engineering report and critical area study for the proposed addition to be constructed on Mercer Island, Washington. The scope of our services consisted of exploring site surface and subsurface conditions, and then developing this report to provide recommendations for general earthwork and design considerations for foundations, retaining walls, slope stability, subsurface drainage, and temporary excavations and shoring. This work was authorized by your acceptance of our proposal, P-11676, dated June 28, 2024 as well as recent email correspondence as the project design has developed.

The attached report contains a discussion of the study and our recommendations. Please contact us if there are any questions regarding this report, or for further assistance during the design and construction phases of this project.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

Matthew K. McGinnis
Geotechnical Engineer

cc: 5ft2 Studio Architects – Peik Li Pang
via email: peikli.pang@5ft2studio.com

MKM/DRW:kg

GEOTECHNICAL ENGINEERING STUDY AND CRITICAL AREA STUDY
Proposed Addition
4103 – 78th Avenue Southeast
Mercer Island, Washington

This report presents the findings and recommendations of our geotechnical engineering study for the site of the proposed addition project to be located on Mercer Island.

We were provided with architectural plans prepared by 5ft2 Studio Architects, dated March 21, 2025. Based on these plans, we understand that a second story addition is being proposed atop the entire footprint of the existing residence. Most of the new loads are being transmitted to the existing perimeter foundations; however, a new interior foundation is being proposed in the existing basement level. No work is being proposed outside of the residence footprint at this time.

If the scope of the project changes from what we have described above, we should be provided with revised plans in order to determine if modifications to the recommendations and conclusions of this report are warranted.

SITE CONDITIONS

SURFACE

The Vicinity Map, Plate 1, illustrates the general location of the site on Mercer Island. The irregular shaped site comprises a total site area of 0.40-acres. The site is bordered to the north and south by residential properties, to the east by 78th Avenue Southeast, and to the west by West Mercer Way. The adjacent residential properties are developed with residences located well away from the proposed addition area.

The grade across the site generally descends from its northern portion to the southwest,. A paved driveway ascends into the northern portion of the sitesite from 78th Avenue Northeast, continuing to the garage portion of the residence The living area of the residence is south of the garage. The residence contains a main level situated at about elevation 200 feet; the garage floor also has this grade. The living portion of the residence, has a basement whose finish floor is approximately elevation 191 feet. The slab floor of the upslope, northern portion of the basement is about 7 to 8 feet below the outside grade. However, the ground slopes down around the sides of the residence, and the southern edge of the basement is elevated about three feet above the ground surface. . Based on test holes we excavated adjacent to foundations of the residence an garage, shallow footing foundations located within a few feet of the ground where the floor grade of the residence or garage is near the outside ground. More detailed information about the residence's differing foundation levels is discussed later in this report as they pertain to the proposed addition work.

The overall grade change from north to southwest is approximately 38 feet. The grade across the residence footprint slopes mostly downward moderately to the southern edge of the residence. However, just south of the residence grade becomes steeply inclined, descending around 50 to 55 percent over an elevation change of up to about 20 feet. The slope becomes more moderate again on its southwestern edge down to West Mercer Way. No signs of deep-seated instability of the steep slope were observed during a recent site visit within the subject site. A majority of the steep slope is covered with blackberries, saplings, underbrush, fallen limbs and brush, as well as scattered mature trees. The remainder of the lot is covered with hardscaping, underbrush, landscaping, and scattered trees. An elevated patio is located west of the residence, and a tall retaining wall lines the south and southwestern sides of this patio area adjacent to the residence.

The Mercer Island GIS indicates that this site is mapped as a Potential Slide Area, Seismic Hazard Area, and Erosion Hazard Area. The Mercer Island Landslide Hazard Assessment maps a potential scarp area at the top of the southern steep slope; however, no documented landslides are shown in the direct vicinity.

SUBSURFACE

The subsurface conditions were explored by drilling two test borings and excavating six test holes at the approximate locations shown on the Site Exploration Plan, Plate 2. Our exploration program was based on the proposed construction, anticipated subsurface conditions and those encountered during exploration, and the scope of work outlined in our proposal.

The test borings were drilled on July 18, 2024 using a track-mounted, hollow-stem auger drill and the test holes were excavated on April 21, 2025 using hand equipment. Samples were taken in the test borings at approximate 2.5- to 5-foot intervals with a standard penetration sampler. This split-spoon sampler, which has a 2-inch outside diameter, is driven into the soil with a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler a given distance is an indication of the soil density or consistency. A geotechnical engineer from our staff observed the drilling process, logged the test borings, and obtained representative samples of the soil encountered. The Test Boring Logs are attached as Plates 3 through 5.

Soil Conditions

Test Boring 1 was drilled near the downslope side of the residence, close to the top of the steep slope, while Test Boring 2 was drilled close to the upslope, northern side of the residence in the driveway. At the ground surface, loose fill soils and/or loose to medium-dense, native silty sand was revealed to depths of about 5 feet. Beneath these upper soils, native, very stiff silt was revealed that continued with depth, becoming hard/dense at depths of about 7.5 feet and then very dense at depths of about 10 to 15 feet. The very dense native silt continued to the base of the borings at depths of 26 to 26.5 feet. Based on the observed soil samples, and the recorded blow counts, it is apparent that the native silt has been glacially compressed.

The test holes were excavated at the residence perimeter. In a majority of the test holes, either loose fill soil or loose native soil was revealed beneath at the ground surface. Some of the test holes were terminated in loose fill or looser native soils because deeper penetration was not possible. However, stiff and harder native silt soil was revealed at depths of 3 to 5 feet in Test Holes 1,2,4, and 6. This native silt soil is very similar to the silt encountered in the test borings.

No obstructions were revealed by our explorations. However, debris, buried utilities, and old foundation and slab elements are commonly encountered on sites that have had previous development.

Groundwater Conditions

No groundwater seepage was observed during the drilling of the test borings or the digging of the test holes. It should be noted that groundwater levels vary seasonally with rainfall and other factors. However, groundwater levels encountered during drilling can be deceptive because seepage into the boring can be blocked or slowed by the auger itself. It should be noted that groundwater levels vary seasonally with rainfall and other factors, with higher and greater amounts typically revealed in the winter and spring months. It is possible that groundwater could be found perched and the looser near-surface soil and the underlying very stiff/dense soils.

The stratification lines on the logs represent the approximate boundaries between soil types at the exploration locations. The actual transition between soil types may be gradual, and subsurface conditions can vary between exploration locations. The logs provide specific subsurface information only at the locations tested. If a transition in soil type occurred between samples in the borings, the depth of the transition was interpreted. The relative densities and moisture descriptions indicated on the test boring logs are interpretive descriptions based on the conditions observed during drilling.

SEISMIC CONSIDERATIONS

In accordance with the International Building Code (IBC), the site class within 100 feet of the ground surface is best represented by Site Class Type D (Stiff Soil). As noted in the USGS website, the mapped spectral acceleration value for a 0.2 second (S_s) and 1.0 second period (S_1) equals 1.42g and 0.49g, respectively.

The IBC and ASCE 7 require that the potential for liquefaction (soil strength loss) during an earthquake be evaluated for the peak ground acceleration of the Maximum Considered Earthquake (MCE), which has a probability of occurring once in 2,475 years (2 percent probability of occurring in a 50-year period). The MCE peak ground acceleration adjusted for site class effects (F_{PGA}) equals 0.66g. The soils beneath the site are not susceptible to seismic liquefaction under the ground motions of the MCE because of their very stiff/dense, glacially-compressed nature and the absence of near-surface groundwater.

Sections 1803.5 of the IBC and 11.8 of ASCE 7 require that other seismic-related geotechnical design parameters (seismic surcharge for retaining wall design and slope stability) include the potential effects of the Design Earthquake. The peak ground acceleration for the Design Earthquake is defined in Section 11.2 of ASCE 7 as two-thirds (2/3) of the MCE peak ground acceleration, or 0.44g.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

THIS SECTION CONTAINS A SUMMARY OF OUR STUDY AND FINDINGS FOR THE PURPOSES OF A GENERAL OVERVIEW ONLY. MORE SPECIFIC RECOMMENDATIONS AND CONCLUSIONS ARE CONTAINED IN THE REMAINDER OF THIS REPORT. ANY PARTY RELYING ON THIS REPORT SHOULD READ THE ENTIRE DOCUMENT.

This report provides a summary of our geotechnical engineering conclusions and recommendations regarding the project. It also provides information regarding a critical area per the MICC.

The test borings and test holes conducted for this study encountered native, very stiff and harder silt soils beneath a mantle of loose fill and looser native soil at a depth of approximately 3 to 7 feet deep. Therefore, it is apparent that the core of the site and slope are comprised of these competent, glacially compressed silt soils, which have a low susceptibility to deep seated instability. These soils have a high internal strength and are not susceptible to deep seated instability. However, it is apparent that approximately up to 3 to greater than 4.5 feet of loose soils exist beneath a large majority of the existing foundations, although the northern basement wall does bear on the competent silt soil based on the nearby test boring. The loose soils are not adequate to support the new building loads without the risk of significant post-construction settlement. Therefore, all new building loads need to be supported on, or into the competent, very stiff and harder native soils. Therefore, new building loads outside of the northern basement wall will need to be supported on deep foundations. For this project, small diameter pipe piles would likely provide the most efficient deep foundation system to support building loads; these should be used for underpinning existing foundations and for any new foundations that are outside of the basement wall. However, because the southern edge of the residence is located near the top of a steep slope, and it appears that approximately 5 feet of loose soil exists below the foundation, lateral support of the southern edge of is needed. This support will deter any movement of the residence and satisfy City of Mercer Island code with regards to steep slopes. For lateral support, we recommend that the deep foundation system at the southern edge of the residence includes helical anchors in addition to the pipe piles. Further recommendations are listed in the ***Pipe Piles*** and ***Helical Anchors*** sections of this report.

The competent silt soils are glacially compressed. These qualities leave little to no inter-particle pore spaces, making the silt soils nearly impermeable (i.e., hydraulically restrictive). Because of this, it is our professional opinion that infiltration of concentrated stormwater should not be implemented for this project. Any attempt to utilize infiltration systems at this site will likely lead to early failure of the systems due to the shallow depth to a hydraulically restrictive layer. This would cause adverse drainage impacts to the site and surrounding areas, as well as the nearby steep slope.

The drainage and/or waterproofing recommendations presented in this report are intended only to prevent active seepage from flowing through concrete walls or slabs. Even in the absence of active seepage into and beneath structures, water vapor can migrate through walls, slabs, and floors from the surrounding soil, and can even be transmitted from slabs and foundation walls due to the concrete curing process. Water vapor also results from occupant uses, such as cooking, cleaning, and bathing. Excessive water vapor trapped within structures can result in a variety of undesirable conditions, including, but not limited to, moisture problems with flooring systems, excessively moist air within occupied areas, and the growth of molds, fungi, and other biological organisms that may be harmful to the health of the occupants. The designer or architect must consider the potential vapor sources and likely occupant uses, and provide sufficient ventilation, either passive or mechanical, to prevent a buildup of excessive water vapor within the planned structure.

Geotech Consultants Inc. should be allowed to review the final development plans to verify that the recommendations presented in this report are adequately addressed in the design. Such a plan review would be additional work beyond the current scope of work for this study, and it may include revisions to our recommendations to accommodate site, development, and geotechnical constraints that become more evident during the review process.

We recommend including this report, in its entirety, in the project contract documents. This report should also be provided to any future property owners so they will be aware of our findings and recommendations.

CRITICAL AREA STUDY (MICC 19.07)

Erosion Hazard Area: The site meets the City of Mercer Island's criteria for an Erosion Hazard Area. However, the construction of the second-story addition can be accomplished with very little ground disturbance outside of the building footprint. The only disturbance outside of the footprint will be for small excavations needed to allow for the installation of piles and helical anchiors. Therefore, this project can readily be done withoutadverse erosion impacts to the site and surrounding properties. The temporary erosion control measures needed during the site development will depend heavily on the weather conditions that are encountered during the site work. One of the most important considerations, particularly during wet weather, is to immediately cover any bare soil areas to prevent accumulated water or runoff from the work area from becoming silty in the first place. A wire-backed silt fence should be erected as close as possible to the planned work area, and the existing vegetation outside of the perimeter of the silt fence be in place.

Potential Landslide Hazard Area: The majority of the site is located within a mapped Potential Landslide Hazard area as noted in the Mercer Island GIS portal. The Potential Slide Area mapping also covers much of the general vicinity. However, as noted above, the core of the subject site consists of very stiff/dense or denser, glacially-compressed, native silt soils that are not susceptible to deep-seated landslides, the residence will be founded on pipe piles and helical anchors that embed into the core soil, and no disturbance to any steep slopes will be done for the project.Therefore, the recommendations presented in this study are intended to provide stability to the residence in the potential event of slope instability, including during an MCE, thereby mitigating the Potential Landslide Hazard risk. Thus, no buffers are necessary to mitigate the mapped Potential Landslide Hazard and the existing residence setback from the southern/southwestern steep slope is adequate.

Seismic Hazard: The site is mapped as a Seismic Hazard Area. The Seismic Hazard mapping appears inaccurate because the site ssoil are not prone to liquefaction

Steep Slope Hazard Areas: A portion of the site's southern slope is steeply inclined and thus meets Mercer Island's code criteria for a Steep Slope Hazard. Provided that the recommendations in this report are followed, with the most significant being that the southern footings of the residence are underpinned with pipe piles and helical anchors as described earlier, it is our opinion that the residence will be stable in its current location. Therefore, no additional buffers or setbacks are needed from the southern steep slope.

Buffers and Mitigation: Under MICC 19.07.160(C), the code-prescriptive buffer of 25 feet is indicated from all sides of a shallow landslide-hazard area.

We recognize that the planned development will occur within the designated critical areas and their applicable prescriptive buffers. However, based on information provided earlier, the recommendations presented in this report are intended to allow the project to be constructed in the proposed configuration without the need for a buffer from the top of the steep slope. In addition, following the recommendations of this report, the planned development will not adversely impact the stability of the neighboring properties or result in a need for increased critical area buffers on those adjacent properties. The geotechnical recommendations associated with foundations, shoring, and erosion control will mitigate any potential hazards to geologic critical areas on the site.

Statement of Risk: We can provide the statement of risk required by the City of Mercer Island once we have reviewed the geotechnical engineering aspects of the final plans that have been submitted for permit.

PIPE PILES

As noted in the ***General*** section, except for the northernmost basement foundation, the majority of the existing foundations should be vertically supported on small diameter pipe piles. Depending on access, a combination of 2-inch diameter up to 4-inch diameter pipe piles could be used. Two-inch diameter pipe piles can be installed using hand carried equipment. The larger, 3- and 4-inch diameter piles could be used where larger installation equipment can assess an area if desired.

A 2-inch-diameter pipe pile driven with a minimum 90-pound jackhammer or a 140-pound Rhino hammer to a final penetration rate of 1-inch or less for one minute of continuous driving may be assigned an allowable compressive load of 3 tons.

Three- or 4-inch-diameter pipe piles driven with an 850- or 1,100- or 2,000-pound hydraulic jackhammer to the following final penetration rates may be assigned the following compressive capacities.

INSIDE PILE DIAMETER	FINAL DRIVING RATE (850-pound hammer)	FINAL DRIVING RATE (1,100-pound hammer)	FINAL DRIVING RATE (2,000-pound hammer)	ALLOWABLE COMPRESSIVE CAPACITY
3 inches	10 sec/inch	6 sec/inch	2 sec/inch	6 tons
4 inches	16 sec/inch	10 sec/inch	4 sec/inch	10 tons

Note: The refusal criteria indicated in the above table are valid only for pipe piles that are installed using a hydraulic impact hammer carried on leads that allow the hammer to sit on the top of the pile during driving. If the piles are installed by alternative methods, such as a vibratory hammer or a hammer that is hard mounted to the installation machine, numerous load tests to 200 percent of the design capacity would be necessary to substantiate the allowable pile load. The appropriate number of load tests would need to be determined at the time the contractor and installation method are chosen.

Schedule 80 pipe should be used for any 2-inch diameter pipe pile. As a minimum, Schedule 40 pipe should be used for pipe piles over 3-inches in diameter. The site soils are not highly organic and are not located near salt water. As a result, they do not have an elevated corrosion potential. Considering this, it is our opinion that standard “black” pipe can be used, and corrosion protection, such as galvanizing, is not necessary for the pipe piles.

Pile caps and grade beams should be used to transmit loads to the piles. Isolated pile caps should include a minimum of two piles to reduce the potential for eccentric loads being applied to the piles. Subsequent sections of pipe can be connected with slip or threaded couplers, or they can be welded together. If slip couplers are used, they should fit snugly into the pipe sections. This may require that shims be used or that beads of welding flux be applied to the outside of the coupler.

Lateral loads due to wind or seismic forces may be resisted by passive earth pressure acting on the vertical, embedded portions of the foundation. For this condition, the foundation must be either poured directly against relatively level, undisturbed soil or be surrounded by level compacted fill. We recommend using a passive earth pressure of 300 pounds per cubic foot (pcf) for this resistance. <u>However, if the ground in front of a foundation is loose or sloping, such as on the eastern side of the proposed additions, the passive earth pressure given above will not be appropriate.</u> <u>No passive pressure should be attributed to the existing western perimeter foundation close to the existing slope.</u> We recommend a safety factor of at least 1.5 for the foundation's resistance to lateral loading, when using the above ultimate passive value.

We recommend that the piles be driven to at least a depth of 8 feet below the existing ground. However, it is very likely that the piles will be driven deeper, with depths of up to about 20 feet possible.

HELICAL ANCHORS

Helical anchors should be included to laterally support the southernmost foundation of the existing residence. Helical anchors consist of single or multiple helixes that are rotated into the ground on the end of round or square metal shafts. The minimum diameter of a single helix anchor is 8 inches. The ultimate capacity of the anchor in tension or compression can be estimated roughly by multiplying the installation torque by 10. We recommend that the uppermost helix be installed at least 5 feet behind the grade beam and into the very dense soils that comprise the core of the site. A typical anchor capacity for a single 8- to 10-inch helix is 10 to 15 kips, but multiple options for the number of helixes and capacity are available. The anchors should be installed by a specialty contractor familiar with the design and installation of helical anchor systems. The anchor contractor can assist with refining the anchor design and details and estimating capacities for different soil and anchor conditions. All anchors should be installed to a torque rate that is estimated to be at least 200 percent of the estimated design capacity. We also recommend that at least one of the anchors be load tested to 200 percent of its design capacity.

The anchors need to restrain lateral pressures of the potential movement of the looser upper soils. The lateral pressure can be calculated by applying an active earth pressure of 40 pounds per cubic foot (pcf) over a depth of 5 feet measured from the existing grade. A safety factor of 1.5 should be applied in determining the necessary capacity of the anchors needed to mitigate the forces of this potential movement.

NORTHERN FOUNDATION OF THE RESIDENCE BASEMENT

The existing northern basement wall can be analyzed as a footing foundation because it appears they bear on very stiff/dense or denser, native silt soils. An allowable bearing pressure of 2,000 pounds per square foot (psf) is appropriate for this footing.

FOUNDATION AND RETAINING WALLS

Retaining walls backfilled on only one side should be designed to resist the lateral earth pressures imposed by the soil they retain.

The following recommended parameters are for walls that restrain level backfill:

PARAMETER	VALUE
Lateral Earth Pressure *	35 pcf
Passive Earth Pressure	300 pcf
Coefficient of Friction^	0.40
Soil Unit Weight	130 pcf

Where: pcf is Pounds per Cubic Foot, and Lateral and Passive Earth Pressures are computed using the Equivalent Fluid Pressures.

*** For a restrained wall that cannot deflect at least 0.002 times its height, a uniform lateral pressure equal to 10 psf times the height of the wall should be added to the above lateral equivalent fluid pressure. This applies only to walls with level backfill.**

^ Not applicable for pile-supported walls

EXCAVATIONS AND SLOPES

Temporary excavation slopes should not exceed the limits specified in local, state, and national government safety regulations. Also, temporary cuts should be planned to provide a minimum 2 feet of space for construction of foundations, walls, and drainage. Temporary cuts to a maximum overall depth of about 4 feet may be attempted vertically in unsaturated soil if there are no indications of slope instability. However, vertical cuts should not be made at property boundaries and at existing utilities and structures. Based upon Washington Administrative Code (WAC) 296, Part N, the soil at the subject site would generally be classified as Type B. Therefore, temporary cut slopes greater than 4 feet in height should not be excavated at an inclination steeper than 1:1 (Horizontal:Vertical), extending continuously between the top and the bottom of a cut.

The above-recommended temporary slope inclination is based on the conditions exposed in our explorations, and on what has been successful at other sites with similar soil conditions. It is possible that variations in soil and groundwater conditions will require modifications to the inclination at which temporary slopes can stand. Temporary cuts are those that will remain unsupported for a relatively short duration to allow for the construction of foundations, retaining walls, or utilities. Temporary cut slopes should be protected with plastic sheeting during wet weather. It is also important that surface runoff be directed away from the top of temporary slope cuts. Cut slopes should also be backfilled or retained as soon as possible to reduce the potential for instability. Please note that loose soil can cave suddenly and without warning. Excavation, foundation, and utility contractors should be made especially aware of this potential danger. These recommendations may need to be modified if the area near the potential cuts has been disturbed in the past by utility installation, or if settlement-sensitive utilities are located nearby.

LIMITATIONS

The conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our exploration and assume that the soil and groundwater conditions encountered in the test borings are representative of subsurface conditions on the site. If the subsurface conditions encountered during construction are significantly different from those observed in our explorations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. Unanticipated conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking samples in test borings. Subsurface conditions can also vary between exploration locations. Such unexpected conditions frequently require making additional expenditures to attain a properly constructed project. It is recommended that the owner consider providing a contingency fund to accommodate such potential extra costs and risks. This is a standard recommendation for all projects.

The recommendations presented in this report are directed toward the protection of only the proposed addition from damage due to slope movement. Predicting the future behavior of steep slopes and the potential effects of development on their stability is an inexact and imperfect science that is currently based mostly on the past behavior of slopes with similar characteristics. Landslides and soil movement can occur on steep slopes before, during, or after the development of property. The owner of any property containing or located close to steep slopes must ultimately accept the possibility that some slope movement could occur. However, such movement will not affect the addition if the recommendations in the report are followed.

This report has been prepared for the exclusive use of Shihang Zhang and his representatives for specific application to this project and site. Our conclusions and recommendations are professional opinions derived in accordance with our understanding of current local standards of practice, and within the scope of our services. No warranty is expressed or implied. The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. Our services also do not include assessing or minimizing the potential for biological hazards, such as mold, bacteria, mildew and fungi in either the existing or proposed site development.

ADDITIONAL SERVICES

In addition to reviewing the final plans, Geotech Consultants, Inc. should be retained to provide geotechnical consultation, testing, and observation services during construction. This is to confirm that subsurface conditions are consistent with those indicated by our exploration, to evaluate whether earthwork and foundation construction activities comply with the general intent of the recommendations presented in this report, and to provide suggestions for design changes in the event subsurface conditions differ from those anticipated prior to the start of construction. However, our work would not include the supervision or direction of the actual work of the contractor and its employees or agents. Also, job and site safety, and dimensional measurements, will be the responsibility of the contractor.

During the construction phase, we will provide geotechnical observation and testing services when requested by you or your representatives. Please be aware that we can only document site work we actually observe. It is still the responsibility of your contractor or on-site construction team to verify that our recommendations are being followed, whether we are present at the site or not.

The following plates are attached to complete this report:

Plate 1	Vicinity Map
Plate 2	Site Exploration Plan
Plates 3 - 4	Test Boring Logs
Plate 5	Test Hole Logs
Plate 6	Typical Footing Drain Detail

We appreciate the opportunity to be of service on this project. Please contact us if you have any questions, or if we can be of further assistance.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

6/05/2025

D. Robert Ward, P.E.
Principal

MKM/DRW:kg

NORTH

(Source: King County iMap)

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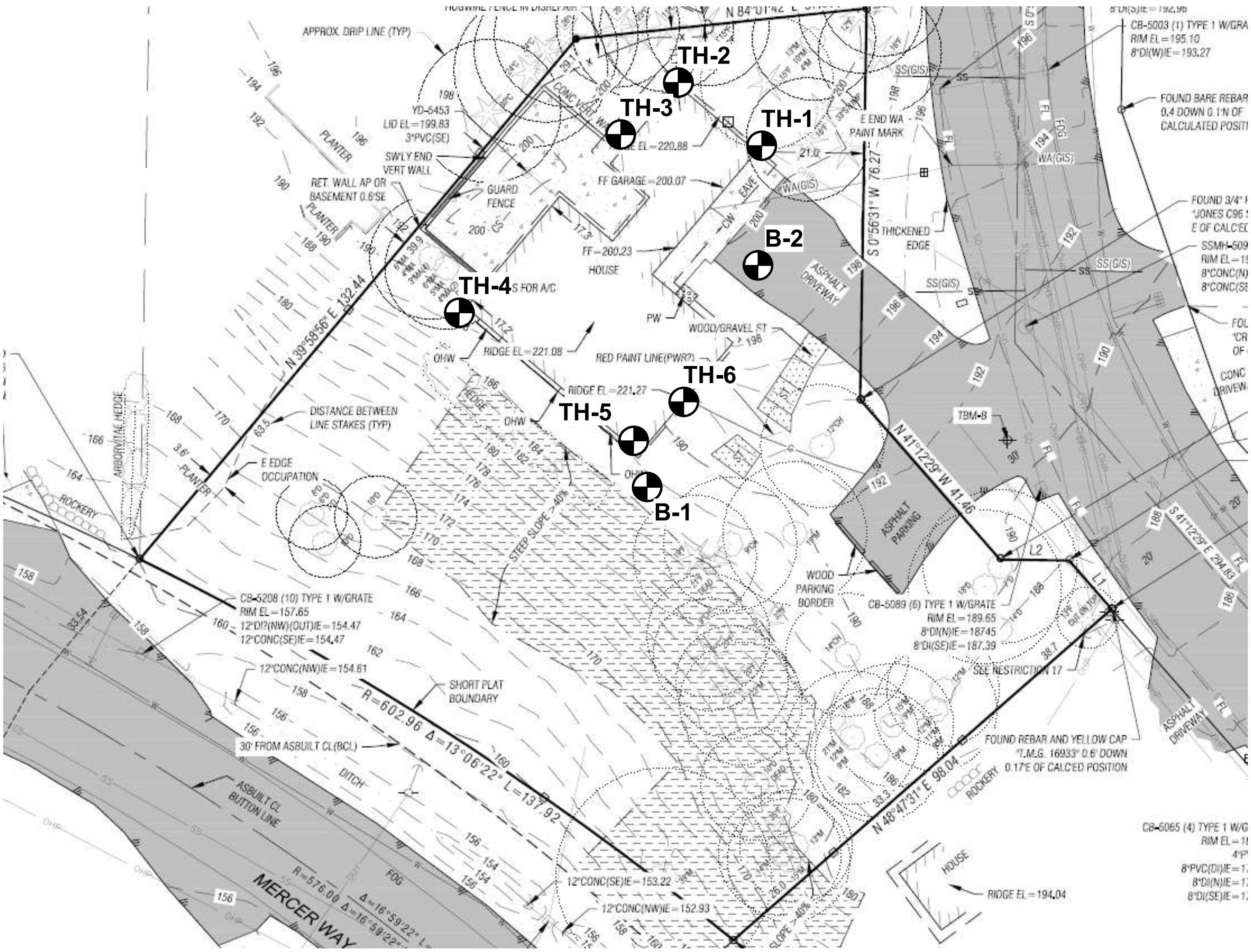
VICINITY MAP

4103 -78th Avenue Southeast
Mercer Island, Washington

Job	Date:		Plate:
24239	July 2024		1

NORTH



Legend:

Test Boring Location

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SITE EXPLORATION PLAN

4103 -78th Avenue Southeast
Mercer Island, Washington

Job	Date:		Plate:
24239	July 2024		2

BORING 1

Surface Elevation ±186'

Depth (ft.)	Moisture	Water Table	Blows per Foot	Sample	USCS	Description
0					FILL	Brown cobbly, gravelly, silty SAND with roots and organics, fine-grained, dry, loose
			12	1	SM	Brown mottlied orange silty SAND / SILT with roots and trace decayed organics, fine-grained, dry, loose to medium-dense
5			27	2	ML	Brown with rusting slightly sandy SILT with trace roots, low-plasticity, moist, very stiff - becomes bedded - becomes gray-brown to gray, with angular, rusted sand seams, hard
			42	3		
10			64	4		- becomes very sandy, low-plasticity to non-plastic, very dense
15			76	5		
20			87/11"	6		
25			76	7		- becomes bluish-gray
30						

*** Test boring was terminated at 26.5 feet on July 18, 2024.**
*** No groundwater was encountered during drilling.**

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TEST BORING LOG

4103 -78th Avenue Southeast
Mercer Island, Washington

Job	Date:	Logged by:	Plate:
24239	July 2024	MKM	3

BORING 2

Depth (ft.)	Moisture	Water Table	Blows per Foot	Sample	USCS	Description — Surface Elevation ±198'
0–5					FILL	Blue SILT with quarry spalls, moist, loose **(FILL)**
5			21	1	ML	Gray-brown heavily mottled orange SILT, low-plasticity, moist, very stiff
			30	2		- becomes gray with trace compressed organics, very sandy, non-plastic, dense
10			34	3		- grades to very fine-grained silty SAND
15			62	4		- increased plasticity, becomes very dense
20			67	5		
25			50/6"	6		

* **Test boring was terminated at 26 feet on July 18, 2024.**
* **No groundwater was encountered during drilling.**

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TEST BORING LOG

4103 -78th Avenue Southeast
Mercer Island, Washington

Job	Date:	Logged by:	Plate:
24239	July 2024	MKM	4

TEST HOLE 1 *Surface Elevation ±200'*

Depth (feet)	Soil Description
0.0 – 1.0	Gray silty SAND, fine-grained, very moist, loose **[FILL]**
1.0 – 4.5	Brown sandy SILT to silty SAND with organics and roots, low plasticity to non-plastic, very moist, soft **[ML/SM]** - 3', becomes grayish-brown mottled orange, less roots, stiff - 4', becomes very stiff

Test Hole was terminated at a depth of 4.5 feet on April 21, 2025.
No groundwater was encountered in the test hole.
Top of footing measured 4 inches below ground surface (bgs). Footing measured 4 inches wide from stem wall. Bottom of footing measured 10 inches bgs.

TEST HOLE 2 *Surface Elevation ±200'*

Depth (feet)	Soil Description
0.0 – 1.5	Gray silty SAND, fine-grained, very moist, loose **[FILL]**
1.5 – 5.0	Brown sandy SILT to silty SAND with organics and roots, low plasticity to non-plastic, very moist, soft to medium-stiff **[ML/SM]** - 3.5', becomes grayish-brown mottled orange, less roots, medium-stiff - 5', becomes very stiff

Test Hole was terminated at a depth of 5.0 feet on April 21, 2025.
No groundwater was encountered in the test hole.
Top of footing measured 10 inches bgs. Footing measured 7 inches wide from stem wall. Bottom of footing measured 17 inches bgs.

TEST HOLE 3 *Surface Elevation ±200'*

Depth (feet)	Soil Description
0.0 – 4.5+	Gray gravelly silty SAND, fine-grained, dry, dull, medium-dense **[FILL]**

Test Hole was terminated at a depth of 4.5 feet on April 21, 2025 due to refusal on gravel.
No groundwater was encountered in the test hole.
Footing dimensions were not able to be measured.

TEST HOLE 4 *Surface Elevation ±188'*

Depth (feet)	Soil Description
0.0 – 2.25	Pea Gravel **[FILL]**
2.25 – 5.0	Brown SILT with roots, decayed organics, and pockets of silty sand, low plasticity, very moist, soft **[FILL]**
5.0 – 7.0	Gray-brown mottled orange, sandy SILT, low plasticity, moist, stiff to very stiff **[ML]** - 7', becomes very stiff to hard

Test Hole was terminated at a depth of 7.0 feet on April 21, 2025.
No groundwater was encountered in the test hole.
Top of footing measured 26 inches below ground surface (bgs). Footing width and bottom of footing not able to be measured due to utilities.

TEST HOLE 5 *Surface Elevation ±188'*

Depth (feet)	Soil Description
0.0 – 4.5+	Brown to dark-brown very gravelly, cobbly, silty SAND, fine-grained, moist, loose **[FILL]** - Probe with easeto 7 feet

Test Hole was terminated at a depth of 4.5 feet on April 21, 2025 due to refusal on gravels.
No groundwater was encountered in the test hole.
Top of footing measured 30 inches below ground surface (bgs). Footing width and bottom of footing not able to be measured due to utilities.

TEST HOLE 6 *Surface Elevation ±190'*

Depth (feet)	Soil Description
0.0 – 2.0	Gray silty SAND, fine-grained, very moist, loose **[FILL]**
2.0 – 5.0	Brown sandy SILT to silty SAND with organics and roots, low plasticity to non-plastic, very moist, soft **[ML/SM]** - 4', becomes gray-brown mottled orange, less organics, stiff

Test Hole was terminated at a depth of 5.0 feet on April 21, 2025.
No groundwater was encountered in the test hole.
Top of footing measured 10 inches bgs. Footing measured 4 inches wide from stem wall. Bottom of footing depth not able to be measured due to utilities.

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TEST HOLE LOGS

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Mercer Island, Washington

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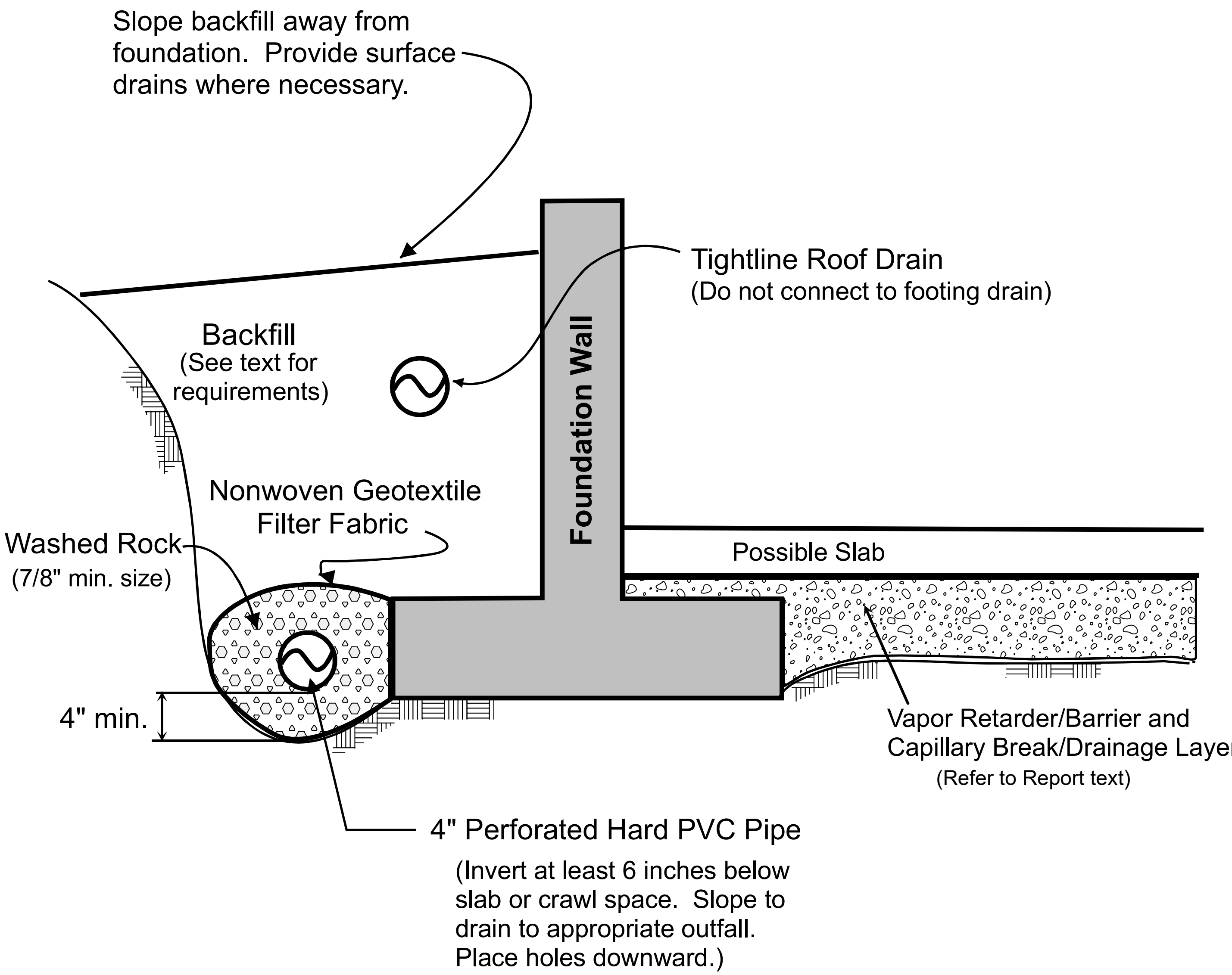

NOTES:

(1) In crawl spaces, provide an outlet drain to prevent buildup of water that bypasses the perimeter footing drains.

(2) Refer to report text for additional drainage, waterproofing, and slab considerations.

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FOOTING DRAIN DETAIL

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