

MR 1-9 Storm Drainage Report Nguyen Residence



9831 SE 42nd Place
Mercer Island, WA 98040

6,844 SF Impervious
(NEW & REPLACED)

May 13, 2022

Co-authored by
Stephenie Seawall
Duffy Ellis, P.E.

General:

This site's new and replaced impervious area is **ABOVE 5,000** sf, site is subject to minimum DOE requirements MR1-9 identified below.

MR1 = Preparation of Storm Water Site Plans	See C2.0 Drainage Plan
MR2 = Construction Storm Water Pollution Prevention Plan	See C1.0 TESCP in plan set. See the CSWPPP in the appendix
MR3 = Source Control of Pollution	See C1.0 for erosion control measures recommended to mitigate erosion and sediment discharge from site during construction phase.
MR4 = Preservation of Natural Drainage Systems and Outfalls	This lot and surrounding area have a topographic tilt toward Lake Washington shoreline. There are no natural drainage systems and outfall options for discharge for this urban lot. Runoff from the roof is collected and connected to the storm drain across the street. We discuss MR4 in more depth on page 5.
MR5 = On-site Stormwater Management	Stormwater BMP's are not proposed on this lake Washington lot. We discuss further in section MR5 of report.

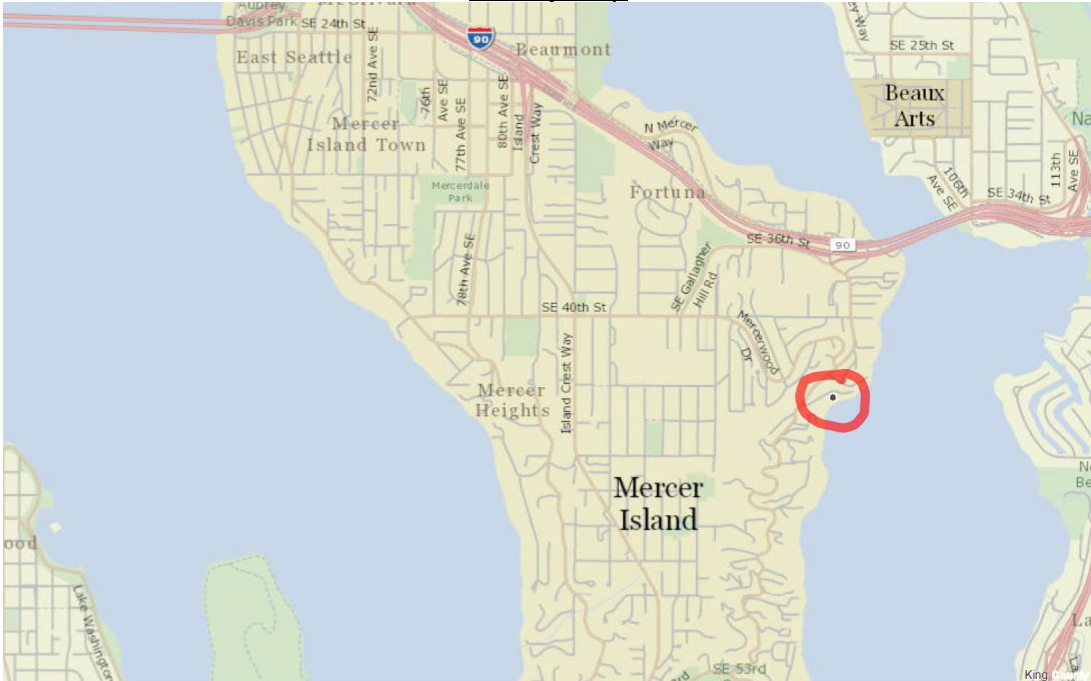
MR6 = Runoff Treatment	Runoff treatment does not meet the 5,000 sf area threshold. The total PGIS area is about <u>3,000 sf.</u>
MR7 = Flow Control	Detention (flow control) is not required if directly discharged into the adjacent Lake Washington
MR8 = Wetlands Protection	N/A – no wetlands in vicinity to our knowledge
MR9 = Operations and Maintenance	N/A – no LID BMPs or detention facilities proposed

Background:

This residential lot is located on the eastern shoreline of Mercer Island, about ½-mile south of I-90. This lot is on the dead-end street of SE 42 Place. Subject redevelopment project consists of demolishing the existing house and garage and removal of most of existing driveway and parking area. This all will be replaced by a new house and driveway/parking area. Brandt Design Group is the architect and project leader..

This residential lot generally slopes southeasterly at an average grade of 16% toward the lake. Our storm design plan proposes collection of all roof and driveway stormwater and conveyed via storm pipe to Lake Washington. Please see our design on sheet C2.0 of the building permit set. Detention is not required since project is adjacent to the lake. We discuss BMP's in the table "MR5 On-site Stormwater Management" section below.

Vicinity Map



Google Street Map View



Soils and Infiltration Feasibility:

This site is mapped as “Infiltration LID facilities are not permitted” on the “Low impact development infiltration feasibility on Mercer Island” map. Also the project geologist (Geotech Consultants, Inc.) mentions till soil, which is not good for infiltration. Infiltration is not proposed for this project.

MR 4 Preservation of Natural Drainage Systems and Outfalls

MR#4 Definition

Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls require energy dissipation. (ref DOE Manual, I-2.5.4)

Response

This project’s drainage runoff will mimic the natural topography and historic drainage pattern for this lot. The natural place for this lot to discharge its stormwater is into adjacent Lake Washington, which is proposed for all impervious surfaces.

MR#4 Objective

To preserve and utilize natural drainage systems to the fullest extent because of the multiple stormwater benefits these systems provide; and to prevent erosion at and downstream of the discharge location. (ref DOE Manual, I-2.5.4)

Response

This is a noble object in the suburban area but there are no natural drainage conveyance discharge options available to our knowledge. Project will simply convey site runoff from the roof and driveway via pipe to shoreline of lake Washington.

MR5 = On-site Stormwater Management

The List Approach (using List #2) selection process was applied to site to evaluate feasibility of BMP’s (reference 2014 DOE Manual):

Lawn and Landscaped Areas:

- Post-Construction Soil Quality and Depth in accordance with BMP T5.13 in Chapter 5 of Volume V of the DOE Manual.
Compost-Amended Soil is required and proposed.
- Roof Surface BMP Evaluation:
Full Dispersion:
Infeasible: A minimum native vegetative flowpath length of 100 lineal feet is not

achievable.

- **Downspout Full Infiltration:**
Infeasible: “Infiltrating LID facilities are not permitted” at this area; see “Low impact development infiltration feasibility on Mercer Island” map in the appendix of this report. Infiltration for projects adjacent to major bodies of water like Lake Washington typically not proposed for many reasons.
- **Bioretention:**
Bioretention for projects adjacent to major bodies of water like Lake Washington typically not proposed for many reasons.
- **Downspout Dispersion:**
Not allowed in Mercer Island and typically these are not proposed when in close proximity to a major water body like lake Washington.
- **Perforated Stub-out Connection:**
This infiltration BMP is not appropriate for this lot. Projects adjacent to major bodies of water like Lake Washington typically not proposed for many reasons.

Driveway Surface BMP Evaluation:

- **Full Dispersion:**
Infeasible due to lack of 100 LF flowpath. Also Mercer Island code is very restrictive about allowing these.
- **Permeable Pavement:**
Infeasible: “Infiltrating LID facilities are not permitted” at this area; see “Low impact development infiltration feasibility on Mercer Island” map in the appendix of this report.

We also don't recommend permeable pavement given the context of the driveway and autocourt location upgradient of the house and basement foundation.

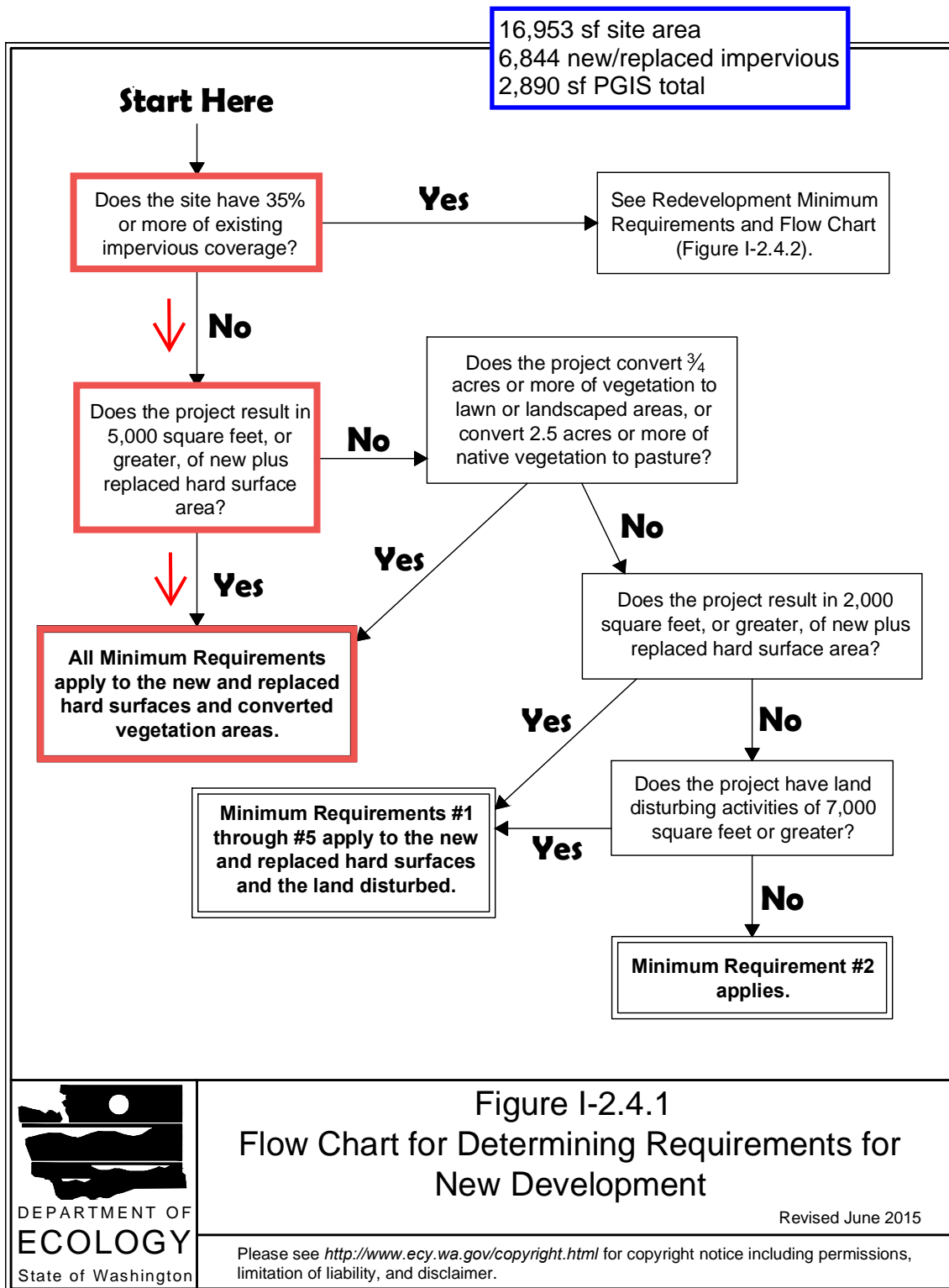
- **Bioretention:**
Not even close to being feasible to locate a rain garden to serve the driveway.
- **Sheet Flow Dispersion / Concentrated Flow Dispersion:**
Not even close to being feasible to propose sheet flow dispersion on this lot.

Attachments

- Impervious Area Spreadsheet
- Geotechnical Engineering Study by Geotech Consultants, Inc., June 2021
- Low impact development infiltration feasibility on Mercer Island map (infiltration feasibility map)
- DOE Flowchart for Determining Requirements for New Development showing MR1-9
- CSWPPP

Impervious Area Spreadsheet - Stormwater		
Nguyen Residence - 9831 SE 42nd Place, Mercer Island, WA 98040		
Gross Site area	16,953	sf
	0.389	acres
Existing On-Site Impervious Area to remain (driveway)	41	sf
total existing =	41	sf
Proposed Impervious Area (on-site)		
New Roof	4,536	sf
New/replaced driveway portion	2,088	
New back patio, exposed	220	
total on-site new + replaced =	6,844	sf
PGIS =	2,890	sf (total)

Figure I-2.4.1 Flow Chart for Determining Requirements for New Development



9831 SE 42nd Place
Mercer Island, WA 98040
CES #2031

June 7, 2021

JN 21165

Sharon Nguyen
9831 Southeast 42nd Place
Mercer Island, Washington
via email: sharon_win@mac.com

Subject: **Transmittal Letter – Geotechnical Engineering Study and Critical Area Study**
Proposed New Residence
9831 Southeast 42nd Place
Mercer Island, Washington

Dear Ms. Nguyen,

Attached to this transmittal letter is our geotechnical engineering report for the proposed residence to be constructed in Mercer Island. 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, critical areas, subsurface drainage, and temporary excavations and shoring. This work was authorized by your acceptance of our proposal, P-10866, dated April 8, 2021.

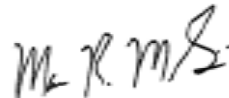
The attached report contains a discussion of the study and our recommendations. Please contact us if there are any questions regarding this report, or for further assistance during the design and construction phases of this project.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.



Matthew K. McGinnis
Geotechnical Engineer



Marc R. McGinnis, P.E.
Principal

MKM/MRM:kg

GEOTECHNICAL ENGINEERING STUDY
Proposed New Residence
9831 Southeast 42nd Place
Mercer Island, Washington

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

Development of the property is still in the planning stage, and detailed plans were not available at the time of writing this report. We were provided with a topographic survey prepared by Site Surveying, Inc., dated June 20, 2016. We were also provided with a sketch showing the approximate outline of a proposed residence overlain on the survey. Based on this information, and our discussions with Sharon Nguyen, we understand that a new, larger residence is proposed to be constructed at the site in place of the existing residence, which will be demolished. The new residence will likely be two stories in height and will be underlain by a basement which will daylight to the south towards Lake Washington. The new house footprint may be shifted further to the south from that of the current residence. The existing driveway will be used for access, and a new garage will be constructed along the north side of the new house. The southward shift of the house's footprint could provide a larger motorcourt. Also, the north wall of the house may be extended above the existing motorcourt grade so that fill can be placed, lessening the grade of the lower portion of the driveway. We would anticipate that a multi-story deck will extend off the southern side of the house, and a patio space will be constructed at the level of the daylight basement. No finish floor elevations or property line setbacks have been developed at this time, but we anticipate that the new residence will have its main floor and basement slab located close to the floor elevations of the existing house.

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 the eastern side of Mercer Island. The irregularly-shaped site comprises a total site area of approximately 0.36-acres. The property is bordered to the north by Southeast 42nd Place, to the east and west by single-family parcels, and to the south by Lake Washington.

The grade across the site slopes downward from north to south, with a total elevation change of approximately 38 feet across the lot. Initially, the grade drops steeply downward from the level of Southeast 42nd Place. This initial slope is inclined at 50 to 60 percent, over total elevation changes of 16 to 18 feet. A 2 to 5-foot-tall rockery lines the base of this slope, and delineates the northern alignment of the concrete driveway, which extends across this slope from the street. A large, relatively flat concrete motorcourt area is set at the base of the driveway, to the north of the existing residence. The grade drops moderately across the residence footprint from the northern, main level to the lower, south-facing daylight basement. Some small landscaping features and rockeries exist in these side yard areas to facilitate the step-down in grade. An above grade deck extends off the south side of the main level of the house, and a small patio is set beneath the deck. The remainder

of the southern portion of the property is sloped gently, continuing out across a large grass yard area to the shore of Lake Washington.

The City of Mercer Island GIS indicates that the site is mapped within a Potential Landslide Hazard Area. The site is also mapped to include an Erosion Hazard Area and Seismic Hazard Area.

The adjacent eastern and western properties are both developed with single-family residences. The eastern property (#9827) contains an older, one-story residence with a daylight basement. This residence appears to have been constructed at a similar elevation to the subject site and is set greater than 10 feet from the property line. However, a large garage/shed is set within a few feet of the property line, near the northeastern corner of the existing residence. This structure appeared to be in poor condition and is likely constructed atop a foundation system located near the ground surface. The adjacent western property is developed with a renovated, two-story residence underlain by a south facing daylight basement. At its closest point, this residence is set approximately 4 feet from the northwestern edge of the subject site's driveway. This section of the residence appears to be garage space and is not underlain by a basement. Most of the site grade on the adjacent lot is set a few feet above the grade of the subject site.

SUBSURFACE

The subsurface conditions on the site were explored by drilling three test borings 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 borings were drilled on May 21, 2021 using a small, rubber tracked drill rig and a portable Acker drill. The Acker drill system utilizes a small, gasoline-powered engine to advance a hollow-stem auger to the sampling depth and can be hand-carried into sites with very limited access. Samples were taken at approximate 2.5 and 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 just north of the existing house, on the upslope, northern side of the proposed residence location, using the larger, more powerful tracked drill. Beneath the ground surface, a layer of medium-dense fill soil was encountered. This fill layer extended to a depth of around 7 feet and was likely placed after the basement walls of the current house were backfilled. Beneath the fill, native, medium-dense, weathered silt was encountered. This upper layer of silt was underlain by a thin layer of medium-dense, slightly silty sand at a depth of 12 feet. Very stiff, glacially-compressed silt was revealed beneath the slightly silty sand layer at a depth of 14 feet. This silt layer continued with depth, becoming hard and massive beneath a depth of 25 feet. This hard silt layer continued to the base of the boring at a depth of 36.5 feet.

Test Boring 2 was drilled near the southern extent of the proposed development, and Test Boring 3 was drilled near the basement patio extending off the existing house. Both were

drilled with the smaller, Acker drill due to access limitations. Beneath the ground surface, native, loose sand and slightly silty sand were encountered. The sand and slightly silty sand layers continued with depth, becoming medium-dense beneath depths of 5 feet, and dense (glacially-compressed) beneath depths of 7.5 to 10 feet. These dense soils continued to the base of the test borings at depths of 10.5 to 16.5 feet where auger refusal was met.

No obstructions were revealed by our on-site explorations. Although our explorations did not encounter cobbles or boulders, they are often found in soils that have been deposited by glaciers or fast-moving water.

Groundwater Conditions

Groundwater seepage was observed at a depth of 12.5 feet in Test Boring 3 during drilling. It should be noted that groundwater levels vary seasonally with rainfall and other factors. We anticipate that groundwater could be found in more permeable soil layers and perched between the looser near-surface soil and the underlying silt.

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.

CRITICAL AREA STUDY (MICC 19.07)

Seismic Hazard Areas: The entire subject site is located within a mapped Seismic Hazard Area. This is noted on the attached Site Exploration Plan. The soils beneath the site are not susceptible to seismic liquefaction under the ground motions of a potential large earthquake either because of their glacially-compressed nature or the absence of near-surface groundwater. In addition, the foundations for the new construction will be supported on pipe piles embedded in to the underlying dense, non-liquefiable soils, which will mitigate any potential Seismic Hazard, whether present or not.

Landslide Hazard Areas: There are several criteria for being a Landslide Hazard Area based on the MICC. The first of several criteria are as follow:

1. Areas of historic failures.
2. Areas with all three of the following characteristics:
 - a. Slopes steeper than 15 percent; and
 - b. Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
 - c. Springs or ground water seepage.
3. Areas that have shown evidence of past movement or that are underlain or covered by mass wastage debris from past movements.
4. Areas potentially unstable because of rapid stream incision and stream bank erosion.

In our professional opinion, none of these criteria are met within the subject site.

There is a fifth criteria with regards to Landslide Hazard areas: Any slope that is 40 percent or greater measured over a 30-foot horizontal run (Steep Slope). As noted earlier, there is an approximate 16 to 18-foot-tall Steep Slope on the northern side of the property, which is inclined from 50 to 60 percent. This slope has obviously been created during previous grading associated with construction of the existing driveway, and possibly Southeast 42nd Place. The original slope was likely cut to its oversteepened condition during this time, and the rockery was likely cut into the toe of the slope during the lot grading. While this slope does exist, the soils encountered in our test borings would indicate that the core of the site consists of glacially compressed soils, which are not susceptible to deep-seated landslides. However, there always exists at least some potential for future shallow landslides to occur within the upper few feet of steep slopes as the upper soils become weathered and saturated with water following extended periods of rainfall. Based on MICC 19.07.160, for Steep Slope Landslide Hazard Areas whose only potential is a shallow landslide, this prescriptive buffer is 25 feet. At this time, we are not aware that any alteration from the prescriptive buffers will be needed for the project, given the preliminary siting location placing the northern edge of the residence outside of the prescriptive buffer. If excavation into the steep slope is avoided, the planned project will not adversely impact the slope's stability.

Erosion Hazard Area: The site also meets the City of Mercer Island's criteria for an Erosion Hazard Area. This has also been indicated on the attached Site Exploration Plan.

Proper erosion control implementation will be important to prevent adverse impacts to the site and neighboring properties, particularly if grading and construction occurs during the wet season. 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. Silty water cannot be discharged off the site, so a temporary holding tank should be planned for wet weather earthwork. A wire-backed silt fence bedded in compost, not native soil, or sand, should be erected as close as possible to the planned work area, and the existing vegetation west of the silt fence be in place. Rocked construction access and staging areas should be established wherever trucks will have to drive off of pavement, in order reduce the amount of soil or mud carried off the property by trucks and equipment. Covering the base of the excavation with a layer of clean gravel or rock is also prudent to reduce the amount of mud and silty water generated. Cut slopes and soil stockpiles should be covered with plastic during wet weather. Soil stockpiles should be minimized. Silty water accumulating in the excavation must not be allowed to flow off the site, or into Lake Washington. In wet conditions, this can require the use of temporary holding tanks (aka Baker tanks). Following rough grading, it may be necessary to mulch or hydroseed bare areas that will not be immediately covered with landscaping or an impervious surface.

Buffers and Mitigation: The attached Site Exploration Plan (Plate 2) denotes the extents of the critical areas that cover the site. Under MICC 19.07.160(C), the code-prescriptive buffer of 25 feet is required from all sides of a shallow landslide-hazard area. As noted above, the entire site lies within a mapped Potential Landslide Hazard Area, and the prescriptive buffer would extend far beyond the boundaries of the property and the planned development area. An approximate prescriptive Steep Slope buffer from the toe of the northwestern steep slope is shown on the attached Site Plan and is shown as the prescriptive buffer from a shallow landslide hazard, which can be interpreted to exist within the man-made, northern steep slope area. This buffer is for reference only and is not drawn to scale. If development is proposed near the toe of the steep slope, additional mitigation measures may need to be implemented to facilitate the proposed construction without adversely affecting the slope.

No buffer is required by the MICC for an Erosion Hazard Area.

We recognize that the planned development will occur within the designated critical areas and their applicable prescriptive buffers. The recommendations presented in this geotechnical report are intended to allow the project to be constructed in the proposed configuration without adverse impacts to critical areas on the site or the neighboring 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: In order to satisfy the City of Mercer Island's requirements, a statement of risk is needed. As such, we make the following statement:

Provided the recommendations in this report are followed, it is our professional opinion that the recommendations presented in this report for the planned alteration will render the development as safe as if it were not located in a geologically hazardous area and will not adversely impact critical areas on adjacent properties.

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.

The test borings conducted for this study encountered loose fill, and unconsolidated native soils to depths of 7.5 to 15 feet beneath the ground surface. On the upslope side of the proposed residence, very stiff, native silt was encountered beneath a depth of 15 feet, and continued to the base of the test boring, becoming harder with depth. On the downslope side of the proposed residence, dense sand and slightly silty sand were revealed beneath depths of 7.5 to 10 feet and continued to the maximum explored depths. These dense sands and hard silts are glacially compressed and are not susceptible to deep-seated instability.

The residence design and layout are preliminary at this time, and final siting locations, as well as slab and foundation elevations have not been defined at this time. Considering the preliminary nature of the design, the depth to suitable bearing soil encountered in our test borings, and anticipated depth of excavation, it would be most practical to plan to support the residence on a deep foundation system. For this development, driven, small-diameter pipe piles would likely be the most practical option, and are commonly used for similar residential projects. These small-diameter pipe piles would be driven through the upper loose and medium-dense soils, to refusal in the underlying very dense soils. Additional recommendations can be found in the **Pipe Piles** section of this report. The use of pipe piles instead of a conventional foundation system will limit the amount of excavation that would be needed to expose suitable bearing materials, which would help to reduce the total export quantities of soil during construction and reduce temporary shoring heights. The use of pipe piles instead of a conventional foundation system would also prevent post-construction settlement from occurring, which would occur if the foundations were constructed atop the looser native soils near the foundation level of the existing residence. Settlement sensitive, on-grade structures such as patios, slabs, walkways, or decks, should also be supported on piles to limit post-construction settlement.

As previously discussed, the new residence will contain a basement. We anticipate that excavations on the order of 10 feet could be needed to reach the foundation elevations in areas. Where shorter excavations area proposed, a temporary excavation inclination of no steeper than a 1:1 (Horizontal:Vertical) is appropriate given the soil conditions. No unsupported cuts should be made in front of the existing rockery along the northern side of the driveway, and care should be taken during excavations in front of the existing rockery located near the northeastern corner of the house, if it is to remain in place. We do not recommend that unshored excavations extend beneath a 2:1 (H:V) extending downward from any adjacent foundation, and do not recommend that vertical excavations be made on, or near the shared property lines. If the above-mentioned excavation inclination cannot be maintained within the property, and temporary excavation easements are not able to be obtained, temporary shoring will be needed. If the proposed design allows, the existing basement walls could be reused as temporary shoring walls to reduce the amount of additional temporary shoring. This may require that the existing walls be braced and would require that the new residence be constructed inside the existing basement walls. A structural engineer should be retained early in the design to determine if the existing basement walls can be adequately braced during construction. Where new, deep cuts are proposed, a rigid shoring system consisting of drilled soldier piles will be needed. Less rigid shoring systems, such as ecology blocks and steel plates, are not appropriate for the upper loose soil conditions. Recommendations for temporary shoring can be found in the **Soldier Pile Shoring** section of this report.

As previously discussed, the subject site is located within a potential landslide hazard area that encompasses much of the general vicinity. The core of the subject site consists of dense native soil that has a low potential for deep-seated landslides. However, any slope in the Puget Sound area has some potential for shallow soil movement in the near-surface soils, particularly after extended periods of concentrated precipitation. The oversteepened slope along the north side of the driveway may experience instability in the future, due to excessive groundwater or an earthquake. As discussed above in the **Critical Area Study** section, the recommendations presented in this report are intended to prevent adverse impacts to the stability of the site and prevent the development from adversely affecting the stability of surrounding properties. The proposed pile foundations and shoring walls will provide stability for the development area. The future property owners should be made well aware that there always exists at least some risk with owning property near steep slopes.

The site is underlain by low permeability soil. In addition to extensive drainage and waterproofing for the basement walls, we recommend installing an underslab drainage system beneath the basement slab of the new residence. This system would consist of a layer of clean crushed rock beneath the interior slab or crawlspace. The rock layer should be at least 9 to 12 inches thick and contain 4-inch diameter, perforated PVC pipes at no more than 15-foot center-to-center spacings. The entire rock layer and pipe system should be covered with a thick vapor retarder/barrier. The perforated pipes should tie into the exterior footing drains. The **Drainage Considerations** section of this report contains an expanded discussion of our subsurface drainage recommendations.

There is always some risk associated with shoring, excavation, and foundation construction near neighboring developed properties. It is imperative that unshored excavations do not extend below a 2:1 (Horizontal:Vertical) imaginary bearing zone sloping downward from existing footings. Contractors working on the construction of your home must be cautioned to avoid strong ground vibrations, which could cause additional settlement in the neighboring foundations. Installation of driven pipe piles is a loud process but does not result in strong ground vibrations. During demolition, strong pounding on the ground with the excavator, which is often used to break up debris and concrete, should not occur. Large equipment and vibratory compactors, such as hoepacks, should not be used close to the property lines. Additionally, in order to protect yourselves from unsubstantiated damage claims from the adjacent owners, 1) the existing condition of their

foundations, pavements, and on-grade elements should be documented before starting site work, and 2) the footings and other settlement-sensitive elements, such as the western driveway, should be monitored for vertical movement during the shoring, excavation, and construction process. These are common recommendations for projects located close to existing structures that may bear on loose soil and have already experienced excessive settlement. We can provide additional recommendations for documentation and monitoring of the adjacent structures, if desired.

The soil that will be excavated for the new residence will consist of variable fill soil, fine-grained silt, and silty sand. These soils have a high fines content and were observed to be in an elevated moisture state during drilling. These qualities make the soil poorly drained, and exceedingly difficult to adequately compact for use as structural fill, even under optimum site conditions. Considering this, we do not recommend that the onsite soils be reused as structural fill. Free-draining, granular fill or gravel should be used behind backfilled walls where needed.

Due to the silty, fine-grained nature of the upper fill and native soils onsite, the steep inclination of the sloped site, and the Potential Landslide Hazard designation, it is our professional opinion that onsite infiltration or dispersion of stormwater is not feasible for this project. Pervious pavements should not be used for this project as they would only act to add a drainage surcharge to the subsurface drainage system of the house and could adversely affect the finished basement spaces.

The drainage and 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.

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 1.41g 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 dense soils that will support the foundations are not susceptible to seismic liquefaction under the ground motions of the MCE because of their dense nature.

PIPE PILES

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.

As a minimum, Schedule 40 pipe should be used. 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.

We expect that the City of Mercer Island will require geotechnical observation of the pile installation. Considering this, the recommendations we have made above for minimum refusal criteria, and our previous experience with pile projects in close proximity to the site, it is our professional opinion that the recommended capacities do not need to be verified by load testing.

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 an ultimate (no safety factor included) passive earth pressure of 300 pounds per cubic foot (pcf) for this resistance. If the ground in front of a foundation is loose or sloping, the passive earth pressure given above will not be appropriate. If additional lateral resistance for the

foundation is needed, inclined helical anchors could be included in the foundation system. We could provide recommendations for such anchors, if they are needed.

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
Active Earth Pressure *	40 pcf
Passive Earth Pressure	300 pcf
Soil Unit Weight	130 pcf

Where: pcf is Pounds per Cubic Foot, and Active 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 active equivalent fluid pressure. This applies only to walls with level backfill.

The design values given above do not include the effects of any hydrostatic pressures behind the walls and assume that no surcharges, such as those caused by slopes, vehicles, or adjacent foundations will be exerted on the walls. If these conditions exist, those pressures should be added to the above lateral soil pressures. Where sloping backfill is desired behind the walls, we will need to be given the wall dimensions and the slope of the backfill in order to provide the appropriate design earth pressures. The surcharge due to traffic loads behind a wall can typically be accounted for by adding a uniform pressure equal to 2 feet multiplied by the above active fluid density. Heavy construction equipment should not be operated behind retaining and foundation walls within a distance equal to the height of a wall, unless the walls are designed for the additional lateral pressures resulting from the equipment.

The values given above are to be used to design only permanent foundation and retaining walls that are to be backfilled, such as conventional walls constructed of reinforced concrete or masonry. It is not appropriate to use the above earth pressures and soil unit weight to back-calculate soil strength parameters for design of other types of retaining walls, such as soldier pile, reinforced earth, modular or soil nail walls. We can assist with design of these types of walls, if desired.

The values for friction and passive resistance are ultimate values and do not include a safety factor. Restrained wall soil parameters should be utilized the wall and reinforcing design for a distance of 1.5 times the wall height from corners or bends in the walls, or from other points of restraint. This is intended to reduce the amount of cracking that can occur where a wall is restrained by a corner.

Wall Pressures Due to Seismic Forces

Per IBC Section 1803.5.12, a seismic surcharge load need only be considered in the design of walls over 6 feet in height. A seismic surcharge load would be imposed by adding a uniform lateral pressure to the above-recommended active pressure. The recommended

seismic surcharge pressure for this project is $9H$ pounds per square foot (psf), where H is the design retention height of the wall. Using this increased pressure, the safety factor against sliding and overturning can be reduced to 1.2 for the seismic analysis.

Retaining Wall Backfill and Waterproofing

Backfill placed behind retaining or foundation walls should be coarse, free-draining structural fill containing no organics. This backfill should contain no more than 5 percent silt or clay particles and have no gravel greater than 4 inches in diameter. The percentage of particles passing the No. 4 sieve should be between 25 and 70 percent. The onsite soils are not acceptable for wall backfill, due to their poor drainage characteristics and low compacted strength. The later section entitled ***Drainage Considerations*** should also be reviewed for recommendations related to subsurface drainage behind foundation and retaining walls.

The purpose of these backfill requirements is to ensure that the design criteria for a retaining wall are not exceeded because of a build-up of hydrostatic pressure behind the wall. Also, subsurface drainage systems are not intended to handle large volumes of water from surface runoff. The top 12 to 18 inches of the backfill should consist of a compacted, relatively impermeable soil or topsoil, or the surface should be paved. The ground surface must also slope away from backfilled walls at one to 2 percent to reduce the potential for surface water to percolate into the backfill.

Water percolating through pervious surfaces (pavers, gravel, permeable pavement, etc.) must also be prevented from flowing toward walls or into the backfill zone. Foundation drainage and waterproofing systems are not intended to handle large volumes of infiltrated water. The compacted subgrade below pervious surfaces and any associated drainage layer should therefore be sloped away. Alternatively, a membrane and subsurface collection system could be provided below a pervious surface.

It is critical that the wall backfill be placed in lifts and be properly compacted, in order for the above-recommended design earth pressures to be appropriate. The recommended wall design criteria assume that the backfill will be well-compacted in lifts no thicker than 12 inches. The compaction of backfill near the walls should be accomplished with hand-operated equipment to prevent the walls from being overloaded by the higher soil forces that occur during compaction. The section entitled ***General Earthwork and Structural Fill*** contains additional recommendations regarding the placement and compaction of structural fill behind retaining and foundation walls.

The above recommendations are not intended to waterproof below-grade walls, or to prevent the formation of mold, mildew, or fungi in interior spaces. Over time, the performance of subsurface drainage systems can degrade, subsurface groundwater flow patterns can change, and utilities can break or develop leaks. Therefore, waterproofing should be provided where future seepage through the walls is not acceptable. This typically includes limiting cold-joints and wall penetrations and using bentonite panels or membranes on the outside of the walls. There are a variety of different waterproofing materials and systems, which should be installed by an experienced contractor familiar with the anticipated construction and subsurface conditions. Applying a thin coat of asphalt emulsion to the outside face of a wall is not considered waterproofing and will only help to reduce moisture generated from water vapor or capillary action from seeping through the concrete. As with any project, adequate ventilation of basement and crawl space areas is important to prevent a buildup of water vapor that is commonly transmitted through concrete walls from the

surrounding soil, even when seepage is not present. This is appropriate even when waterproofing is applied to the outside of foundation and retaining walls. We recommend that you contact an experienced envelope consultant if detailed recommendations or specifications related to waterproofing design or minimizing the potential for infestations of mold and mildew are desired.

BUILDING FLOORS

If no settlement can be tolerated in the building floors, the building floors should be constructed as structural slabs or framed floors that are designed to span between the pile supported foundation without any reliance on soil bearing. Even where the exposed soils appear dry, water vapor will tend to naturally migrate upward through the soil to the new constructed space above it. This can affect moisture-sensitive flooring, cause imperfections or damage to the slab, or simply allow excessive water vapor into the space above the slab. As recommended in the **General** section, underslab drainage should be provided for the basement spaces, even if they step down through the house. A typical underslab drainage detail is included as Plate 8.

As noted by the American Concrete Institute (ACI) in the *Guides for Concrete Floor and Slab Structures*, proper moisture protection is desirable immediately below any on-grade slab that will be covered by tile, wood, carpet, impermeable floor coverings, or any moisture-sensitive equipment or products. ACI recommends a minimum 10-mil thickness vapor retarder for better durability and long-term performance than is provided by 6-mil plastic sheeting that has historically been used. A vapor retarder is defined as a material with a permeance of less than 0.3 perms, as determined by ASTM E 96. It is possible that concrete admixtures may meet this specification, although the manufacturers of the admixtures should be consulted. Where vapor retarders are used under slabs, their edges should overlap by at least 6 inches and be sealed with adhesive tape. The sheeting should extend to the foundation walls for maximum vapor protection.

If no potential for vapor passage through the slab is desired, a vapor *barrier* should be used. A vapor barrier, as defined by ACI, is a product with a water transmission rate of 0.01 perms when tested in accordance with ASTM E 96. Reinforced membranes having sealed overlaps can meet this requirement.

We recommend that the contractor, the project materials engineer, and the owner discuss these issues and review recent ACI literature and ASTM E-1643 for installation guidelines and guidance on the use of the protection/blotter material.

SOLDIER PILE SHORING

Cantilevered soldier pile shoring systems have proven to be an efficient method for providing excavation shoring where excavation depths do not exceed 15 feet. Soldier pile walls would be constructed after making planned cut slopes, and prior to commencing the mass excavation, by setting steel H-beams in a drilled hole and grouting the space between the beam and the soil with concrete for the entire height of the drilled hole. The contractor should be prepared to case the holes or use the slurry method if caving soil is encountered. Excessive ground loss in the drilled holes must be avoided to reduce the potential for settlement on adjacent properties. If water is present in a hole at the time the soldier pile is poured, concrete must be tremied to the bottom of the hole.

As excavation proceeds downward, the space between the piles should be lagged with timber, and any voids behind the timbers should be filled with pea gravel, or a slurry comprised of sand and fly ash. Treated lagging is usually required for permanent walls, while untreated lagging can often be utilized for temporary shoring walls. Temporary vertical cuts will be necessary between the soldier piles for the lagging placement. The prompt and careful installation of lagging is important, particularly in loose or caving soil, to maintain the integrity of the excavation and provide safer working conditions. Additionally, care must be taken by the excavator to remove no more soil between the soldier piles than is necessary to install the lagging. Caving or overexcavation during lagging placement could result in loss of ground on neighboring properties. Timber lagging should be designed for an applied lateral pressure of 30 percent of the design wall pressure if the pile spacing is less than three pile diameters. For larger pile spacings, the lagging should be designed for 50 percent of the design load.

Soldier Pile Wall Design

Temporary soldier pile shoring that is cantilevered and that has a level backslope, should be designed for an active soil pressure equal to that pressure exerted by an equivalent fluid with a unit weight of 40 pounds per cubic foot (pcf). Traffic surcharges can typically be accounted for by increasing the effective height of the shoring wall by 2 feet. Slopes and buildings above the shoring walls will exert additional surcharge pressures. These surcharge pressures will vary, depending on the configuration of the cut slope and shoring wall. We can provide recommendations regarding slope and building surcharge pressures when the preliminary shoring design is completed.

It is important that the shoring design provides sufficient working room to drill and install the soldier piles, without needing to make unsafe, excessively steep temporary cuts. Cut slopes should be planned to intersect the backside of the drilled holes, not the back of the lagging.

Lateral movement of the soldier piles below the excavation level will be resisted by an ultimate passive soil pressure equal to that pressure exerted by a fluid with a density of 350 pcf. For permanent walls, we recommend a minimum factor of safety of 1.5 be applied to overturning and sliding calculations when using this ultimate value (temporary installations may use a factor of safety of 1.2). This soil pressure is valid only for a level excavation in front of the soldier pile; it acts on two times the grouted pile diameter. Cut slopes made in front of shoring walls significantly decrease the passive resistance. This includes temporary cuts necessary to install internal braces or rakers. The minimum embedment below the floor of the excavation for cantilever soldier piles should be equal to the height of the "stick-up."

DRAINAGE CONSIDERATIONS

We anticipate that permanent foundation walls may be constructed against the shoring walls. Where this occurs, a plastic-backed drainage composite, such as Miradrain, Battledrain, or similar, should be placed against the entire surface of the shoring prior to pouring the foundation wall. Weep pipes located no more than 6 feet on-center should be connected to the drainage composite and poured into the foundation walls or the perimeter footing. A footing drain installed along the inside of the perimeter footing will be used to collect and carry the water discharged by the weep pipes to the storm system. Isolated zones of moisture or seepage can still reach the permanent wall where groundwater finds leaks or joints in the drainage composite. This is often an acceptable risk in unoccupied below-grade spaces, such as parking garages. However, formal waterproofing is typically necessary in areas where wet conditions at the face of the permanent wall will not be

tolerable. If this is a concern, the permanent drainage and waterproofing system should be designed by a specialty consultant familiar with the expected subsurface conditions and proposed construction. While it may be more costly, constructing the foundation walls with a zone of free-draining in front of the shoring wall provides better long-term drainage protection. A typical detail for drainage of walls poured directly against shoring is attached to this report as Plate 6.

Footing drains should be used where: (1) crawl spaces or basements will be below a structure; (2) a slab is below the outside grade; or (3) the outside grade does not slope downward from a building. Drains should also be placed at the base of all earth-retaining walls. These drains should be surrounded by at least 6 inches of 1-inch-minus, washed rock that is encircled with non-woven, geotextile filter fabric (Mirafi 140N, Supac 4NP, or similar material). At its highest point, a perforated pipe invert should be at least 6 inches below the bottom of a slab floor or the level of a crawl space. The discharge pipe for subsurface drains should be sloped for flow to the outlet point. Roof and surface water drains must not discharge into the foundation drain system. A typical footing drain detail is attached to this report as Plate 7. For the best long-term performance, perforated PVC pipe is recommended for all subsurface drains. Clean-outs should be provided for potential future flushing or cleaning of footing drains.

If the structure includes an elevator, it may be necessary to provide special drainage or waterproofing measures for the elevator pit. If no seepage into the elevator pit is acceptable, it will be necessary to provide a footing drain and free-draining wall backfill, and the walls should be waterproofed. If the footing drain will be too low to connect to the storm drainage system, then it will likely be necessary to install a pumped sump to discharge the collected water. Alternatively, the elevator pit could be designed to be entirely waterproof; this would include designing the pit structure to resist hydrostatic uplift pressures.

Recommendations for underslab drainage can be found in the **General** section.

As a minimum, a vapor retarder, as defined in the **Building Floors** section, should be provided in any crawl space area to limit the transmission of water vapor from the underlying soils. Crawl space grades are sometimes left near the elevation of the bottom of the footings. As a result, an outlet drain is recommended for all crawl spaces to prevent an accumulation of any water that may bypass the footing drains. Providing a few inches of free draining gravel underneath the vapor retarder is also prudent to limit the potential for seepage to build up on top of the vapor retarder.

If seepage is encountered in an excavation, it should be drained from the site by directing it through drainage ditches, perforated pipe, or French drains, or by pumping it from sumps interconnected by shallow connector trenches at the bottom of the excavation.

The excavation and site should be graded so that surface water is directed off the site and away from the tops of slopes. Water should not be allowed to stand in any area where foundations, slabs, or pavements are to be constructed. Final site grading in areas adjacent to the residence should slope away at least one to 2 percent, except where the area is paved. Surface drains should be provided where necessary to prevent ponding of water behind foundation or retaining walls. A discussion of grading and drainage related to pervious surfaces near walls and structures is contained in the **Foundation and Retaining Walls** section.

GENERAL EARTHWORK AND STRUCTURAL FILL

All building and pavement areas should be stripped of surface vegetation, topsoil, organic soil, and other deleterious material. The stripped or removed materials should not be mixed with any materials to be used as structural fill, but they could be used in non-structural areas, such as landscape beds.

Structural fill is defined as any fill, including utility backfill, placed under, or close to, a building, or in other areas where the underlying soil needs to support loads. All structural fills should be placed in horizontal lifts with a moisture content at, or near, the optimum moisture content. The optimum moisture content is that moisture content that results in the greatest compacted dry density. The moisture content of fill is very important and must be closely controlled during the filling and compaction process. As discussed in the **General** section, the on-site soils are not suitable for reuse as structural fill, due to its fine-grained, silty nature.

The allowable thickness of the fill lift will depend on the material type selected, the compaction equipment used, and the number of passes made to compact the lift. The loose lift thickness should not exceed 12 inches, but should be thinner if small, hand-operated compactors are used. We recommend testing structural fill as it is placed. If the fill is not sufficiently compacted, it should be recompacted before another lift is placed. This eliminates the need to remove the fill to achieve the required compaction. The following table presents recommended levels of relative compaction for compacted fill:

LOCATION OF FILL PLACEMENT	MINIMUM RELATIVE COMPACTION
Beneath slabs or walkways	95%
Filled slopes and behind retaining walls	90%
Beneath pavements	95% for upper 12 inches of subgrade; 90% below that level

Where: Minimum Relative Compaction is the ratio, expressed in percentages, of the compacted dry density to the maximum dry density, as determined in accordance with ASTM Test Designation D 1557-91 (Modified Proctor).

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 residence 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, resulting in possible loss of ground or damage to the facilities around the proposed residence.

This report has been prepared for the exclusive use of Sharon Nguyen and her 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 - 5	Test Boring Logs
Plate 6	Typical Shoring Drain Detail
Plate 7	Typical Footing Drain Detail
Plate 8	Typical Underslab Drainage 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.

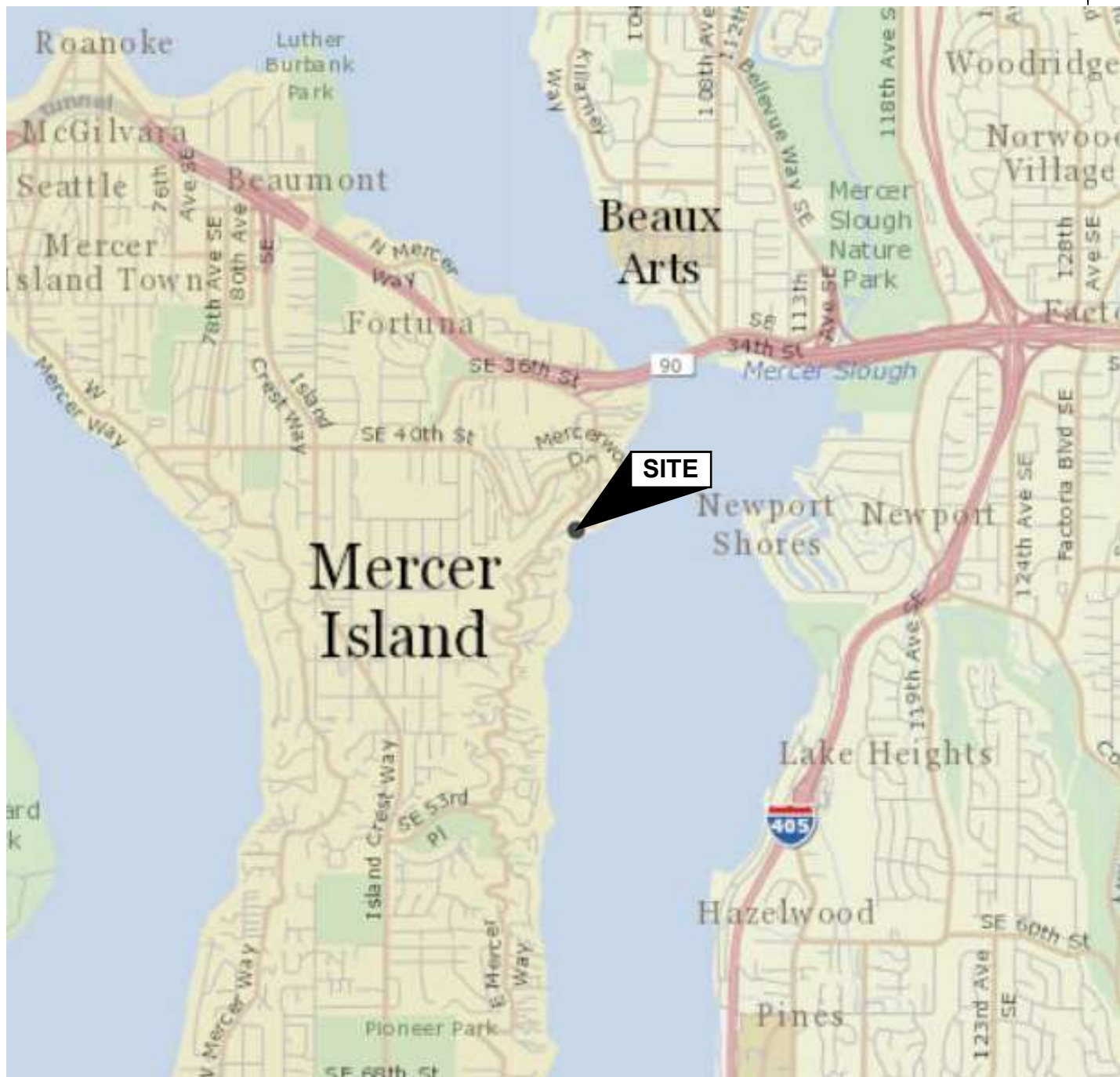
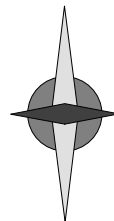


06/07/2021

Marc R. McGinnis, P.E.
Principal

MKM/MRM:kg

NORTH



(Source: King County iMap)

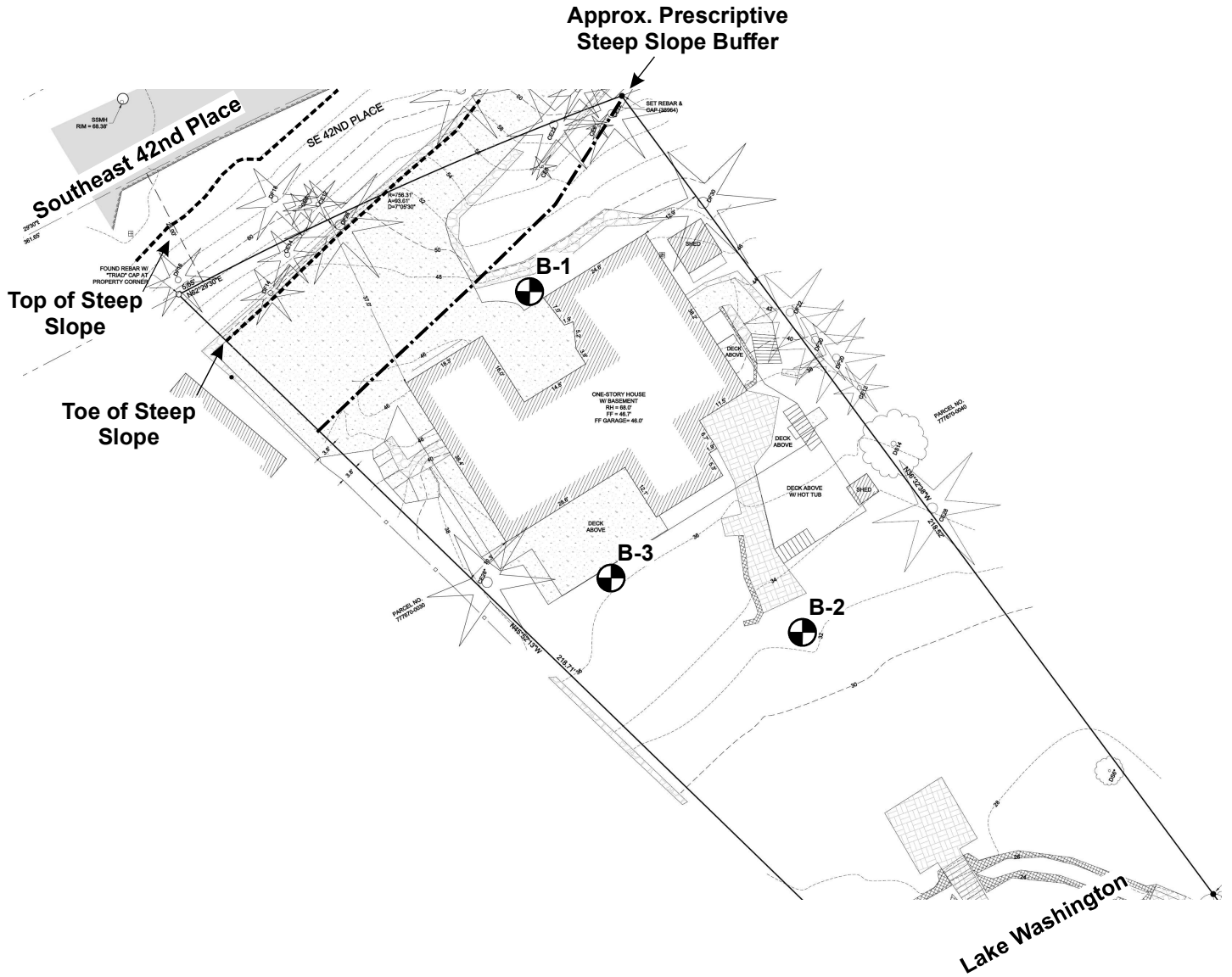
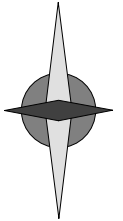


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VICINITY MAP
9831 Southeast 42nd Place
Mercer Island, Washington

Job No: 21165	Date: May 2021	Plate: 1
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NORTH



Legend:

 Test Boring Location

* The City of Mercer Island GIS tool maps the subject site as a Seismic Hazard Area, Potential Landslide Hazard Area, and an Erosion Hazard Area in its entirety. The prescriptive buffers for shallow Potential Landslide Hazard Areas under MICC 19.07 extend beyond the property boundaries.



SITE EXPLORATION PLAN
 9831 Southeast 42nd Place
 Mercer Island, Washington

Job No: 21165	Date: May 2021	No Scale	Plate: 2
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BORING 1

	Moisture Water Table	Blows per Foot	Sample	USCS	Description
5		12	1	FILL	Gravel over; Brown silty SAND intermixed with small pieces of gray silty sand, fine-grained, moist, medium-dense (FILL) -becomes jumbled with pockets of sand and silt
		17	2		
		19	3	ML	Gray-brown slightly gravelly SILT, non-plastic, moist, medium-dense -becomes mottled orange with roots
		10	4		
		22	5	SP SM	Gray-brown slightly silty SAND with thin silt lenses, fine-grained, moist, medium-dense
		15	26		Bluish-gray SILT with thin, light gray streaks, low plasticity, moist, very stiff -with trace gravel, becomes bedded
		20	23		
		25	30	ML	-becomes slightly clayey in part, massive, hard
		30	32		
		35	54		
40					

* Test boring was terminated at 36.5 feet on May 21, 2021.
 * No groundwater seepage was encountered during drilling.



BORING LOG
 9831 Southeast 42nd Place
 Mercer Island, Washington

Job 21165	Date: May 2021	Logged by: MKM	Plate: 3
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BORING 2

	Moisture Water Table	Blows per Foot	Sample	USCS	Description
5		9	1	SP SM	Grass over; Gray, slightly gravelly, silty SAND with clean sand seams. fine-grained, moist, loose
		17	2		-becomes gray-brown mottled orange, gravelly, slightly silty to silty, medium-dense
		43	3	SP	Gray-brown with rusting, gravelly SAND, fine-grained, moist, dense
10		31	4		

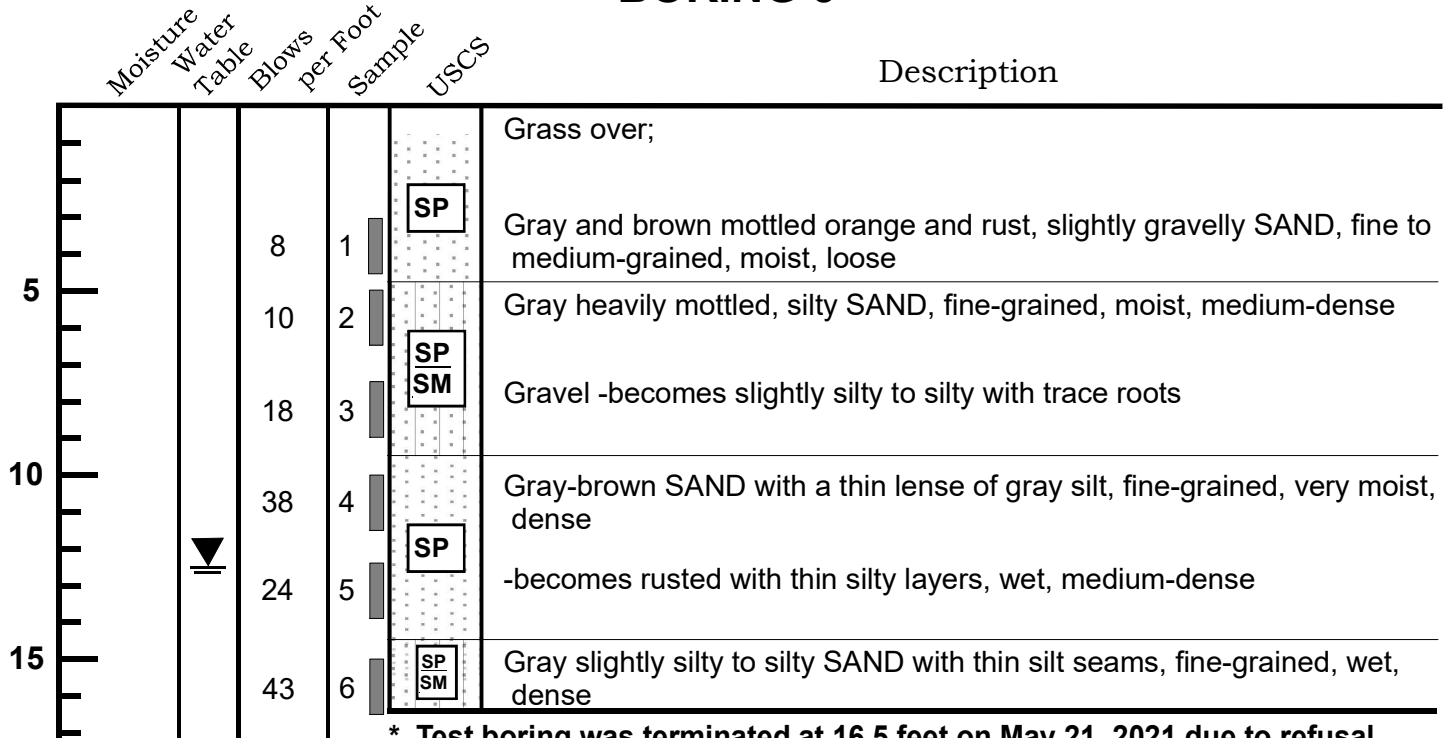
* Test boring was terminated at 10.5 feet on May 21, 2021 due to auger refusal.
 * No groundwater seepage was encountered during drilling.



BORING LOG
 9831 Southeast 42nd Place
 Mercer Island, Washington

Job 21165	Date: May 2021	Logged by: MKM	Plate: 4
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BORING 3

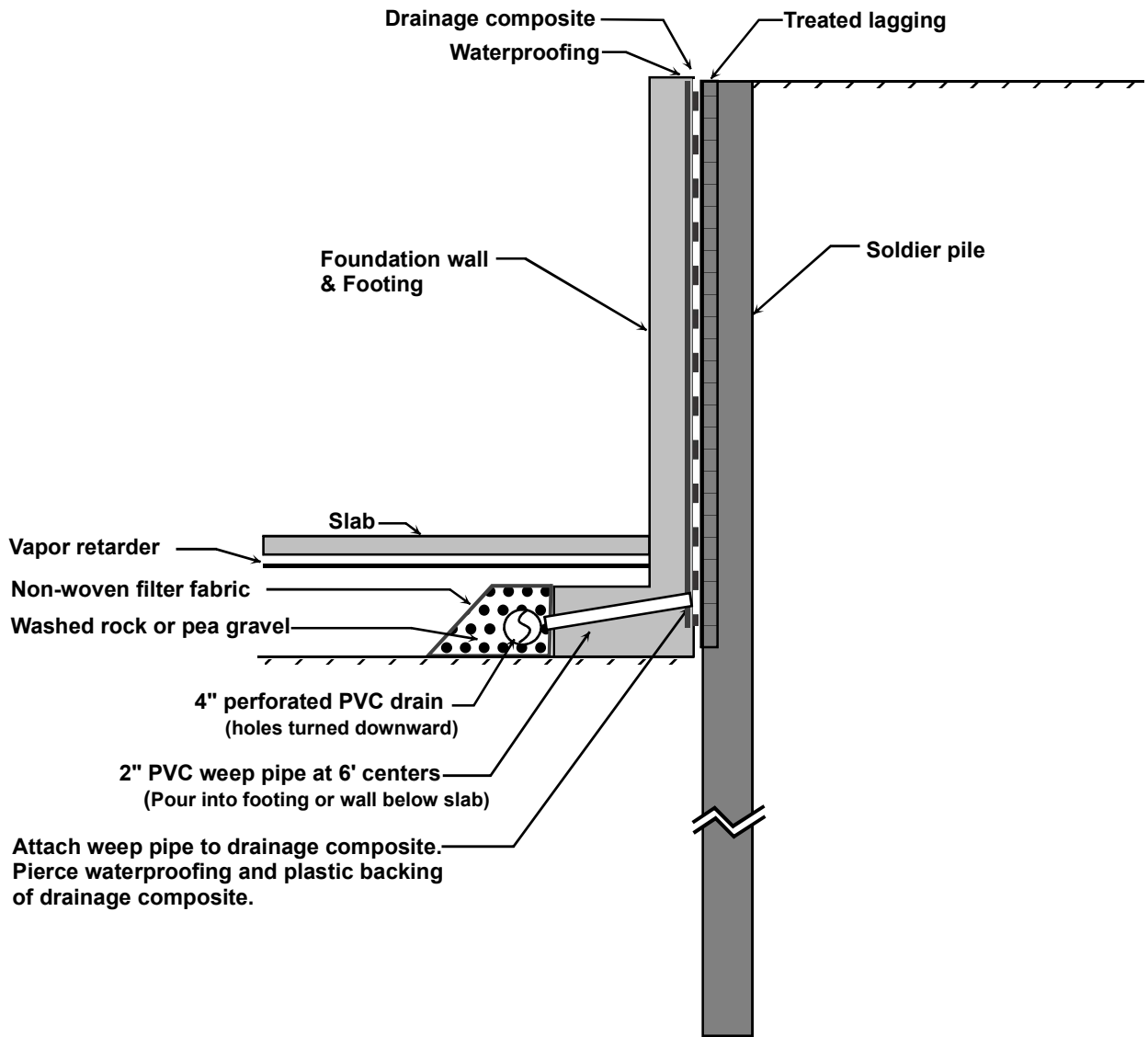


- * Test boring was terminated at 16.5 feet on May 21, 2021 due to refusal.
- * Groundwater seepage was encountered at 12.5 feet during drilling.



BORING LOG
9831 Southeast 42nd Place
Mercer Island, Washington

Job 21165	Date: May 2021	Logged by: MKM	Plate: 5
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Attach weep pipe to drainage composite.
Pierce waterproofing and plastic backing
of drainage composite.

Note - Refer to the report for additional considerations related to drainage and waterproofing.



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SHORING DRAIN DETAIL

9831 Southeast 42nd Place
Mercer Island, Washington

Job No:

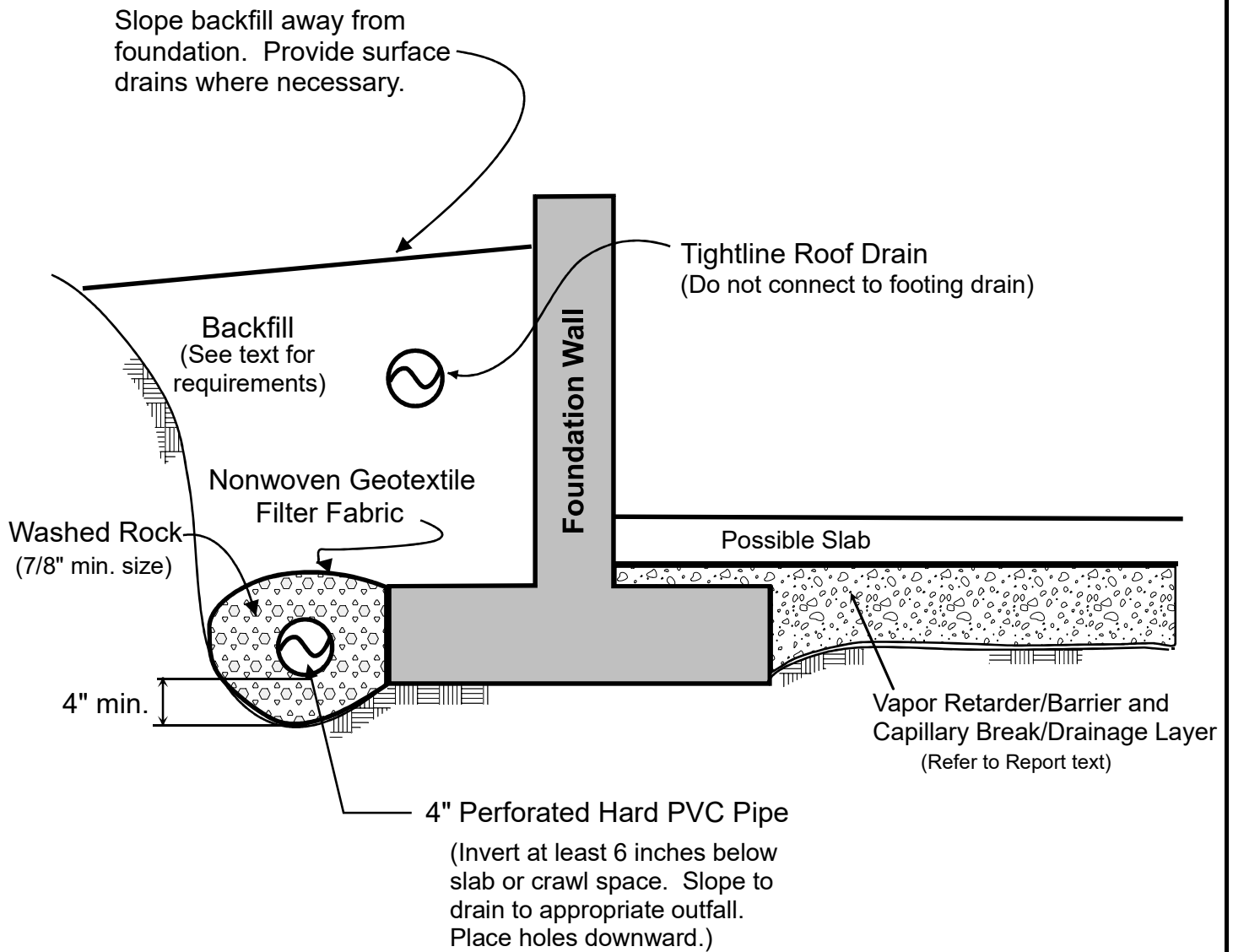
21165

Date:

May 2021

Plate:

6



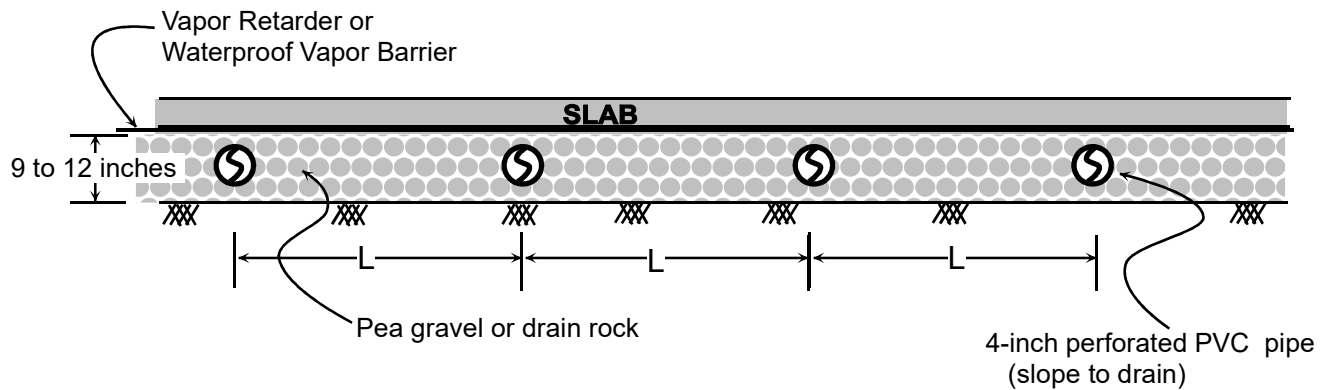
NOTES:

- (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.



FOOTING DRAIN DETAIL
9831 Southeast 42nd Place
Mercer Island, Washington

Job No: 21165	Date: May 2021	Plate: 7
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NOTES:

- (1) Refer to the report text for additional drainage and waterproofing considerations.
- (2) The typical maximum underslab drain separation (L) is 15 to 20 feet.
- (3) No filter fabric is necessary beneath the pipes as long as a minimum thickness of 4 inches of rock is maintained beneath the pipes.
- (4) The underslab drains and foundation drains should discharge to a suitable outfall.



TYPICAL UNDERSLAB DRAINAGE
 9831 Southeast 42nd Place
 Mercer Island, Washington

Job No: 21165	Date: May 2021	Plate: 8
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CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Instructions

This is a template for a simplified Construction Stormwater Pollution Prevention Plan (“Construction SWPPP”). If “No” is the answer to one or more of the statements on the first page of Section A of this submittal package, then a full Construction SWPPP is required and the project does not qualify for the use of the Small Project Construction SWPPP Narrative template. If the project is less than the thresholds on the first page of Section A of this submittal package, then Minimum Requirement #2 still applies, but this section (Section B) or a full construction SWPPP is not required. You should include your Construction SWPPP in your contract with your builder. A copy of the Construction SWPPP must be located at the construction site or within reasonable access to the site for construction and inspection personnel at all times.

General Information on the Existing Site and Project

Describe the following in the Project Narrative box below (attach additional pages if necessary):

- Nature and purpose of the construction project
- Existing topography, vegetation, and drainage, and building structures
- Adjacent areas, including streams, lakes, wetlands, residential areas, and roads that might be affected by the construction project
- How upstream drainage areas may affect the site
- Downstream drainage leading from the site to the receiving body of water
- Areas on or adjacent to the site that are classified as critical areas
- Critical areas that receive runoff from the site up to one-quarter mile away
- Special requirements and provisions for working near or within critical areas
- Areas on the site that have potential erosion problems

Project Narrative:



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Construction SWPPP Drawings

Refer to the general Drawing Requirements in Stormwater Management Manual for Western Washington (SWMMWW) Volume I, Chapter 3.

Vicinity Map

Provide a map with enough detail to identify the location of the construction site, adjacent roads, and receiving waters.

Site Map

Include the following (where applicable):

- | | |
|---|---|
| <input type="checkbox"/> Legal description of the property boundaries or an illustration of property lines (including distances) on the drawings. see C2.0 Drainage Plan | <input type="checkbox"/> Final and interim grade contours as appropriate, drainage basins, and the direction of stormwater flow during and upon completion of construction. |
| <input type="checkbox"/> North arrow. | <input type="checkbox"/> Areas of soil disturbance, including all areas affected by clearing, grading, and excavation. |
| <input type="checkbox"/> Existing structures and roads. | <input type="checkbox"/> Locations where stormwater will discharge to surface waters during and upon completion of construction. |
| <input type="checkbox"/> Boundaries and identification of different soil types. | <input type="checkbox"/> Existing unique or valuable vegetation and vegetation to be preserved. |
| <input type="checkbox"/> Areas of potential erosion problems. | <input type="checkbox"/> Cut-and-fill slopes indicating top and bottom of slope catch lines. |
| <input type="checkbox"/> Any on-site and adjacent surface waters, critical areas, buffers, flood plain boundaries, and Shoreline Management boundaries. | <input type="checkbox"/> Total cut-and-fill quantities and the method of disposal for excess material. |
| <input type="checkbox"/> Existing contours and drainage basins and the direction of flow for the different drainage areas. | <input type="checkbox"/> Stockpile; waste storage; and vehicle storage, maintenance, and washdown areas. |
| <input type="checkbox"/> Where feasible, contours extend a minimum of 25 feet beyond property lines and extend sufficiently to depict existing conditions. | |

Temporary and Permanent BMPs

Include the following on site map (where applicable):

- | | |
|---|--|
| <input type="checkbox"/> Locations for temporary and permanent swales, interceptor trenches, or ditches. | <input type="checkbox"/> Details for bypassing off-site runoff around disturbed areas. |
| <input type="checkbox"/> Drainage pipes, ditches, or cut-off trenches associated with erosion and sediment control and stormwater management. | <input type="checkbox"/> Locations of temporary and permanent stormwater treatment and/or flow control best management practices (BMPs). |
| <input type="checkbox"/> Temporary and permanent pipe inverts and minimum slopes and cover. | <input type="checkbox"/> Details for all structural and nonstructural erosion and sediment control (ESC) BMPs (including, but not limited to, silt fences, construction entrances, sedimentation facilities, etc.) |
| <input type="checkbox"/> Grades, dimensions, and direction of flow in all ditches and swales, culverts, and pipes. | <input type="checkbox"/> Details for any construction-phase BMPs or techniques used for Low Impact Development (LID) BMP protection. |
| <input type="checkbox"/> Locations and outlets of any dewatering systems. | |



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 1: Preserve Vegetation / Mark Clearing Limits

The goal of this element is to preserve native vegetation and to clearly show the limits of disturbance.

This element **does not** apply to my project because:

The site was cleared as part of clearing activity that is subject to an enforcement action and is re-vegetated. Restoration may be necessary to comply with Critical Area Regulations or NPDES requirements. Buffer Zones-BMP C102 may apply if Critical Areas exist on-site and buffer zones shall be protected.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the best management practices (BMPs) you will use:

The perimeter of the area to be cleared shall be marked prior to clearing operation with visible flagging, orange plastic barrier fencing and/or orange silt fencing as shown on the SWPPP site map. The total disturbed area shall be less than 7,000 square feet. Vehicles will only be allowed in the areas to be graded, so no compaction of the undeveloped areas will occur.

Additional Comments:

Check the BMPs you will use:

C101 Preserving Natural Vegetation

C102 Buffer Zones

C103 High Visibility Fence



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 2: Construction Access

The goal of this element is to provide a stabilized construction entrance/exit to prevent or reduce or sediment track out.

This element **does not** apply to my project because:

The driveway to the construction area already exists and will be used for construction access. All equipment and vehicles will be restricted to staying on that existing impervious surface.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

A stabilized construction entrance will be installed prior to any vehicles entering the site, at the location shown on the SWPPP site map.

Additional Comments:

Check the BMPs you will use:

C105 Stabilized Construction Entrance / Exit

C106 Wheel Wash

C107 Construction Road / Parking Area Stabilization



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 3: Control Flow Rates

The goal of this element is to construct retention or detention facilities when necessary to protect properties and waterways downstream of development sites from erosion and turbid discharges.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Flow rates will be controlled by using SWPPP Element 4 sediment controls and BMP T5.13 Post-Construction Soil Quality and Depth if necessary.

Additional Comments:



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 4: Sediment Control

The goal of this element is to construct sediment control BMPs that minimize sediment discharges from the site.

This element **does not** apply to my project because:

The site has already been stabilized and re-vegetated.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Sediment control BMPs shall be placed at the locations shown on the SWPPP site map

Additional Comments:

Check the BMPs you will use:

C231 Brush Barrier

C233 Silt Fence

C235 Wattles

C232 Gravel Filter Berm

C234 Vegetated Strip



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 5: Stabilize Soils

The goal of this element is to stabilize exposed and unworked soils by implementing erosion control BMPs.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Exposed soils shall be worked during the week until they have been stabilized. Soil stockpiles will be located within the disturbed area shown on the SWPPP site map. Soil excavated for the foundation will be backfilled against the foundation and graded to drain away from the building. No soils shall remain exposed and unworked for more than 7 days from May 1 to September 30 or more than 2 days from October 1 to April 30. Once the disturbed landscape areas are graded, the grass areas will be amended using BMP T5.13 Post-Construction Soil Quality and Depth. All stockpiles will be covered with plastic or burlap if left unworked.

Additional Comments:

Check the BMPs you will use:

- | | | | | |
|---|--|--|---|---------------------------------------|
| <input type="checkbox"/> C120 Temporary & Permanent Seeding | <input type="checkbox"/> C122 Nets & Blankets | <input type="checkbox"/> C124 Sodding | <input type="checkbox"/> C131 Gradient Terraces | <input type="checkbox"/> C235 Wattles |
| <input type="checkbox"/> C121 Mulching | <input type="checkbox"/> C123 Plastic Covering | <input type="checkbox"/> C125 Topsoil / Composting | <input type="checkbox"/> C140 Dust Control | |



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 6: Protect Slopes

The goal of this element is to design and construct cut-and-fill slopes in a manner to minimize erosion.

This element **does not** apply to my project because:

No cut slopes over 4 feet high or slopes steeper than 2 feet horizontal to 1 foot vertical, and no fill slopes over 4 feet high will exceed 3 feet horizontal to 1 foot vertical. Therefore, there is no requirement for additional engineered slope protection.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Additional Comments:

Check the BMPs you will use:

- | | | |
|---|---|---|
| <input type="checkbox"/> C120 Temporary & Permanent Seeding | <input type="checkbox"/> C205 Subsurface Drains | <input type="checkbox"/> C207 Check Dams |
| <input type="checkbox"/> C204 Pipe Slope Drains | <input type="checkbox"/> C206 Level Spreader | <input type="checkbox"/> C208 Triangular Silt Dike (Geotextile-Encased Check Dam) |



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 7: Protect Permanent Drain Inlets

The goal of this element is to protect storm drain inlets during construction to prevent stormwater runoff from entering the conveyance system without being filtered or treated.

This element **does not** apply to my project because:

- The site has open ditches in the right-of-way or private road right-of-way.
- There are no catch basins on or near the site.
- Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

- Catch basins on the site or immediately off site in the right-of-way are shown on the SWPPP site map. Storm drain inlet protection shall be installed.

Additional Comments:

Check the BMPs you will use:

- C220 Storm Drain Inlet Protection



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 8: Stabilize Channels and Outlets

The goal of this element is to design, construct, and stabilize on-site conveyance channels to prevent erosion from entering existing stormwater outfalls and conveyance systems.

This element **does not** apply to my project because:

Construction will occur during the dry weather. No storm drainage channels or ditches shall be constructed either temporary or permanent. A small swale shall be graded to convey yard drainage around the structure using a shallow slope; it shall be seeded after grading and stabilized.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

A wattle shall be placed at the end of the swale to prevent erosion at the outlet of the swale.

Additional Comments:

Check the BMPs you will use:

C202 Channel Lining C207 Check Dams C209 Outlet Protection C235 Wattles



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 9: Control Pollutants

The goal of this element is to design, install, implement and maintain BMPs to minimize the discharge of pollutants from material storage areas, fuel handling, equipment cleaning, management of waste materials, etc.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Any and all pollutants, chemicals, liquid products and other materials that have the potential to pose a threat to human health or the environment will be covered, contained, and protected from vandalism. All such products shall be kept under cover in a secure location on-site. Concrete handling shall follow BMP C151.

Additional Comments:

Check the BMPs you will use:

C151 Concrete Handling

C152 Sawcutting and Surfacing Pollution Prevention

C153 Material Delivery, Storage, and Containment

C154 Concrete Washout Area



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 10: Control De-watering

The goal of this element is to handle turbid or contaminated dewatering water separately from stormwater.

This element **does not** apply to my project because:

No dewatering of the site is anticipated.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Additional Comments:

Check the BMPs you will use:

C203 Water Bars

C236 Vegetated Filtration

C206 Level Spreader



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 11: Maintain Best Management Practices

The goal of this element is to maintain and repair all temporary and permanent erosion and sediment control BMPs to assure continued performance.

Describe the steps you will take:

- Best Management Practices or BMPs shall be inspected and maintained during construction and removed within 30 days after the City Inspector or Engineer determines that the site is stabilized, provided that they may be removed when they are no longer needed.

Element 12: Manage the Project

The goal of this element is to ensure that the construction SWPPP is properly coordinated and that all BMPs are deployed at the proper time to achieve full compliance with City regulations throughout the project.

If it **does** apply, describe the steps you will take and select the BMPs you will use:

The Construction SWPPP will be implemented at all times. The applicable erosion control BMPs will be implemented in the following sequence:

- 1. Mark clearing limits
- 2. Install stabilized construction entrance
- 3. Install protection for existing drainage systems and permanent drain inlets
- 4. Establish staging areas for storage and handling polluted material and BMPs
- 5. Install sediment control BMPs
- 6. Grade and install stabilization measures for disturbed areas
- 7. Maintain BMPs until site stabilization, at which time they may be removed

Additional Comments:



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 13: Protect Low Impact Development BMPs

The goal of this element is to protect on-site stormwater management BMPs (also known as “Low Impact Development BMPs”) from siltation and compaction during construction. On-site stormwater management BMPs used for runoff from roofs and other hard surfaces include: full dispersion, roof downspout full infiltration or dispersion systems, perforated stubout connections, rain gardens, bioretention systems, permeable pavement, sheetflow dispersion, and concentrated flow dispersion. Methods for protecting on-site stormwater management BMPs include sequencing the construction to install these BMPs at the latter part of the construction grading operations, excluding equipment from the BMPs and the associated areas, and using the erosion and sedimentation control BMPs listed below.

Describe the construction sequencing you will use:

Additional Comments:

Select the BMPs you will use:

- | | | |
|---|---|---|
| <input type="checkbox"/> C102 Buffer Zone | <input type="checkbox"/> C103 High Visibility Fence | <input type="checkbox"/> C231 Brush Barrier |
| <input type="checkbox"/> C233 Silt Fence | <input type="checkbox"/> C234 Vegetated Strip | |



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Minimum Requirement #5 (On-Site Stormwater Management)

The following tables summarize infeasibility criteria that can be used to justify not using various on-site stormwater management best management practices (BMPs) for consideration for Minimum Requirement #5. This information is also included under the detailed descriptions of each BMP in the 2014 Stormwater Management Manual for Western Washington (Stormwater Manual), but is provided here in this worksheet for additional clarity and efficiency. Where any inconsistencies or lack of clarity exists, the requirements in the main text of the Stormwater Manual shall be applied. If a project is limited by one or more of the infeasibility criteria specified below, but an applicant is interested in implementing a specific BMP, a functionally equivalent design may be submitted to the City for review and approval. Evaluate the feasibility of the BMPs in priority order based on List #1 or #2 (Small Project Stormwater Requirements Tip Sheet and Stormwater Manual). Select the first BMP that is considered feasible for each surface type. Document the infeasibility (narrative description and rationale) for each BMP that was not selected. Only one infeasibility criterion needs to be selected for a BMP before evaluating the next BMP on the list. Attach additional pages for supporting information if necessary.

Note: If your project discharges directly to Lake Washington (flow control exempt) or a downstream analysis confirms that the downstream system is free of capacity constraints for a minimum of ¼ mile and a maximum of 1 mile, then you do not need to complete this worksheet, but should still refer to the infeasibility criteria when selecting BMPs.

Lawn and Landscaped Areas		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Post-construction Soil Quality and Depth List #1 and #2	<input type="checkbox"/> Siting and design criteria provided in BMP T5.13 (Stormwater Manual Volume V, Section 5.3) cannot be achieved. <input type="checkbox"/> Lawn and landscape area is on till slopes greater than 33 percent.	
Roofs		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Full Dispersion List #1 and #2	<input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.30 (Stormwater Manual Volume V, Section 5.3) cannot be achieved. <input type="checkbox"/> A 65 to 10 ratio of forested or native vegetation area to impervious area cannot be achieved. <input type="checkbox"/> A minimum forested or native vegetation flowpath length of 100 feet (25 feet for sheet flow from a non-native pervious surface) cannot be achieved.	
Downspout Full Infiltration List #1 and #2	<input type="checkbox"/> Evaluation of infiltration is not required per the Infiltration Infeasibility Map due to steep slopes, erosion hazards, or landslide hazards. <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.10A (Stormwater Manual Volume III, Section 3.1.1) cannot be achieved. <input type="checkbox"/> The lot(s) or site does not have out-wash or loam soils. <input type="checkbox"/> There is not at least 3 feet or more of permeable soil from the proposed final grade to the seasonal high groundwater table or other impermeable layer. <input type="checkbox"/> There is not at least 1 foot or more of permeable soil from the proposed bottom of the infiltration system to the seasonal high groundwater table or other impermeable layer.	<div style="border: 2px solid black; padding: 5px; display: inline-block; color: red; font-weight: bold; font-size: 1.5em;">N/A</div>



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Roofs (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Bioretention or Rain Gardens List #1 (both) and List #2 (bioretention only)	<p><i>Note: Criteria with setback distances are as measured from the bottom edge of the bioretention soil mix.</i></p> <p>Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or down-gradient flooding. <input type="checkbox"/> Within an area whose ground water drains into an erosion hazard, or landslide hazard area. <input type="checkbox"/> Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, pre-existing structures, or pre-existing road or parking lot surfaces. <input type="checkbox"/> Where the only area available for siting does not allow for a safe overflow pathway to stormwater drainage system or private storm sewer system. <input type="checkbox"/> Where there is a lack of space for bioretention areas at re-development sites, or where there is insufficient space within the existing public right-of-way on public road projects. <input type="checkbox"/> Where infiltrating water would threaten existing below grade basements. <input type="checkbox"/> Where infiltrating water would threaten shoreline structures such as bulkheads. <p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Evaluation of infiltration is not required per the Infiltration Infeasibility Map due to steep slopes, erosion hazards, or landslide hazards <input type="checkbox"/> Within setback provided for BMP T7.30 (Stormwater Manual Volume V, Section 7.4) <input type="checkbox"/> Where they are not compatible with surrounding drainage system as determined by the city (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning bioretention area). 	<div style="border: 2px solid black; padding: 5px; display: inline-block; color: red; font-weight: bold; transform: rotate(-2deg);"> N/A </div>



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Roofs (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Bioretention or Rain Gardens (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where land for bioretention is within an erosion hazard, or landslide hazard area (as defined by MICC 19.07.060). <input type="checkbox"/> Where the site cannot be designed to locate bioretention areas on slopes greater than 8 percent. <input type="checkbox"/> Within 50 feet from the top of slopes that are greater than 20 percent and over 10 feet of vertical relief. <input type="checkbox"/> For properties with known soil or groundwater contamination (typically federal Superfund sites or state cleanup sites under the Model Toxics Control Act [MTCA]): <ul style="list-style-type: none"> • Within 100 feet of an area known to have deep soil contamination. • Where groundwater modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the groundwater. • Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area. • Any area where these facilities are prohibited by an approved cleanup plan under the state MTCA or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW. <input type="checkbox"/> Within 100 feet of a closed or active landfill. <input type="checkbox"/> Within 10 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is 1,100 gallons or less. As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10 percent or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface. <input type="checkbox"/> Within 100 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is greater than 1,100 gallons. 	<p style="text-align: center; font-size: 2em; font-weight: bold; border: 2px solid black; padding: 5px; display: inline-block;">N/A</p>



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Roofs (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Bioretention or Rain Gardens (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where field testing indicates potential bioretention/rain garden sites have a measured (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.30 inches per hour. A small-scale or large-scale PIT in accordance with the Water Manual Volume III, Section 3.3.6 (or an alternate test specified by the City) shall be used to demonstrate infeasibility of bioretention areas. If the measured native soil infiltration rate is less than 0.30 in/hour, bioretention/rain garden BMPs are not required to be evaluated as an option in List #1 or List #2. In these slow draining soils, a bioretention area with an underdrain may be used to treat pollution-generating surfaces to help meet Minimum Requirement #6, Runoff Treatment. If the underdrain is elevated within a base course of gravel, it will also provide some modest flow reduction benefit that will help achieve Minimum Requirement #7. <input type="checkbox"/> Where the minimum vertical separation of 3 feet to the seasonal high groundwater elevation or other impermeable layer would not be achieved below bioretention that would serve a drainage area that exceeds the following thresholds (and cannot reasonably be broken down into amounts smaller than indicated): <ul style="list-style-type: none"> o 5,000 square feet of pollution-generating impervious surface (PGIS) o 10,000 square feet of impervious area o 0.75 acres of lawn and landscape. <input type="checkbox"/> Where the minimum vertical separation of 1 foot to the seasonal high groundwater or other impermeable layer would not be achieved below bioretention that would serve a drainage area less than the above thresholds. <input type="checkbox"/> Within 100 feet of a drinking water well, or a spring used for drinking water supply. <input type="checkbox"/> Within 10 feet of small on-site sewage disposal drainfield, including reserve areas, and grey water reuse systems. For setbacks from a "large on-site sewage disposal system," see Chapter 246-272B WAC. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Roofs (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Downspout Dispersion Systems List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.10B (Stormwater Manual Volume III, Section 3.1.2) cannot be achieved. <input type="checkbox"/> For splash blocks, a vegetated flowpath at least 50 feet in length from the downspout to the downstream property line, structure, stream, wetland, slope over 15 percent to other impervious surface is not feasible. <input type="checkbox"/> For trenches, a vegetated flowpath of at least 25 feet in between the outlet of the trench and any property line, structure, stream, wetland, or impervious surface is not feasible. A vegetated flowpath of at least 50 feet between the outlet of the trench and any slope steeper than 15 percent is not feasible. <div style="text-align: center; border: 2px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="color: red; font-weight: bold; font-size: 1.2em;">N/A</p> </div>	
Perforated Stub-Out Connections List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Evaluation of infiltration is not required per the Infiltration Infeasibility Map due to steep slopes, erosion hazards, or landslide hazards <input type="checkbox"/> For sites with septic systems, the only location available for the perforated portion of the pipe is located up-gradient of the drainfield primary and reserve areas. This requirement can be waived if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary. <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.10C (Stormwater Manual Volume III, Section 3.1.3) cannot be achieved. <input type="checkbox"/> There is not at least 1 foot of permeable soil from the proposed bottom (final grade) of the perforated stub-out connection trench to the highest estimated groundwater table or other impermeable layer. <input type="checkbox"/> The only location available for the perforated stub-out connection is under impervious or heavily compacted soils. 	
On-site Detention List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Project discharges directly to Lake Washington. <input type="checkbox"/> Findings from a 1/4 mile downstream analysis confirm that the downstream system is free of capacity constraints. <input type="checkbox"/> Site setbacks and design criteria provided in the Stormwater Manual (Volume III, Section 3.2.2) cannot be achieved. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Full Dispersion List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.30 (Stormwater Manual Volume V, Section 5.3) cannot be achieved. <input type="checkbox"/> A 65 to 10 ratio of forested or native vegetation area to impervious area cannot be achieved. <input type="checkbox"/> A minimum forested or native vegetation flowpath length of 100 feet (25 feet for sheet flow over native pervious surface) cannot be achieved. <div style="border: 2px solid black; padding: 5px; display: inline-block; transform: rotate(-2deg); color: red; font-weight: bold; font-size: 1.2em;">N/A</div>	
Permeable Pavement List #1 and #2	<p>Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or downgradient flooding. <input type="checkbox"/> Within an area whose ground water drains into an erosion hazard, or landslide hazard area. <input type="checkbox"/> Where infiltrating and ponded water below the new permeable pavement area would compromise adjacent impervious pavements. <input type="checkbox"/> Where infiltrating water below a new permeable pavement area would threaten existing below grade basements. <input type="checkbox"/> Where infiltrating water would threaten shoreline structures such as bulkheads. <input type="checkbox"/> Down slope of steep, erosion prone areas that are likely to deliver sediment. <input type="checkbox"/> Where fill soils are used that can become unstable when saturated. <input type="checkbox"/> Excessively steep slopes where water within the aggregate base layer or at the subgrade surface cannot be controlled by detention structures and may cause erosion and structural failure, or where surface runoff velocities may preclude adequate infiltration at the pavement surface. <input type="checkbox"/> Where permeable pavements cannot provide sufficient strength to support heavy loads at industrial facilities such as ports. <input type="checkbox"/> Where installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, or pre-existing road subgrades. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Permeable Pavement (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Evaluation of infiltration is not required per the Infiltration Infeasibility Map due to steep slopes, erosion hazards, or landslide hazards <input type="checkbox"/> Within an area designated as an erosion hazard, or landslide hazard. <input type="checkbox"/> Within 50 feet from a slope of slopes that are greater than 20 percent. <input type="checkbox"/> For properties with known soil or groundwater contamination (typically federal Superfund sites or state cleanup sites under MTCA): <ul style="list-style-type: none"> • Within 100 feet of an area known to have deep soil contamination. • Where groundwater modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the groundwater. • Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area. • Any area where these facilities are prohibited by an approved cleanup plan under the state MTCA or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW. <input type="checkbox"/> Within 100 feet of a closed or active landfill. <input type="checkbox"/> Within 100 feet of a drinking water well, or a spring used for drinking water supply, if the pavement is a pollution-generating surface. <input type="checkbox"/> Within 10 feet of a small on-site sewage disposal drainfield, including reserve areas, and grey water reuse systems. For setbacks from a "large on-site sewage disposal system," see Chapter 246-272B WAC. <input type="checkbox"/> Within 10 feet of any underground storage tank and connecting underground pipes, regardless of tank size. As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10 percent or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface. <input type="checkbox"/> At multi-level parking garages, and over culverts and bridges. <input type="checkbox"/> Where the site design cannot avoid putting pavement in areas likely to have long-term excessive sediment deposition after construction (e.g., construction and landscaping material yards). 	<div style="border: 2px solid black; padding: 5px; display: inline-block; color: red; font-weight: bold; font-size: 1.5em;">N/A</div>



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Permeable Pavement (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where the site cannot reasonably be designed to have: <ul style="list-style-type: none"> • Porous asphalt surface < 5% slope • Pervious concrete surface < 10% slope • Permeable interlocking concrete pavement surface < 12% N/A • Grid < 12% slope (check with manufacturer and local supplier to confirm maximum slope) <input type="checkbox"/> Where the subgrade soils below a pollution-generating permeable pavement (e.g., road or parking lot) do not meet the soil suitability criteria for providing treatment. See soil suitability criteria for treatment in the Stormwater Manual Volume III, Section 3.3.7. Note: In these instances, the city may approve installation of a 6 inch sand filter layer meeting city specifications for treatment as a condition of construction. <input type="checkbox"/> Where underlying soils are unsuitable for supporting traffic loads when saturated. Soils meeting a California Bearing Ratio of 5 percent are considered suitable for residential access roads. <input type="checkbox"/> Where replacing existing impervious surfaces unless the existing surface is a non-pollution generating surface over an outwash soil with a saturated hydraulic conductivity of 4 inches per hour or greater. <input type="checkbox"/> Where appropriate field testing indicates soils have a measured (a.k.a., initial) subgrade soil saturated hydraulic conductivity less than 0.3 inches per hour. Only small-scale PIT or large-scale PIT methods in accordance with Stormwater Manual Volume III, Section 3.3.6 (or an alternative small scale test specified by the City) shall be used to evaluate infeasibility of permeable pavement areas. (Note: In these instances, unless other infeasibility restrictions apply, roads and parking lots may be built with an underdrain, preferably elevated within the base course, if flow control benefits are desired.) <input type="checkbox"/> Roads that receive more than very low traffic volumes, and areas having more than very low truck traffic. Roads with a projected average daily traffic volume of 400 vehicles or less are very low volume roads (AASHTO 2001) (U.S. Department of Transportation, 2013). Areas with very low truck traffic volumes are roads and other areas not subject to through truck traffic but may receive up to weekly use by utility trucks (e.g., garbage, recycling), daily school bus use, and multiple daily use by pick-up trucks, mail/parcel delivery trucks, and maintenance vehicles. (Note: This infeasibility criterion does not extend to sidewalks and other non-traffic bearing surfaces associated with the collector or arterial). 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Permeable Pavement (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> At sites defined as “high-use sites” (refer to the Glossary in the Stormwater Manual Volume I). <input type="checkbox"/> In areas with “industrial activity” identified in 40 CFR 122.26(b)(14). <input type="checkbox"/> Where the risk of hazardous material spills is more likely such as gas stations, truck stops, and industrial chemical storage sites. <input type="checkbox"/> Where routine, heavy applications of sand occur in frequent snow zones to maintain traction during weeks of snow and ice accumulation. <input type="checkbox"/> Where the seasonal high groundwater or an underlying impermeable/low permeable layer would create saturated conditions within 1 foot of the bottom of the lowest gravel base course. 	
Bioretention or Rain Gardens List #1 (both) and List #2 (bioretention only)	<p><i>Note: Criteria with setback distances are as measured from the bottom edge of the bioretention soil mix.</i></p> <p>Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or down-gradient flooding. <input type="checkbox"/> Within an area whose ground water drains into an erosion hazard, or landslide hazard area. <input type="checkbox"/> Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, pre-existing structures, or pre-existing road or parking lot surfaces. <input type="checkbox"/> Where the only area available for siting does not allow for a safe overflow pathway to stormwater drainage system or private storm sewer system. <input type="checkbox"/> Where there is a lack of usable space for bioretention areas at re-development sites, or where there is insufficient space within the existing public right-of-way on public road projects. <input type="checkbox"/> Where infiltrating water would threaten existing below grade basements. <input type="checkbox"/> Where infiltrating water would threaten shoreline structures such as bulkheads. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Bioretention or Rain Gardens (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where evaluation of infiltration is not required per the Infiltration Infeasibility Map due to steep slopes, erosion hazards, or landslide hazards. <input type="checkbox"/> Within setback provided for D₅₀ 7.30 (Stormwater Manual Volume V, Section 7.4) N/A <input type="checkbox"/> Where they are not compatible with surrounding drainage system as determined by the city (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning bioretention area). <input type="checkbox"/> Where land for bioretention is within an erosion hazard, or landslide hazard area (as defined by MICC 19.07.060). <input type="checkbox"/> Where the site cannot be reasonably designed to locate bioretention areas on slopes less than 8 percent. <input type="checkbox"/> Within 50 feet from the top of slopes that are greater than 20 percent and over 10 feet of vertical relief. <input type="checkbox"/> For properties with known soil or groundwater contamination (typically federal Superfund sites or state cleanup sites under the Model Toxics Control Act [MTCA]): <ul style="list-style-type: none"> • Within 100 feet of an area known to have deep soil contamination. • Where groundwater modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the groundwater. • Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area. • Any area where these facilities are prohibited by an approved cleanup plan under the state MTCA or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW. <input type="checkbox"/> Within 100 feet of a closed or active landfill. <input type="checkbox"/> Within 10 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is 1,100 gallons or less. As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10 percent or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Bioretention or Rain Gardens (cont.)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Within 100 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is greater than 1,100 gallons. <input type="checkbox"/> Where field tests (e.g., initial) native soil saturated hydraulic conductivity less than 0.30 inches per hour. A small-scale or large-scale PIT in accordance with Stormwater Manual Volume III, Section 3.3.6 (or an alternative small scale test specified by the City) shall be used to demonstrate infeasibility of bioretention areas. If the measured native soil infiltration rate is less than 0.30 in/hour, bioretention/rain garden BMPs are not required to be evaluated as an option in List #1 or List #2. In these slow draining soils, a bioretention area with an underdrain may be used to treat pollution-generating surfaces to help meet Minimum Requirement #6, Runoff Treatment. If the underdrain is elevated within a base course of gravel, it will also provide some modest flow reduction benefit that will help achieve Minimum Requirement #7. <input type="checkbox"/> Where the minimum vertical separation of 3 feet to the seasonal high groundwater elevation or other impermeable layer would not be achieved below bioretention that would serve a drainage area that exceeds the following thresholds (and cannot reasonably be broken down into amounts smaller than indicated): <ul style="list-style-type: none"> o 5,000 square feet of pollution-generating impervious surface (PGIS) o 10,000 square feet of impervious area o 0.75 acres of lawn and landscape. <input type="checkbox"/> Where the minimum vertical separation of 1 foot to the seasonal high groundwater or other impermeable layer would not be achieved below bioretention that would serve a drainage area less than the above thresholds <input type="checkbox"/> Within 100 feet of a drinking water well, or a spring used for drinking water supply. <input type="checkbox"/> Within 10 feet of small on-site sewage disposal drainfield, including reserve areas, and grey water reuse systems. For setbacks from a "large on-site sewage disposal system," see Chapter 246-272B WAC. 	



CITY OF MERCER ISLAND

SECTION C: INFEASIBILITY CRITERIA

Other Hard Surfaces (cont.)		
BMP and Applicable Lists	Infeasibility Criteria	Infeasibility Description and Rationale for Each BMP Not Selected
Sheet Flow Dispersion List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.12 (Stormwater Manual Volume V, Section 5.3) cannot be achieved. <input type="checkbox"/> Positive drainage for sheet flow runoff cannot be achieved. <input type="checkbox"/> Area to be dispersed (e.g., driveway, patio) cannot be graded to have less than a 15 percent slope. <input type="checkbox"/> For flat to moderate slopes, at least a 10 foot-wide vegetation buffer for dispersion of the adjacent 20 feet of contributing surface cannot be achieved. For variably sloped areas, at least a 25 foot vegetated flowpath between berms cannot be achieved. <div style="text-align: center; border: 2px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> N/A </div>	
Concentrated Flow Dispersion List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Site setbacks and design criteria provided in BMP T5.11 (Stormwater Manual Volume V, Section 5.3) cannot be achieved. <input type="checkbox"/> A minimum 3 foot length of rock pad and 50 foot flowpath OR a dispersion trench and 25 foot flowpath for every 700 square feet of drainage area followed with applicable setbacks cannot be achieved. <input type="checkbox"/> More than 700 square feet drainage area drains to any dispersion device. 	
On-site Detention List #1 and #2	<ul style="list-style-type: none"> <input type="checkbox"/> Project discharges directly to Lake Washington. <input type="checkbox"/> Findings from a 1/4 mile downstream analysis confirm that the downstream system is free of capacity constraints. <input type="checkbox"/> Site setbacks and design criteria provided in the Stormwater Manual (Volume III, Section 3.2.2) cannot be achieved. 	



CITY OF MERCER ISLAND

SECTION D: POST-CONSTRUCTION SOIL MANAGEMENT

Attachments Required *(Check off required items that are attached)*

<input type="checkbox"/> Site Plan showing, to scale: <div style="text-align: center; color: blue;">(see C2.0)</div>	<input type="checkbox"/> Areas of undisturbed native vegetation (no amendment required) <input type="checkbox"/> New planting beds (amendment required) <input type="checkbox"/> New turf areas (amendment required) <input type="checkbox"/> Type of soil improvement proposed for each area
<input type="checkbox"/> Soil test results (required if proposing custom amendment rates)	
<input type="checkbox"/> Product test results for proposed amendments	

Total Amendment / Topsoil / Mulch for All Areas

Calculate the quantities needed for the entire site based on all of the areas identified on the Site Plan and the calculations on the following page(s):

Product	Total Quantity (CY)	Test Results
Product #1: _____	_____ CY	_____ % organic matter _____ C:N ratio "Stable"? yes <input type="checkbox"/> no <input type="checkbox"/>
Product #2: _____	_____ CY	_____ % organic matter _____ C:N ratio "Stable"? yes <input type="checkbox"/> no <input type="checkbox"/>
Product #3: _____	_____ CY	_____ % organic matter _____ C:N ratio "Stable"? yes <input type="checkbox"/> no <input type="checkbox"/>

CY = cubic yards, C:N = Carbon:Nitrogen



CITY OF MERCER ISLAND

SECTION D: POST-CONSTRUCTION SOIL MANAGEMENT

Amendment / Topsoil / Mulch by Area

For each identified area on your Site Plan, provide the following information: (Use additional sheets if necessary)

Area # _____ (should match identified Area # on Site Plan)

Planting type: Turf Undisturbed native vegetation
 Planting Beds Other: _____

Pre-Approved Amendment Method

<input type="checkbox"/>	Amend with compost	Turf: _____ SF x 5.4 CY ÷ 1,000 SF = _____ CY Planting beds: _____ SF x 9.3 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY Scarification depth: 8 inches	Product: _____
<input type="checkbox"/>	Stockpile and amend	Turf: _____ SF x 5.4 CY ÷ 1,000 SF = _____ CY Planting beds: _____ SF x 9.3 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY Scarification depth: 8 inches	Product: _____
<input type="checkbox"/>	Topsoil import	Turf: _____ SF x 18.6 CY ÷ 1,000 SF = _____ CY Planting beds: _____ SF x 18.6 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY Scarification depth: 6 inches	Product: _____

Custom Amendment

<input type="checkbox"/>	Amend with compost	Attach information on bulk density, percent organic matter, moisture content, C:N ratio, and heavy metals analysis to support custom amendment rate and scarification depth. Total Quantity = _____ CY Scarification depth: _____ inches	Product: _____
<input type="checkbox"/>	Stockpile and amend	Attach information on bulk density, percent organic matter, moisture content, C:N ratio, and heavy metals analysis to support custom amendment rate and scarification depth. Total Quantity = _____ CY Scarification depth: _____ inches	Product: _____

Mulch

<input type="checkbox"/>	Amend with compost	Planting beds: _____ SF x 12.4 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY	Product: _____
<input type="checkbox"/>	Stockpile and amend	Planting beds: _____ SF x 12.4 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY	Product: _____
<input type="checkbox"/>	Topsoil import	Planting beds: _____ SF x 12.4 CY ÷ 1,000 SF = _____ CY Total Quantity = _____ CY	Product: _____

CY = cubic yards, C:N = Carbon:Nitrogen



CITY OF MERCER ISLAND

SECTION E: SIGNATURE PAGE

Project Engineer's Certification for Section B

For Stormwater Site Plans with engineered elements, the Construction SWPPP is stamped by a professional engineer licensed in the State of Washington in civil engineering.

If required, attach a page with the project engineer's seal with the following statement:

"I hereby state that this Construction Stormwater Pollution Prevention Plan for _____ (name of project) has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Mercer Island does not and will not assume liability for the sufficiency, suitability, or performance of Construction SWPPP BMPs prepared by me."

Applicant Signature for Full Stormwater Package (Sections A through D)

I have read and completed the Stormwater Submittal Package and know the information provided to be true and correct.

Print Applicant Name: _____

Applicant Signature: _____ Date _____

