GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists
& Environmental Specialists

May 17, 2023 G-5770-1

Gerald Yuen
4624 E Mercer Way
Mercer Island, WA 98040

Subject: **Stormwater Drainage Report**
Proposed Driveway Modifications
4624 – East Mercer Way
Mercer Island, Washington 98040

Dear Mr. Yuen:

At your request, we have reviewed Mercer Island's stormwater management requirements, evaluated the project's conformance with the stormwater management requirements, and prepared the following drainage report for the proposed modifications to the driveway at the subject property.

MINIMUM STORMWATER REQUIREMENTS

Based upon our discussions with you, and our review of the landscape plan prepared by Ragen & Associates, we understand that modifications to the existing driveway are proposed near the center of the subject property. The proposed new plus replaced impervious surfacing is approximately 6,386 square feet. The proposed new impervious surfacing is approximately 2,490 square feet of asphalt and concrete driveway surfaces. The proposed replaced impervious surfacing is approximately 3,896 square feet of asphalt driveway surfaces. The total proposed lot coverage is approximately 10,922 square feet for the approximately 40,017 square feet large project site. As such, Minimum Stormwater Requirements #1 through #5 must be satisfied for the proposed project. See the flowchart on the following page.

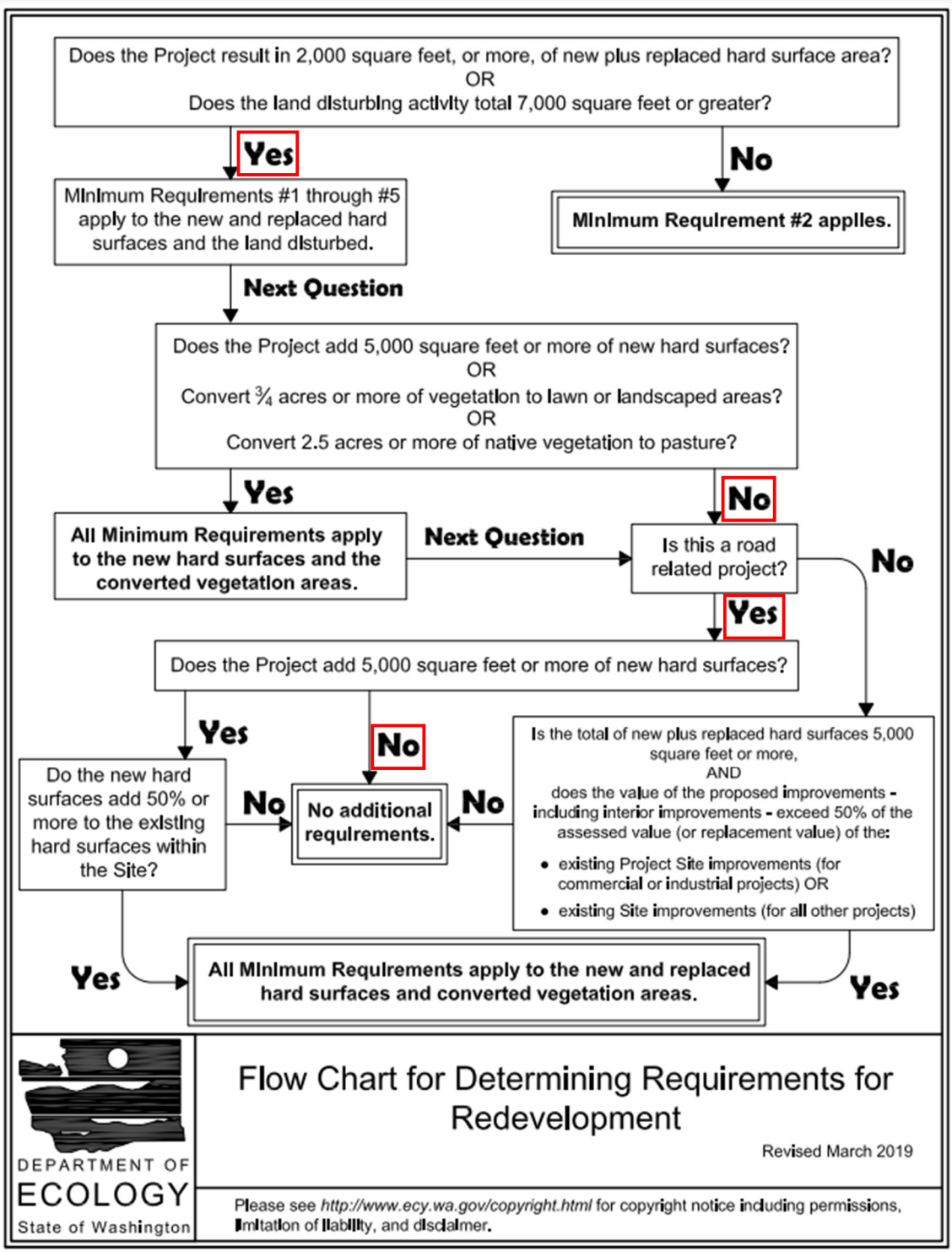


Figure 1: Flow Chart for Determining Requirement for Redevelopment, WA DOE Stormwater Manual, 2019.

M.R. #1: Prepare Stormwater Site Plans

A stormwater site plan was prepared as part of the project's design team's response to the first correction comments prepared by Mercer Island for the building permit application. The stormwater site plan describes the collection, conveyance, and discharge of stormwater from the site, and was prepared in general accordance with Mercer Island's City Code and Stormwater Management Program (MICC 15.09.050.C).

M.R. #2: Construction Stormwater Pollution and Prevention Plan (CSWPPP)

A CSWPPP was prepared as part of the project's design team's response to the first correction comments prepared by Mercer Island for the building permit application. Temporary Erosion and Sedimentation Control (TESC) plan elements are included on the CSWPPP plan as well.

Temporary Erosion and Sedimentation Control measures are required as disturbance to the site's soils is required to construct the proposed driveway modifications. No disturbance to soils at the project site that are outside the project area are proposed. The site's existing grades generally direct stormwater flow away from adjacent properties, and towards the existing onsite stormwater system. As more than 2,000 square feet of new hard surfacing is proposed for the project, elements one through thirteen of the CSWPPP are required when appropriate. These elements include: Marking clearing limits, establishing construction access, controlling flow rates, installing sediment controls, stabilizing soils, protecting slopes, protecting drain inlets, stabilizing channels and outlets, controlling pollutants, controlling dewatering, maintaining Best Management Practices (BMPs), managing the project, and protecting Low Impact Development (LID) BMPs. To mitigate the potential for erosion and minimize sedimentation during construction, the following BMPs will be utilized as shown on the CSWPPP/ESC Plan.

- Site soils that are excavated and not anticipated to be used to achieve the proposed final design site elevations are to be removed from the site.

- During trucking operations and when any trackout is observed outside of the material delivery and staging areas, roadways at the site are to be swept.

- Stormwater runoff is not to be allowed to develop into concentrated flows on the ground's surface, and point discharge of stormwater runoff is to be prevented.

- Silt fencing is to be installed downslope of the areas to be disturbed, and the fencing is to be maintained until stabilization of all disturbed soils has been completed.

- Stockpiled and disturbed soils that are exposed and not being worked are to be covered with straw mulching or plastic sheeting.

M.R. #3: Source Control of Pollution

Source control BMPs have been included in the CSWPPP/ESC plan, including covering unworked soils, minimizing trackout & preventing soils from leaving the site, stabilization & amendment of disturbed soils upon the completion of the project.

M.R. #4: Preservation of Natural Drainage Systems and Outfalls

During construction, stormwater runoff from the driveway is to be collected and directed towards dispersion trenches with adequate vegetated flow paths. Any overflow from the dispersion trenches is to be directed towards the existing downstream stormwater drainage system at the subject property, which is tightlined to outflow into Lake Washington at the subject property's eastern limit.

No changes to the existing roof downspouts and residence's drainage system are proposed for the project.

M.R. #5: On-Site Stormwater Management

The project is required to manage stormwater onsite to the maximum extent practical. The following section describes the process for selection of appropriate BMPs for the project. BMPs are to be analyzed for the proposed new and replaced pavement areas per List 1. In addition, disturbed soils are required to be amended per BMP T5.13 for soil quality and depth.

According to Mercer Island's Infiltration map, the project site is located within an area mapped as unsuitable for LID infiltration facilities. Alternative BMPs for stormwater management such as permeable pavers are also not practical for the project's design due to the relatively low

permeability of the underlying soils. Due to the lack of a 100-foot vegetated flow path, full dispersion is also not appropriate for the project, however, partial dispersion utilizing gravel trenches with adequate vegetated flow paths is feasible near the center and eastern extent of the project area. Please see the flowchart and infiltration feasibility map on the following page.

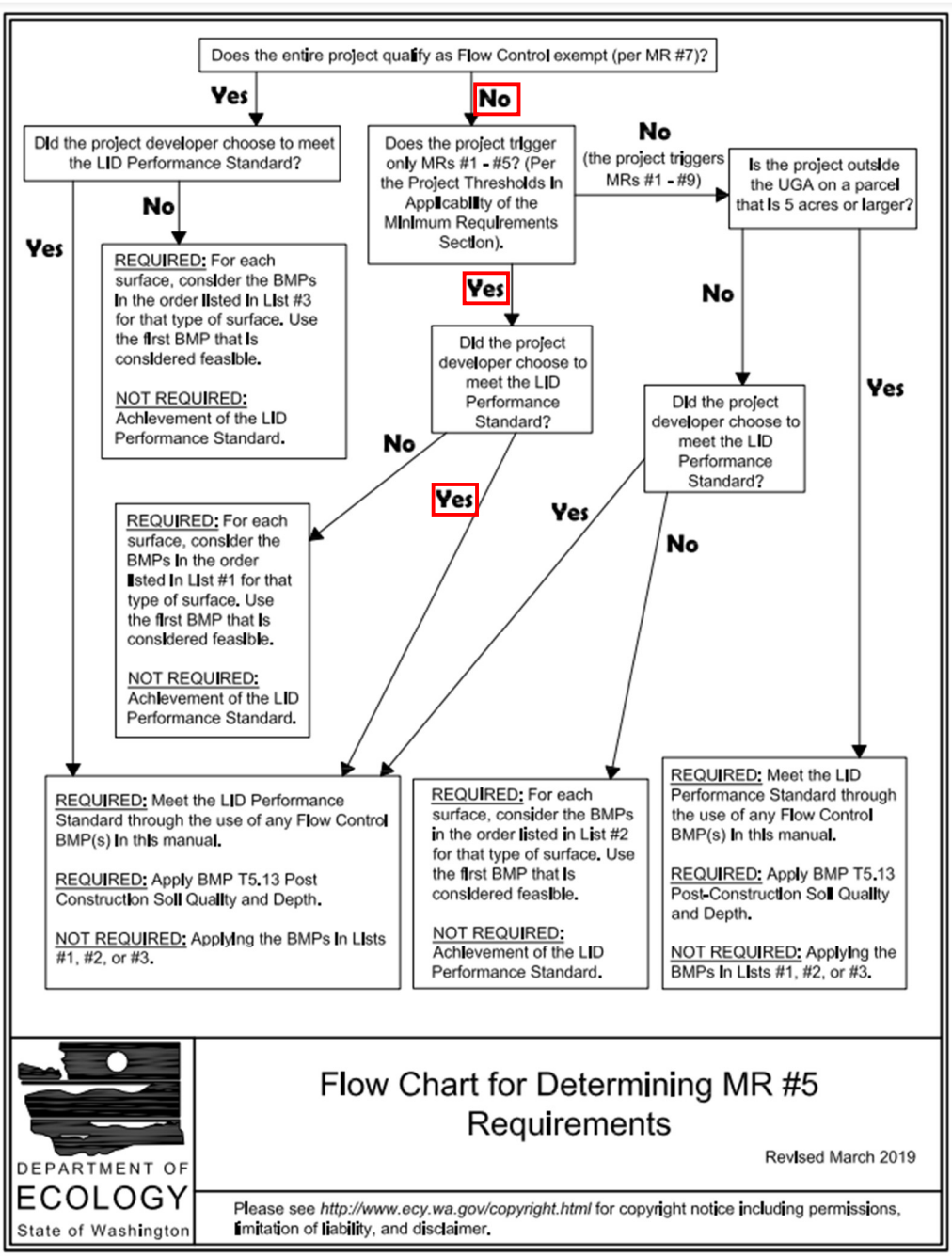


Figure 2: Flow Chart for Determining MR #5 Requirements, WA DOE Stormwater Manual, 2019

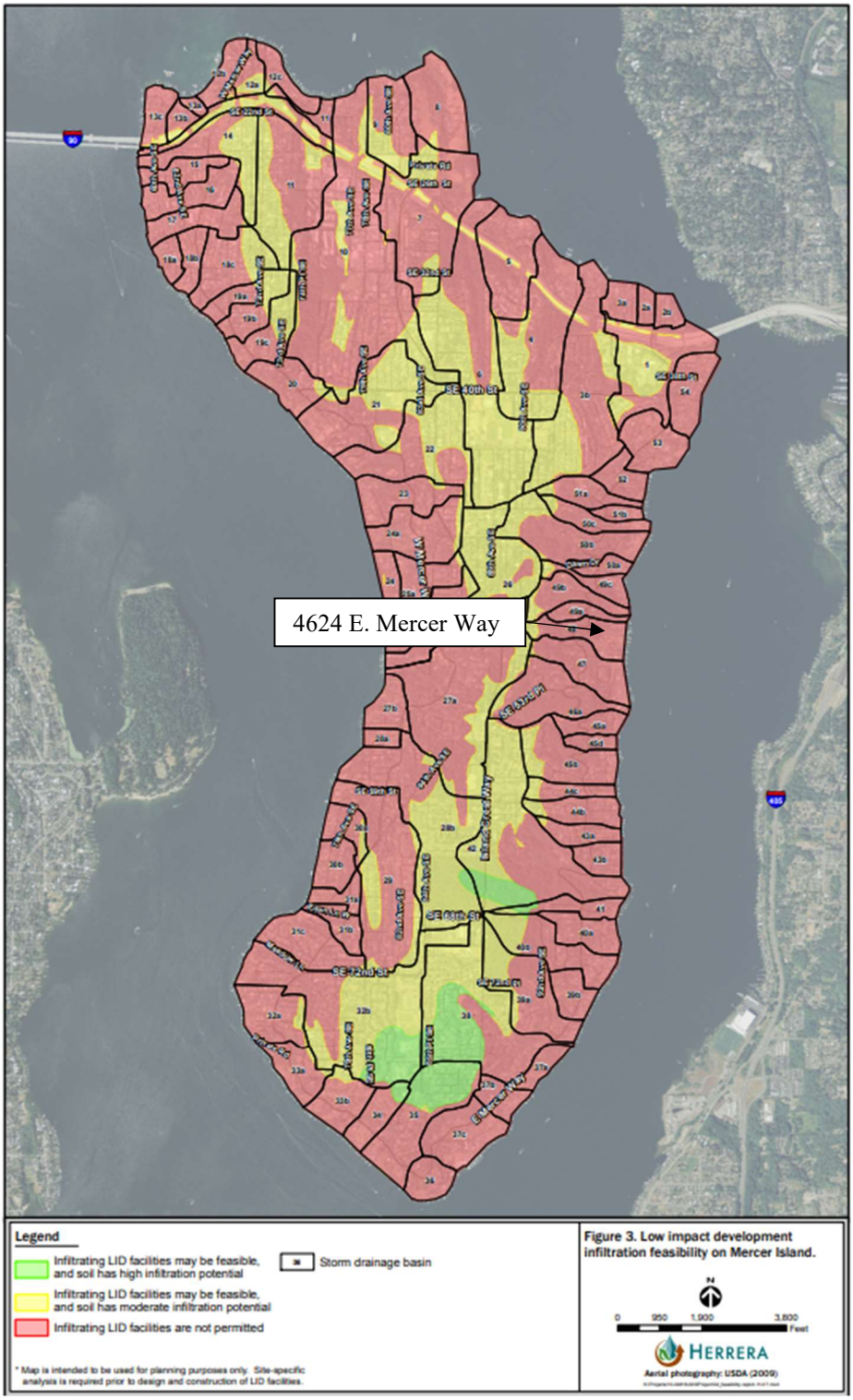


Figure 3. Map of LID Infiltration feasibility on Mercer Island.

DRAINAGE REPORT

Legal Description
SANDY BEACH TRS UNREC 4 LESS N 21 FT OF 5 & SH LDS ADJ
Plat Block:
Plat Lot: 4-5

Site Description

The project site (Parcel No. 755870-0020) is located at 4624 East Mercer Way in Mercer Island, Washington. The project site is approximately rectangular-shaped, with the major axis oriented approximately east-west. The project site is approximately 40,017 square feet (0.92 acres) in size.

The project site steeply then gently slopes downwards towards the east, with a maximum elevation of approximately 140 feet near the site's southwest corner and a minimum elevation of approximately 20 feet near the site's eastern limit. The project site is currently developed, consisting of an approximately 2,430 square feet large single-family residence with an approximately 4582 square feet large asphalt driveway, an approximately 2058 square feet large concrete driveway, and an approximately 66 square feet shed. The approximately 26,101 square feet of undeveloped and landscaped areas of the project site consist of moderately to heavily forested terrain near the western perimeter of the project site, and landscaped areas near the central and eastern limits of the project site. Based on the Boundary and Topographic Study prepared for the project, the average lot slope is approximately 22 percent. As such, the maximum lot coverage limit for impervious surfaces for the lot is 35%. Please see the table below for existing and proposed lot coverage calculations.

Total Area (sf)	40,017
Ex. Undeveloped/Landscaped Area (sf)	26,101
Existing Impervious Areas (sf)	9,136
Existing Lot Coverage (%)	22.8
Proposed Impervious Areas (sf)	10,922
Proposed Lot Coverage (%)	27.3

The project site is accessed by a private access road to the northwest. The project site is bounded by developed residential lots to the north & south, by East Mercer Way to the west, and by Lake Washington to the east.

Currently, stormwater from impervious surfaces is collected and directed towards roof downspouts and a trench drain located southwest of the existing residence, which are tightlined to the on-site stormwater system that drains to Lake Washington. The proposed driveway design consists of asphalt and concrete pavement, which will direct stormwater runoff towards dispersion trenches that are proposed to be located within the partially cleared region near the center of the project site, and within the proposed project area.

Existing Condition

The published geologic map (Geologic Map of Mercer Island, Washington, Troost et al., 2006) for the site's vicinity indicates that the soils at the project site consist of Quaternary-age pre-Olympia nonglacial (Qpon) deposits. Based on Mercer Island's Landslide Hazard Assessment (Troost & Wisher, 2009), the project site and vicinity are overlain by mass wastage (Qmw) deposits. A detailed description of the subsurface conditions at the project site, and an evaluation of the mapped geologic hazards at the project site are provided in the geotechnical report[1] previously prepared for the project.

According to the USDA's Natural Resources Conservation Service's Web Soil Survey, soils at the property are identified as KpD - Kitsap Silt Loam, 15 to 30 percent slopes. According to available mapping by Mercer Island and King County, there are no wetlands identified on the site, and no drainage complaints or sensitive area notices are mapped near the property.

Drainage Basin: Mercer Island
Watershed: Cedar River / Lake Washington
WRIA: Cedar-Sammamish (8)

Wells and Septic Systems

According to available mapping by Washington State's Department of natural Resources, no

[1]Geotechnical Engineering Investigation, Proposed Driveway Modification, 4624 – East Mercer Way Mercer Island, Washington 98040, GEO Group Northwest, Inc., Dated October 31, 2022.

wells are located at or within 500 feet of the subject property. No wells or septic systems are proposed for this project.

Fuel Tanks

It is our understanding that there are no existing underground storage or fuel tanks, and that none are proposed for this project.

Sub-Basins

There are no drainage sub-basins mapped at the project site by Mercer Island or King County.

Floodplains

There are no floodplains mapped at the project site by Mercer Island or King County.

Downstream Drainage Analysis and Stormwater Facility Sizing

The project site is located within the urban growth area, as mapped by King County. Adjacent lots to the north and south consist of developed residential properties, and the project site is bounded by E Mercer Way to the west, and by Lake Washington to the east. Site topography is gently to steeply sloping towards Lake Washington to the east. The existing single-family residence at the project site conveys stormwater through roof downspouts tightlined to an existing on-site stormwater system that then drains to Lake Washington. The existing driveway conveys stormwater to a trench drain located southwest of the existing residence that is tightlined to the existing on-site stormwater system. There are no significant on or off-site flows onto the project site, and no downstream drainage problems or surface flow were observed during our site investigation on September 28th, 2022. There are no downstream effects anticipated from the proposed project. There are no reported problems to be investigated, and no disturbance of aquatic habitat on-site or downstream are proposed for the project.

Per Mercer Island's Stormwater Management Standards, an on-site detention facility for storm water runoff from the proposed new and replaced impervious asphalt and concrete surfaces is not required, as stormwater discharges directly into Lake Washington.

Per MICC 19.05.050.B, passive spill control is required for the project to prevent oil and/or other pollutants from entering Lake Washington. Passive spill control should be incorporated in the project's stormwater design by including a tee section in the existing trench drain downslope of the proposed driveway modifications and the proposed dispersion trenches.

Per the 2019 Stormwater Management Manual for Western Washington by Washington State's Department of Ecology, partial dispersion of runoff from driveways or other pavement through a vegetated area can help to attenuate peak runoff flows into the on-site stormwater system, and can provide water quality benefits. BMPs T5.11 & T5.12 may be used in areas where flows can be dispersed through existing or proposed vegetation, and as such, is a practical method for stormwater management for the project. BMP T5.12 should only be used for stormwater management in gently sloping (<15%) areas, such as the vegetated area south of the proposed concrete driveway. Driveways should be sloped at a maximum inclination of 2% towards the proposed dispersion trenches. If sloping of driveways towards the dispersion trenches is not feasible, approximately 2 to 4 inches tall asphalt berms should direct stormwater towards the proposed dispersion trenches.

Design guidelines indicate that the minimum sizing for sheet flow dispersion is a 10-feet wide vegetated buffer for up to a 20 feet wide paved or impervious surface. For each additional 20 feet of impervious surface width, or fraction thereof, the vegetated buffer should be increased by an additional 10 feet. Based on the landscape plan prepared by Ragen & Associates for the project, the maximum width of the proposed driveway is approximately 58 feet wide. As such, a minimum of 30-feet wide of vegetated buffer is required for the project. These design requirements are illustrated on the attached *Plate 1 – Drainage Plan*, and details for the dispersion trench design are illustrated on the attached *Plate 2 – Drainage Plan Details*.

LIMITATIONS

This report has been prepared for the specific application to this site for the exclusive use of Mr. Yuen, and their authorized representatives. Any use of this report by other parties is solely at that party's own risk. We recommend that this report be included in its entirety in the project contract documents for reference during construction.

Our findings and recommendations stated herein are based on field observations, our experience and judgement. The recommendations are our professional opinion derived in a manner

consistent with the level of care and skill ordinarily exercised by other members of the profession currently practicing under similar conditions in this area, and within the budget constraint. No warranty is expressed or implied. In the event that drainage conditions not anticipated in this report are encountered during site development, GEO Group Northwest, Inc. should be notified and the above recommendations should be re-evaluated.

CLOSING

We appreciate the opportunity to provide you with engineering services for this project. If you have any questions, or if we may be of further service, please do not hesitate to contact us.

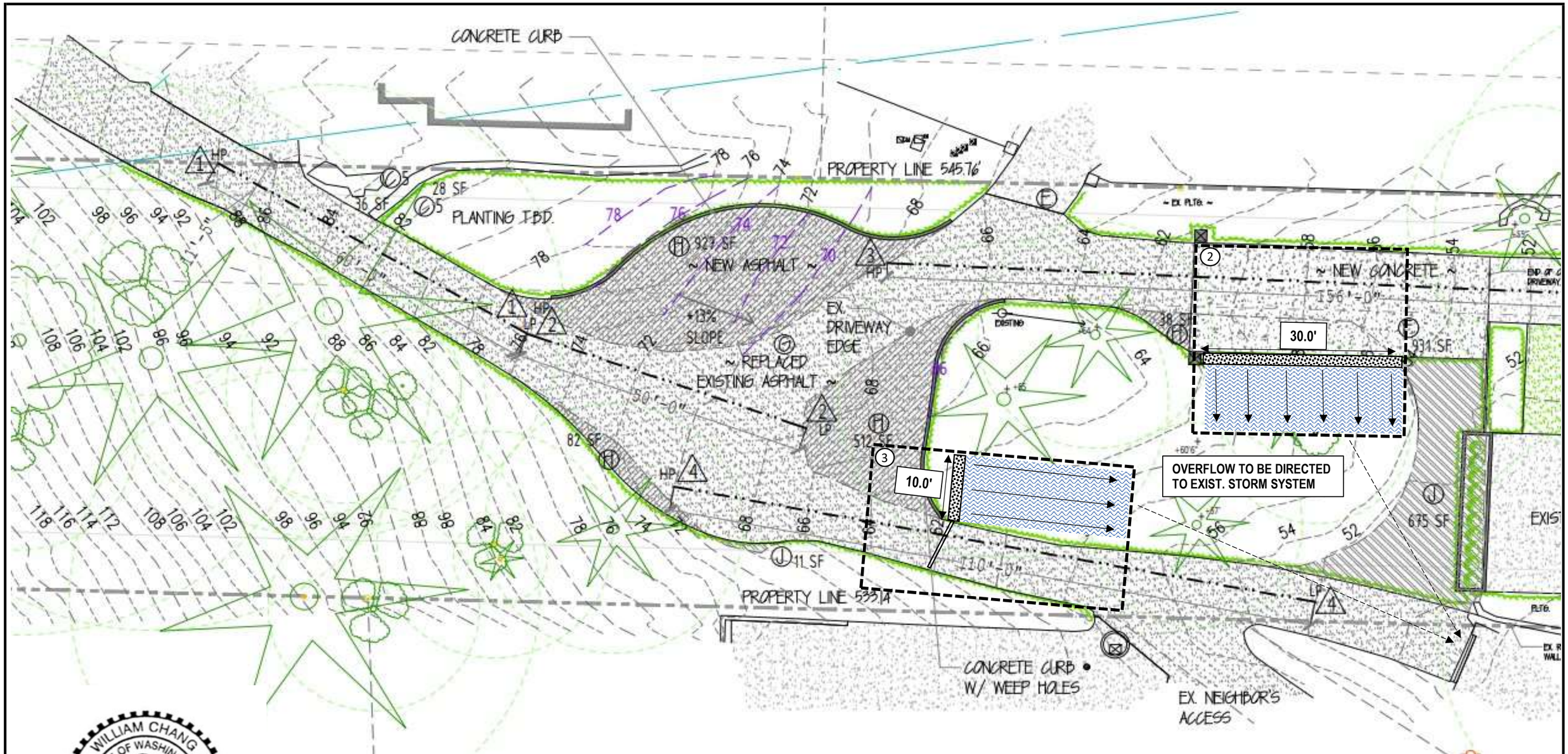
Sincerely,
GEO GROUP NORTHWEST, INC.

Andrew Hoff, G.I.T.
Staff Engineering Geologist

Dated: 5/17/2023
William Chang, P.E.
Principal Engineer

Attachments:

- Plate 1 – *Drainage Plan*
- Plate 2 – *Drainage Plan Details*



WILLIAM CHANG
STATE OF WASHINGTON
20114
REGISTERED
PROFESSIONAL ENGINEER

Source: Landscape Plan by Ragen & Associates, 2023

0 15' 30'

Scale: 1 inch = 15'

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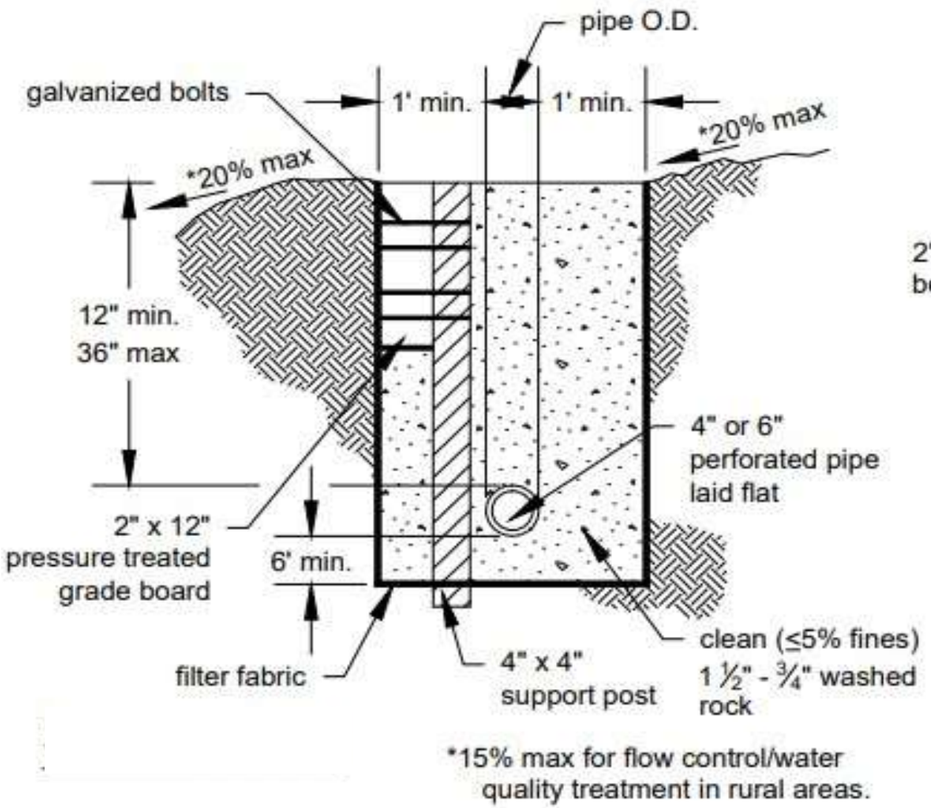
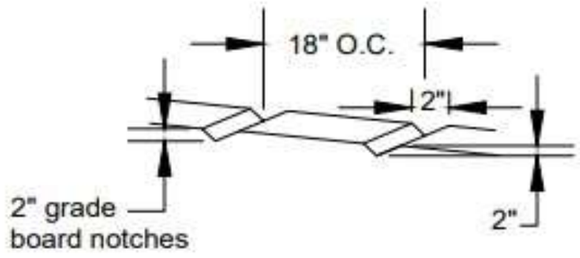
GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

DRAINAGE PLAN
PROPOSED DRIVEWAY EXPANSION
4624 E MERCER WY
MERCER ISLAND, WA 98040

SCALE	As Shown	DATE	5/17/23	MADE	AH	CHKD	WC	JOB NO.	G-5770	PLATE	1

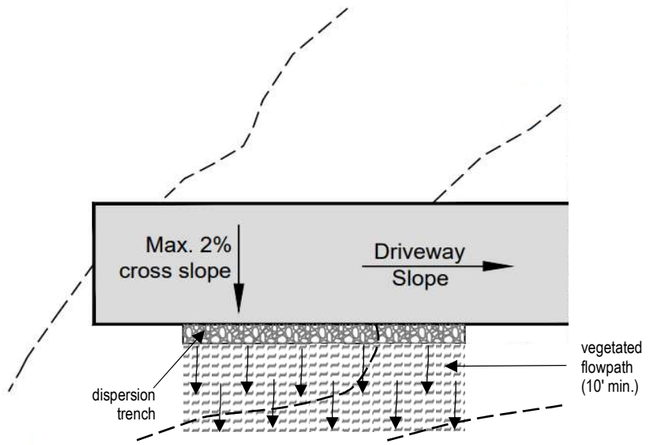


① DISPERSION TRENCH DETAIL

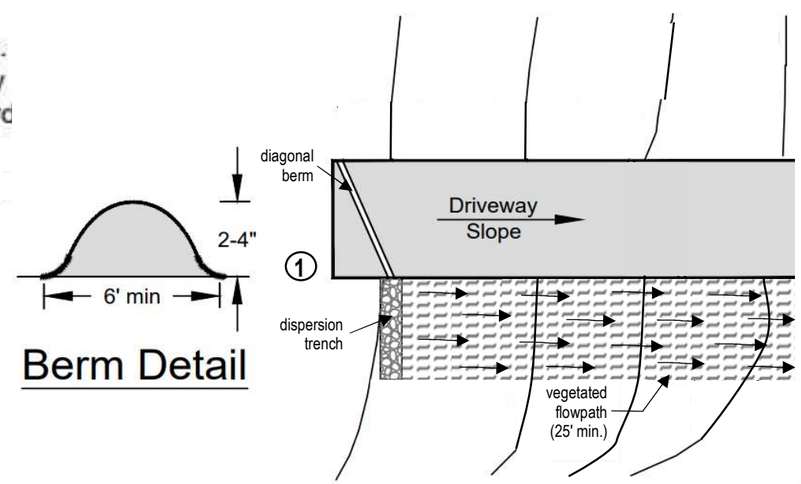


Notes:

1. This trench shall be constructed so as to prevent point discharge and/or erosion.
2. Trenches may be placed no closer than 50 feet to one another. (100 feet along flowline)
3. Trench and grade board must be level. Align to follow contours of site.
4. Support post spacing as required by soil conditions to ensure grade board remains level.



② SHEET FLOW DISPERSION FROM A DRIVEWAY



③ DRIVEWAY DISPERSION TRENCH DETAIL

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

DRAINAGE PLAN DETAILS
PROPOSED DRIVEWAY EXPANSION
4624 E MERCER WY
MERCER ISLAND, WA 98040

SCALE	DATE	MADE	CHKD	JOB NO.	PLATE
NO SCALE	5/17/23	AH	WC	G-5770	2