Anstey Engineering

Benjamin P. Anstey, PE
8627 NE 180th Street Bothell, WA 98011
Ph: 206-303-7639
e-mail: benanstey@ansteyengineering.com

Storm Drainage Report

2423 63rd Avenue SE.
Mercer Island, WA 98040

Parcel # 409950-0430

December 23, 2019

Prepared for:

Mr. Mingqin Li and Sun Yong

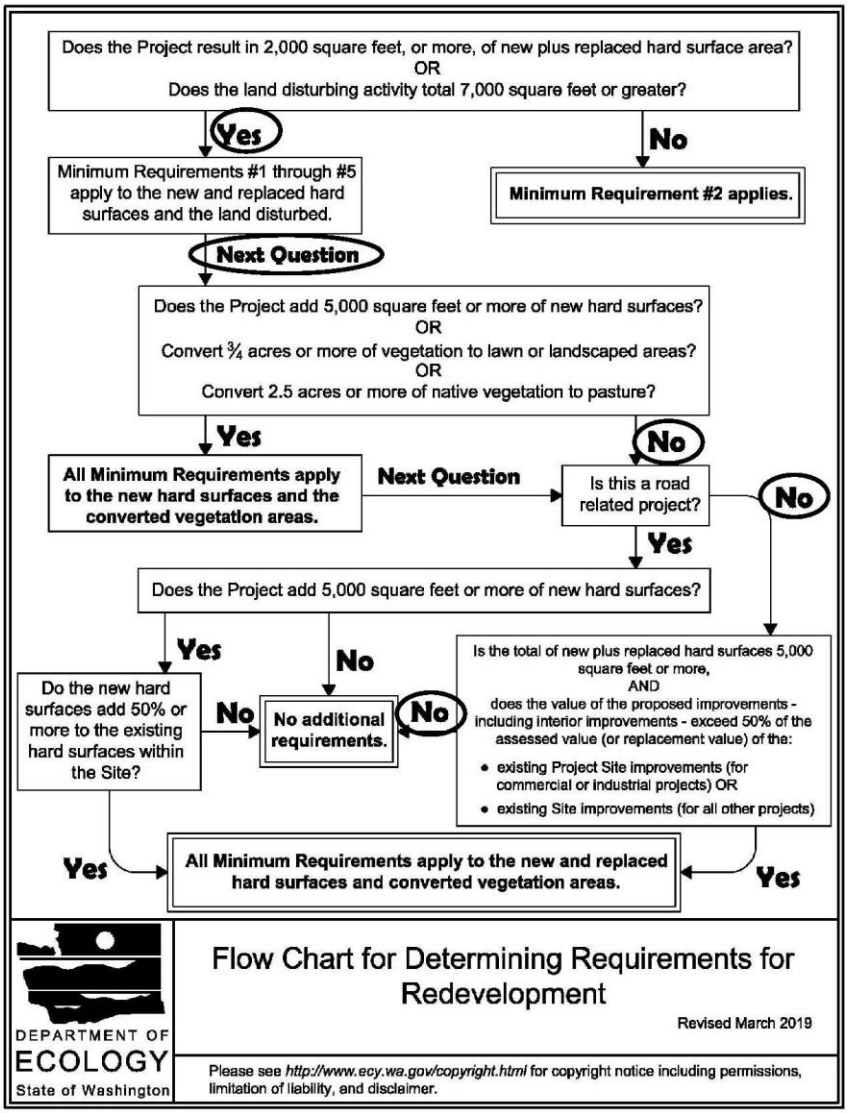
12-23-2019

TABLE OF CONTENTS

Minimum Stormwater Requirements

The project is a re-development project with new and replaced impervious surface totaling 2944.65 sf of the 10,500 sf lot and disturbed area totaling +/- 4,773 sf. The following path addresses Minimum Stormwater Requirements l through 5. See the flow chart below. The lot has an existing house, driveway, desks, and brickwalks that will be demolished. See the TESC plan for detail.

Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment



2019 Stormwater Management Manual for Western Washington

Volume I - Chapter 3 - Page 90

MRl- Prepare Stormwater Site Plans.

A stormwater site plan has been prepared as part of the building permit and details the collection, conveyance and discharge of stormwater from the site. The stormwater site was prepared in accordance with the Mercer Island Stormwater and Site Development Manual (WSDOE 2019 SWMMWW).

MR2 - Construction Stormwater Pollution Prevention Plan (CSWPPP)

A CSWPPP has been prepared as part of the building permit and demolition permit applications. The TESC plan elements are included on the TESC plan.

Temporary ESC measures will be required as there will be disturbance of the soil to construct the driveway and house, and clearing of the site. All of the flows from the driveway and house will flow onto the lot so no adjacent properties will be affected. A silt fence around the construction area and construction entrance should be provided at a minimum. No special requirements are needed. In order to prevent erosion and trap sediment within the project site, the following BMPs will be used approximately as shown on the ESC plan:

- Clearing limits will be marked by fencing or other means on the ground but in this case are the limits of the property.
- Extra excavated soil will be removed from the site
- A rocked construction entrance will be placed at the location of the proposed driveway throughout construction.
- Runoff will not be allowed to concentrate and no water will be allowed to point discharge.
- Silt fencing will be placed along slope contours at the down slope limit of clearing.
- Mulch will be spread over all cleared areas of the site when they are not being worked. Mulch will consist of air-dried straw and chipped vegetation.
- Elements 1- 13 of CSWPPP are required when the project is more than 2,000 sf of new plus hard surface area or disturb more than 7,000 sf of land

    1. Mark clearing limits
    2. Establish construction access
    3. Control flow rates
    4. Install sediment controls
    5. Stabilize soils
    6. Protect slopes
    7. Protect drain inlets
    8. Stabilize channels and outlets
    9. Control pollutants
    10. Control dewatering
    11. Maintain BMPs

12. Manage the project
13. Protect Low Impact Development BMPs.

MR3-Source Control of Pollution

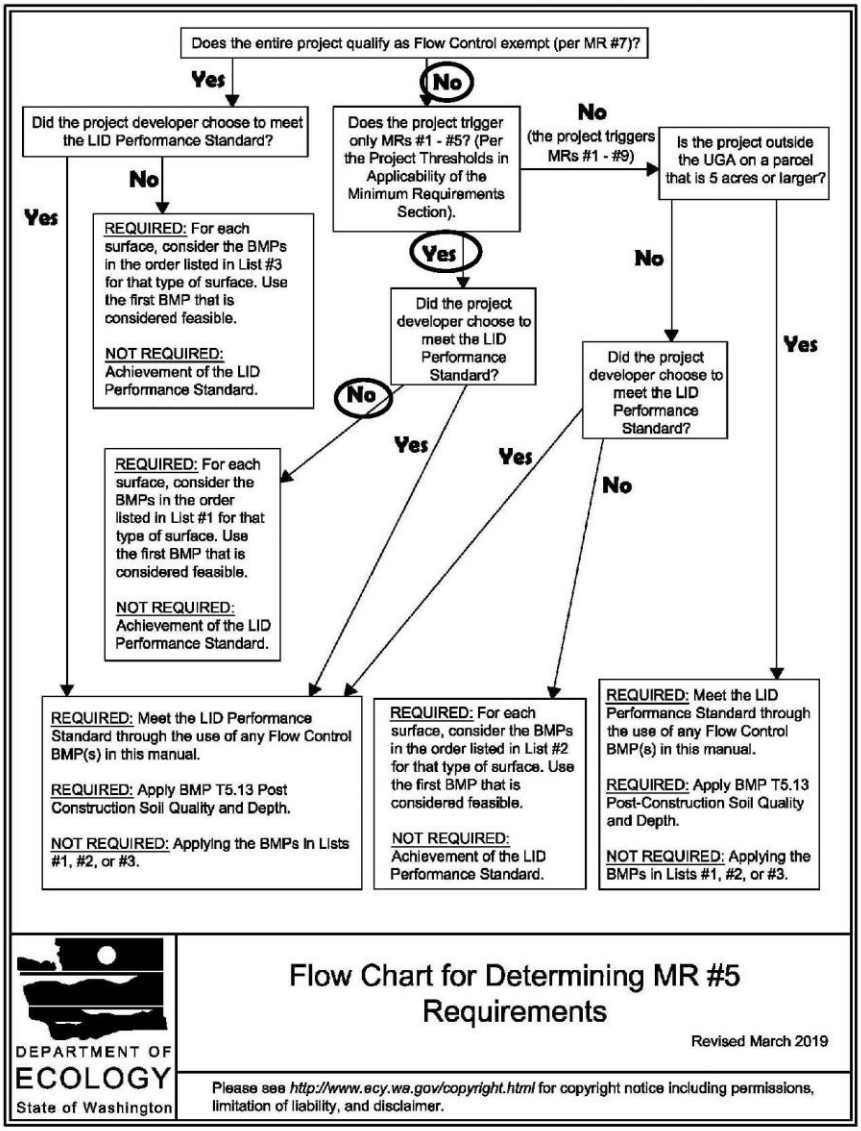
Source control BMPs have been included in the CSWPPP including covering practices construction entrance, silt fence, amended soil, top-soiling, and silt retention.

MR4 - Preservation of Natural Drainage Systems and Outfalls

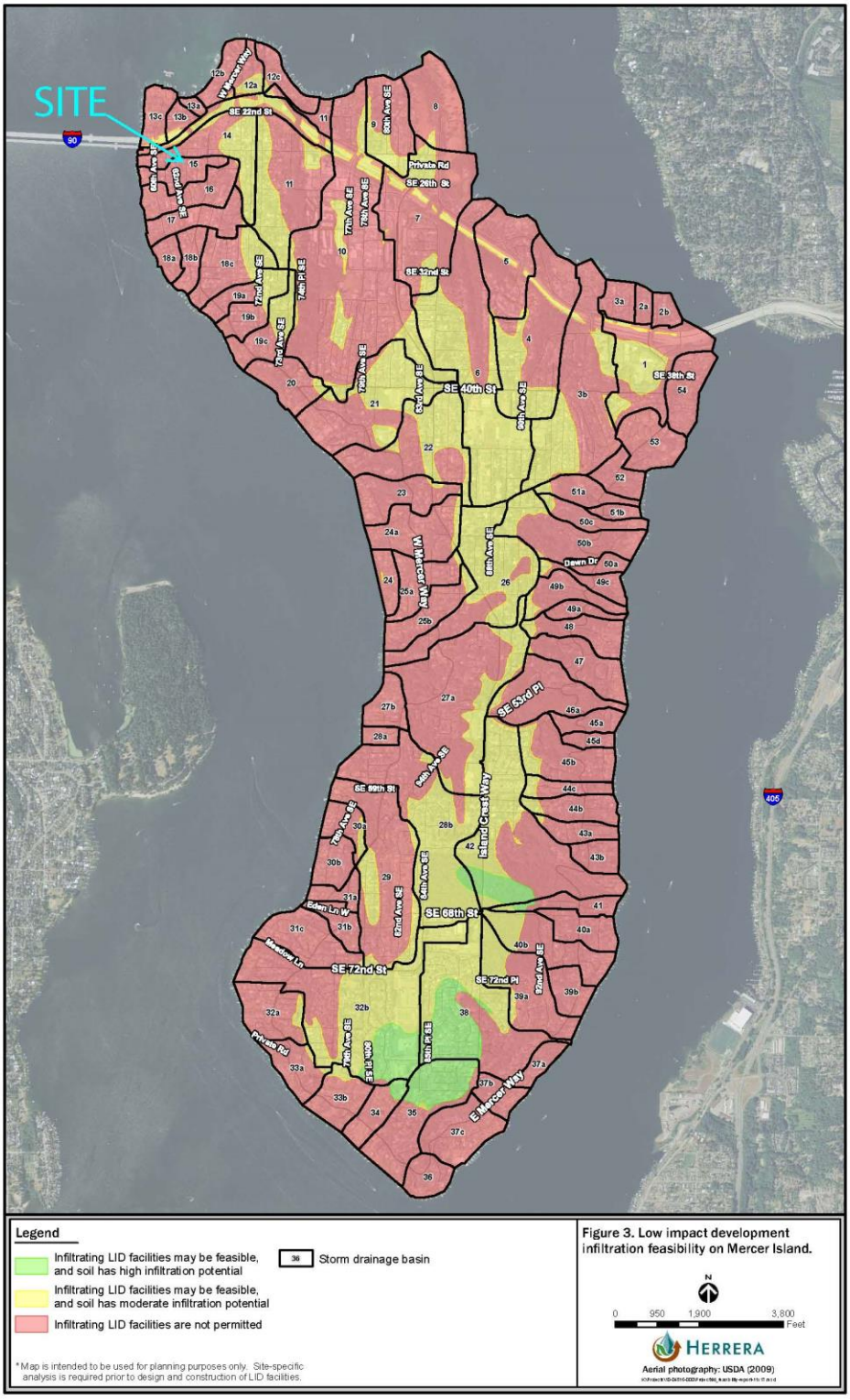
Runoff from the roof and driveway will be collected into new catch basins and drained to a 45'x2'dispersion trench. There will be no basic change in the drainage system.

MR5 - On-site Stormwater Management

Figure I-3.3: Flow Chart for Determining MR #5 Requirements



As the lot will have less than 5,000sf of impervious surface List 1 will be used per Fig I-3.3: Flow Chart for Determining MR#5 Requirements above. On-site stormwater management BMPs have been examined for their feasibility. Due to the lack of a 100 foot flow path Full Dispersion cannot be used. The soils are unsuitable for infiltration (per Mercer Island Infiltration map below) and there is not adequate space for raingardens.



Per Geologic Map of Mercer Island below, the soils are Vashon subglacial till (Qvt) which is unsuitable for infiltration. Per Natural Resource Conservation Service Soil Report, the soils are KpB - Kitsap Silt Loam, 2 to 8 percent slopes- which is a Till soil and unsuitable for infiltration.

On-Site Stormwater Management

The project, in accordance with requirement MR5, is required to manage stormwater onsite to the maximum extent practical. This chapter concerns the process for selection of BMPs. BMPs will be used for the hard surface areas of the site per List 1. Additional discussion of each On-Site Stormwater Management item:

PER LIST 1

Disturbed soil will be amended per BMP T5.13 for soil quality and depth

Roof :

Full dispersion cannot be used as the there is no 100 foot vegetated flowpath.
Full infiltration cannot be used per Mercer Island Infiltration map, and the Till soils are unsuitable for infiltration.
A raingarden is infeasible due to poor soil and lack of space.
Downspout dispersion is feasible as there is 25 foot vegetated flow path. As the impervious area is larger than 700sf, we use 45'x2' downspout dispersion trench in the back yard per Figure V.4.5: Standard Dispersion Trench with Notched Grade Board- 2019 DOE. Please a calculation below.

Pavement:

Full dispersion cannot be used as there is not an adequate 100 foot vegetated flow path
Permeable Pavement will not be used as the soil does not have adequate depth or permeability for pervious pavement to function properly.
Sheet flow dispersion will not be used as the slopes do not provide an adequate flow path to a 10 foot minimum vegetated area.
As No BMPs are feasible, we will install a new catch basin in the proposed driveway and connect it to another new catch basin in the back of the house and flow to the 45'x2' dispersion trench.

Total new and replaced impervious area is 2,944.65sf (see the proposed impervious area tables in Developed Condition below or drainage plan). Per 2019 DOE Volume V-Chapter 4-Page 714, 10ft of trench length per 700sf will be used.

2945sf x 10lf / 700sf = 42.07lf. We use 45lf of trench length.

DRAINAGE REPORT

SECTION 1 - PROPOSED PROJECT DESCRIPTION

Parcel: 4099500430

Address: 2423 63rd AVE SE, Mercer Island, WA 98040

Legal Description: LAKE VIEW PLACE EAST SEATTLE N 1/2 OF LOT 14 ALL OF LOTS 15 THRU 17
PLat Block: 4
Plat Lot: 14-17

The 10,500sf Lot is located on Mercer Island near the intersection of SE 24th Place and 63rd Avenue SE at 2423 63rd AVE SE, Mercer Island, WA 98040. The site is currently used as a single family residence with a 1,664 sf house, a 360sf parking carport, 517sf concrete driveway, 112.35sf shed, 28.33sf concrete, 1086.46sf desks and 513.1sf brick walks. The existing house, existing driveway, existing carport, existing desks, and 407.94sf existing bricks will be removed. A new single-family residence with a roof area of 2,184sf, 531.8sf concrete driveway, and 116.5sf walkway will be constructed on the 10,500sf Lot. Total new impervious areas are 2832.3sf or 27% coverage; total new and replaced impervious areas are 2944.65sf or 28% coverage. See the developed and existing condition below for detail existing impervious and new and replace impervious areas. Stormwater is proposed to be routed from the roof downspouts to a new catch basin at the backyard of the new house, then connect to a dispersion trench per Figure V.4.5: Standard Dispersion Trench with Notched Grade Board- 2019 DOE. The driveway and walk will use concrete pavement which will drain to a new catch basin in the driveway and then connect to the new catch basin in the backyard and flow to the dispersion trench.

Developed Condition

The existing house, existing driveway, existing carport, existing desks, and 407.94sf existing bricks will be demolished. A new single-family residence with a roof area of 2,184sf, 531.8sf concrete driveway, and 116.5sf walkway will be constructed. The roof will drain to a new catch basin in the backyard and flow to the dispersion trench. The driveway and walk will drain to the new catch basin in the driveway and then connect to the new catch basin in the backyard and flow to the dispersion trench. We will use the existing utilities for the proposed house.

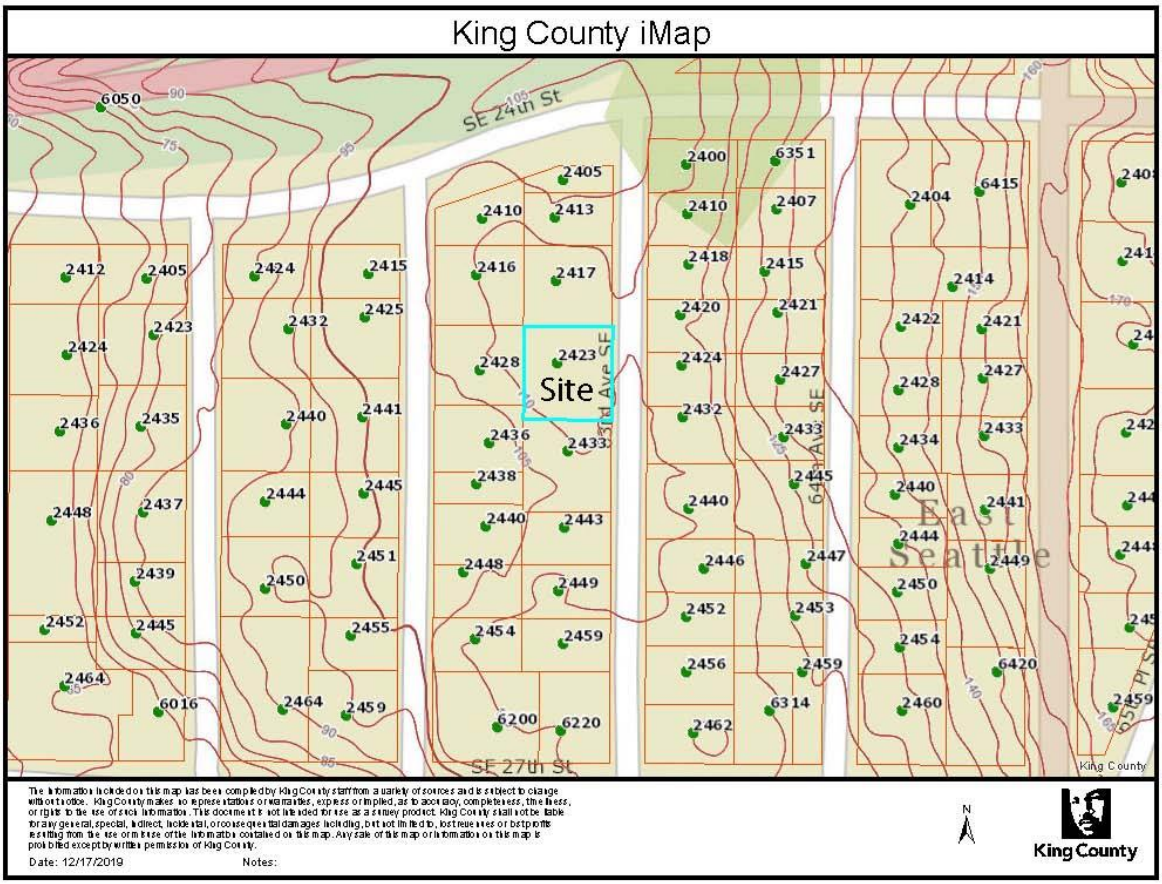
Proposed Building Footprint including garage(sf)	2,184
Pro. Driveway (sf)	531.8
Pro. Walk/Paver (sf)	116.5
Total Proposed Impervious areas (sf)	2832.3
Total Proposed Impervious coverage	27.0%

Total new and replaced impervious area = 2832.3sf proposed impervious+ 112.35sf existing shed remained = 2944.65sf or 28% coverage.

Total area of land disturbing activity: 5,000 sf+/-

Converted native pervious: 0 SF (There is no existing native vegetation onsite; all vegetated area is lawn or landscaped)

Figure 1: Vicinity Map from Imap



SECTION 2 - EXISTING CONDITION

There are single-family lots to the North, South, and West of the property. There is 63rd AVE SE on the East of the site. The site has been previously graded.

Total lot area = 10,500sf. Existing impervious area:

Ex. Buildings TBD (sf)	1664
Ex. Parking carport TBD (sf)	360
Ex. Concrete Driveway TBD (sf)	517
Ex. Concrete TBD (sf)	28.33
Ex. Shed remained(sf)	112.35
Total Ex. Impervious areas (sf)	2681.68
Total Ex. Impervious coverage	25.5%

Total existing impervious areas demolished = 2,569.33 or 24.5% coverage.

Ex. Bricks Remained (sf)	105.16
Ex. Bricks TBD (sf)	407.94
Ex. Desk above existing footprint TBD(sf)	1086.46
Total other existing area	1599.56

The site is flat with lot slopes down to the southwest at about 3%. See vicinity map. The existing house uses underground infiltration trenches.

There are no wetlands identified on the site. The site is not located in landslide, erosion hazard areas, or other environmentally sensitive areas according to King County iMap. There is no drainage complaints in this area.

Drainage Basin: Mercer Island

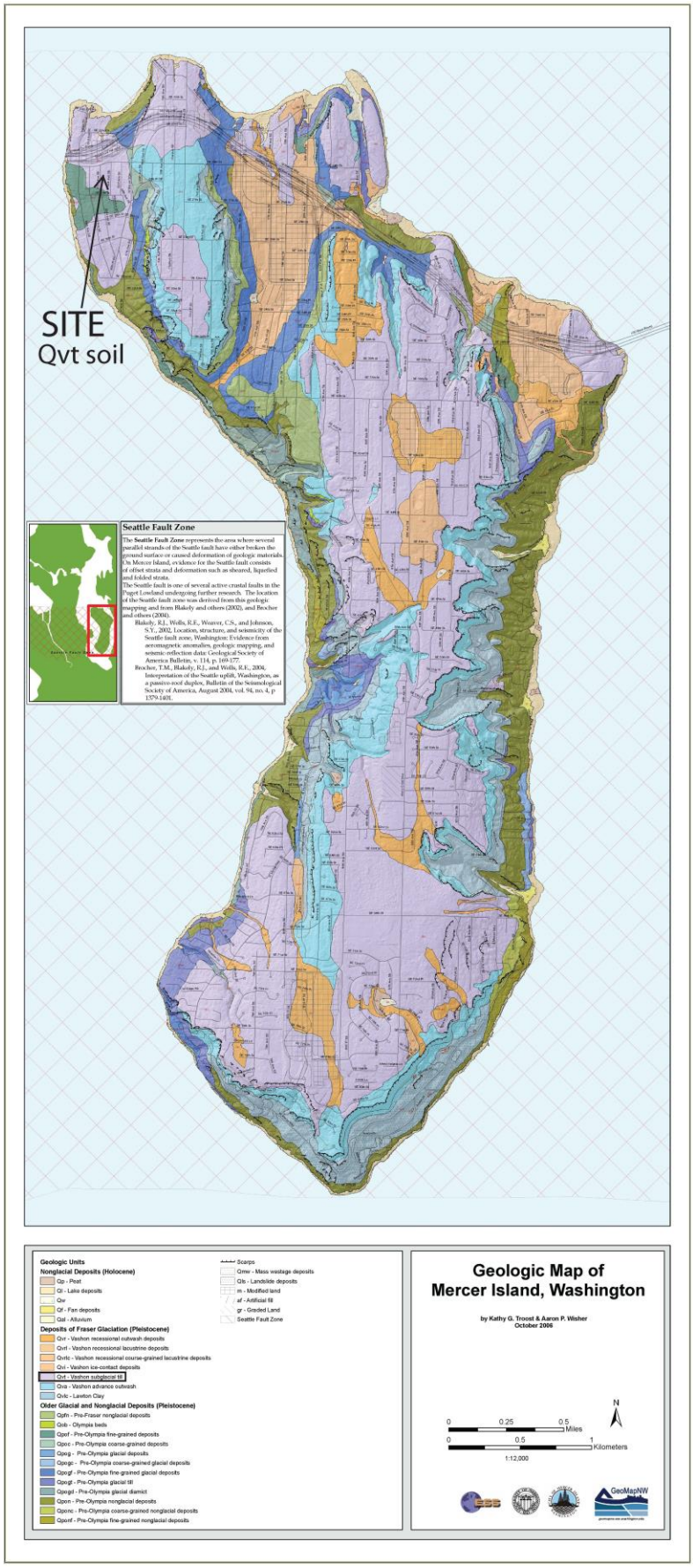
Watershed: Cedar River / Lake Washington

WRIA: Cedar-Sammamish (8)

SECTION 3 - SOILS REPORT

Per Geologic Map of Mercer Island below, the soils are Vashon subglacial till (Qvt) which is unsuitable for infiltration, and Mercer Island infiltration map shows that the site is infeasible for infiltration.
Per Natural Resource Conservation Service Soil Report, the soils are KpB - Kitsap Silt Loam, 2 to 8 percent slopes.

Typical profile:
H1 - 0 to 5 inches: silt loam
H2 - 5 to 24 inches: silt loam
H3 - 24 to 60 inches: stratified silt to silty clay loam


SITE
Qvt soil
Seattle Fault Zone
The Seattle Fault Zone represents the area where several parallel strands of the Seattle fault have either broken the ground surface or caused deformation of geologic materials. On Mercer Island, evidence for the Seattle fault consists of offset strata and deformation such as sheared, liquefied and folded strata.
The Seattle fault is one of several active crustal faults in the Puget Lowland undergoing further research. The location of the Seattle fault zone was derived from this geologic mapping and from Blakely and others (2002), and Brocher and others (2004).
Blakely, R.J., Wells, R.E., Weaver, C.S., and Johnson, S.Y., 2002, Location, structure, and seismicity of the Seattle fault zone, Washington: Evidence from aeromagnetic anomalies, geologic mapping, and seismic-reflection data: Geological Society of America Bulletin, v. 114, p. 169-177.
Brocher, T.M., Blakely, R.J., and Wells, R.E., 2004, Interpretation of the Seattle uplift, Washington, as a passive-roof duplex, Bulletin of the Seismological Society of America, August 2004, vol. 94, no. 4, p 1379-1401.
Geologic Units
Nonglacial Deposits (Holocene)
Qp - Peat
Ql - Lake deposits
Qtr
Qf - Fan deposits
Qal - Alluvium
Deposits of Fraser Glaciation (Pleistocene)
Qvr - Vashon recessional outwash deposits
Qvrl - Vashon recessional lacustrine deposits
Qvrlc - Vashon recessional course-grained lacustrine deposits
Qvi - Vashon ice-contact deposits
Qvt - Vashon subglacial till
Qva - Vashon advance outwash
Qvlc - Lawton Clay
Older Glacial and Nonglacial Deposits (Pleistocene)
Qpfn - Pre-Fraser nonglacial deposits
Qpb - Olympia beds
Qpof - Pre-Olympia fine-grained deposits
Qpoc - Pre-Olympia coarse-grained deposits
Qpog - Pre-Olympia glacial deposits
Qpogc - Pre-Olympia coarse-grained glacial deposits
Qpogf - Pre-Olympia fine-grained glacial deposits
Qpogt - Pre-Olympia glacial till
Qpogd - Pre-Olympia glacial diamict
Qpon - Pre-Olympia nonglacial deposits
Qponc - Pre-Olympia coarse-grained nonglacial deposits
Qponf - Pre-Olympia fine-grained nonglacial deposits
Scarps
Qmw - Mass wastage deposits
Qls - Landslide deposits
m - Modified land
af - Artificial fill
gr - Graded Land
Seattle Fault Zone
Geologic Map of Mercer Island, Washington
by Kathy G. Troost & Aaron P. Wisher
October 2006
0 0.25 0.5 Miles
0 0.5 1 Kilometers
1:12,000
N
GeoMapNW

SECTION 4 - WELLS AND SEPTIC SYSTEMS

There is no well on or near this project.

SECTION 5 - FUEL TANKS

There are no Fuel Tanks proposed for this project.

SECTION 6 - SUB-BASINS

There are no sub-basins on this project

SECTION 7 - FLOODPLAIN

There is no floodplain on this project

SECTION 8 - FACILITY SIZING AND DOWNSTREAM DRAINAGE ANALYSIS

The site is in the urban growth area. The properties to the North, South, and West of this site are single family residences. The East of the site is 63rd AVE SE Street. The site has existing house using underground infiltration trenches. There is an existing driveway on the east of the site. The existing house was graded higher than the 63rd AVE SE Street. There are no significant on or off site flows onto this property. No downstream drainage problems were observed, and there is no drainage complaint. There are no downstream effects anticipated from the proposed development.

Using the King County iMap interactive tool, it was found that there are no immediate critical areas upstream or downstream of the property. The iMap also confirmed that there are no mitigating rivers and floodplain issues.

There are no reported problems to be investigated. The amount of space and soil types present on the property clearly support the flow control BMPs being implemented. There will not be any destruction of aquatic habitat on-site or downstream. The site was visited on December 10, 2019 and a 1/4 mile downstream investigation was made. As there are no signs of surface flow, no problems were identified. See the Mercer Island utility system map below for the current drainage system of the site. The downstream drainage course is to flow west across the adjacent properties and into the 62nd Avenue SE piped drainage system.

For an overall impervious surface of this size and per 2019 DOE Volume V-Chapter 4, 45 foot dispersion trench will be used for the new house and the driveway.

There are no existing or potential drainage problems and water quality problems. As there is no downstream drainage system and the soils are unsuitable for infiltration, the stormwater from the roof and the driveway will be routed to a 45’ dispersion trench.

Upstream of the site is the street 63rd AVE SE, so there are no upstream drainage problems.

SECTION 9 - UTILITIES

There will be no utility conflicts. Existing services will be used.

SECTION 10 - COVENANTS AND EASEMENTS

Covenants will be provided when requested.

SECTION 11 - PROPOSED HOMEOWNER ASSOCIATION

NA this is a SFR

SECTION 12 - OTHER PERMITS

A building permit will be required

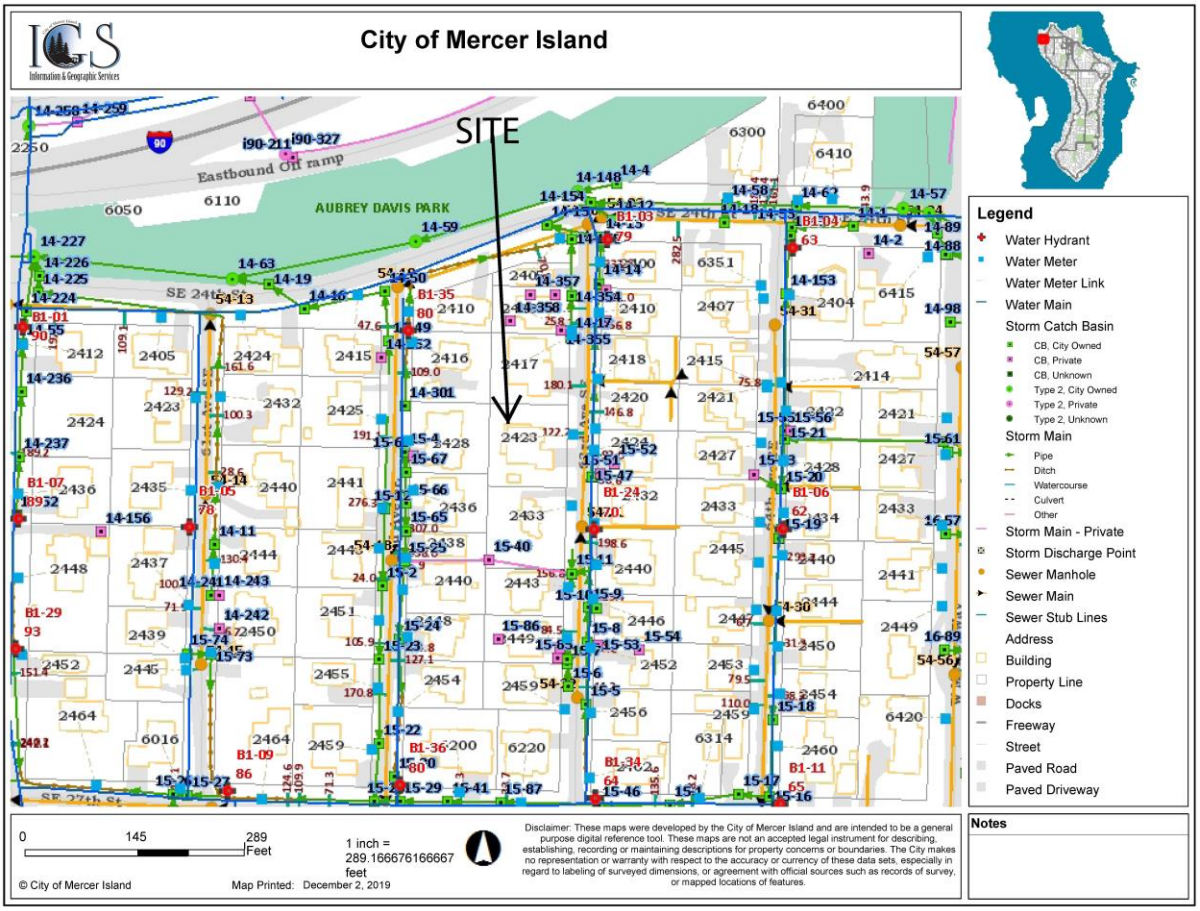


Figure V-4.4: Typical Downspout Dispersion Trench

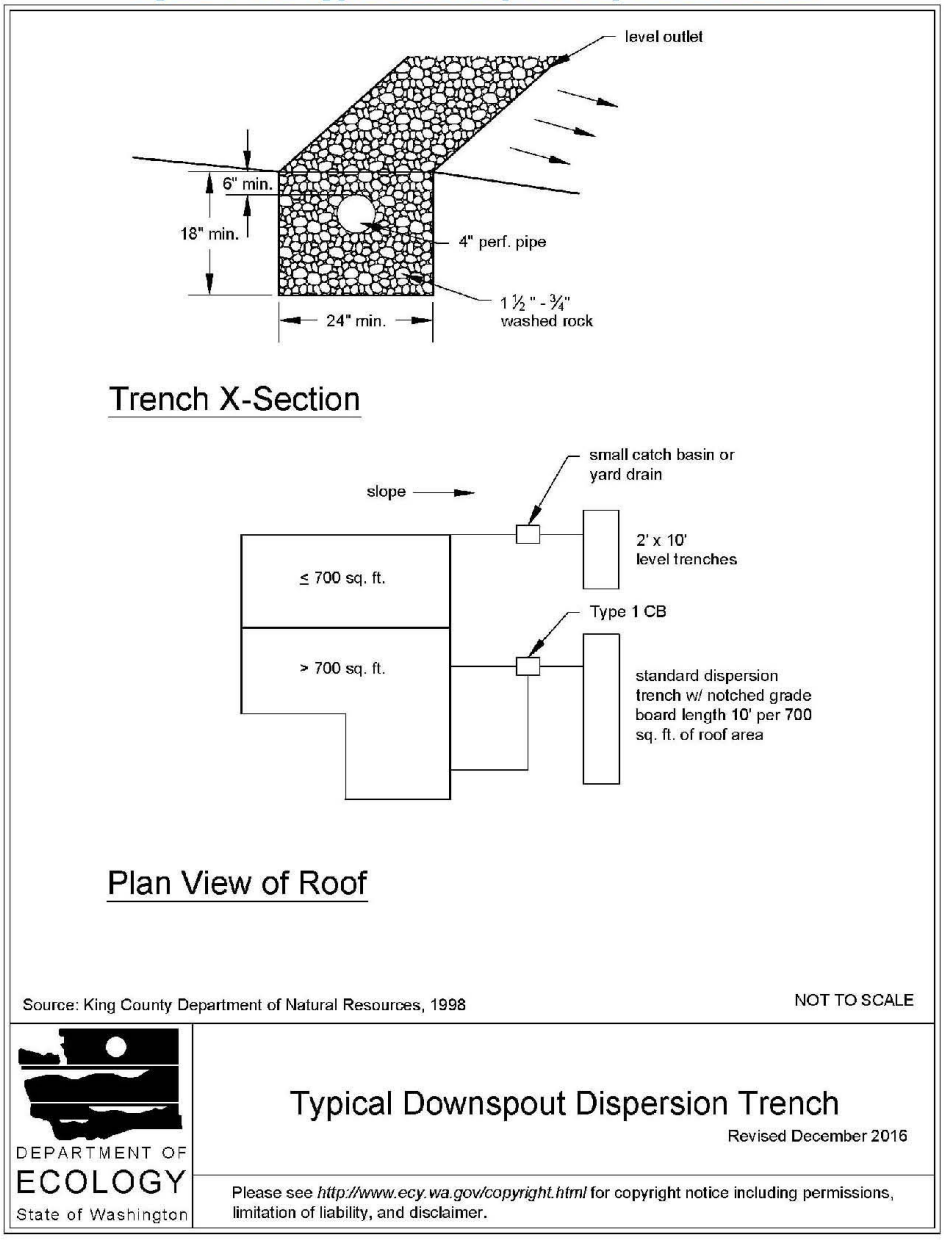


Figure V-4.5: Standard Dispersion Trench with Notched Grade Board