Anstey Engineering

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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

6-14-2022

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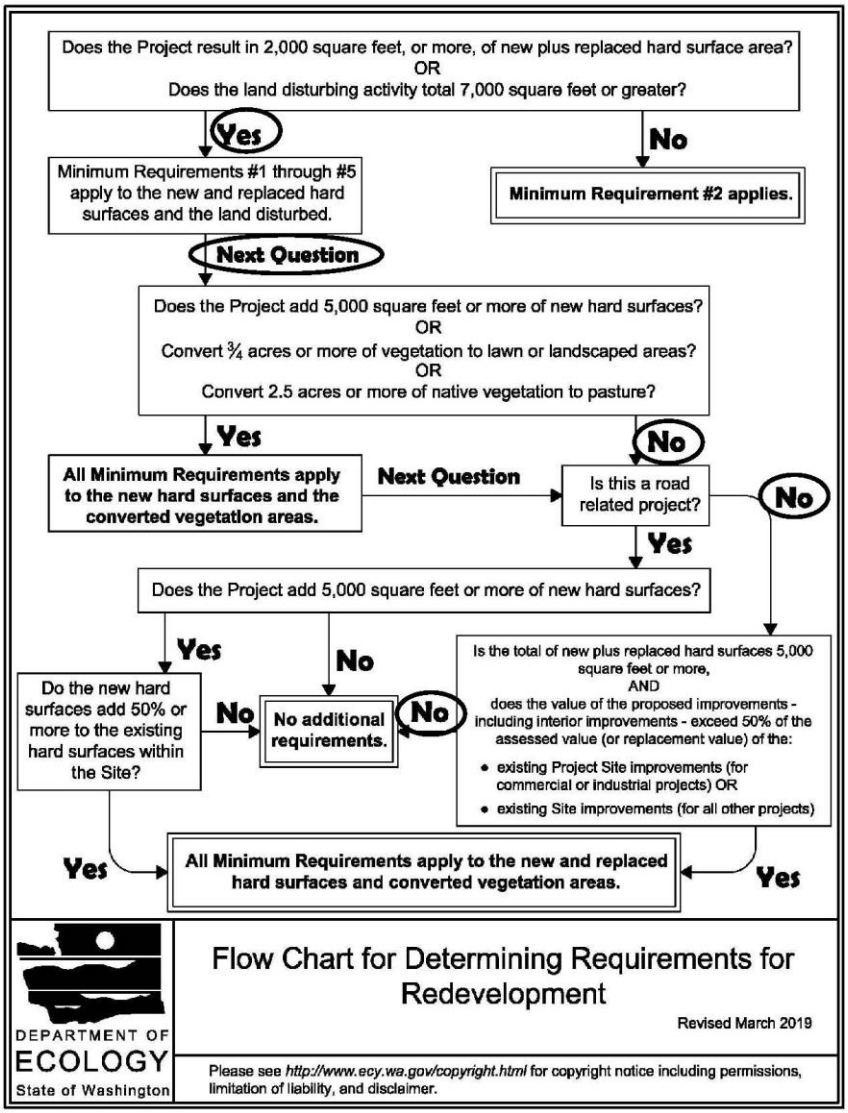
Minimum Stormwater Requirements

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

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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

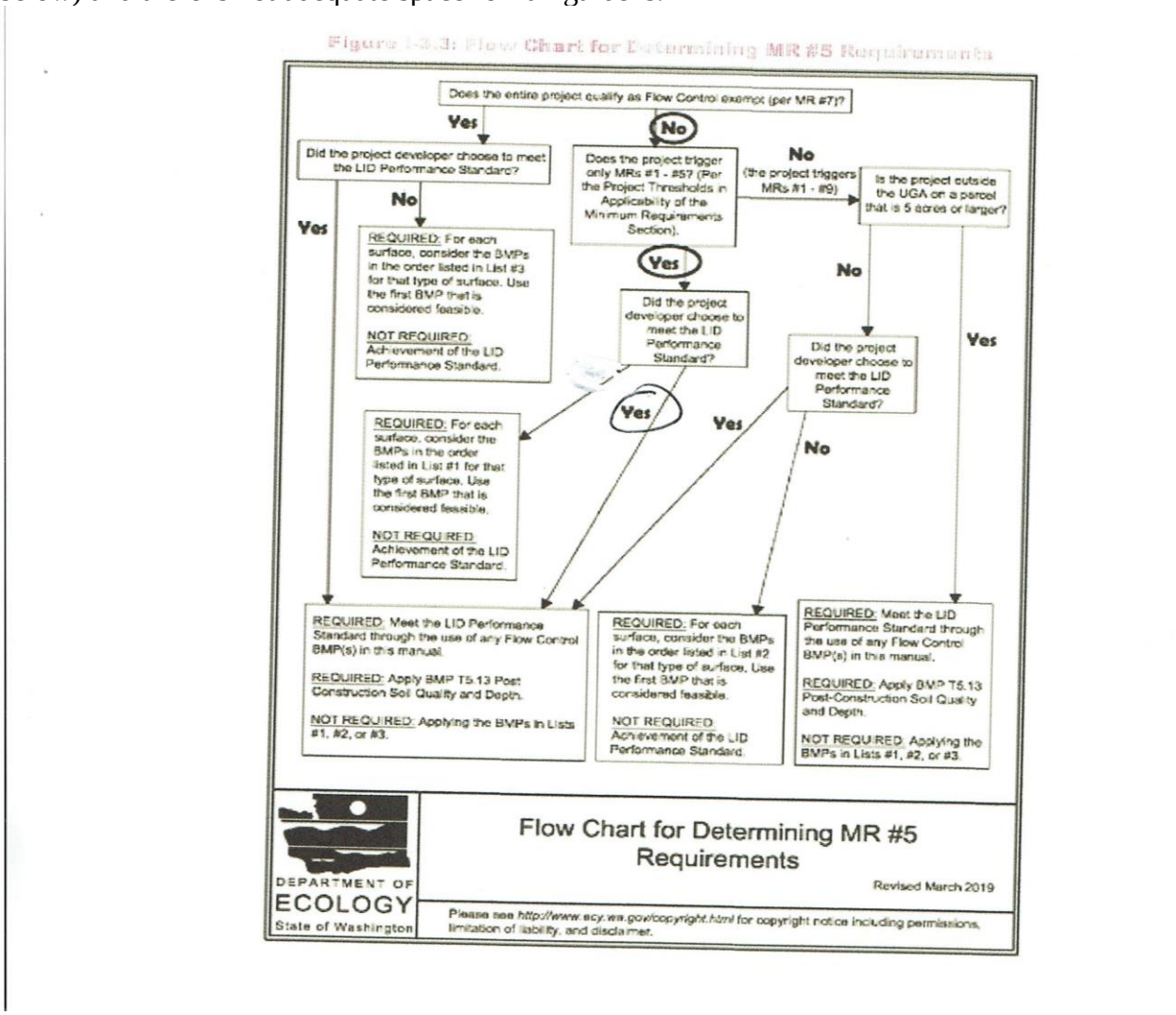
    1. Mark clearing limits
    2. Establish construction access
    3. Control flow rates
    4. Install sediment controls
    5. Stabilize soils
    6. Protect slopes
    7. Protect drain inlets
    8. Stabilize channels and outlets
    9. Control pollutants
    10. Control dewatering
    11. Maintain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

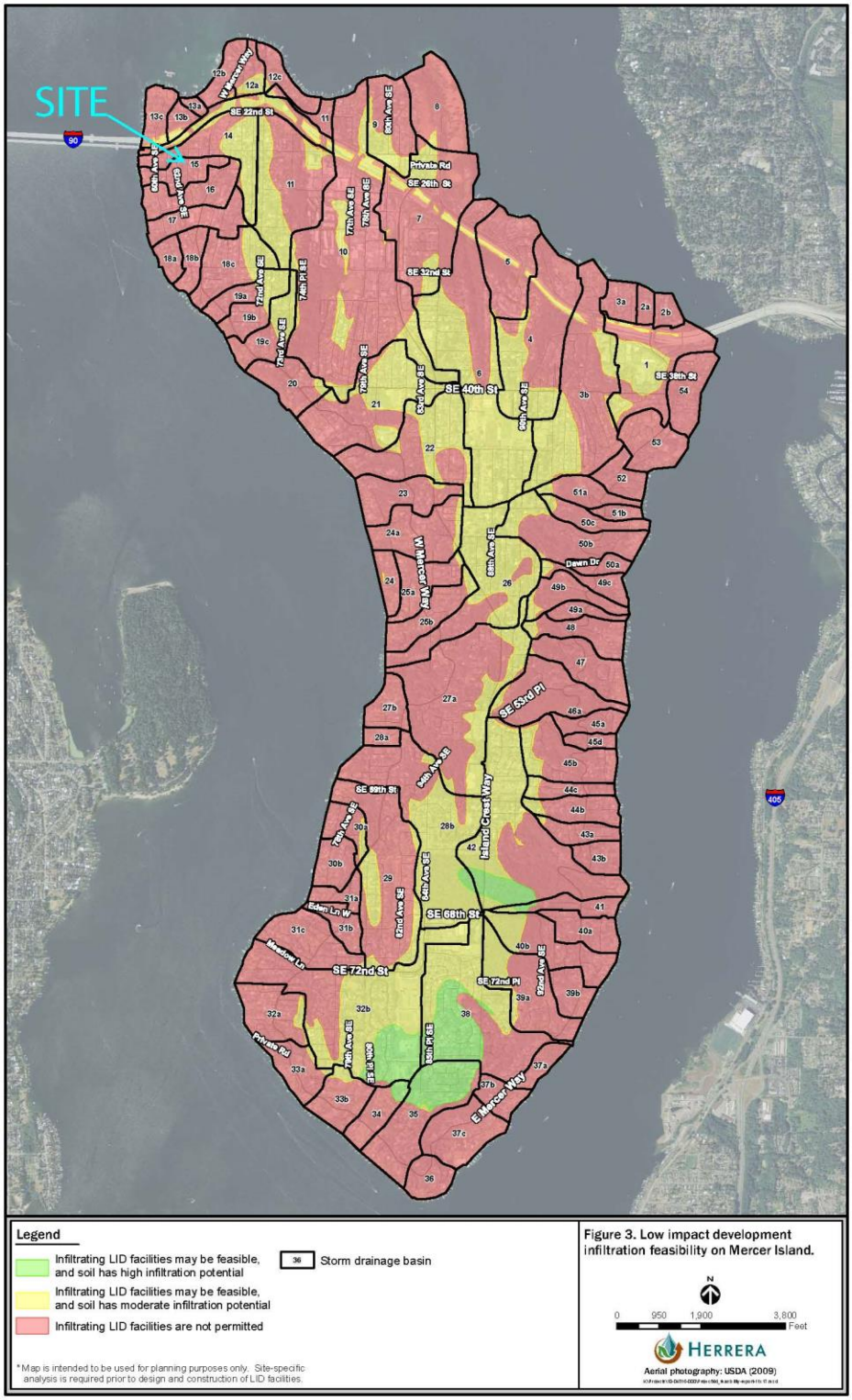
12. Manage the project
13. Protect Low Impact Development BMPs.

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 detention pipe and drained to the drainage system in 63rd Avenue SE.

MR5 - On-site Stormwater Management
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 Type C 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 analyzed 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 not feasible as there is not an adequate 25 foot vegetated flow path.
Due to concerns about the effect upon downstream property a Stormwater detention system will be used connecting to the existing storm drain in 63rd Ave SE.

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 the on-site stormwater detention system.

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 decks and 513.1sf brick walks for an existing impervious area of 4,260.35sf. 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, and a 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. 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 southeast yard of the new house, then connect to a detention system which will drain to the existing storm drainage pipe in 63rd Ave SE. 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 southeast yard and flow into the detention system.

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 southeast yard and flow to the detention system. We will reuse the existing utilities for the proposed house.

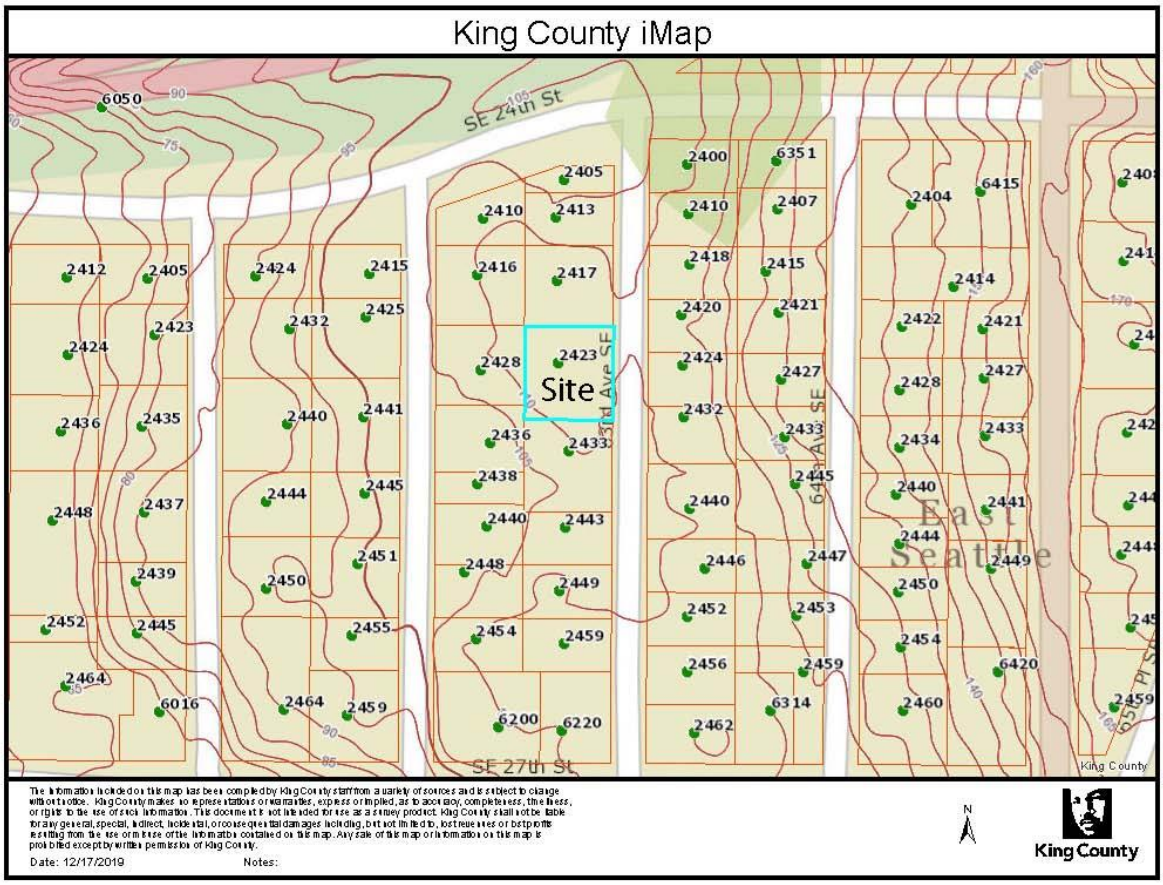
Proposed Building Footprint including garage(sf)	2,184
Pro. Driveway (sf)	531.8
Pro. Walk/Paver (sf)	116.5
Total Proposed Impervious areas (sf)	2832.3
Total Proposed Impervious coverage	27.0%

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/dispersion 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

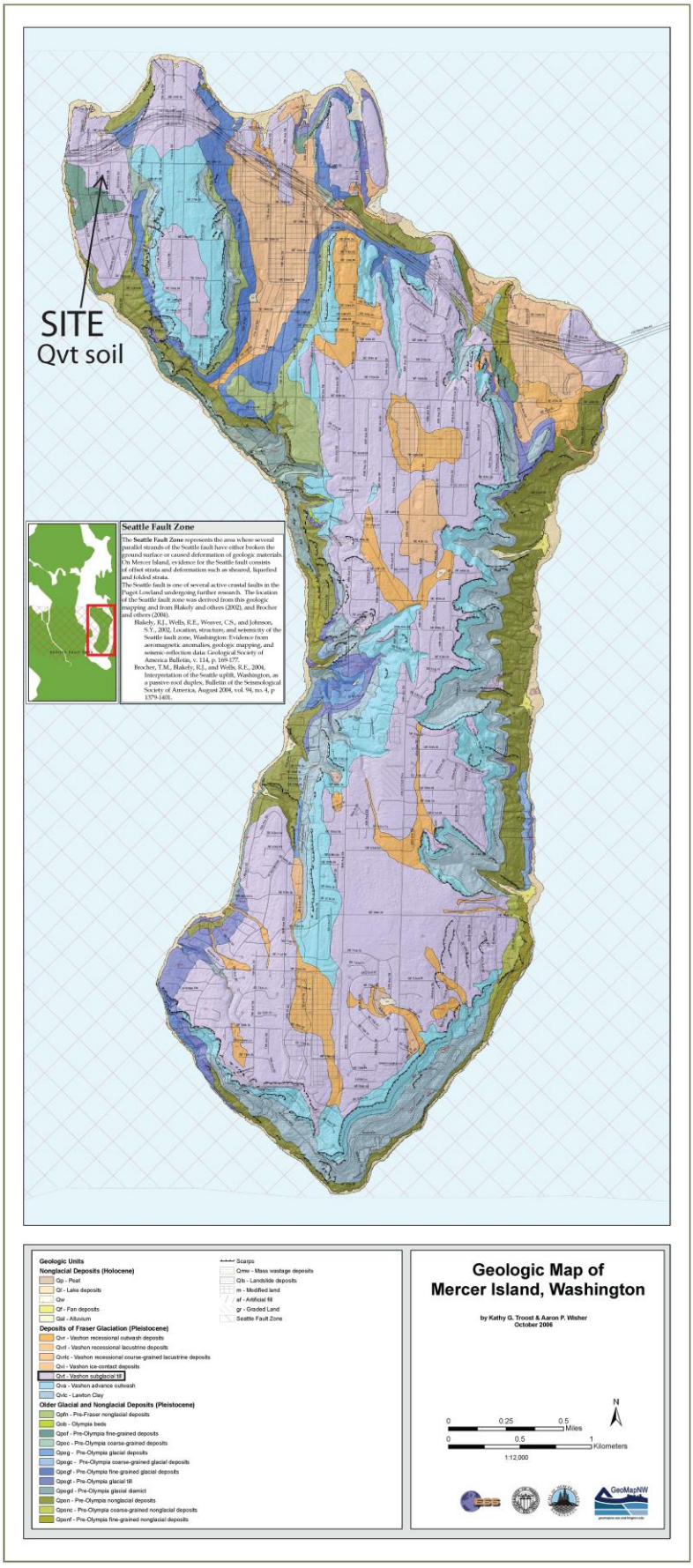
Watershed: Cedar River / Lake Washington

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
Qw
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
Qob - 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.

For an overall impervious surface of this size and per 2019 DOE Volume V-Chapter 4, and City of Mercer Island Table 1 Detention Requirements an equivalent to 66lf of 36"ø detention pipe will be use for the new house and the driveway. = 466.29 CF MIN of detention storage. A Concrete vault will be used with a length of 40' feet width of 5 feet and depth of 3.0 (incudes 0.5' of sediment storage) = 500cf of storage provided = greater than required.

The 36" pipe system required a bottom orifice of 0.5" Ø and a 2nd orifice of 1.9" Ø @ 2.4' which provided a peak flow of 0.1612cfs

We will provide a 0.5"Ø lower orifice and a 2nd Orifice at 2.1 feet with a diameter of 2" which will provide a peak flow of 0.161 cfs.

Q=0.62x0.021x(2x 32.2 x 2.1)^0.5= 0.151cfs for 2nd orifice+

Q = 0.62x0.00136x(2x32.2x2.5)^0.5= 0.01cfs for 0.5"Ø orifice at 2.5 feet

Q= 0.161 cfs for Tank system = pipe system.

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 detention system and then drained to the existing 12" storm drain in 63rd Ave SE.

Upstream of the site is the street 63rd AVE SE, with asphalt gutters and a piped drainage system, so there are no upstream drainage problems.

Per the attached City of Mercer Island Table 1 Detention Handout the site requires 66lf of 36"ø pipe or 466.29cf of storage required.

The Control Manhole will be provided per the Attachment 1 Detention System Detail. As our head will only be 2.5' instead of 3 feet the 2nd orifice will be resized to 2"ø with a 2.1' head to provide the same flow as the 1.9" orifice at 2.4 feet from Table 1

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.

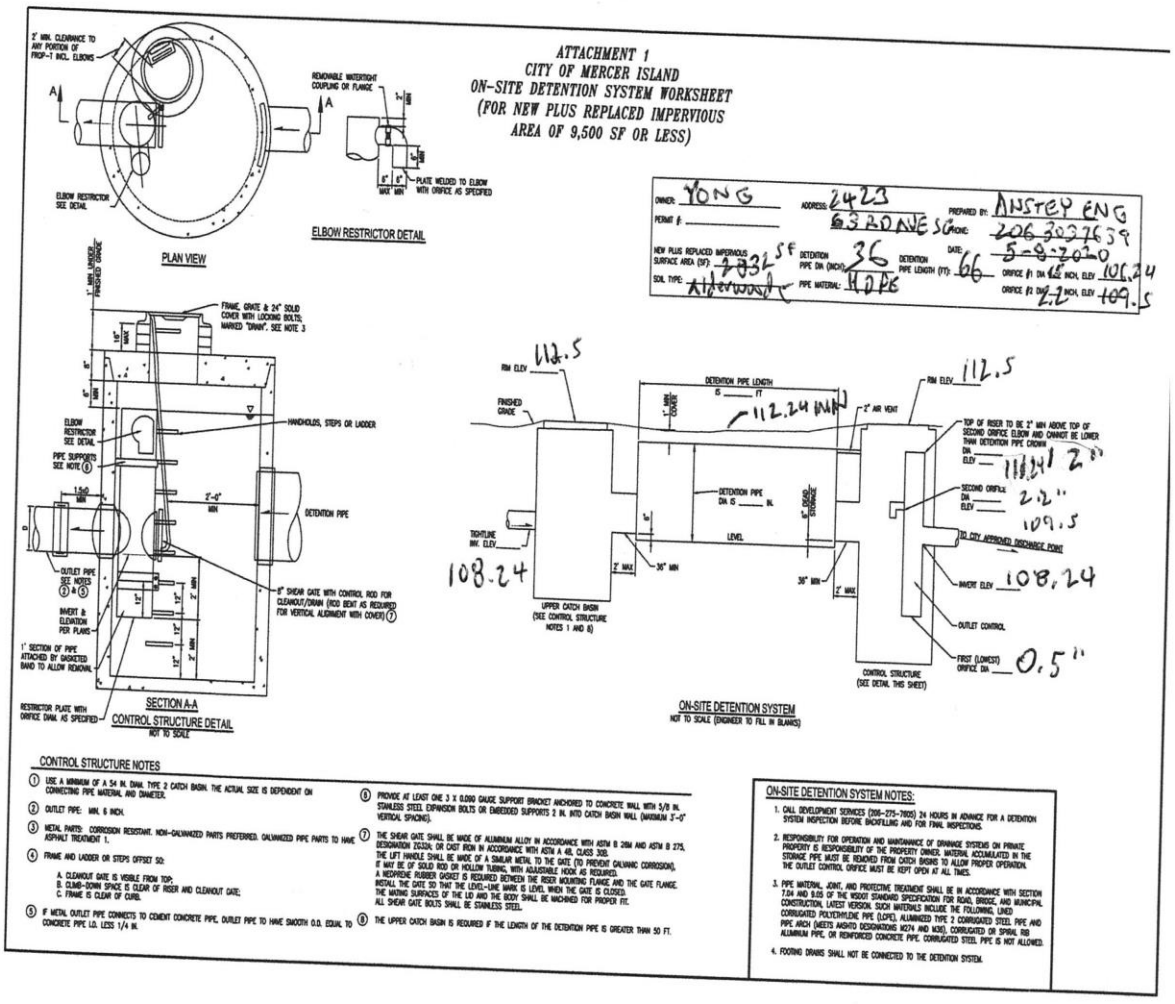
SECTION 11 - PROPOSED HOMEOWNER ASSOCIATION

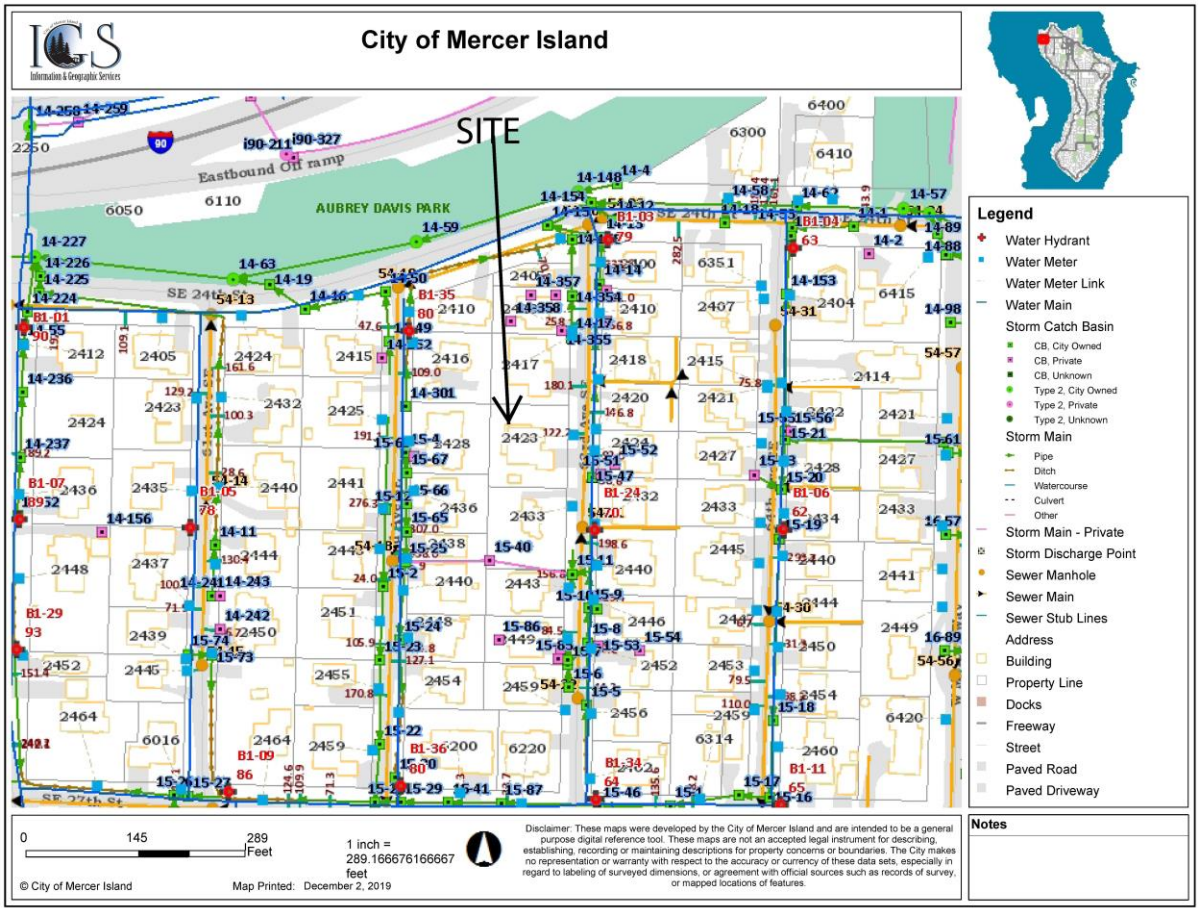
NA this is a SFR

SECTION 12 - OTHER PERMITS

A building permit will be required and a ROW Permit will be required for the storm drain crossing of 63rd Avenue SE.

Attachments: 1. City of Mercer Island Utility Map
2. Attachment 1 Detention System Handout City of Mercer Island


ATTACHMENT 1
CITY OF MERCER ISLAND
ON-SITE DETENTION SYSTEM WORKSHEET
(FOR NEW PLUS REPLACED IMPERVIOUS AREA OF 9,500 SF OR LESS)
OWNER: YONG
ADDRESS: 2423 63RD AVE SE
PREPARED BY: ANSTEY ENG
PHONE: 206 307 6739
DATE: 5-8-2020
PERMIT #:
NEW PLUS REPLACED IMPERVIOUS SURFACE AREA (SF): 7032 SF
DETENTION PIPE DIA (INCH): 36
DETENTION PIPE LENGTH (FT): 66
PIPE MATERIAL: HDPE
SOIL TYPE: ALderwood
ORIFICE #1 DIA 0.5 INCH, ELEV 108.24
ORIFICE #2 DIA 2.2 INCH, ELEV 109.5
PLAN VIEW
ELBOW RESTRICTOR DETAIL
SECTION A-A
CONTROL STRUCTURE DETAIL
NOT TO SCALE
ON-SITE DETENTION SYSTEM
NOT TO SCALE (ENGINEER TO FILL IN BLANKS)
RIM ELEV 112.5
DETENTION PIPE LENGTH 66 FT
112.24 MIN
2" AIR VENT
TOP OF RISER TO BE 2" MIN ABOVE TOP OF SECOND ORIFICE ELBOW AND CANNOT BE LOWER THAN DETENTION PIPE CROWN
DIA 36"
ELEV 111.24
SECOND ORIFICE DIA 2.2"
ELEV 109.5
TO CITY APPROVED DISCHARGE POINT
INVERT ELEV 108.24
OUTLET CONTROL
FIRST (LOWEST) ORIFICE DIA 0.5"
CONTROL STRUCTURE (SEE DETAIL THIS SHEET)
UPPER CATCH BASIN (SEE CONTROL STRUCTURE NOTES 1 AND 8)
TIGHTLINE INV. ELEV 108.24
DETENTION PIPE DIA 36 IN.
LEVEL
6" ORIFICE STORAGE
FINISHED GRADE
CONTROL STRUCTURE NOTES
1. USE A MINIMUM OF A 54 IN. DIAM. TYPE 2 CATCH BASIN. THE ACTUAL SIZE IS DEPENDENT ON CONNECTING PIPE MATERIAL AND DIAMETER.
2. OUTLET PIPE: MIN. 6 INCH.
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
4. FRAME AND LADDER OR STEPS OFFSET SO:
A. CLEANOUT GATE IS VISIBLE FROM TOP;
B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE;
C. FRAME IS CLEAR OF CURB.
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE, OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4 IN.
6. PROVIDE AT LEAST ONE 3 X 0.090 GAUGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL WITH 5/8 IN. STAINLESS STEEL EXPANSION BOLTS OR EMBEDDED SUPPORTS 2 IN. INTO CATCH BASIN WALL (MAXIMUM 3'-0" VERTICAL SPACING).
7. THE SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26M AND ASTM B 275, DESIGNATION 356.0A, OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B. THE LIFT HANDLE SHALL BE MADE OF A SIMILAR METAL TO THE GATE (TO PREVENT GALVANIC CORROSION), IT MAY BE OF SOLID ROD OR HOLLOW TUBING, WITH ADJUSTABLE HOOK AS REQUIRED. A NEOPRENE RUBBER GASKET IS REQUIRED BETWEEN THE RISER MOUNTING FLANGE AND THE GATE FLANGE. INSTALL THE GATE SO THAT THE LEVEL-LINE MARK IS LEVEL WHEN THE GATE IS CLOSED. THE MATING SURFACES OF THE LID AND THE BODY SHALL BE MACHINED FOR PROPER FIT. ALL SHEAR GATE BOLTS SHALL BE STAINLESS STEEL.
8. THE UPPER CATCH BASIN IS REQUIRED IF THE LENGTH OF THE DETENTION PIPE IS GREATER THAN 50 FT.
ON-SITE DETENTION SYSTEM NOTES:
1. CALL DEVELOPMENT SERVICES (206-275-7605) 24 HOURS IN ADVANCE FOR A DETENTION SYSTEM INSPECTION BEFORE BACKFILLING AND FOR FINAL INSPECTIONS.
2. RESPONSIBILITY FOR OPERATION AND MAINTENANCE OF DRAINAGE SYSTEMS ON PRIVATE PROPERTY IS RESPONSIBILITY OF THE PROPERTY OWNER. MATERIAL ACCUMULATED IN THE STORAGE PIPE MUST BE REMOVED FROM CATCH BASINS TO ALLOW PROPER OPERATION. THE OUTLET CONTROL ORIFICE MUST BE KEPT OPEN AT ALL TIMES.
3. PIPE MATERIAL, JOINT, AND PROTECTIVE TREATMENT SHALL BE IN ACCORDANCE WITH SECTION 7.04 AND 9.05 OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, LATEST VERSION. SUCH MATERIALS INCLUDE THE FOLLOWING, LINED CORRUGATED POLYETHYLENE PIPE (LDPE), ALUMINIZED TYPE 2 CORRUGATED STEEL PIPE AND PIPE ARCH (MEETS AASHTO DESIGNATIONS M274 AND M36), CORRUGATED OR SPIRAL RIB ALUMINUM PIPE, OR REINFORCED CONCRETE PIPE. CORRUGATED STEEL PIPE IS NOT ALLOWED.
4. FOOTING DRAINS SHALL NOT BE CONNECTED TO THE DETENTION SYSTEM.


City of Mercer Island
SITE
AUBREY DAVIS PARK
Eastbound Off ramp
SE 24th St
SE 27th St
Legend
Water Hydrant
Water Meter
Water Meter Link
Water Main
Storm Catch Basin
CB, City Owned
CB, Private
CB, Unknown
Type 2, City Owned
Type 2, Private
Type 2, Unknown
Storm Main
Pipe
Ditch
Watercourse
Culvert
Other
Storm Main - Private
Storm Discharge Point
Sewer Manhole
Sewer Main
Sewer Stub Lines
Address
Building
Property Line
Docks
Freeway
Street
Paved Road
Paved Driveway
Notes
0
145
289
Feet
1 inch = 289.166676166667 feet
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Map Printed: December 2, 2019
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