

Anstey Engineering

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Storm Drainage Report

7036 81st Avenue SE.
Mercer Island, WA 98040
Parcel # 873230-0240

November 15, 2020

Prepared for:

Chan Revocable Living Trust



11-25-2020

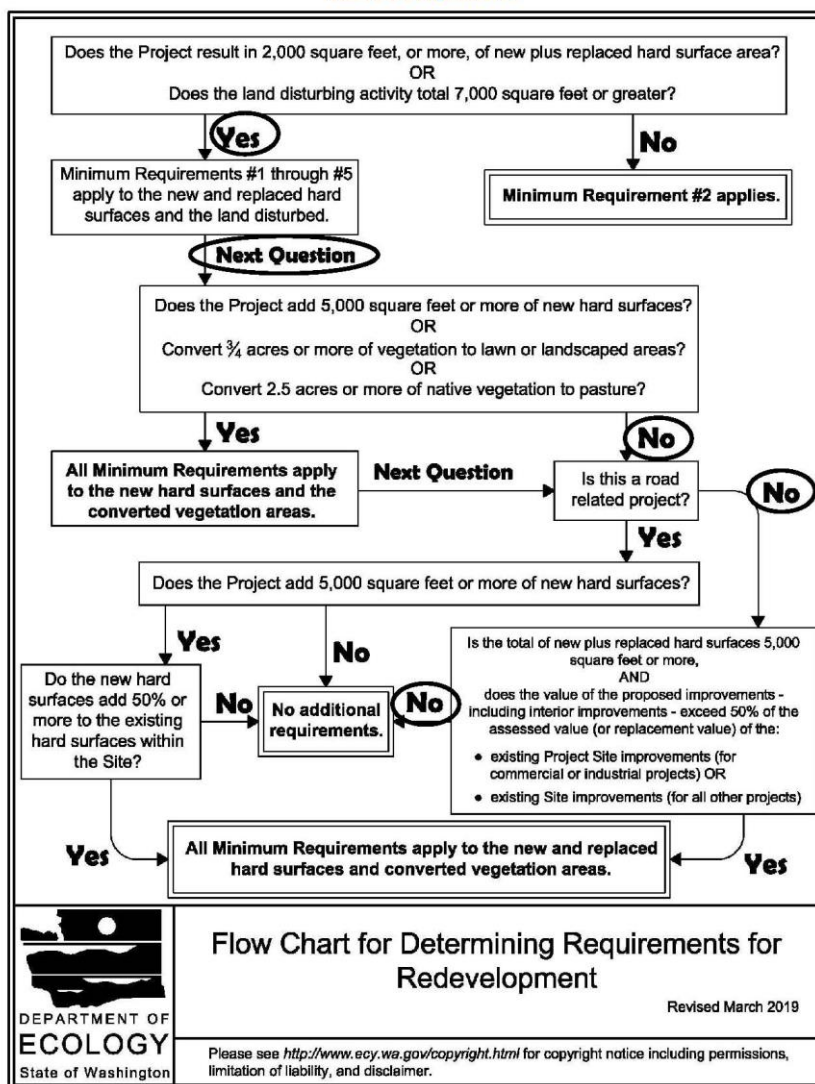
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Section 4 – Wells and Septic Systems NA – there are no wells or Septic System	
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Minimum Stormwater Requirements

The project is a re-development project with new plus replaced hard surface totaling 2,751sf of the 10,323-sf lot and disturbed area totaling +/- 3,650 sf. The following path addresses Minimum Stormwater Requirements # 1 through 5 need to be satisfied. See the flow chart below. The lot has an existing house, garage, shed/storage, driveway. Garage and shed will be demolished. Driveway will be replaced. New asphalt parking will be installed. See the TESC plan for detail.

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



MRI- 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 rock 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.

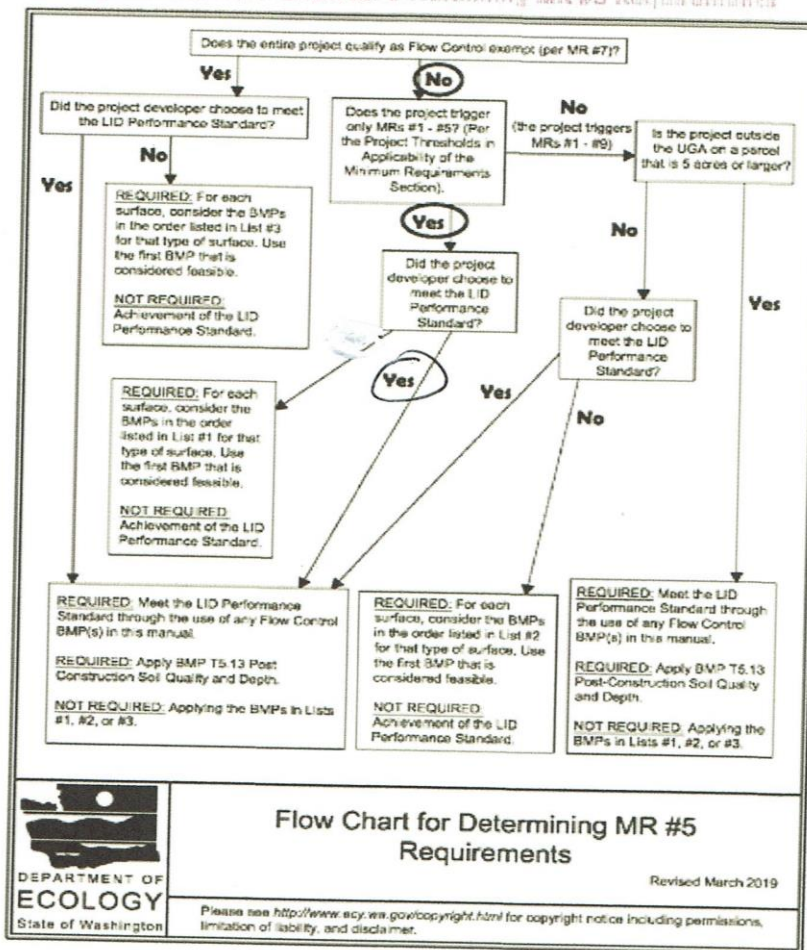
MR4 - Preservation of Natural Drainage Systems and Outfalls

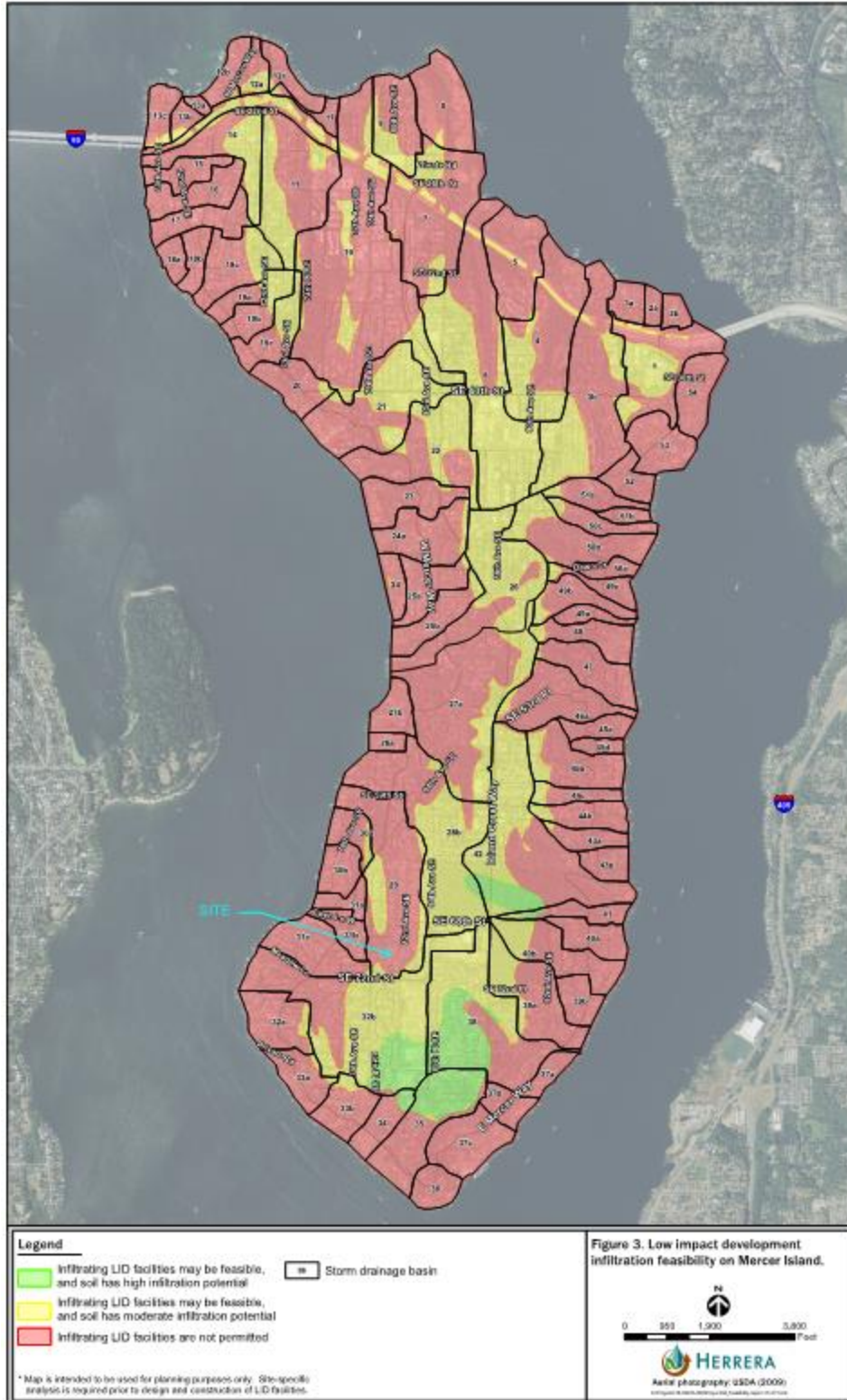
Runoff from the roof and driveway will be collected into new catch basins and drained to a detention pipe and drained to the drainage system in 81st Avenue SE.

MR5 - On-site Stormwater Management

As the lot will have less than new/replaced 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.

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





Per Geologic Map of Mercer Island below, the soils are Vashon advance outwash (Qva) which is unsuitable for infiltration. Per Natural Resource Conservation Service Soil Report, the soils are AmC – Arents Alderwood (Gravelly Sandy loam), 6 to 15 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 there is no 100-foot vegetated flow path.

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 drainage system a Stormwater detention system will be used connecting to the existing storm drain in 81st 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. Also, Infiltration is not allowed as per Mercer Island Infiltration map.

Sheet flow dispersion will not be used because there is not an adequate flow path to a 10-foot minimum vegetated area.

As No BMPs are feasible, we will trench drain in the proposed replaced driveway and connect it to the on-site stormwater detention system. Catch basin will be installed in replaced asphalt driveway area to rout the storm to detention system.

DRAINAGE REPORT

SECTION 1 - PROPOSED PROJECT DESCRIPTION

Parcel: 8732300240

Address: 7036 81st AVE SE, Mercer Island, WA 98040

Legal Description:

(PER STATUTORY WARRANTY DEED RECORDING# 20120628001442)

LOT 3, BLOCK 4, TWIN VIEW NO. 2, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 64 OF PLATS, PAGES 90 AND 91, IN KING COUNTY, WASHINGTON.

The 10,323sf Lot is located on Mercer Island on East side of 81st Ave SE between SE 70th and 71st Street, North of the intersection of SE 71th Ave and 81st Avenue SE at 7036 81st AVE SE, Mercer Island, WA 98040. The site is currently used as a single-family residence with a 1,651-sf house, a 402sf parking garage, 922sf asphalt driveway, 331sf shed, 245sf concrete, and 247sf uncovered deck as whole covered area. For the existing hard surface area, 3448sf of roof area with extended eave at outer walls, 922sf of asphalt drive way and 184 sf of concrete outside roof area, and 247sfof uncovered deck, total 4554 sf (46.5%). The existing house will remain, existing garage and shed will be removed for addition of new garage and attached accessory dwelling unit. New and replaced asphalt driveway and concrete walk way will added to new impervious surface. Total new/replaced hard areas are 2751sf or 27% coverage of 10323sflot, 2514 sf of total new/replaced is impervious surface and remaining 60 sf is replaced pervious walk way pavers. 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 new/replaced roof downspouts to a new catch basin at the front yard of the house, then connect to a detention system which will drain to the existing storm drainage pipe in 81rd Ave SE. The new/replaced driveway will use asphalt and walkway will use concrete pavement which will be routed to the detention system via catch basin.

Developed Condition

The existing garage/shed and roof over patio deck with 1408sf of roof area will be demolished, a new garage with attached accessory unit and covered patio with 1668sf roof area will be constructed. Existing home with 2040 sf of roof area will remain as it. Existing asphalt driveway (922sf uncovered) will be replaced and with new surface addition total 981sf of driveway is proposed. The total 2,751 sf of New/replaced hard surface; 1663sf of roof, 981sf of new/replaced asphalt driveway, 47 sf of new/replaced concrete walkway/stairs and 60sf of replaced walkway with pervious pavers is proposed the project. As per MIIC MICC 15.09.050 A2, The storm water from the added/replaced impervious surface will be routed to detention system via catch basins and trench drain. The downspouts for new roof are combined with portions of the existing roof which will included in the new/replaced impervious for design of detention system. The drainage system for the remaining existing house roof will stay as it flows now. The utilities from accessory unit will be connected to the existing utilities for the existing house.

Total new/replaced hard surface:

Pro. New/Replaced Roof Area (sf)	1,663
Pro. New/ Replaced Asphalt drive way(sf)	981
Pro. New/Replaced uncovered walk way (sf)	47
Pro. Replaced pervious pavers walk way (sf)	60
Total Proposed new/rep hard areas (sf)	2751
Total Proposed new/rep hard surface coverage	26.65%

Total hard surface area = 2,751sf proposed new/replaced impervious+ 2,040sf existing house roof + 247 sf of uncovered deck = 5,038sf or 49% of lot.

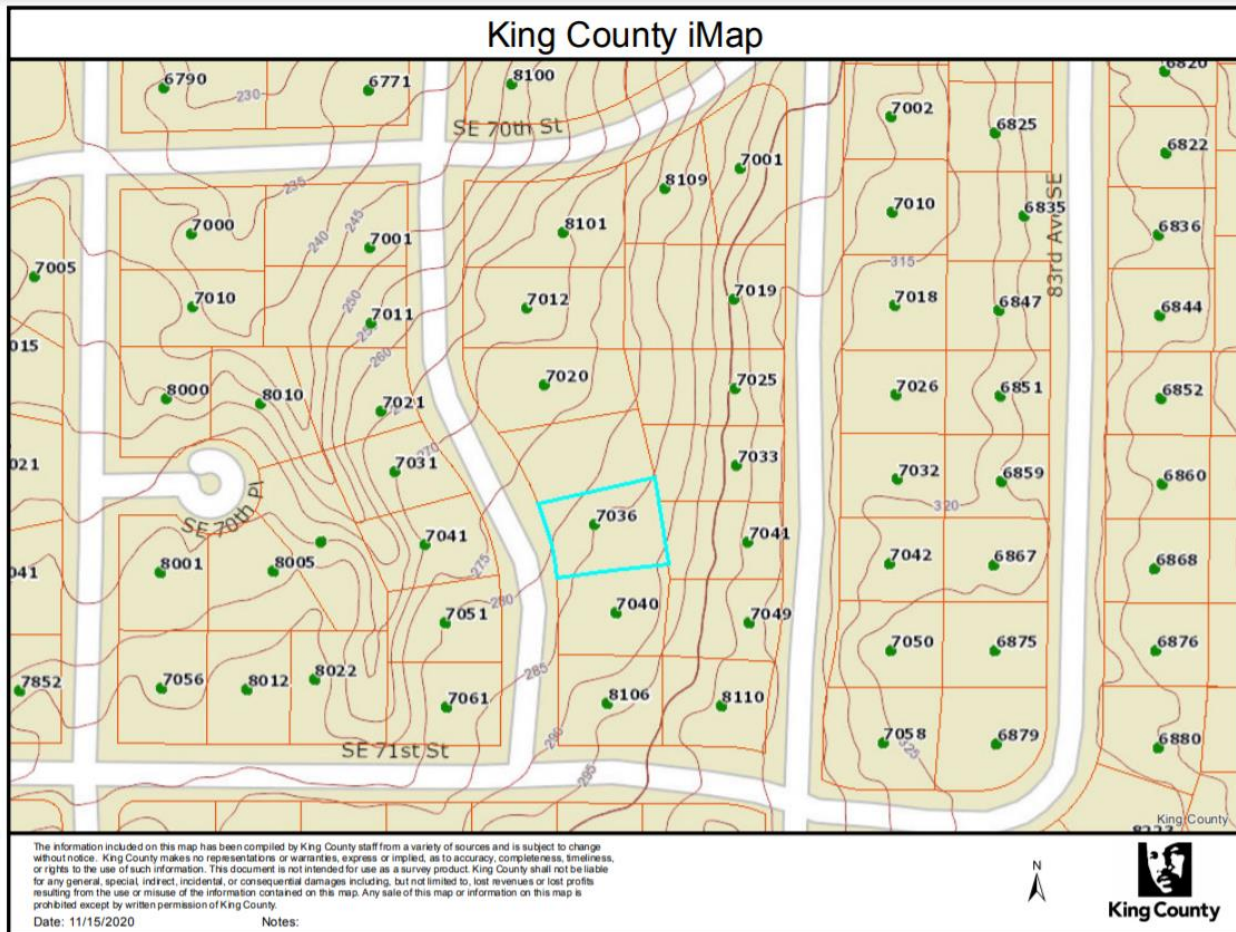
Total existing hard surface areas demolished/replaced = 2,514sf or 24.35% Total new addition of hard surface = 237sf (2.30%)

Total for impervious surface for design of detention system= 2,691 sf proposed new/replaced + 840sf of existing roof combined downspout with new roof= 3,531sf

Total area of land disturbing activity: 3,350 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 East of the property. There is 81st AVE SE on the East of the site. The site has been previously graded.

Total lot area = 10,323sf. Existing impervious area:

Ex. main building roof area (sf)	2,040
Ex. garage and shed/store (sf)	998
Ex. covered patio/deck (sf)	410
Ex. asphalt driveway (sf)	922
Ex. conc. walkway	184
Ex. uncovered deck at front	247
Total Ex. hard surface areas (sf)	4,801
Total Ex. hard surface coverage	46.5%

Total existing hard surface areas demolished/replaced = 2,514sf or 24.35%

Ex. House roof remained (sf)	2,040
Ex. uncovered deck at front (sf)	247
Total existing area to remain	2287

The site is with lot slopes down to the northwest at about 6-8%. See vicinity map. The existing house uses underground infiltration/dispersion trenches or connected to the existing drainage city system.

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 Advance outwash (Qva) 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 AmC – Arens Alterwood, Sandy Loam, 6 to 15 percent slopes.

Typical profile:

H1 - 0 to 26 inches: Gravelly sandy loam

H2 - 26 to 60 inches: Very Gravelly sandy loam

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 East of this site are single family residences. The West of the site is 81st AVE SE Street. The site has existing house using downspout connected to underground pipes which is connected are infiltration trenches or directly to the storm system in 81st Ave. The downstream stormwater going through the ditch in front of adjacent lot on north, then enters a 12" CP culvert which goes North past the next lot and then turns west, and then turns North to connect to the city storm system 24" CP after the North of SE 70th ST. There is an existing driveway on the west of the site. The existing house was graded higher than the 81rd 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. There will not be any destruction of aquatic habitat on-site or downstream. The site was visited on Nov 07, 2020 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 a new/replaced 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 42 LF of 48"ø detention pipe will be used for the new/replaced house and the driveway hard surface.

There are no existing or potential drainage problems and water quality problems. As the soils are unsuitable for infiltration, the stormwater from the new/replaced roof and the driveway will be routed to a detention system and then drained to the existing 12" storm drain in 81rd Ave SE.

Upstream of the site is another Lot on North and East which are connected to city piped drainage system, so there are no upstream drainage problems.

Per the attached City of Mercer Island Table-1 Detention Handout the site requires 421f of 48”ø pipe or 527cf of storage required. The Control Manhole will be provided per the Attachment 1 Detention System Detail.

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 connection to 12” RCP in 81ST Avenue SE.

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

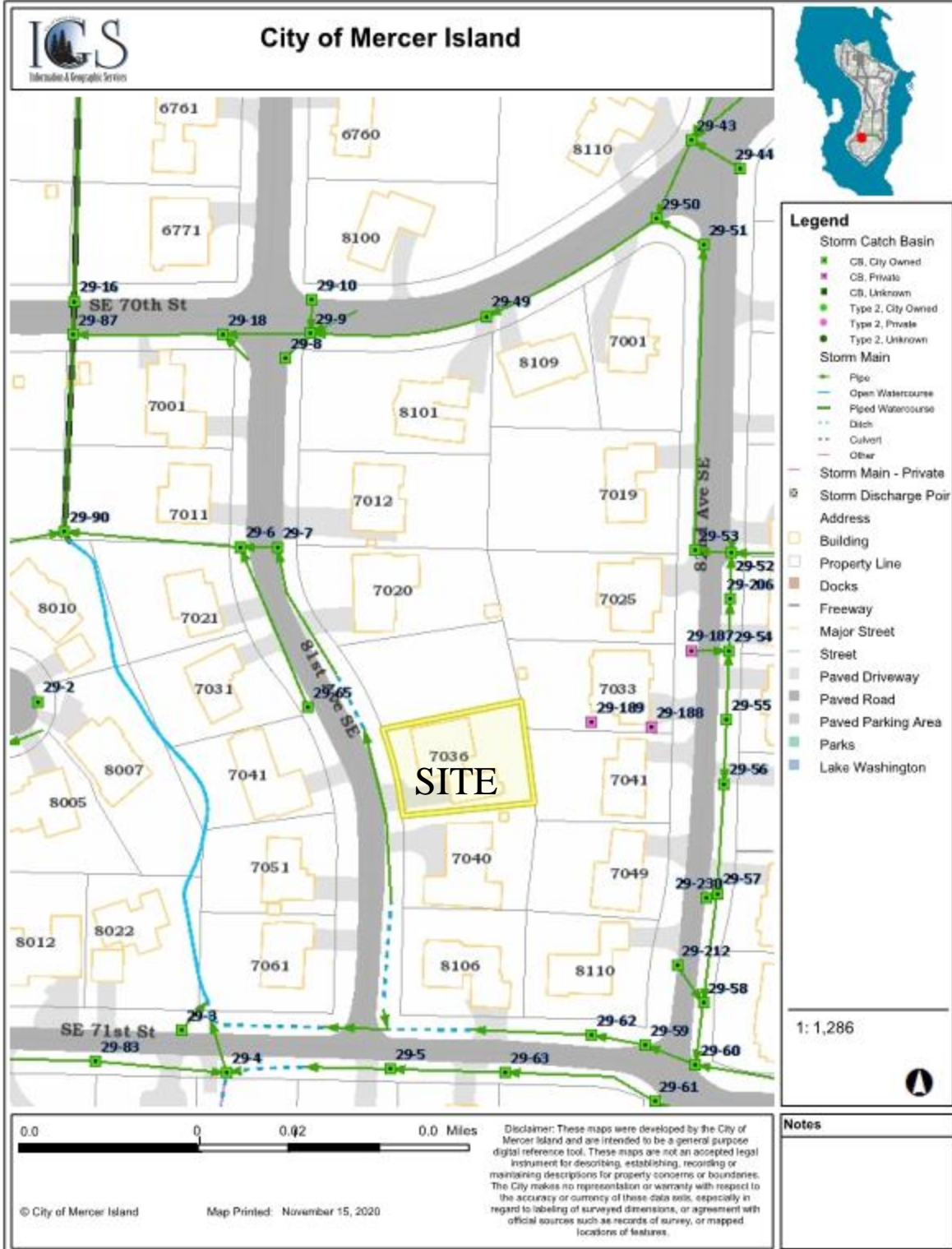


Table 1

ON-SITE DETENTION DESIGN FOR PROJECTS BETWEEN 500 SF AND 9,500 SF NEW PLUS REPLACED IMPERVIOUS SURFACE AREA

New and Replaced Impervious Surface Area (sf)	Detention Pipe Diameter (in)	Detention Pipe Length (ft)		Lowest Orifice Diameter (in) ⁽¹⁾		Distance from Outlet Invert to Second Orifice (ft)		Second Orifice Diameter (in)	
		B soils	C soils	B soils	C soils	B soils	C soils	B soils	C soils
500 to 1,000 sf	36"	30	22	0.5	0.5	2.2	2.0	0.5	0.8
	48"	18	11	0.5	0.5	3.3	3.2	0.9	0.8
	60"	11	7	0.5	0.5	4.2	3.4	0.5	0.6
1,001 to 2,000 sf	36"	66	43	0.5	0.5	2.2	2.3	0.9	1.4
	48"	34	23	0.5	0.5	3.2	3.3	0.9	1.2
	60"	22	14	0.5	0.5	4.3	3.6	0.9	0.9
2,001 to 3,000 sf	36"	90	66	0.5	0.5	2.2	2.4	0.9	1.9
	48"	48	36	0.5	0.5	3.1	2.8	0.9	1.5
	60"	30	20	0.5	0.5	4.2	3.7	0.9	1.1
3,001 to 4,000 sf	36"	120	78	0.5	0.5	2.4	2.2	1.4	1.6
	48"	62	42	0.5	0.5	2.8	2.9	0.8	1.3
	60"	42	26	0.5	0.5	3.8	3.9	0.9	1.3
4,001 to 5,000 sf	36"	134	91	0.5	0.5	2.8	2.2	1.7	1.5
	48"	73	49	0.5	0.5	3.6	2.9	1.6	1.5
	60"	46	31	0.5	0.5	4.6	3.5	1.6	1.3
5,001 to 6,000 sf	36"	162	109	0.5	0.5	2.7	2.2	1.8	1.6
	48"	90	59	0.5	0.5	3.5	2.9	1.7	1.5
	60"	54	37	0.5	0.5	4.6	3.6	1.6	1.4
6,001 to 7,000 sf	36"	192	128	0.5	0.5	2.7	2.2	1.9	1.8
	48"	102	68	0.5	0.5	3.7	2.9	1.9	1.6
	60"	64	43	0.5	0.5	4.6	3.6	1.8	1.5
7,001 to 8,000 sf	36"	216	146	0.5	0.5	2.8	2.2	2.0	1.9
	48"	119	79	0.5	0.5	3.8	2.9	2.2	1.7
	60"	73	49	0.5	0.5	4.5	3.6	2.0	1.6
8,001 to 8,500 sf ⁽¹⁾	36"	228	155	0.5	0.5	2.8	2.2	2.1	1.9
	48"	124	84	0.5	0.5	3.7	2.9	1.9	1.8
	60"	77	53	0.5	0.5	4.6	3.6	2.0	1.6
8,501 to 9,000 sf	36"	NA ⁽¹⁾	164	0.5	0.5	NA ⁽¹⁾	2.2	NA ⁽¹⁾	1.9
	48"	NA ⁽¹⁾	89	0.5	0.5	NA ⁽¹⁾	2.9	NA ⁽¹⁾	1.9
	60"	NA ⁽¹⁾	55	0.5	0.5	NA ⁽¹⁾	3.6	NA ⁽¹⁾	1.7
9,001 to 9,500 sf ⁽²⁾	36"	NA ⁽¹⁾	174	0.5	0.5	NA ⁽¹⁾	2.2	NA ⁽¹⁾	2.1
	48"	NA ⁽¹⁾	94	0.5	0.5	NA ⁽¹⁾	2.9	NA ⁽¹⁾	2.0
	60"	NA ⁽¹⁾	58	0.5	0.5	NA ⁽¹⁾	3.7	NA ⁽¹⁾	1.7

Notes:

• Minimum Requirement #7 (Flow Control) is required when the 100-year flow frequency causes a 0.15 cubic feet per second increase (when modeled in WWHM with a 15-minute timestep). Breakpoints shown in this table are based on a flat slope (0-5%). The 100-year flow frequency will need to be evaluated on a site-specific basis for projects on moderate (5-15%) or steep (> 15%) slopes.

• Soil type to be determined by geotechnical analysis or soil map.

• Sizing includes a Volume Correction Factor of 120%.

• Upper bound contributing area used for sizing.

⁽¹⁾ On Type B soils, new plus replaced impervious surface areas exceeding 8,500 sf trigger Minimum Requirement #7 (Flow Control)

⁽²⁾ On Type C soils, new plus replaced impervious surface areas exceeding 9,500 sf trigger Minimum Requirement #7 (Flow Control)

⁽³⁾ Minimum orifice diameter = 0.5 inches

in = inch

ft = feet

sf = square feet

Basis of Sizing Assumptions:

Sized per MR#5 in the Stormwater Management Manual for Puget Sound Basin (1992 Ecology Manual)

SBUH, Type 1A, 24-hour hydrograph

2-year, 24-hour storm = 2 in; 10-year, 24-hour

storm = 3 in; 100-year, 24-hour storm = 4 in

Predeveloped = second growth forest (CN = 72 for Type B

soils, CN = 81 for Type C soils)

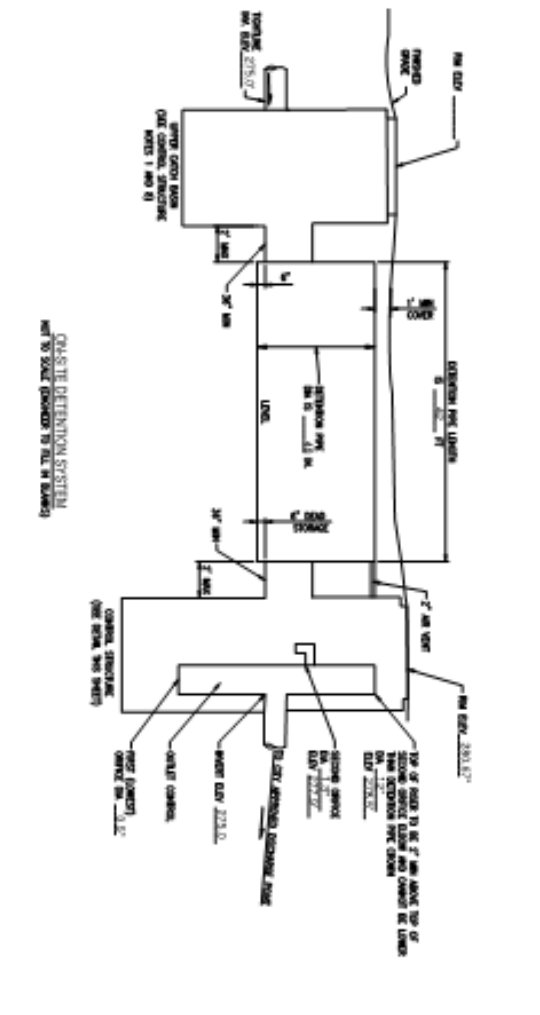
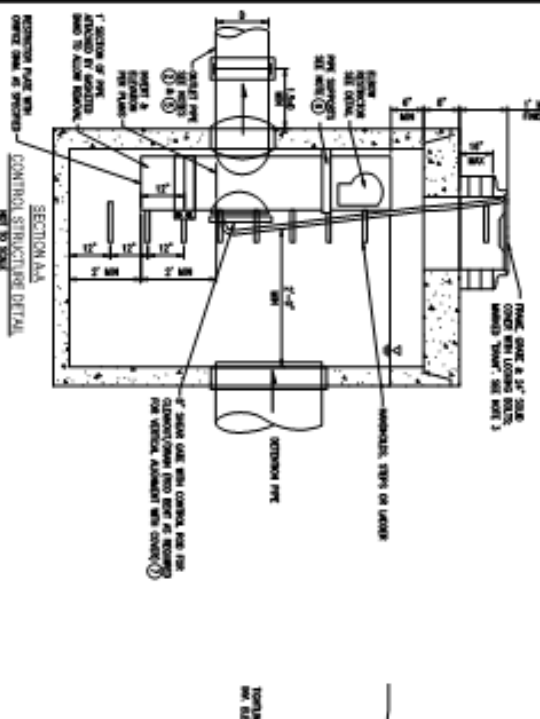
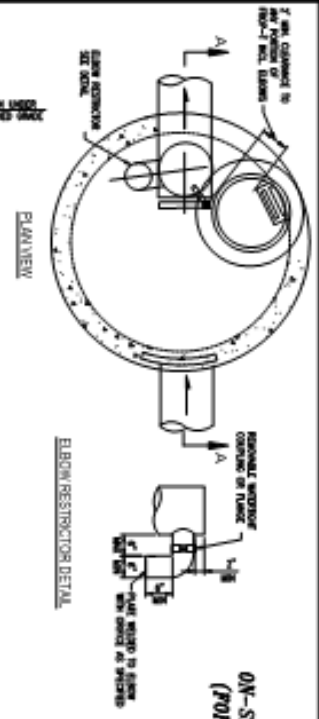
Developed = impervious (CN = 98)

0.5 foot of sediment storage in detention pipe

Overland slope = 5%

ATTACHMENT 1 CITY OF MERCER ISLAND ON-SITE DETENTION SYSTEM WORKSHEET (FOR NEW PLUS REPLACED IMPERVIOUS AREA OF 9,500 SF OR LESS)

OWNER: <u>CHEKI</u>	ADDRESS: <u>2036 81ST AVE SE</u>	PROPOSED BY: <u>ANASTY ENGINEERING</u>
PROJECT #:	MERCER ISLAND, WA	PHONE: <u>206 323 7859</u>
DATE: <u>11-16-2008</u>	PROJECT: <u>ON-SITE DETENTION</u>	DATE: <u>11-16-2008</u>
DESIGNER: <u>ANASTY ENGINEERING</u>	PROJECT: <u>ON-SITE DETENTION</u>	DATE: <u>11-16-2008</u>
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DESIGNER: <u>ANASTY ENGINEERING</u>	PROJECT: <u>ON-SITE DETENTION</u>	DATE: <u>11-16-2008</u>



- CONTROL STRUCTURE NOTES**
- USE A MINIMUM OF A 24\"/>

- MINIMUM OF 18\"/>

- ON-SITE DETENTION SYSTEM NOTES**
- ALL UNDERGROUND STRUCTURES (CONCRETE, METAL, OR POLYETHYLENE GLYCOL) SHALL BE INSTALLED AT A MINIMUM OF 18\"/>