

**DRAINAGE REPORT
2429 74th Avenue SE
City of Mercer Island, Washington
King County Tax #531510-0417**

for:

**Jay Marc Custom Homes – Luigi Pontes Custom
Attn.: Gary Upper
7683 SE 27th Street
Suite #487
Mercer Island, Washington 98040
gary@jaymarchomes.com**

January 19, 2021

prepared by:

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01/20/2021

SITE CHARACTERISTICS

Total Lot Area = 12,714 square feet

EXISTING CONDITIONS

Impervious (hard) surfaces: 0 sq. feet

Pervious surfaces = 12,714 sq. feet

DEVELOPED CONDITIONS

Impervious (hard) surfaces:

House w/overhang = 3,219 sq. feet

Uncovered driveway = 906 sq. feet

Uncovered concrete patio = 420 sq. feet

Uncovered walkway = 126 sq. feet

Total Impervious (hard) surfaces = 4,671 square feet

Pervious Surfaces:

Lawn/landscaping/trees retained = 8,043 sq. feet

Total Pervious surfaces = 8,043 square feet

Summary of Project Information

Project Site Area	12,714 sq. feet
Existing Impervious Area	0 sq. feet
Existing Impervious Coverage	0%
New Impervious Area	4,671 sq. feet
Replaced Impervious Area	0 sq. feet
New plus Replaced Impervious	4,671 square feet
Proposed Impervious Area	4,671 square feet
Converted pervious: Native to lawn	0 sq. feet
Converted pervious: Native to pasture	0 sq. feet
Total Area of Land Disturbance	9,250 square feet

FLOW CHART FIGURE II-2.4.1

2429 74th Avenue SE

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

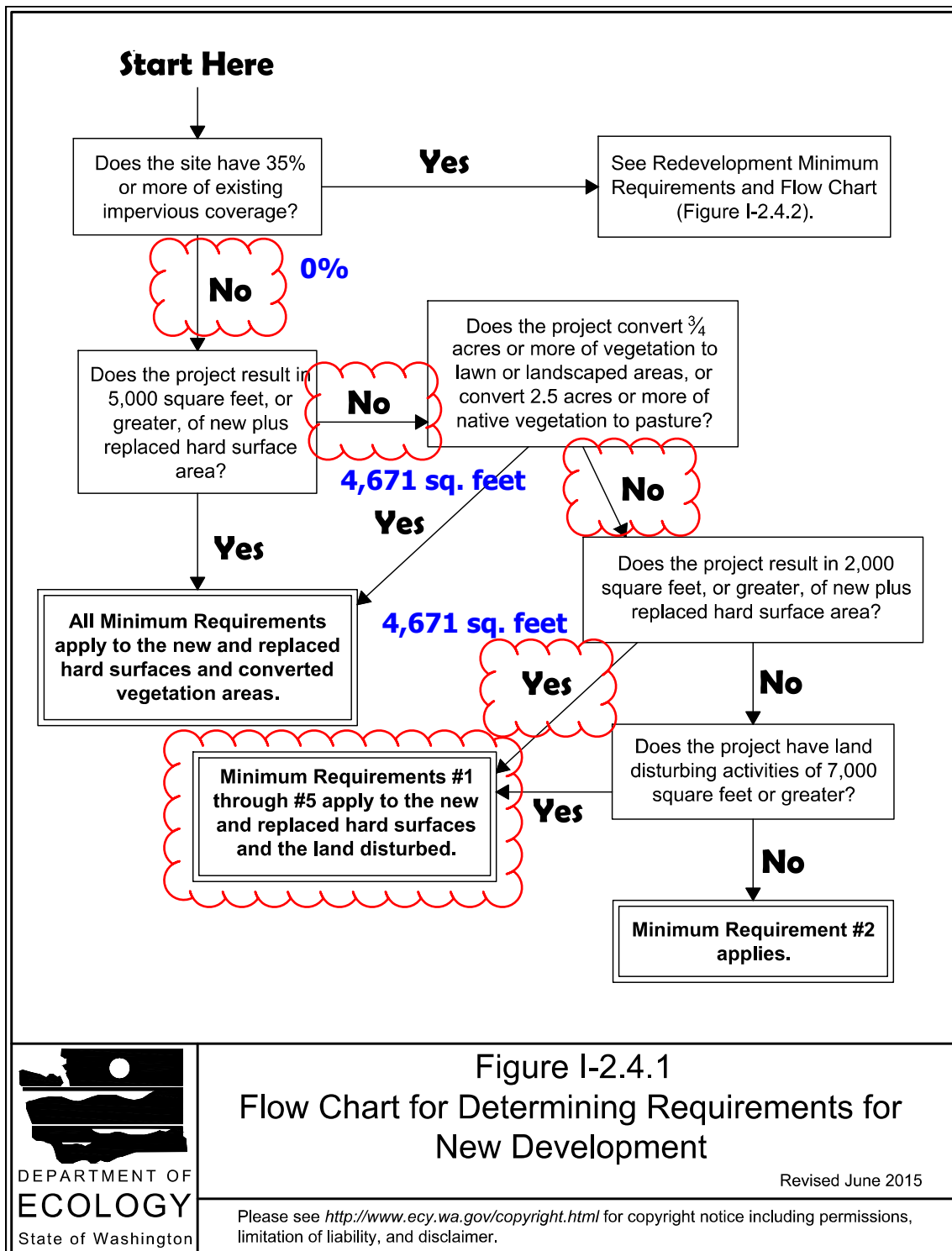
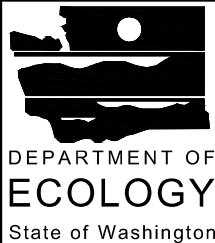


Figure I-2.4.1
Flow Chart for Determining Requirements for New Development

Revised June 2015



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Based upon the Flow Chart Figure I-2.4.1 and I-2.4.2 (Amended December 2014 SWMMWW, DOE Manual), the Minimum Requirements 1-5 apply to this project, see attached Flow Chart.

I-2.5.1 Minimum Requirement #1 – Preparation of Stormwater Site Plans

A Stormwater site plan (drainage plan) has been prepared for this project together with construction details for installation of the proposed drainage control system. The Stormwater site plans and drainage narrative shall be submitted and reviewed by the City of Mercer Island as part of the building permit application.

I-2.5.2 Minimum Requirement #2 - Construction Storm Water Pollution Prevention Plan (SWPP)

The Stormwater site plan (Minimum Requirement #1) shall include construction installation of erosion control, establish a construction access, preservation of existing vegetation during construction, and protection of existing drainage inlets. This will include but not limited to: retaining of the existing driveway for use as a temporary construction access to mitigate dirt and mud from construction vehicles; filter fabric silt fencing along the down gradient property lines (west and north); installation of filter socks within the public catch basins located within 90th Avenue SE; retention of native vegetated areas including tree retention within the rear yard (east); and the use straw or chipped materials placed over exposed disturbed soils to prevent runoff from carrying solids.

I-2.5.3 Minimum Requirement #3 - Source Control of Pollution

Source control BMP's will be utilized to contain pollution generating runoff. No concrete washout will be allowed on the property during construction. No fuel materials will be placed or stored on site during construction.

I-2.5.4 Minimum Requirement #4 - Preservation of Natural Drainage Systems and Outfalls

The property was visited in August and September 2019 to verify drainage patterns. The subject property is very flat with little to no relief. The property slopes from the southeast corner, near the school property, to the northwest corner (at 90th Avenue SE). There are no visible signs of erosion, scouring, or overtopping occurring along the shoulder of 90th avenue SE where the existing runoff discharges into the public street. There are no indications of erosion at the ends of the existing downspouts on the house. The soils onsite appear to be providing infiltration of existing runoff. 90th Avenue SE is a dead-end street in front of the property. The existing hard surfaces on the property discharge onto the ground and sheet flow towards 90th avenue SE (on the west side). The drainage within 90th Avenue flows on the thickened edge shoulder to the north and into a public storm system located approximately 200 feet north; on the east side of the street. There are no indications of scouring or flooding at the inlet of the public storm system within 90th Avenue SE.

The developed project will be evaluated using the City of Mercer Island Stormwater standards.

I-2.5.5 Minimum Requirement #5 - On-Site Stormwater Management

The proposed project discharge shall be evaluated using "*List #1, On-Site Stormwater Management BMP's for projects triggering Minimum Requirements #1 - #5*" – DOE Volume 1, chapter 2, pages 56 and 57.

A geologist report has been prepared for the property by Cobalt Geosciences and is attached to this Report. This Report will be the basis for review of allowable and acceptable storm water BMP's. Cobalt Geosciences recommends the use of stormwater infiltration type BMP's.

Lawn and Landscaped Areas:

1. Post-Construction Soil Quality and Depth per BMP T5.13 - **Feasible**

Roofs:

1. a. Full Dispersion per BMP T5.30 – There is not adequate space on the project to provide 100 feet of downgradient flow path for full dispersion – **Not Feasible**
1. b. Full Downspout Infiltration per BMP T5.10A – Based upon the Soils Report provided by Cobalt Geosciences, infiltration is feasible. Cobalt recommends the use of medium sands for the design of onsite infiltration BMP's. **Feasible**

DOE Section III-3.1.1 BMP T5.10A

Medium sands for infiltration dry wells use 90 cubic feet per 1,000 sq. feet of roof area.
4,031 sq. ft. / 1,000 * 90 cu. ft. = 362.8 cu. feet of gravel

Other Hard Surfaces:

1. Full Dispersion per BMP T5.30 – There is inadequate space on the project to provide 100 feet of downgradient flow path for full dispersion – **Not Feasible**
2. a. Permeable pavement per BMP T5.15 – Permeable pavement is infeasible "where replacing existing impervious surfaces unless the existing surface is a non-pollution generating", see page 925 DOE. This type BMP would be replacing an existing driveway that is pollution generating therefore, BMP is not feasible. **Not Feasible**
b. Rain Gardens BMP T5.14A – Using the infeasibility Criteria for Bioretention (page 966, 2014 DOE) there is not adequate space outside of the setbacks from the structure and the "save" trees in the front or rear yard for bioretention. The area in the rear yard (east) is at an elevation that will not gravity from the other hard surfaces to use this area. **Not Feasible**
c. Bioretention Cells BMP T7.30 – Same as Rain Gardens BMP T5.14A
3. a. Sheet Flow Dispersion per BMP 5.12 – There is not 25 feet of downgradient flow path from the edge of the driveway to the property line – **Not Feasible**
b. Concentrated Flow Dispersion per BMP 5.11 – There is not adequate space for a 50-foot flow path for a rock pad, OR 25 feet from the driveway to the downgradient property line. **Not Feasible**

DETENTION CALCULATIONS AND SIZING

Project Impervious: 4,671 square feet

Detention Required per Table 1:

Range 4,001-5,000 sq. feet impervious – Using 48" pipe; 49 lin. feet required

Orifice sizing:

Orifice #1 (lowest): 1/2" diameter

Orifice #2 (2.9' above outlet); 1-1/2" diameter

2429 74th Avenue SE

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) ⁽³⁾		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	90	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

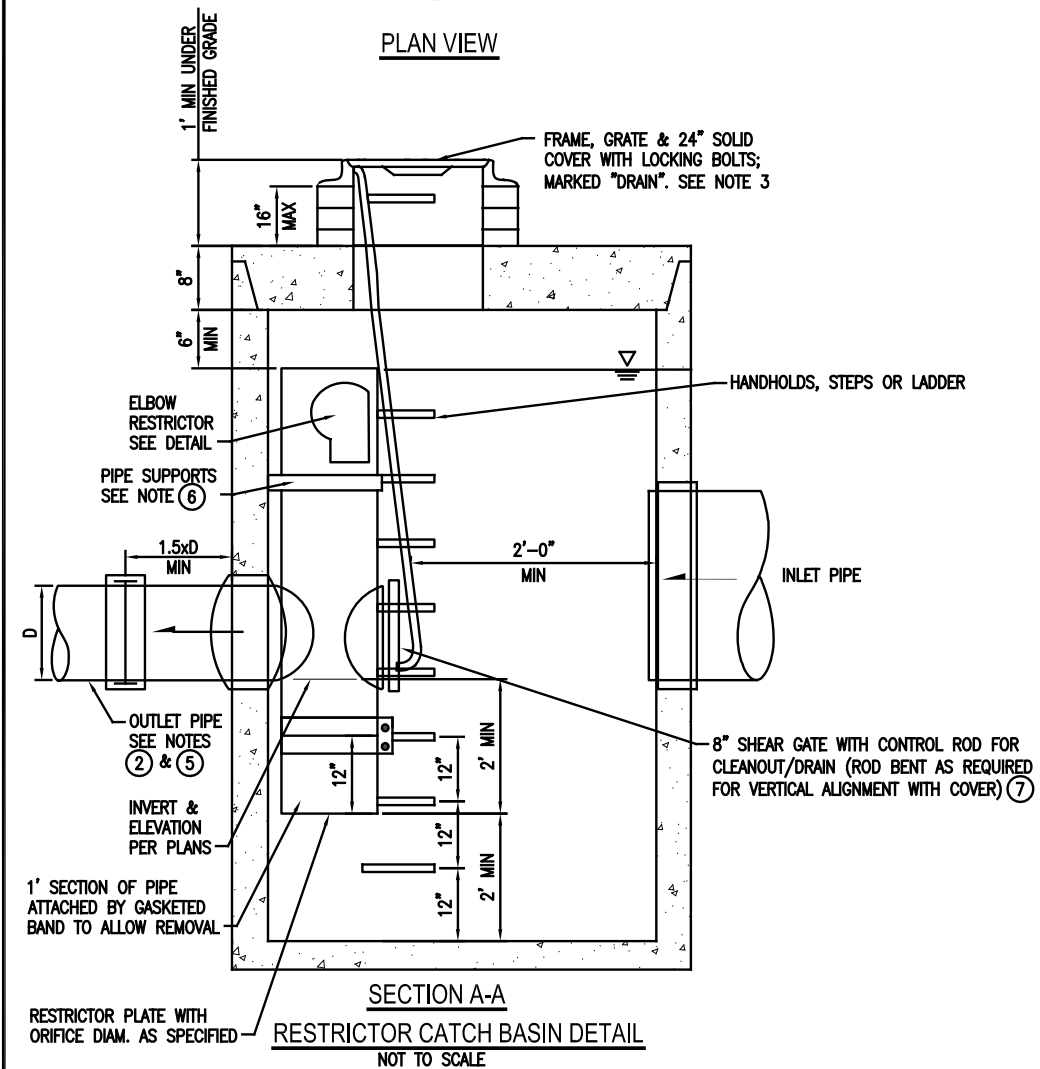
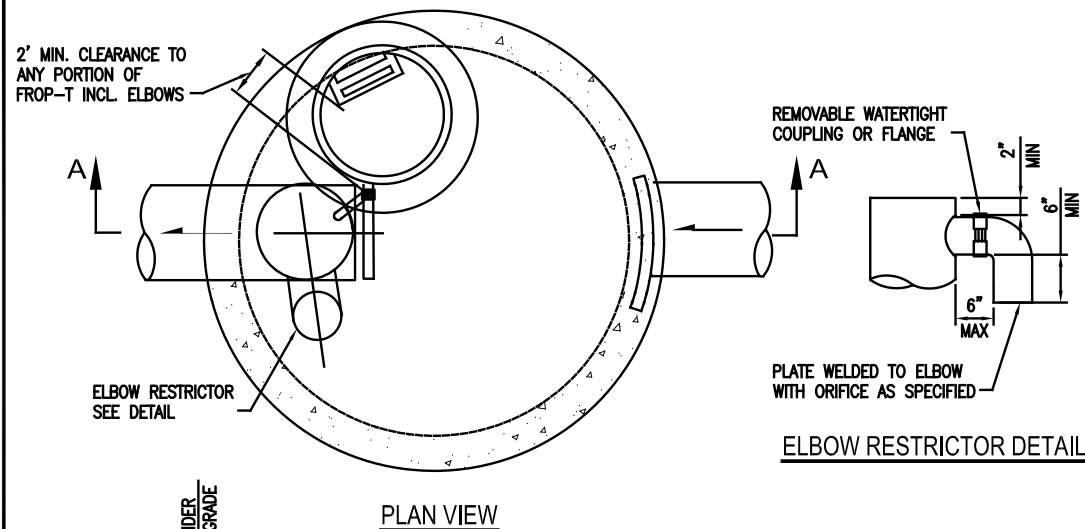
Predeveloped = second growth forest (CN = 72 for Type B soils, CN = 81 for Type C soils)

Developed = impervious (CN = 98)

0.5 foot of sediment storage in detention pipe

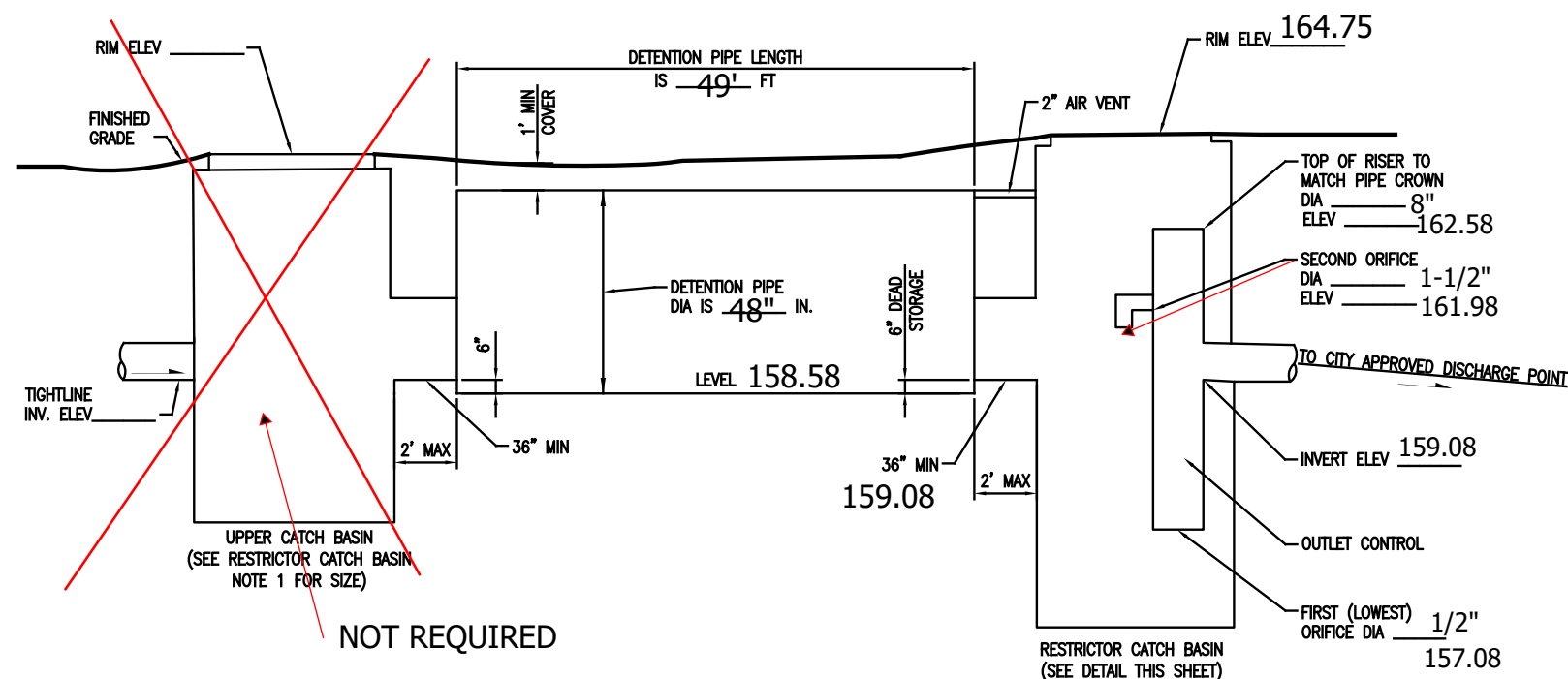
Overland slope = 5%

Attachment 1
CITY OF MERCER ISLAND
STANDARD DETENTION SYSTEM WORKSHEET
(FOR IMPERVIOUS AREA OF 5,000 SF OR LESS)



OWNER: <u>Luigi Pontes</u>	ADDRESS: <u>2429 74th Avenue SE</u>	PREPARED BY: <u>Offe Engineers, PLLC</u>
PERMIT #:	<u>Mercer Island, WA</u>	PHONE: <u>(425) 260-3412</u>
		DATE: <u>Jan. 19, 2021</u>
IMPERVIOUS SURFACE AREA (SF): <u>4,671</u>	DETENTION PIPE DIA (INCH): <u>48"</u>	DETENTION PIPE LENGTH (FT): <u>49'</u>
	PIPE MATERIAL: <u>CMP</u>	ORIFICE #1 DIA <u>1/2"</u> INCH, ELEV <u>157.08</u>
		ORIFICE #2 DIA <u>1-1/2"</u> INCH, ELEV <u>161.98</u>

FOOTING DRAINS SHALL NOT BE CONNECTED TO DETENTION SYSTEM



STANDARD PIPE DETENTION SYSTEM
 NOT TO SCALE (ENGINEER TO FILL IN BLANKS)

RESTRICTOR CATCH BASIN NOTES:

- USE A MINIMUM OF A 72 IN. DIAM. TYPE 2 CATCH BASIN WHEN CONNECTING PIPE MATERIAL IS CONCRETE OR LCPE. A 54 IN. DIAM. TYPE 2 CATCH BASIN MAY BE USED FOR OTHER CIRCULAR SINGLE WALL PIPE (SUCH AS CORRUGATED ALUMINUM PIPE).
- OUTLET PIPE: MIN. 6 INCH.
- METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
- FRAME AND LADDER OR STEPS OFFSET SO:
 - CLEANOUT GATE IS VISIBLE FROM TOP;
 - CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE;
 - FRAME IS CLEAR OF CURB.
- 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.
- 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).
- THE SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26M AND ASTM B 275, DESIGNATION ZG32A; 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.

STANDARD DETENTION SYSTEM NOTES:

- CALL DEVELOPMENT SERVICES (206-275-7605) 24 HOURS IN ADVANCE FOR A DETENTION SYSTEM INSPECTION BEFORE BACKFILLING AND FOR FINAL INSPECTIONS.
- RESPONSIBILITY FOR OPERATION AND MAINTANANCE 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.
- 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 (LCPE), 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.