DRAINAGE REPORT
6515 SE 30th Street
City of Mercer Island, Washington
King County Tax #217450-0800

for:

JayMarc Emerald, LLC
Attn.: Gary Upper
7683 SE 27th Street
Suite #487
Mercer Island, Washington 98040
gary@jaymarchomes.com

April 20, 2021

prepared by:

Offe Engineers, PLLC
Darrell Offe, P.E.
13932 SE 159th Place
Renton, Washington 98058
425-260-3412
darrell.offe@comcast.net

4/20/2021

Narrative:

The subject property is located in the southwest corner of the intersection of SE 30th Street and 67th Avenue SE. The property is slopes from the northeast (at the intersection) to the southwest. The property naturally discharges at the southwest corner onto the neighboring properties.

The existing structure, hard surfaces, and driveway will be removed. The existing access to the property is from SE 30th Street on the north side. The runoff from the existing house and hard surfaces sheet flows over the landscape areas and discharges at the southwest corner.

The site soils are characterized as Vashon Subglacial Till using the City of Mercer Island Geological Survey maps; further discussion on soils and drainage can be found in Minimum Requirement #4.

The project will be evaluated for storm water treatment and control using the Amended December 2014 SWMMWW (DOE Manual).

SITE CHARACTERISTICS
Total Lot Area = 9,000 square feet

EXISTING CONDITIONS

Impervious (hard) surfaces:
- House w/overhang = 2,478 sq. ft.
- Uncovered driveway = 355 sq. ft.
- Shed = 116 sq. feet
- Uncovered concrete patio/walkways = 368 sq. ft.
- Shed = 372 sq. ft.

Total Impervious (hard) surfaces = 3,689 sq. feet

Total Pervious surfaces = 5,311 sq. feet

DEVELOPED CONDITIONS

Impervious (hard) surfaces:
- House w/overhang = 2,675 sq. feet
- Uncovered driveway = 399 sq. feet
- Uncovered deck = 8 sq. feet
- Uncovered stairs & landing = 51 sq. feet
- Uncovered walkways = 91 sq. feet

Total Impervious (Hard) Surfaces = 3,224 square feet

Pervious Surfaces:
- Lawn/landscaping/tree retention = 5,776 sq. feet

Total Pervious Surfaces = 5,776 square feet

Summary of Project Information

Project Site Area	9,000 square feet
Existing Impervious Area	3,689 sq. feet
Existing Impervious Coverage	41.0%
New Impervious Area	0 sq. feet
Replaced Impervious Area	3,224 sq. feet
New plus Replaced Impervious	3,224 square feet
Proposed Impervious Area	3,224 square feet
Converted pervious: Native to lawn	0 sq. feet
Converted pervious: Native to pasture	0 sq. feet
Total Area of Land Disturbance	5,800 square feet

The existing property has greater than 35% (41%) imperious coverage and the total proposed project new plus replaced impervious surfaces will be less than 5,000 (3,224) square feet; therefore, the proposed project is classified as "Redevelopment Project".
Using Figure #I-2.4.2 – *"Flow Chart for Determining Minimum Requirements for Redevelopment Projects"* page 38, *2014 Stormwater Management Manual for Western Washington*, Minimum Requirements #1 – #5 apply to this project.

2014 DOE FLOW CHARTS

6515 SE 30th Street

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

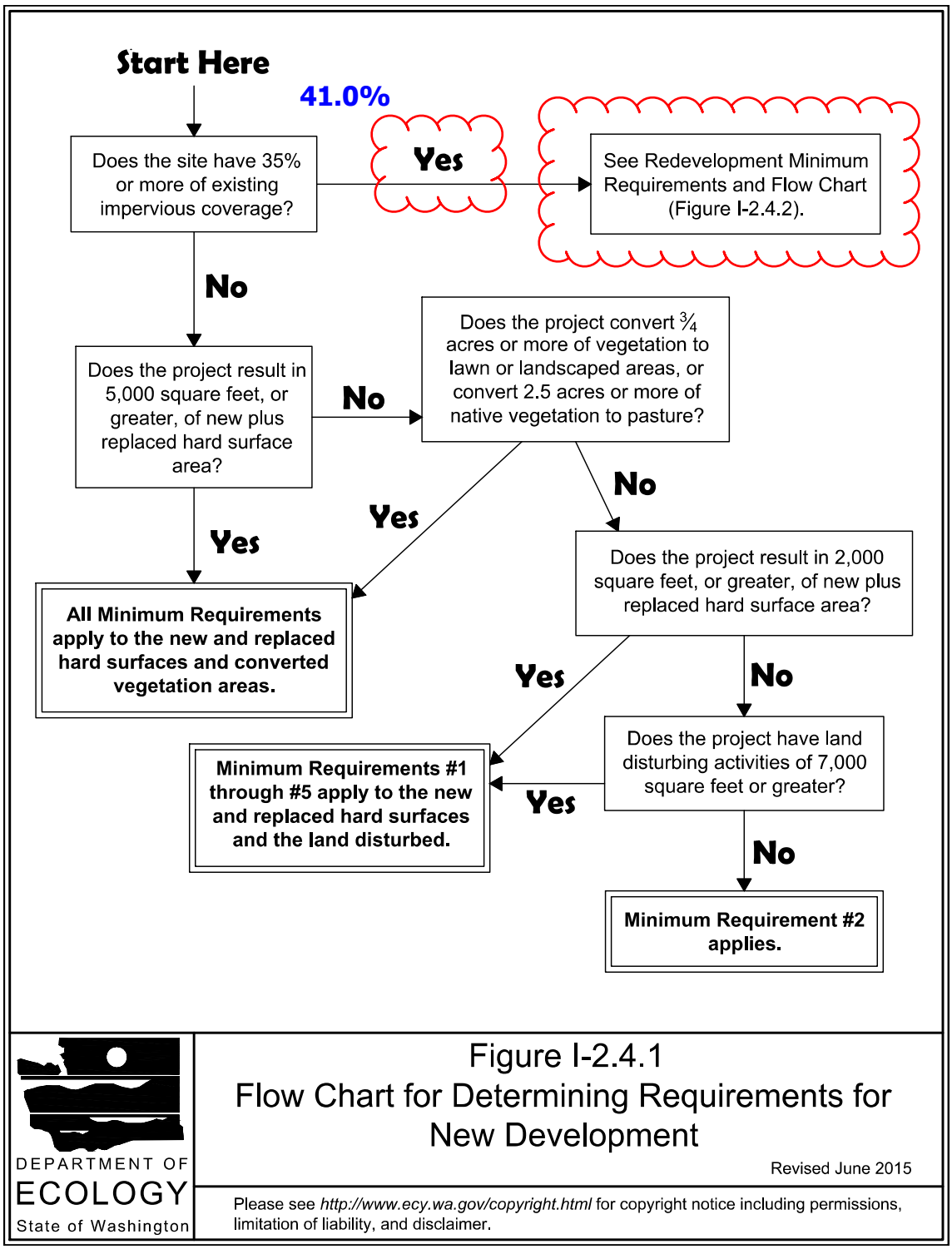
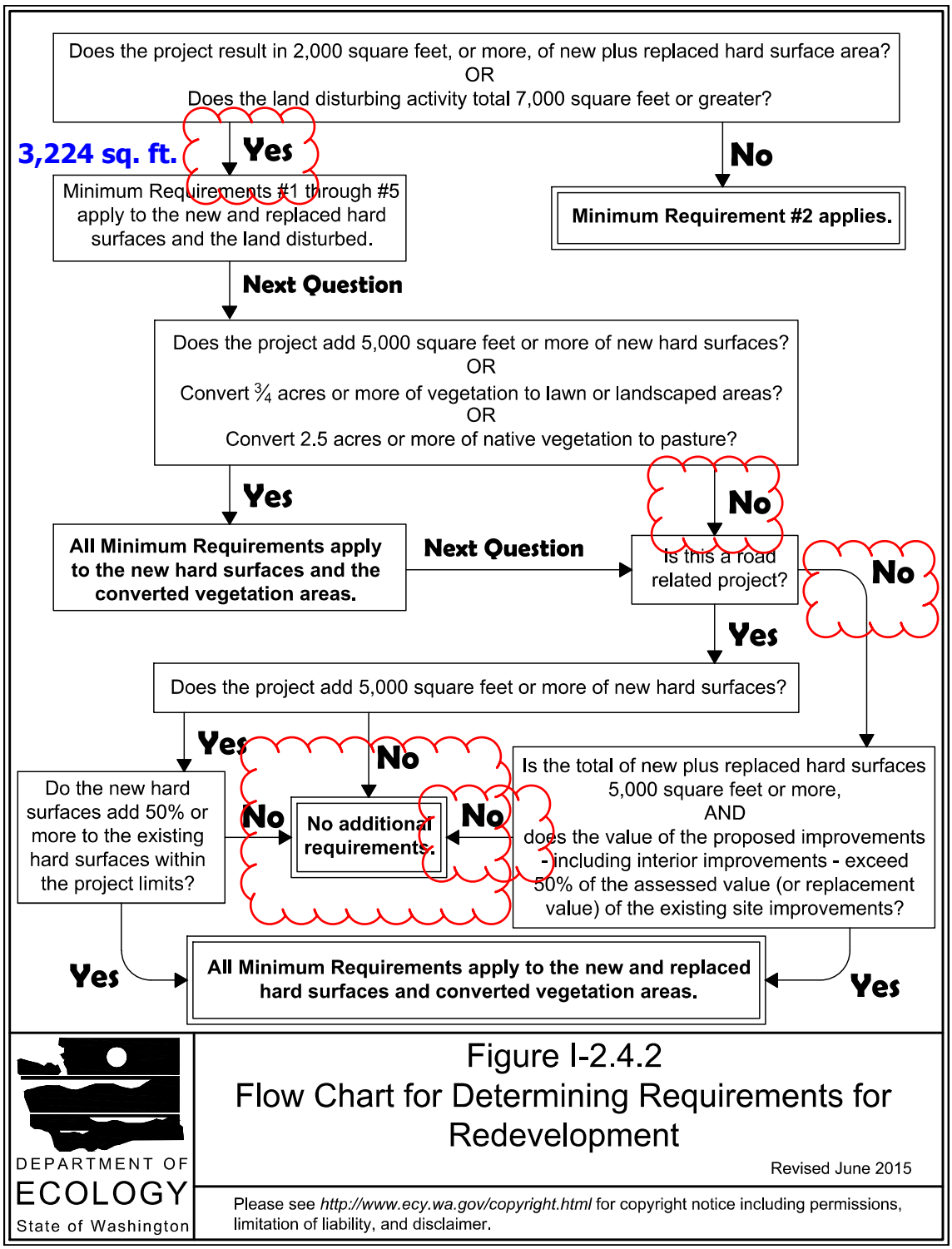


Figure I-2.4.2 Flow Chart for Determining Requirements for Redevelopment



Minimum Requirements

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, north, and east); installation of filter socks within the public catch basins located within SE 30th Street; 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 February and April 2021 to verify drainage patterns and evaluate the downstream system. The subject property has 10 feet of relief from the northeast corner to the southwest corner. The natural discharge from the property is the southwest corner onto the neighboring properties. The subject property is below the elevations of 67th Avenue SE (to the east) and slightly below the elevation of SE 30th Street (to the north).

There is public storm drainage system within SE 30th Street; however, the public system is not at an elevation that would serve the property via gravity. A pump system (non-gravity discharge) will be used for discharge from the developed property into the public storm within SE 30th Street.

Discussions with City staff have indicated a downstream constraint within the storm system in SE 30th Street, therefore, stormwater detention will also be necessary. The pump discharge and detention system will be sized using the City of Mercer Island Standards.

TOPOGRAPHIC & BOUNDARY SURVEY

LEGAL DESCRIPTION

(PER QUIT CLAIM DEED RECORDING #20010815001315)

LOTS 31, 32 AND 33, BLOCK 5, EAST SEATTLE ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 3 OF PLATS, PAGE 22, IN KING COUNTY, WASHINGTON.

BASIS OF BEARINGS

HELD A BEARING OF N 89°51'12" E BETWEEN FOUND MONUMENTS ON CENTERLINE OF SE 32ND ST PER R1

REFERENCES

R1. RECORD OF SURVEY, VOL. 244, PG. 067, RECORDS OF KING COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD88 PER GPS OBSERVATIONS.

SURVEYOR'S NOTES

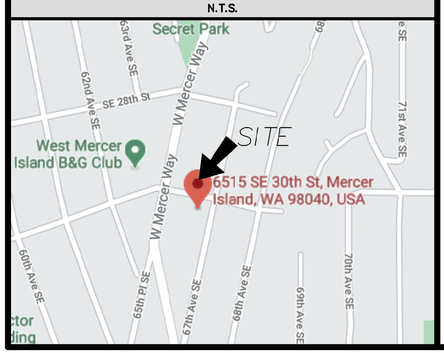
1. THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN DECEMBER OF 2020. THE FIELD DATA WAS COLLECTED AND RECORDED ON MAGNETIC MEDIA THROUGH AN ELECTRONIC THEODOLITE. THE DATA FILE IS ARCHIVED ON DISC OR CD. WRITTEN FIELD NOTES MAY NOT EXIST. CONTOURS ARE SHOWN FOR CONVENIENCE ONLY. DESIGN SHOULD RELY ON SPOT ELEVATIONS.
2. ALL MONUMENTS SHOWN HEREON WERE LOCATED DURING THE COURSE OF THIS SURVEY UNLESS OTHERWISE NOTED.
3. THE TYPES AND LOCATIONS OF ANY UTILITIES SHOWN ON THIS DRAWING ARE BASED ON INFORMATION PROVIDED TO US, BY OTHERS OR GENERAL INFORMATION READILY AVAILABLE IN THE PUBLIC DOMAIN INCLUDING, AS APPLICABLE, IDENTIFYING MARKINGS PLACED BY UTILITY LOCATE SERVICES AND OBSERVED BY TERRANE IN THE FIELD. AS SUCH, THE UTILITY INFORMATION SHOWN ON THESE DRAWINGS ARE FOR INFORMATIONAL PURPOSES ONLY AND SHOULD NOT BE RELIED ON FOR DESIGN OR CONSTRUCTION PURPOSES; TERRANE IS NOT RESPONSIBLE OR LIABLE FOR THE ACCURACY OR COMPLETENESS OF THIS UTILITY INFORMATION. FOR THE ACCURATE LOCATION AND TYPE OF UTILITIES NECESSARY FOR DESIGN AND CONSTRUCTION, PLEASE CONTACT THE SITE OWNER AND THE LOCAL UTILITY LOCATE SERVICE (800-424-5555).
4. SUBJECT PROPERTY TAX PARCEL NO. 2174500800.
5. SUBJECT PROPERTY AREA PER THIS SURVEY IS 9,000± S.F. (0.21 ACRES)
6. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT. EASEMENTS AND OTHER ENCUMBRANCES MAY EXIST THAT ARE NOT SHOWN HEREON.
7. FIELD DATA FOR THIS SURVEY WAS OBTAINED BY DIRECT FIELD MEASUREMENTS WITH A CALIBRATED ELECTRONIC 5-SECOND TOTAL STATION AND/OR SURVEY GRADE GPS OBSERVATIONS. ALL ANGULAR AND LINEAR RELATIONSHIPS ARE ACCURATE AND MEET THE STANDARDS SET BY WAC 332-130-090.

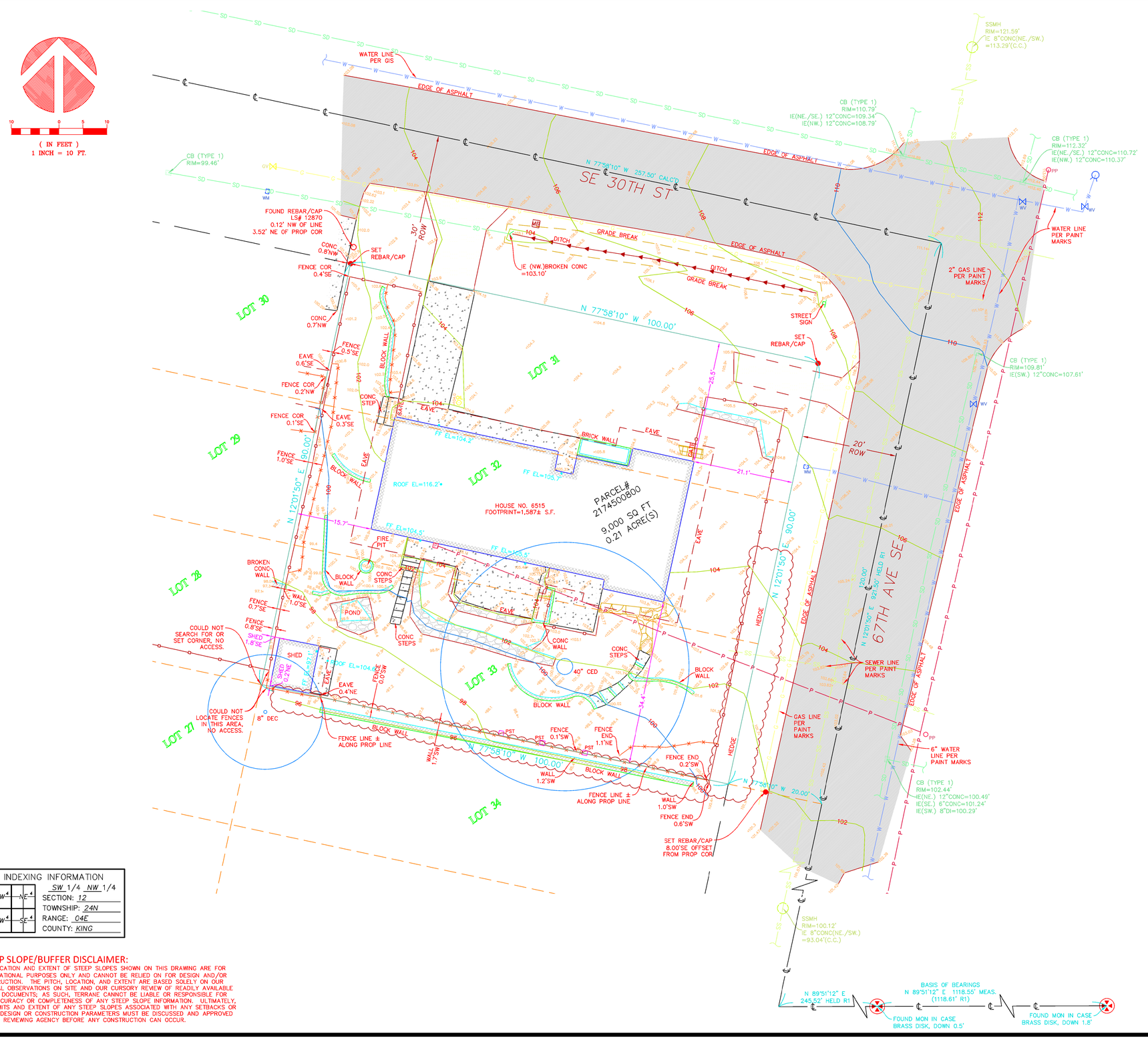
LEGEND

ASPHALT SURFACE	OIL: OIL FILL CAP
BUILDING	PAVER SURFACE
CENTERLINE ROW	PST: POST
CULVERT PIPE	P: POWER METER
CONCRETE SURFACE	POWER (OVERHEAD)
RETAINING WALL	PP: POWER POLE
DITCH (FLOWLINE)	REBAR AS NOTED (FOUND)
FENCE LINE (CHAIN LINK)	REBAR & CAP (SET)
FENCE LINE (WOOD)	ROCKERY
FIRE HYDRANT	SEWER LINE
FLAGSTONE SURFACE	SEWER MANHOLE
GAS LINE	SIGN (AS NOTED)
GV: GAS VALVE	SD: STORM DRAIN LINE
GRAVEL SURFACE	SIZE TYPE: TREE (AS NOTED)
HEDGE FOLIAGE LINE	W: WATER LINE
INLET (TYPE 1)	WM: WATER METER
NAIL AS NOTED	WV: WATER VALVE
MAILBOX (RESIDENTIAL)	

VICINITY MAP

N.T.S.





INDEXING INFORMATION

SW 1/4 NW 1/4
SECTION: 12
TOWNSHIP: 24N
RANGE: 04E
COUNTY: KING

STEEP SLOPE/BUFFER DISCLAIMER:

THE LOCATION AND EXTENT OF STEEP SLOPES SHOWN ON THIS DRAWING ARE FOR INFORMATIONAL PURPOSES ONLY AND CANNOT BE RELIED ON FOR DESIGN AND/OR CONSTRUCTION. THE PITCH, LOCATION, AND EXTENT ARE BASED SOLELY ON OUR GENERAL OBSERVATIONS ON SITE AND OUR CURSORY REVIEW OF READILY AVAILABLE PUBLIC DOCUMENTS; AS SUCH, TERRANE CANNOT BE LIABLE OR RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ANY STEEP SLOPE INFORMATION. ULTIMATELY, THE LIMITS AND EXTENT OF ANY STEEP SLOPES ASSOCIATED WITH ANY SETBACKS OR OTHER DESIGN OR CONSTRUCTION PARAMETERS MUST BE DISCUSSED AND APPROVED BY THE REVIEWING AGENCY BEFORE ANY CONSTRUCTION CAN OCCUR.

measure success

TOPOGRAPHIC & BOUNDARY SURVEY
PARCEL NO. 2174500800

JAYMARC HOMES

6515 SE 30TH ST
MERCER ISLAND, WA 98040

Terrane
10801 Main Street, Suite 102, Bellevue, WA 98004
phone 425.458.4488 support@terrane.net
www.terrane.net

JOB NUMBER:	202476
DATE:	12/30/2020
DRAFTED BY:	RSN
CHECKED BY:	JGM
SCALE:	1" = 10'

REVISION HISTORY

SHEET NUMBER
1 OF 1

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.

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* – The Site soils are identified from the City of Mercer island geological Survey as being "Vashon Subglacial Till"; not suitable for infiltration. – *Not Feasible*

2. Rain Garden/Bioretention – Infeasible due to lack of available space on the downgradient portion of the property (east side). Cannot remove trees in this area nor work under. – *Not Feasible*

3. Downspout Dispersion System – Lack of available flow path from the downspouts to the property line – *Not Feasible*.

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* – Soils are not compatible for infiltration type BMP's. - *Not Feasible*
   b. Rain Gardens BMP T5.14A – Lack of available space on the downgradient side of the property (east) – cannot remove trees; area being placed with fill. – *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*

The subject property is required to provide detention based upon a downstream constriction. The detention tank will be sized using the City of mercer island Standards. Additionally, the site topography slopes away from the public drainage within SE 30th Street; therefore, a pump station discharge will be sized in lieu of a restrictor control on the detention system.

DETENTION SIZING

Detention Tank Sizing

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%

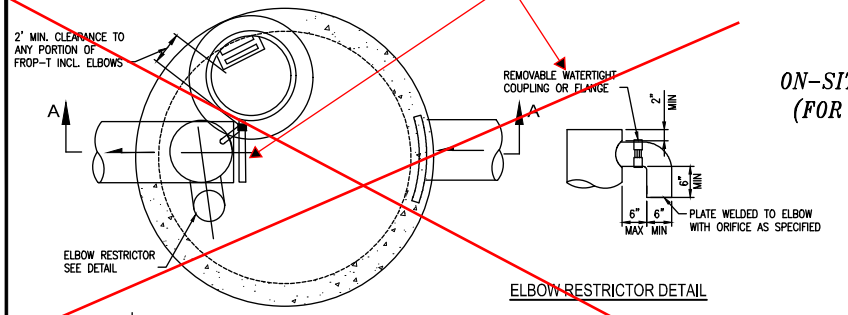
N/A on this project

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

OWNER: JayMarc Emerald
PERMIT #: _____
NEW PLUS REPLACED IMPERVIOUS SURFACE AREA (SF): 3,224 s.f.
SOIL TYPE: C

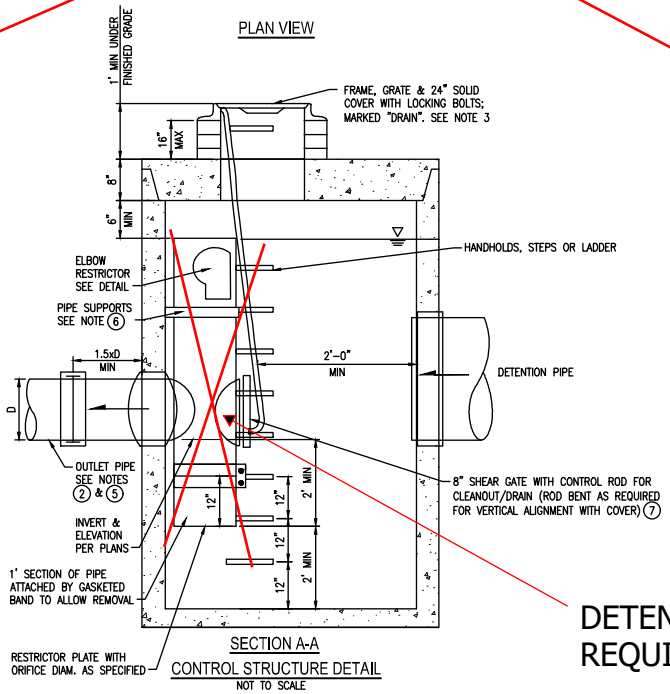
ADDRESS: 6515 SE 30th Street Mercer Island, WA
DETENTION PIPE DIA (INCH): 60"
PIPE MATERIAL: CMP

PREPARED BY: Offe Engineers, PLLC
PHONE: 425-260-3412
DATE: April 19, 2021
DETENTION PIPE LENGTH (FT): 26'
ORIFICE #1 DIA ___ INCH, ELEV _____
ORIFICE #2 DIA ___ INCH, ELEV _____



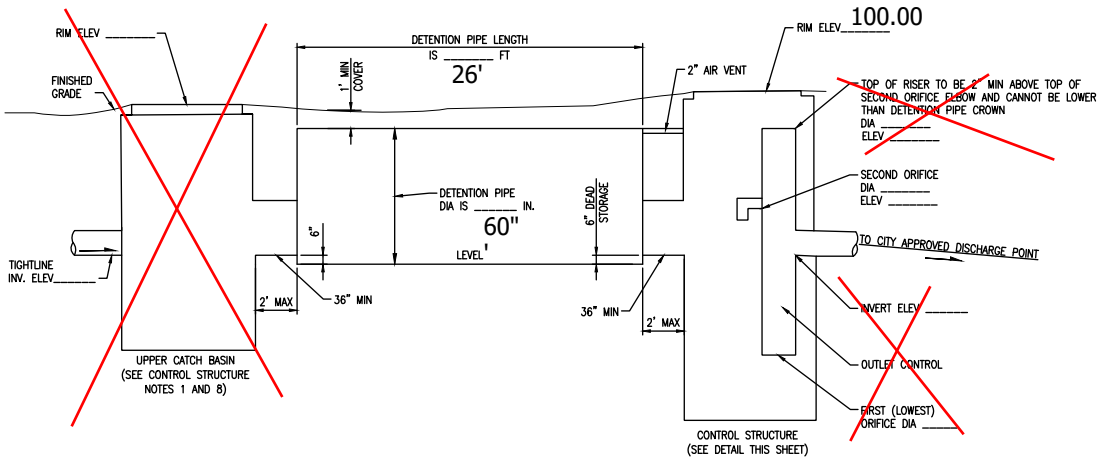
ELBOW RESTRICTOR DETAIL

PLAN VIEW



SECTION A-A

CONTROL STRUCTURE DETAIL
NOT TO SCALE



ON-SITE DETENTION SYSTEM
NOT TO SCALE (ENGINEER TO FILL IN BLANKS)

DETENTION RESTRICTOR NOT REQUIRED ON THIS PROJECT

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 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.
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 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.
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 (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.
4. FOOTING DRAINS SHALL NOT BE CONNECTED TO THE DETENTION SYSTEM.

PUMP SIZING

6515 SE 30th Street
Pump Design/Sizing

Inflow

100-year Rational Method for sizing

Using Isopluvials Map P(100)= 3.9 inches <<Based upon Western King County Isopluvials>

i(100)= (2.61) * Tc**(-0.63)
Tc - use 6.0 minutes (minimum)

i(100)= (2.61)*6.0**(-0.63)
i(100)= 0.844

therefore I(100)= i(100)*P(100)
I(100)= 0.844*3.9
I(100)= 3.29 inches per hour

C (n) Impervious Area
2675 square feet (roof/overhang area)
399 sq. feet (driveway)
150 sq. feet (other areas)
Area=0.074 acres

Only Impervious into detention system
C(n) = 0.900

Inflow = Q(100) Q(100)=C(n)*I(100)*Area
Q(100)= 0.90*3.29*0.074
Q(100)= 0.219 cfs
Q(100)= 0.219 * 448 gallons/minute
Q(100)= 98 gpm ***100 year flow rate***

Total Dynamic Head Calculations

Static Head CB #2 - connection (gravity) 102.85
CB #3 - Bottom 91.83
Static Head= 11.02 feet

2" pipe losses Pipe length 75 feet

2" bend losses

bends	each
90	2
45	3
tee	1

Head losses in pipe= 12.50 From friction loss calculation

TDH = 23.52

Liquid Friction Pressure Loss

Pressure Loss (psi): 5.43 **Head Loss (ft):** 12.5

Line Number: 6515 SE 30th Street	**Piping Length (ft):** 75
Date: 4/19/2021	**Short Radius Elbows:** 2
Nominal Pipe Size: 2	**45 degree Elbows :** 3
Pipe Schedule: SCH 40	**Tee Flow Through:** 1
Flow Rate (gpm): 98	
Viscosity (cP): 1	
Specific Gravity (water=1): 1	
Temperature (F): 40	
Pipe Roughness (ft): 0.000016	
Actual Pipe ID (in.): 2.067	
Fluid Velocity (ft/sec): 9.37	
Reynolds Number: 149944	
Flow Region: Turbulent	
Friction Factor: 0.017	
Overall K: 9.19	

'Copy and Paste' Pressure Loss or Head Loss into other applications
If any output is NaN click back button and make sure all Fluid and Piping and Valves and Fittings fields contain values, enter 0 if necessary

HD Fowler Company Submittal -
Product code: GUWS0511BF - 1/2HP 115V MANUAL SEWAGE PUMP 20' CORD 2" SOLIDS, 2" FIPT DISCHARGE FLANGE, GOULDS WS0511BF

Vendor: 71520 GOULDS PUMPS INC

ITT

Wastewater

Goulds Pumps

WS_BF Series Model 3887BF

Submersible Sewage Pump

Prosurance available for residential applications.

GOULDS PUMPS

Goulds Pumps is a brand of ITT Corporation.

www.goulds.com

Engineered for life

FEATURES

- **Impeller:** Cast iron, semi-open, non-clog, dynamically balanced with pump out vanes for mechanical seal protection.
- **Casing:** Cast iron flanged volute type for maximum efficiency. Designed for easy installation on A10-20 slide rail or base elbow rail systems.
- **Mechanical Seal:** Silicon Carbide vs. Silicon Carbide sealing faces for superior abrasive resistance, stainless steel metal parts, BUNA-N elastomers.
- **Shaft:** Corrosion resistant, 300 series stainless steel. Threaded design. Locknut on all models to guard against component damage on accidental reverse rotation.
- **Fasteners:** 300 series stainless steel.
- Capable of running dry without damage to components.
- Designed for continuous operation, when fully submerged.

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association — File #LR38549
Goulds Pumps is ISO 9001 Registered.

HD Fowler Company Submittal -

Product code: GUWS0511BF - 1/2HP 115V MANUAL SEWAGE PUMP 20' CORD 2" SOLIDS, 2" FIPT DISCHARGE FLANGE, GOULDS WS0511BF

Vendor: 71520 GOULDS PUMPS INC

ITT

GOULDS PUMPS
Wastewater

APPLICATIONS

Specifically designed for the following uses:

- Homes
- Sewage systems
- Dewatering/Effluent
- Water transfer
- Light industrial
- Commercial applications

Anywhere waste or drainage must be disposed of quickly, quietly and efficiently.

SPECIFICATIONS

Pump

- Solids handling capabilities: 2" maximum.
- Capacities: up to 185 GPM.
- Total heads: up to 38 feet TDH.
- Discharge size: 2" NPT threaded companion flange as standard. 3" option available but must be ordered separately. (Order no. A1-3)
- Temperature: 104°F (40°C) continuous
  140°F (60°C) intermittent.

MOTORS

- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer. All ratings are within the working limits of the motor.
- Class B insulation.

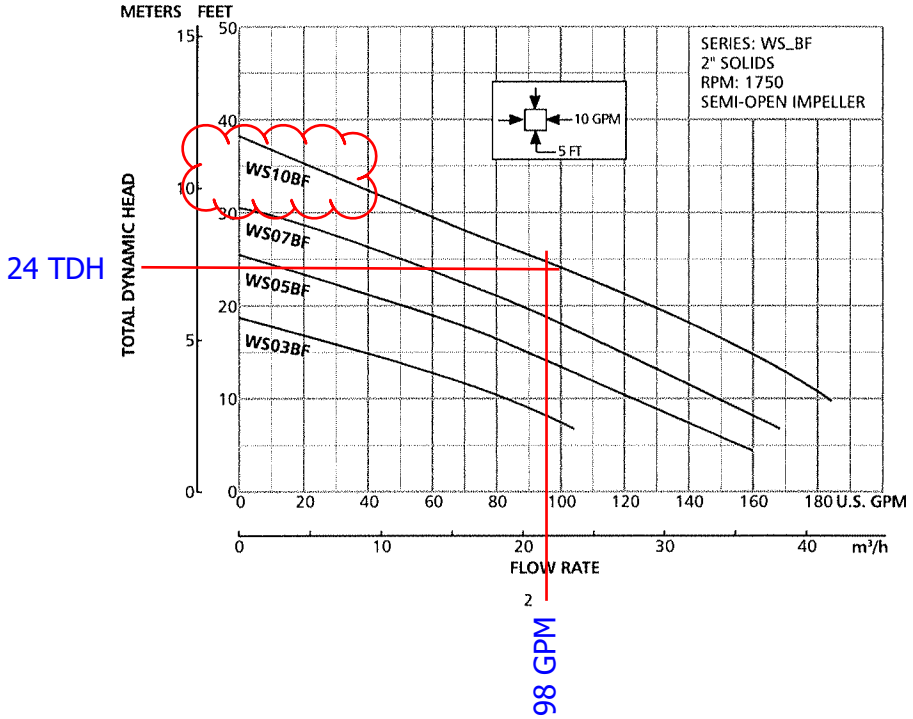
Single phase (60 Hz):

- Capacitor start motors for maximum starting torque.
- Built-in overload with automatic reset.
- SJTOW or STOW severe duty oil and water resistant power cords.
- ⅓ – 1 HP models have NEMA three prong grounding plugs.

Three phase (60 Hz):

- Class 10 overload protection must be provided in separately ordered starter unit.
- STOW power cords all have bare lead cord ends.

- **Designed for Continous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage when fully submerged.
- **Bearings:** Upper and lower heavy duty ball bearing construction.
- **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. Standard cord is 20'. Optional lengths are available.
- **Motor Cover O-ring:** Assures positive sealing against contaminant and oil leakage.



HD Fowler Company Submittal -

Product code: GUWS0511BF - 1/2HP 115V MANUAL SEWAGE PUMP 20' CORD 2" SOLIDS, 2" FIPT DISCHARGE FLANGE, GOULDS WS0511BF

Vendor: 71520 GOULDS PUMPS INC

ITT

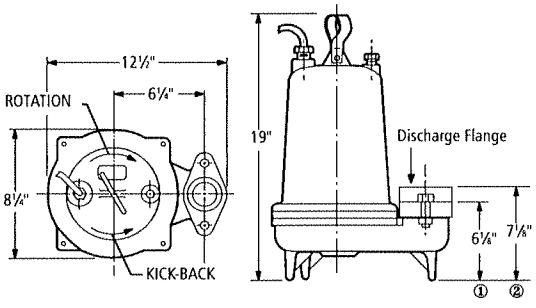
GOULDS PUMPS
Wastewater

MOTOR AND MODEL INFORMATION

ORDER NUMBER	HP	PHASE	VOLTS	RPM	IMPELLER DIA. (IN.)	MAX. AMPS	LOCKED ROTOR AMPS	KVA CODE	LOAD MOTOR EFF. %	RESISTANCE		WEIGHT (LBS.)
										START	LINE-LINE	
WS0311BF	0.33	1	115	1750	4.69	10.7	30.0	M	54	11.9	1.7	63
WS0318BF	0.33	1	208			6.8	19.5	K	51	9.1	4.2	
WS0312BF	0.33	1	230			4.9	14.1	L	53	14.5	8.0	
WS0511BF	0.5	1	115		5.00	14.5	31.1	J	55	9.3	1.4	65
WS0518BF	0.5	1	208			8.0	19.5	K	51	9.1	4.2	
WS0512BF	0.5	1	230			7.3	16.5	J	54	11.7	5.6	
WS0538BF	0.5	3	200			3.8	12.3	K	75	–	6.7	
WS0532BF	0.5	3	230			3.3	9.7	K	75	–	9.9	
WS0534BF	0.5	3	460			1.7	4.9	K	75	–	39.4	
WS0537BF	0.5	3	575			1.4	4.3	K	68	–	47.8	
WS0718BF	0.75	1	208		5.38	11.0	39.0	K	65	2.6	1.4	85
WS0712BF	0.75	1	230			9.4	24.8	J	57	4.8	2.3	
WS0738BF	0.75	3	200			4.1	21.2	H	74	–	4.3	
WS0732BF	0.75	3	230			3.6	17.3	J	76	–	5.6	
WS0734BF	0.75	3	460			1.8	8.9	J	76	–	22.4	
WS0737BF	0.75	3	575			1.5	7.3	J	71	–	29.2	
WS1018BF	1	1	208		5.75	14.0	39.0	K	65	2.6	1.4	
WS1012BF	1	1	230			12.3	30.5	H	60	4.3	1.8	
WS1038BF	1	3	200			6.0	21.2	H	74	–	4.3	
WS1032BF	1	3	230			5.8	17.3	J	76	–	5.6	
WS1034BF	1	3	460			2.9	8.9	J	76	–	22.4	
WS1037BF	1	3	575			2.4	7.3	J	71	–	29.2	

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)



Discharge Flange:

① 2" NPT standard

② 3" NPT optional (order an A1-3)

HD Fowler Company Submittal -

Product code: GUWS0511BF - 1/2HP 115V MANUAL SEWAGE PUMP 20' CORD 2" SOLIDS, 2" FIPT DISCHARGE FLANGE, GOULDS WS0511BF

Vendor: 71520 GOULDS PUMPS INC

ITT

Wastewater

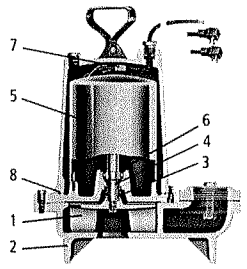
PERFORMANCE RATINGS (gallons per minute)

Order No.		WS03BF	WS05BF	WS07BF	WS10BF
HP ▶		⅓	½	¾	1
RPM ▶		1750	1750	1750	1750
Total Head Feet of Water	10 ▶	80	122	145	183
	15	36	90	116	152
	20	–	50	86	123
	25	–	–	48	95
	30	–	–	–	58
	35	–	–	–	20

COMPONENTS

Item No.	Description
1	Impeller
2	Casing
3	Mechanical Seal
4	Motor Shaft
5	Motor
6	Ball Bearings
7	Power Cable
8	Casing O-Ring

* For available repair parts, see repair parts book.

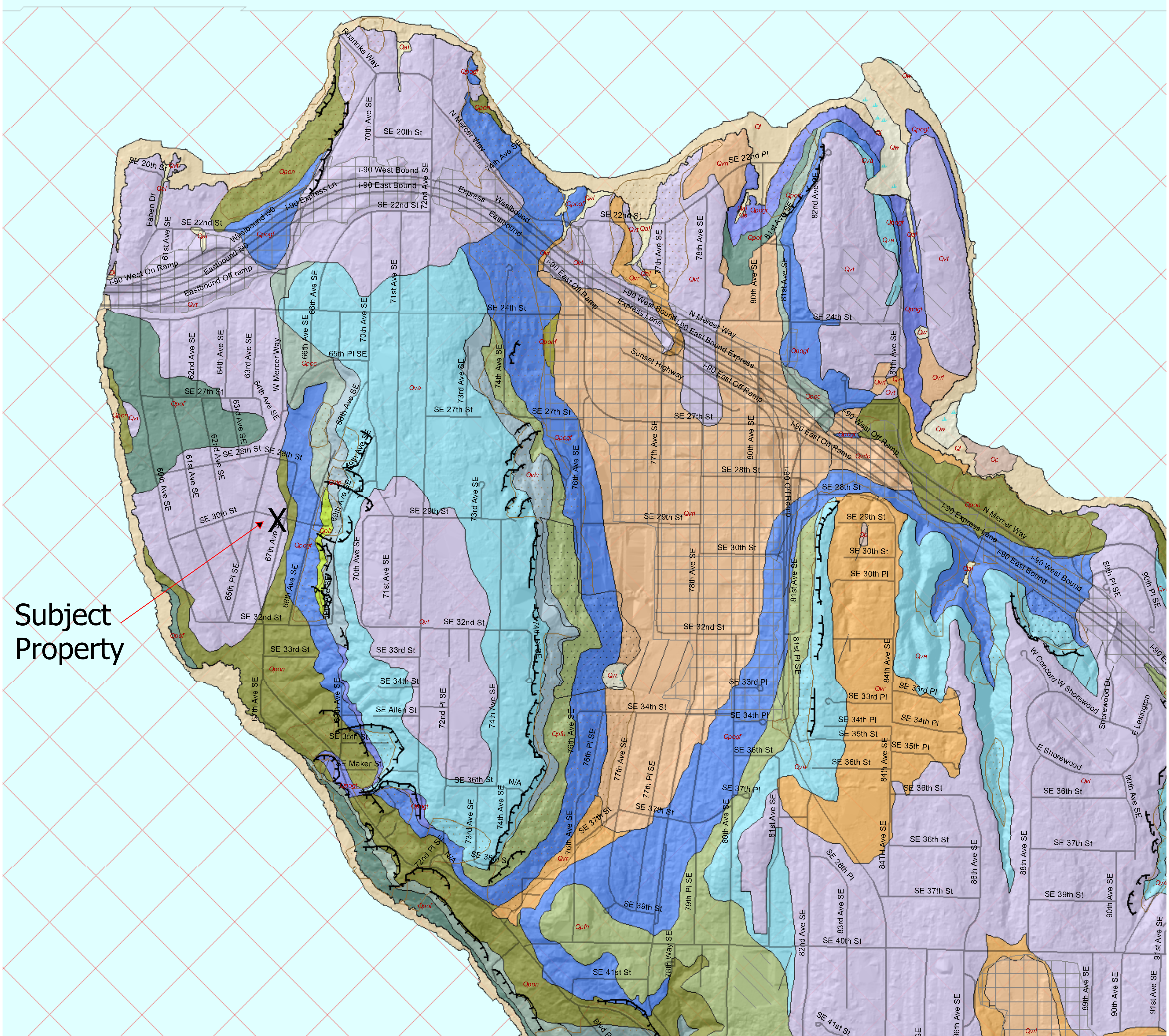


GOULDS PUMPS

B3887BF July, 2007

Engineered for life

CITY OF MERCER ISLAND GEOLOGICAL SURVEY MAP


Subject Property
X
SE 20th St
SE 22nd St
SE 22nd Pl
SE 24th St
65th Pl SE
SE 27th St
SE 28th St
SE 29th St
SE 30th St
SE 32nd St
SE 33rd St
SE 34th St
SE Allen St
SE 35th St
SE Maker St
SE 36th St
SE 37th St
SE 39th St
SE 40th St
SE 41st St
W Mercer Way
N Mercer Way
Sunset Highway
I-90 West Bound
I-90 East Bound
I-90 Express Ln
Eastbound Off ramp
I-90 West On Ramp
I-90 East Off Ramp
I-90 West Off Ramp
I-90 East On Ramp
Roanoke Way
W Concord
W Shorewood
E Shorewood
Shorewood Dr
E Lexington
60th Ave SE
61st Ave SE
62nd Ave SE
63rd Ave SE
64th Ave SE
65th Pl SE
66th Ave SE
67th Ave SE
68th Ave SE
70th Ave SE
71st Ave SE
72nd Ave SE
72nd Pl SE
73rd Ave SE
74th Ave SE
76th Ave SE
77th Ave SE
78th Ave SE
80th Ave SE
81st Ave SE
82nd Ave SE
83rd Ave SE
84th Ave SE
86th Ave SE
88th Ave SE
89th Pl SE
90th Ave SE
91st Ave SE
Qvt
Qva
Qpon
Qpof
Qpogf
Qvr
Qal
Qw
Ql
Qp

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

N

0 0.25 0.5 Miles

0 0.5 1 Kilometers

1:12,000

geomapnw.ess.washington.edu