Stormwater Drainage Report
4104 83rd Avenue SE
Mercer Island, Washington
KC Tax Parcel #362650-0040
Permit #: 2402-144

Prepared For:

JayMarc Diamond, LLC
Attn.: Gary Upper
7525 SE 24th Street
Suite #520
Mercer Island, Washington 98040
425-281-2706
Gary@jaymarchomes.com

July 26, 2024

Prepared By:

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

07/26/2024

TABLE OF CONTENT

Section 1: Project Narrative:

The subject property is located on the west of Island Crest Way and North of SE 42nd Street. The subject property takes access from the 83rd Avenue SE on at the northwest corner of the property. There is an existing house, long asphalt driveway, and patio area on the property. These features will all be removed for the new residence. All public and franchise utilities are located on the west side within 83rd Avenue SE.

The site soils are characterized between Vashon Glacial Till and infeasible for infiltration type BMPs by Cobalt Geosciences, Geotechnical Evaluation attached within this Report. City staff has determined that on-site detention is required for this new development, sizing of on-site system is included within the Report.

The property was visited in September and November 2023 to verify runoff patterns and possible storm water discharge options. The downstream system was reviewed and walked, where possible.

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

TOPOGRAPHIC & BOUNDARY SURVEY

LEGAL DESCRIPTION

PER PERSONAL REPRESENTATIVE'S DEED RECORDING #9511090268

LOT 8, BLOCK 1, ISLAND RIDGE TRACTS, ACCORDING TO THE PLAT RECORDED IN VOLUME 47 OF PLATS, PAGE 71, IN KING COUNTY, WASHINGTON.

BASIS OF BEARINGS

N 89°45'50" E BETWEEN FOUND CENTERLINE MONUMENTATION ALONG SE 42ND ST PER PLAT

REFERENCES

R1. RECORD OF SURVEY, VOL. 132, PG. 105, RECORDS OF KING COUNTY, WASHINGTON.
R2. RECORD OF SURVEY, VOL. 71, PG. 216, RECORDS OF KING COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD88 PER CITY OF MERCER ISLAND BENCHMARK #3060
CONC MON W/ 2" BRASS CAP W/ PUNCH, DOWN 0.75'.
(INTERSECTION OF ISLAND CREST WAY & SE 42ND ST)
ELEV: 284.936'

SITE TEMP. BENCHMARK
DESCRIPTION: SET BENCHTIE IN PP
LOCATION: WEST SIDE 83RD AVE SE
ELEVATION: 274.71'

SURVEYOR'S NOTES

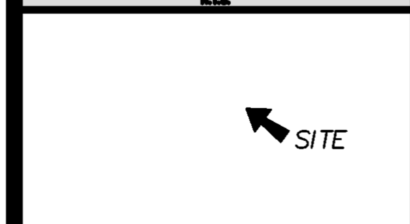
1. THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN JULY OF 2023. THE FIELD DATA WAS COLLECTED AND RECORDED ON MAGNETIC MEDIA THROUGH AN ELECTRONIC THEODOLITE. THE DATA FILE IS ARCHIVED ON DISC OR CD. WRITTEN FIELD NOTES MAY NOT EXIST. CONTOURS ARE SHOWN FOR CONVENIENCE ONLY. DESIGN SHOULD RELY ON 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. 3626500040
5. SUBJECT PROPERTY AREA PER THIS SURVEY IS 14,078 S.F. (0.32 ACRES)
6. EXISTING STRUCTURE(S) LOCATION AND DIMENSIONS ARE MEASURED FROM THE FACE OF THE SIDING UNLESS OTHERWISE NOTED.
7. FIELD DATA FOR THIS SURVEY WAS OBTAINED BY DIRECT FIELD MEASUREMENTS WITH A CALIBRATED ELECTRONIC 3-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

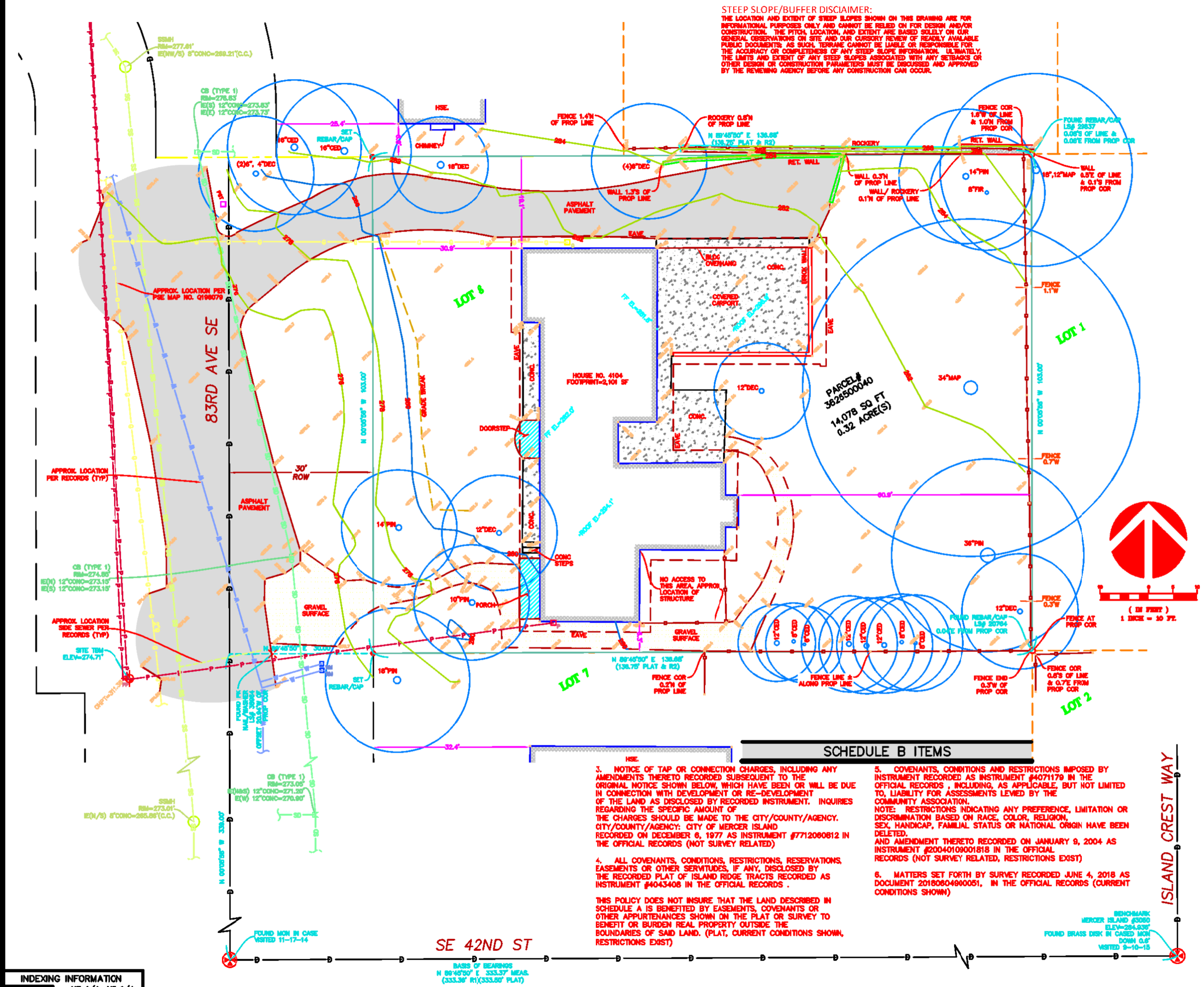
	BENCHMARK	PP	POWER POLE
	CENTERLINE ROW	P	POWER (OVERHEAD)
	FENCE LINE (WOOD)		INLET (TYPE 1)
	MONUMENT (IN CASE, FOUND)	SD	STORM DRAIN LINE
	PROPERTY LINES (ADJACENT)		SEWER MANHOLE
	PROPERTY LINE (SUBJECT)	SS	SEWER LINE
	REBAR & CAP (SET)	WM	WATER METER
	REBAR AS NOTED (FOUND)	W	WATER LINE
	RETAINING WALL	BLDG	BUILDING
	RIGHT-OF-WAY LINES	C.C.	CENTER CHANNEL
	SUBDIVISION LINES	CALC'D	CALCULATED
	BUILDING	CB	CATCH BASIN
PST	POST	COS	CITY OF SEATTLE
SIZE TYPE	TREE (AS NOTED)	CONC	CONCRETE
	ASPHALT SURFACE	COR	CORNER
	CONCRETE SURFACE	DEC	DECIDUOUS
	DECK	ELEV	ELEVATION
	GRAVEL SURFACE	EVG	EVERGREEN
	ROCKERY	FF	FINISH FLOOR
G	GAS METER	G	GAS
	GAS LINE	LS#	LAND SURVEYOR NUMBER
P	POWER METER	MEAS	MEASURED
		MON	MONUMENT
		OHP	OVERHEAD POWER
		PROP	PROPERTY
		SD	SERVICE DRAIN
		SSMH	SANITARY SEWER MANHOLE
		SF	SQUARE FEET

VICINITY MAP

N.T.S.



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. TERRANE CANNOT BE HELD 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.



SCHEDULE B ITEMS

3. NOTICE OF TAP OR CONNECTION CHARGES, INCLUDING ANY AMENDMENTS THERETO RECORDED SUBSEQUENT TO THE ORIGINAL NOTICE SHOWN BELOW, WHICH HAVE BEEN OR WILL BE DUE IN CONNECTION WITH DEVELOPMENT OR RE-DEVELOPMENT OF THE LAND AS DISCLOSED BY RECORDED INSTRUMENT. INQUIRIES REGARDING THE SPECIFIC AMOUNT OF THE CHARGES SHOULD BE MADE TO THE CITY/COUNTY/AGENCY.
CITY/COUNTY/AGENCY: CITY OF MERCER ISLAND
RECORDED ON DECEMBER 6, 1977 AS INSTRUMENT #7712060812 IN THE OFFICIAL RECORDS (NOT SURVEY RELATED)

4. ALL COVENANTS, CONDITIONS, RESTRICTIONS, RESERVATIONS, EASEMENTS OR OTHER SERVITUDES, IF ANY, DISCLOSED BY THE RECORDED PLAT OF ISLAND RIDGE TRACTS RECORDED AS INSTRUMENT #4043408 IN THE OFFICIAL RECORDS .

THIS POLICY DOES NOT INSURE THAT THE LAND DESCRIBED IN SCHEDULE A IS BENEFITED BY EASEMENTS, COVENANTS OR OTHER APPURTENANCES SHOWN ON THE PLAT OR SURVEY TO BENEFIT OR BURDEN REAL PROPERTY OUTSIDE THE BOUNDARIES OF SAID LAND. (PLAT, CURRENT CONDITIONS SHOWN, RESTRICTIONS EXIST)

5. COVENANTS, CONDITIONS AND RESTRICTIONS IMPOSED BY INSTRUMENT RECORDED AS INSTRUMENT #4071179 IN THE OFFICIAL RECORDS , INCLUDING, AS APPLICABLE, BUT NOT LIMITED TO, LIABILITY FOR ASSESSMENTS LEVIED BY THE COMMUNITY ASSOCIATION.
NOTE: RESTRICTIONS INDICATING ANY PREFERENCE, LIMITATION OR DISCRIMINATION BASED ON RACE, COLOR, RELIGION, SEX, HANDICAP, FAMILIAL STATUS OR NATIONAL ORIGIN HAVE BEEN DELETED.
AND AMENDMENT THERETO RECORDED ON JANUARY 9, 2004 AS INSTRUMENT #20040109001818 IN THE OFFICIAL RECORDS (NOT SURVEY RELATED, RESTRICTIONS EXIST)

6. MATTERS SET FORTH BY SURVEY RECORDED JUNE 4, 2018 AS DOCUMENT 20180604900051, IN THE OFFICIAL RECORDS (CURRENT CONDITIONS SHOWN)

INDEXING INFORMATION
NE 1/4 NE 1/4
SECTION: 13
TOWNSHIP: 24N
RANGE: 04E, W.M.
COUNTY: KING

TOPOGRAPHIC & BOUNDARY SURVEY
PARCEL NO. 3626500040
JAYMARC HOMES, LLC
4104 83RD AVE SE
MERCER ISLAND, WA 98040

JOB NUMBER: 23/284
DATE: 08/02/23
DRAFTED BY: TDB
CHECKED BY: EJG/TLR/TRM
SCALE: 1" = 10'
REVISION HISTORY
1/4/23 ADD TITLE
SHEET NUMBER
1 OF 1

Section 2: Site Evaluation

Total Lot Area = 14,078 square feet (0.32 acres)

EXISTING CONDITIONS

Impervious:

Roof area = 3,708 sq. feet

Uncovered walkway = 542 sq. feet

Uncovered patio = 138 sq. feet

Uncovered driveway = 1,563 sq. feet ((PGHS))

Subtotal: 5,951 sq. feet

Pervious:

Lawn, trees, landscaping = *8,127 sq. feet*

DEVELOPED CONDITIONS

Impervious (hard) surfaces:

House roof area w/overhang = 4,687 sq. feet

Uncovered driveway = 1,069 sq. feet ((PGHS))

Uncovered walkway/pads = 211 sq. feet

Total Impervious (Hard) Surfaces = 5,967 sq. feet

Pervious Surfaces:

Ex. Lawn, trees, landscaping = 7,974 *sq. feet*

Added landscaping = 137 sq. feet

Total Pervious Surfaces = 8,111 square feet

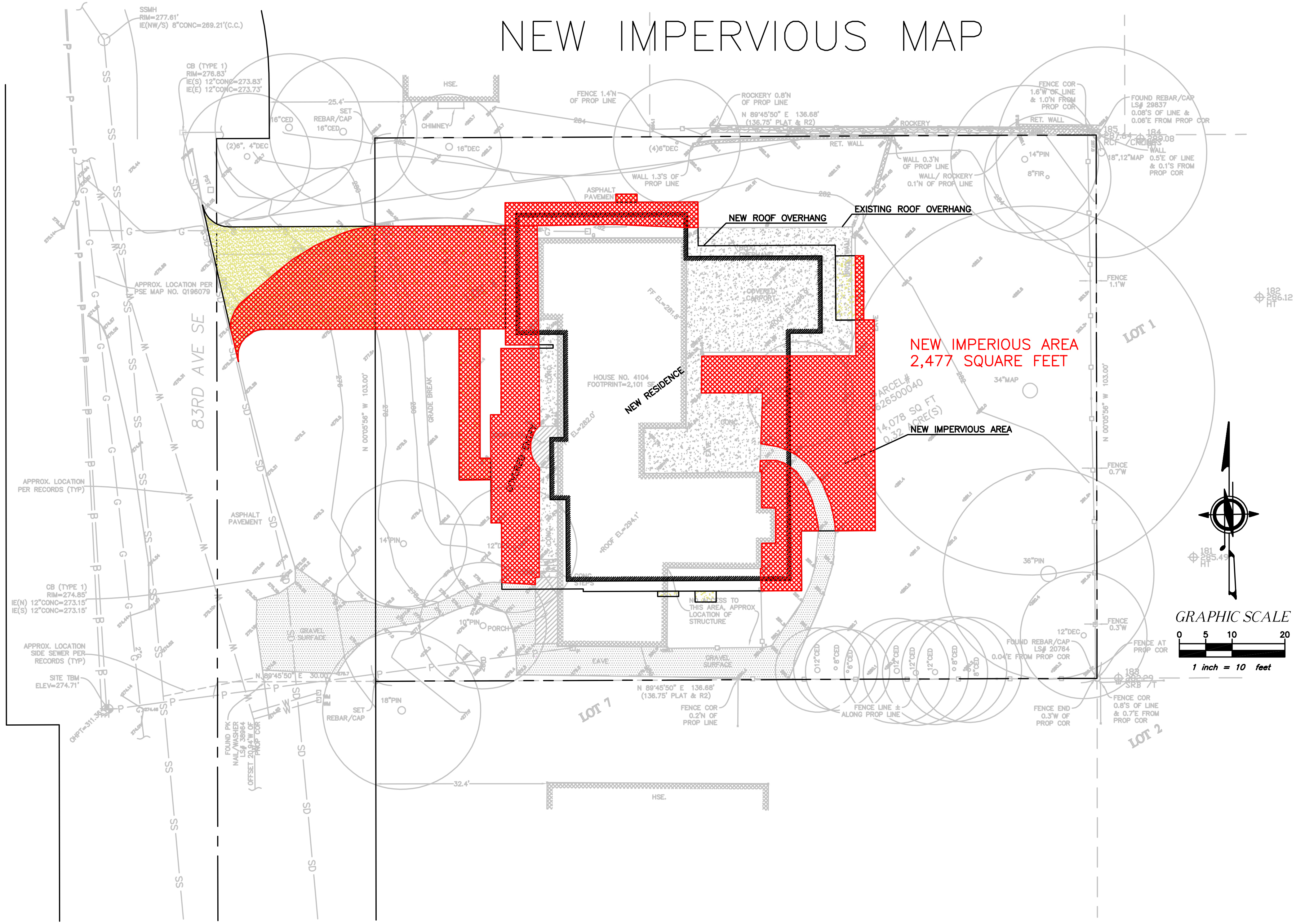
((PGHS)) -Pollution Generating Hard Surface

Summary of Project Information

Project Site Area	14,078 square feet
Existing Impervious Area	5,921 sq. feet
Existing Impervious Coverage	42.0%
New Impervious Area	2,477 sq. feet (see attached New Impervious Map – next page)
Replaced Impervious Area	3,490 sq. feet
New plus Replaced Impervious	5,967 square feet
Proposed Impervious Area	5,967 square feet
Converted pervious: Native to lawn	0 sq. feet
Converted pervious: Native to pasture	0 sq. feet
Total Area of Land Disturbance	9,000 square feet

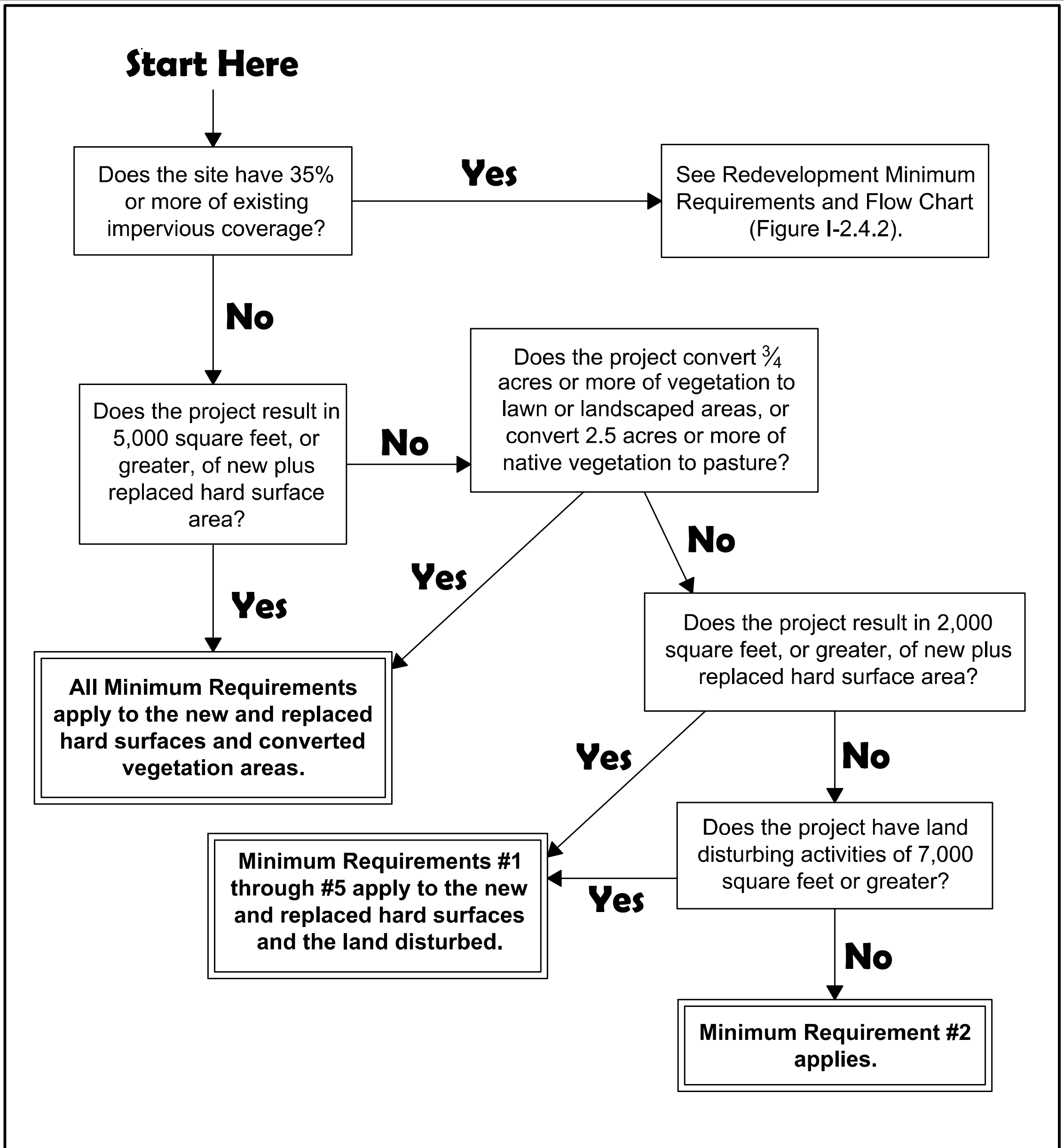
The existing property has greater than 35% (42.0%) imperious coverage and the total proposed project new plus replaced impervious surfaces will be greater than 5,000 (5,967) square feet; using Figure I-2.4.2 – *"Flow Chart for Determining Minimum Requirements for Redevelopment"* page 38, 2014 Stormwater Management Manual for Western Washington, Minimum Requirements #1 – #9 apply to this project.

NEW IMPERVIOUS MAP



FLOW CHART FIGURE II-2.4.1

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

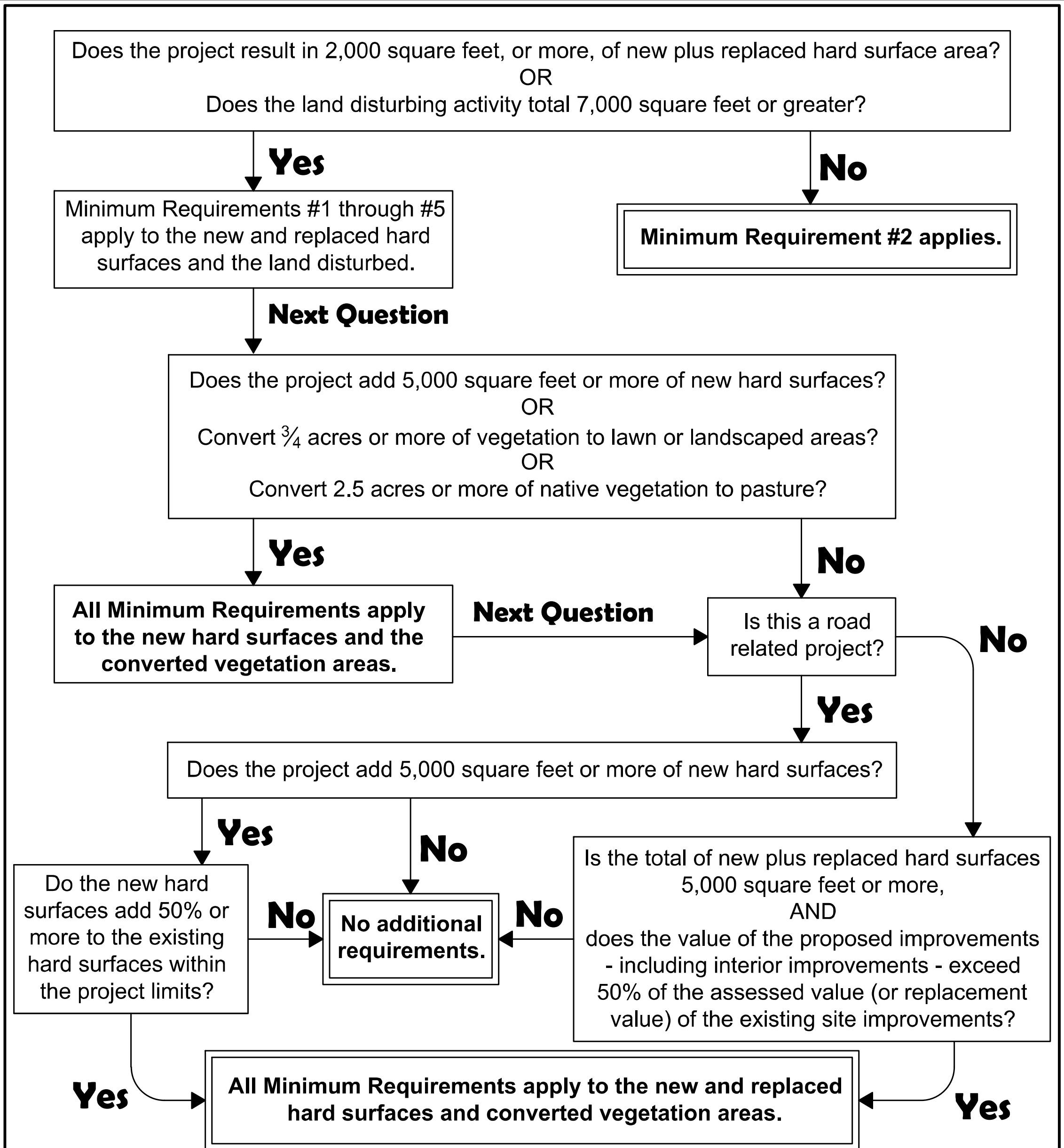


DEPARTMENT OF ECOLOGY
State of Washington

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

Revised June 2015

Figure I-2.4.2 Flow Chart for Determining Requirements for Redevelopment



DEPARTMENT OF ECOLOGY State of Washington

Figure I-2.4.2
Flow Chart for Determining Requirements for Redevelopment

Revised June 2015

Section 3: Minimum Requirements

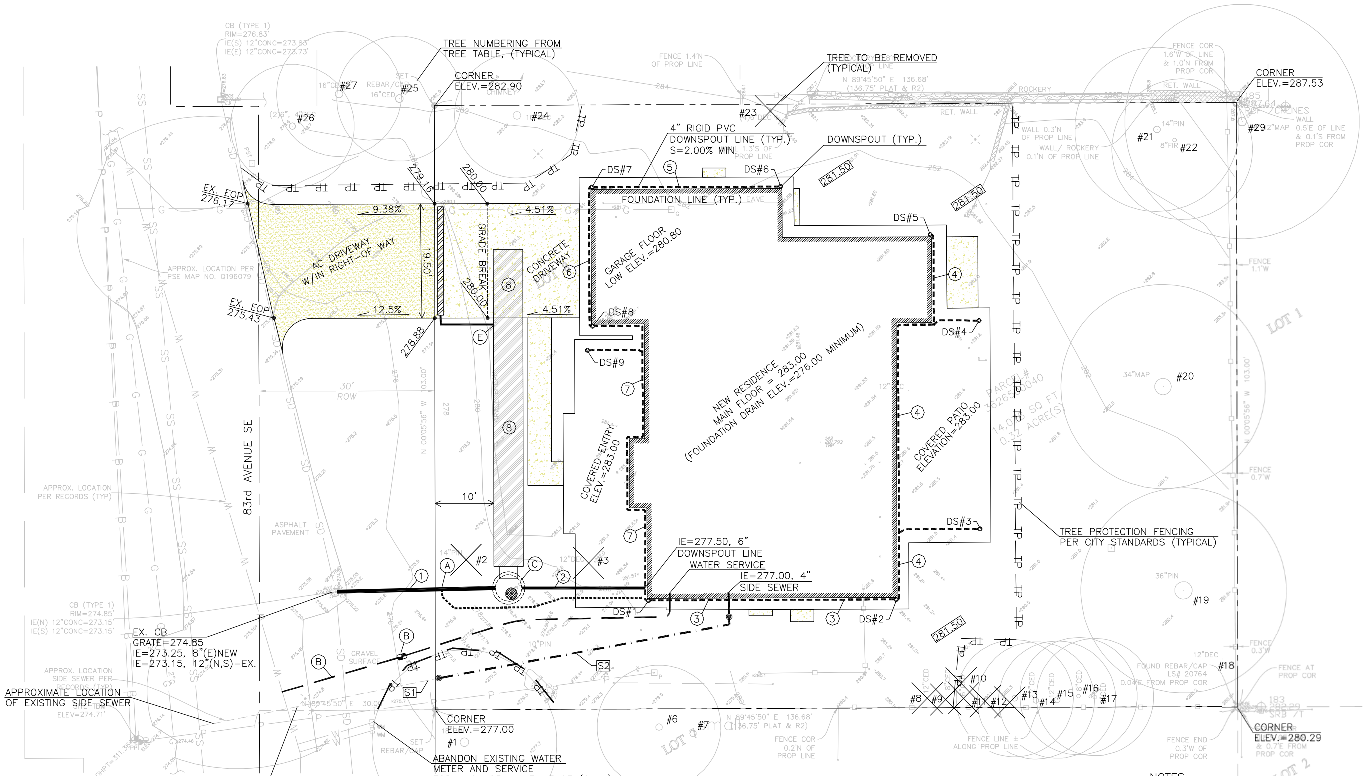
Based upon the Flow Chart Figure I-2.4.1 and I-2.4.2 (Amended December 2014 SWMMWW, DOE Manual), all Minimum Requirements 1-9 apply to this project.

Section 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.

NE 1/4 OF THE NE 1/4 OF SECTION 13, TOWNSHIP 24 NORTH., RANGE 4 EAST, W.M., KING COUNTY, WA.

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILIITES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

CALL BEFORE YOU DIG: 811



LEGEND

ASPHALT SURFACE		EXISTING SPOT ELEVATIONS	
BRICK SURFACE		MONUMENT IN CASE (FOUND)	
BUILDING		POWER METER	
CENTERLINE ROW		POWER (OVERHEAD)	
CLEANOUT		POWER POLE	
CULVERT PIPE		REBAR AS NOTED (FOUND)	
CONCRETE SURFACE		REBAR & CAP (SET)	
RETAINING WALL		ROCKERY	
DECK		SEWER LINE	
FENCE LINE (CHAIN LINK)		SEWER MANHOLE	
FENCE LINE (WOOD)		STORM DRAIN LINE	
GAS METER		TELEPHONE (OVERHEAD)	
GRAVEL SURFACE		TELEPHONE SENTRY	
HEDGE FOLIAGE LINE		WATER METER	
INLET (TYPE 1)		POWER TRANSFORMER POLE	
MAILBOX (RESIDENTIAL)		TREE (AS NOTED)	

ONSITE TREE TABLE

ID	Species	Dbh	Dripline	Classification	Limit of Development LOD	RETAIN	REMOVE
2	Blue spruce	12	16	Significant	10		yes
3	Flowering cherry	14	24	Significant	14		yes
4	Laceleaf Maple	3	5	Small Tree	N/A		yes
5	Mugo Pine	5	8	Small Tree	N/A		yes
8	Leyland cypress	12	18	Significant	10		yes
9	Leyland cypress	5	8	Small Tree	N/A		yes
10	Leyland cypress	4	6	Small Tree	N/A		yes
11	Leyland cypress	4	6	Small Tree	N/A		yes
12	Leyland cypress	3	6	Small Tree	N/A		yes
13	Leyland cypress	10	12	Significant	10	yes	
14	Leyland cypress	10	14	Significant	10	yes	
15	Leyland cypress	10	14	Significant	10	yes	
16	Leyland cypress	6	8	Small Tree	10	yes	
17	Leyland cypress	6	8	Small Tree	10	yes	
18	Hawthorn	10	22	Exeptional	12	yes	
19	Douglas-fir	40	42	Exceptional	116	yes	
20	Big leaf maple	46.0	79	Exceptional	16	yes	
21	Douglas-fir	8	16	Small Tree	10	yes	
22	Douglas-fir	14	30	Significant	16	yes	
23	Goldenchain tree	18		Dead	N/A		yes
24	Vine Maple	10	18	Exceptional	10	yes	
27	Evergreen Magnolia	6	10	Small Tree	14		yes
28	Hawthorn	10	18	Exceptional	18	yes	

OFFSITE

1	Ponderosa Pine	18	28	Significant	15		
6	Saucer magnolia	7	16	Small Tree	10		
25	Leyland Cypress	10	18	Significant	10		
26	Leyland Cypress	10	18	Significant	10		

NOTE: A TV INSPECTION OF THE EXISTING SIDE SEWER TO THE CITY SEWER MAIN IN WEST MERCER WAY IS REQUIRED PRIOR TO ANY WORK RELATED TO THE SIDE SEWER. IF THE RESULT OF THE TV INSPECTION IS NOT IN SATISFACTORY CONDITION, AS DETERMINED BY THE CITY OF MERCER ISLAND INSPECTOR, THE REPLACEMENT OF THE EXISTING SIDE SEWER IS REQUIRED TO THE SEWER MAIN.

SIDE SEWER NOTES

- S1 APPROXIMATE LOCATION OF EXISTING SANITARY SIDE SEWER.
- S2 INSTALL 55LF., 4" PVC SIDE SEWER @ MIN. 2% SLOPE W/SANITARY SEWER CLEANOUTS

NOTES:

- A 4" FOUNDATION DRAIN CONNECTION IE=273.60, 8"x4" WYE
- B INSTALL 1-1/2" METER AND 2" SERVICE LINE PER CITY OF MERCER ISLAND STANDARD PLAN W-14.
  NOTE: CONTRACTOR TO COORDINATE FINAL LOCATION OF NEW METER WITH CITY OF MERCER ISLAND INSPECTOR AT TIME OF CONSTRUCTION
- C CB#1, CONTROL STRUCTURE, TYPE II-54"ø ((SEE DETAIL ON SHEET 3 OF 4)) W/SOLID LOCKING LID
  RIM=280.30
  OVERFLOW=278.68, 8"(TOP OF TEE)
  IE=276.50, 6"(E)-DOWNSPOUT LINE
  IE=273.40, 36"(N), 8"(W)
  ELEV.=271.40, 8"(BOTTOM OF TEE)
  INSIDE BOTTOM=269.40
- D 20' SLOT DRAIN GRATE ELEV.=VARIES (MIN.=278.85) IE=277.10, 4"(E)
- E 4" WATER TIGHT CONNECTION IE=275.64, 4"

STORM PIPE TABLE

1. 27LF., 8" D.I. @ S=0.50%
2. 21LF., 6" PVC SDR-35 @ S=4.76%
3. 42LF., 4" PVC SDR-35 @ S=2.00%
4. 69LF., 4" PVC SDR-35 @ S=2.00%
5. 32LF., 4" PVC SDR-35 @ S=4.75%
6. 24LF., 4" PVC SDR-35 @ S=2.00%
7. 62LF., 4" PVC SDR-35 @ S=2.00%
8. 54LF., 60" CMP @S=0.50%

DOWNSPOUT TABLE

DS#1	GROUND=281.50 DOWNSPOUT LINE=278.45, 4"
DS#2	GROUND=281.50 DOWNSPOUT LINE=279.30, 4"
DS#3	CONCRETE=283.00 DOWNSPOUT LINE=281.00, 4"
DS#4	CONCRETE=283.00 DOWNSPOUT LINE=281.00, 4"
DS#5	GROUND=281.50 DOWNSPOUT LINE=280.67, 4"
DS#6	GROUND=281.50 DOWNSPOUT LINE=280.67, 4"
DS#7	GROUND=280.50 DOWNSPOUT LINE=279.15, 4"
DS#8	GROUND=280.50 DOWNSPOUT LINE=278.67, 4"
DS#9	CONCRETE=283.00 DOWNSPOUT LINE=281.00, 4"

NOTE: CONNECT 4" FOUNDATION DRAIN AT LOCATION SHOWN ON PLANS - ONLY!

NOTE: 4" PERFORATED FOUNDATION DRAIN REQUIRED BUT NOT SHOWN ON PLAN, CONNECT WHERE SHOWN ON PLAN, WYE INTO DETENTION TANK OUTFALL

NOTE: THE LAWN AND LANDSCAPE AREAS ARE REQUIRED TO PROVIDE POST-CONSTRUCTION SOIL QUALITY AND DEPTH IN ACCORDANCE WITH BMP T5.13. THE PROJECT CIVIL ENGINEER MUST PROVIDE A LETTER OF CERTIFICATION TO ENSURE THAT THE LAWN AND LANDSCAPE AREAS ARE MEETING THE POST-CONSTRUCTION SOIL QUALITY AND DEPTH REQUIREMENTS SPECIFIED ON THE APPROVED PLAN SET PRIOR TO FINAL INSPECTION OF THE PROJECT.

STORM PIPE PVC SHALL BE SDR-35 PVC AT SLOPE=2.00% MINIMUM (TYPICAL) UNLESS OTHERWISE NOTED

IMPERVIOUS SURFACES:
ROOF AREA (UNDER EAVES) = 4,687 SQ. FEET
UNCOVERED DRIVEWAY AREA = 1,069 SQ. FEET
UNCOVERED PAVER WALKWAY = 122 SQ. FEET
UNCOVERED CONCRETE PADS = 89 SQ. FEET
TOTAL IMPERVIOUS AREAS = 5,967 SQ. FEET

GRAPHIC SCALE
0 5 10 20
1 inch = 10 feet

PERMIT #: 2402-144

REV. NO.	DATE	DESCRIPTION
2	07/26/24	REVISED HOUSE LAYOUT
1	12/20/23	REVISED DETENTION TANK PER RUJIEMAIL 12/19/2023

DARRELL L. OFFE JR. STATE OF WASHINGTON 27460 REGISTERED PROFESSIONAL ENGINEER 07/26/2024

OFFE ENGINEERS

DESIGNED BY DLO | DRAWN BY SL$ | CHECKED BY DLO

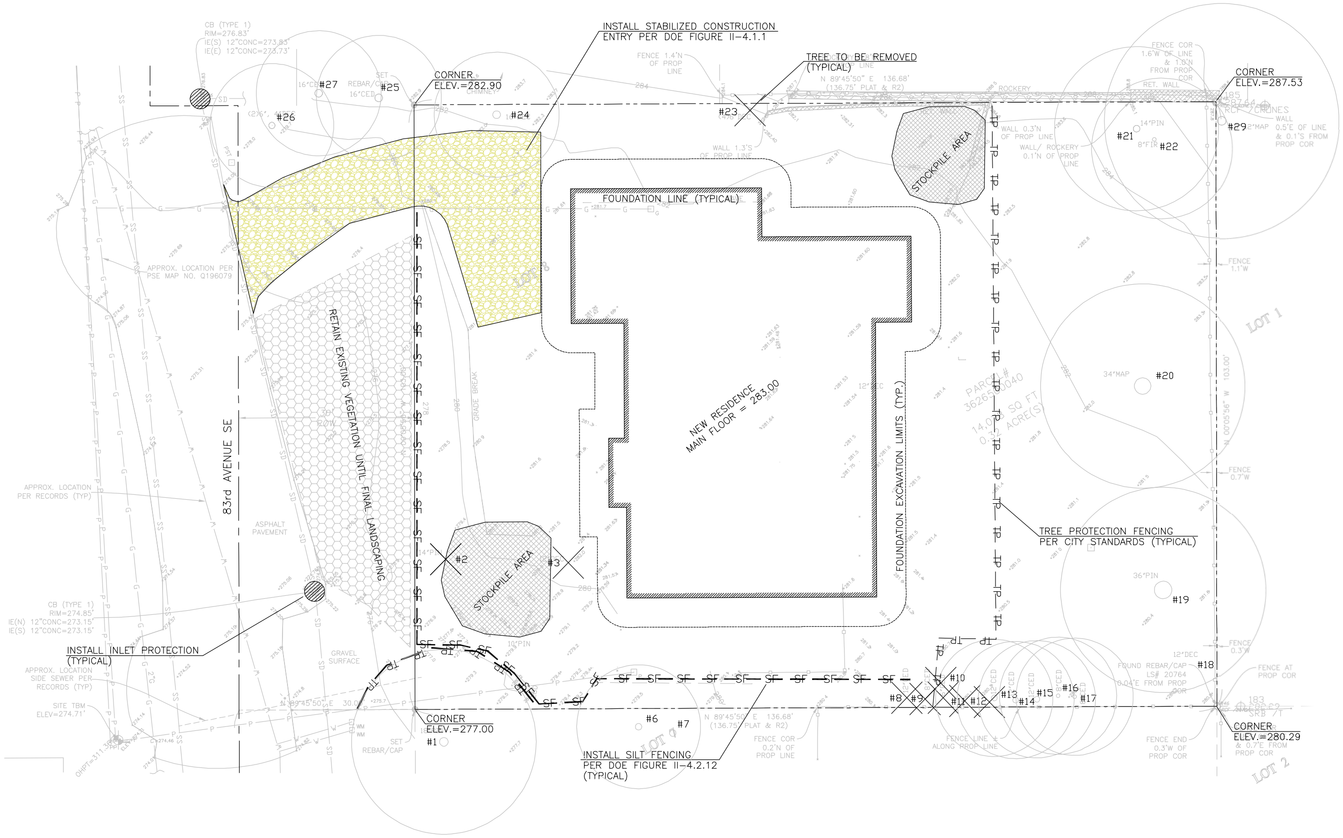
PROJECT: 4104 83rd Avenue SE
CLIENT: JayMarc Diamond, LLC
SHEET CONTENT: Utility & Tree Plan

DATE 07/26/2024
JOB NO.
DWG NO.
SHEET 2 OF 4

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

A Construction Stormwater Pollution Prevention Plan (CSWPP) has been prepared and included within this Report. The CSWPP plan 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: the use of the existing asphalt driveway (on the north side) to provide construction access from 83rd Avenue SE; installing filter fabric silt fencing along the down gradient property lines (west and south); installation of filter socks within the public catch basins located within 83rd Avenue SE; retention of native vegetated areas including tree/vegetation retention within the rear (east) and front (west) yards; and the use straw or chipped materials placed over exposed disturbed soils to prevent runoff from carrying solids.

NE 1/4 OF THE NE 1/4 OF SECTION 13, TOWNSHIP 24 NORTH., RANGE 4 EAST, W.M., KING COUNTY, WA.



LEGEND

- ASPHALT SURFACE
- BRICK SURFACE
- BUILDING
- CENTERLINE ROW
- CLEANOUT
- CULVERT PIPE
- CONCRETE SURFACE
- RETAINING WALL
- DECK
- FENCE LINE (CHAIN LINK)
- FENCE LINE (WOOD)
- GAS METER
- GRAVEL SURFACE
- HEDGE FOLIAGE LINE
- INLET (TYPE 1)
- MAILBOX (RESIDENTIAL)
- EXISTING SPOT ELEVATIONS
- MONUMENT IN CASE (FOUND)
- POWER METER
- POWER (OVERHEAD)
- POWER POLE
- REBAR AS NOTED (FOUND)
- REBAR & CAP (SET)
- ROCKERY
- SEWER LINE
- SEWER MANHOLE
- STORM DRAIN LINE
- TELEPHONE (OVERHEAD)
- TELEPHONE SENTRY
- WATER METER
- POWER TRANSFORMER POLE
- TREE (AS NOTED)

ONSITE TREE TABLE

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TABLE OF CONTENT

GRAPHIC SCALE

0 5 10 20

1 inch = 10 feet

PERMIT #: 2402-144

REV.NO.	DATE	DESCRIPTION
1	07/26/24	REVISED HOUSE LAYOUT

07/26/2024

OFFE ENGINEERS

DESIGNED BY DLO

DRAWN BY SLS

CHECKED BY DLO

PROJECT 4104 83rd Avenue SE

CLIENT JayMarc Diamond, LLC

SHEET CONTENT Temp. Erosion & Sedmientation Control Plan

DATE 07/26/2024

JOB NO.

DWG NO.

SHEET 1 OF 4

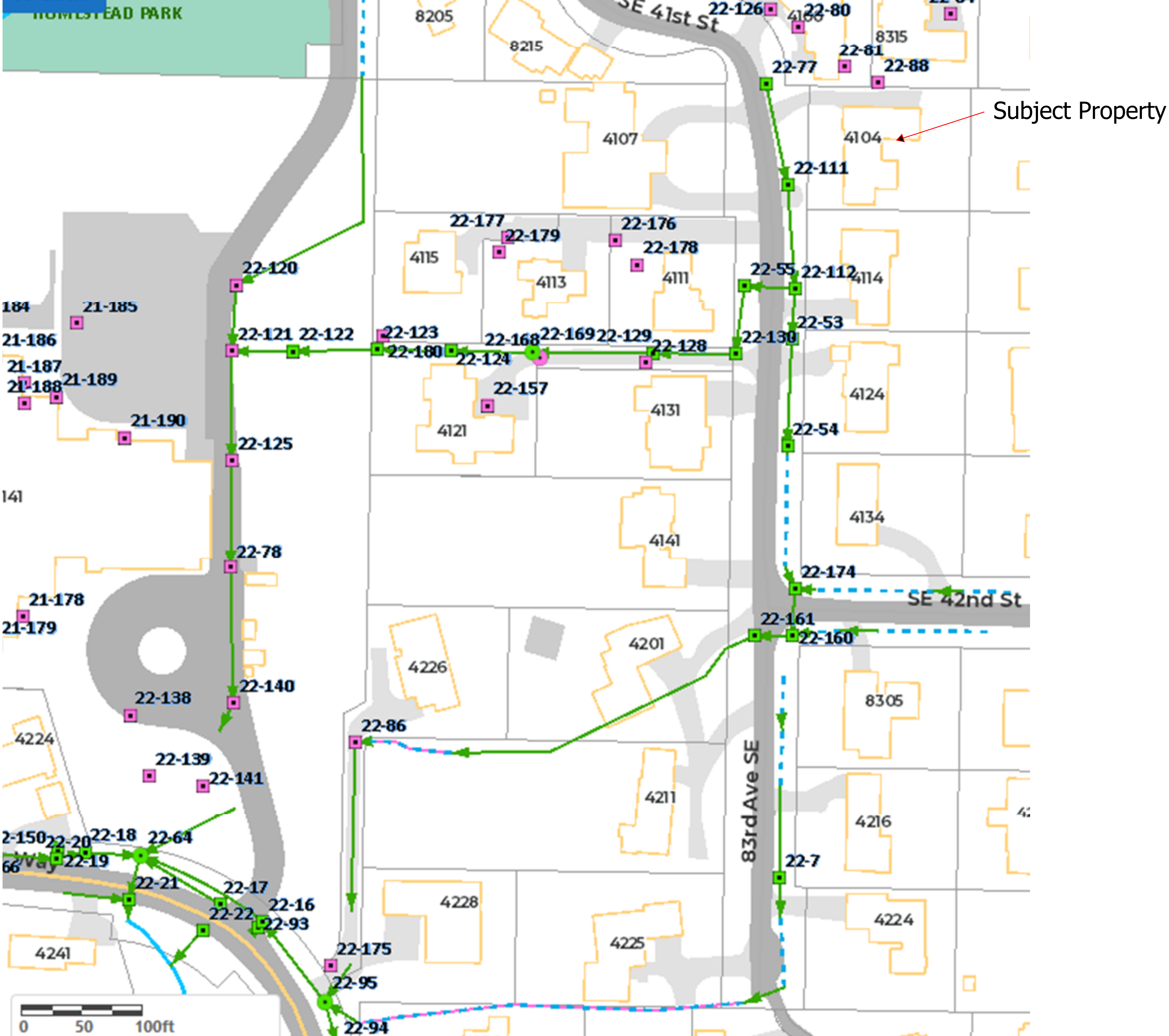
Section I-2.5.3 Minimum Requirement #3 - Source Control of Pollution

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.

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

The subject property slopes from a high point at the northeast corner (at elevation 287.53) towards the southwest corner (at elevation 277.00). The existing house roof area discharges onto the ground with splash blocks and then sheet flows over the landscape area and into 83rd Avenue SE. The existing driveway sheet flows towards the shoulder of 83rd Avenue SE. Both these areas combine within catch basin (CB#22-111 – Photo #4) within 83rd Avenue SE at the southwest corner. The natural discharge and outfall from the subject property is sheet flow and collection by a public storm basin in the southwest corner of the property. The proposed discharge will be to convey the onsite drainage from the driveway and roof area within a storm pipe and connect to CB#22-111. The natural outfall has been preserved by the new development.

The subject property was visited in September and November 2023 to review and evaluate on-site drainage patterns and walk and review the downstream system. The downstream system consists of catch basins and conveyance pipes before discharging into a ravine on the south side of West Mercer Way. The downstream, where accessible, has no indications of flooding, overtopping, scouring.


Subject Property
HOMESTEAD PARK
SE 41st St
SE 42nd St
83rd Ave SE
8205
8215
8315
4107
4104
4115
4113
4111
4114
4121
4131
4124
4134
4141
4226
4201
8305
4211
4216
4228
4225
4224
4241
22-126
22-80
22-81
22-77
22-88
22-111
22-177
22-179
22-176
22-178
22-55
22-112
22-120
22-53
21-185
21-186
21-187
21-188
21-189
22-121
22-122
22-123
22-180
22-168
22-169
22-129
22-124
22-128
22-130
22-157
21-190
22-54
22-125
22-78
22-174
21-178
21-179
22-161
22-160
22-140
22-138
22-86
22-139
22-141
22-20
22-18
22-64
22-19
22-21
22-17
22-16
22-22
22-93
22-7
22-175
22-95
22-94
0
50
100ft

4104 83rd Avenue SE Downstream

Photo #1 – View ffrom 83rd Avenue SE towards subject property

Photo #2 – View from northwest corner of subject property towards existing house

Photo #3 – View from 83rd Avenue SE towards northwest corner – existing driveway

Photo #4 – View south on 83rd at Cb#22-111

Photo #5 – Viewing north on 83rd at CB#22-112

Photo #6 – Viewing south on 83rd at CB#22-55

Photo #7 – Viewing west down shared access between 4131 & 4111 83rd Avenue SE – CB#22-130

Photo #8 – West end of shared access – CB#22-168 (with solid round lid)

Photo #9 – View from school access towards West Mercer Way – CB#22-16

Photo #10 – CB#22-21

Photo #11 – View from Cb#22-21 towards south – drainage channel

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

The proposed project drainage shall be evaluated using *"List #2, On-Site Stormwater Management BMPs for projects triggering Minimum Requirements #1 - #9"* – DOE Volume 1, chapter 2, pages 57 - 58. A Geotechnical Evaluation was prepared by Cobalt Geosciences and is attached to this Report in Appendix A.

List #2

Lawn and landscape areas – ***feasible -*** The use of Post-Construction Soil Quality and Depth shall be implemented within areas of the property that are not covered by hard surfaces and were disturbed during condition.

Roofs:

1.a. Full Dispersion BMP T5.30 – ***infeasible*** due to lack of available 100' of vegetated flow path downgradient from the roof area.

1.b. Full Infiltration BMP T5.10A – ***infeasible*** due to lack of permeable soils.

2. Rain Garden/Bioretention BMP T7.30 – ***infeasible*** due to lack of available area on the downgradient portion of the property (west side) and preserved tree area on the west side. Can not remove trees in this area nor work under.

3. Downspout Dispersion System BMP T5.10B – ***infeasible*** due to lack of available 50' flow path downgradient of the downspout leaders.

4. *Perforated Pipe Connection BMP T5.10C* - ***infeasible*** due to lack of permeable soils.

Other Hard Surfaces:

1. Full Dispersion BMP T5.30 – ***infeasible*** due to the lack of available 100' of vegetated flow path length.

2. Permeable Pavement BMP T5.15 – ***infeasible*** infiltration type BMP not recommended by City of Mercer Island Infiltration Infeasibility Map.

3. Rain Garden/Bioretention BMP T7.30 – ***infeasible*** due to lack of available area on the downgradient portion of the property (west side) and preserved tree area on the west side. Can not remove trees in this area nor work under.

4.a. Sheet Flow Dispersion BMP T5.12 – ***infeasible*** due to lack of available 25 feet of flow path downgradient from driveway.

4.b. Concentrated Flow Dispersion BMP T5.11 - ***infeasible*** due to lack of available flow path downgradient from hard surfaces.

There are no available BMPs to provide treatment of the roof area or other hard surfaces. Therefore, a connection to the public storm system within 83rd Avenue Se will be provided.

Section I-2.5.6 Minimum Requirement #6 – Runoff Treatment

Determine if thresholds for runoff treatment have been exceeded:

(a) *Projects that exceed 5,000 square feet of pollution generating hard surfaces (PGHS)* – The proposed project will generate 1,069 square feet of PGHS – threshold not exceeded

(b) *Projects that create or modify ¾ acre (32,670 square feet) of pollution generating pervious surface (PGPS)* – The proposed project will create or modify 4,350 square feet (1/10 acre) of PGPS – threshold not exceeded.

The thresholds for runoff treatment have not been exceeded, therefore proposed project does not have to provided runoff treatment.

Section I-2.5.7 Minimum Requirement #7 – Flow Control
Determine if thresholds for flow control have been exceeded:

Thresholds:

(a) *Project effective impervious surfaces exceed 10,000 square feet* – Proposed project will create 5,814 square feet of effective impervious surfaces – threshold not exceeded.
(b) *Project converts ¾ acre of vegetation to lawn or landscape area* – Proposed project will convert 1/10 acre to landscape area – threshold not exceeded.
(c) *Project will cause a 0.10 cfs increase in the 100-year event between the existing condition and the proposed condition* – Project modeling will be required to determine if there is an increase in the 100-year event that exceeds threshold.

Modeling: Using WWHM model

Existing condition input:

Roof area (flat) – 0.0851 acres
Driveway (moderate) – 0.0359 acres
Walkways/patio (flat) – 0.0156 acres
Lawn (moderate) – 0.1866 acres

Mitigated condition (proposed) input:

Roof area (moderate) – 0.1076 acres
Driveway (moderate) – 0.0245 acres
Walkways/pads (flat) – 0.0048 acres
Lawn (moderate) – 0.1862 acres

WWMH Modeling can be found within Appendix B.

Modeling results: (see page 7, WWHM modeling within Appendix B)
100-year existing = 0.128 cfs
100-year mitigated = 0.128 cfs

The proposed new project will equal the pre-developed 100-year event, therefore threshold not exceeded

No flow control thresholds will be exceeded; therefore, DOE flow control is not required. However, City of Mercer Island (MI) does require flow control. Calculations for MI flow control is attached.

Detention Tank sizing per Mercer Island Requirements

Sizing of required for on-site detention system

(A) The Geotechnical Evaluation by Cobalt Geosciences has determined the underlying soils type to be Class B
(B) The proposed total impervious surface is 5,967 square feet

Using "*City of Mercer Island On-Site Detention Design Requirements, Table 1*", the required detention tank will be 54 linear feet of 60" (5') CMP pipe.

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

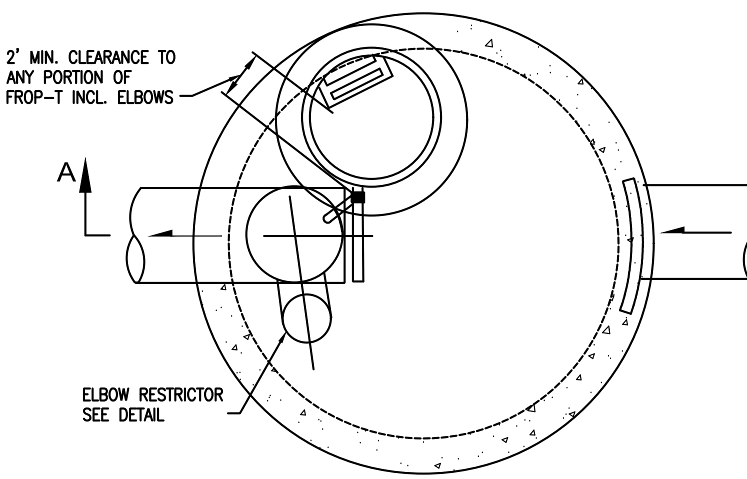
in = inch
ft = feet
sf = square feet

Basis of Sizing Assumptions:

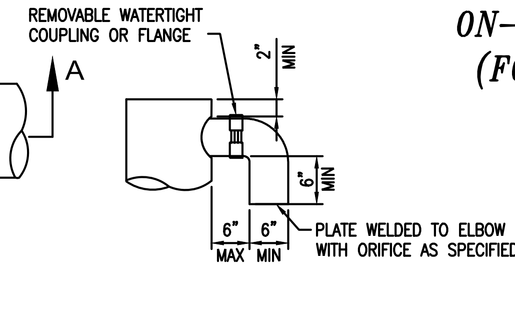
Sized per MR#5 in the Stormwater Management Manual for Puget Sound Basin (1992 Ecology Manual)
SBUH, Type 1A, 24-hour hydrograph
2-year, 24-hour storm = 2 in; 10-year, 24-hour storm = 3 in; 100-year, 24-hour storm = 4 in
Predeveloped = second growth forest (CN = 72 for Type B soils, CN = 81 for Type C soils)
Developed = impervious (CN = 98)
0.5 foot of sediment storage in detention pipe
Overland slope = 5%

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

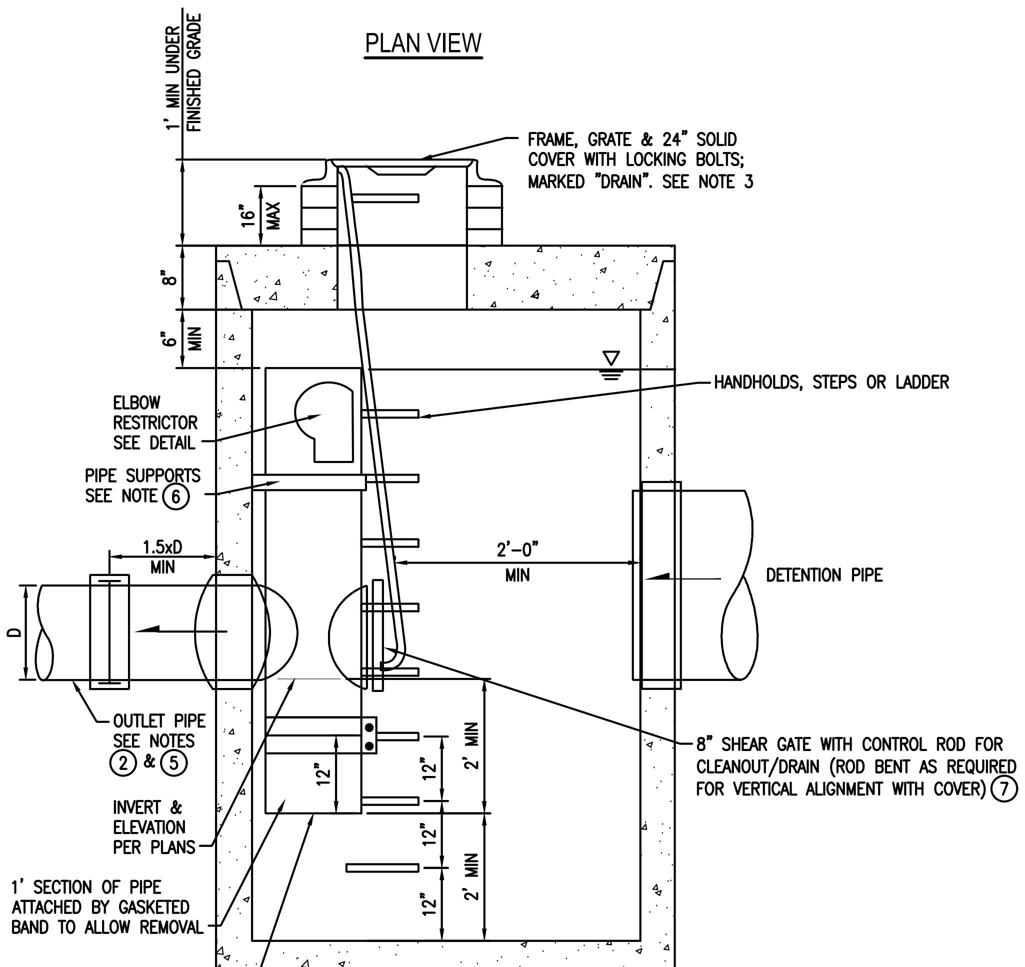
OWNER: ____________	ADDRESS: ____________	PREPARED BY: ____________
PERMIT #: ____________	____________	PHONE: ____________
		DATE: ____________
NEW PLUS REPLACED IMPERVIOUS SURFACE AREA (SF): ________	DETENTION PIPE DIA (INCH): ________	DETENTION PIPE LENGTH (FT): ________
SOIL TYPE: ____________	PIPE MATERIAL: ________	ORIFICE #1 DIA ___ INCH, ELEV ______ ; ORIFICE #2 DIA ___ INCH, ELEV ______



PLAN VIEW



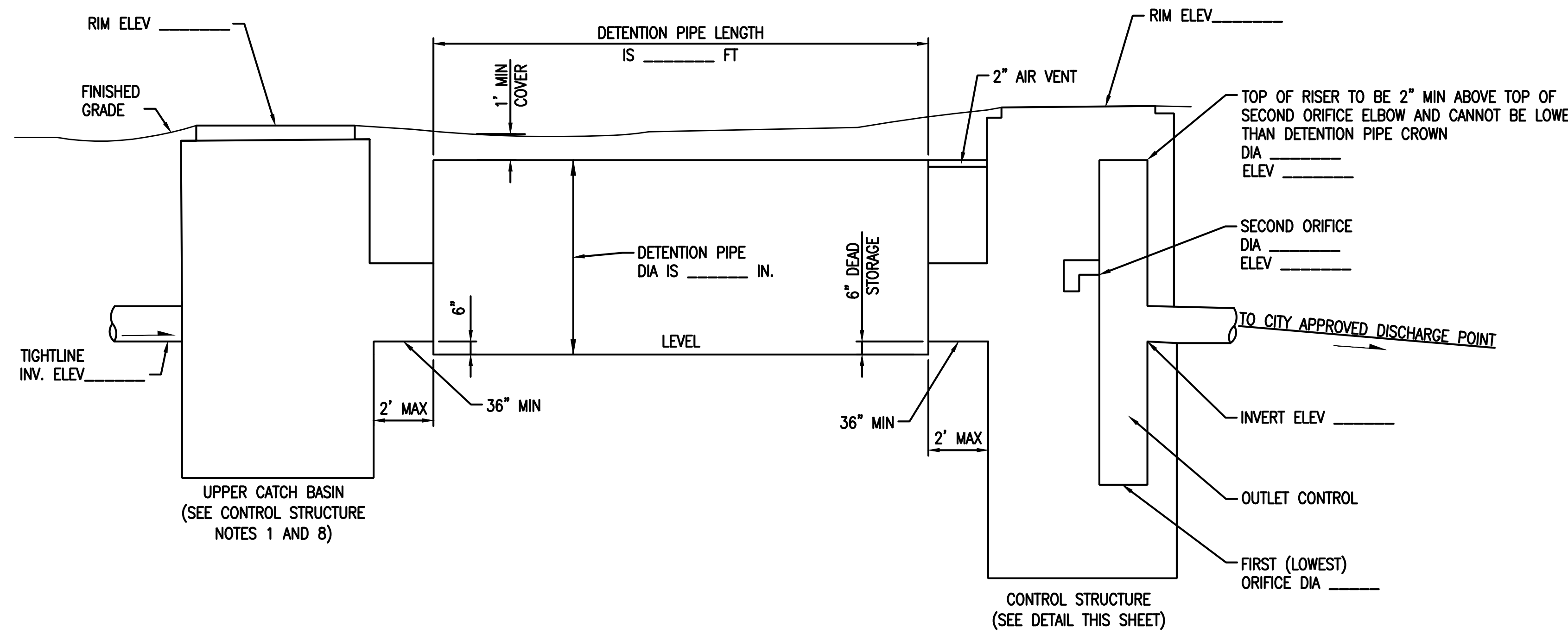
ELBOW RESTRICTOR DETAIL



SECTION A-A

CONTROL STRUCTURE DETAIL

NOT TO SCALE



ON-SITE DETENTION SYSTEM

NOT TO SCALE (ENGINEER TO FILL IN BLANKS)

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. STANLESS 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.

Section I-2.5.8 Minimum Requirement #8 – Wetlands Protection

Proposed project does not discharge into a wetland; therefore, Minimum Requirement #8 dopes not apply.

Section I-2.5.9 Minimum Requirement #9 – Operation and Maintenance

Attached

Table V-4.5.2(3) Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.

Table V-4.5.2(3) Maintenance Standards - Closed Detention Systems (Tanks/Vaults) (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See "Catch Basins" (No. 5)	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(4) Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as

Table V-4.5.2(4) Maintenance Standards - Control Structure/Flow Restrictor (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		are not watertight and show signs of rust.	designed.
		Any holes - other than designed holes - in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).
Catch Basin	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(5) Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks. Frame is sit-

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	ting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into	Mechanism opens with

Table V-4.5.2(5) Maintenance Standards - Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Working	frame have less than 1/2 inch of thread.	proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

Table V-4.5.2(6) Maintenance Standards - Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4

Appendix A: Geotechnical Evaluation

Cobalt Geosciences, LLC
P.O. Box 1792
North Bend, WA 98045

November 13, 2023

JayMarc Homes
C/O Darrell Offe
Darrell.offe@comcast.net

RE: Geotechnical Evaluation
Proposed Residence
4104 83rd Avenue SE
Mercer Island, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter to discuss the results of our geotechnical evaluation at the referenced site.

The purpose of our evaluation was to provide recommendations for foundation design, grading, and earthwork.

Site Description

The site is located at 4104 83rd Avenue SE in Mercer Island, Washington. The site consists of one nearly rectangular parcel (No. 3626500040) with a total area of 14,085 square feet.

The central portion of the property is developed with a residence and driveway. The site slopes downward from northeast and east to west and southwest at magnitudes of about 5 to 15 percent and relief of about 10 feet. There is a short cut slope about 4 feet tall and at magnitudes of over 50 percent near the west property line and right of way. There is an apparent wall near the north property line that is about 6 feet tall and 15 feet long (obscured by vegetation).

The site is vegetated with grasses, bushes, and variable diameter trees. The site is bordered to the north, south, and east by residences, and to the west by 83rd Avenue SE.

The proposed development includes a new residence and driveway in the central portion of the property.

Stormwater will include infiltration or other systems depending on feasibility. Site grading may include cuts and fills of 3 feet or less and foundation loads are expected to be light. We should be provided with the final plans to verify that our recommendations remain valid and do not require updating.

Area Geology

The Geologic map of the Mercer Island, indicates that the site is underlain by Vashon Glacial Till.

Vashon Glacial Till includes dense mixtures of silt, sand, gravel, and clay. These deposits are typically impermeable below a weathered zone.

Soil & Groundwater Conditions

As part of our evaluation, we excavated two hand borings where accessible. The explorations encountered approximately 6 inches of grass and topsoil underlain by approximately 3.25 to 4.25 feet of loose to medium dense, silty-fine to medium grained sand with gravel (Weathered Glacial

Till). These materials were underlain by dense, silty-fine to medium grained gravel (Glacial Till), which continued to the termination depths of the explorations.

Groundwater was not encountered during the exploration work. Perched groundwater may develop within 5 feet of the existing site elevations during the wet season based on the presence of soil mottling. Volumes would generally be light.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project. It would be necessary to install a piezometer to determine groundwater depths over a typical year.

Seismic Parameters

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *D* applies to an overall profile consisting of medium dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site with referenced parameters from ASCE 7-16.

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
D	1.418	0.493	1.0	Null	0.945	Null	0.607

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The site has a relatively low likelihood of liquefaction. For items listed as “Null” see Section 11.4.8 of the ASCE.

Conclusions and Recommendations

General

The site is underlain by soils consistent with Vashon Glacial Till. These soils become relatively dense below a weathered zone. The proposed residential structure may be supported on a shallow foundation system bearing on medium dense or firmer native soils or on structural fill placed on the native soils.

Local overexcavation or recompaction of loose weathered native soils may be necessary depending on the proposed elevations and locations of the new footings.

Widespread infiltration is not feasible due to the soil conditions and anticipated seasonal groundwater conditions. We recommend utilizing direct or perforated connection to an approved conveyance.

Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 18 inches. Deeper excavations will be necessary below larger trees and foundation systems.

The native soils consist of silty-sand with gravel. Most of the native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are variably moisture sensitive and may degrade during periods of wet weather and under equipment traffic.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 3 feet or less for foundation and most of the utility placement. Temporary excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils and fill, 1H:1V in medium dense native soils and 3/4H:1V in dense to very dense native soils (if encountered). If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

Foundation Design

The proposed structure may be supported on a shallow spread footing foundation system bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. Any undocumented fill and/or loose native soils should be removed and replaced with structural fill below foundation elements. Structural fill below footings should consist of clean angular rock 5/8 to 4 inches in size. We should verify soil conditions during foundation excavation work.

For shallow foundation support, we recommend widths of at least 16 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 2,500 pounds per square foot (psf) may be used for design.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas). The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

Stormwater Management Feasibility

The site is underlain by weathered and unweathered glacial soil deposits. We evaluated the infiltration characteristics in HB-2 at a depth of 4 feet below grade.

We attempted to perform an in-situ infiltration test; however, during the saturation period, the inflow of testing water was reduced to the lowest possible rate and the water level in the exploration consistently increased. This indicates that vertical infiltration was reduced to near zero, confirming infiltration infeasibility due to the presence of an aquitard.

We recommend direct or perforated connection of runoff collection devices to City infrastructure. We can provide additional input if other systems are being considered or proposed.

Slab-on-Grade

We recommend that the upper 18 inches of the existing native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined above. A 4- to 6-inch-thick capillary break layer should be placed over the prepared subgrade. This material should consist of pea gravel or 5/8 inch clean angular rock.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4-inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September).

However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).

- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Utilities

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The contractor is responsible for the safety of open trenches. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

In general, silty and sandy soils were encountered at shallow depths in the explorations at this site. These soils have low cohesion and density and will have a tendency to cave or slough in excavations. Shoring or sloping back trench sidewalls is required within these soils in excavations greater than 4 feet deep.

All utility trench backfill should consist of imported structural fill or suitable on site soils. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. Depending on the depth and location of the proposed utilities, we anticipate the need to re-compact existing fill soils below the utility structures and pipes. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction procedures.

CONSTRUCTION FIELD REVIEWS

Cobalt Geosciences should be retained to provide part time field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. This will require field and engineering review to:

- Monitor and test structural fill placement and soil compaction
- Observe bearing capacity at foundation locations

- Observe slab-on-grade preparation
- Monitor foundation drainage placement
- Observe excavation stability

Geotechnical design services should also be anticipated during the subsequent final design phase to support the structural design and address specific issues arising during this phase. Field and engineering review services will also be required during the construction phase in order to provide a Final Letter for the project.

CLOSURE

This report was prepared for the exclusive use of JayMarc Homes and their appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of JayMarc Homes who is identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

Sincerely,

Cobalt Geosciences, LLC

11/13/2023
Phil Haberman, PE, LG, LEG
Principal

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

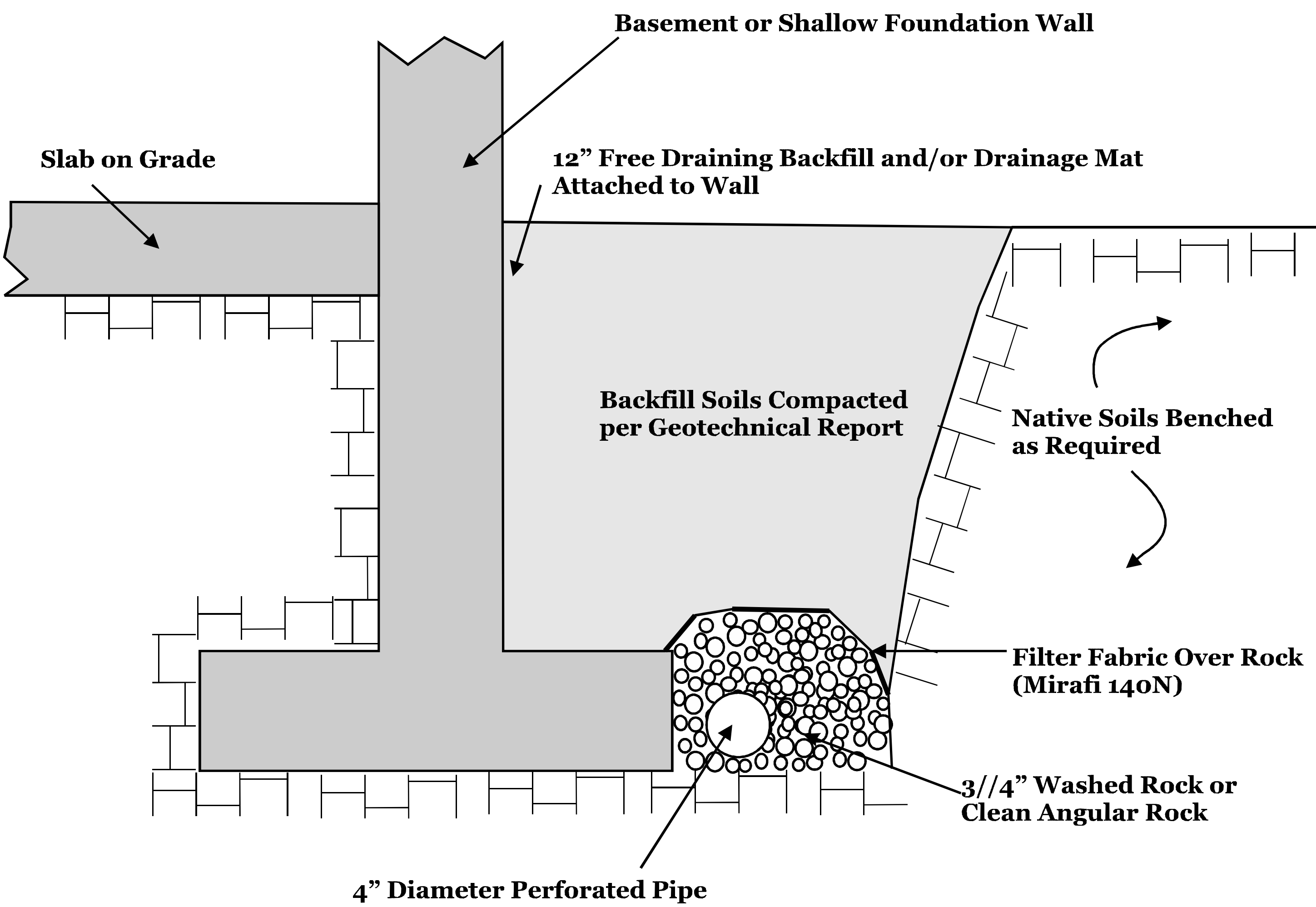
PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.

HB-1 **Approximate Hand Boring Location**

King County imap Image

N

COBALT GEOSCIENCES	Proposed Residence 4014 83rd Ave SE Mercer Island, Washington	**Site Image** **Figure 1**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com



Not to Scale

COBALT GEOSCIENCES	**Typical Foundation Drain Detail**	**Attachment**	Cobalt Geosciences, LLC PO Box 1792 North Bend, WA 98045 (206) 331-1097 www.cobaltgeo.com phil@cobaltgeo.com

Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

COBALT GEOSCIENCES

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Soil Classification Chart

Figure C1

Hand Boring HB-1

Date: November 2023	Depth: 6’	Groundwater: None
Contractor: Cobalt	Elevation:	Logged By: PH Checked By: SC

Moisture Content (%): Plastic Limit — Liquid Limit

DCP Equivalent N-Value: 0 10 20 30 40 50

Depth (Feet)	Interval	Graphic Log	USCS Symbol	Material Description	Groundwater
0				Topsoil/Vegetation	
1–4			SM	Loose to medium dense, silty-fine to medium grained sand with gravel, dark yellowish brown to grayish brown, moist. (Weathered Glacial Till) Locally mottled	
5–6			SM	Dense, silty-fine to medium grained sand with gravel grayish brown, moist. (Glacial Till)	
6				End of Hand Boring 6’	

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

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Hand Boring HB-2

Date: November 2023	Depth: 6'	Groundwater: None
Contractor: Cobalt	Elevation:	Logged By: PH Checked By: SC

Depth (Feet)	Interval	Graphic Log	USCS Symbol	Material Description	Groundwater	Moisture Content (%) Plastic Limit — Liquid Limit / DCP Equivalent N-Value 0 10 20 30 40 50
0				Topsoil/Vegetation		
1–3			SM	Loose to medium dense, silty-fine to medium grained sand with gravel, dark yellowish brown to grayish brown, moist. (Weathered Glacial Till) Locally mottled		
4–6			SM	Dense, silty-fine to medium grained sand with gravel grayish brown, moist. (Glacial Till)		
6–10				End of Hand Boring 6'		

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Appendix B: WWHM Modeling

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 4104 WWHM

Site Name:	JayMarc
Site Address:	4104 83rd Avenue SE
City:	Mercer Island
Report Date:	7/26/2024
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Mod	0.1866
Pervious Total	0.1866
Impervious Land Use	acre
ROOF TOPS FLAT	0.0851
ROADS FLAT	0.0359
SIDEWALKS FLAT	0.0156
Impervious Total	0.1366
Basin Total	0.3232

Mitigated Land Use

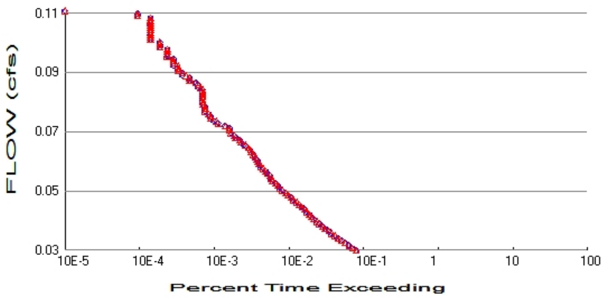
Basin 1

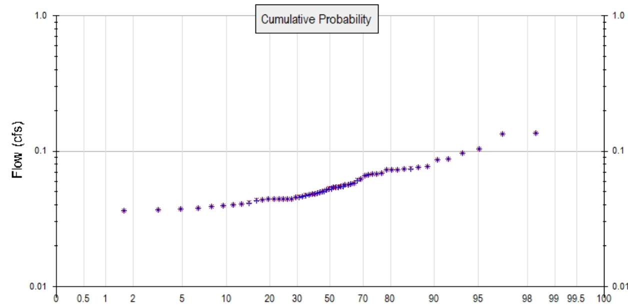
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Mod	0.1863
Pervious Total	0.1863
Impervious Land Use	acre
ROOF TOPS FLAT	0.1076
ROADS FLAT	0.0245
SIDEWALKS FLAT	0.0048
Impervious Total	0.1369
Basin Total	0.3232

Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.1866
Total Impervious Area: 0.1366

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.1863
Total Impervious Area: 0.1369

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.05352
5 year	0.070445
10 year	0.082808
25 year	0.099795
50 year	0.113477
100 year	0.128072

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.053629
5 year	0.070576
10 year	0.082954
25 year	0.099958
50 year	0.113653
100 year	0.128261

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.069	0.069
1950	0.076	0.076
1951	0.050	0.050
1952	0.038	0.038
1953	0.040	0.041
1954	0.045	0.045
1955	0.048	0.048
1956	0.047	0.047
1957	0.054	0.054
1958	0.043	0.043

1959	0.044	0.044
1960	0.044	0.044
1961	0.046	0.046
1962	0.040	0.040
1963	0.046	0.046
1964	0.043	0.044
1965	0.057	0.057
1966	0.037	0.037
1967	0.073	0.073
1968	0.072	0.073
1969	0.050	0.050
1970	0.049	0.049
1971	0.058	0.058
1972	0.074	0.074
1973	0.036	0.036
1974	0.053	0.053
1975	0.061	0.061
1976	0.041	0.042
1977	0.044	0.044
1978	0.054	0.054
1979	0.074	0.074
1980	0.067	0.067
1981	0.054	0.055
1982	0.077	0.077
1983	0.062	0.063
1984	0.040	0.040
1985	0.054	0.054
1986	0.047	0.047
1987	0.073	0.073
1988	0.044	0.044
1989	0.055	0.055
1990	0.136	0.136
1991	0.087	0.088
1992	0.039	0.039
1993	0.034	0.034
1994	0.037	0.037
1995	0.048	0.048
1996	0.067	0.067
1997	0.056	0.056
1998	0.051	0.051
1999	0.103	0.104
2000	0.052	0.052
2001	0.057	0.057
2002	0.066	0.066
2003	0.053	0.053
2004	0.097	0.097
2005	0.044	0.044
2006	0.044	0.044
2007	0.134	0.134
2008	0.086	0.086
2009	0.067	0.067

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1361	0.1363
2	0.1337	0.1338
3	0.1035	0.1037

4	0.0968	0.0971
5	0.0875	0.0876
6	0.0862	0.0863
7	0.0768	0.0769
8	0.0759	0.0760
9	0.0742	0.0743
10	0.0741	0.0742
11	0.0729	0.0730
12	0.0726	0.0728
13	0.0724	0.0725
14	0.0687	0.0689
15	0.0673	0.0675
16	0.0673	0.0673
17	0.0666	0.0667
18	0.0660	0.0661
19	0.0625	0.0626
20	0.0608	0.0610
21	0.0579	0.0580
22	0.0571	0.0572
23	0.0566	0.0567
24	0.0561	0.0562
25	0.0551	0.0552
26	0.0544	0.0546
27	0.0543	0.0544
28	0.0542	0.0543
29	0.0537	0.0538
30	0.0528	0.0529
31	0.0528	0.0529
32	0.0519	0.0520
33	0.0506	0.0507
34	0.0503	0.0504
35	0.0496	0.0497
36	0.0486	0.0487
37	0.0483	0.0484
38	0.0480	0.0481
39	0.0473	0.0474
40	0.0471	0.0472
41	0.0459	0.0460
42	0.0458	0.0459
43	0.0453	0.0454
44	0.0444	0.0445
45	0.0444	0.0444
46	0.0443	0.0444
47	0.0443	0.0444
48	0.0442	0.0443
49	0.0441	0.0442
50	0.0435	0.0436
51	0.0433	0.0434
52	0.0415	0.0416
53	0.0405	0.0406
54	0.0399	0.0400
55	0.0396	0.0397
56	0.0390	0.0391
57	0.0376	0.0377
58	0.0372	0.0372
59	0.0369	0.0370
60	0.0362	0.0363
61	0.0338	0.0339

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0268	1697	1707	100	Pass
0.0276	1502	1515	100	Pass
0.0285	1350	1361	100	Pass
0.0294	1199	1207	100	Pass
0.0303	1069	1077	100	Pass
0.0311	967	970	100	Pass
0.0320	882	887	100	Pass
0.0329	796	799	100	Pass
0.0338	723	735	101	Fail
0.0346	651	656	100	Pass
0.0355	600	605	100	Pass
0.0364	549	551	100	Pass
0.0373	500	505	101	Fail
0.0381	458	461	100	Pass
0.0390	423	426	100	Pass
0.0399	401	401	100	Pass
0.0408	371	375	101	Fail
0.0417	343	346	100	Pass
0.0425	316	320	101	Fail
0.0434	293	294	100	Pass
0.0443	270	272	100	Pass
0.0452	246	249	101	Fail
0.0460	228	229	100	Pass
0.0469	207	208	100	Pass
0.0478	194	195	100	Pass
0.0487	173	175	101	Fail
0.0495	161	161	100	Pass
0.0504	149	151	101	Fail
0.0513	139	141	101	Fail
0.0522	128	129	100	Pass
0.0530	123	123	100	Pass
0.0539	118	120	101	Pass
0.0548	109	110	100	Pass
0.0557	105	105	100	Pass
0.0565	97	97	100	Pass
0.0574	90	90	100	Pass
0.0583	83	84	101	Pass
0.0592	82	82	100	Pass
0.0600	79	79	100	Pass
0.0609	74	76	102	Pass
0.0618	72	72	100	Pass
0.0627	66	66	100	Pass
0.0635	64	65	101	Pass
0.0644	59	61	103	Pass
0.0653	53	56	105	Pass
0.0662	48	49	102	Pass
0.0671	46	47	102	Pass
0.0679	41	41	100	Pass
0.0688	39	40	102	Pass
0.0697	36	36	100	Pass
0.0706	34	34	100	Pass
0.0714	34	34	100	Pass
0.0723	30	30	100	Pass
0.0732	24	24	100	Pass

0.0741	21	23	109	Pass
0.0749	19	19	100	Pass
0.0758	19	19	100	Pass
0.0767	18	18	100	Pass
0.0776	16	16	100	Pass
0.0784	16	16	100	Pass
0.0793	16	16	100	Pass
0.0802	15	15	100	Pass
0.0811	15	15	100	Pass
0.0819	15	15	100	Pass
0.0828	15	15	100	Pass
0.0837	15	15	100	Pass
0.0846	15	15	100	Pass
0.0854	15	15	100	Pass
0.0863	13	14	107	Pass
0.0872	13	13	100	Pass
0.0881	12	12	100	Pass
0.0890	10	10	100	Pass
0.0898	10	10	100	Pass
0.0907	8	9	112	Fail
0.0916	8	8	100	Pass
0.0925	7	7	100	Pass
0.0933	7	7	100	Pass
0.0942	6	7	116	Fail
0.0951	6	6	100	Pass
0.0960	6	6	100	Pass
0.0968	6	6	100	Pass
0.0977	5	5	100	Pass
0.0986	5	5	100	Pass
0.0995	5	5	100	Pass
0.1003	5	5	100	Pass
0.1012	4	4	100	Pass
0.1021	4	4	100	Pass
0.1030	4	4	100	Pass
0.1038	3	3	100	Pass
0.1047	3	3	100	Pass
0.1056	3	3	100	Pass
0.1065	3	3	100	Pass
0.1073	3	3	100	Pass
0.1082	3	3	100	Pass
0.1091	3	3	100	Pass
0.1100	3	3	100	Pass
0.1108	3	3	100	Pass
0.1117	3	3	100	Pass
0.1126	2	2	100	Pass
0.1135	2	2	100	Pass

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

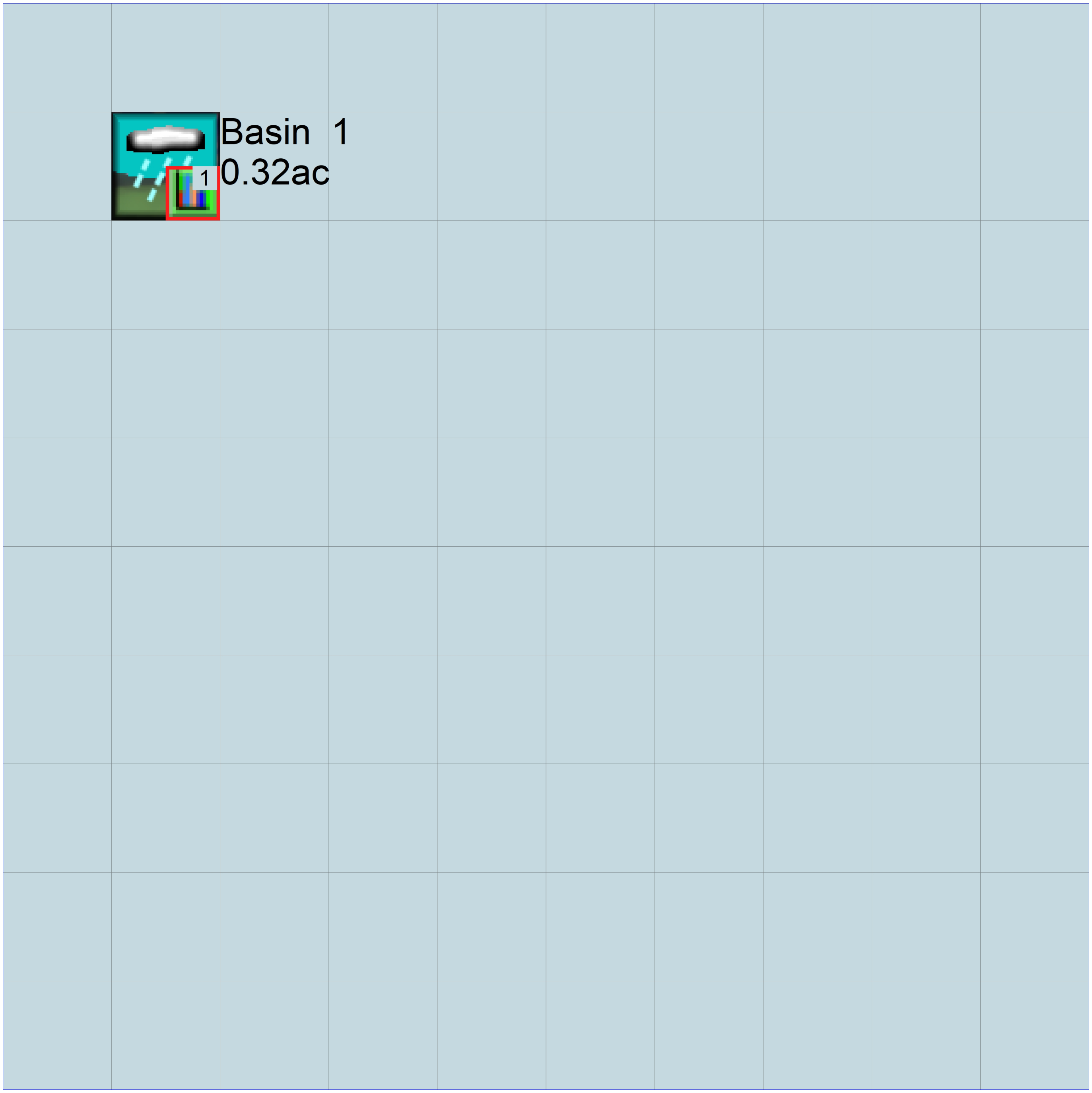
PERLND Changes

No PERLND changes have been made.

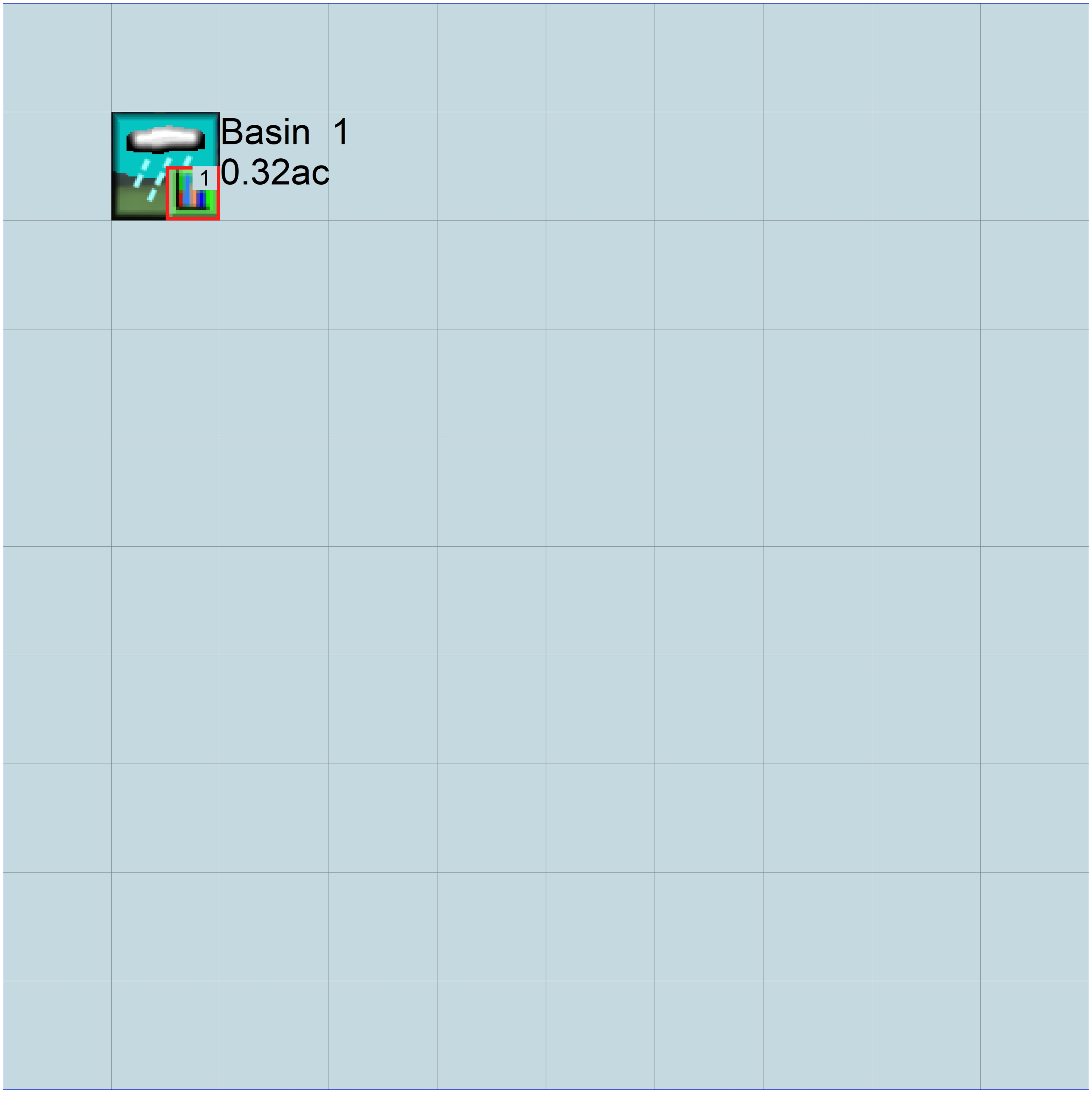
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   4104 WWHM.wdm
MESSU      25   Pre4104 WWHM.MES
           27   Pre4104 WWHM.L61
           28   Pre4104 WWHM.L62
           30   POC4104 WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       8
      IMPLND       4
      IMPLND       1
      IMPLND       8
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    8     A/B, Lawn, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    8         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
```

```
  8         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  8         0    0    0    0    0    0    0    0    0    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >      PWATER input info: Part 2         ***
  # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  8             0         5       0.8       400       0.1       0.3     0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS >      PWATER input info: Part 3         ***
  # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  8             0         0         2         2         0         0         0
END PWAT-PARM3
PWAT-PARM4
  <PLS >     PWATER input info: Part 4                                     ***
  # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  8           0.1       0.5      0.25         0       0.7      0.25
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
  8             0         0         0         0         3         1         0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
  <PLS ><-------Name------->   Unit-systems   Printer ***
  # -  #                     User  t-series Engl Metr ***
                                     in  out          ***
  4      ROOF TOPS/FLAT         1    1    1   27    0
  1      ROADS/FLAT             1    1    1   27    0
  8      SIDEWALKS/FLAT         1    1    1   27    0
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ************* Active Sections *****************************
  # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  4         0    0    1    0    0    0
  1         0    0    1    0    0    0
  8         0    0    1    0    0    0
END ACTIVITY

PRINT-INFO
  <ILS > ******** Print-flags ******** PIVL  PYR
  # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  4         0    0    4    0    0    4    1    9
  1         0    0    4    0    0    0    1    9
  8         0    0    4    0    0    0    1    9
END PRINT-INFO

IWAT-PARM1
  <PLS >  IWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP  VRS  VNN RTLI     ***
  4         0    0    0    0    0
  1         0    0    0    0    0
  8         0    0    0    0    0
END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    1            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    1              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    1              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   8                      0.1866     COPY   501     12
PERLND   8                      0.1866     COPY   501     13
IMPLND   4                      0.0851     COPY   501     15
IMPLND   1                      0.0359     COPY   501     15
IMPLND   8                      0.0156     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
```

```
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   4104 WWHM.wdm
MESSU      25   Mit4104 WWHM.MES
           27   Mit4104 WWHM.L61
           28   Mit4104 WWHM.L62
           30   POC4104 WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       8
      IMPLND       4
      IMPLND       1
      IMPLND       8
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1        1    1
  501        1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    8     A/B, Lawn, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    8         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
```

```
    8         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    8         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    8            0         5       0.8       400       0.1       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    8            0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    8            0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    8            0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
    1      ROADS/FLAT             1    1    1   27    0
    8      SIDEWALKS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    1         0    0    1    0    0    0
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
    1         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    1         0    0    0    0    0
    8         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    1            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    1              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    1              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   8                      0.1863     COPY   501     12
PERLND   8                      0.1863     COPY   501     13
IMPLND   4                      0.1076     COPY   501     15
IMPLND   1                      0.0245     COPY   501     15
IMPLND   8                      0.0048     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
```

```
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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