EASTSIDE CONSULTANTS, INC. ENGINEERS-SURVEYORS
www.eastsideconsultants.com

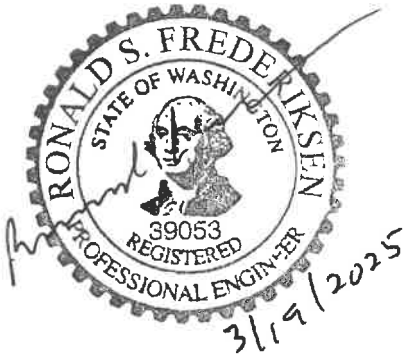
TECHNICAL INFORMATION REPORT
FOR
Lee Remodel

8904 SE 58th Street
Mercer Island, WA 98040

Parcel No. 228700-0350
City of Mercer Island File No. 2409-012

Eastside Consultants, Inc. File No. 24081

October 16, 2024
Revision
January 21, 2025
Revision
March 19, 2025



Prepared by:
Eastside Consultants, Inc.
1320 NW Mall Street, Ste B.
Issaquah, WA 98027
(425) 392-5351

Prepared for:
Jennie Lee
8904 SE 58th Street
Mercer Island, WA 98014

TABLE OF CONTENTS

PROJECT SITE DESCRIPTION

The proposed remodel consists of removing the existing driveway and adding a new walkway and expanding the house. The project is located at 8904 SE 58th Street in Mercer, Island, WA.

The project parcel is located on the South end of Mercer Island and will be discharging stormwater runoff through downspouts to a new type 2 catch basin on SE 58th Street.

There are single family residences to the North, South, and East of the residence. The project is on the corner of SE 58th Street and 89th Ave SE.

The runoff will primarily sheet flow off the roof into gutters and be transported from the main roof via downspouts into a new type 1 catch basin offsite, just South of the driveway. From here it will flow East enter a new type 2 catch basin offsite, on the North side of NE 58th Street.

HYDROLOGIC CONDITIONS

A. Existing Runoff Conditions

The project site currently consists of a 3,035 SF home, 252 SF of offsite driveway, 928 SF of concrete onsite driveway, 435 sf of concrete patio / walkways, and 64 SF of brick. The total onsite impervious is 4,456 SF and offsite is a total of 252 SF. The existing impervious onsite area is 44.54% of the total lot. Therefore, per Fig I-3.2 we are under redevelopment. According to Figure I-3.2 minimum requirement #2 applies.

Based on the City of Mercer Island Code, the existing runoff conditions were analyzed per the 2024 DOE Western Washington Stormwater Manual.

B. Proposed Runoff Conditions

The proposed project consists of removing 1,912 SF of concrete driveway, walkway and roof area. This project proposes to add 1,626 sf to the existing house for a total of 3,696 sf, 311 SF of driveway, retain the brick and concrete patio then add 89 sf of walkway on site, and 266 SF of offsite driveway. This amounts to a total of 4,855 sf on and off site. The new driveway will be pervious pavement to help water the large tree in the front of the property. The runoff will primarily sheet flow off the roof into gutters and be transported from the main roof via downspouts into a new type 1 catch basin offsite, just South of the driveway. From here it will flow East enter a new type 2 catch basin offsite, on the North side of NE 58th Street.

OFF-SITE ANALYSIS

See attached

LEVEL 1 DRAINAGE ANALYSIS

FOR

Lee Remodel

Eastside Consultants, Inc. File No. 24080

October 16, 2024
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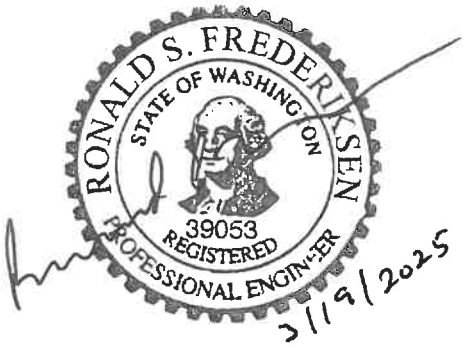
March 19, 2025



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8904 SE 58th Street,
Mercer Island, WA

Task 1 – Define Map and Study Area

The downstream drainage path consists of one flow path. The runoff flows to the Southeast border of the property. The runoff travels South into a series of catch basins, pipes, and open watercourses. The site is located within the Mercer Island drainage basin.

Task 2 – Resource Review

A review of the Mercer Island Hazards Maps revealed there is an erosion hazard about 700 feet to the Northwest. A review of the Mercer Island Hazards Maps revealed that the West part of the site is within a seismic hazard area. A review of the mercer Island Environmental Maps revealed there are no watercourses on or around the site. A review of the Mercer Island Hazards Maps revealed that there is a landslide area about 700 feet to the Northwest. A review of the Mercer Island Hazards Maps revealed that there are no wind exposure or steep slope hazards on or near the site. A review of the King County IMAPS revealed there are no drainage complaints on or near the site.

Task 3 – Field Inspection

Upstream basin

There is little to no upstream drainage basin for this site. The upstream basin extends west to 89th Ave SE. See the Upstream Drainage Map Section for a map defining the area.

Downstream Basin

The downstream flow path and basin is described in the following section. Flow leaves the property at the Southeast corner of the property. Flow then heads towards the catch basin to the Southeast. See the Downstream Drainage Map Section for a map defining the area.

Task 4 – Drainage System Description

Downstream Basin

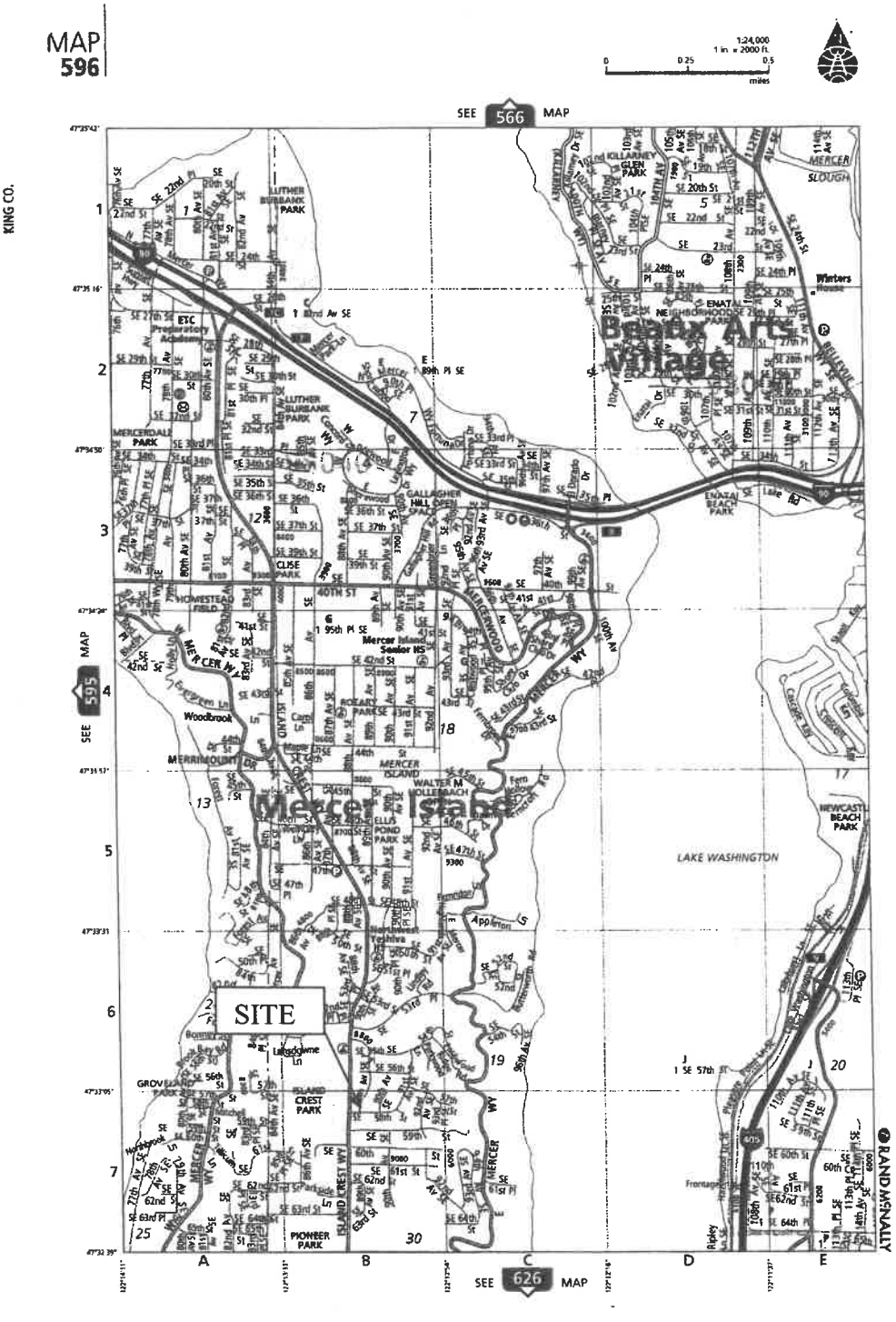
The flow will sheet flow from the Southeast corner of the property (Point A) into a catch basin (Point B). The flow will then continue Southeasterly in a 12" concrete pipe to another catch basin (Point C). The flow will then travel South through a series of 18" pipes and catch basins for 796 feet (Point D-L). The flow will continue South in a 24" pipe for approximately 43 (Points L-M). Then the flow continues South in a open watercourse (Points M-N). Next the water enters another 18" piped watercourse (N-O).

Task 5 – Mitigation of Existing or Potential Problems

No issues were found during the downstream investigation. This project will not create a significant impact to the downstream conveyance system.

QUAD, SOILS, AND VICINITY MAPS

VICINITY MAP



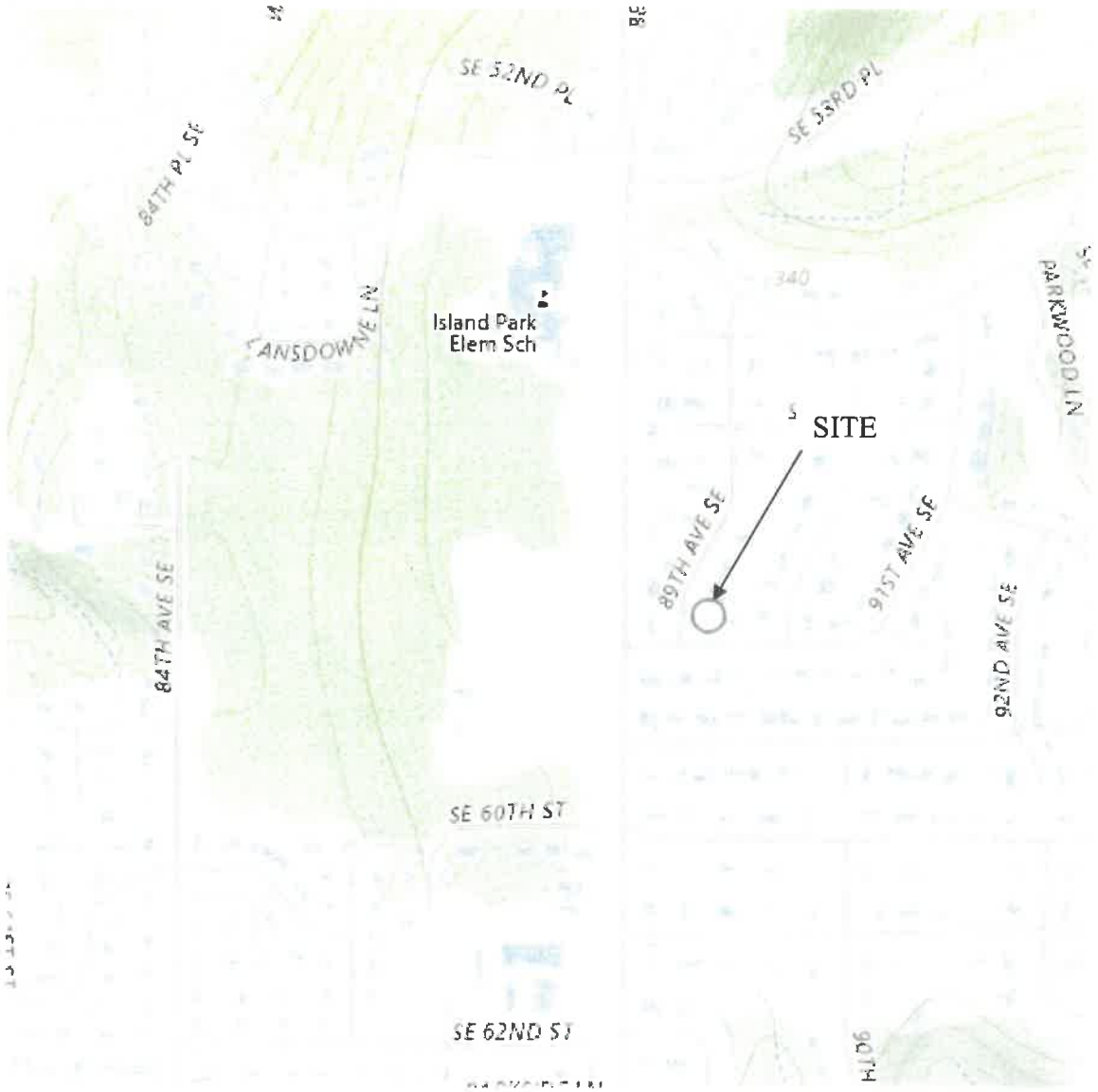
SOILS MAP
(Web Soil Survey from USDA NRCS)

King County Area, Washington (WA633)

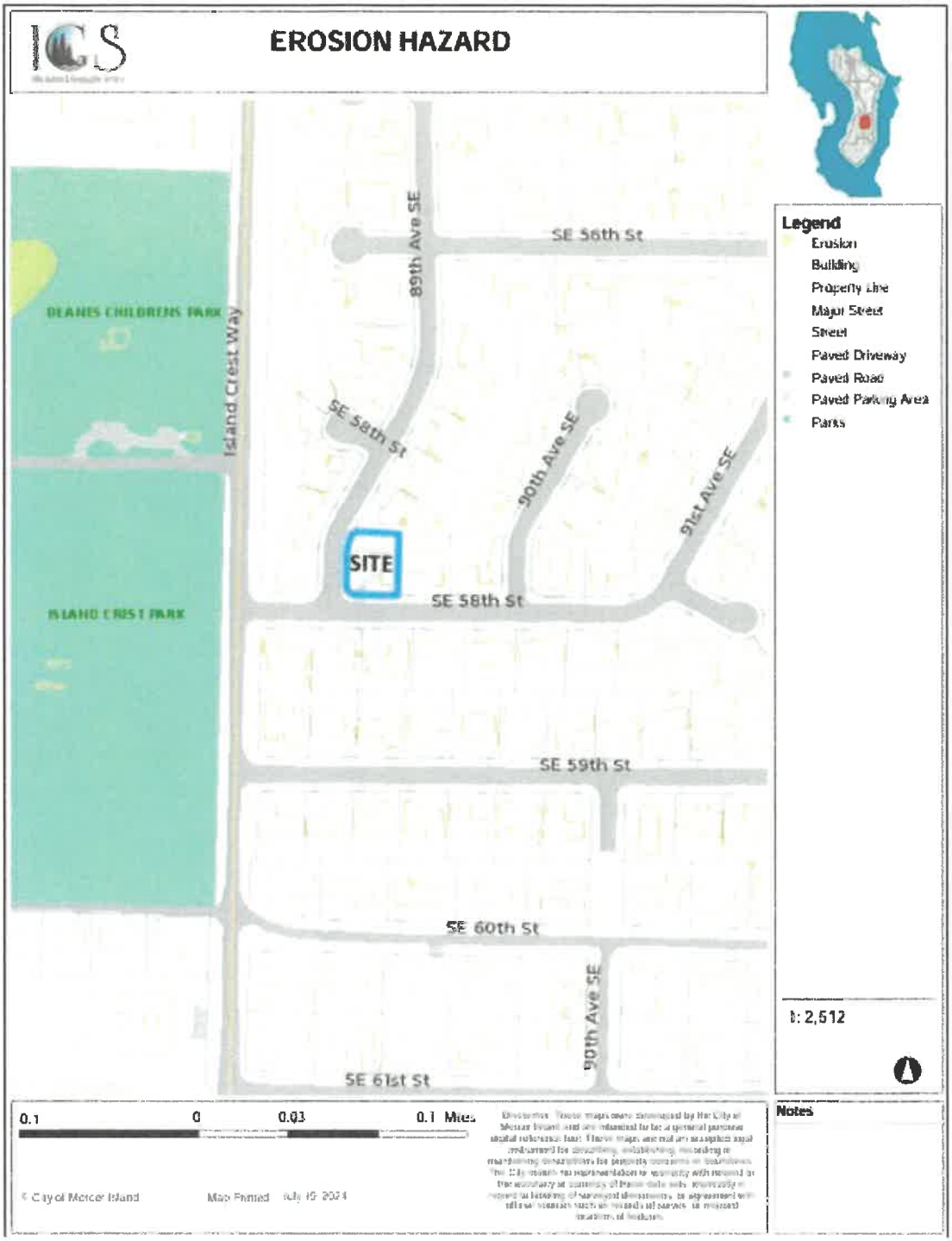
King County Area, Washington (WA633)

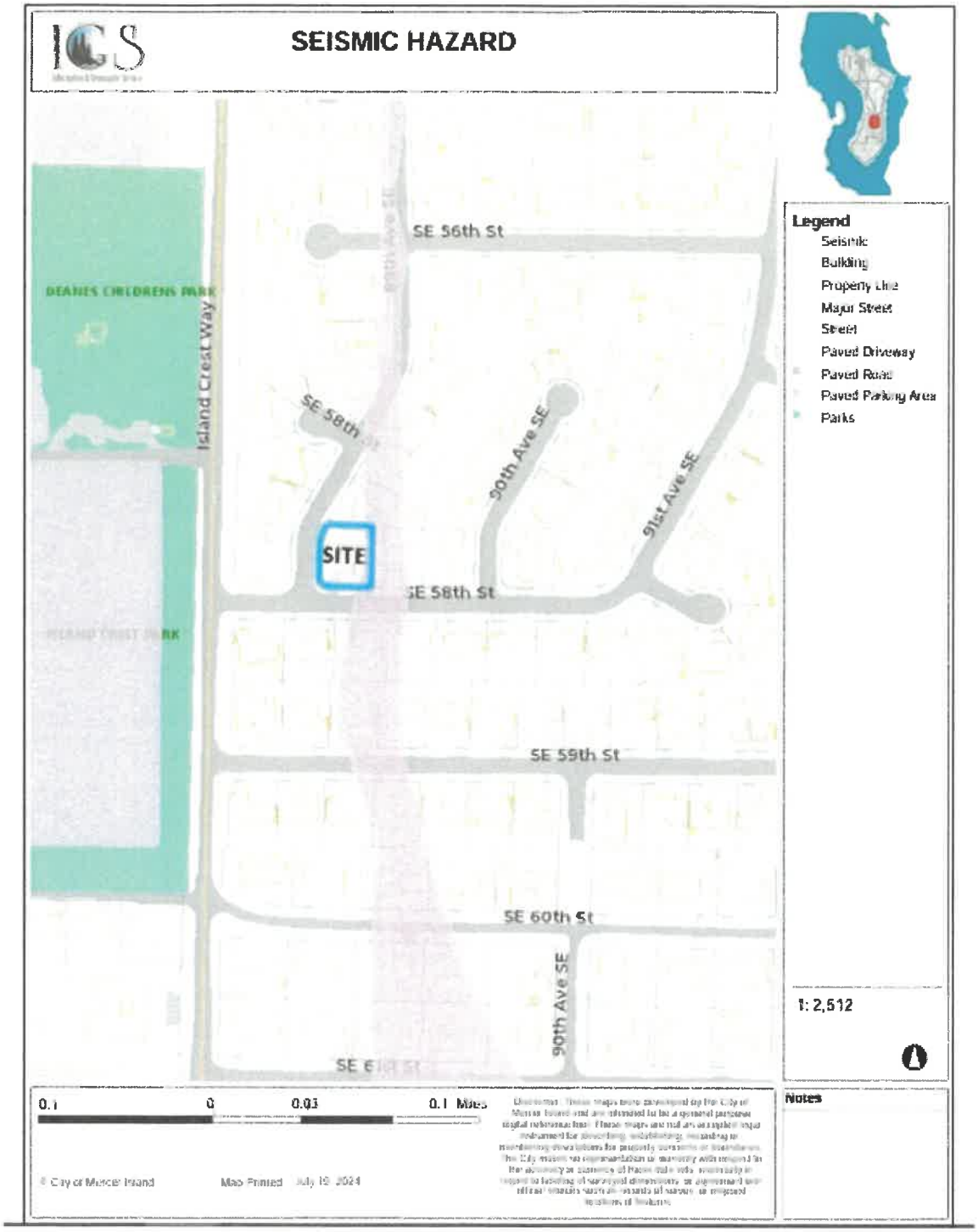
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AmB	Arents, Alderwood material, 0 to 6 percent slopes	13.9	100.0%
Totals for Area of Interest		**13.9**	**100.0%**

QUAD MAP


SE 52ND PL
84TH PL SE
LANSDOWNE LN
Island Park
Elem Sch
SE 53RD PL
340
PARKWOOD LN
SITE
89TH AVE SE
91ST AVE SE
92ND AVE SE
84TH AVE SE
SE 60TH ST
SE 62ND ST

1990 SENSITIVE AREA FOLIO MAPS


EROSION HAZARD
DEANES CHILDRENS PARK
ISLAND CREST PARK
Island Crest Way
89th Ave SE
SE 56th St
SE 58th St
90th Ave SE
91st Ave SE
SITE
SE 58th St
SE 59th St
SE 60th St
90th Ave SE
SE 61st St
Legend
Erosion
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1: 2,512
0.1
0
0.03
0.1 Miles
Notes
© City of Mercer Island
Map Printed July 19, 2024


SEISMIC HAZARD
SE 56th St
Island Crest Way
SE 58th
90th Ave SE
91st Ave SE
SITE
SE 58th St
SE 59th St
SE 60th St
90th Ave SE
Legend
Seismic
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
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Notes
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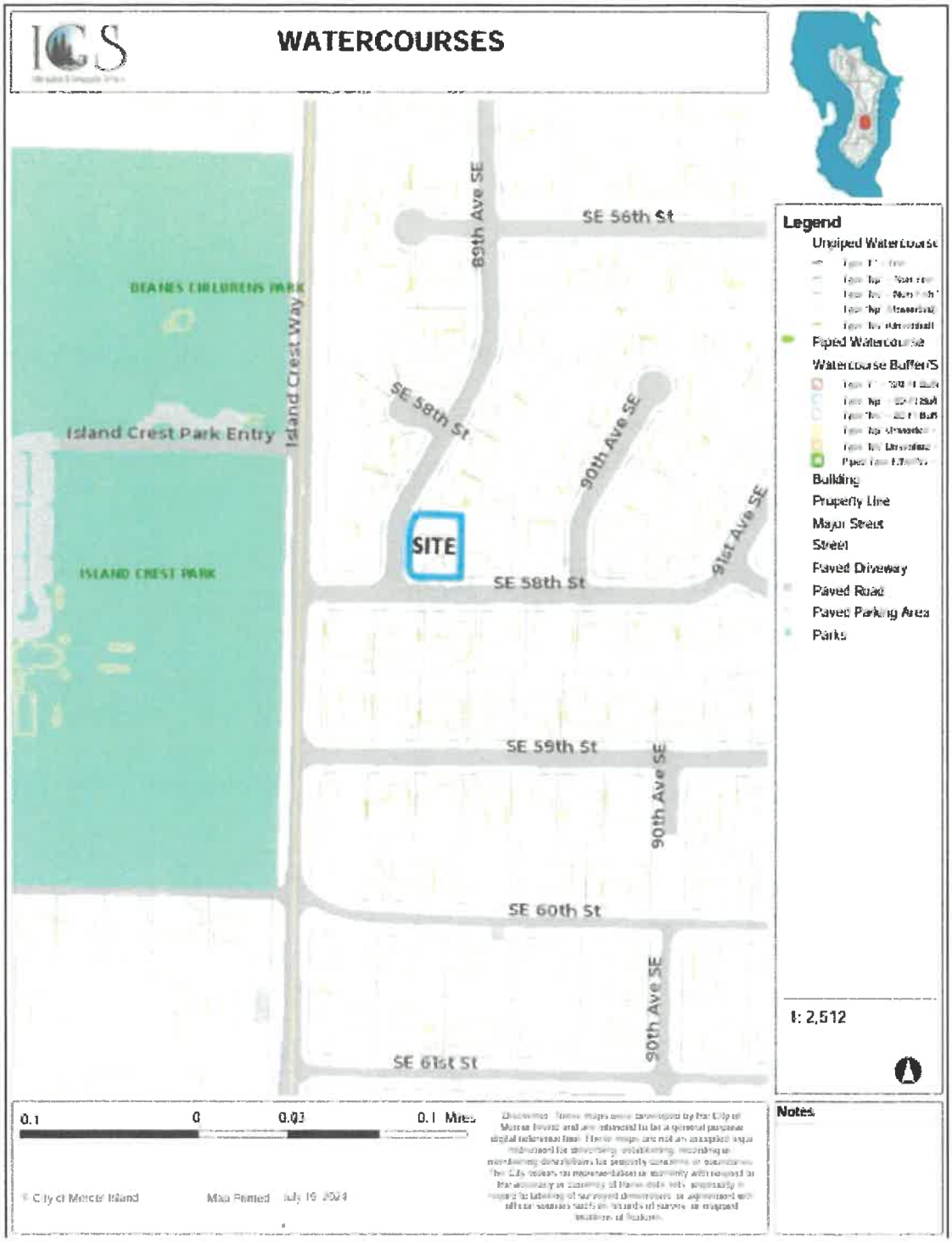
0.1 Miles
© City of Mercer Island
Map Printed July 19, 2024


WATERCOURSES
SE 56th St
89th Ave SE
BEANES CHILDRENS PARK
Island Crest Way
SE 58th St
Island Crest Park Entry
90th Ave SE
91st Ave SE
SITE
ISLAND CREST PARK
SE 58th St
SE 59th St
90th Ave SE
SE 60th St
90th Ave SE
SE 61st St
Legend
Piped Watercourse
Watercourse Buffers
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1: 2,512
0.1
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0.03
0.1 Miles
© City of Mercer Island
Map Printed July 19 2024
Notes


LANDSLIDE HAZARD ASSESMENT
DEANES CHILDRENS PARK
Island Crest Park Entry
ISLAND CREST PARK
Island Crest Way
89th Ave SE
SE 56th St
SE 58th St
90th Ave SE
91st Ave SE
SITE
SE 58th St
SE 59th St
SE 60th St
90th Ave SE
SE 61st St
Legend
Identified Landslide
Scarp
Geologic Contacts
Spring Locations
Springs Mapped
Water - 10 ft below g
Landslide Area
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1: 2,512
Notes
0.1
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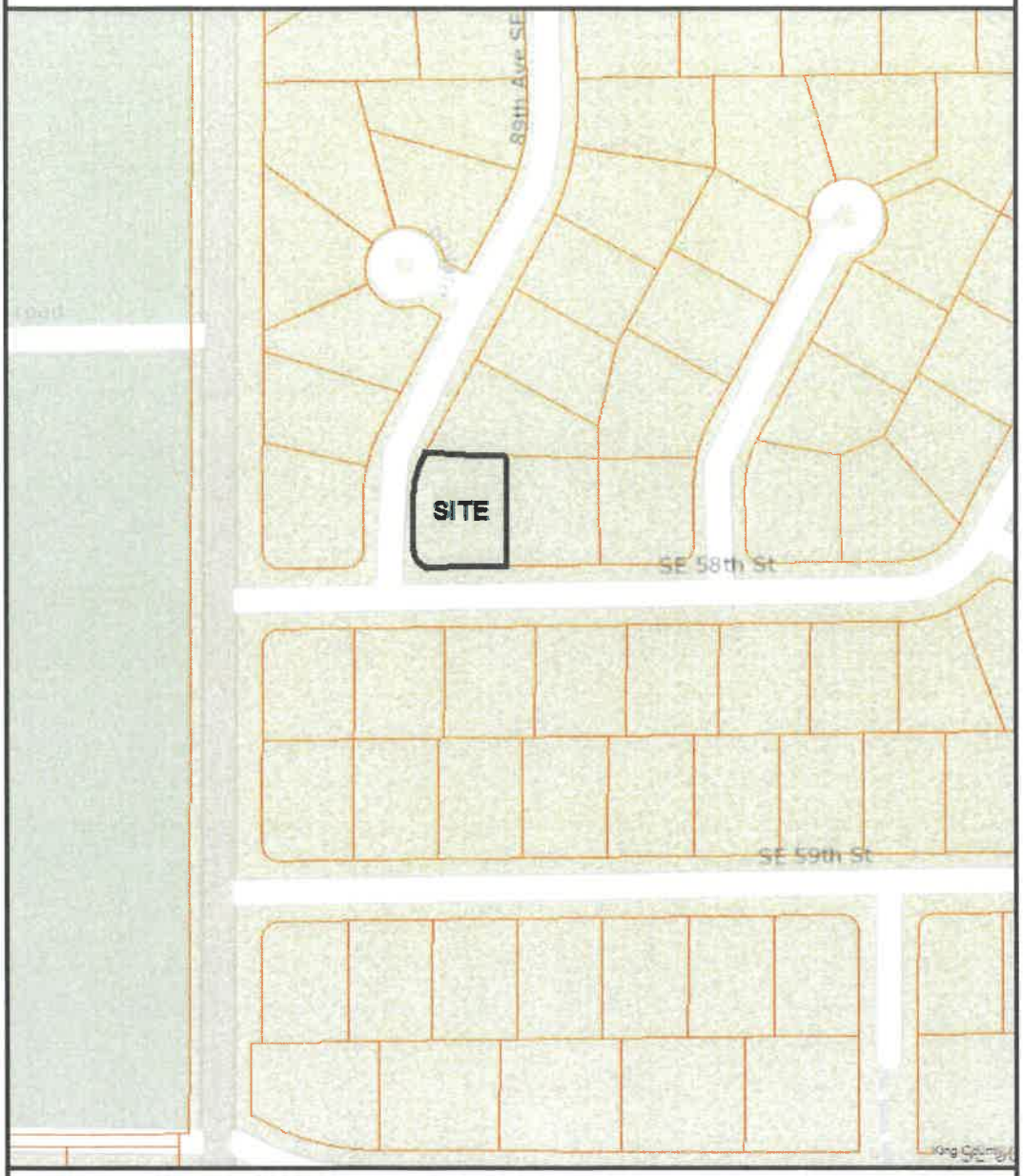
0.03
0.1 Miles
© City of Mercer Island
Map Printed: July 15 2024

DRAINAGE COMPLAINTS

DRAINAGE COMPLAINTS

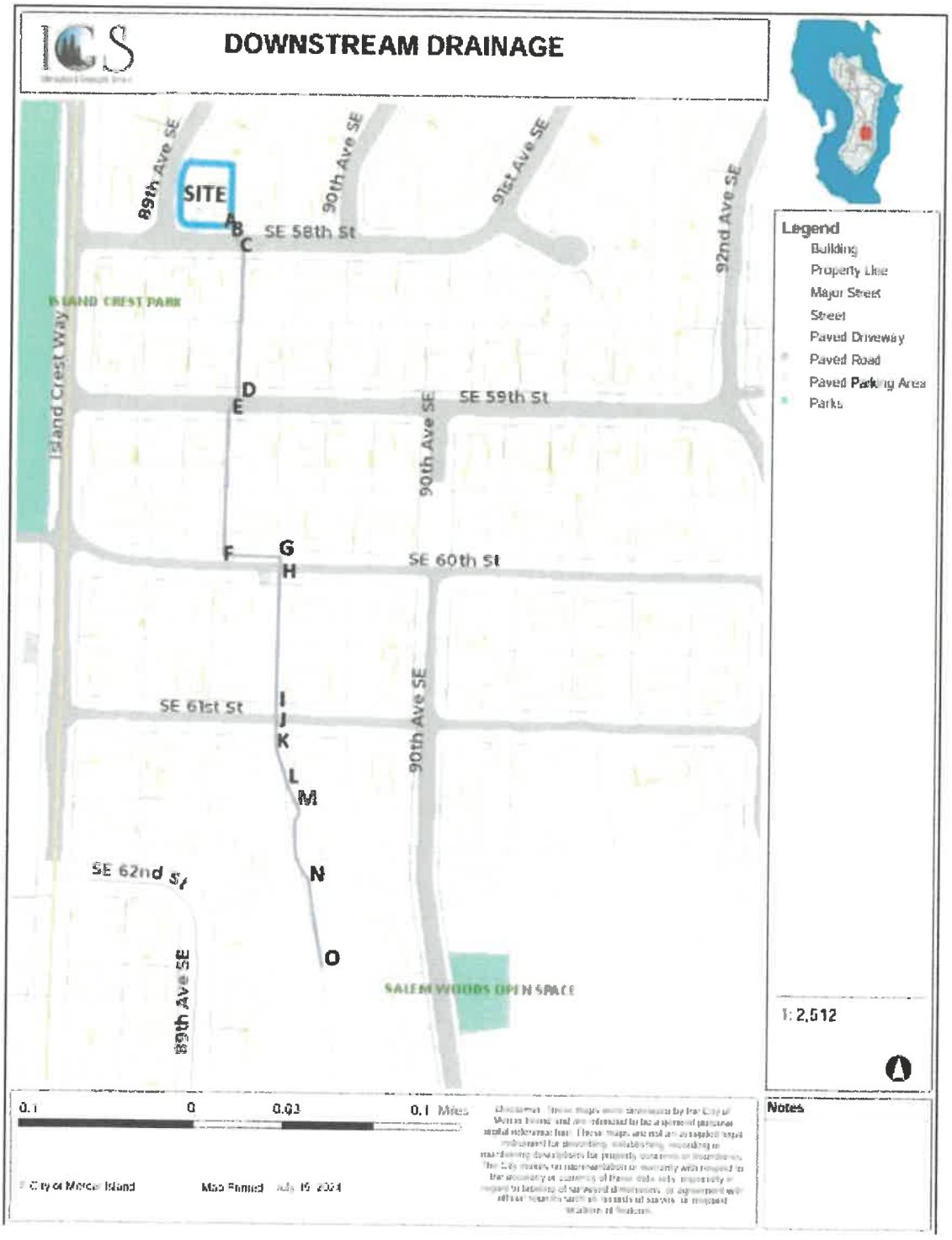


Date: 7/19/2024 Notes:

N

King County

DOWNSTREAM DRAINAGE MAP


DOWNSTREAM DRAINAGE
SITE
89th Ave SE
90th Ave SE
91st Ave SE
92nd Ave SE
SE 58th St
SE 59th St
SE 60th St
SE 61st St
SE 62nd St
Island Crest Way
ISLAND CREST PARK
SALEM WOODS OPEN SPACE
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
Legend
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1: 2,512
0.1
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0.03
0.1 Miles
Notes
© City of Mercer Island
Map Printed


DOWNSTREAM DRAINAGE A-H
SITE
89th Ave SE
SE 58th St
SE 59th St
90th Ave SE
SE 60th St
A
B
C
D
E
F
G
42-40
42-39
42-183
42-184
42-97
42-44
42-41
42-38
42-46
42-45
42-28
42-27
42-76
42-74
42-77
42-158
42-71
42-70
42-75
42-73
42-72
42-69
42-203
42-104
Legend
Storm Catch Basin
Storm Main
Storm Main - Private
Storm Discharge Pur
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1: 1,256
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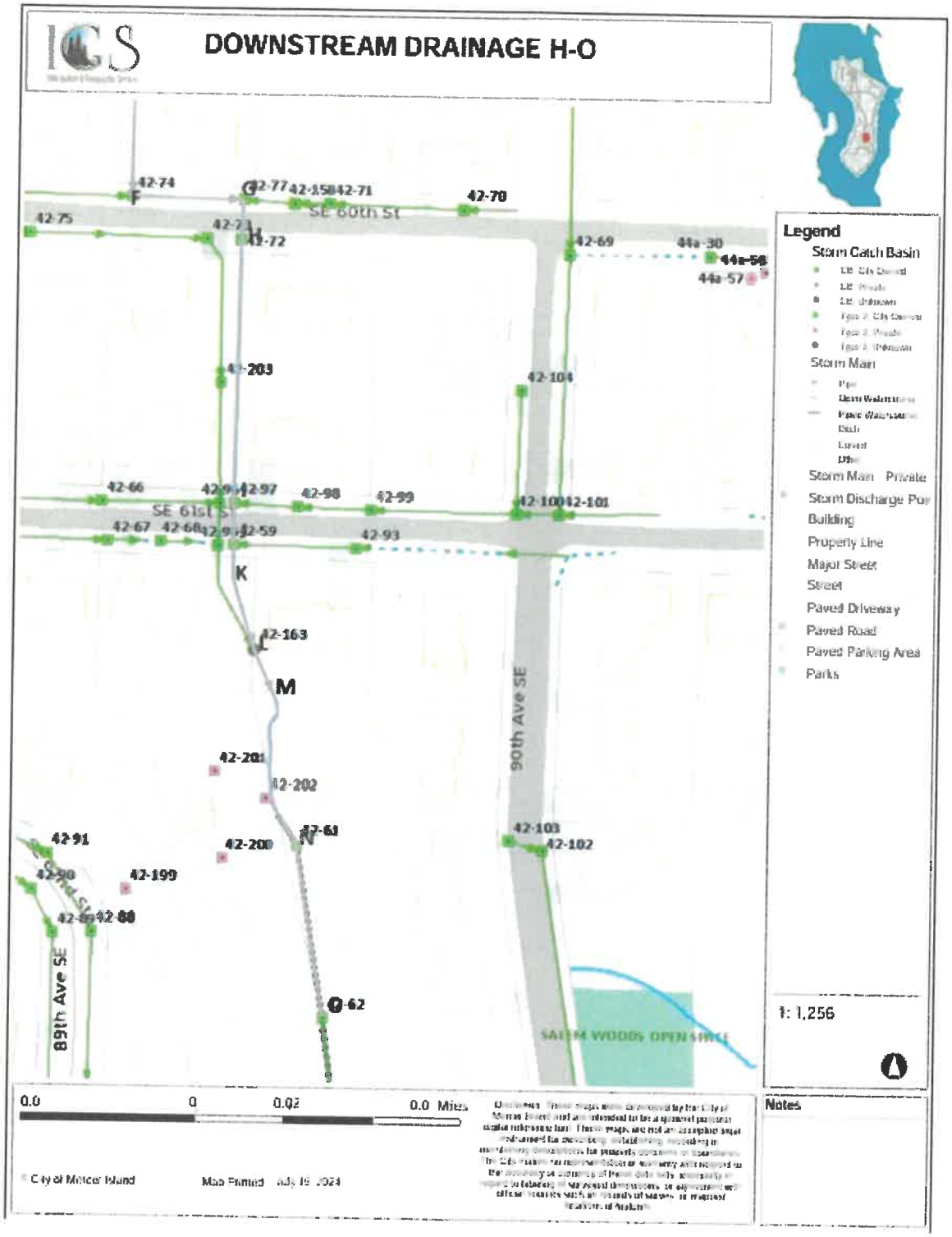
0.0 Miles
Notes
City of Mercer Island
Map Printed July 19, 2024


DOWNSTREAM DRAINAGE H-O
SE 60th St
SE 61st St
90th Ave SE
89th Ave SE
SALEM WOODS OPEN SPACE
42-74
42-77
42-15
42-71
42-70
42-75
42-73
42-72
42-69
44a-30
44a-56
44a-57
42-203
42-104
42-66
42-97
42-98
42-99
42-100
42-101
42-67
42-68
42-59
42-93
K
42-163
L
M
42-201
42-202
42-61
42-200
42-103
42-102
42-91
42-90
42-199
42-89
42-88
42-62
N
Legend
Storm Catch Basin
Storm Main
Storm Main Private
Storm Discharge Poi
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
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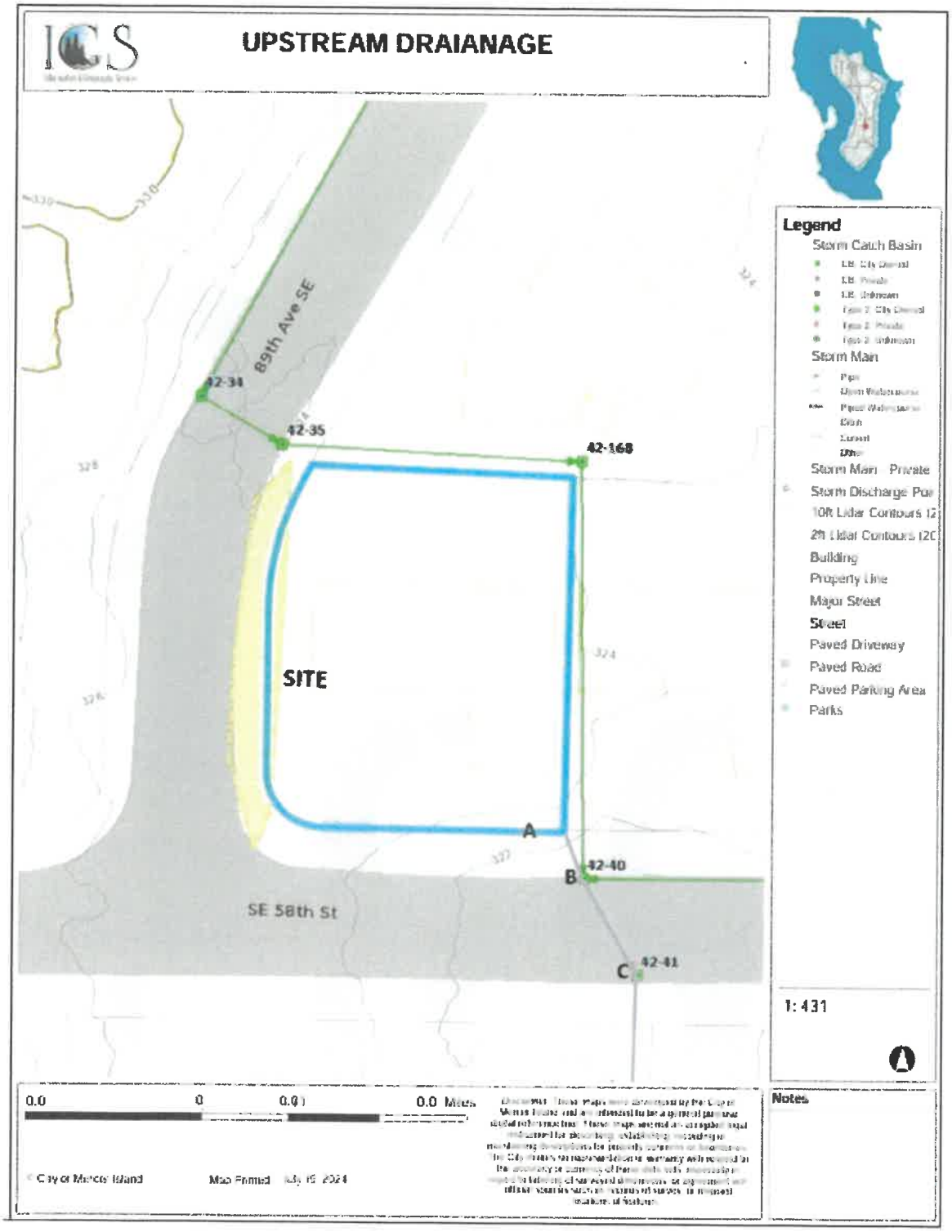
City of Mercer Island
Map Printed July 19 2024
Notes

UPSTREAM DRAINAGE MAP


UPSTREAM DRAIANAGE
89th Ave SE
42-34
42-35
42-168
SITE
A
B
42-40
SE 58th St
C
42-41
Legend
Storm Catch Basin
Storm Main
Storm Main Private
Storm Discharge Poi
10ft Lidar Contours 12
2ft Lidar Contours 120
Building
Property Line
Major Street
Street
Paved Driveway
Paved Road
Paved Parking Area
Parks
1:431
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City of Mercer Island
Map Printed July 15, 2024
Notes

OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE

OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE
SURFACE WATER DESIGN MANUAL, CORE REQUIREMENT #2

Basin: Mercer Island **Subbasin Name:** **Subbasin Number:**

Symbol	Drainage Component Type, Name, and Size	Drainage Component Description	Slope	Distance from site discharge	Existing Problems	Potential Problems	Observations of field inspector, resource reviewer, or resident
see map	Type: sheet flow, swale, stream, channel, pipe, pond; Size: diameter, surface area	drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	¼ mi = 1,320 ft.	constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		tributary area, likelihood of problem, overflow pathways, potential impacts
A	Site Discharge			0			
A-B	Sheet flow	Type 1, Straight Slot	1	0' –16'	None observed	None	
B-C	12" Concrete, Type 1 Straight Slot	Type 1, Straight Slot	1	16' –50'	None observed	None	
C-D	18" Concrete Pipe	Type 1, Vaned	1	50' –316'	None observed	None	
D-E	18" Concrete Pipe	Type 1, Vaned	1	316' –347'	None observed	None	
E-F	18" Concrete Pipe	Type 1, Straight Slot	1	347' –605'	None observed	None	
F-G	18" Concrete Pipe	Type 1, Straight Slot	2	605' –702'	None observed	None	
G-H	18" Concrete Pipe	Type 1, Straight Slot	3	702'-739'	None observed	None	
H-I	18" Concrete Pipe	Type 1, Straight Slot	2	739'-976'	None observed	None	
I-J	18" Concrete Pipe	Unknown	1	976'-1014'	None observed	None	

J-K	18" Concrete Pipe		4	1014'-1047'	None observed	None	
K-L	18" Concrete Pipe	Type 2 MH, Round Solid Lid	3	1047'-1112'	None observed	None	
L-M	24" Concrete Pipe	Open Watercourse, Earthen	5	1112'-1155'	None observed	None	
M-N	Open Watercourse, Earthen/ Piped Watercourse 18" Unknown Material	Unknown	3	1155'-1301'	None observed	None	
N-O	Piped Watercourse, Unknown 18"	Unknown	18	1301'-1458'	None observed	None	
O	Unknown			1458'	None observed	None	

ADHERENCE TO 2024 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON MINIMUM TECHNICAL REQUIREMENTS 1-5

Though we are only required to adhere to minimum requirement #2 (per Figure I-3.2), we have complied with requirements 1-5 detailed here.

1. Minimum Requirement #1: Preparation of a Stormwater Site Plan

A set of preliminary civil plans have been prepared and included with this submittal.

2. Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)

Element 1: Preserve Vegetation/ Mark Clearing Limits
Use BMPs C233: Silt Fence, C103: High-Visibility Fence, and C101: Preserving Natural Vegetation to comply with Element 1.

Element 2: Establish Construction Access
Use BMP C105: Stabilized Construction Access to comply with Element 2.

Element 3: Control Flow Rates
Use BMP C235: Wattles to comply with Element 3.

Element 4: Install Sediment Controls
Silt fence and wattles (detailed previously) will be used for Element 4 as well.

Element 5: Stabilize Soils
Use BMPs C120: Temporary and Permanent Seeding, C121: Mulching, and C123: Plastic Covering to comply with Element 5.

Element 6: Protect Slopes
Use the same BMPs from Element 5 to comply with Element 6.

Element 7: Protect Storm Drain Inlets
Use BMP C220: Inlet Protection to comply with Element 7.

Element 8: Stabilize Channels and Outlets
Use BMP C122: Nets and blankets to comply with Element 8.

Element 9: Control Pollutants
Use BMP C153: Material Delivery, Storage, and Containment to comply with Element 9.

Element 10: Control Dewatering
Dewatering is not expected but if so use BMP C236: Vegetative Filtration.

Element 11: Maintain BMPs
Use BMP C150: Materials on Hand to comply with Element 11.

Element 12: Manage the Project

Use BMP C150: Materials on Hand to comply with Element 12.

Element 13: Protect Infiltration BMPs

Use BMP C233: Silt Fence to comply with Element 13.

3. Minimum Requirement #3: Source Control of Pollution

The main source of pollution in this project will be automobile oils and grease. Since the impact of this will be insignificant, no measures will be taken.

4. Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

The stormwater is discharged in the natural downstream direction.

5. Minimum Requirement #5: On-site Stormwater Management

Using List 1:

Lawn and Landscaped Areas:

BMP T5.13: Post-Construction Soil Quality and Depth will be applied

Roofs:

1) Full Dispersion is infeasible due to an inadequate flow path.

   Full Infiltration is infeasible due to poor soils.

2) Bioretention is infeasible due to the poor soils.

3) Downspout Dispersion is infeasible due to inadequate flow path

   Using a Perforated Stub-out connection per BMP T5.10C is deemed infeasible due poor soils.

Other Hard Surfaces:

1) Full Dispersion is infeasible due to an inadequate flow path.

2) Permeable Pavement is infeasible due to the poor soils.

3) Bioretention is infeasible due to the poor soils.

4) Sheet Flow Dispersion is infeasible due to inadequate flow path.

All exposed soils shall be either hydroseeded, sodded, mulched, covered with a plastic coating, or application of ground base on areas to be paved within the following time periods listed below. From October 1 through April 30, no soils shall remain exposed for more than 2 days. From May 1 through September 30, no soils shall remain exposed for more than 7 days.

Bmp's shall be suitable for the appropriate time of year construction takes place. These shall include but not limited to silt fence, catchbasin inserts, strawbale and rock check dams, and interceptor trenches.

Permanent catch basins used during the construction phase of the project will be protected using filter fabric barriers under the grate. These will be routinely replaced to prevent plugging.

All underground utility construction guidelines will be complied with according to erosion and sediment control requirement # 9.

A construction entrance will be established using quarry spalls. All temporary BMPs will be removed within 30 days after final site stabilization is complete.

All dewatering onsite will be detained in a temporary detention pond before entering any pipe.

All temporary and permanent control measures will be properly maintained and repaired as needed to assure proper performance measures. The contractor shall be bonded to assure compliance with the sediment and control plan.

Detention System and Water Quality Analysis and Design

1. Overview

Site Area = 10,005 sf
R.O.W Area = 163 sf
Total Area Being Analyzed = 10,168 sf or 0.234 acres

Soils: Arents, Alderwood material, 0 to 6 percent slopes
USDA Web Soil Survey

Design Standards:

1. City of Mercer Island Storm and Surface Water Engineering Standards
   2024 Department of Ecology Manual
2. Used Western Washington Hydrologic Runoff Model and DOE flow duration standard

2. Existing Site Conditions

Site Area = **10,168 sf or 0.234 acres**

Impervious Area:

Roof = 3,035 sf or 0.070 acres (Roof top/flat)
Driveway = 928 sf or 0.021 acres (driveways/flat)
Bricks/ Concrete patio / walkway = 169 sf or 0.004 acres (sidewalks/flat)
R.O.W. = 163 sf or 0.004 (roads/flat)
Total Lot Coverage= 4,456 sf or 0.106 acres
Rest is pervious area (C, Flat Lawn) = 0.234 - .106 = 0.128 acres

Using WWHM. (See Printout)
Q-100 = 0.080175 cfs
Q-10 = 0.052194 cfs
Q-2 = 0.033517 cfs

3. Proposed Site Conditions

Site Area = **10,168 sf or 0.234 acres**

Impervious Area:

House= 3696 sf or 0.084 acres (Roof top/flat)
Driveway = 311 sf or 0.007 acres (driveways/flat)
Walkway/ patio / brick = 582 sf or 0.013 acres (sidewalks/flat)
R.O.W. = 163 or 0.004 acres (roads/flat)
Total Lot Coverage= 4,589 sf or 0.108 acres

Pervious Area:

Modeled as C, Flat Lawn
Lawn = (0.234 – 0.108) = **0.126 acres**

Using WWHM. (See Printout)

Q-100 = 0.080731 cfs

Q-10 = 0.052694 cfs

Q-2 = 0.033929 cfs

Since we are less than 0.1 cfs difference between the Pre-Developed and Developed runoff conditions, we are exempt from Flow Control. The proposed project is also less than 500 sf of net increase in impervious surface and less than 2,000 sf of new and replaced hard surface. Under these conditions we are therefore exempt from using a detention system.

4. Detention Sizing

Since the proposed project is also less than 500 sf of net increase in impervious surface and less than 2,000 sf of new and replaced hard surface. Under these conditions we are therefore exempt from using a detention system

WWHM2012
PROJECT REPORT

Project Name: REV 3 . WWHM2012
Site Name:
Site Address:
City :
Report Date: 3/19/2025
Gage : Seatac
Data Start : 1948/10/01
Data End : 2009/09/30
(adjusted) **Precip Scale:** 0.00
Version Date: 2024/06/28
Version : 4.3.1

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	.128
Pervious Total	0.128

Impervious Land Use	acre
ROADS FLAT	0.004
ROOF TOPS FLAT	0.07
DRIVEWAYS FLAT	0.021
SIDEWALKS FLAT	0.011
Impervious Total	0.106
Basin Total	0.234

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	.126
Pervious Total	0.126

Impervious Land Use	acre
ROADS FLAT	0.004
ROOF TOPS FLAT	0.084
DRIVEWAYS FLAT	0.007
SIDEWALKS FLAT	0.013
Impervious Total	0.108
Basin Total	0.234

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.128
Total Impervious Area:0.106

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.126
Total Impervious Area:0.108

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.033517
5 year	0.044381
10 year	0.052194
25 year	0.062798
50 year	0.071245
100 year	0.080175

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.033929
5 year	0.04485
10 year	0.052694
25 year	0.063328
50 year	0.07179
100 year	0.080731

Appendix A

EXISTING AND DEVELOPED CONDITION MAPS

TOPOGRAPHIC & BOUNDARY SURVEY

LEGAL DESCRIPTION

PER TRUSTEE'S DEED RECORDING # 20231102000233

LOT 35, EL DORADO ESTATES, ACCORDING TO PLAT RECORDED IN VOLUME 62 OF PLATS, PAGE 7, IN KING COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF KING, STATE OF WASHINGTON.

SUBJECT TO AND TOGETHER WITH EASEMENTS, CONDITIONS, COVENANTS AND RESTRICTIONS OF RECORD.

BASIS OF BEARINGS

ACCEPTED THE BEARING OF N 29°48'12" E BETWEEN MONUMENTS FOUND ALONG THE CENTERLINE OF 89TH AVE SE, PER REFERENCE NO. 1.

REFERENCES

R1. EL DORADO ESTATES, VOL. 62 OF PLATS, PG. 07, RECORDS OF KING COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD 88 PER CITY OF MERCER ISLAND BENCHMARK NO. 1800
DESCRIPTION: CONC. MON W/ TACK IN LEAD
LOCATION: C/L 89TH AVE SE OPP HSE #5639
ELEVATION: 323.242'

SITE TEMP. BENCHMARK
DESCRIPTION: PK NAIL W/ RED WASHER
LOCATION: 67.7'S & 53.8'W FROM THE NW PROPERTY CORNER
ELEVATION: 324.96'

SURVEYOR'S NOTES

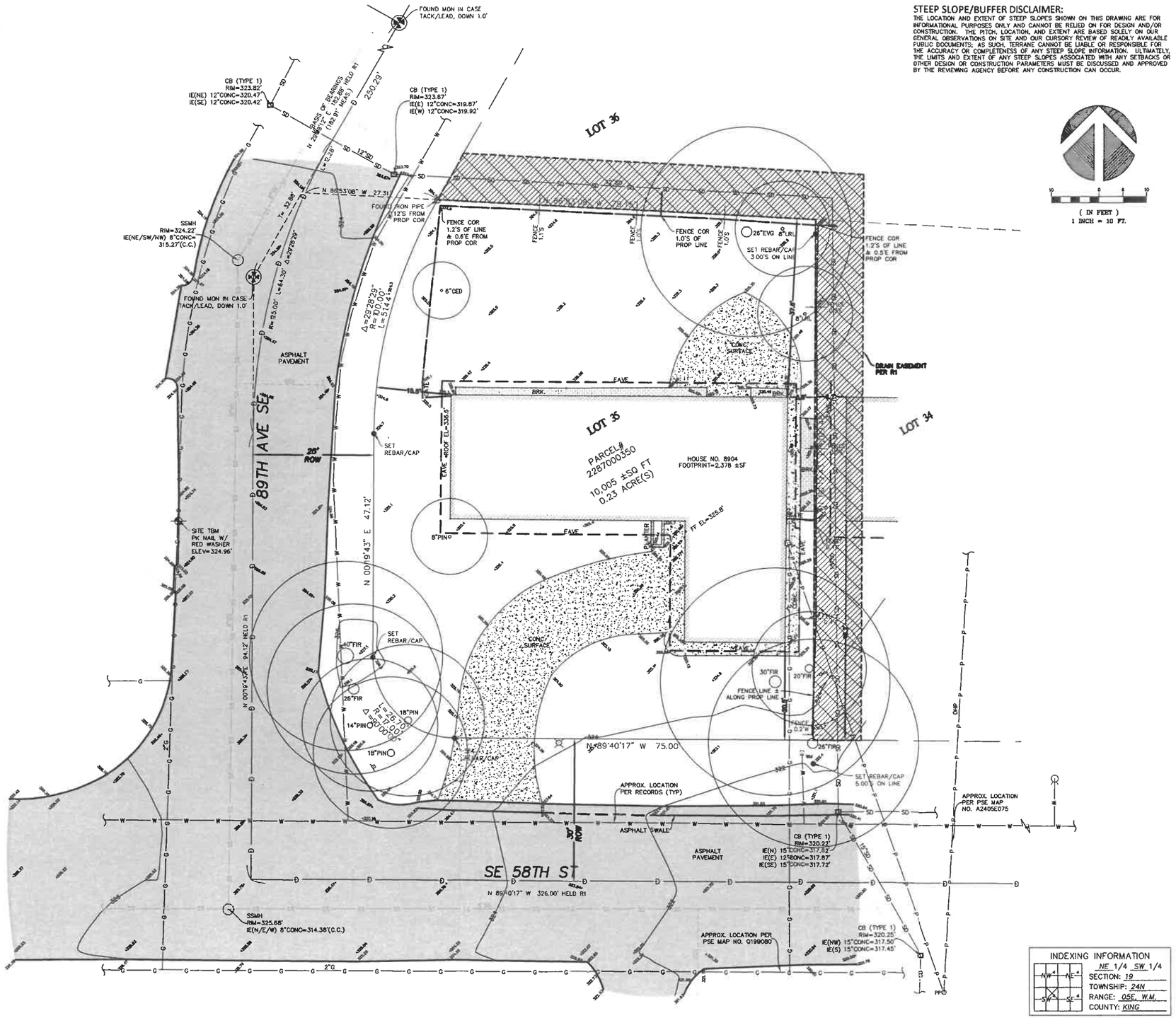
1. THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN JANUARY OF 2024. THE FIELD DATA WAS COLLECTED AND RECORDED ON MAGNETIC MEDIA THROUGH AN ELECTRONIC THEODOLITE. THE DATA FILE IS ARCHIVED ON DISC OR CD. WRITTEN FIELD NOTES MAY NOT EXIST. CONTOURS ARE SHOWN FOR CONVENIENCE ONLY. DESIGN SHOULD RELY 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. 2287000350
5. SUBJECT PROPERTY AREA PER THIS SURVEY IS 10,005 ±S.F. (0.23 ACRES)
6. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT. EASEMENTS AND OTHER ENCUMBRANCES MAY EXIST THAT ARE NOT SHOWN HEREON.
7. EXISTING STRUCTURE(S) LOCATION AND DIMENSIONS ARE MEASURED FROM THE FACE OF THE SIDING UNLESS OTHERWISE NOTED.
8. 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
- BRASS DISC (FOUND)
- CENTERLINE ROW
- FENCE LINE (WOOD)
- IRON PIPE (FOUND)
- MONUMENT (IN CASE, FOUND)
- NAIL AS NOTED
- PROPERTY LINES (ADJACENT)
- PROPERTY LINE (SUBJECT)
- REBAR & CAP (SET)
- RETAINING WALL
- RIGHT-OF-WAY LINES
- BUILDING
- SIGN (AS NOTED)
- TREE (AS NOTED)
- ASPHALT SURFACE
- BRICK SURFACE
- CONCRETE SURFACE
- DECK
- GAS METER
- GAS LINE
- INLET (TYPE 1)
- STORM DRAIN LINE
- SEWER MANHOLE
- SEWER LINE
- POWER METER
- POWER POLE
- POWER (OVERHEAD)
- YARD LIGHT
- FIRE HYDRANT
- WATER METER
- WATER LINE
- DRAIN EASEMENT PER R1

VICINITY MAP

VMAP.png



STEEP SLOPE/BUFFER DISCLAIMER:

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

(IN FEET)
1 INCH = 10 FT.

INDEXING INFORMATION

NE 1/4 SW 1/4
SECTION: 19
TOWNSHIP: 24N
RANGE: 05E, W.M.
COUNTY: KING

WATM.jpg

TOPOGRAPHIC & BOUNDARY SURVEY
PARCEL NO. 2287000350

JENNIE LEE RESIDENCE
8904 SOUTHEAST 58TH STREET
MERCER ISLAND, WA 98040

T-LOGO.jpg

JOB NUMBER:	232300
DATE:	01/19/24
DRAFTED BY:	CAS
CHECKED BY:	JGM / WMS
SCALE:	1" = 10'

REVISION HISTORY

SHEET NUMBER
1 OF 1

ote.dwg

LEE RESIDENCE

NW 1/4, SW 1/4, SECTION 19, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.
CITY OF MERCER ISLAND, WASHINGTON

OWNER:
JENNIE LEE
8904 SE 58TH STREET,
MERCER ISLAND, WA

ARCHITECT: ARCHITECTURAL INNOVATIONS
NAME: ROBERT YOUNG
COMPANY
PH: 425-641-5320

CIVIL ENGINEER:
EASTSIDE CONSULTANTS, INC
1320 NW MALL STREET, STE B
ISSAQUAH, WA 98027
PHONE: 425.392.5351
CONTACT: RON FREDERIKSEN

GRAPHIC SCALE
(IN FEET)
1 inch = 10 ft.

ONSITE IMPERVIOUS SURFACE COVERAGE CAL △

TOTAL IMPERVIOUS COVERAGE ALLOWED (60%): 10,005 SF X 0.600 =6,003 SF

	(E)EXISTING AREA	(N)PROPOSED AREA	NET AREA
HOUSE	3,035 SF	3,686 SF (NEW+REMAIN)	+651 SF
CONCRETE PATIO / WALKWAY	435 SF	524 SF (REMAIN+NEW)	+89 SF
BRICK	88 SF	88 SF (REMAIN)	0 SF
DRIVEWAY	928 SF	311 SF (NEW/PERVIOUS*)	- 617 SF
TOTAL	4,486 SF	4,609 SF (46.2%)	+123**
		<6,003 SF ... OK	

*NOTE - THE PERVIOUS PAVEMENT CREDIT WAS NOT USED IN THIS CALCULATION. PERVIOUS PAVERS RECOMMENDED FOR TREE WATERING

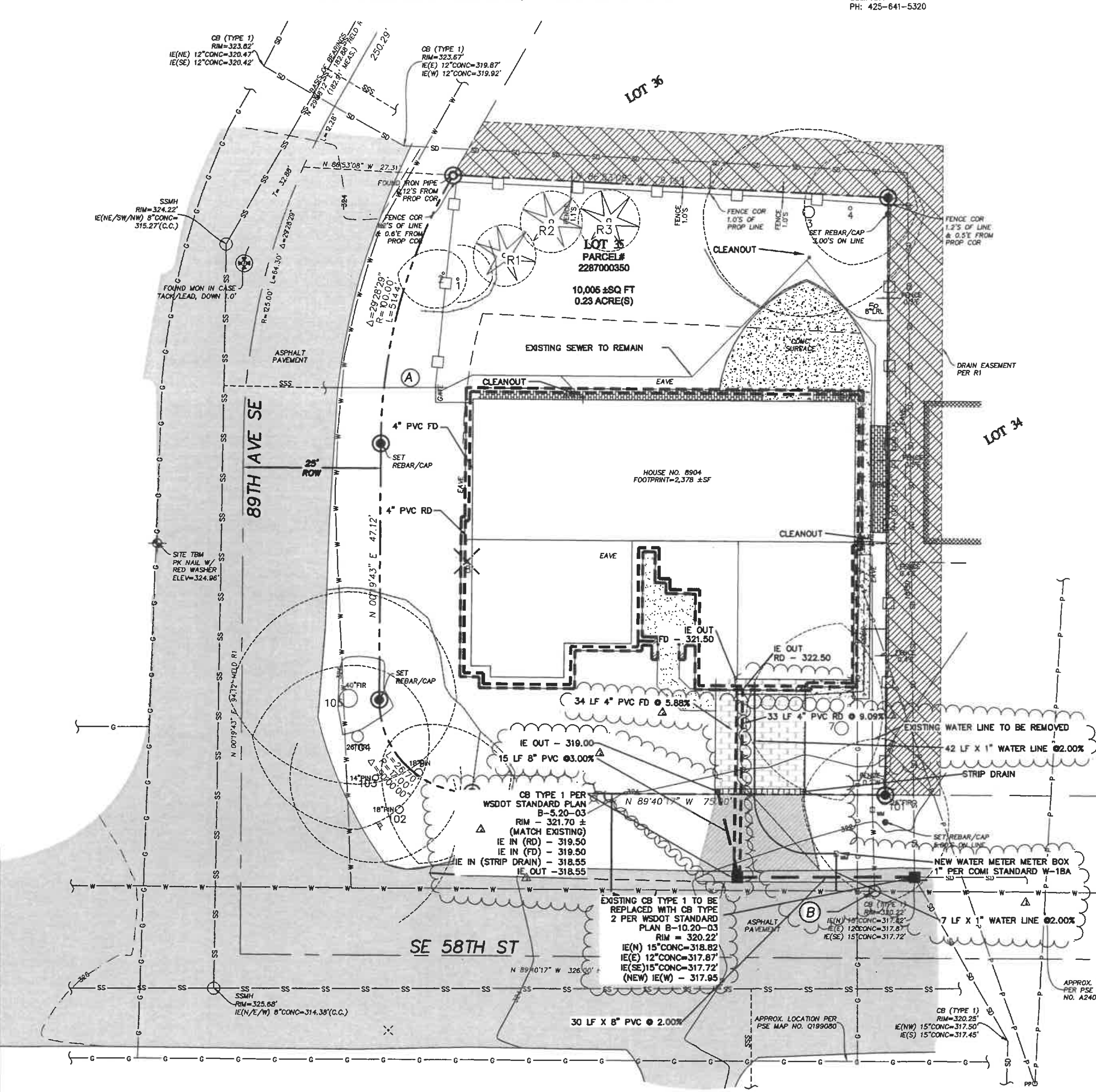
**NOTE - NET AREA IS UNDER 500SF THEREFORE DETENTION IS NOT REQUIRED

OFFSITE IMPERVIOUS SURFACE

	(E)EXISTING AREA	(N)PROPOSED AREA	NET AREA
DRIVEWAY (OLD)	282 SF	0	-282 SF
DRIVEWAY (NEW)	0 SF	296 SF (NEW)	+296 SF
TOTAL	282 SF	296 SF	+ 14 SF

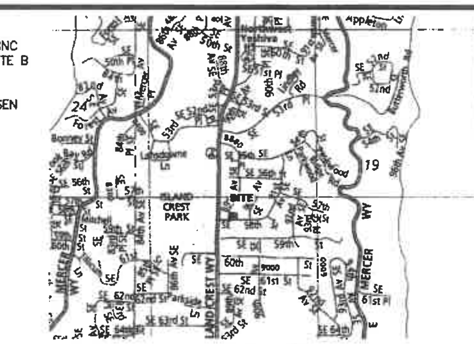
(A) EXISTING SEWER AND STUB TO BE TV'D TO DETERMINE IF IT IS UP TO STANDARDS (CMI STD. # S-17, S-18). IF SEWER AND STUB IS DETERMINED 'NOT UP TO STANDARDS' REPLACE PER CMI STD. # S-17, S-18

(B) EXISTING WATER LINE TO BE ABBANDONED AT WATER MAIN △



LEGEND

	BENCHMARK		BRICK SURFACE
⊕	BRASS DISC (FOUND)		CONCRETE SURFACE
	CENTERLINE ROW		DECK
	FENCE LINE (WOOD)	G	GAS METER
IPO	IRON PIPE (FOUND)	—G—	GAS LINE
	MONUMENT (IN CASE, FOUND)		INLET (TYPE 1)
	NAIL AS NOTED	—SD—	STORM DRAIN LINE
	PROPERTY LINES (ADJACENT)		SEWER MANHOLE
	PROPERTY LINE (SUBJECT)		SEWER LINE
●	REBAR & CAP (SET)	P	POWER METER
	RETAINING WALL	PP	POWER POLE
	RIGHT-OF-WAY LINES	—P—	POWER (OVERHEAD)
	BUILDING		YARD LIGHT
	SIGN (AS NOTED)		FIRE HYDRANT
SIZE TYPE	TREE (AS NOTED)	WM	WATER METER
	ASPHALT SURFACE	—W—	WATER LINE
	PHASE 2 TREE PROTECTION		DRAIN EASEMENT PER R1
	PHASE 1 TREE PROTECTION		



VICINITY MAP
N.T.S.

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DESCRIPTION: PK NAIL W/ RED WASHER
LOCATION: 67.7'S & 53.8'W FROM THE NW PROPERTY CORNER
ELEVATION:324.96'

INDEX LOCATION:
SEC.30 T.24N.R. 5E. W.M.

30

RONALD B. FREDERIKSEN, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER

03/19/2025

SITE ADDRESS: 8904 SE 58TH ST.

REVISIONS	BY	DATE
REVISED PER CITY MARKUPS △	REH	01/21/25
REVISED PER CLIENT △	REH	03/19/25

SEWER WATER STORM PLAN

JENNIE LEE
8904 SE 58TH ST.
MERCER ISLAND, WA

ENGINEERS - SURVEYORS
EASTSIDE CONSULTANTS, INC.

JOB NO. 24081
DATE 10/24
SCALE 1"=10'
DESIGNED R.E.H.
DRAWN R.E.H.
CHECKED R.S.F.
APPROVED R.S.F.

SHEET 2 OF 14

Appendix B

FIGS I-3.1 AND I-3.2

Figure I-3.1: Flow Chart for Determining Requirements for New Development

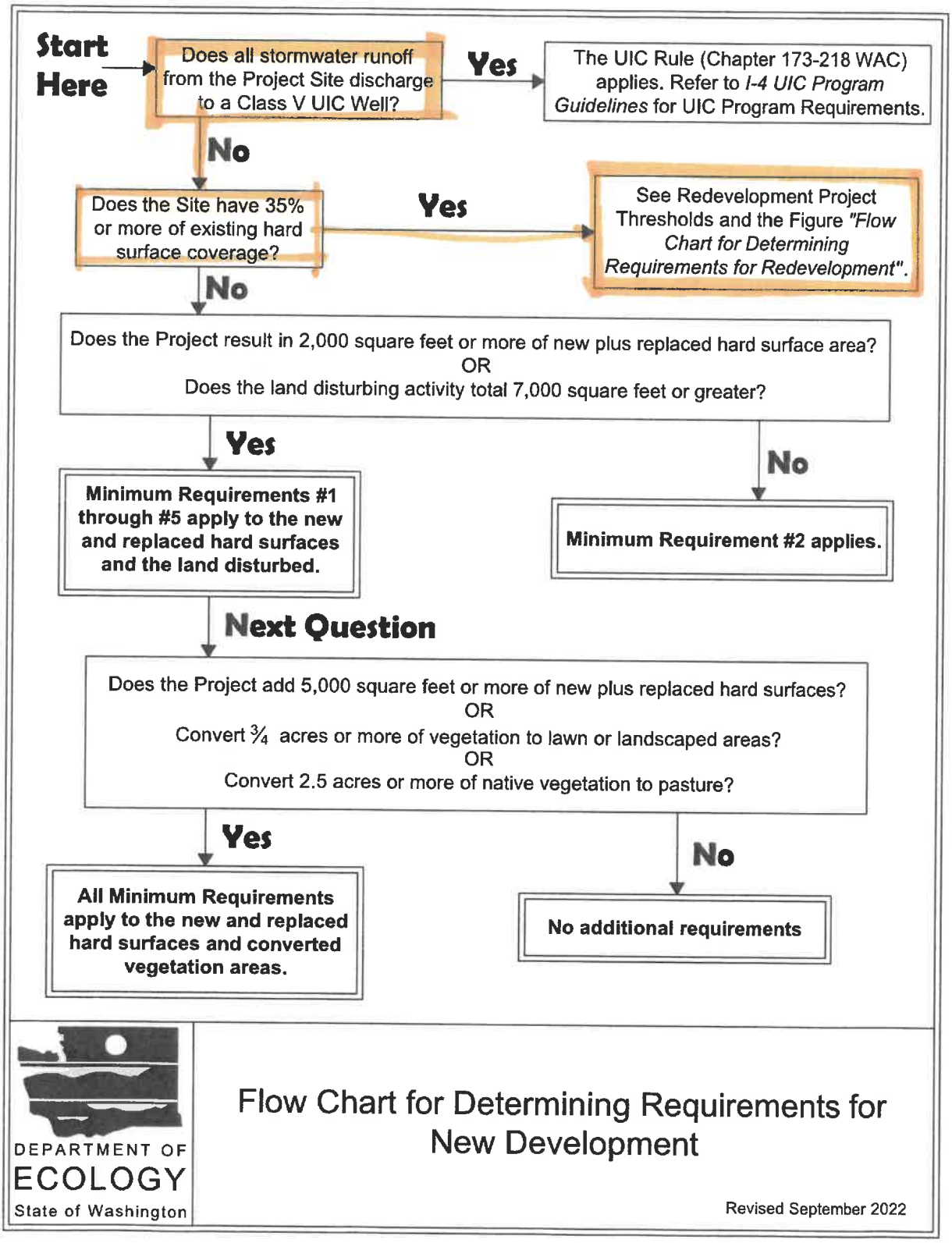
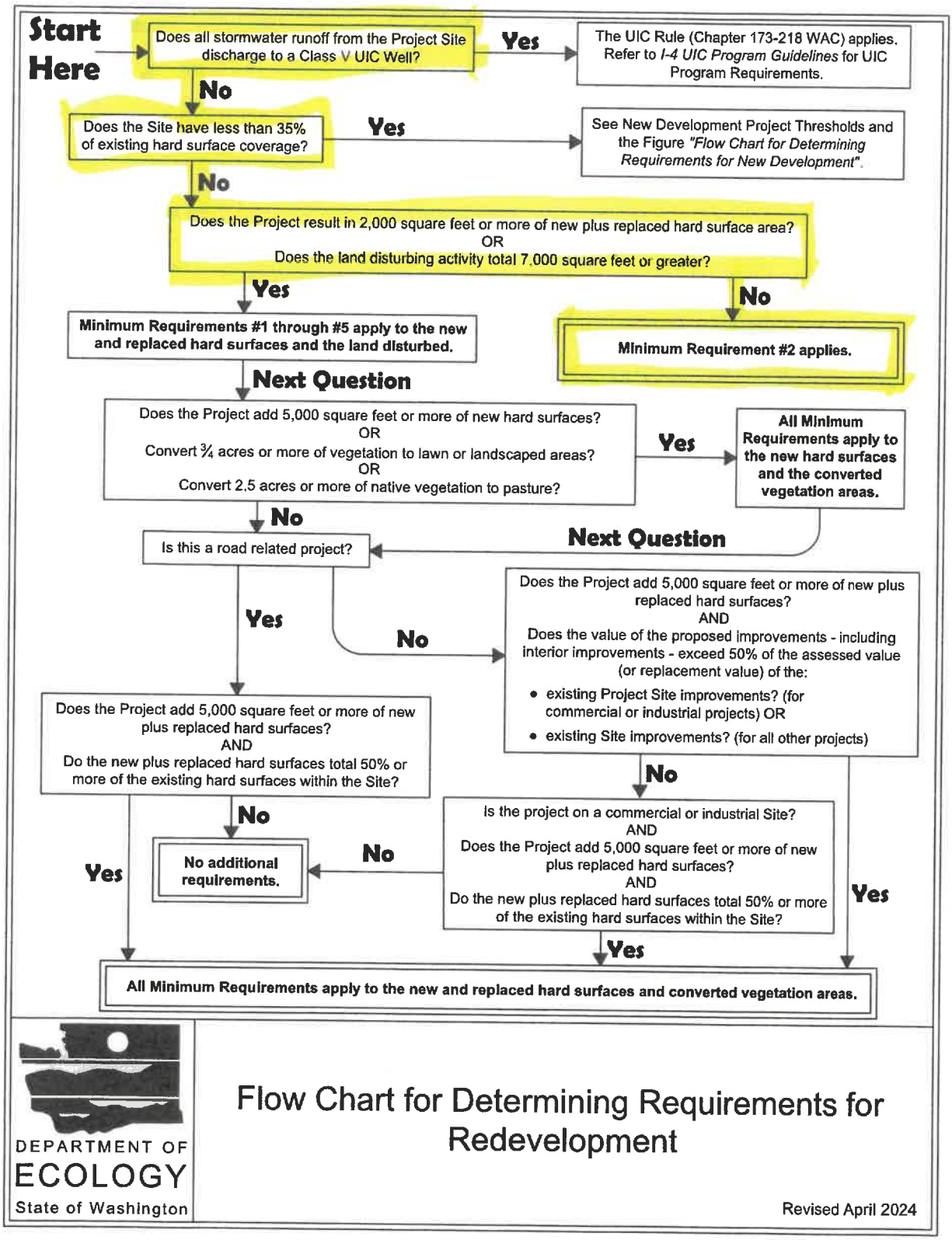


Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment



Appendix C

CSWPPP REPORT

Construction Stormwater Pollution Prevention Plan

For

Lee Remodel
8904 SE 58th Street
Mercer Island, WA 98040

Parcel No. 228700-0350
City of Mercer Island File No. 2409-012

Eastside Consultants, Inc. File No. 24081

October 16, 2024
Revision
January 21, 2025
Revision
March 20, 2025

Prepared by:
Eastside Consultants, Inc.
1320 NW Mall Street, Ste B.
Issaquah, WA 98027
(425) 392-5351

Prepared for:
Jennie Lee
8904 SE 58th Street
Mercer Island, WA 98014

TABLE OF CONTENTS

Project Overview

The proposed Single-Family Residence consists of removing the existing driveway and adding a new walkway and expanding the house. The project is located at 8904 SE 58th Street in Mercer, Island, WA. The parcel is located on the corner of SE 58th Street and 89th Ave SE.

The runoff will primarily sheet flow off the roof into gutters and be transported from the main roof via downspouts into a new type 1 catch basin offsite, just South of the driveway. From here it will flow East enter a new type 2 catch basin offsite, on the North side of NE 58th Street.

ADHERENCE TO 2024 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON MINIMUM TECHNICAL REQUIREMENTS 1-5

Though we are only required to adhere to minimum requirement #2 (per Figure I-3.2), we have complied with requirements 1-5 detailed here.

1. Minimum Requirement #1: Preparation of a Stormwater Site Plan

A set of preliminary civil plans have been prepared and included with this submittal.

2. Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)

Element 1: Preserve Vegetation/ Mark Clearing Limits
Use BMPs C233: Silt Fence, C103: High-Visibility Fence, and C101: Preserving Natural Vegetation to comply with Element 1.

Element 2: Establish Construction Access
Use BMP C105: Stabilized Construction Access to comply with Element 2.

Element 3: Control Flow Rates
Use BMP C235: Wattles to comply with Element 3.

Element 4: Install Sediment Controls
Silt fence and wattles (detailed previously) will be used for Element 4 as well.

Element 5: Stabilize Soils
Use BMPs C120: Temporary and Permanent Seeding, C121: Mulching, and C123: Plastic Covering to comply with Element 5.

Element 6: Protect Slopes
Use the same BMPs from Element 5 to comply with Element 6.

Element 7: Protect Storm Drain Inlets
Use BMP C220: Inlet Protection to comply with Element 7.

Element 8: Stabilize Channels and Outlets
Use BMP C122: Nets and blankets to comply with Element 8.

Element 9: Control Pollutants
Use BMP C153: Material Delivery, Storage, and Containment to comply with Element 9.

Element 10: Control Dewatering
Dewatering is not expected but if so use BMP C236: Vegetative Filtration.

Element 11: Maintain BMPs
Use BMP C150: Materials on Hand to comply with Element 11.

Element 12: Manage the Project

Use BMP C150: Materials on Hand to comply with Element 12.

Element 13: Protect Infiltration BMPs

Use BMP C233: Silt Fence to comply with Element 13.

3. Minimum Requirement #3: Source Control of Pollution

The main source of pollution in this project will be automobile oils and grease. Since the impact of this will be insignificant, no measures will be taken.

4. Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

The stormwater is discharged in the natural downstream direction.

5. Minimum Requirement #5: On-site Stormwater Management

Using List 1:

Lawn and Landscaped Areas:

BMP T5.13: Post-Construction Soil Quality and Depth will be applied

Roofs:

1) Full Dispersion is infeasible due to an inadequate flow path.

   Full Infiltration is infeasible due to poor soils.

2) Bioretention is infeasible due to the poor soils.

3) Downspout Dispersion is infeasible due to inadequate flow path

   Using a Perforated Stub-out connection per BMP T5.10C is deemed infeasible due poor soils.

Other Hard Surfaces:

1) Full Dispersion is infeasible due to an inadequate flow path.

2) Permeable Pavement is infeasible due to the poor soils.

3) Bioretention is infeasible due to the poor soils.

4) Sheet Flow Dispersion is infeasible due to inadequate flow path.

All exposed soils shall be either hydroseeded, sodded, mulched, covered with a plastic coating, or application of ground base on areas to be paved within the following time periods listed below. From October 1 through April 30, no soils shall remain exposed for more than 2 days. From May 1 through September 30, no soils shall remain exposed for more than 7 days.

Bmp's shall be suitable for the appropriate time of year construction takes place. These shall include but not limited to silt fence, catchbasin inserts, strawbale and rock check dams, and interceptor trenches.

Permanent catch basins used during the construction phase of the project will be protected using filter fabric barriers under the grate. These will be routinely replaced to prevent plugging.

All underground utility construction guidelines will be complied with according to erosion and sediment control requirement # 9.

A construction entrance will be established using quarry spalls. All temporary BMPs will be removed within 30 days after final site stabilization is complete.

All dewatering onsite will be detained in a temporary detention pond before entering any pipe.

All temporary and permanent control measures will be properly maintained and repaired as needed to assure proper performance measures. The contractor shall be bonded to assure compliance with the sediment and control plan.

Appendix A: SWPPP PLANS

LEE RESIDENCE

NW 1/4, SW 1/4, SECTION 19, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF MERCER ISLAND, WASHINGTON

OWNER:
JENNIE LEE
8904 SE 58TH STREET,
MERCER ISLAND, WA

ARCHITECT: ARCHITECTURAL INNOVATIONS
NAME: ROBERT YOUNG
COMPANY
PH: 425-641-5320

CIVIL ENGINEER:
EASTSIDE CONSULTANTS, INC
1320 NW MALL STREET, STE B
ISSAQUAH, WA 98027
PHONE: 425.392.5351
CONTACT: RON FREDERIKSEN

GRAPHIC SCALE
10 0 5 10 20
(IN FEET)
1 inch = 10 ft.

IN COMPLIANCE WITH THE SWPPP 13 ELEMENTS
1. PRESERVE VEGETATION/MARK CLEARING LIMITS
USE BMP C101 PRESERVING NATURAL, C103 HIGH-VISIBILITY FENCE VEGETATION, & C233 SILT FENCE
2. ESTABLISH CONSTRUCTION ACCESS
USE BMP C105 STABILIZED CONSTRUCTION
3. CONTROL FLOW RATES
USE BMP C235 WATTLES
4. INSTALL SEDIMENT CONTROLS
USE BMP C233 SILT FENCE & C235 WATTLES
5. STABILIZE SOILS
USE BMP C121 MULCHING, C120 TEMPORARY AND PERMANENT SEEDING & C123 PLASTIC COVERING
6. PROTECT SLOPES
USE BMP C121 MULCHING, C120 TEMPORARY AND PERMANENT SEEDING & C123 PLASTIC COVERING
7. PROTECT DRAIN INLET
USE BMP C220 STORM DRAIN INLET
8. STABILIZE CHANNELS AND OUTLETS
C122 NETS AND BLANKETS
9. CONTROL POLLUTANTS
USE BMP C153 MATERIAL DELIVERY, STORAGE, AND CONTAINMENT
10. CONTROL DEWATERING
NO DEWATERING EXPECTED, IF NEEDED USE BMP C236 VEGETATIVE FILTRATION
11. MAINTAIN BMPS
ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL (ESC) SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION AND USE BMP C150 MATERIALS ON HAND
12. MANAGE THE PROJECT
THE PROJECT WILL BE MANAGED APPROPRIATELY BY THE TESC SUPERVISOR AND USE BMP C150 MATERIALS ON HAND
13. PROTECT LOW IMPACT DEVELOPMENT (LID) BMPS
USE BMP C233 SILT FENCE AS NECESSARY

1. PRESERVING NATURAL VEGETATION PER BMP C101
2. STABILIZED CONSTRUCTION ACCESS PER BMP C105
3. TEMPORARY AND PERMANENT SEEDING PER BMP C120
4. MULCHING PER BMP C121
5. PLASTIC COVERING PER BMP C123
6. CONCRETE HANDLING PER BMP C151
7. MATERIAL DELIVERY STORAGE AND CONTAINMENT PER BMP C153
8. WATTLES PER BMP C235
9. NETS AND BLANKETS PER BMP C122
10. VEGETATIVE FILTRATION PER BMP C236
11. MATERIALS ON HAND PER BMP C150

ONSITE IMPERVIOUS SURFACE COVERAGE CAL

TOTAL IMPERVIOUS COVERAGE ALLOWED (50%): 10,005 SF X 0.800 =8,000 SF

	(E)EXISTING AREA	(N)PROPOSED AREA	NET AREA
HOUSE	3,208 SF	3,699 SF (NEW+REMAIN)	+491 SF
CONCRETE PATIO / WALKWAY	436 SF	624 SF (REMAIN+NEW)	+188 SF
BRICK	88 SF	88 SF (REMAIN)	0 SF
DRIVEWAY	668 SF	311 SF (DEMO/REMOVE)	-357 SF
TOTAL	4,400 SF	4,698 SF (48.2%)	+132**
		<8,000 SF – OK	

*NOTE - THE PERVIOUS PAVEMENT CREDIT WAS NOT USED IN THIS CALCULATION. PERVIOUS PAVERS RECOMMENDED FOR TREE WATERING
**NOTE - NET AREA IS UNDER 800SF THEREFORE DETENTION IS NOT REQUIRED

OFFSITE IMPERVIOUS SURFACE

	(E)EXISTING AREA	(N)PROPOSED AREA	NET AREA
DRIVEWAY (OLD)	262 SF	0	-262 SF
DRIVEWAY (NEW)	0 SF	288 SF (NEW)	+288 SF
TOTAL	262 SF	288 SF	+ 14 SF

LEGEND

- BENCHMARK
- BRASS DISC (FOUND)
- CENTERLINE ROW
- FENCE LINE (WOOD)
- IRON PIPE (FOUND)
- MONUMENT (IN CASE, FOUND)
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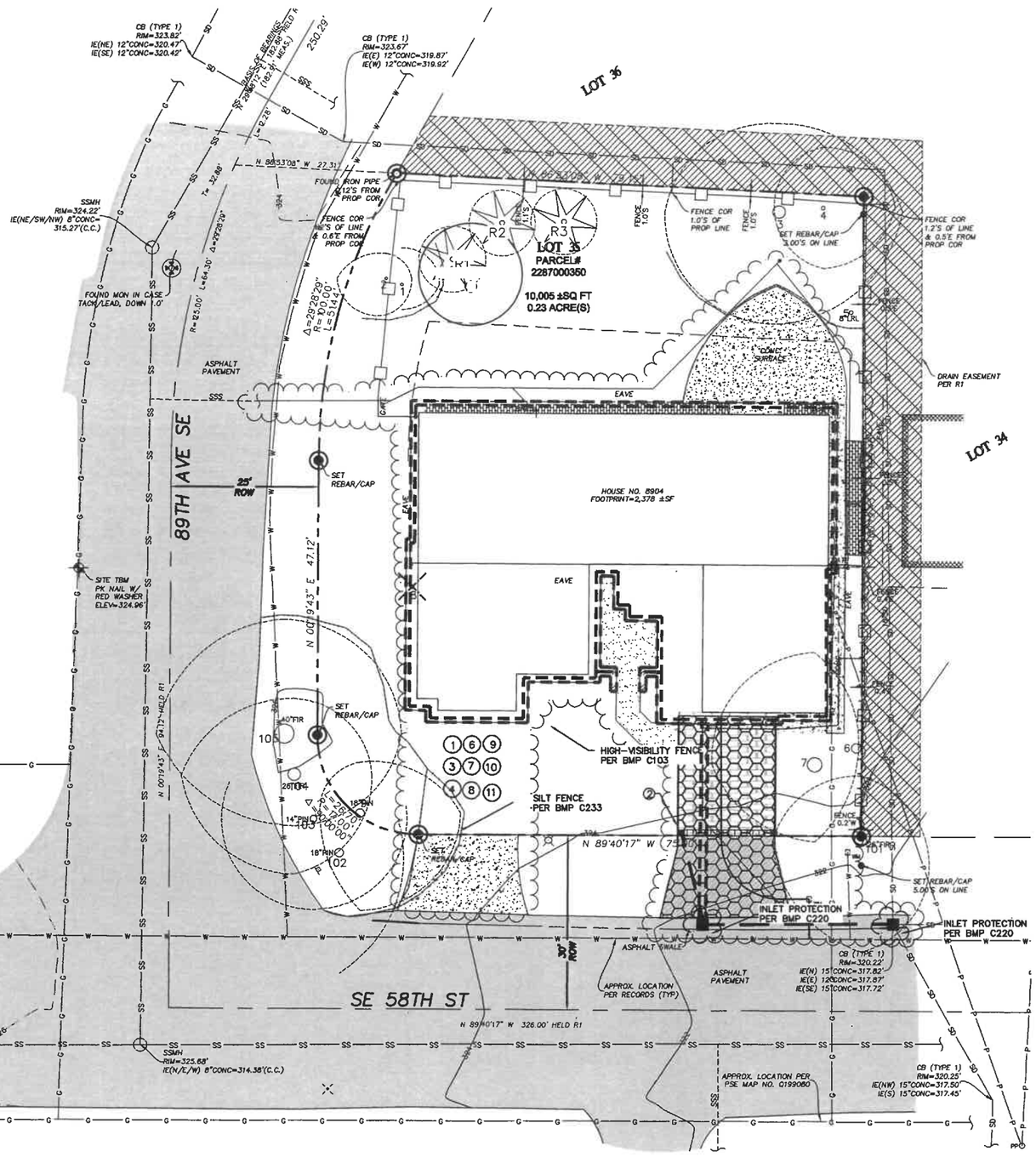
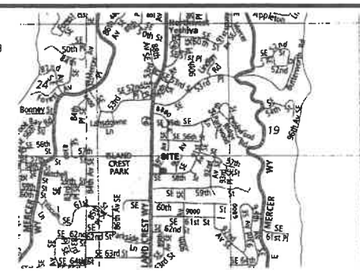
- PHASE 1 TREE PROTECTION





VICINITY MAP
N.T.S.

LEGAL DESCRIPTION

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1. THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN JANUARY OF 2024. 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.
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5. SUBJECT PROPERTY AREA PER THIS SURVEY IS 10,005 ±S.F. (0.23 ACRES)
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8. 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.

BASIS OF BEARINGS

ACCEPTED THE BEARING OF N 29°48'12" E BETWEEN MONUMENTS FOUND ALONG THE CENTERLINE OF 89TH AVE SE, PER REFERENCE NO. 1.

REFERENCES

R1. EL DORADO ESTATES, VOL. 62 OF PLATS, PG. 07, RECORDS OF KING COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD 88 PER CITY OF MERCER ISLAND BENCHMARK NO. 1800
DESCRIPTION: CONC. MON W/ TACK IN LEAD
LOCATION: C/L 89TH AVE SE OPP HSE #5639
ELEVATION:323.242'

SITE TEMP. BENCHMARK
DESCRIPTION: PK NAIL W/ RED WASHER
LOCATION: 67.7'S & 53.8'W FROM THE NW PROPERTY CORNER
ELEVATION:324.96'

RONALD B. FREDERIKSEN STATE OF WASHINGTON 21053 REGISTERED PROFESSIONAL ENGINEER
03/19/2025

INDEX LOCATION:
SEC. 30 T. 24 N. R. 5 E. W.M.

30

REVISIONS	BY	DATE
REVISED PER CITY MARKUPS	A	01/21/25
REVISED PER CLIENT	A	03/19/25

TESC PLAN

SITE ADDRESS: 8904 SE 58TH ST.

JENNIE LEE
8904 SE 58TH ST.
MERCER ISLAND, WA

ENGINEERS - SURVEYORS
EASTSIDE CONSULTANTS, INC.
1320 N.W. MALL ST., SUITE B
ISSAQUAH, WASH. 98027
PHONE (425) 392-5351

JOB NO. 24081
DATE 10/24
SCALE 1"=10'
DESIGNED R.F.H.
DRAWN R.F.H.
CHECKED R.S.F.
APPROVED R.S.F.
SHEET 4 OF 14

Appendix B: Construction Stormwater BMP's

Table II-4.1: Construction Stormwater BMPs by SWPPP Element (continued)

Con-struction Stormwater BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
II-2.2 Element 2: Establish Construction Access II-2.3 Element 3: Control Flow Rates II-2.4 Element 4: Install Sediment Controls II-2.5 Element 5: Stabilize Soils II-2.6 Element 6: Protect Slopes II-2.7 Element 7: Protect Storm Drain Inlets II-2.8 Element 8: Stabilize Channels and Outlets II-2.9 Element 9: Control Pollutants II-2.10 Element 10: Control Dewatering II-2.11 Element 11: Maintain BMPs II-2.12 Element 12: Manage the Project II-2.13 Element 13: Protect Infiltration BMPs													

II-4.2 Construction Source Control BMPs

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural (or existing) vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50% of all rain that falls during a storm. Up to 20% to 30% of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by the local jurisdiction.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local jurisdictions may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. The tile system should be laid out on the original grade leading from a drywell around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

  Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.
- *Excavations* - Protect trees and other plants when excavating for drainfields and power, water, and/or sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:
    - Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
    - Backfill the trench as soon as possible.
    - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western red cedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (e.g. fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

Buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zone BMPs to protect natural swales and they can incorporate them into the natural landscaping of an area.

Do not use critical area buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

The types of buffer zones can change the level of protection required as shown below:

- Designated Critical Area Buffers - buffers that protect Critical Areas, as defined by the Washington State Growth Management Act, and are established and managed by the local

permitting authority. These should not be disturbed and must protected with sediment control BMPs to prevent impacts. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

- Vegetative Buffer Zones - areas that may be identified in undisturbed vegetation areas or managed vegetation areas that are outside any Designated Critical Area Buffer. They may be utilized to provide an additional sediment control area and/or reduce runoff velocities. If being used for preservation of natural vegetation, they should be arranged in clumps or strips. They can be used to protect natural swales and incorporated into the natural landscaping area.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by burying and smothering vegetation.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately. Remove all materials located in the buffer area that may impede the ability of the vegetation to act as a filter.

BMP C103: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

- Restrict clearing to approved limits.
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
- Limit construction traffic to designated construction entrances, exits, or internal roads.
- Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High-visibility plastic fence shall be composed of a high-density polyethylene (HDPE) material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 lbs/ft using the ASTM D4595 testing method.

If appropriate, install fabric silt fence in accordance with BMP C233: Silt Fence to act as high-visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Access

Purpose

Stabilized construction accesses are established to reduce the amount of sediment transported onto paved roads outside the project site by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for project sites.

Conditions of Use

Construction accesses shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential subdivision construction sites, provide a stabilized construction access for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized accesses not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

- See Figure II-4.1: Stabilized Construction Access for details. Note: the 100' minimum length of the access shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').
- Construct stabilized construction accesses with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction access stabilization because these products raise pH levels in stormwater and concrete discharge to waters of the State is prohibited.
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the standards listed in Table II-4.2: Stabilized Construction Access Geotextile Standards.

Table II-4.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	No. 20 to No. 45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized access. Also consider the installation of excess concrete as a stabilized access. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction access.
- Whenever possible, the access shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction accesses should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction access must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Alternative Material Specification

WSDOT has raised safety concerns about the quarry spall rock specified above. WSDOT observes that the 4-inch to 8-inch rock sizes can become trapped between dually truck tires, and then released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the stabilized construction access remains effective. To remain effective, the BMP must prevent sediment from migrating off site. To date, there has been no performance testing to verify operation of this new specification. Local jurisdictions may use the alternative specification, but must perform increased off-site inspection if they use, or allow others to use, it.

Stabilized construction accesses may use material that meets the requirements of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Section 9-03.9(1) (WSDOT, 2016) for ballast except for the following special requirements.

The grading and quality requirements are listed in Table II-4.3: Stabilized Construction Access Alternative Material Requirements.

Table II-4.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½"	99 to 100
2"	65 to 100
¾"	40 to 80
No. 4	5 max.
No. 100	0 to 2
% Fracture	75 min.

Notes:

1. All percentages are by weight.
2. The sand equivalent value and dust ratio requirements do not apply.
3. The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.

Maintenance Standards

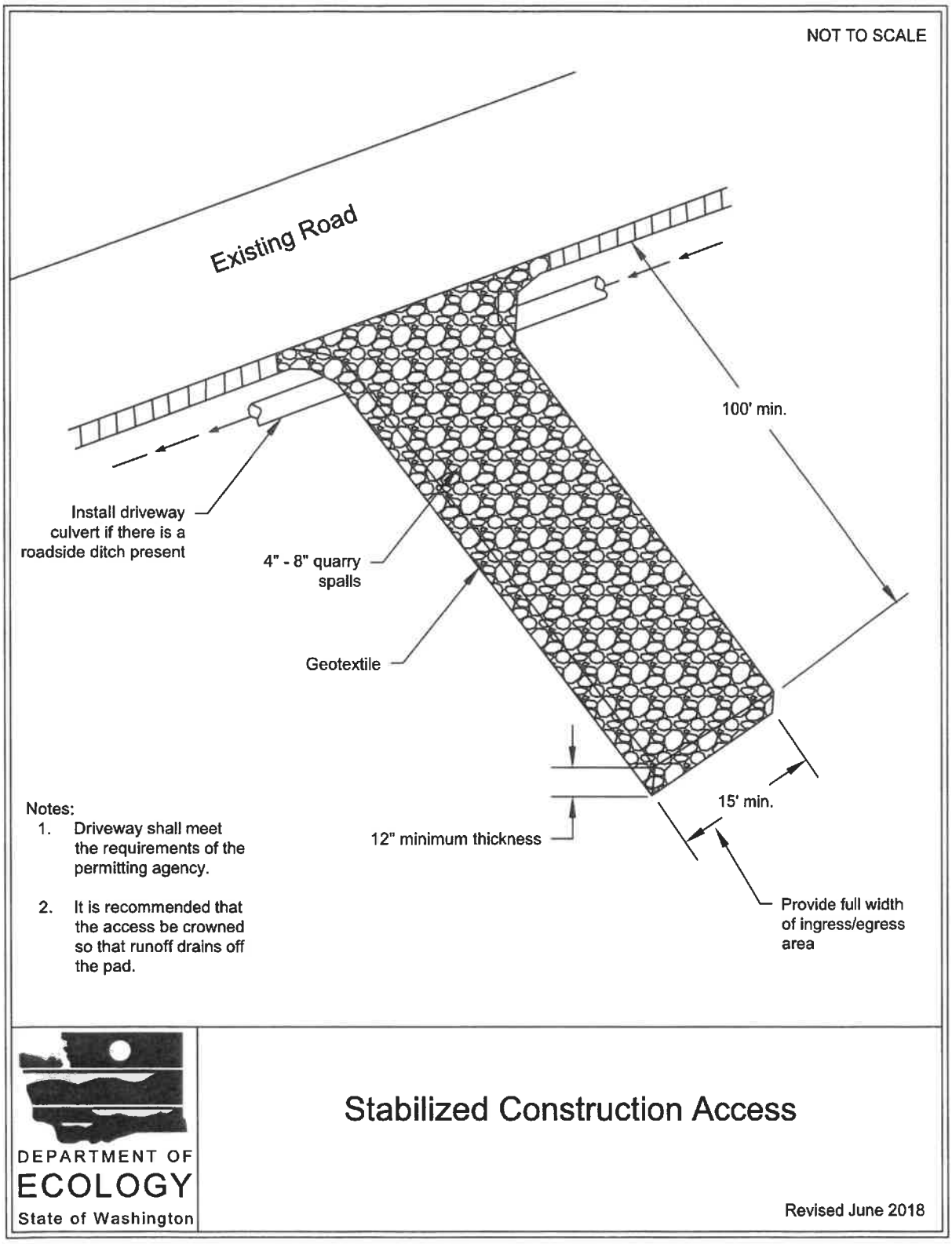
Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the access is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions

of the access, or the installation of BMP C106: Wheel Wash.

- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction access(es), BMP C103: High-Visibility Fence shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Figure II-4.1: Stabilized Construction Access



Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105: Stabilized Construction Access is not preventing sediment from being tracked off site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Wheel wash wastewater is not stormwater. It is commonly called process water, and must be discharged to a separate on-site treatment system that prevents discharge to waters of the State, or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto BMP C105: Stabilized Construction Access. In order to achieve this, BMP C105: Stabilized Construction Access may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

Suggested details are shown in Figure II-4.2: Wheel Wash. The local permitting authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days. See II-2.5 Element 5: Stabilize Soils for specific timelines for stabilizing exposed soils.
- See Table II-4.4: Seeding Windows in Western Washington (continued) for appropriate seeding windows.
- Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See BMP T5.13: Post-Construction Soil Quality and Depth.

Table II-4.4: Seeding Windows in Western Washington

Month	Seeding Recommendations
January	Seeding requires a cover of mulch or an erosion control blanket until 75% grass cover is established
February	
March	

Table II-4.4: Seeding Windows in Western Washington (continued)

Month	Seeding Recommendations
April	Optimum seeding window
May	
June	
July	Seeding requires irrigation until 75% grass cover is established
August	
September	Optimum seeding window
October	Seeding requires a cover of mulch or an erosion control blanket until 75 percent grass cover is established
November	
December	

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over the top of hydroseed. Before allowing water to flow in vegetated channels, establish a 75% vegetation cover. If vegetated channels cannot be established by seed before water flow, install sod or prevegetated mats in the channel bottom over top of hydromulch and erosion control blankets.
- Confirm the installation of all required stormwater control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre (lb/acre) of mulch with 3% tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only, and not landscaping, may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Vegetation establishment can be enhanced by one of the following two approaches:
    - Approach 1: Enhance vegetation establishment by dividing the hydromulch operation into two phases:

        - Phase 1 – Install all seed and fertilizer with 25% to 30% mulch and tackifier onto the soil in the first lift.
        - Phase 2 – Install the remaining mulch and tackifier over the first lift.
    - Approach 2: Vegetation can also be enhanced by:
        - Installing the mulch, seed, fertilizer, and tackifier in one lift;
        - Spreading or blowing straw over the top of the hydromulch at a rate of about 800 to 1,000 lb/acre; or
        - Holding straw in place with a standard tackifier.

    Both of these approaches (Approach 1 and Approach 2) will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

    - Irrigation,
    - Reapplication of mulch, and
    - Repair of failed slope surfaces.

    Either of these approaches can use standard hydromulch (1,500 lb/acre minimum) and BFM/mechanically bonded fiber matrix (MBFM) (3,000 lb/acre minimum).

- Seed may be installed by hand if it is:
    - Temporary and covered by straw, mulch, or topsoil; or
    - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- Consult the local suppliers and/or the local conservation district for their recommendations for appropriate seed mixes and application rates. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic.
- In addition to meeting erosion control functions and not hindering maintenance operations, selection of long-lived, successional growth native vegetation that can compete against or exclude weeds and grow with minimal maintenance after plant establishment is preferred. Provide diversity to the greatest extent possible and plan for a succession of flowering times to improve pollinator habitat.
- The seed mixes listed in Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued) include recommended mixes for both temporary and permanent seeding. Alternative seed mixes approved by the local jurisdiction may also be used.
- Apply the mixes in Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued), with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.

Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba* or *Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix				

Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple, single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall receive soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches, complete the rototilling process in multiple lifts, or prepare the soil amendments per the specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer needed is recommended. This will prevent the overapplication of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
- In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre.
- Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
- There are numerous products available to take the place of chemical fertilizers, including several with seaweed extracts that are beneficial to soil microbes and organisms. If 100% cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes, use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre with approximately 10% tackifier. Achieve a minimum of 95% soil coverage during application. Numerous products are available commercially. Most products require 24-36 hours to cure before rainfall, and cannot be installed on wet or saturated soils. Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.
- Install products per manufacturer's instructions.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include the following:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

- Reseed any seeded areas that fail to establish at least 75% cover (100% cover for areas that receive sheet or concentrated flows) of all seeded areas after 3 months of active growth following germination during the growing season. If reseeding is ineffective, use an alternate method, such as sodding, mulching, or nets/blankets. If winter weather prevents

adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There are a variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

For seeded areas, mulch may be made up of 100 percent:

- Cottonseed meal;
- Fibers made of wood, recycled cellulose, hemp, or kenaf;

- Compost;
- Or blends of these.

Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers.

Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Recycled cellulose may contain polychlorinated biphenyl (PCBs). Ecology recommends that products should be evaluated for PCBs prior to use.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

Any mulch or tackifier product used shall be installed per the manufacturer's instructions.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table II-4.7: Mulch Standards and Guidelines (continued). Consult with the local supplier or the local conservation district for their recommendations. Increase the application rate until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "Compost" is selected, it should be a coarse compost that meets the size gradations listed in Table II-4.6: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B found in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Table II-4.6: Size Gradations of Compost as Mulch Material

Sieve Size	Percent Passing
3"	100%
1"	90% - 100%
3/4"	70% - 100%
1/4"	40% - 100%

Table II-4.7: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	**Quality Stand-**	Air-dried; free from undesirable seed and coarse material.

Table II-4.7: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
	ards	
	Application Rates	2" to 3" thick; 5 bales per 1,000 sf or 2 to 3 tons per acre
	Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas, straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier because even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species, and it has no significant long-term benefits. Straw should only be used if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	Quality Standards	No growth inhibiting factors.
	Application Rates	Approx. 35-45 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre
	Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.
Compost	Quality Standards	No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". Compost makes an excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125: Topsoiling / Composting or BMP T5.13: Post-Construction Soil Quality and Depth. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use compost near wetlands if biosolids are included. Do not use compost near phosphorous impaired water bodies.
Chipped Site Vegetation	Quality Standards	Gradations from fines to 6 inches in length for texture, variation, and interlocking properties. Include a mix of various sizes so that the

Table II-4.7: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
		average size is between 2 and 4 inches.
	Application Rates	2" thick minimum.
	Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approximately 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If permanent seeding or planting is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. Note: Thick application of this material over existing grass, herbaceous species, and some groundcovers could smother and kill vegetation.
Wood-Based Mulch	**Quality Standards**	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs. per cubic yard).
	Remarks	This material is often called "wood straw" or "hog fuel". The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	**Quality Standards**	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.
	Application Rates	2" thick minimum.
	Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95% of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between 1/16 and 0.5 inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. See specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

Maintenance Standards

The thickness of the mulch cover must be maintained.

Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage systems during high flows.

Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (e.g. coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control netting and blankets shall be made of natural plant fibers unaltered by synthetic materials.

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap.

Disadvantages of nets and blankets include:

- Surface preparation is required.
- On slopes steeper than 2.5H:1V, net and blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000 - $6,000 per acre installed.

Advantages of nets and blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training

- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of nets and blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

An alternative to nets and blankets in some limited conditions is BMP C202: Riprap Channel Lining. Ensure that BMP C202: Riprap Channel Lining is appropriate before using it as a substitute for nets and blankets.

Design and Installation Specifications

- See Figure II-4.3: Channel Installation (Clackamas County et al., 2008) and Figure II-4.4: Slope Installation for typical orientation and installation of nets and blankets used in channels and as slope protection. Note: these are typical only; all nets and blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Install nets and blankets on slopes per the following steps:
    1. Complete final grade and track walk up and down the slope. Soils should be raked and uniform prior to installing nets or blankets. To be effective, nets and blankets must have good adhesion to the soil.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the net/blanket into the small trench and staple approximately every 18 inches.

       NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the net/blanket slowly down the slope as the installer walks backward.

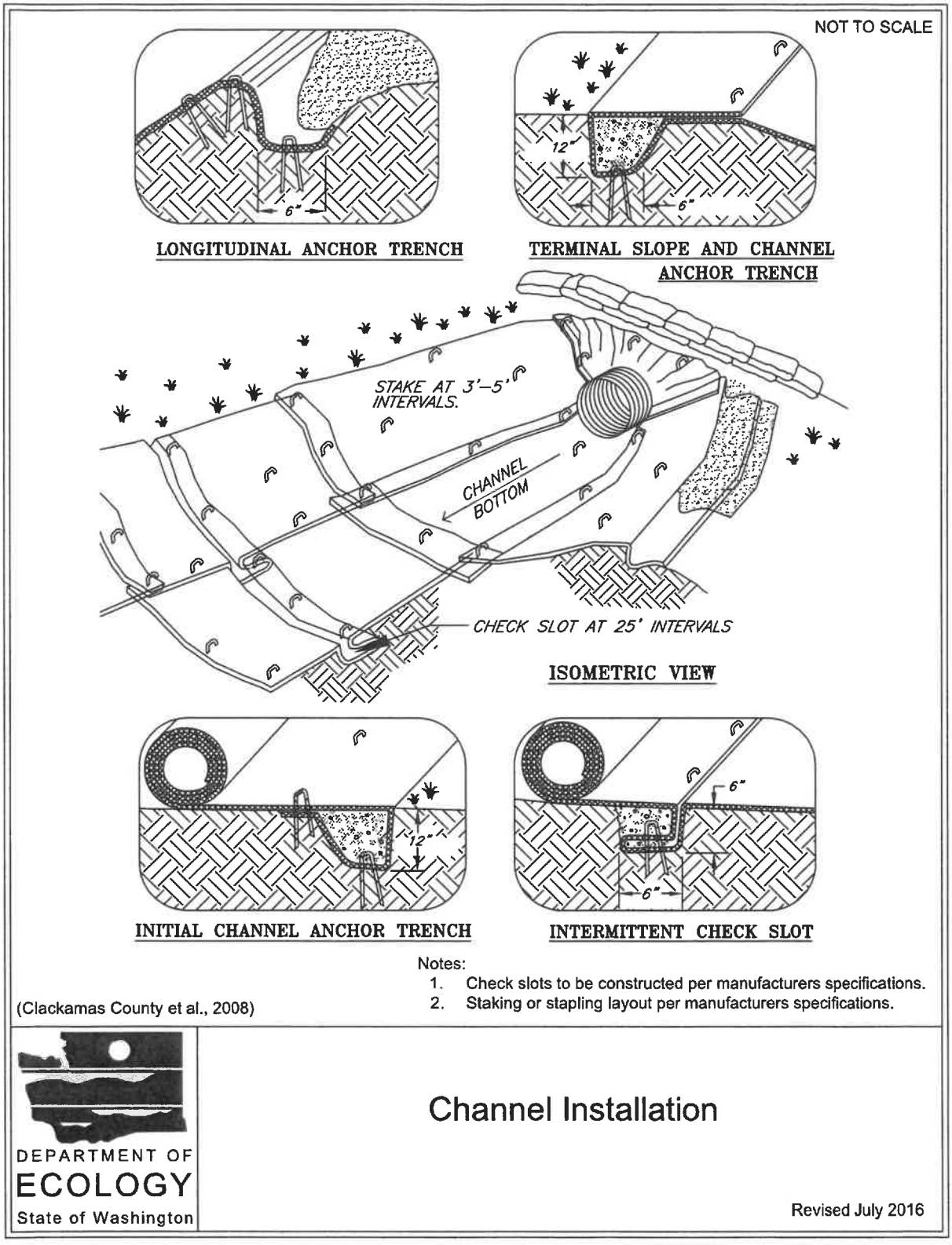
       NOTE: The net/blanket rests against the installer's legs. Staples are installed as the net/blanket is unrolled. It is critical that the proper staple pattern is used for the net/blanket being installed. The net/blanket is not to be allowed to roll down the slope on its own as this stretches the net/blanket, making it impossible to maintain soil contact. In addition, no one is allowed to walk on the net/blanket after it is in place.
    6. If the net/blanket is not long enough to cover the entire slope length, the trailing edge of the upper net/blanket should overlap the leading edge of the lower net/blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.

- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the designer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available in WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Division 8-01 and Division 9-14 (WSDOT, 2016).
- Use jute matting in conjunction with mulch (BMP C121: Mulching). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- 100 percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning it breaks down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

Figure II-4.3: Channel Installation



Notes:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.

(Clackamas County et al., 2008)

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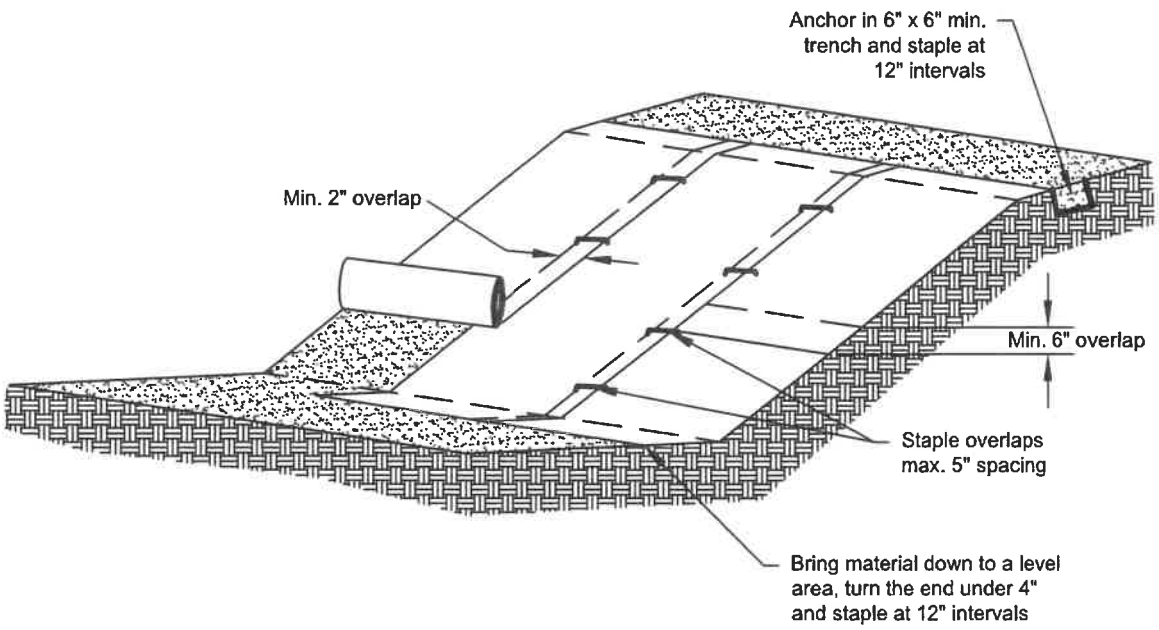
State of Washington

Channel Installation

Revised July 2016

Figure II-4.4: Slope Installation



Notes:

1. Slope surface shall be smooth before placement for proper soil contact.
2. Stapling pattern as per manufacturer's recommendations.
3. Do not stretch blankets/mattings tight - allow the rolls to mold to any irregularities.
4. For slopes less than 3H:1V, rolls may be placed in horizontal strips.
5. If there is a berm at the top of the slope, anchor upslope of the berm.
6. Lime, fertilize, and seed before installation. Planting of shrubs, trees, etc. should occur after installation.

NOT TO SCALE

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State of Washington

Slope Installation

Revised June 2016

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. However, the relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for applications greater than six months.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- Although the plastic material is inexpensive to purchase, the cost of installation, maintenance, removal, and disposal add to the total costs of this BMP.
- Whenever plastic is used to protect slopes, install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    - Temporary ditch liner.
    - Pond liner in temporary sediment pond.
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    - Emergency slope protection during heavy rains.
    - Temporary drainpipe ("elephant trunk") used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down the slope, not across the slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
    3. Provide a minimum of 8-inch overlap at the seams.
    4. On long or wide slopes, or slopes subject to wind, tape all seams.
    5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
    6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
    7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil, which causes extreme erosion.
    8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 6 mil.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

be reviewed and approved by the local permitting authority and discharge of PAM may be a basis for penalties per RCW 90.48.080.

- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP. See the following website for more information:

  https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Techniques that can be used for unpaved roads and lots include:
  - Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
  - Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
  - Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
  - Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
  - Encourage the use of alternate, paved routes, if available.
  - Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
  - Limit dust-generating work on windy days.
  - Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy rains. Having these materials on-site reduces the time needed to replace existing or implement new BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel "T" posts.
- Materials should be stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or project proponent could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

- Clear plastic, 6 mil
- Drainpipe, 6 or 8 inch diameter
- Sandbags, filled
- Straw bales for mulching
- Quarry spalls
- Washed gravel
- Geotextile fabric
- Catch basin inserts
- Steel "T" posts
- Silt fence material
- Straw wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel "T" posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials as needed.

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate groundwater or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening, or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose of process water in a manner that does not violate groundwater or surface water quality standards.
- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuum trucks.

BMP C153: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

Use at construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., polyacrylamide)
- Fertilizers, pesticides, and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (October 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.

- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days.
- Secondary containment facilities shall be covered at all times, except when in active use.
- Keep material storage areas clean, organized, and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1 - Water resistant nylon bag
    - 3 - Oil absorbent socks 3"x 4'
    - 2 - Oil absorbent socks 3"x 10'
    - 12 - Oil absorbent pads 17"x19"
    - 1 - Pair splash resistant goggles
    - 3 - Pairs nitrile gloves
    - 10 - Disposable bags with ties
    - Instructions

Maintenance Standards

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Re-stock spill kit materials as needed.

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants from concrete waste to stormwater by conducting washout off-site, or performing on-site washout in a designated area.

Conditions of Use

Concrete washout areas are implemented on construction projects where:

- For a 5 to 10 fps discharge velocity at the outlet, use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
- For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), use an engineered energy dissipator.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion. See BMP C122: Nets and Blankets.

- Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife. See I-2.14 Hydraulic Project Approvals.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipator if sediment builds up.

BMP C220: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-4.11: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to plug and require a high frequency of maintenance. Limit contributing drainage areas for an individual inlet to one acre or less. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table II-4.11: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved / Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth of 1 to 2 feet as measured from the crest of the inlet structure.
- Side slopes of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.

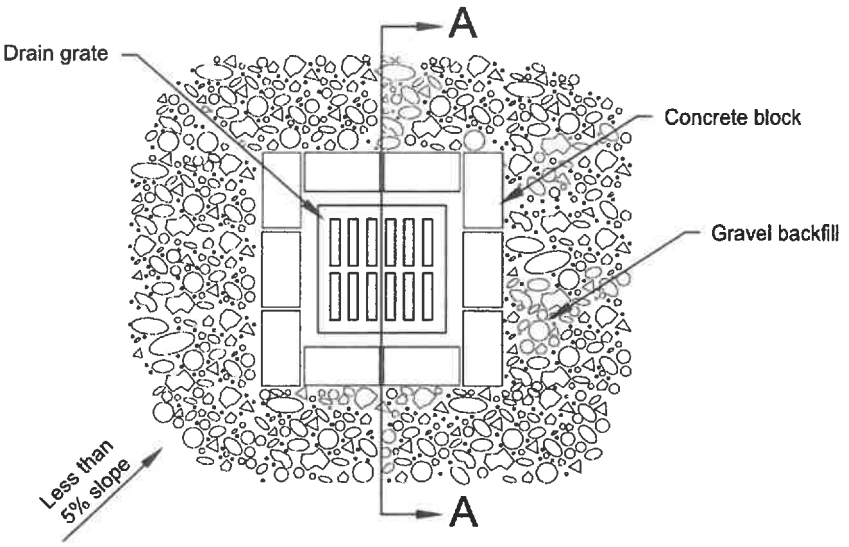
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

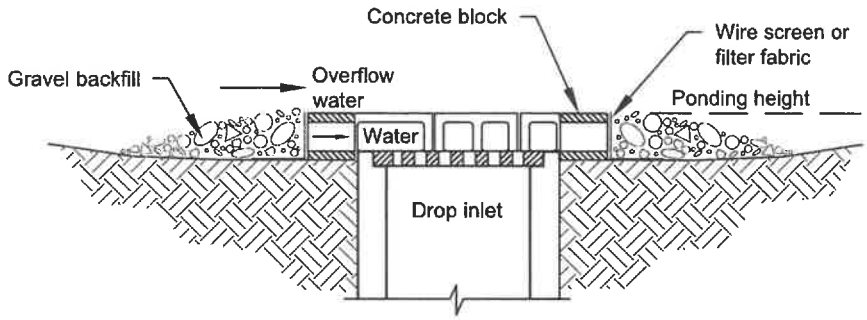
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-4.17: Block and Gravel Filter. Design and installation specifications for block and gravel filters include:

- Provide a height of 1 to 2 feet above the inlet.
- Recess the first row of blocks 2-inches into the ground for stability.
- Support subsequent courses by placing a pressure treated wood (2x4) through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with 0.5-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot wide level rock area between the gravel berm and the inlet.
    - Use rocks 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel 0.5 to 0.75 inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-4.17: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with 0.5 inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide at least a 12-inch depth of aggregate over the entire inlet opening and extend at least 18-inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection with Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

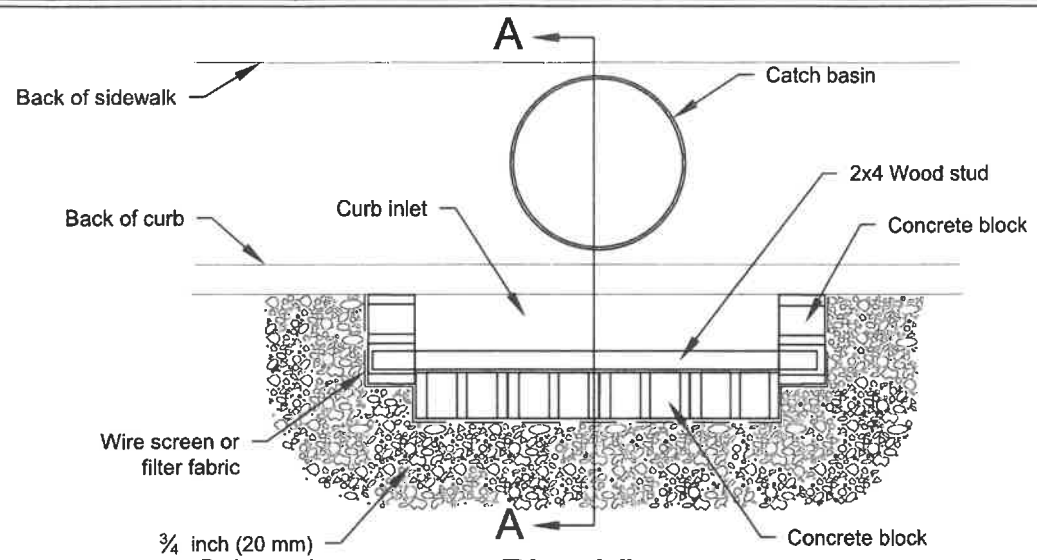
- Use wire mesh with 0.5 inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

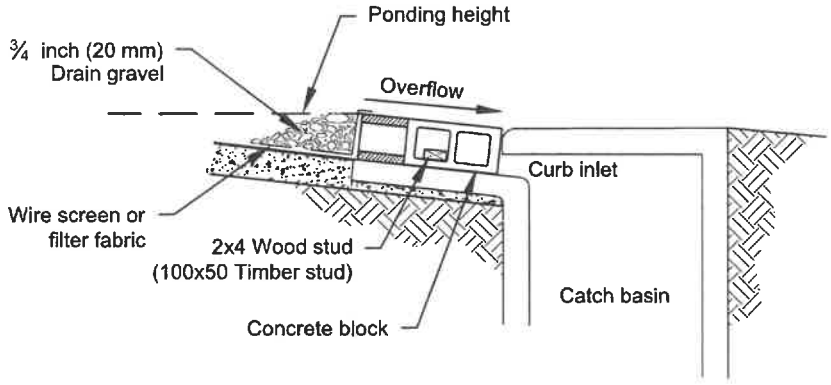
Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-4.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with 0.5 inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Figure II-4.18: Block and Gravel Curb Inlet Protection



Plan View



Section A-A

Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Block and Gravel Curb Inlet Protection

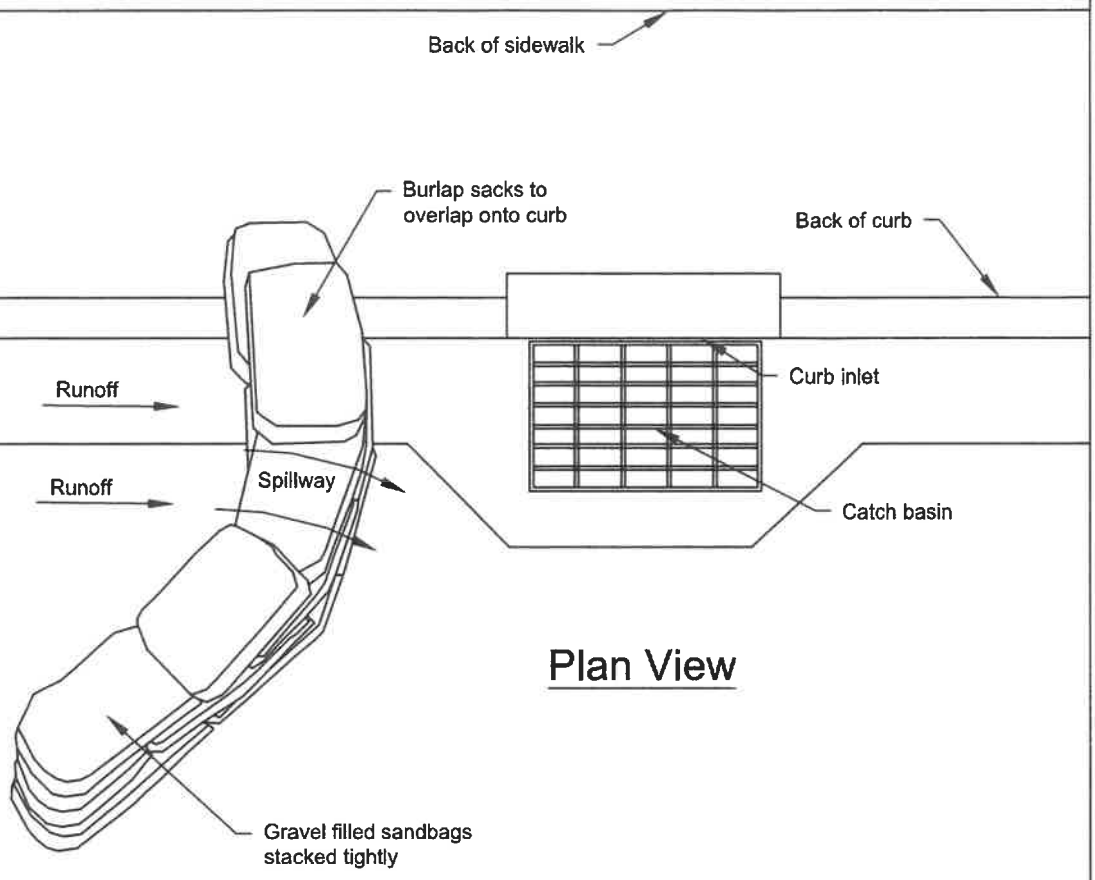
Revised June 2016

Curb and Gutter Sediment Barrier

A curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-4.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barriers include:

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

Figure II-4.19: Curb and Gutter Barrier



Notes:

1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven 'geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Curb and Gutter Barrier

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Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull away the rocks from the inlet and clean or replace. An alternative approach would be to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C231: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of disturbed areas that are less than one-quarter acre.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be directed to a sediment trapping BMP. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than by a sediment trapping BMP, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height: 2 feet (minimum) to 5 feet (maximum).
- Width: 5 feet at base (minimum) to 15 feet (maximum).

BMP C233: Silt Fence

Purpose

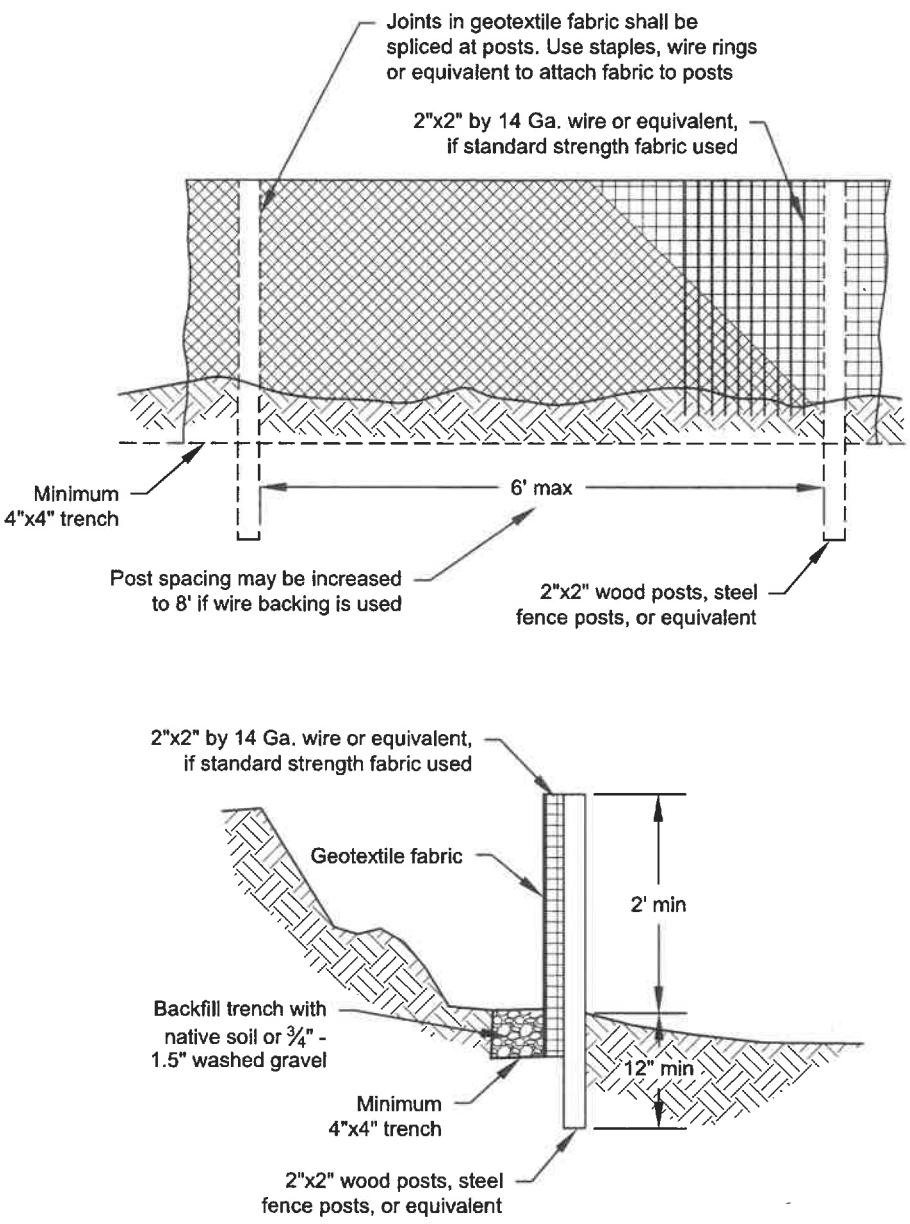
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Figure II-4.22: Silt Fence



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State of Washington

Silt Fence

Revised July 2017

Design and Installation Specifications

- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- Use geotextile fabric that meets the following standards. All geotextile properties listed below are minimum average roll values (i.e. the test result for any sampled roll in a lot shall meet or exceed the values shown in Table II-4.12: Geotextile Fabric Standards for Silt Fence):

Table II-4.12: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- 100% biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-4.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

    1. The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans.

2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
3. The silt fence shall have a 2-foot min. and a 2.5-feet max. height above the original ground surface.
4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
5. Attach the geotextile fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.
6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the geotextile fabric up-slope of the mesh.
7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.
8. Bury the bottom of the geotextile fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.
9. Drive or place the silt fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of one of the following:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.

- Other steel posts having equivalent strength and bending resistance to the post sizes listed above.

11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

    - Check dams shall be approximately 1 foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.

    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-4.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:

    1. The base of both end posts must be at least 2 to 4 inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.

    2. Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.

    3. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.

    4. Install posts with the nipples facing away from the geotextile fabric.

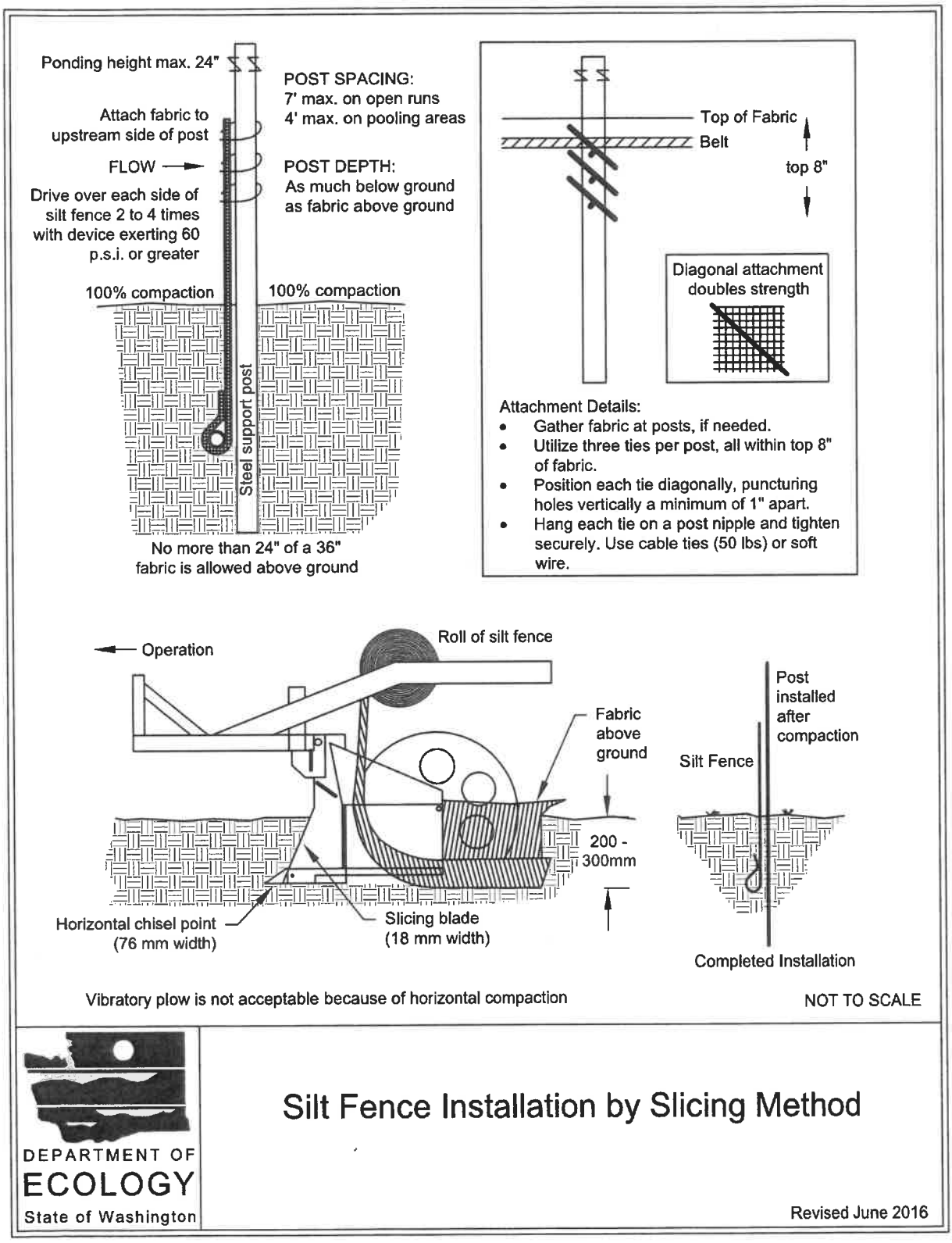
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.

    6. Wrap approximately 6 inches of the geotextile fabric around the end posts and secure with 3 ties.

    7. No more than 24 inches of a 36 inch geotextile fabric is allowed above ground level.

    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck the fabric deeper into the ground if necessary.

Figure II-4.23: Silt Fence Installation by Slicing Method



Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment trapping BMP.
- Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C234: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to BMP C241: Sediment Pond (Temporary) or other sediment trapping BMP. The only circumstance in which overland flow can be treated solely by a vegetated strip, rather than by a sediment trapping BMP, is when the following criteria are met (see Table II-4.13: Contributing Drainage Area for Vegetated Strips):

Table II-4.13: Contributing Drainage Area for Vegetated Strips

Average Contributing Area Slope	Average Contributing Area Percent Slope	Maximum Contributing Area Flowpath Length
1.5H : 1V or flatter	67% or flatter	100 feet
2H : 1V or flatter	50% or flatter	115 feet
4H : 1V or flatter	25% or flatter	150 feet
6H : 1V or flatter	16.7% or flatter	200 feet
10H : 1V or flatter	10% or flatter	250 feet

Design and Installation Specifications

- The vegetated strip shall consist of a continuous strip of dense vegetation with topsoil for a minimum length of 25 feet along the flow path. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally, vegetated strips shall consist of undisturbed native growth with a well-developed soil that allows for infiltration of runoff.
- The slope within the vegetated strip shall not exceed 4H:1V.
- The uphill boundary of the vegetated strip shall be delineated with clearing limits.

Maintenance Standards

- Any areas damaged by erosion or construction activity shall be seeded immediately and protected by mulch.
- If more than 5 feet of the original vegetated strip width has had vegetation removed or is being eroded, sod must be installed.
- If there are indications that concentrated flows are traveling across the vegetated strip, stormwater runoff controls must be installed to reduce the flows entering the vegetated strip, or additional perimeter protection must be installed.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in netting made of natural plant fiber or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

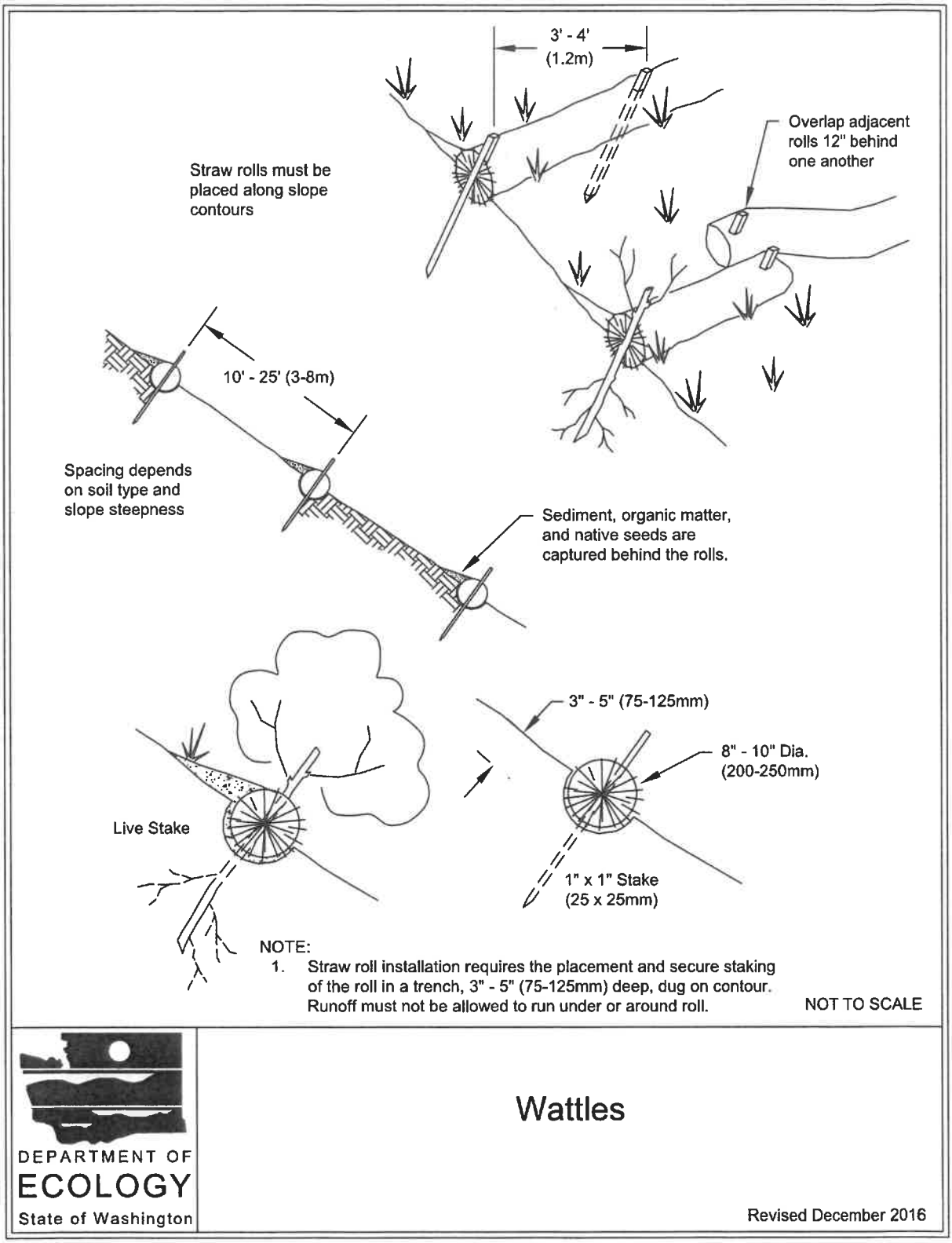
Conditions of Use

- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - On exposed soils during the period of short construction delays, or over winter months.
    - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, wattles are effective for one to two seasons.
- Prevent rilling beneath wattles by entrenching and overlapping wattles to prevent water from passing between them.

Design Criteria

- Wattles shall consist of cylinders of plant material such as weed-free straw, coir, wood chips, excelsior, or wood fiber or shavings encased within netting made of natural plant fibers unaltered by synthetic materials.
- See Figure II-4.24: Wattles for typical construction details.
- Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.
- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Place wattles in shallow trenches, staked along the contour of disturbed or newly constructed slopes. Dig narrow trenches across the slope (on contour) to a depth of 3 to 5 inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5 to 7 inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact it using hand tamping or other methods.
- Construct trenches at intervals of 10 to 25 feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and overlap the ends of adjacent wattles 12 inches behind one another.
- Install stakes at each end of the wattle, and at 4 foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 0.75 x 0.75 x 24 inches minimum. Willow cuttings or 3/8 inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Figure II-4.24: Wattles



Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.
- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C236: Vegetative Filtration

Purpose

Vegetative filtration as a BMP is used in conjunction with detention storage in the form of portable tanks or BMP C241: Sediment Pond (Temporary), BMP C206: Level Spreader, and a pumping system with surface intake. Vegetative filtration improves turbidity levels of stormwater discharges by filtering runoff through existing vegetation where undisturbed forest floor duff layer or established lawn with thatch layer are present. Vegetative filtration can also be used to infiltrate dewatering waste from foundations, vaults, and trenches as long as runoff does not occur.

Conditions of Use

- For every 5 acres of disturbed soil, use 1 acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, groundwater table height, and other site conditions.
- Wetlands shall not be used for vegetative filtration.
- Do not use this BMP in areas with a high groundwater table, or in areas that will have a high seasonal groundwater table during the use of this BMP.
- This BMP may be less effective on soils that prevent the infiltration of the water, such as hard till.
- Using other effective source control measures throughout a construction site will prevent the generation of additional highly turbid water and may reduce the time period or area need for this BMP.
- Stop distributing water into the vegetated filtration area if standing water or erosion results.

- On large projects that phase the clearing of the site, areas retained with native vegetation may be used as a temporary vegetative filtration area.

Design Criteria

- Find land adjacent to the project site that has a vegetated field, preferably a farm field or wooded area.
- If the site does not contain enough vegetated field area consider obtaining permission from adjacent landowners (especially for farm fields).
- Install a pump and downstream distribution manifold depending on the project size. Generally, the main distribution line should reach 100 to 200 feet long. Large projects, or projects on tight soil, will require systems that reach several thousand feet long with numerous branch lines off of the main distribution line.
- The manifold should have several valves, allowing for control over the distribution area in the field.
- Install several branches of 4 inch diameter schedule 20 polyvinyl chloride (PVC), swaged-fit common septic tight-lined sewer line, or 6 inch diameter fire hose, which can convey the turbid water out to various sections of the field. See Figure II-4.25: Manifold and Branches in a Wooded, Vegetated Spray Field.
- Determine the branch length based on the field area geography and number of branches. Typically, branches stretch from 200 feet to several thousand feet. Lay the branches on contour with the slope.
- On uneven ground, sprinklers perform well. Space sprinkler heads so that spray patterns do not overlap.
- On relatively even surfaces, a level spreader using 4 inch diameter perforated pipe may be used as an alternative option to the sprinkler head setup. Install drain pipe at the highest point on the field and at various lower elevations to ensure full coverage of the filtration area. Place the pipe with the holes up to allow for gentle weeping evenly out all holes. Leveling the pipe by staking and using sandbags may be required.
- To prevent over saturating of the vegetative filtration area, rotate the use of branches or spray heads. Repeat as needed based on monitoring of the spray field.

Table II-4.14: Flowpath Guidelines for Vegetative Filtration

Average Slope	Average Area % Slope	Estimated Flowpath Length (ft)
1.5H:1V	67%	250
2H:1V	50%	200
4H:1V	25%	150
6H:1V	16.7%	115
10H:1V	10%	100

Figure II-4.25: Manifold and Branches in a Wooded, Vegetated Spray Field

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Manifold and Branches in a Wooded, Vegetated Spray Field

Revised June 2016

Maintenance Standards

- Monitor the spray field on a daily basis to ensure that over saturation of any portion of the field does not occur at any time. The presence of standing puddles of water or creation of concentrated flows visually signify that over saturation of the field has occurred.
- Monitor the vegetated spray field all the way down to the nearest surface water, or farthest spray area, to ensure that the water has not caused overland or concentrated flows, and has not created erosion around the spray nozzle(s).
- Do not exceed water quality standards for turbidity.
- Ecology recommends that a separate inspection log be developed, maintained, and kept with the existing site logbook to aid the operator conducting inspections. This separate "Field Filtration Logbook" can also aid in demonstrating compliance with permit conditions.
- Inspect the spray nozzles daily, at a minimum, for leaks and plugging from sediment particles.
- If erosion, concentrated flows, or over saturation of the field occurs, rotate the use of branches or spray heads or move the branches to a new field location.
- Check all branches and the manifold for unintended leaks.

BMP C240: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the contributing drainage area.

Conditions of Use

- Sediment traps are intended for use on sites where the contributing drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of 6 months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the contributing drainage area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Projects that are constructing permanent Flow Control BMPs, or permanent Runoff Treatment BMPs that use ponding for treatment, may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment trap. When permanent BMP footprints are used as temporary sediment traps, the surface area requirement of the sediment trap must be met. If the surface area requirement of the sediment trap is larger than the surface area of the permanent BMP, then the sediment trap shall be enlarged beyond the