EASTSIDE CONSULTANTS, INC.
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ENGINEERS-
SURVEYORS

TECHNICAL INFORMATION REPORT

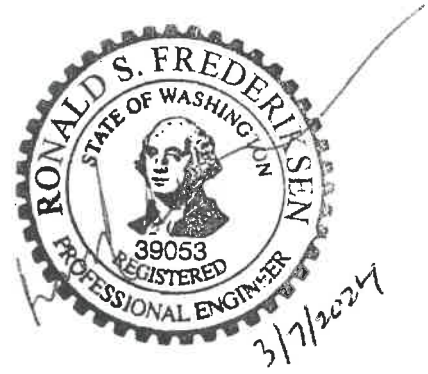
FOR

Ramaiyah and Subramarian Residence

7466 East Mercer Way

Eastside Consultants, Inc. File No. 24014

March 6, 2024



Prepared by:
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(425) 392-5351

Prepared for:
Ramaiyah and Subramian Residence
7466 East Mercer Way
Mercer Island, WA 98040

PROJECT SITE DESCRIPTION

The proposed Single Family Residence consists of removing the existing house and garage and constructing a new one. The project is located at 7466 East Mercer Way in Mercer, Island, WA.

The project parcel is located on the east side of Mercer Island and will be discharging stormwater runoff through the existing storm line running through the neighbor's property (7618 East Mercer Way) and into Lake Washington.

The physical location of the site is 7466 East Mercer Way, Mercer Island, WA. There are single family residences to the North, South, and East of the residence. East Mercer Way is located just West of the site.

The runoff will primarily sheetflow off the roof into gutters and be transported from the main roof via downspouts into a catchbasin in the back of the house. From here it will enter another newly installed catchbasin over the existing drainage pipe leading offsite. The front deck, driveway, and footing drains will be picked up in a trench drain and catchbasin and pumped up to the newly installed catchbasin over the existing drainage pipe.

HYDROLOGIC CONDITIONS

A. Existing Runoff Conditions

The project consists of removing an existing 1,816 sf home, 1,029 sf garage, 709 sf of concrete patio and walkways, 1,827 sf of asphalt driveway, 92 sf of retaining wall, and 50 sf of pavers for a total of 5,523 sf of existing impervious on a 10,150 sf site. This is 54.41 percent of the site. There per Fig I-3.1 we are under Redevelopment

Based on the City of Mercer Island Code, the existing runoff conditions were analyzed per the 2019 DOE Western Washington Stormwater Manual.

B. Proposed Runoff Conditions

We will be adding a 2,546 sf structure and 886 sf of hardscape, for a total of 3,432 sf of impervious. The runoff will primarily sheetflow off the roof into gutters and be transported from the main roof via downspouts into a catchbasin in the back of the house. From here it will enter another newly installed catchbasin over the existing drainage pipe leading offsite. The front deck, driveway, and footing drains will be picked up in a trench drain and catchbasin and pumped up to the newly installed catchbasin over the existing drainage pipe.

OFF-SITE ANALYSIS

ADHERENCE TO 2019 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON MINIMUM TECHNICAL REQUIREMENTS 1-5

1. Minimum Requirement #1: Preparation of Stormwater Site Plans

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

2. Minimum Requirement #2: Construction Stormwater Pollution Prevention

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.

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

Drainage from the proposed site will discharge directly into Lake Washington. The proposed driveway will be directly discharged to Lake Washington since it is less than 5,000 sf. We will be adding a downturn elbow to remove oils and grease. The stormwater is discharged in the natural downstream direction which enters Lake Washington.

5. Minimum Requirement Number 5: On-Site Stormwater Management

Lawn and Landscape Areas:

1) We will be applying Post-Construction Soil Quality and Depth per BMP T5.13

Roofs:

Using List #1

1) Full Dispersion is infeasible due to an inadequate flow path.
   Full Infiltration is infeasible due to poor soils per the Geotechnical Report
2) Rain Gardens and Bioretention is infeasible due to the poor soils.
3) Downspout Dispersion is infeasible due to inadequate flowpath
4) Using a Perforated Stub-out connection per BMP T5.10C is deemed infeasible due poor soils.

Other Hard Surfaces

For all other impervious areas, Using List #2

1) Full Dispersion is infeasible due to an inadequate flow path.
   Full Infiltration is infeasible due to poor soils
2) Permeable Pavement and Rain Gardens are infeasible due to the poor soils
3) Bioretention is infeasible due to the poor soils.
4) Sheet Flow Dispersion and concentrated flowpath dispersion is infeasible due to inadequate flowpath.

Detention System and Water Quality Analysis and Design

1. Overview

Site Area = 10,150 sf
R.O.W. Area = 280 sf
Total Area Being Analyzed = (10,150 - 280) = 9,870 sf or 0.227 acres

Soils: Vashon Glacial Till
TILL SOILS

Design Standards:

1. City of Mercer Island Storm and Surface Water Engineering Standards
   2014 Department of Ecology Manual
2. Used Western Washington Hydrologic Runoff Model and DOE flow duration standard

2. Existing Site Conditions

Modeled as Forest
Site Area = **9,870 sf or 0.227 acres**

Using WWHM. (See Printout)
Q-100 = 0.0242 cfs
Q-10 = 0.0174 cfs
Q-2 = 0.0092 cfs

3. Developed Site Conditions

Impervious Area:
Hardscape Total= 886 sf
Under Structure = 2,546 sf
Total Lot Coverage= 3,432 sf or 0.079 acres

Pervious Area:

Modeled as Lawn
Planter area = (9,870 – 3,432) = **6,438sf or 0.148 acres**

Using WWHM. (See Printout)
Q-100 = 0.0781 cfs
Q-10 = 0.0494 cfs
Q-2 = 0.0307 cfs

Since we are less then 0.1 cfs difference between the Pre-Developed and Developed runoff conditions, we are exempt from Flow Control

WWHM2012
PROJECT REPORT

Project Name: 24014 Residence
Site Name:
Site Address:
City :
Report Date: 3/7/2024
Gage : Seatac
Data Start : 1948/10/01 00:00
Data End : 2009/09/30 00:00
Precip Scale: 1.00
Version Date: 2021/08/18
Version : 4.2.18

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, Forest, Steep	.227
Pervious Total	0.227

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.227

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Steep	.148
Pervious Total	0.148

Impervious Land Use	acre
ROOF TOPS FLAT	0.079
Impervious Total	0.079
Basin Total	0.227

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.227
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.148
Total Impervious Area:0.079

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.009227
5 year	0.014471
10 year	0.017441
25 year	0.020585
50 year	0.02253
100 year	0.024184

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.030749
5 year	0.041502
10 year	0.04935
25 year	0.060128
50 year	0.068804
100 year	0.078053

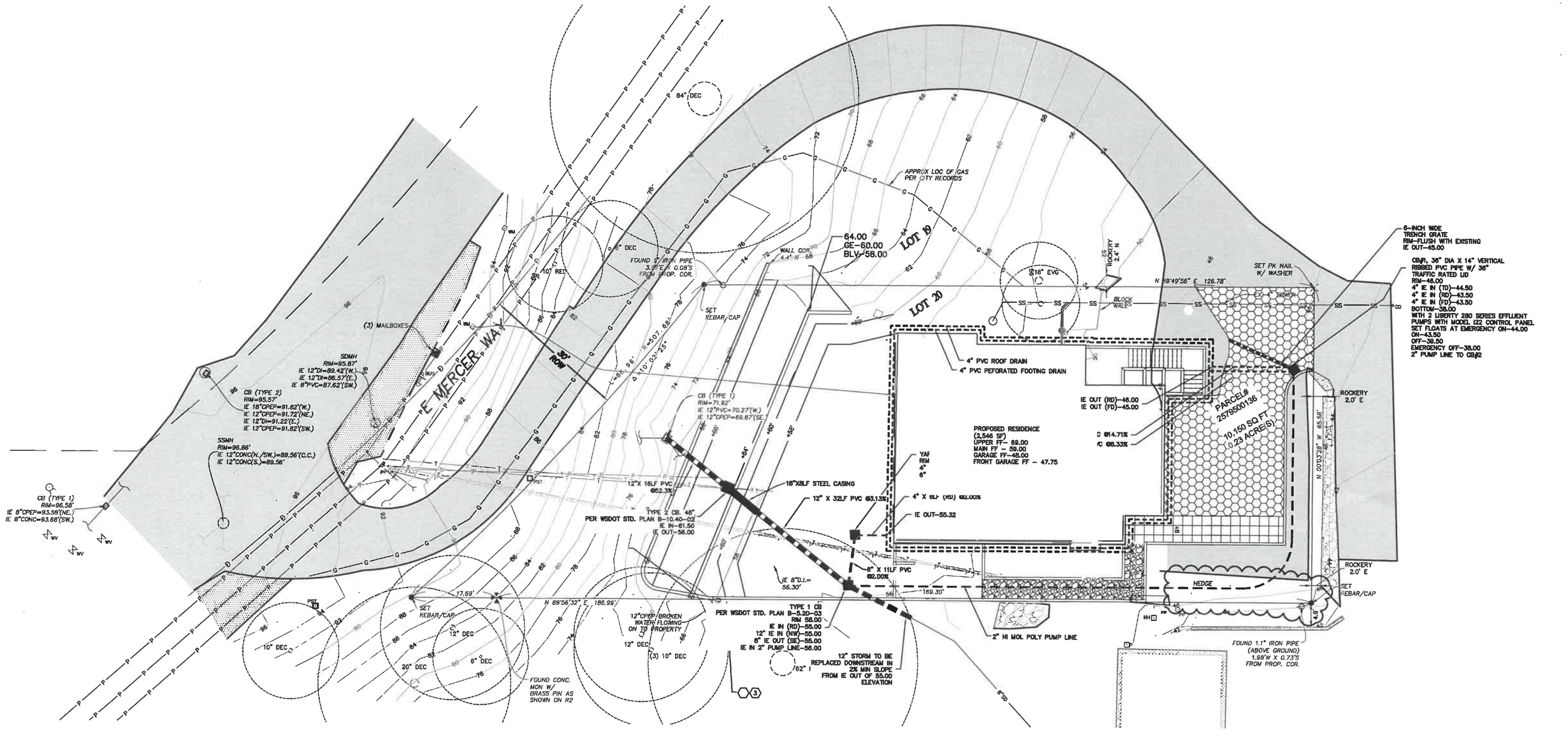
Appendix A

EXISTING AND DEVELOPED CONDITION MAPS

EXISTING DRAINAGE MAP

SCALE: 1"=20'

PROPOSED DRAINAGE MAP
SCALE: 1"=20'



Appendix B

FIGS I-3.1 AND I-3.2 AND TABLE I-3.2

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

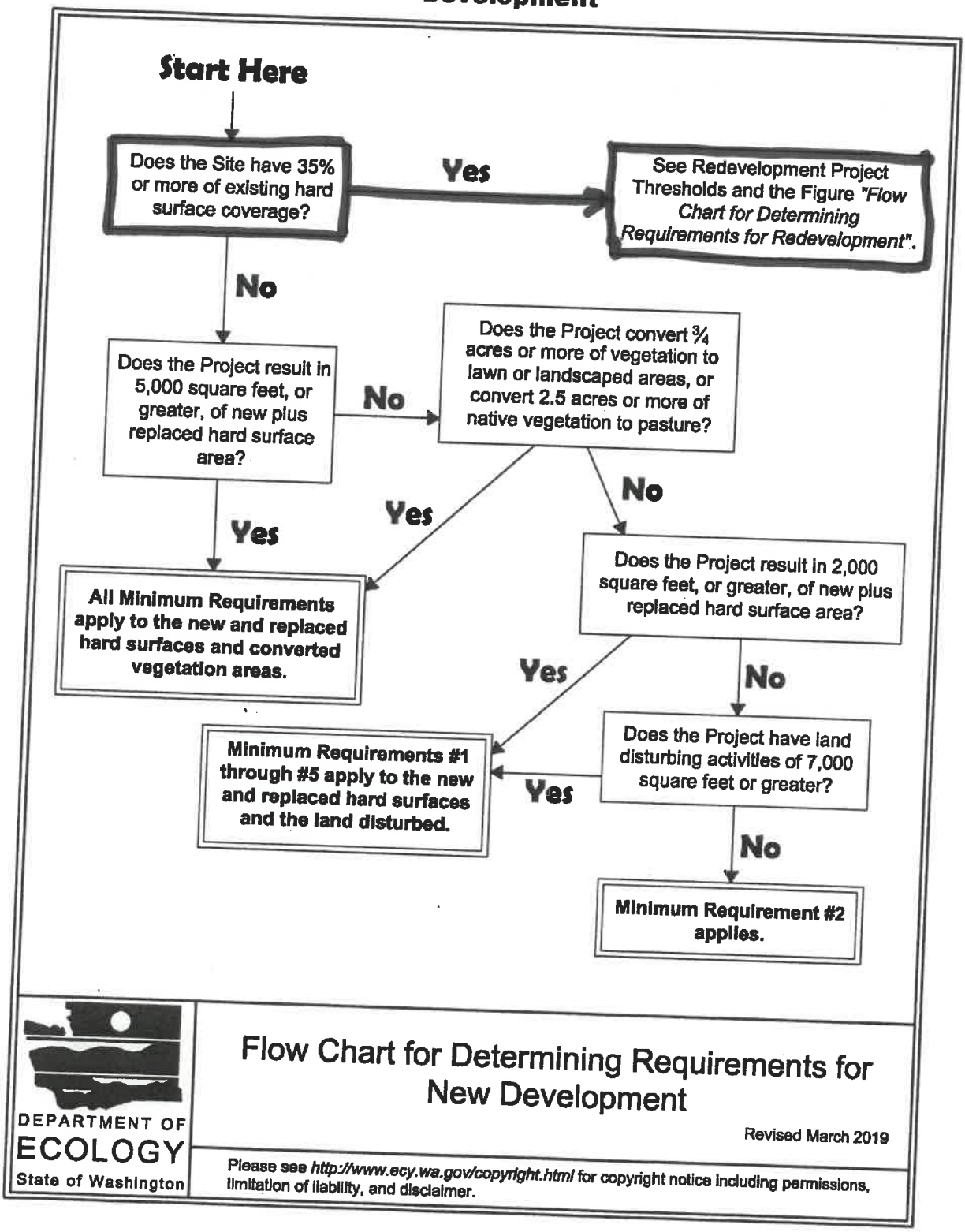


Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment

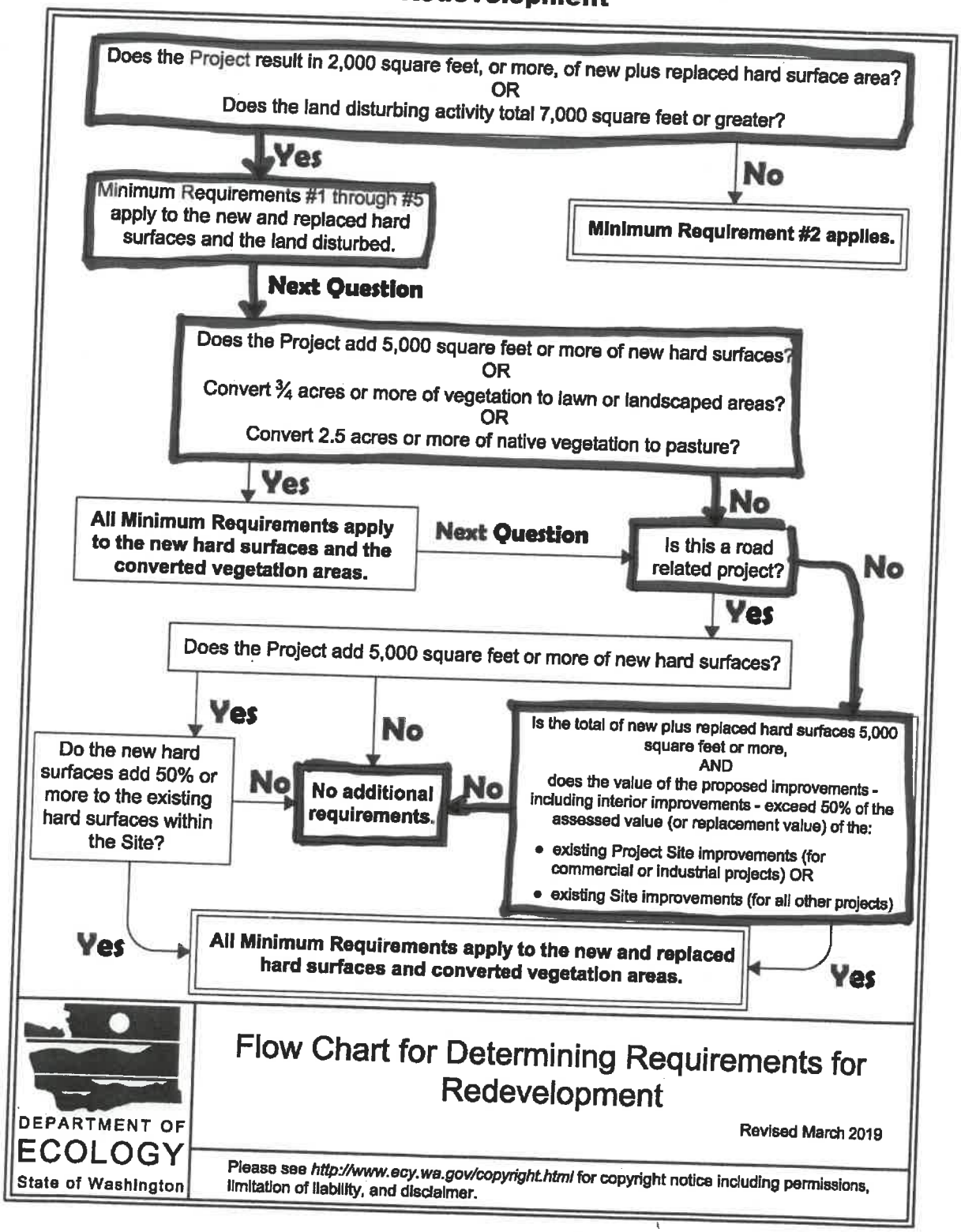


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention	
	4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	

Notes for using the List Approach:

1. Size BMP T5.14: Rain Gardens and BMP T7.30: Bioretention used in the List Approach to have a minimum horizontal projected surface area below the overflow which is at least 5% of the area drain-

Appendix C

Geotechnical Report

Ages Engineering, LLC

A Geotechnical and Environmental Services, LLC

P.O. Box 935
Puyallup, WA. 98371

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PRELIMINARY GEOTECHNICAL REPORT

Ramaiyah Residence

7466 E. Mercer Way
Mercer Island, Washington
Parcel Number: 2579500136

Project No. A-1562

Prepared For:

Sella Ramaiyah
7466 E. Mercer Way
Mercer Island, Washington 98040

July 10, 2020

Ages Engineering, LLC

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July 10, 2020
Project No. A-1562

Sella Ramaiyah
7466 E. Mercer Way.
Mercer Island, WA. 98040

Subject: Preliminary Geotechnical Report
Ramaiyah Residence
7466 E. Mercer Way
Mercer Island, Washington
PN: 2579500136

Dear Ms. Ramaiyah,

As requested, we have conducted a preliminary geotechnical study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

Our field exploration indicates the site is generally underlain with 0.0 to 5.0 feet of old fill soils overlying medium dense to dense sand with silt and gravel consistent with Advance Outwash. The western (uphill) end of the site is underlain with very dense silty sand with gravel consistent with Glacial Till. We did not observe groundwater seepage to the depths explored.

In our opinion, the soil and groundwater conditions at the site are suitable for the planned development. The new structure can be supported on typical spread footing foundations bearing on the existing organic-free undisturbed native soils observed at 0.0 to 5.0 feet below surface grades, or on structural fill placed above these soils.

Detailed recommendations addressing these issues and other geotechnical design considerations are presented in the attached report. We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Respectfully Submitted,

Ages Engineering, LLC

7-10-2020

Bernard P. Knoll, II
Principal

BPK:bpk

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Figures

Appendix

Preliminary Geotechnical Report
Ramaiyah Residence
7466 E. Mercer Way
Seattle, Washington

1.0 PROJECT DESCRIPTION

The project will consist of a new single-family residence. The new structure will likely be a two-story wood framed structure with a daylight basement facing the northeast. The basement will have a slab-on-grade floor. the new residence will likely have an attached garage with slab-on-grade floors. Access to the site is provided by Arrowsmith Avenue South located along the northeast side of the site, and by an alley located along the southwest side of the site. Storm water collected on the site will discharge to the existing City of Seattle storm water system located adjacent the site.

We expect the new residence will be a two-story wood-framed structure with daylight basement. The basement will have slab-on-grade floors. Foundation loads should be relatively light, in the range of 1 to 3 kips per lineal foot for bearing walls and up to 25 kips for isolated column footings.

The conclusions and recommendations presented in this report are based on our understanding of the above stated site and the planned project design features. If actual site conditions differ, the planned project design features are different than we expect, or if changes are made, we should review them in order to modify or supplement our conclusions and recommendations as necessary.

2.0 SCOPE

On June 29, 2020, we excavated four hand-augured test holes to a maximum depth of 7.0 feet below surface grades. Using the information obtained from our subsurface exploration, we developed geotechnical design and construction recommendations for the project. Specifically, this report addresses the following:

- Reviewing the available geologic, hydrogeologic and geotechnical data for the site area, and conducting a geologic reconnaissance of the site area.
- Addressing the appropriate geotechnical regulatory requirements for the planned site development, including a Geologic Hazard evaluation.
- Advancing four test holes in the planned new development area to a maximum depth of approximately 7.0 feet below surface grades.
- Providing geotechnical recommendations for site grading including site preparation, subgrade preparation, fill placement criteria, suitability of on-site soils for use as structural fill, temporary and permanent cut and fill slopes, and drainage and erosion control measures.

- Providing geotechnical recommendations for design and construction of new foundations and floor slabs, including allowable bearing capacity and estimates of settlement.
- Providing geotechnical recommendations for lower level building or retaining walls, including backfill and drainage requirements, lateral design loads, and lateral resistance values.
- Providing an evaluation of the steep slopes on the site.
- Providing recommendations for site drainage.

Our work and report will be considered "Preliminary" until the projects design details become finalized. The preliminary work we do will assist in determining the final design details for the planned site development. Once the sites' project design details become finalized, we can and often do revise our report to "Geotechnical Report", removing the preliminary status from the report and including in the final report all of the relevant design and construction recommendations made to that point.

It should be noted that our work does not include services related to environmental remediation or design and performance issues related to moisture intrusion through walls. An appropriate design professional or qualified contractor should be contacted to address these issues. Our work does not include infiltration testing.

3.0 SITE CONDITIONS

3.1 Surface

The subject site area is an irregular shaped residential parcel located at 7466 East Mercer Way in the Clarke Beach area of Mercer Island, Washington. The subject site is currently occupied with a single-family residence located in the eastern central (downhill) portion of the site. A detached garage is located along the sites' eastern property line. A driveway switchbacks down the western end of the site to the detached garage located along the east end of the site. The site is bordered with residential lots to the north, east, and south, and by East Mercer Way to the west. The location of the site is shown on the Site Vicinity Map provided in Figure 1. The current site layout is shown on the Exploration Location Plan provided in Figure 2.

Groundwater seepage was observed emanating from the center of the sites' southern property line. The water is currently allowed to flow freely over the property line to a concrete collection basin constructed in the ground. The collected water then flows into a storm water pipe. The concrete collection basin is located in a flat area along the south side of the existing residence. A concrete retaining wall facing east with an exposed height of 7.0 feet is located to the immediate west of the concrete collection basin. Another concrete retaining wall facing east spans the property from south to north along the west side of the existing residence. A concrete staircase extends up the slope along the north side of the detached garage on the site. Another concrete retaining wall facing east is located to the north of the concrete staircase.

In general surface grades in the vicinity of the site slope down to the east. Surface grades on the site slope down to the east at surface grades ranging from 0 to 40 percent. Elevation relief across the site is approximately 25.0 feet. Site vegetation consists of various landscape bushes and trees with some grass lawn areas around the residence. The western (uphill) end of the site is vegetated with several medium-sized evergreen and deciduous trees with thick underbrush.

3.2 Mapped Soils

According to *The Geologic Map of Mercer Island,* by Kathy G. Troost and Aaron P. Wisher (October 2006), the soil in the vicinity of the site is mapped as Lawton Clay (Qvlc). However, based on our site exploration, the soils underlying a majority of the site would be better classified as Advance Outwash (Qva). The soil along the western (uphill) end of the site is underlain with Glacial Till (Qvt). The Advance Outwash and Glacial Till were deposited during the Vashon stade of the Fraser Glaciation, approximately 12,000 to 15,000 years ago. The Advance Outwash was deposited in front of the advancing glacial ice during brief periods of intense warming. The Till was deposited along the base of the advancing glacial ice. Both the Advance Outwash and Glacial Till were consequently over-ridden by the glacial ice mass. The Advance Outwash is described as a poorly graded mixture of sand and gravel with minor silt and clay content. The Till is a described as a well-graded mixture of sand, silt and gravel with minor clay content. The Advance Outwash and Glacial Till will typically be found in a dense condition where undisturbed. The near surface soils at the site have been disturbed by natural weathering processes that have occurred since their deposition. Groundwater seepage was observed along the south side of the existing residence on the site. A copy of the Geologic Map for the subject site is provided in Figure 3.

According to the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), the soils underlying the site are classified as Kitsap Silt Loam (KpD) soils that form on 15 to 30 percent slopes. According to the USDA NRCS, the Kitsap soils will have a severe potential for erosion when exposed. A copy of the USDA NRCS Map for the subject site is provided in Figure 4.

3.3 Soils

The soils we observed at the site generally consist of old fill soils overlying sand with silt and gravel consistent with Advance Outwash. The eastern (uphill) end of the site is underlain with silty sand with gravel consistent with Glacial Till.

In Test Hole TH-1, located near the NE corner of the existing residence, we encountered 9 inches of topsoil overlying moist, medium dense, reddish-orange silty sand with gravel to a depth of 2.5 feet below surface grades. Below a depth of 2.5 feet we encountered moist, medium dense to dense, light brown sand with silt and gravel consistent with Advance Outwash. In Test Hole TH-2, located along the south side of the existing residence on the site, we encountered old fill soils to a depth of 2.5 feet below surface grades. The fill consisted of moist, medium dense, brown sand with silt and gravel with some topsoil. Below 2.5 feet, the soils became medium dense to dense, light brown sand with silt and gravel consistent with Advance Outwash. In Test Hole TH-

3, located near the NW corner of the existing residence on the site, we encountered3 inches of topsoil overlying old fill soils to a depth of 5.0 feet below surface grades. The fill consisted of moist, medium dense, brown sand with silt and gravel with some topsoil. In Test Hole TH-4, located along the east side of the driveway where it extends off East Mercer Way, we encountered moist, very dense, gray silty sand with gravel consistent with Glacial Till.

Figures A-1 through A-3 present more detailed descriptions of the subsurface conditions encountered in the test holes. The approximate test hole locations are shown on the Exploration Location Plan provided in Figure 2.

3.4 Groundwater

We did not encounter groundwater seepage in any of the test holes excavated on the site. However, we expect a seasonal perched water table likely develops on top of the dense glacial till during periods of wet weather. The groundwater levels and flow rates will fluctuate seasonally and typically reach their highest levels during and shortly following the wet winter months (October through May).

Groundwater seepage was observed emanating from the center of the sites' southern property line. The water is currently allowed to flow freely over the property line to a concrete collection basin constructed in the ground. The collected water then flows into a storm water pipe.

4.0 GEOLOGIC HAZARDS

4.1 General

According to Section 19.16 in the City of Mercer Island Municipal Code, geologic hazard areas are defined as "Areas susceptible to erosion, sliding, earthquake, or other geological events based on a combination of slope (gradient or aspect), soils, geologic material, hydrology, vegetation, or alterations, including landslide hazard areas, erosion hazard areas and seismic hazard areas".

4.2 Landslide

According to Section 19.16 in the City of Mercer Island municipal code, Landslide Hazard Areas are defined as, "Those areas subject to landslides based on a combination of geologic, topographic, and hydrologic factors, including:

1. Areas of historic failures;
2. Areas with all three of the following characteristics:
    a. Slopes steeper than 15 percent; and
    b. Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
    c. Springs or ground water seepage;

3. Areas that have shown evidence of past movement or that are underlain or covered by mass wastage debris from past movements;
4. Areas potentially unstable because of rapid stream incision and stream bank erosion; or
5. Steep Slope. Any slope of 40 percent or greater calculated by measuring the vertical rise over any 30-foot horizontal run."

During our site visit and subsurface exploration, we did not observe any evidence of past site movement or areas of historic failures. We did observe slopes steeper than 15 percent on the site, and groundwater seepage. However, we did not observe relatively permeable sediment overlying a relatively impermeable sediment or bedrock. We did not observe any areas that have shown evidence of past movement or that are underlain or covered by mass wastage debris from past movements. We did not observe any areas of rapid stream incision. We did observe areas sloping 40 percent or greater along the eastern (uphill) end of the site. However, the height of these slopes is less than 30 feet. Based on these factors, according to the city of Mercer Island municipal code, the site is not classified as having landslide hazard areas.

4.3 Erosion

According to Section 19.16 in the City of Mercer Island municipal code, Erosion Hazard areas are defined as, "Those areas greater than 15 percent slope and subject to a severe risk of erosion due to wind, rain, water, slope and other natural agents including those soil types and/or areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a "severe" or "very severe" rill and inter-rill erosion hazard."

The site does have any areas sloping steeper than 15 percent along the western end of the site. Based on our subsurface exploration, the site is underlain with soils having a "severe" potential for erosion when exposed. Therefore, according to the City of Mercer Island municipal code, the eastern end of the site is classified as having erosion hazard areas. We expect the planned development will not encroach into the steep slope area along the east end of the site.

In our opinion, regardless of the erosion hazard classification at the site, Temporary Erosion and Sediment Control (TESC) measures should be in place prior to the start of construction activities at the site. In our opinion, the potential for erosion is not a limiting factor in site development. Erosion hazards can be mitigated by applying Best Management Practices (BMPs) outlined in the Washington State Department of Ecology's (Ecology) *Stormwater Management Manual for Western Washington.* TESC measures, as required by the City of Mercer Island, should be in place prior to the start of construction activities at the site.

4.4 Seismic

According to Section 19.16 in the City of Mercer Island Municipal Code, seismic hazard areas are defined as, "areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction or surface faulting."

We observed no site features indicating past seismic disturbance. The site is located within the Seattle Fault Zone. Structures constructed on this site using the seismic criteria provided in the

City of Mercer Island municipal code and the International Building Code (IBC) will have no greater chance of seismic damage during an earthquake than any other residential structure in the Puget Sound area.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in pore water pressure. The increase in water pressure is typically induced by vibrations such as those associated with earthquakes. Liquefaction mainly affects geologically recent deposits of loose, fine-grained sands that are below the groundwater table. Due to the site being underlain with glacially consolidated relatively coarse-grained soils that are in a medium dense to dense condition, it is our opinion, the liquefaction potential of the site should be considered very low.

The state of Washington has adopted the International Building Code (IBC). Based on the soil conditions encountered and the local geology, site class "D" can be used in structural design. This is based on the inferred range of SPT (Standard Penetration Test) blow counts for the upper 100 feet of the site relative to hand excavation progress and probing with a ½-inch diameter steel probe rod. The presence of glacially consolidated soil conditions are assumed to be representative for the site conditions beyond the depths explored.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on our study, in our opinion, soil and groundwater conditions at the site are suitable for the proposed development. The new structure can be supported on conventional spread footings bearing on the existing organic-free, undisturbed, native site soils observed at 0.0 to 5.0 feet below surface grades, or on structural fill placed above these existing soils. Floor slabs and pavements should be similarly supported. The development storm water should discharge to the existing system in use on the site.

The native soils encountered at the site contain a high enough percentage of fines (silt and clay-size particles) that will make them difficult to compact as structural fill when too wet. Accordingly, the ability to use the soils from site excavations as structural fill will depend on their moisture content and the prevailing weather conditions at the time of construction. If grading activities will take place during the winter season, the owner should be prepared to import free-draining granular material for use as structural fill and backfill.

The following sections provide detailed recommendations regarding these issues and other geotechnical design considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 Site Preparation and Grading

To prepare the site for construction, all vegetation, organic surface soils, and other deleterious materials including any existing structures, foundations or abandoned utility lines should be

stripped and removed from the new development areas. Organic topsoil will not be suitable for use as structural fill but may be used for limited depths in non-structural areas. The existing old fill soils and disturbed native soils observed in the upper 0.0 to 5.0 feet will not be suitable for support of structural elements. Prior to construction, these unsuitable soils should be removed from under new development areas.

Once clearing and stripping operations are complete, cut and fill operations can be initiated to establish desired grades. In order to achieve proper compaction of structural fill, and to provide adequate foundation and floor slab support, the native subgrade must be in a stable condition. Prior to placing structural fill, and to prepare the foundation subgrade, all exposed surfaces should be compacted with heavy vibratory compaction equipment to determine if any isolated soft and yielding areas are present.

If excessively soft or yielding areas are present, and cannot be stabilized in place by compaction, they should be cut to firm bearing soil and filled to grade with structural fill. If the depth to remove the unsuitable soil is excessive, using a geotextile fabric can be considered, such as Mirafi HP270 or an approved equivalent, in conjunction with structural fill. In general, a minimum of 18-inches of clean, granular structural fill over the geotextile fabric should establish a stable bearing surface.

A representative of Ages Engineering, LLC should observe the foundation subgrade compaction operations to verify that stable subgrades are achieved for support of structural elements.

Our study indicates the native surface soils encountered at the site contain a sufficient enough percentage of fines (silt and clay-size particles) that will make them difficult to compact as structural fill when too wet. Accordingly, the ability to use the soils from site excavations as structural fill will depend on their moisture content and the prevailing weather conditions at the time of construction. If grading activities are planned during the wet winter months, or the on-site soils become too wet to achieve adequate compaction, the owner should be prepared to import a wet-weather structural fill. For wet weather structural fill, we recommend importing a granular soil that meets the following gradation requirements:

U. S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the ¾ inch fraction

Prior to use, Ages Engineering, LLC should examine and test all materials to be imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soils' laboratory maximum dry density as determined by American Society for Testing and Materials (ASTM) Test Designation D-1557 (Modified Proctor). The moisture content of the soil at the time of compaction should be within two percent

of its optimum, as determined by this same ASTM standard. In non-structural areas, the degree of compaction can be reduced to 90 percent.

5.3 Excavations

General,

The inclination for a safe and stable excavation slope cut is determined based on two factors, the current Washington State Safety and Health Administration (WSHA) regulations for confined spaces and global stability of the slope cut. Most often, the WSHA regulations are more conservative than the global stability requirements.

According to WAC 296-809-099, a confined space is defined as: "A space that is all of the following:

(a) Large enough and arranged so an employee could fully enter the space and work.

(b) Has limited or restricted entry or exit. Examples of spaces with limited or restricted entry are tanks, vessels, silos, storage bins, hoppers, vaults, excavations, and pits.

(c) Not primarily designed for human occupancy."

In the context of site excavation and grading, the Washington State Department of Labor and Industries considers a confined space as a space in which a worker enters an excavation that is tall enough and/or narrow enough to inundate the worker and cause bodily harm if a cave-in occurs. This does not include excavations that are less than 4.0 feet in depth.

WSHA Approved Slopes,

All excavations at the site associated with confined spaces, such as utility trenches and lower level building and retaining walls, must be completed in accordance with local, state, and/or federal requirements. Based on current Washington State Safety and Health Administration (WSHA) regulations, the existing near-surface loose to medium dense soils and the weathered medium dense native soils would be classified as Type C soils. The deeper dense native Advance Outwash soils would be classified as Type B soils. The deeper dense native Glacial Till soils would be classified as Type A soils.

According to WSHA, for temporary excavations of less than 20 feet in depth, the side slopes in Type C soils should be laid back at a slope inclination of 1.5:1 (Horizontal:Vertical) or flatter from the toe to the crest of the slope. The side slopes in Type B soils should be laid back at a slope inclination of 1:1 (Horizontal:Vertical) or flatter from the toe to the crest of the slope. The side slopes in Type A soils should be laid back at a slope inclination of 0.75:1 (Horizontal:Vertical) or flatter from the toe to the crest of the slope. All exposed slope faces should be covered with a durable reinforced plastic membrane during construction to prevent slope raveling and rutting during periods of precipitation. These guidelines assume that all surface loads are kept at a minimum distance of at least one half the depth of the cut away from the top of the excavation slope and that significant seepage is not present on the slope face. Flatter cut slopes will be necessary where significant raveling or seepage occurs, or if

construction materials will be stockpiled along the slope crest. If these safe temporary slope inclinations cannot be achieved due to property line constraints, shoring may be necessary.

Non-WSHA Approved Slopes,

Based on the composition and consistency of the site soils, stable slope cuts to provide adequate global stability can be steeper than WSHA standards in areas that are not considered confined spaces. Excavations into the native site soils that will not result in WSHA regulated confined spaces can be cut to an inclination of 0.5:1. Some raveling of the gravel and cobbles exposed on the slope surface may occur at an inclination of 0.5:1. Due to the potential for raveling to occur, and to prevent erosion, the slope face should be covered with durable plastic sheeting.

This information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Ages Engineering, LLC assumes responsibility for job site safety. It is understood that job site safety is the sole responsibility of the project contractor.

5.4 Foundations

The new residential foundations may be supported on conventional spread footing foundations bearing on the competent native organic-free soils or on structural fills placed above these native soils. Foundation subgrades should be prepared as recommended in the "Site Preparation and Grading" section of this report. According to the "Site Preparation and Grading" section of this report, the existing old fill soils and disturbed native soils observed in the upper 0.0 to 5.0 feet will not be suitable for support of structural elements. Prior to construction, these unsuitable soils should be removed from under new foundation areas.

Perimeter foundations exposed to the weather should bear at a minimum depth of 1.5 feet below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab. We recommend designing new foundations for a net allowable bearing capacity of 2,500 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used. With the anticipated loads and this bearing stress applied, building settlements should be less than one-half inch total and one-quarter inch differential.

For designing foundations to resist lateral loads, a base friction coefficient of 0.35 can be used. Passive earth pressures acting on the sides of the footings can also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 325 pounds per cubic foot (pcf). We recommend not including the upper 12 inches of soil in this computation because it can be affected by weather or disturbed by future grading activity. This value assumes the foundations will be constructed neat against competent soil and backfilled with structural fill, as described in the "Site Preparation and Grading" section of this report. The values recommended include a safety factor of 1.5.

Foundation Parameter Summary	
Description	***Design Value**
Net Allowable Bearing Capacity	2,500 psf
Friction Coefficient	0.35
Lateral Resistance	325 pcf

*Details regarding the use of these parameters are provided in the section above.

5.5 Slab-On-Grade

Slab-on-grade floors should be supported on subgrades prepared as recommended in the "Site Preparation and Grading" section of this report. According to the "Site Preparation and Grading" section of this report, the existing old fill soils and disturbed native soils observed in the upper 0.0 to 5.0 feet will not be suitable for support of structural elements. Prior to construction, these unsuitable soils should be removed from under new slab areas.

Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer of clean, free-draining, coarse sand or fine gravel that has less than three percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slabs. The drainage material should be placed in one lift and compacted to a firm and unyielding condition.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and aid in uniform curing of the concrete slab. It should be noted that if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will not assist in uniform curing of the slab, and may serve as a water supply for moisture transmission through the slab and affecting floor coverings. Additionally, if the sand is too dry, it can effectively drain the fresh concrete, thereby lowering its strength. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided.

5.6 Lower Level and Building Walls

The magnitude of earth pressure development on below-grade walls, such as basement or retaining walls, will greatly depend on the quality of the wall backfill and the wall drainage. We recommend placing and compacting wall backfill as structural fill. Wall backfill below structurally loaded areas, such as pavements or floor slabs, should be compacted to a minimum of 95 percent of its maximum dry density, as determined by ASTM Test Designation D-1557 (Modified Proctor). In unimproved areas, the relative compaction can be reduced to 90 percent.

To guard against hydrostatic pressure development, drainage must be installed behind the wall. We recommend that wall drainage consist of a minimum 12 inches of clean sand and/or gravel with less than three percent fines placed against the back of the wall. In addition, a drainage collector

system consisting of 4-inch perforated PVC pipe should be placed behind the wall to provide an outlet for any accumulated water. The drains should be provided with cleanouts at easily accessible locations. These cleanouts should be serviced at least once every year. The wall drainage material should be capped at the ground surface with 1-foot of relatively impermeable soil to prevent surface intrusion into the drainage zone. Alternatively, the 12-inch wide drainage layer placed against the back of the wall can be replaced with a Mirafi G100N Drainage Board, or an approved equivalent. If drainage board is used, the 4-inch perforated PVC pipe should be covered with at least 12 inches of clean washed gravel and the drainage board should be hydraulically connected to drainpipe and surrounding gravel.

With wall backfill placed and compacted as recommended and the wall drainage properly installed, unrestrained walls can be designed for an active earth pressure equivalent to a fluid weighing 35 pcf. For restrained walls, an additional uniform lateral pressure of 100 psf should be included. These values assume a horizontal backfill condition and that no other surcharge loading, such as traffic, sloping embankments, or adjacent buildings, will act on the wall. If such conditions exist, then the imposed loading must be included in the wall design. Friction at the base of the wall foundation and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in the "Foundations" section of this report.

Lower Level Building and Retaining Wall Parameter Summary		
Description	**Condition**	***Design Value**
Earth Pressure	Unrestrained	35 pcf
Earth Pressure	Restrained	Additional 100 psf
Earth Pressure	Surcharge	Dependent upon magnitude

*Details regarding the use of these parameters are provided in the section above.

5.7 Storm Water

The storm water collected in the roof and foundation drains should discharge off of the site to the existing storm water system currently in place on the site.

5.8 Permanent Slopes and Embankments

All permanent cut and fill slopes should be graded with a finished inclination of no greater than 2:1 (Horizontal:Vertical). Upon completion of grading, the slope face should be appropriately vegetated or provided with other physical means to guard against erosion. Final grades at the top of the slope must promote surface drainage away from the slope crest. Water must not be allowed to flow in an uncontrolled fashion over the slope face. If it is necessary to direct surface runoff towards the slope, it should be controlled at the top of the slope, piped in a closed conduit installed on the slope face, and taken to an appropriate point of discharge beyond the toe.

All fill used for slope and embankment construction should meet the structural fill requirements described in the Site Preparation and Grading section of this report. In addition, if new fills will

be placed over existing slopes of 20 percent or greater, the structural fill should be keyed and benched into competent slope soils.

5.9 Site Drainage

Surface,

Final exterior grades should promote free and positive drainage away from the building area. All ground surfaces, pavements, and sidewalks should be sloped away from the structure. We recommend providing a gradient of at least three percent for a minimum distance of ten feet from the building perimeter, except in paved locations. In paved locations, a minimum gradient of one percent should be provided, unless provisions are included for collection and disposal of surface water adjacent to the structure.

Subsurface,

We recommend installing a continuous drain along the lower outside edge of the perimeter building foundation. The foundation drain should be tightlined to an approved point of controlled discharge. The roof drain should not be connected to the footing drains unless a backflow device will be installed, or an adequate gradient will prevent backflow into the footing drains.

Subsurface drains must be laid with a gradient sufficient to promote positive flow to the point of discharge. All drains should be provided with cleanouts at easily accessible locations. These cleanouts should be serviced at least once every year.

6.0 ADDITIONAL SERVICES

Ages Engineering, LLC should review the final project designs and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design. If changes are made in the loads, grades, locations, configurations or types of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as necessary.

We should also provide geotechnical services during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for expedient design changes if subsurface conditions differ from those anticipated prior to the start of construction.

7.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Ages Engineering, LLC and is intended for the exclusive use of Ms. Sella Ramaiyah

and her authorized representatives for use in the design, permitting, and construction portions of this project.

The analysis and recommendations presented in this report are based on data obtained from others and our site explorations, and should not be construed as a warranty of the subsurface conditions. Variations in subsurface conditions are possible. The nature and extent of which may not become evident until the time of construction. If variations appear evident, Ages Engineering, LLC should be requested to reevaluate the recommendations in this report prior to proceeding with construction. A contingency for unanticipated subsurface conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated during our exploration, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

Ages Engineering, LLC

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Puyallup, WA. 98371

Main (253) 845-7000
www.agesengineering.com

Site Vicinity Map
Ramaiyah Residence
7466 East Mercer Way
Mercer Island, Washington

Project No.: A-1562	July 2020	Figure 1

KEY:

APPROXIMATE LOCATION OF TEST HOLE TH-1

Ages Engineering, LLC
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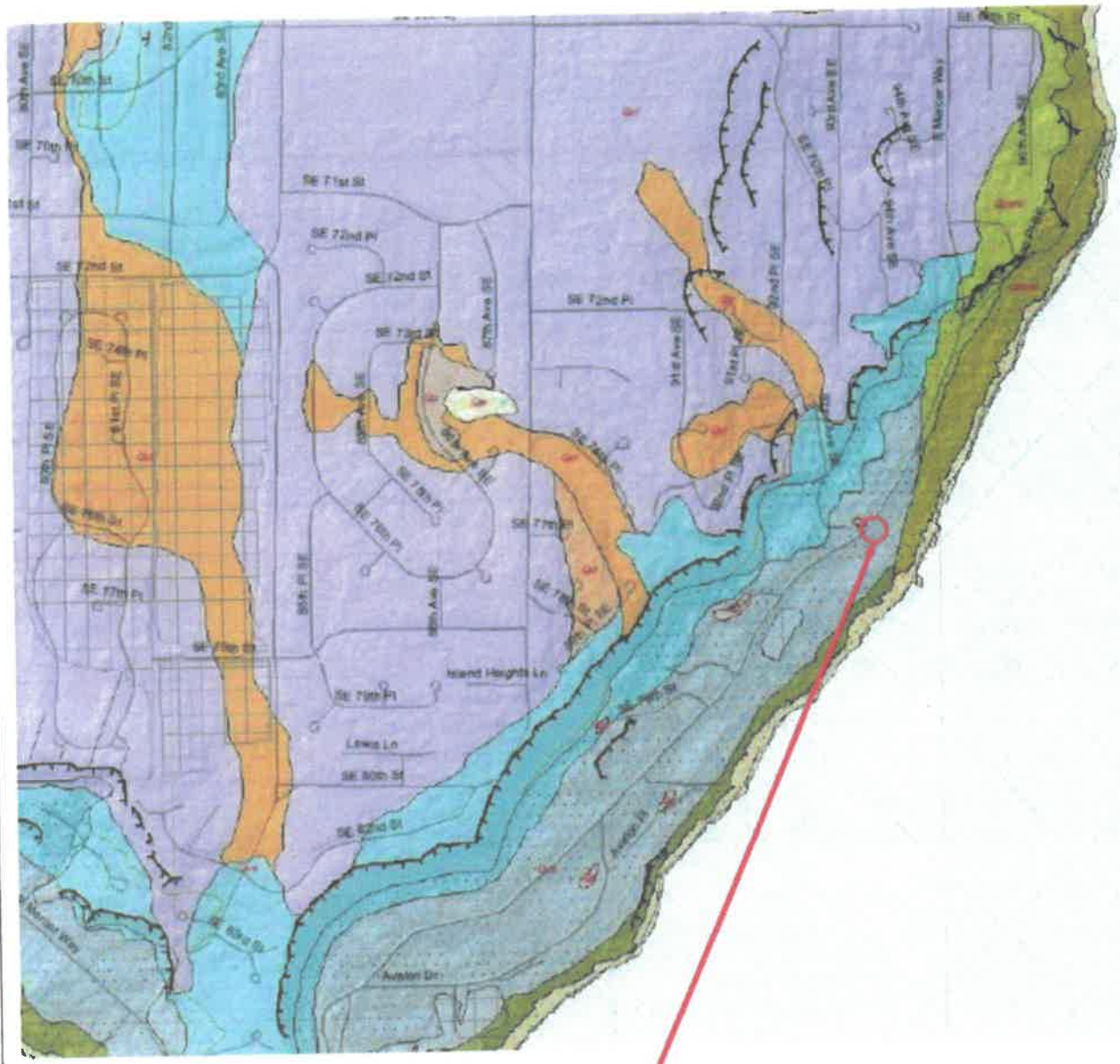
Exploration Location Plan
Ramaiyah Residence
7466 East Mercer Way
Mercer Island, Washington

Project No.: A-1562	July 2020	Figure 2



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Geologic Map
Ramaiyah Residence
7466 East Mercer Way
Mercer Island, Washington

Project No.: A-1562	July 2020	Figure 3

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USDA NRCS Map
Ramaiyah Residence
7466 East Mercer Way
Mercer Island, Washington

Project No.: A-1562	July 2020	Figure 4

APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTING

Ramaiyah Residence
Mercer Island, Washington

On June 29, 2020 we explored subsurface conditions at the site by advancing four hand-augured test holes to a maximum depth of 7.0 feet below surface grades. The approximate test hole locations are shown on the Exploration Location Plan provided in Figure 2.

A geotechnical engineering representative from our office conducted the field exploration, maintained a log of each test hole and, classified the soils encountered, collected representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1. The test hole logs are presented on Figures A-2 and A-3.

Representative soil samples obtained from the test holes were placed in sealed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the test hole logs.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	GRAVEL WITH < 5 % FINES	GW	Well-Graded GRAVEL
			GP	Poorly-Graded GRAVEL
		GRAVEL WITH BETWEEN 5 AND 15 % FINES	GW-GM	Well-Graded GRAVEL with silt
			GW-GC	Well-Graded GRAVEL with clay
			GP-GM	Poorly-Graded GRAVEL with silt
			GP-GC	Poorly-Graded GRAVEL with clay
		GRAVEL WITH > 15 % FINES	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	SAND WITH < 5 % FINES	SW	Well-Graded SAND
			SP	Poorly-Graded SAND
		SAND WITH BETWEEN 5 AND 15 % FINES	SW-SM	Well-Graded SAND with silt
			SW-SC	Well-Graded SAND with clay
			SP-SM	Poorly-Graded SAND with silt
			SP-SC	Poorly-Graded SAND with clay
		SAND WITH > 15 % FINES	SM	Silty SAND
			SC	Clayey SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY	Liquid Limit Less than 50	ML	Inorganic SILT with low plasticity
			CL	Lean inorganic CLAY with low plasticity
			OL	Organic SILT with low plasticity
		Liquid Limit 50 or more	MH	Elastic inorganic SILT with moderate to high plasticity
			CH	Fat inorganic CLAY with moderate to high plasticity
			OH	Organic SILT or CLAY with moderate to high plasticity
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

(1) Soil descriptions are based on visual field and laboratory observations using the classification methods described in ASTM D-2488. Where laboratory data are available, classifications are in accordance with ASTM D-2487.

(2) Solid lines between soil descriptions indicate a change in the interpreted geologic unit. Dashed lines indicate stratigraphic change within the unit.

(3) Fines are material passing the U.S. No. 200 Sieve.

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Unified Soil Classification System (USCS)
Ramaiyah Residence
7466 East Mercer Way
Mercer Island, Washington

Project No.: A-1562	July 2020	Figure A-1

Ages Engineering, LLC

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Test Hole TH-1

DATE: June 29, 2020 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	9 inches TOPSOIL		
	Reddish-orange silty SAND with gravel, medium dense, moist. (SM)		
5	Light brown SAND with silt and gravel, cobbles to 5 inches, moist, medium dense. (SM) (Weathered Advance Outwash)		
	Test Hole terminated at a depth of 7.0 feet below surface grades. No groundwater seepage encountered.		

Test Hole TH-2

DATE: June 29, 2020 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0			
	FILL: Brown sand with silt and gravel, some topsoil, medium dense, moist. (SM)		
5	Light brown SAND with silt and gravel, cobbles to 5 inches, moist, medium dense. (SM) (Weathered Advance Outwash)		
	Test Hole terminated at a depth of 7.0 feet below surface grades. No groundwater seepage encountered.		

Figure A-2

Project No.: A-1562

Ages Engineering, LLC

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Puyallup, WA. 98371
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Test Hole TH-3

DATE: June 29, 2020 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	3 inches **TOPSOIL**		
	FILL: Brown sand with silt and gravel, some topsoil, medium dense, moist. (SM)		
5	Test Hole terminated at a depth of 5.0 feet below surface grades.		
	No groundwater seepage encountered.		

Test Hole TH-4

DATE: June 29, 2020 LOGGED BY: BPK ELEV:

Depth (feet)	Soil Description	Notes M%	Notes Other
0	Gray silty **SAND** sand with gravel, fractured, very dense, moist. (SM) (Glacial Till)		
5	Test Hole terminated at a depth of 4.0 feet below surface grades.		
	No groundwater seepage encountered.		

Figure A-3

Project No.: A-1562

Appendix D

CSWPPP REPORT

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

Construction Stormwater Pollution Prevention Plan

For

Ramaiyah and Subramian Residence
7466 East Mercer Way
Mercer Island, WA 98040

Parcel No. 2579500136
City of Mercer Island File No. TBD

Eastside Consultants, Inc. File No. 24014

March 7, 2024

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

Prepared for:
Ramaiyah and Subramian Residence
7466 East Mercer Way
Mercer Island, WA 98040

TABLE OF CONTENTS

Project Overview

The proposed Single Family Residence consists of removing the existing house and garage and constructing a new one. The project is located at 7466 East Mercer Way in Mercer, Island, WA.

The project parcel is located on the east side of Mercer Island and will be discharging stormwater runoff through the existing storm line running through the neighbor's property (7618 East Mercer Way) and into Lake Washington.

The physical location of the site is 7466 East Mercer Way, Mercer Island, WA. There are single family residences to the North, South, and East of the residence. East Mercer Way is located just West of the site.

The runoff will primarily sheetflow off the roof into gutters and be transported from the main roof via downspouts into a catchbasin in the back of the house. From here it will enter another newly installed catchbasin over the existing drainage pipe leading offsite. The front deck, driveway, and footing drains will be picked up in a trench drain and catchbasin and pumped up to the newly installed catchbasin over the existing drainage pipe.

ADHERENCE TO 2019 DEPARTMENT OF ECOLOGY STORMWATER DESIGN MANUAL FOR WESTERN WASHINGTON MINIMUM REQUIREMENTS #2

Since we are less then 5,000 sf of New plus replaced impervious surface, only minimum requirements 1 – 5 apply, apply for this project according to Figure 4.2 from the Department of Ecology County Stormwater Drainage Manual located in Appendix A in this report, because it is anticipated that less than 5,000 sf of new plus replaced impervious will be generated.

1. Minimum Requirement #1: Preparation of Stormwater Site Plans

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

Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan

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 construction time. No soils shall remain exposed for more than 7 days.

BMPs shall be suitable for the appropriate time of year construction takes place. These shall include but not limited to silt fence, mulching, hydroseeding, and preservation of existing vegetation.

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

A construction entrance will be established by using the existing driveway.

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.

Element 1: Preserve Vegetation/Mark Clearing Limits
Clearing and disturbance limits will be marked with plastic or metal fencing to prevent erosion and to maintain a natural vegetated area for the flowpath of the dispersion trench.

- BMP C233: Silt Fence

Element 2: Establish Construction Entrance
Existing driveway will serve as the construction entrance. If it starts to fail Driveway Construction Entrance will be upgraded to

- BMP C105: Stabilized Construction Entrance

Element 3: Control Flow Rates
Post-construction soil quality and depth BMP will be used to control flow rates of surface runoff.

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

Element 4: Install Sediment Controls
A silt fence will be placed on the downgradient side of the construction area.

- BMP C233: Silt Fence

Element 5: Stabilize Soils
Exposed soils shall be stabilized with the following BMPs throughout the duration of the project to prevent erosion and p120
1123rotect downstream receiving streams from sediment loading.

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C123: Plastic Covering

Element 6: Protect Slopes
No additional slope protection should be required since steep slopes are not present on site.

Element 7: Protect Permanent Drain Inlets
Catch basins will be protected with catch basin filters to prevent suspended solids from reaching the receiving lake.

- BMP C220: Storm Drain Inlet Protection

Element 8: Stabilize Channels and Outlets
Outlet to lake outlet protection is not needed due to the direct stub-out connection being level making it so that runoff velocity is not high enough to deem worthy of outlet protection

Element 9: Control Pollutants
The following BMPs shall be followed during the installation of the PVC pipe leading to dispersion trench beneath the existing driveway and installation of the new driveway.

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention

Element 10: Control Dewatering
Dewatering will not occur with this project.

Element 11: Maintain Best Management Practices
The SWPPP shall provide for inspection and maintenance of the constructed BMPs. The applicant shall maintain BMPs and comply with their removal at the end of the project.

Element 12: Manage the Project

Construction plan to be determined by the contractor.

Element 13: Protect On-site Stormwater Management BMPs for Runoff From Roofs and Other Hard Surfaces
BMPs will be installed at the correct time of constructed and will be adequately protected.

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

Drainage from the proposed site will discharge directly into Lake Washington. The proposed driveway will be directly discharged to Lake Washington since it is less than 5,000 sf. We will be adding a downturn elbow to remove oils and grease. The stormwater is discharged in the natural downstream direction which enters Lake Washington.

5. Minimum Requirement Number 5: On-Site Stormwater Management

Lawn and Landscape Areas:

1) We will be applying Post-Construction Soil Quality and Depth per BMP T5.13

Roofs:

Using List #1

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

   Full Infiltration is infeasible due to poor soils per the Geotechnical Report

2) Rain Gardens and Bioretention is infeasible due to the poor soils.

3) Downspout Dispersion is infeasible due to inadequate flowpath

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

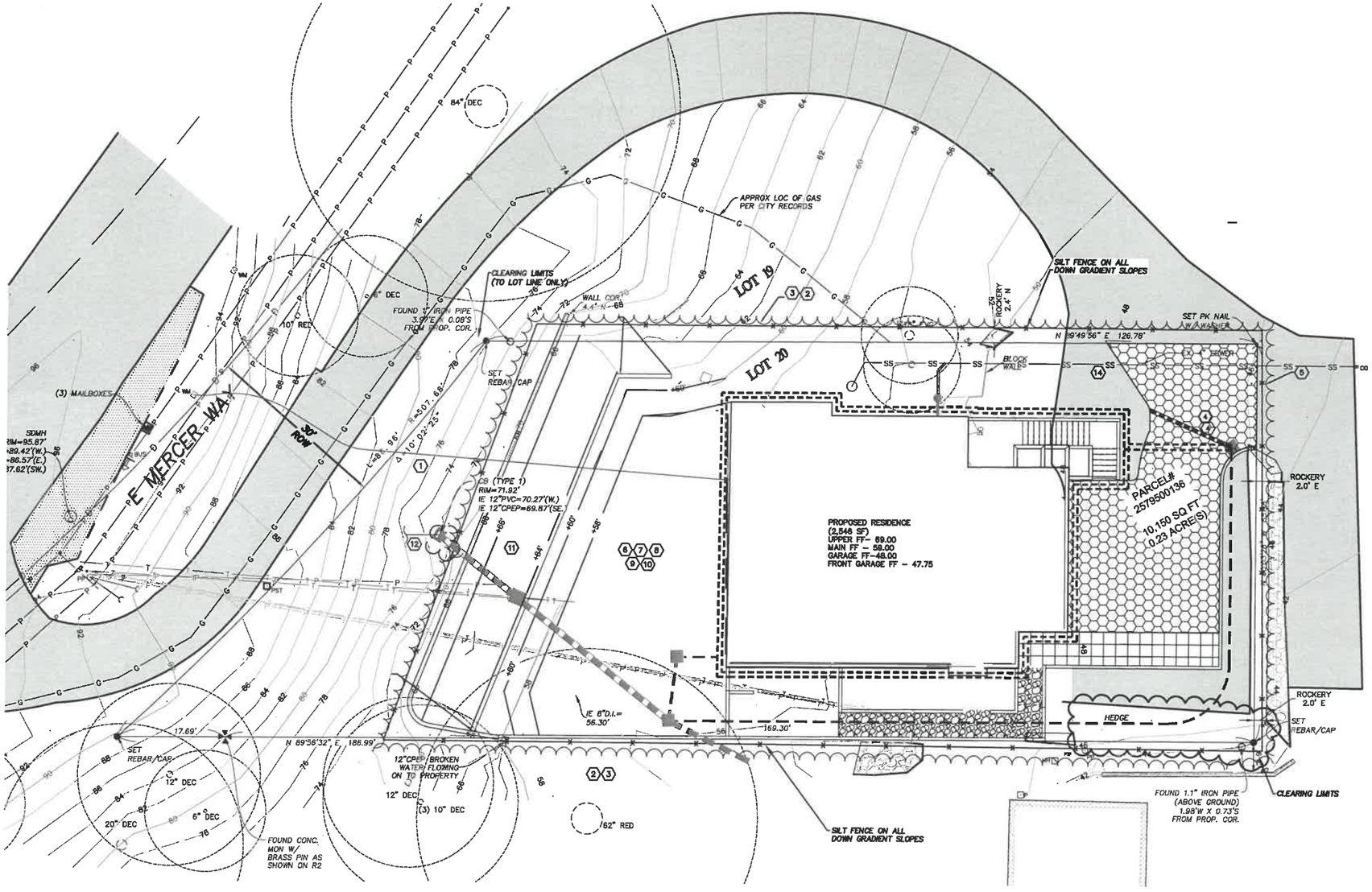
Other Hard Surfaces

For all other impervious areas, Using List #2

1) Full Dispersion is infeasible due to an inadequate flow path.
   Full Infiltration is infeasible due to poor soils
2) Permeable Pavement and Rain Gardens are infeasible due to the poor soils
3) Bioretention is infeasible due to the poor soils.
4) Sheet Flow Dispersion and concentrated flowpath dispersion is infeasible due to inadequate flowpath.

Appendix A: SWPPP PLANS

CSWPP PLAN
SCALE: 1"=40'



TESC CALLOUTS

1. PRESERVING NATURAL VEGETATION PER BMP C101
2. HIGH VISIBILITY PLASTIC OR METAL FENCE PER BMP C103
3. SILT FENCE PER BMP C233
4. STABILIZED CONSTRUCTION ENTRANCE/EXIT PER BMP C105
5. WATTLES PER BMP C235
6. TEMPORARY AND PERMANENT SEEDING PER BMP C120
7. MULCHING PER BMP C121
8. NETS AND BLANKETS PER BMP C122
9. PLASTIC COVERING PER BMP C123
10. SURFACE ROUGHENING PER BMP C130
11. GRADIENT TERRACES PER BMP C131
12. STORM DRAIN INLET PROTECTION PER BMP C220
13. CONCRETE HANDLING PER BMP C151
14. SAWCUTTING AND SURFACING POLLUTION PREVENTION PER BMP C152
15. MATERIAL DELIVERY, STORAGE, AND CONTAINMENT PER BMP C153
16. MATERIALS ON HAND PER BMP C150

X TREES TO BE REMOVED

Appendix B: Construction Stormwater BMP's

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural 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 percent of all rain that falls during a storm. Up to 20-30 percent 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 water-courses or swales, and on building sites in wooded areas.

- As required by local governments.
- 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 governments 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 dry well

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 2-3 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, power, water, and 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 with a few specific trees 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 (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-areas 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 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-3.1: 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-3.2: Stabilized Construction Access Geotextile Standards.

Table II-3.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 psi min.

Table II-3.2: Stabilized Construction Access Geotextile Standards (continued)

Geotextile Property	Required Value
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (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. 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-3.3: Stabilized Construction Access Alternative Material Requirements.

Table II-3.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½"	99-100

Table II-3.3: Stabilized Construction Access Alternative Material Requirements (continued)

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

- All percentages are by weight.
- The sand equivalent value and dust ratio requirements do not apply.
- 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.

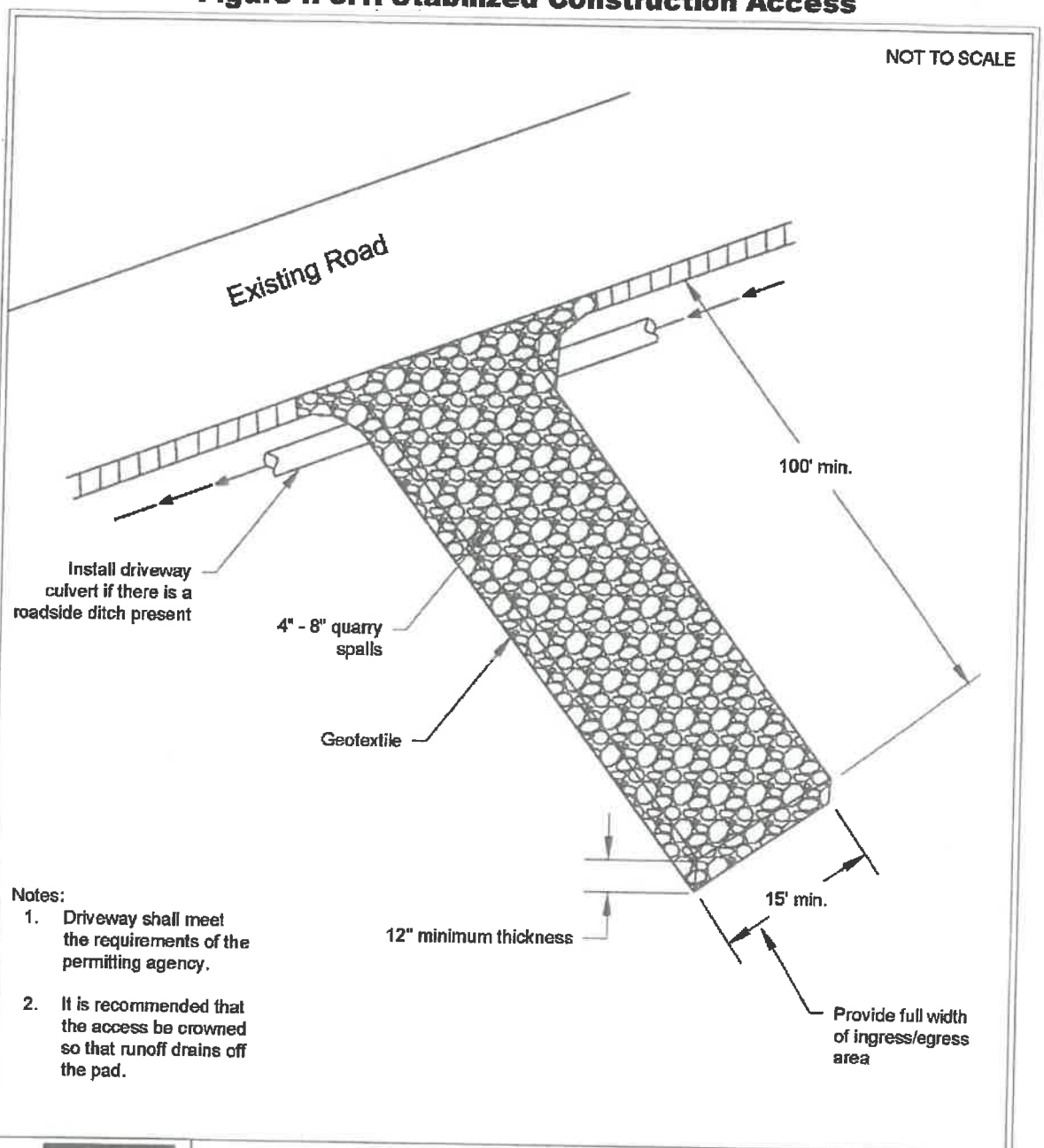
Maintenance Standards

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 high efficiency 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-3.1: 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-3.2: Wheel Wash. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

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.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch or an erosion control blanket until 75 percent grass cover is established.

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.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. 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 75 percent vegetation cover. If vegetated channels cannot be established by seed

before water flow; install sod in the channel bottom — over top of hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent 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.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:
    - Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
    - Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:

    - Installing the mulch, seed, fertilizer, and tackifier in one lift.
    - Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
    - Hold straw in place with a standard tackifier.

  Both of these approaches 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.
    - Repair of failed slope surfaces.

  This technique works with standard hydromulch (1,500 pounds per acre minimum) and Bonded Fiber Matrix/ Mechanically Bonded Fiber Matrix (BFM/MBFMs) (3,000 pounds per acre minimum).
- Seed may be installed by hand if:
    - Temporary and covered by straw, mulch, or topsoil.
    - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in Table II-3.4: Temporary and Permanent Seed Mixes include

recommended mixes for both temporary and permanent seeding.

- Apply these mixes, 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.
- Consult the local suppliers or the local conservation district for their recommendations. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used, depending on the soil type and hydrology of the area.

Table II-3.4: Temporary and Permanent Seed Mixes

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 fes-	*Festuca arundin-*	75-80	98	90

Table II-3.4: Temporary and Permanent Seed Mixes (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
cue	*acea* or *Festuca elatior*			
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba* or *Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix 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 use 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 engineered soil system per specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application 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 that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent 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 percent tackifier. Achieve a minimum of 95 percent 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:
    - 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 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, nets, or blankets.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes run-off.

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-3.6: Mulch Standards and Guidelines. 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-3.5: 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).

Table II-3.5: Size Gradations of Compost as Mulch Material

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

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.

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.

Table II-3.6: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	Quality Standards	Air-dried; free from undesirable seed and coarse material.
	Application Rates	2"-3" thick; 5 bales per 1,000 sf or 2-3 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 as 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 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 min.; approx. 100 tons per acre (approx. 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". 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 near wetlands or 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 average size is between 2- and 4- inches.
	Application Rates	2" thick min.;

Table II-3.6: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
	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 approx. 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 min.; approx. 100 tons per acre (approx. 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 min.
	Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and 1/2-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. [Specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

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 ways during high flows.

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 0.06 millimeters.
- 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

BMP C124: Sodding

Purpose

The purpose of sodding is to establish turf for immediate erosion protection and to stabilize drainage paths where concentrated overland flow will occur.

- PAM designated for these uses should be "water soluble" or "linear" or "non-crosslinked". Cross-linked or water absorbent PAM, polymerized in highly acidic (pH<2) conditions, are used to maintain soil moisture content.
- The PAM anionic charge density may vary from 2-30 percent; a value of 18 percent is typical. Studies conducted by the United States Department of Agriculture (USDA)/ARS demonstrated that soil stabilization was optimized by using very high molecular weight (12-15 mg/-mole), highly anionic (>20% hydrolysis) PAM.
- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a mixing rate of no more than 0.5-1 lb. per 1000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at an application rate of 3 – 5 lbs per acre, which can be too much. In addition, pump problems can occur at higher application rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM treated soil is left undisturbed, a reapplication may be necessary after two months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.
- PAM may affect the treatment efficiency of chitosan flocculent systems.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, or BMP C124: Sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.

- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

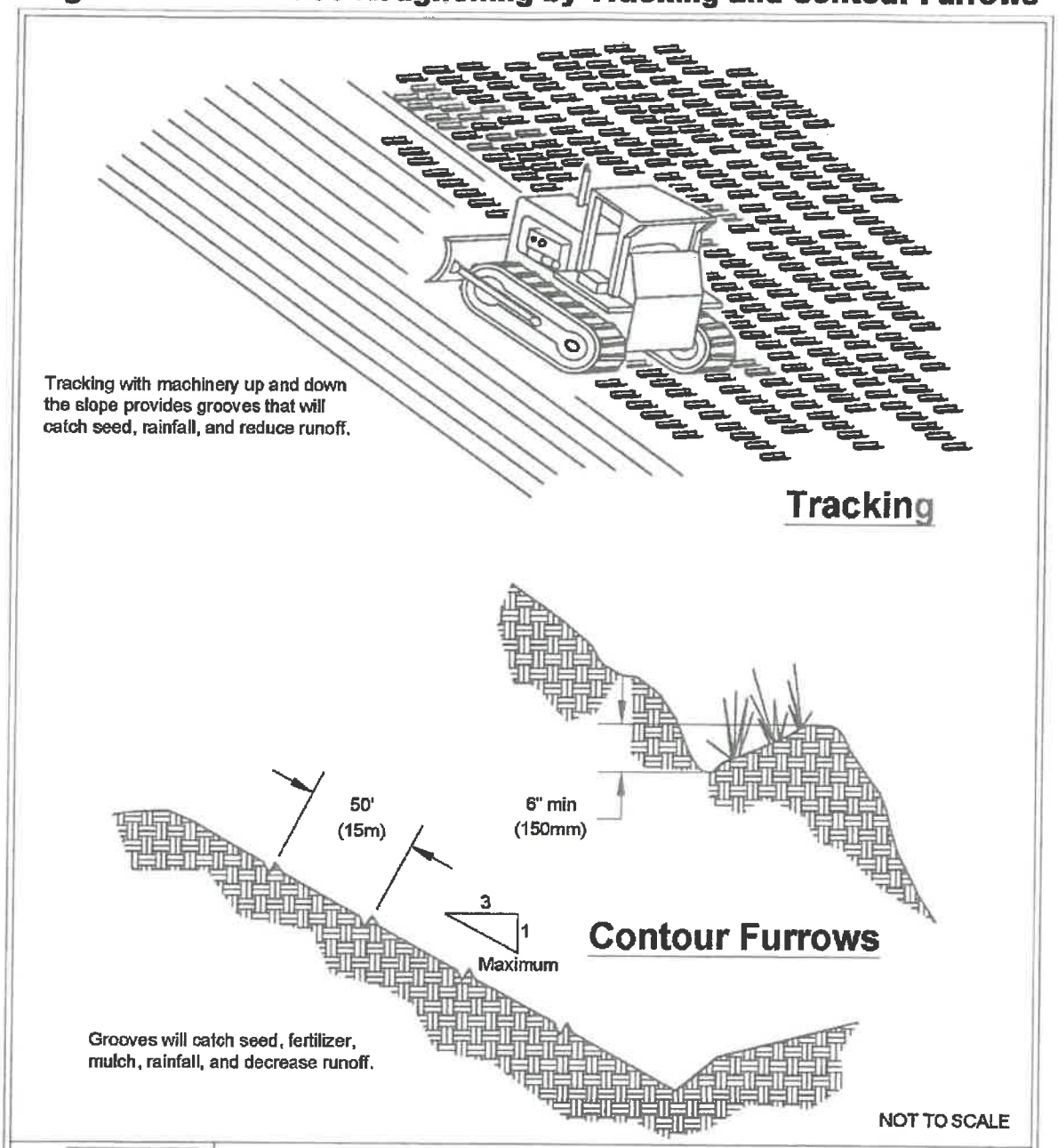
There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure II-3.5: Surface Roughening by Tracking and Contour Furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are surface roughened should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-roughened and re-seeded immediately.

Figure II-3.5: Surface Roughening by Tracking and Contour Furrows



BMP C131: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conveying it to a stable outlet at a non-erosive velocity.

Conditions of Use

Gradient terraces are normally limited to bare land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may only be used where suitable outlets are or will be made available.

Design and Installation Specifications

- The maximum vertical spacing of gradient terraces should be determined by the following method:

  $$VI = (0.8)s + y$$

  Where:

  VI = vertical interval in feet

  s = land rise per 100 feet, expressed in feet

  y = a soil and cover variable with values from 1.0 to 4.0

  Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1½ tons of straw/acre equivalent) is on the surface.

- The minimum constructed cross-section should meet the design dimensions.
- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.
- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length (0.6%). For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type.
- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover and energy dissipators should be used in the outlet channel.
- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design

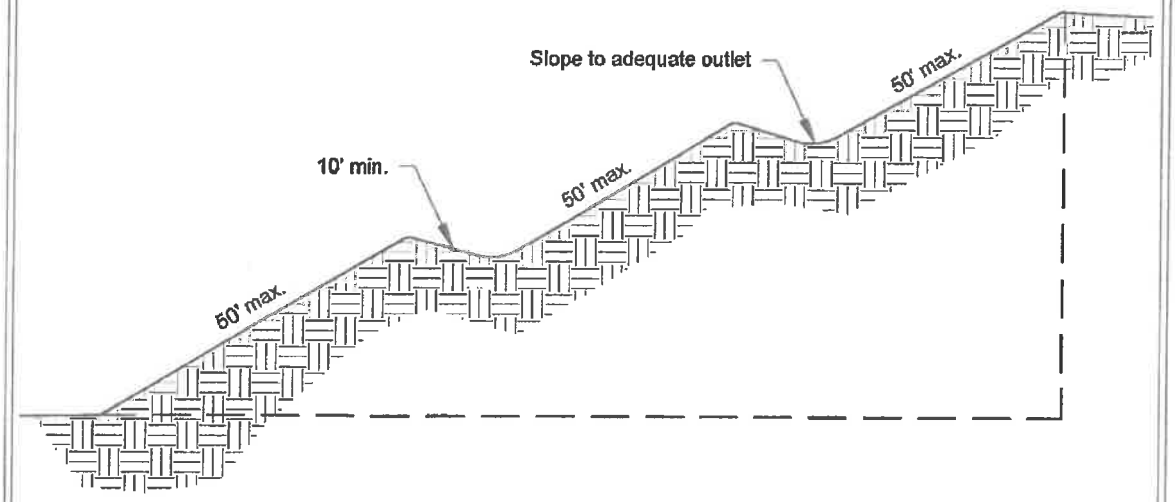
flow.

- Vertical spacing determined by the above methods may be increased as much as 0.5 feet or 10 percent, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet. The drainage area above the terrace should not exceed the area that would be drained by a terrace with normal spacing.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross-section should be proportioned to fit the land slope.
- The ridge height should include a reasonable settlement factor.
- The ridge should have a minimum top width of 3 feet at the design height.
- The minimum cross-sectional area of the terrace channel should be 8 square feet for land slopes of 5 percent or less, 7 square feet for slopes from 5 to 8 percent, and 6 square feet for slopes steeper than 8 percent. The terrace can be constructed wide enough to be maintained using a small vehicle.

Maintenance Standards

Maintenance should be performed as needed. Terraces should be inspected regularly; at least once per year, and after large storm events.

Figure II-3.6: Gradient Terraces



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State of Washington

Gradient Terraces

Revised June 2016

compliance with this BMP.

- 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-causing 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.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.
    - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.

- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
    - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to:

- 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 ground water 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 ground water 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

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-2.11 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-3.10: 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-3.10: 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 1-2 ft as measured from the crest of the inlet structure.
- Slope sides 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.

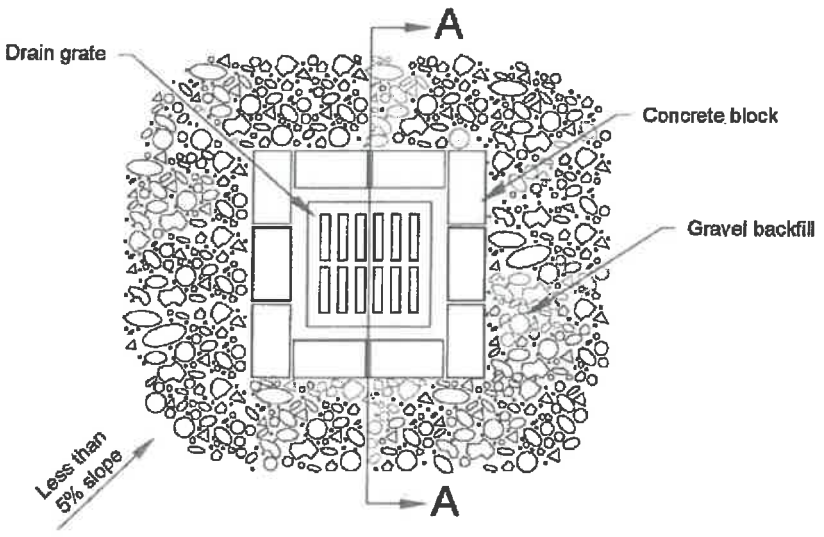
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent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

Block and Gravel Filter

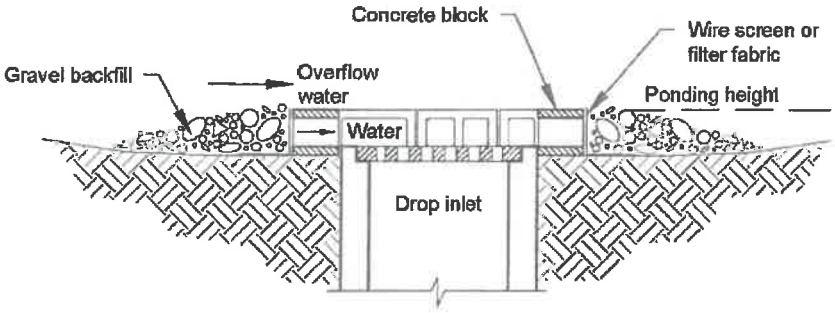
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-3.17: Block and Gravel Filter. Design and installation specifications for block gravel filters include:

- 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 ½-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 stone area between the gravel berm and the inlet.
    - Use stones 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel ½- to ¾-inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-3.17: 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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State of Washington

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 ½-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:

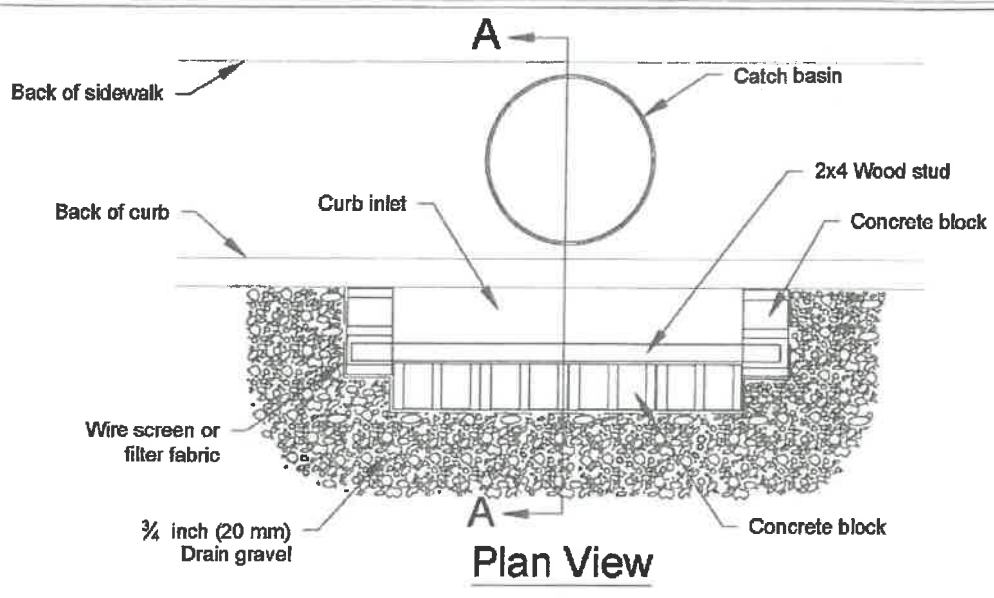
- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

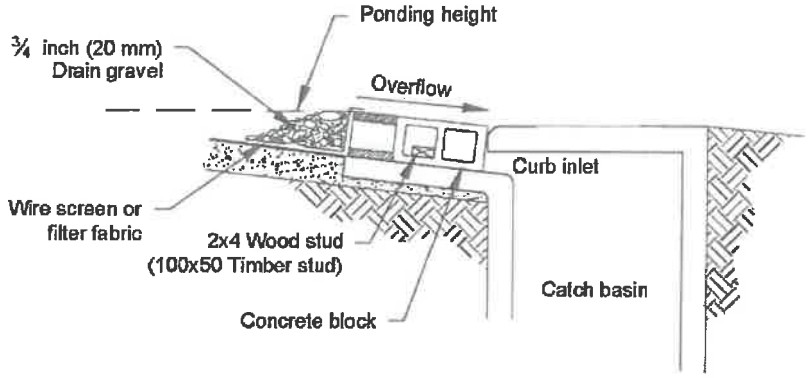
Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-3.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with ½-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-3.18: 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

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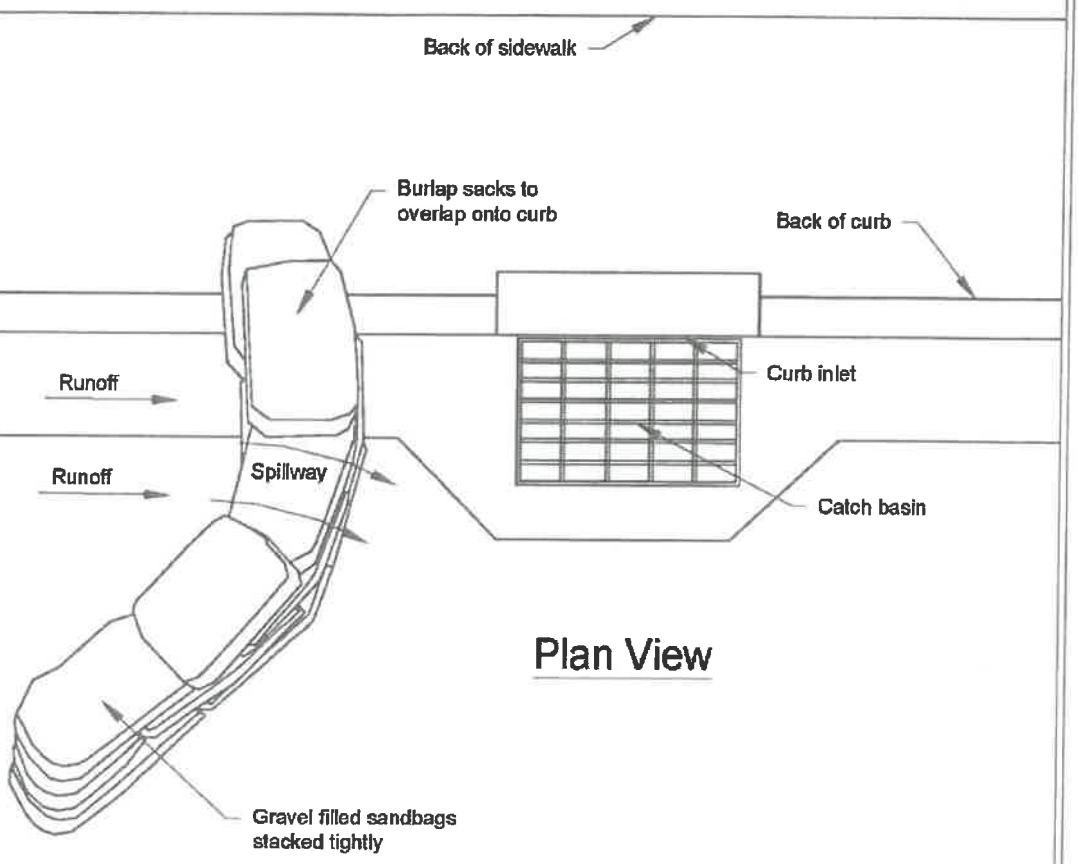
Curb and Gutter Sediment Barrier

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-3.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barrier 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-3.19: 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).
- Filter fabric (geotextile) may be anchored over the brush berm to enhance the filtration ability of the barrier. Ten-ounce burlap is an adequate alternative to filter fabric.

BMP C233: Silt Fence

Purpose

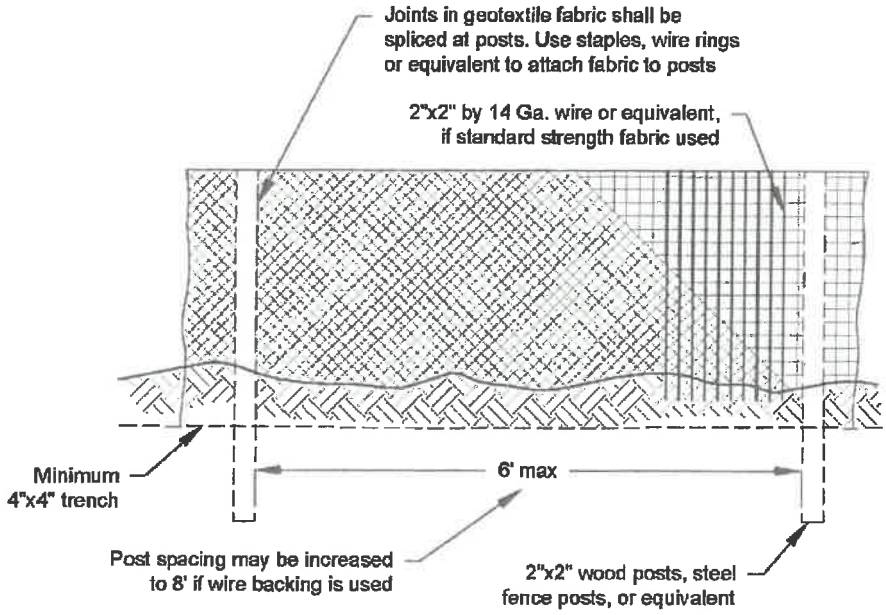
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

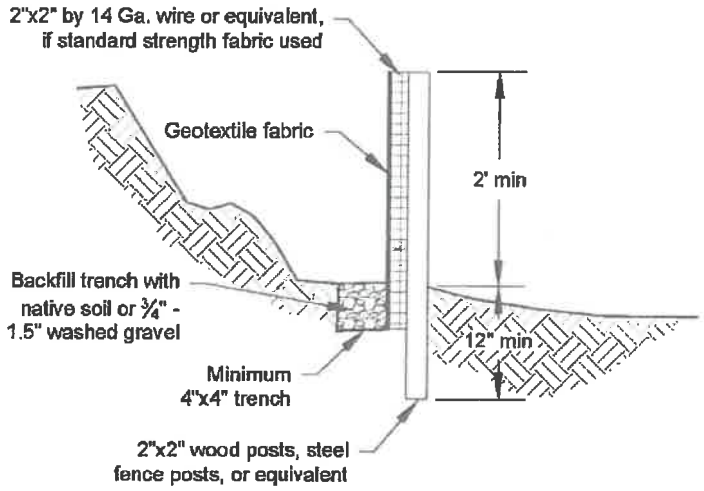
Conditions of Use

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-3.22: Silt Fence





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Silt Fence

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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-3.11: Geotextile Fabric Standards for Silt Fence):

Table II-3.11: 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 six months of expected usable construction life at a temperature range of 0°F to 120°F.
- One-hundred percent 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-3.22: 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-feet min. and a 2½-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 either:

    - 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.

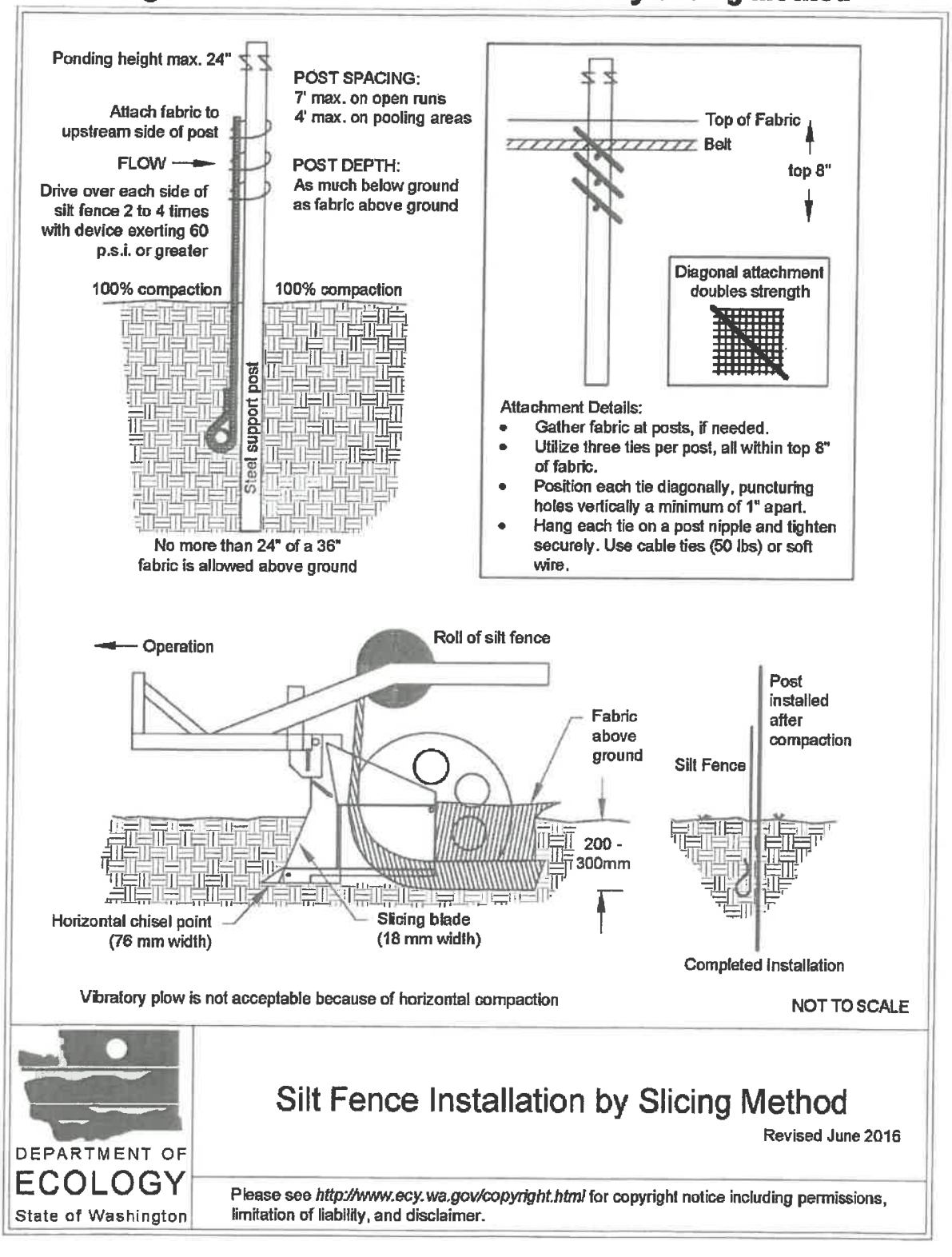
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

    - 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-3.23: 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-3.23: Silt Fence Installation by Slicing Method



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Silt Fence Installation by Slicing Method

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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-3.12: Contributing Drainage Area for Vegetated Strips):

Table II-3.12: Contributing Drainage Area for Vegetated Strips

Average Contributing Area Slope	Average Contributing Area Percent Slope	Max 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 of a 25-foot length along the flowpath. 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

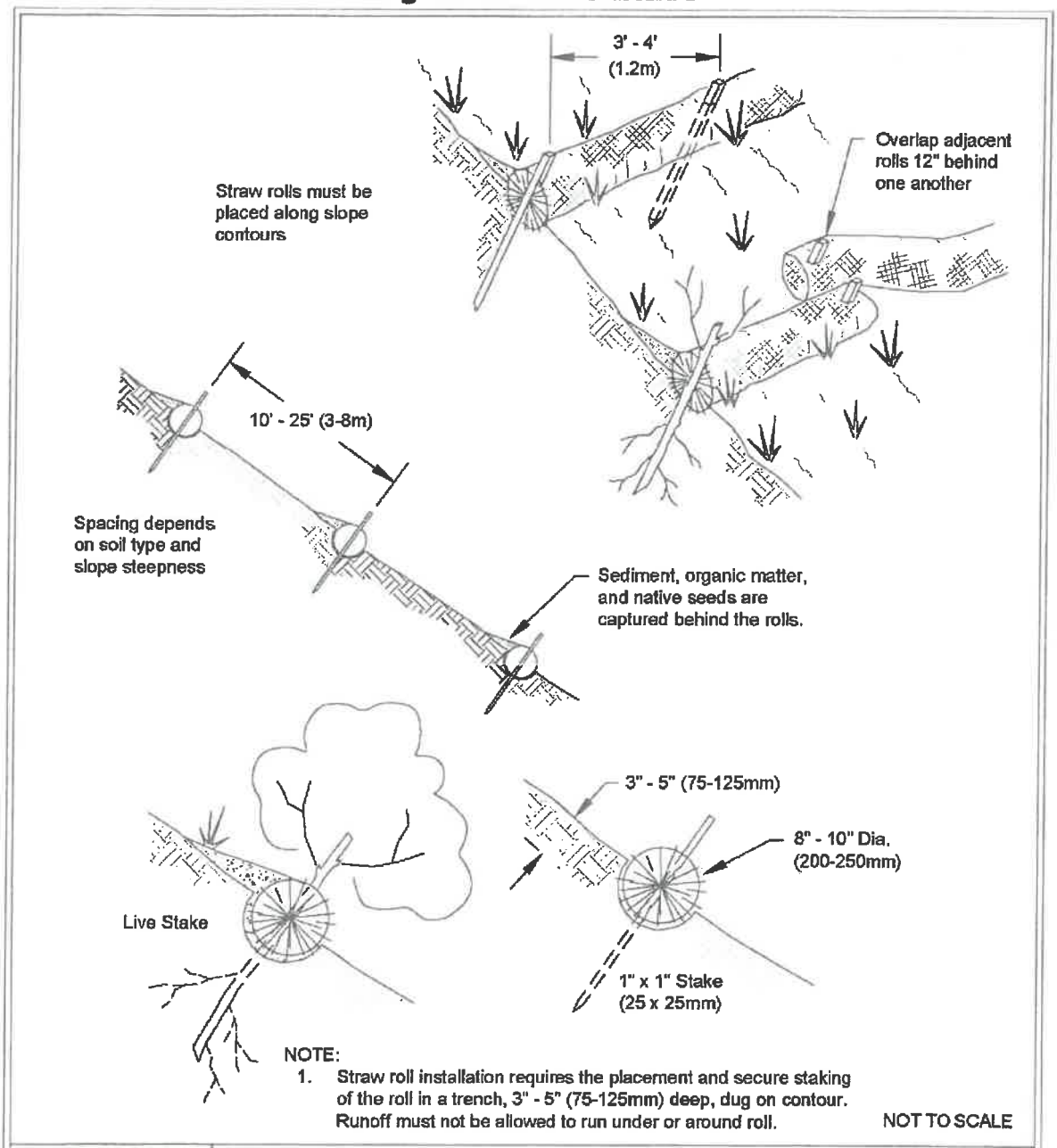
- Wattles shall consist of cylinders of plant material such as weed-free straw, coir, wood chips, excelsior, or wood fiber or shavings encased within netting made of natural plant fibers unaltered by synthetic materials.
- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - 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

- See Figure II-3.24: 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 min. 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-3.24: Wattles



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Wattles

Revised December 2016

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 five acres of disturbed soil use one acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, ground water table height, and other site conditions.
- Wetlands shall not be used for vegetative filtration.
- Do not use this BMP in areas with a high ground water table, or in areas that will have a high seasonal ground water 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.

V-11 Miscellaneous LID BMPs

V-11.1 Introduction to Miscellaneous LID BMPs

BMPs in this chapter have been grouped because they have the following in common:

- They employ Low Impact Development (LID) Principles
- They cannot be used to meet I-3.4.6 MR6: Runoff Treatment
- They cannot, by themselves, be used to meet the Flow Control Performance Standard or the LID Performance Standard.
    - Some of the BMPs in this chapter do allow for some amount of Flow Control credit. See the guidance for each individual BMP for details.
- The design methods for each BMP in this chapter are unique. They do not have strong enough design similarities to other BMPs in this volume to place them in the other BMP categories identified in this volume.

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

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to

meet this BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

Design Guidelines

Soil Retention

Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.
2. Mulch planting beds with 2 inches of organic material.
3. Use compost and other materials that meet the following organic content requirements:
    a. The organic content for "pre-approved" amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention, with the exception that the compost may have up to 35% biosolids or manure.

       The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.

       The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

    b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options

The soil quality design guidelines listed above can be met by using one of the methods listed below:

1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
2. Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on tests of the soil and amendment.
3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Local governments are encouraged to adopt guidelines and procedures similar to those recommended in *Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* (Stenn et al., 2016).

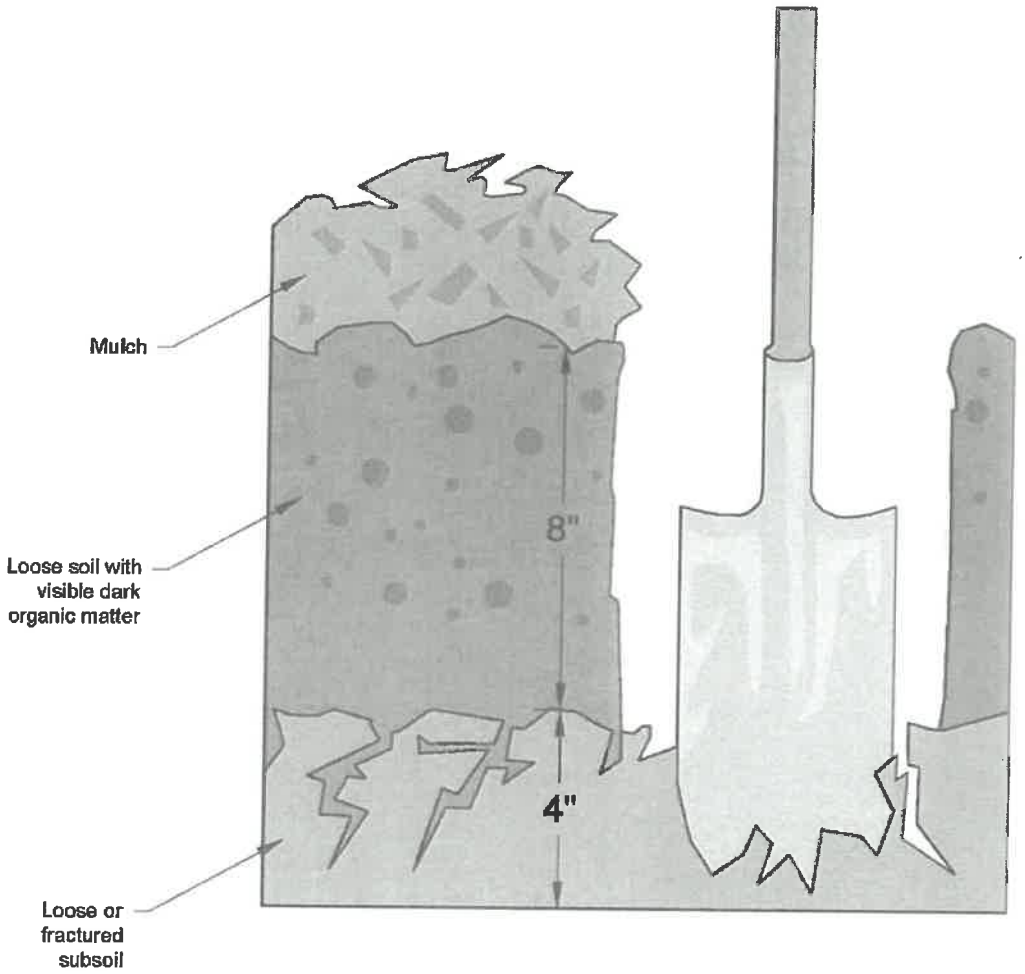
Maintenance

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant vegetation and mulch the amended soil area after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

Runoff Model Representation

All areas meeting the soil quality and depth design criteria may be entered into approved runoff models as "Pasture" rather than "Lawn/Landscaping".

Figure V-11.1: Planting Bed Cross-Section



Reprinted from *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington*, 2010, Washington Organic Recycling Council

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Planting Bed Cross-Section

Revised June 2016

Appendix E

CRITICAL AREA REPORT

TECHNICAL MEMORANDUM

THE WATERSHED COMPANY

Date:	October 21, 2020
To:	Subu Sankra Subramanan & Sellapriya Ramaiyah
From:	Ryan Kahlo, PWS, Senior Ecologist
Project Name:	Mercer Island Ramaiyah
Project Number:	200832

Subject: 7466 E. Mercer Way Critical Areas Evaluation

This memorandum describes the findings of a critical areas evaluation for the property located at 7466 E. Mercer Way (Parcel #2579500136) in the City of Mercer Island. A site inspection was conducted on September 11, 2020, to evaluate the jurisdictional status of the watercourse, which is mapped as a "piped watercourse" on the subject property by the City of Mercer Island. City GIS mapping (Mercer Island GIS Portal) also depicts and open channel, Type Np, segment of the same watercourse immediately downstream of the subject property on Parcel #3024059114. Additionally, the site was assessed for fish and wildlife habitat conservation areas, specifically related to a nearby bald eagle nest. This memorandum also includes a discussion of the regulatory implications of our findings.

Site Inspection

During the inspection, I evaluated the on-site watercourse characteristics and visually observed areas farther upstream to the extent feasible from publicly accessible areas. I have confirmed that a piped watercourse (Watercourse A) is located on the subject property (Figure 1). While Watercourse A conveys stormwater during rain events, it also conveys natural flows and is, therefore, regulated as a watercourse under Mercer Island City Code (MICC). Upstream and downstream segments of Watercourse A were flowing at the time of the inspection, which occurred during a prolonged dry period with no measurable rainfall.

Watercourse A originates from two tributaries located in wetlands approximately 600 feet northwest of the subject property on Parcel #2579500190. Watercourse A flows southeast towards the subject property alternating open channel and piped segments before being piped beneath E. Mercer Way and the access drive serving the subject and neighboring properties. As the watercourse is conveyed beneath E. Mercer Way, the flow is combined with untreated stormwater runoff from the road. Watercourse A is then piped in a southwestern direction at the base of a steep slope immediately west of

the subject residence before continuing southeast towards the southern property boundary. Watercourse A continues as a piped watercourse towards the southeast, eventually daylighting and flowing east along the southern property line on Parcel #3024059114, where it discharges into Lake Washington approximately 150 feet southeast of the subject property. I did not observe an open channel segment immediately south of the subject property as depicted on the City GIS map; the open channel begins immediately south of the primary residence on Parcel #3024059114 (Figure 1).

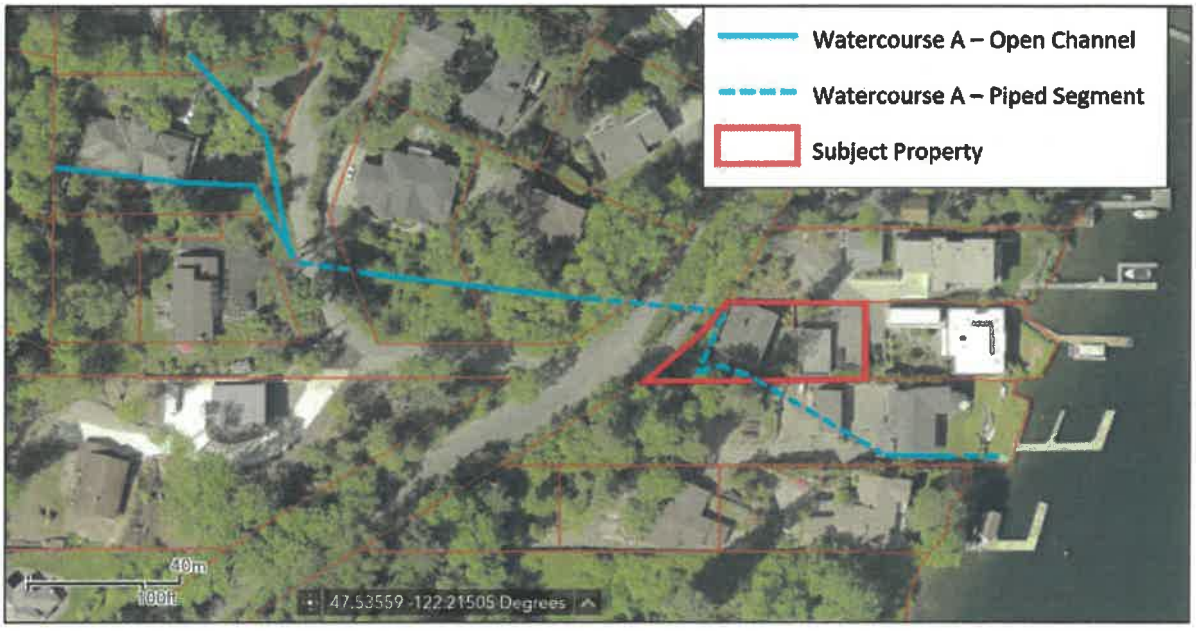

Figure 1. Approximate location of Watercourse A

Figure 2. Watercourse A on the subject property, facing southeast (9/11/20)

Figure 3. Location where open channel segment of Watercourse A is mapped south of subject property, facing southeast (10/16/20).

No wetlands or fish and wildlife habitat conservation areas were observed on-site or within the immediate vicinity. A bald eagle nest was verified in Clarke Beach Park approximately 325 feet southwest of the subject property. Bald eagle nests are classified as a fish and wildlife habitat conservation area under MICC. The nest, which is located on top of a western hemlock tree in relatively poor health, is visible from the subject property. The precise location was verified in the Park and recorded (Figure 4).

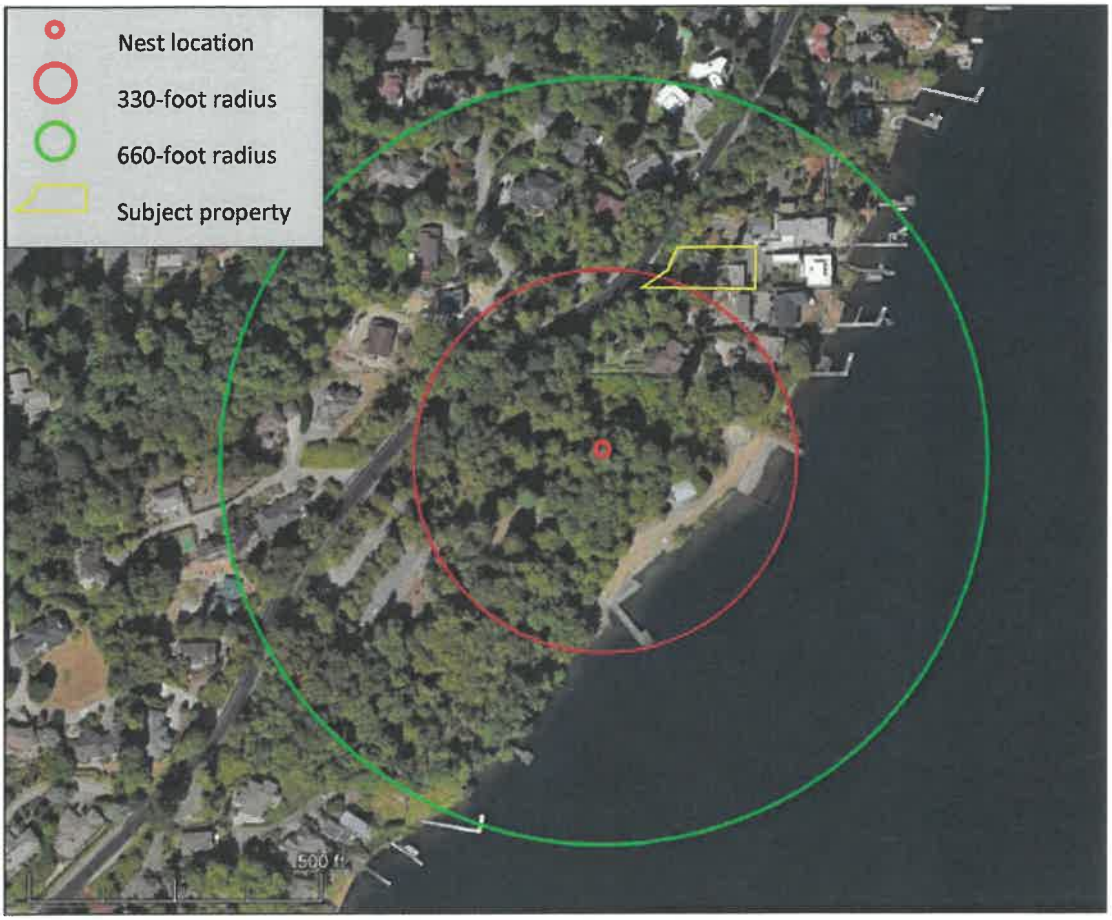

Figure 4. Bald eagle nest location relative to subject property.

Figure 5. Bald eagle nest viewed through spotting scope from subject property (10/16/20).

Regulations

Per MICC 19.07.180.C.6.b, piped watercourses require a 45-foot setback. Per MICC 19.07.180.C.6.c, piped watercourses setback widths shall be reduced to a 15-foot buffer when the portion of the piped watercourse on the applicant's property is daylighted and where the watercourse has been restored to an open channel, provided a restoration plan demonstrates:

i. The watercourse channel will be stable and is not expected to cause safety risks or environmental damage; and

ii. No additional impact nor encumbrance by watercourse buffer or critical area setback is added to properties neighboring the applicant(s) property.

Per MICC 19.07.180.C.6.d, piped watercourse setback widths shall be reduced to 10 feet on lots with a lot width of 50 feet or more, when daylighting is determined by qualified professional(s) to result in one or more of the following outcomes:

i. Increased risk of landslide or other potential hazard that cannot be mitigated;

ii. Increased risk of environmental damage (e.g., erosion, diminished water quality) that cannot be mitigated;

iii. The inability of a legally established existing lot to meet the vehicular access requirements of this title; or

iv. The inability of a legally established existing lot to meet the building pad standards in MICC 19.09.090.

The piped segment of Watercourse A is located beneath the canopy of and within the critical root zone of an old-growth California redwood tree (*Sequoia sempervirens*) on the adjacent property to the south (Parcel #3024059114) (Figure 6). Based on visual estimates from the subject property, the redwood tree has a diameter at breast height of greater than 60 inches. Daylighting Watercourse A would necessitate the removal of this tree. The City prioritizes the retention of exceptional trees, and a redwood tree of this size and age is generally irreplaceable. The removal of the tree would represent an unnecessary risk of environmental damage due to the irreplaceable loss of habitat, soil stability, and evapotranspiration functions provided by this rare, old-growth tree, which conflicts with the requirements of MICC 19.07.180.C.6.d.ii. The environmental benefit of daylighting this short watercourse segment would not compensate for the loss of this tree, and it is not possible to completely mitigate the loss of this tree. Additionally, the redwood tree is not located on the subject property, meaning its removal would cause an additional impact on a neighboring property, which is in conflict with the requirements of MICC 19.07.180.C.6.c.ii. Daylighting Watercouse A would also create a watercourse buffer on the adjacent property where none currently exists, which conflicts with the same provision.

Figure 6. Watercourse A with old-growth redwood tree in background, facing southeast (9/11/20)

The portion of Watercourse A located immediately adjacent and upslope of the existing residence is at the base of a steep slope and retaining wall. It seems likely that creating an open channel in this location could risk slope stability and structural stability of the residence. The Watershed Company does not provide geotechnical analysis, but it is our understanding that a geotechnical engineer will assess the associated risk of this potential action.

Based on the environmental damage resulting from the removal of an old-growth redwood tree, both on the subject property and the adjacent property, as well as the additional buffer encumbrance daylighting Watercourse A would create on the neighboring property, it is our opinion that daylighting Watercourse A is not feasible or environmentally beneficial at this location. Therefore, in accordance with MICC 19.07.180.C.6.d, a 10-foot setback should be required for Watercourse A.

The following may be allowed in the critical area setback (MICC 19.07.180.C.8):

a. Landscaping;

b. Uncovered decks less than 30 inches above existing or finished grade, whichever is lower;

c. Building overhangs if such overhangs do not extend more than 18 inches into the setback area;

d. Hardscape and driveways; provided, that such improvements may be subject to requirements in Chapter 15.09 MICC, Storm Water Master Program;

e. Split-rail fences;

f. Trails, consistent with the requirements of this chapter; and

g. Subgrade components of foundations; provided, that any temporary impacts to building setbacks shall be restored to their previous condition or better.

Under MICC 19.07.170.A.3, *"Areas used by bald eagles for foraging nesting and roosting, or within 660 feet of a bald eagle nest"* are regulated as a fish and wildlife conservation area. A bald eagle nest has been verified within 660 feet of the subject property. The general review requirements under 19.07.170.B.1 include the following:

a. *Identification of the species referenced in subsection A of this section that has a primary association with the habitat on or in the vicinity of the site;*

   A bald eagle (*Haliaeetus leucocephalus*) nest has been confirmed approximately 325 feet southwest of the subject property and approximately 350 southwest of the existing residence. Active use of the nest was not confirmed during the October 16, 2020, site inspection, and no eagles were observed. However, the site

inspection did not coincide with the nesting season, and eagles may return to nests after several years of inactivity.

b. *Extent of wildlife habitat areas, including acreage, and required buffers based on the species;*

Federal bald eagle management guidelines recommend 330-foot and 660-foot projection areas for bald eagles, depending upon the scope of the proposed project and the existing conditions surrounding the nest. MICC stipulates that all areas within 660 feet of a bald eagle nest are regulated as fish and wildlife habitat conservation areas.

c. *Vegetative, faunal, and hydrologic conditions;*

The nest is located near the top of a western hemlock tree in Clarke Beach Park. The area immediately surrounding the nest, within the park, is well vegetated, native forest dominated by Douglas-fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*) trees. Beyond the park, the landscape is single-family residential interspersed with individual mature redwood, Douglas-fir, and western red cedar (*Thuja plicata*) trees. Any of the taller trees in the area could be used for perching and foraging.

d. *Evaluation of direct and indirect potential impacts on habitat provided by the project, including impacts to water quality;*

The proposed project is to demolish and reconstruct an existing single-family residence. There are no trees on the property that could be used for nesting, perching, or foraging. The closest large tree to the subject property is the aforementioned mature redwood immediately south of the property. The only potential risk to this tree, which could be used for perching/foraging, would be if Watercourse A is daylighted. By not daylighting Watercourse A, the tree will be preserved. Therefore, the project will have no direct impacts on bald eagle habitat. Indirect impacts are limited to visual and auditory disturbances during construction activities. Indirect impacts are expected to be minor, since any nesting birds in this location are already tolerant of residential land uses. Significant noise disturbances during the egg-laying/incubation period could lead to nest abandonment, although this risk is reduced near or after hatching, or nest flushing that could leave unattended eggs, resulting in loss of moisture and

cooling of the eggs. Noise and visual impacts, when occurring after the incubation periods, could lead to flushing and potentially missed feedings.

e. *A discussion of any federal, state, or local special management recommendations, including Washington State Department of Fish and Wildlife habitat management recommendations that have been developed for the species or habitats; and*

Bald eagles are no longer considered a priority species by Washington Department of Fish and Wildlife (WDFW). As such, WDFW does not maintain its previous management recommendations and, instead, directs individuals to the federal management recommendations from the U.S. Fish and Wildlife Service (USFWS). For building construction, one or two story, with a project footprint of ½-acre or less, and if the activity will be visible from the nest, USFWS recommends 660 feet, or as close as existing tolerated activity of similar scope; landscape buffers are recommended. For temporary noise-generating uses, such as use of heavy machinery, USFWS recommends limiting these activities to outside of the breeding season.

Single-family residential land uses occur within approximately 200 feet of the eagle nest, and proposed construction activities will be approximately 350 feet from the nest. It is not possible to construct the new residence farther from the nest given the location of the lot. The nest-building and egg-laying/incubation periods are the most sensitive periods for bald eagles. In the Pacific region, these activities generally occur from January through April. Temporary noise-generating activities, such as loud machinery, can be conducted outside of these times without causing disturbance.

f. *A discussion of avoidance, minimization, and mitigation of impacts pursuant to MICC 19.07.100.*

The construction of a new single-family residence on the subject property will avoid all direct impacts to bald eagle habitat. Indirect effects, including visual and auditory disturbance, will be minor. By adhering to the timing restrictions identified by USFWS, when nests are at their most vulnerable (January through April), the project will minimize potential adverse effects to nesting bald eagles.

The information contained in this memorandum is based on the application of technical guidelines currently accepted as the best available science. All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available to us at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, State and Federal regulatory authorities. No other warranty, expressed or implied, is made.

Appendix F

CAO DECISION

CITY OF MERCER ISLAND

COMMUNITY PLANNING & DEVELOPMENT
9611 SE 36TH STREET | MERCER ISLAND, WA 98040
PHONE: 206.275.7605 | www.mercerisland.gov

DECISION

CRITICAL AREA REVIEW 2 CAO20-003

Project No:	CAO20-003
Description:	Request to reduce piped watercourse setback from 45 feet to 10 feet pursuant to MICC 19.07.180(C)(6)(d) to accommodate future construction of a single-family home.
Applicant/ Owner:	Johan Luchsinger (Baylis Architects) / Sellapriya Ramaiyah & Subu Sankara Subramanian
Site Address:	7466 E Mercer Way / Mercer Island WA 98040
Zoning District	R-8.4
Staff Contact:	Robin Proebsting, Senior Planner
Exhibits:	1. Development Application signed October 25, 2020 2. Critical Area Study prepared by The Watershed Company, dated October 21, 2020 3. Letter prepared by Ages Engineering, LLC dated October 7, 2020 4. Site plan prepared by Baylis Architects, dated October 26, 2020 5. Memorandum prepared by ESA, dated January 15, 2021

INTRODUCTION

I. Project Description

The applicant has applied for a Critical Area Review 2 to reduce the 45-foot piped watercourse setback on the subject property to 10 feet in order to accommodate a planned single-family home (Exhibit 4).

II. Site Description and Context

The subject site is currently developed with a one-story single-family home and is within the R-8.4 zone. It is bound by E Mercer Way to the east and surrounded by single-family homes on all sides. The subject site contains mapped landslide, erosion, and seismic hazard areas, as well as portions of a dripline of a large (approx. 60 in diameter at breast height (DBH)) Redwood tree on a neighboring property.

The existing piped watercourse is conveyed under E Mercer Way to the subject property, then flows toward the southern property line of the subject property to the property to the south, where it daylights briefly south of the house on the property to the south (7618 E Mercer Way).

Findings of Fact & Conclusions of Law

III. Application Procedure

1. The application for a Critical Area Review 2 was received by the City of Mercer Island on October 27, 2020. The application was determined to be complete on November 24, 2020.

2. According to MICC 19.15.030, Table A, applications for Critical Area Review 2 must undergo Type III review. Type III reviews require notice of application (discussed below). A notice of decision is issued once the project review is complete.

3. A notice of application was issued on February 16, 2021, and the public comment period ran from February 16, 2021 to March 18, 2021. Public notice was issued via a mailing to neighboring property owners within 300 feet of the subject site, a sign posted on the subject property, and a posting in the City's weekly permit bulletin.

4. No public comment was received.

IV. SEPA finding of fact and conclusions

5. The proposal is exempt from SEPA Review pursuant to WAC 197-11-800(1)

V. Consistently with the Critical Areas Code

6. MICC 19.07.180(C)(6)(d) Piped watercourse setback widths shall be reduced to: (i) 10 feet on lots with a lot width of 50 feet or more, and (ii) five feet on lots with a width of less than 50 feet, when daylighting is determined by qualified professional(s) to result in one or more of the following outcomes:[...] ii. Increased risk of environmental damage (e.g., erosion, diminished water quality) that cannot be mitigated;

   Staff Analysis: The piped watercourse is within the canopy and critical root zone of the neighboring property's Redwood tree. The Redwood tree has a DBH of 60 inches and would be considered exceptional as defined in MICC 19.16.010. As an exceptional tree, the Redwood would need to be retained under MICC 19.10.060(A)(3). The applicant's critical area study notes that daylighting the piped watercourse within the subject property would necessitate the removal of the Redwood tree, causing an environmental impact—in the form of a loss of habitat, soil stabilization, evapotranspiration functions—that could not be mitigated (Exhibit 2). Daylighting the watercourse would also increase the risk of erosion and site instability, according to the project geotechnical engineer (Exhibit 3). The City's third-party reviewer agreed that a 10-foot setback from the piped watercourse is appropriate (Exhibit 5).

CONDITIONS OF APPROVAL

1. The project proposal shall be in substantial conformance with Exhibit 4 and all applicable development standards contained within Mercer Island City Code (MICC) Chapter 19.07.

2. The applicant is responsible for documenting any required changes in the project proposal due to conditions imposed by any applicable local, state and federal government agencies.

3. Construction or substantial progress toward construction of a development for which a permit has been granted must be undertaken within three years after the approval of the permit or the permit shall terminate. The code official shall determine if substantial progress has been made.

DEVELOPMENT REGULATION COMPLIANCE – DISCLOSURE

1. Compliance with all applicable codes, including but not limited to zoning, critical areas (including Fish & Wildlife Habitat Conservation Areas), and building code, will be required as part of building permit review.

DECISION / RECOMMENDATION

Based upon the above noted Findings of Fact and Conclusions of Law, Critical Area Review 2 application CAO20-003, as depicted in Exhibit 4, is hereby **APPROVED**. This decision is final, unless appealed in writing consistent with adopted appeal procedures, MICC 19.15.020(J), and all other applicable appeal regulations.

Approved this 22nd day of March, 2021

Robin Proebsting
Senior Planner
Community Planning & Development
City of Mercer Island

If you desire to file an appeal, you must submit the appropriate form, available from the department of Community Planning and Development, and file it with the City Clerk within fourteen (14) days from the date after the notice of decision is made available to the public and applicant pursuant to MICC 19.15.130. Upon receipt of a timely complete appeal application and appeal fee, an appeal hearing will be scheduled. To reverse, modify or remand this decision, the appeal hearing body must find that there has been substantial error, the proceedings were materially affected by irregularities in procedure, the decision was unsupported by material and substantial evidence in view of the entire record, or the decision is in conflict with the city's applicable decision criteria.

Please note that the City will provide notice of this decision to the King County Department of Assessment, as required by State Law (RCW 36.70B.130). Pursuant to RCW 84.41.030(1), affected property owners may request a change in valuation for property tax purposes notwithstanding any program of revaluation by contacting the King County Department of Assessment at (206) 296-7300.

CITY OF MERCER ISLAND

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CITY USE ONLY		
PROJECT#	RECEIPT #	Exhibit 1
Date Received:		
Received By:		

DEVELOPMENT APPLICATION

STREET ADDRESS/LOCATION	ZONE
7466 East Mercer Way Mercer Island, WA 98040	R-8.4
COUNTY ASSESSOR PARCEL #'S	**PARCEL SIZE (SQ. FT.)**
257950-0136	10,150

PROPERTY OWNER *(required)*	ADDRESS *(required)*	CELL/OFFICE *(required)*
Sellapriya Ramaiyah Subu Sankara Subramanian	7466 East Mercer Way Mercer Island, WA 98040	860.990.7528 E-MAIL *(required)* sellapriya@yahoo.com
PROJECT CONTACT NAME	**ADDRESS**	**CELL/OFFICE**
Johan Luchsinger	10801 Main St Ste 110, Bellevue, WA 98004	425.454.0566 E-MAIL luchsinger@baylisarchitects.com
TENANT NAME	**ADDRESS**	**CELL PHONE**
NA	NA	E-MAIL

DECLARATION: I HEREBY STATE THAT I AM THE OWNER OF THE SUBJECT PROPERTY OR I HAVE BEEN AUTHORIZED BY THE OWNER(S) OF THE SUBJECT PROPERTY TO REPRESENT THIS APPLICATION, AND THAT THE INFORMATION FURNISHED BY ME IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

SIGNATURE

10/25/2020
DATE

PROPOSED APPLICATION(S) AND CLEAR DESCRIPTION OF PROPOSAL (PLEASE USE ADDITIONAL PAPER IF NEEDED):

ATTACH RESPONSE TO DECISION CRITERIA IF APPLICABLE

CHECK TYPE OF LAND USE APPROVAL REQUESTED:

APPEALS	DEVIATIONS	SUBDIVISION SHORT PLAT
☐ Building	☐ Changes to Antenna requirements	☐ Short Plat- Two Lots
☐ Code Interpretation	☐ Changes to Open Space	☐ Short Plat- Three Lots
☐ Land use	☐ Seasonal Development Limitation Waiver	☐ Short Plat- Four Lots
☐ Right-of-Way Use		☐ Short Plat- Deviation of Acreage Limitation
CRITICAL AREAS	**ENVIRONMENTAL REVIEW (SEPA)**	☐ Short Plat- Amendment
☐ Critical Area Review 1 (Hourly Rate 2hr Min)	☐ SEPA Review (checklist)- Minor	☐ Short Plat- Final Plat
■ Critical Area Review 2 (Determination)	☐ SEPA review (checklist)- Major	**OTHER LAND USE**
☐Reasonable Use Exception	☐ Environmental Impact Statement	☐ Accessory Dwelling Unit
DESIGN REVIEW	**SHORELINE MANAGEMENT**	☐ Code Interpretation Request
☐ Pre Design Meeting	☐ Exemption	☐ Comprehensive Plan Amendment (CPA)
☐ Design Review (Code Official)	☐ Permit Revision	☐ Conditional Use (CUP)
☐ Design Commission Study Session	☐ Shoreline Variance	☐ Lot Line Revision
☐ Design Review- Design Commission- Exterior Alteration	☐ Shoreline Conditional Use Permit	☐ Noise Exception
☐ Design Review- Design Commission- New Building	☐ Substantial Development Permit	☐ Reclassification of Property (Rezoning)
WIRELESS COMMUNICATION FACILITIES	**SUBDIVISION LONG PLAT**	☐ Transportation Concurrency (see supplemental application form)
☐ Wireless Communications Facilities- 6409 Exemption	☐ Long Plat- Preliminary	☐ Planning Services (not associated with a permit or review)
☐ New Wireless Communication Facility	☐ Long Plat- Alteration	☐ Zoning Code Text Amendment
	☐ Long Plat- Final Plat	☐ Request for letter
	VARIANCES (Plus Hearing Examiner Fee)	☐ Temporary Commerce on Public Property
	☐ Variance	

TECHNICAL MEMORANDUM

THE WATERSHED COMPANY

Date:	October 21, 2020
To:	Subu Sankra Subramanan & Sellapriya Ramaiyah
From:	Ryan Kahlo, PWS, Senior Ecologist
Project Name:	Mercer Island Ramaiyah
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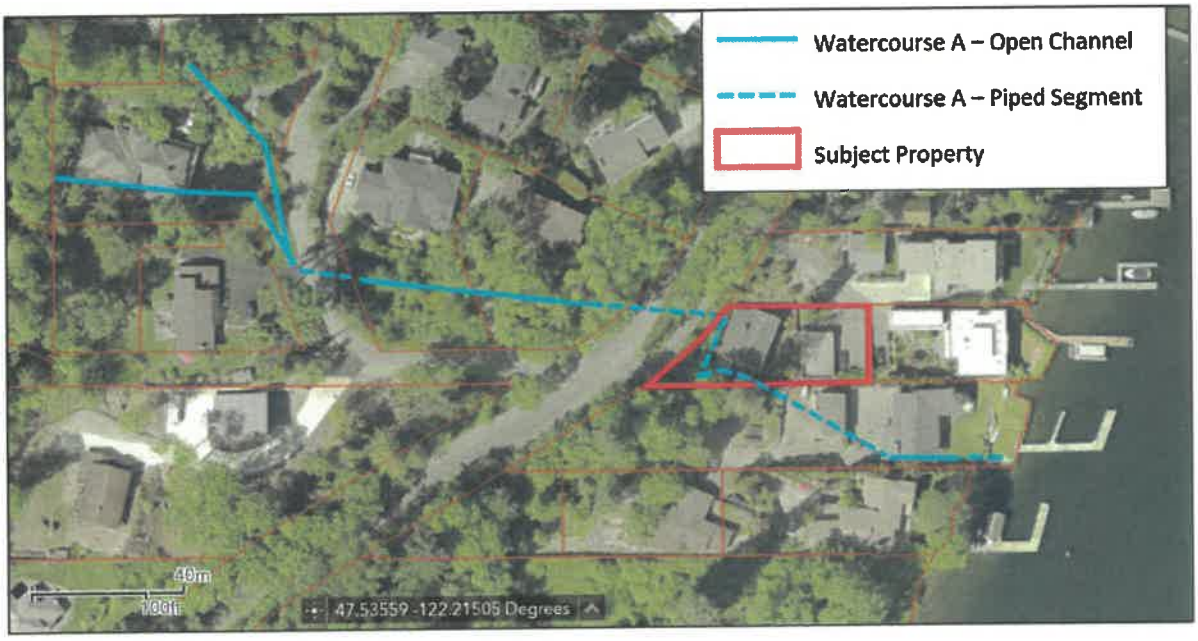

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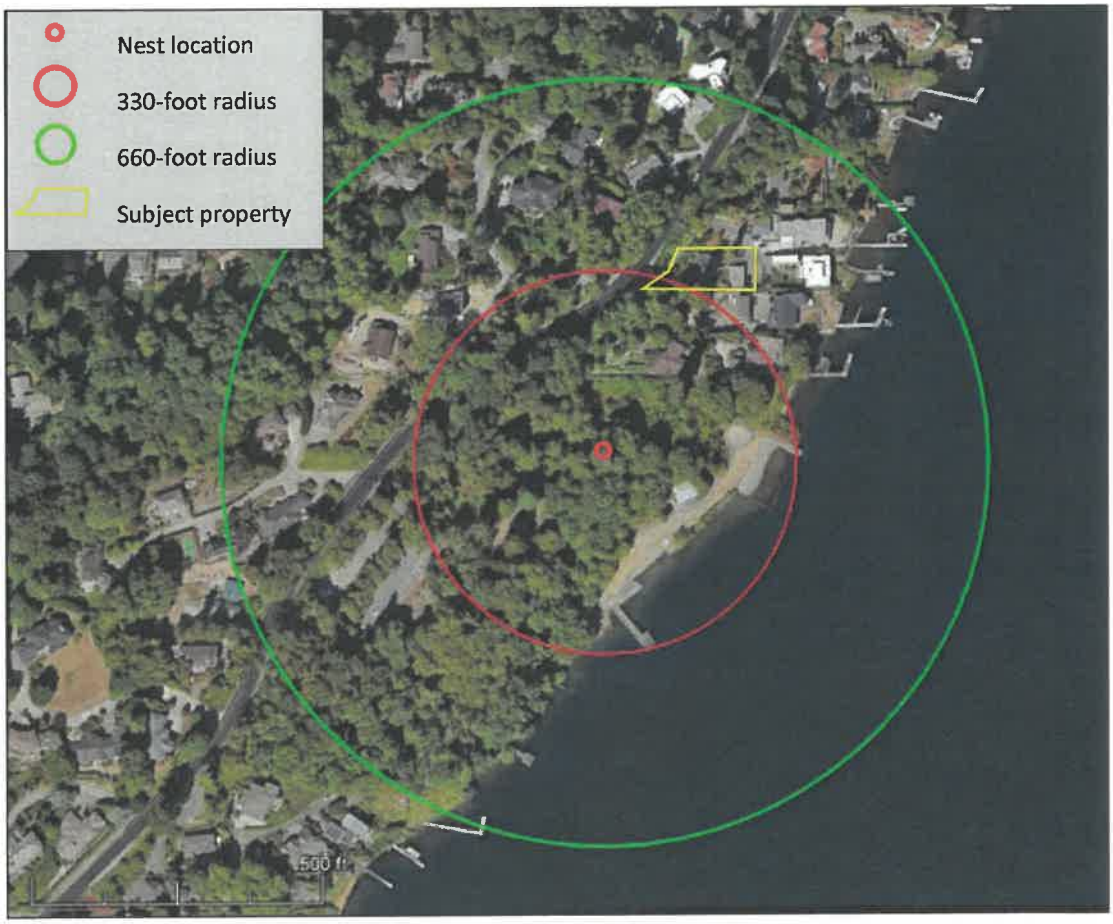

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g. Subgrade components of foundations; provided, that any temporary impacts to building setbacks shall be restored to their previous condition or better.

Under MICC 19.07.170.A.3, *"Areas used by bald eagles for foraging nesting and roosting, or within 660 feet of a bald eagle nest"* are regulated as a fish and wildlife conservation area. A bald eagle nest has been verified within 660 feet of the subject property. The general review requirements under 19.07.170.B.1 include the following:

a. *Identification of the species referenced in subsection A of this section that has a primary association with the habitat on or in the vicinity of the site;*

   A bald eagle (*Haliaeetus leucocephalus*) nest has been confirmed approximately 325 feet southwest of the subject property and approximately 350 southwest of the existing residence. Active use of the nest was not confirmed during the October 16, 2020, site inspection, and no eagles were observed. However, the site

inspection did not coincide with the nesting season, and eagles may return to nests after several years of inactivity.

b. *Extent of wildlife habitat areas, including acreage, and required buffers based on the species;*

Federal bald eagle management guidelines recommend 330-foot and 660-foot projection areas for bald eagles, depending upon the scope of the proposed project and the existing conditions surrounding the nest. MICC stipulates that all areas within 660 feet of a bald eagle nest are regulated as fish and wildlife habitat conservation areas.

c. *Vegetative, faunal, and hydrologic conditions;*

The nest is located near the top of a western hemlock tree in Clarke Beach Park. The area immediately surrounding the nest, within the park, is well vegetated, native forest dominated by Douglas-fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*) trees. Beyond the park, the landscape is single-family residential interspersed with individual mature redwood, Douglas-fir, and western red cedar (*Thuja plicata*) trees. Any of the taller trees in the area could be used for perching and foraging.

d. *Evaluation of direct and indirect potential impacts on habitat provided by the project, including impacts to water quality;*

The proposed project is to demolish and reconstruct an existing single-family residence. There are no trees on the property that could be used for nesting, perching, or foraging. The closest large tree to the subject property is the aforementioned mature redwood immediately south of the property. The only potential risk to this tree, which could be used for perching/foraging, would be if Watercourse A is daylighted. By not daylighting Watercourse A, the tree will be preserved. Therefore, the project will have no direct impacts on bald eagle habitat. Indirect impacts are limited to visual and auditory disturbances during construction activities. Indirect impacts are expected to be minor, since any nesting birds in this location are already tolerant of residential land uses. Significant noise disturbances during the egg-laying/incubation period could lead to nest abandonment, although this risk is reduced near or after hatching, or nest flushing that could leave unattended eggs, resulting in loss of moisture and

cooling of the eggs. Noise and visual impacts, when occurring after the incubation periods, could lead to flushing and potentially missed feedings.

e. *A discussion of any federal, state, or local special management recommendations, including Washington State Department of Fish and Wildlife habitat management recommendations that have been developed for the species or habitats; and*

Bald eagles are no longer considered a priority species by Washington Department of Fish and Wildlife (WDFW). As such, WDFW does not maintain its previous management recommendations and, instead, directs individuals to the federal management recommendations from the U.S. Fish and Wildlife Service (USFWS). For building construction, one or two story, with a project footprint of ½-acre or less, and if the activity will be visible from the nest, USFWS recommends 660 feet, or as close as existing tolerated activity of similar scope; landscape buffers are recommended. For temporary noise-generating uses, such as use of heavy machinery, USFWS recommends limiting these activities to outside of the breeding season.

Single-family residential land uses occur within approximately 200 feet of the eagle nest, and proposed construction activities will be approximately 350 feet from the nest. It is not possible to construct the new residence farther from the nest given the location of the lot. The nest-building and egg-laying/incubation periods are the most sensitive periods for bald eagles. In the Pacific region, these activities generally occur from January through April. Temporary noise-generating activities, such as loud machinery, can be conducted outside of these times without causing disturbance.

f. *A discussion of avoidance, minimization, and mitigation of impacts pursuant to MICC 19.07.100.*

The construction of a new single-family residence on the subject property will avoid all direct impacts to bald eagle habitat. Indirect effects, including visual and auditory disturbance, will be minor. By adhering to the timing restrictions identified by USFWS, when nests are at their most vulnerable (January through April), the project will minimize potential adverse effects to nesting bald eagles.

The information contained in this memorandum is based on the application of technical guidelines currently accepted as the best available science. All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available to us at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, State and Federal regulatory authorities. No other warranty, expressed or implied, is made.

Exhibit 3

Ages Engineering, LLC

A Geotechnical & Environmental Services LLC

P.O. Box 935
Puyallup, WA. 98371

Main (253) 845-7000
www.agesengineering.com

October 7, 2020
Project No. A-1562

Sella Ramaiyah
7466 E. Mercer Way
Mercer Island, WA. 98040

Subject: Watercourse Evaluation
Ramaiyah Residence
7466 E. Mercer Way
Mercer Island, Washington
PN: 2579500136

Reference: Preliminary Geotechnical Report, Ramaiyah Residence, Prepared by Ages Engineering, LLC, dated July 10, 2020

Dear Ms. Ramaiyah,

As requested, we are providing additional information for the subject site. Based on our discussion with you, we understand the City of Mercer Island is considering returning the existing watercourse on the site to an overland flow. Currently, the water course flows to the approximate middle of the site where the existing building wall is located. The surface water becomes groundwater that flows around the building walls and the site retaining wall to the center of the south side of the house where it crops out onto the ground surface and is immediately collected in a catchbasin and conveyed off site. We have been requested to evaluate the plan and provide recommendations for maintaining site stability.

Based on our evaluation, it is our opinion the watercourse should not be returned to an overland flow. The potential risk for site erosion to increase and for site stability to decrease is very high. The watercourse should remain in a closed conduit across the subject site.

◆ ◆ ◆

We trust this information is sufficient for your current needs. If you have any questions, or require additional information, please call.

Respectfully Submitted,
Ages Engineering, LLC

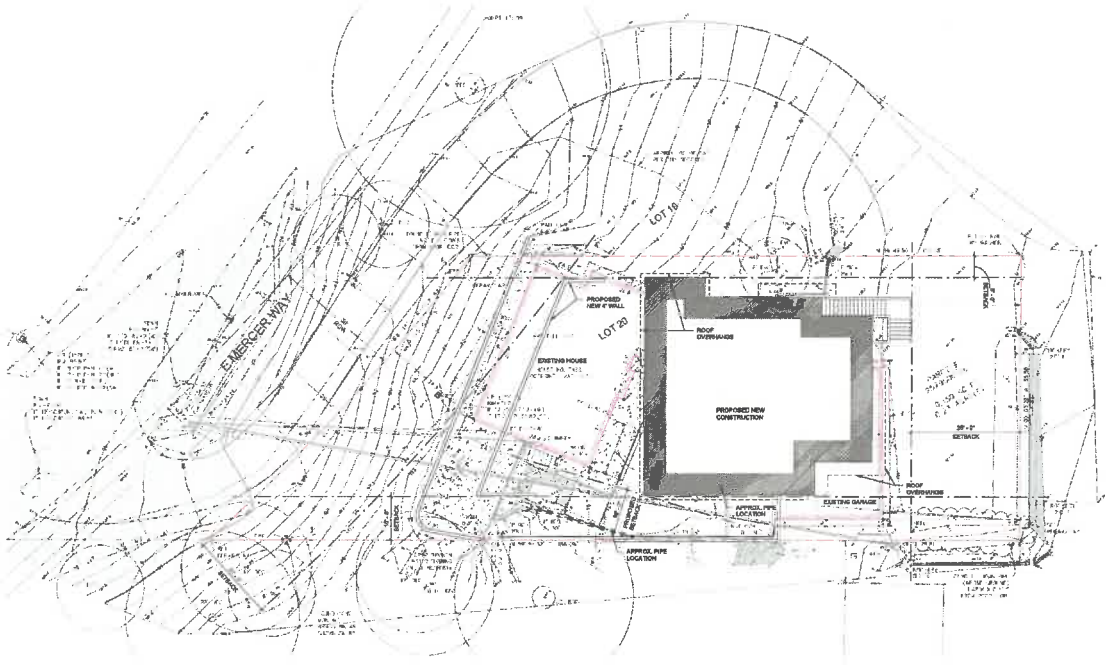
BERNARD P. KNOLL II
STATE OF WASHINGTON
38917
REGISTERED
PROFESSIONAL ENGINEER

10-7-2020

Bernard P. Knoll, II, P.E.
Principal

BPK/bpk

Exhibit 4



1 PROPOSED SITE PLAN
1" = 10'-0"

1"=10'-0" 2.5 5 10 20 40

SITE PLAN LEGEND

- SHORELINE BUFFER
- PROPOSED BUILDING AREA
- ADA PROPERTY DRIVEWAY
- PROPOSED DECK AREA
- TRENCH DRAIN
- C.O. CLEANOUT (C.O.)
- D.S. DOWNSPOUT (D.S.)
- EXISTING TO BE REMOVED
- LINE OF ROOF OVERHANG
- LINE OF EXISTING GRADE
- LINE OF PROPOSED GRADE
- SETBACK/EASEMENT
- PROPERTY LINE
- W WATER LINE
- SS SANITARY SEWER LINE
- SD STORM DRAIN LINE
- G GAS LINE
- EXISTING TREE TO REMAIN
- EXISTING TREE TO BE REMOVED
- TPF TREE PROTECTION FENCE

ARCHITECT
BAYLIS ARCHITECTS
10801 MAIN ST # 110, BELLEVUE, WA 98004
PHONE: (425) 454- 3545
CONTACT: JOHAN LUCHSINGER
EMAIL: luchsinger@baylisarchitects.com

GENERAL SITE NOTES

1. SITE INFORMATION TAKEN FROM BOUNDARY AND TOPOGRAPHIC SURVEY DATED ON 5/4/2020.
2. SEE COVER SHEET A001 FOR ADDITIONAL PROJECT DATA.

TREE PROTECTION DURING CONSTRUCTION

1. THE CONTRACTOR SHALL FOLLOW BEST PRACTICES TO PROTECT ANY TREE SCHEDULED TO BE RETAINED AND ALL TREES ON ADJACENT PROPERTY FROM DAMAGE. ALL TREES TO BE RETAINED WILL BE TAGGED BY THE OWNER. SHOULD THE CONTRACTOR AT ANY TIME HAVE CONCERNS OR QUESTIONS ABOUT ANY TREE HE IS TO CONTACT THE OWNER IMMEDIATELY AND THE OWNER WILL CONSULT WITH HIS LANDSCAPE ARCHITECT AND/OR ARBORIST TO INSPECT THE TREE IN QUESTIONS AND PROVIDE THEIR RECOMMENDATIONS.

CLEARING AND GRADING NOTES

1. CLEAR SITE OF VEGETATION AS REQUIRED FOR EXCAVATION OF HOUSE, PROJECT SLOPES AND CLEARED AREAS PER TOWN OF YARROW POINT.
2. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF IMPROVEMENTS ON ADJACENT PROPERTIES. COORDINATE WITH NEIGHBORS AS REQUIRED.
3. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE TOWN OF YARROW POINT STANDARDS.
4. ALL EXISTING UTILITIES SHOWN ON PLAN WERE OBTAINED FROM FIELD SURVEY. CONTRACTOR IS RESPONSIBLE FOR SITE VERIFICATION OF ALL UTILITY LOCATIONS AND CONDITIONS.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT TELEPHONE, GAS, POWER AND CABLE UTILITIES PRIOR TO CONSTRUCTION TO LOCATE AND PROTECT THE NECESSARY PLANS FOR THE EXTENSION OF THEIR RESPECTIVE SYSTEMS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THESE ACTIVITIES DURING CONSTRUCTION.
6. EROSION CONTROL - CONTRACTOR TO INSTALL CONTINUOUS SILT FENCING @ BOUNDARY OF CLEARED/DISTURBED AREA PER TOWN OF YARROW POINT STANDARDS.

Ramaiyah Subramanian Residence
201 South 4th Place

PROPOSED SITE PLAN
10/26/20

PROJECT NUMBER: 20-0002
PROJECT MANAGER: Chester
DRAWN BY: Author

NO.	DESCRIPTION	DATE

baylis ARCHITECTS
10801 Main Street, #110 Bellevue, WA 98004
(425) 454-3545 BaylisArchitects.com

SITE PLAN

A002

ESA

5309 Shilshole Avenue NW
Suite 200
Seattle, WA 98107
206.789.9658 phone
206.789.9684 fax

memorandum

date January 15, 2021

to Robin Proebsting, Senior Planner- City of Mercer Island

from Scott Olmsted, Senior Ecologist and Rachelle Tews, Ecologist
Environmental Science Associates

subject 7466 East Mercer Way (Tax Parcel 2579500136) Critical Areas Evaluation (CAO-20-003) Third Party Review

Environmental Science Associates (ESA) prepared this memorandum on behalf of the City of Mercer Island (City) to provide third party review of the critical areas evaluation submitted for the property located at 7466 E. Mercer Way (Parcel # 2579500136). The project proposes to demolish and rebuild the residence and garage located on the property.

The purpose of this memorandum is to verify the accuracy of the findings within the critical areas evaluation prepared by the applicant's consultant, The Watershed Company (TWC), titled *7466 E. Mercer Way Critical Areas Evaluation* (Memo) and dated October 21, 2020. This review assessed whether physical site constraints and rationale used to reduce the piped watercourse setback are consistent with the requirements of Mercer Island City Code (MICC) Chapter 19.07—Environment. Additionally, this review evaluated the accuracy of TWC biologist's assessment of fish and wildlife habitat conservation areas, specifically related to an offsite bald eagle nest.

Document Review

ESA reviewed information available in the public domain including: Washington Department of Fish and Wildlife (WDFW) web-mapping tools (Priority Habitats and Species [PHS] mapping and Salmonscape), U.S. Fish and Wildlife Service (USFWS), National Wetland Inventory (NWI) maps, King County's GIS mapping website (iMap), and City of Mercer Island critical areas mapping. Online maps indicate that there are no priority habitats and species, streams accessible to fish, or wetlands present on the parcel. The City of Mercer Island critical areas mapping shows a piped watercourse mapped on the site, classified as type "NP" (non-fish).

According to the memo submitted by TWC, a watercourse is piped on the subject property. In addition, the memo documents an exceptional tree located on the neighboring property, adjacent to the piped watercourse. Mercer Island City Code (MICC) typically requires a 45-foot setback for piped watercourses (MICC 19.07.180.C.6.b). The memo notes that per MICC 19.07.180.C.6.c, piped watercourse setback widths can be reduced to a 15-foot buffer when the portion of the piped watercourse on the applicant's property is daylighted and where the watercourse has been restored to an open channel, provided a restoration plan demonstrates that:

i. The watercourse channel will be stable and is not expected to cause safety risks or environmental damage; and

ii. No additional impact nor encumbrance by watercourse buffer or critical area setback is added to properties neighboring the applicant(s) property.

Additionally, the memo states that according to MICC 19.07.180.C.6.d, piped watercourse setback widths can be reduced to 10 feet on properties with a lot width of 50 feet or more, which is applicable to the subject property, when daylighting is determined by qualified professional(s) to result in one or more of the following outcomes:

i. Increased risk of landslide or other potential hazard that cannot be mitigated;

ii. Increased risk of environmental damage (e.g., erosion, diminished water quality) that cannot be mitigated;

iii. The inability of a legally established existing lot to meet the vehicular access requirements of this title; or

iv. The inability of a legally established existing lot to meet the building pad standards in MICC 19.09.090.

The memo states that because the piped watercourse is located within the critical root zone of the significant tree growing on the adjacent property, daylighting the piped watercourse would require tree removal. Tree removal would not only result in the loss of an exceptional tree, increasing risk of environmental damage (MICC 19.07.180.C.6.(d)(ii)), but would also impact the neighboring property and result in a new buffer encumbrance on that property, which is counter to MICC 19.07.180.C.6(c)(ii). Additionally, a steep slope is located immediately up-gradient from the piped section of watercourse and daylighting would affect slope stability. Therefore, the memo suggests daylighting the stream does not provide adequate environmental benefits to compensate for the environmental damage associated with tree removal and is not consistent with multiple sections of code. The applicant has requested a 10-foot setback from the piped watercourse that is to remain in-place.

Review of Site Conditions

ESA ecologists Scott Olmsted and Rachelle Tews conducted a site visit on December 16, 2020. The field visit included observations of 1) a publicly accessible area located up-gradient and west of the subject property, 2) the subject property, including the piped watercourse, and 3) an eagle nest located south of the subject property.

Based on the site visit, ESA agrees that Watercourse A flows within an open channel on Parcel #2579500190, which is located west of the subject property, before discharging to a culvert located beneath E. Mercer Way. The watercourse flows within the pipe from the road crossing, through several properties, including the subject property, until it briefly daylights and then returns to a pipe prior to discharging to Lake Washington.

During the site visit, a piped Watercourse A was observed beneath the canopy and within the critical root zone of an old growth California redwood (*Sequoia sempervirens*). The tree was visually confirmed to have a diameter greater than 60 inches at breast height. Exceptional trees with diameters of more 24 inches are prioritized for retention within the City (MICC 19.10.060). While tree removal may not be necessary to daylight the stream, daylighting could impact the critical root zone of the tree. Damage to the critical root zone of an exceptional tree could degrade tree health and ultimately result in tree death. Loss of the tree would degrade environmental functions both onsite and offsite. ESA agrees that the potential environmental damage caused by daylighting the

watercourse is not consistent with City code and therefore, a 10-foot setback from the piped watercourse is appropriate.

The applicant hired a geotechnical engineer to assess slope stability of the onsite steep slope and whether the watercourse should be daylighted. The engineer submitted their evaluation and recommendations in a separate review, titled *Watercourse Evaluation* and prepared by Ages Engeineering, LLC on October 7, 2020, and indicated that the piped watercourse should not be daylighted.

No wetlands or fish and wildlife habitat conservation areas were observed onsite or in the immediate vicinity. However, a bald eagle (*Haliaeetus leucocephalus*) nest was observed approximately 325 feet southwest of the subject property and a mature bald eagle was seen flying and perching in a tree just south of the nest. Under MICC 19.07.170.A.3, all areas within 660 feet of a bald eagle nest are regulated as fish and wildlife habitat conservation areas. The proposed project will have no direct impact on bald eagle habitat in the form of tree removal and indirect impacts (e.g., visual and auditory disturbances) would likely be minor. ESA agrees that temporary, indirect impacts could be mitigated if the applicant adheres to construction timing restrictions outlined by the U.S. Fish and Wildlife Service (during the nesting season from January through April).

The property is located within 200 feet of Lake Washington's shoreline and the lake is regulated as a shoreline of statewide significance. Projects proposed within the shoreline jurisdiction (e.g., within 200 feet of the shoreline) must comply with the City of Mercer Island's Shoreline Master Program (SMP) as outlined in MICC 19.13. The critical areas evaluation does not discuss compliance with the City's SMP; ESA recommends that the memo address these regulations.

Conclusions

Based on our review of the memo and our observations made during the December 16, 2020 site visit, we agree that the 10-foot setback from the piped watercourse on the property is appropriate and consistent with City code MICC 19.07.180.C.6.d, and believe USFWS construction timing restrictions should be followed to mitigate potential indirect impacts to nearby bald eagle habitat, and recommend the applicant's consultant address SMP compliance.