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3/3/2025

STORMWATER DRAINAGE REPORT

For

**Ankpura Residence
Single Family**

Site Location:

4249 92nd Avenue SE
Mercer Island, WA 98040

SECTION 1- PROPOSED PROJECT DESCRIPTION:

This project involves site improvements at a single-family residence located on a 9,634-square-foot (0.221-acre) site zoned as R-9.6 in Mercer Island, Washington. The site currently features an existing single-family residence that will undergo major renovations down to the foundation and newly proposed construction upon existing foundation footprint. The site is predominantly a mixture of vegetative grass and paved patio area complete with private swimming pool.

Planned modifications include decommissioning of the pool and removing the impervious surface surrounding it, replacing it with vegetation. The remaining areas will be reconfigured to suit the new egress points of the proposed residence but overall site changes, other than the pool area, will be minimal. The disturbed portions will be amended and seeded with vegetation, resulting in a net reduction in impervious surface coverage and stormwater runoff rates.

The reduction of impervious surface coverage and implementation of dispersion (where feasible) will result in improved on-site stormwater management and a decrease in runoff rates. The increase in vegetated areas will minimize the environmental impact and improve overall stormwater quality. Proper erosion and sediment control measures will also ensure compliance during construction.

Project Boundaries & Zoning

The project is located on 1 currently developed parcel.

<u>Parcel No:</u>	<u>Area</u>
445730-0035	9,634 SF – 0.221 Acre

Zoning: R-9.6

Max Allowable Impervious: 40% (19.02.060 MICD) = 3,854sf

Site Areas:

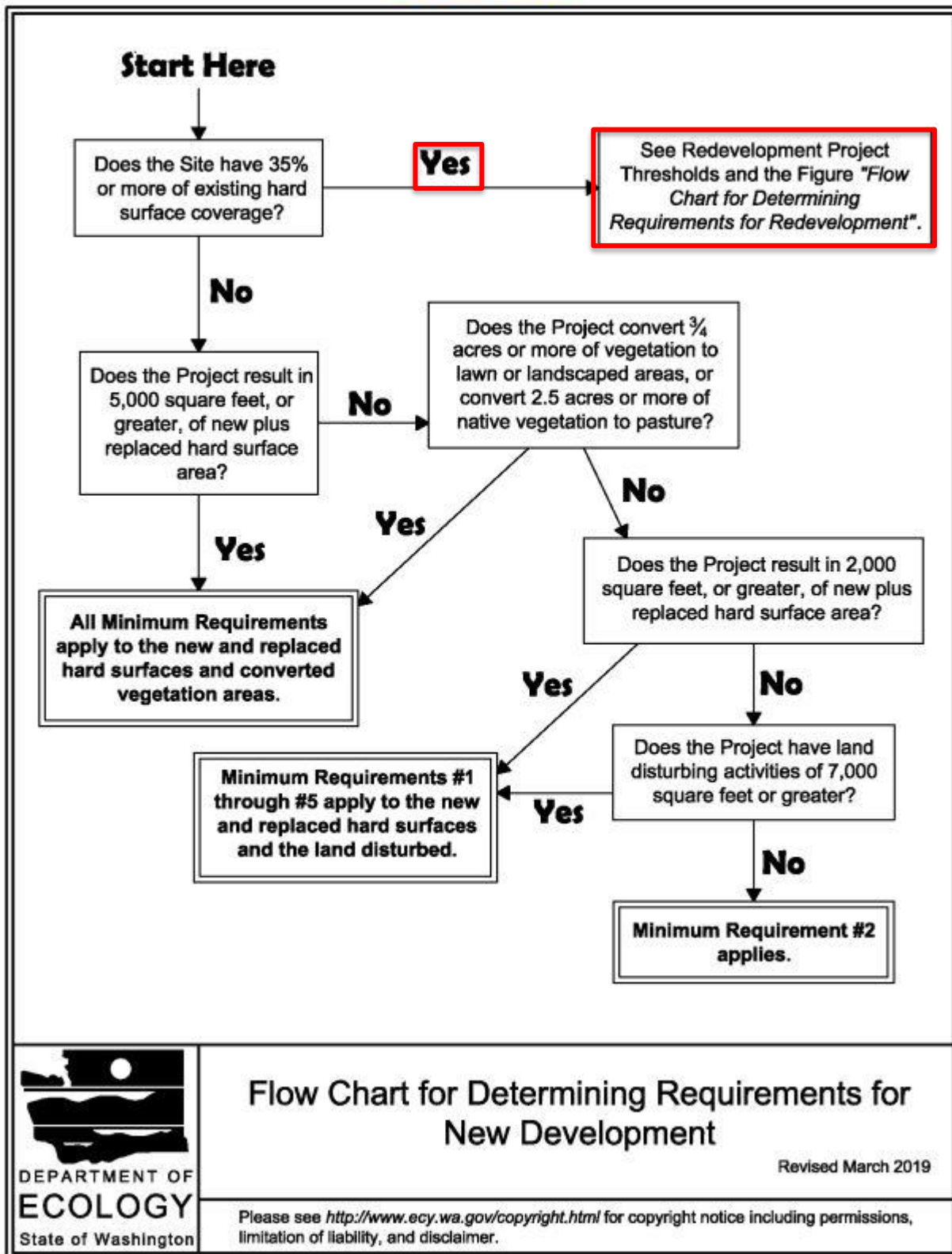
The Existing and Proposed project development areas are as follows:

Existing Site	Proposed Site
Roof Top: 2,879 sf	Roof Top: 2,543 sf
Driveway/Patio/Walkway: 2,661	Driveway/Decks/Walkway: 1103 sf
Accessory Buildings: 198 sf	Accessory Buildings: 30 sf
Total Impervious: 5,738 sf	Total Impervious: 3,676 sf

SECTION 2- MINIMUM REQUIREMENTS:

Based on Figure I-3.1 and Figure I-3.2 from the adopted 2019 Stormwater Management Manual for Western Washington, this project is considered a redevelopment requiring Core Requirements #1 through 5.

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

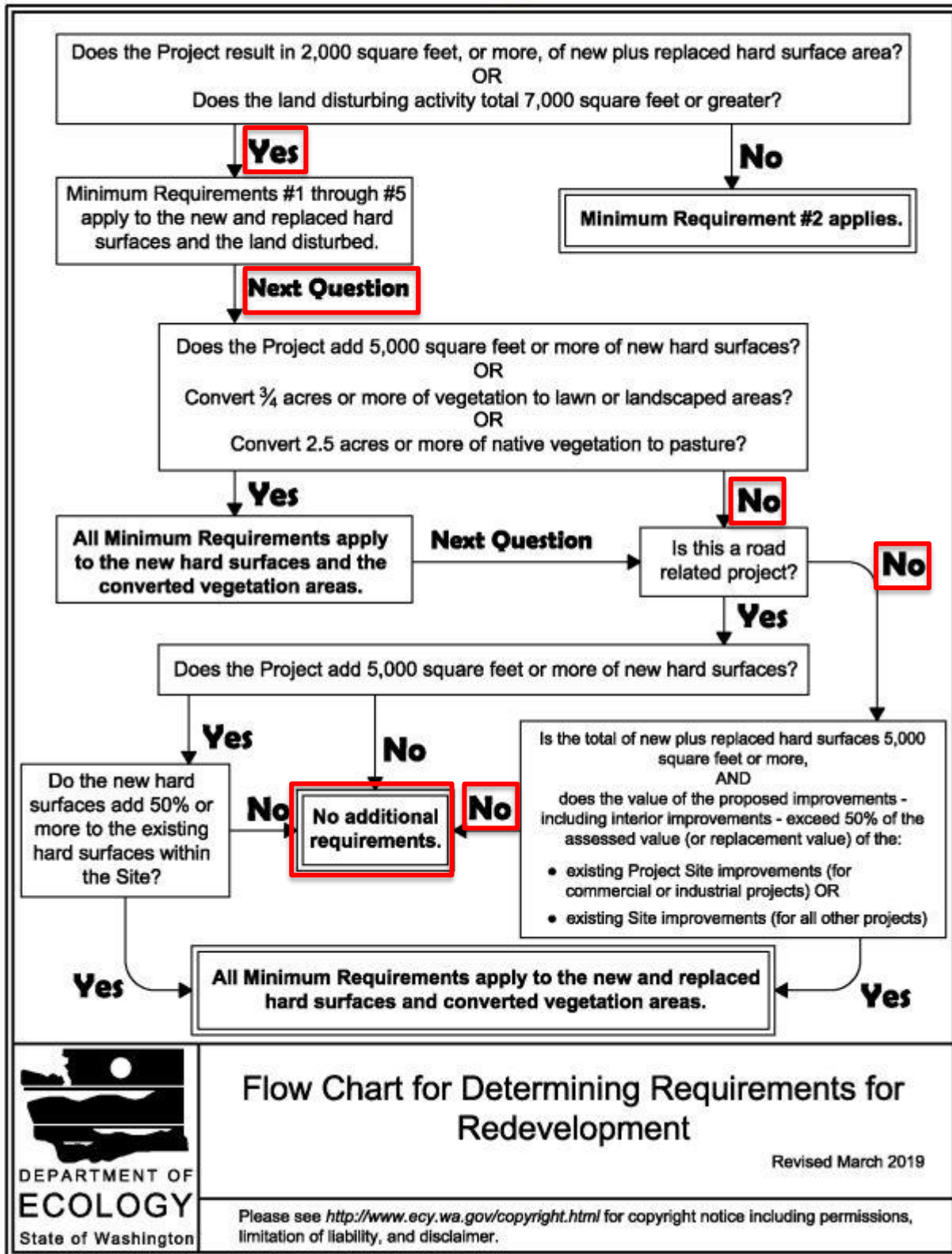


Flow Chart for Determining Requirements for New Development

Revised March 2019

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



Flow Chart for Determining Requirements for Redevelopment

Revised March 2019

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Minimum Requirement #1 – Stormwater Site Planning:

A comprehensive Stormwater Site Plan has been developed to ensure compliance with Mercer Island's stormwater regulations. This plan incorporates detailed site development information, stormwater management strategies, and best management practices (BMPs) designed to provide effective water quality treatment both during and after construction. According to the Geotechnical Memo, the site soils are not conducive to infiltration. Thus, no infiltration design measures were chosen for this design. The Technical Memorandum can be found in **Appendix C**.

However, given that the project involves a reduction in overall impervious surface, a net decrease in runoff is achieved. The calculations supporting this reduction in flow, using the WWHM model, are presented in **Appendix D**. This approach ensures that the site will meet Mercer Island's stormwater quality standards while promoting sustainable, long-term stormwater management.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan:

A Construction Stormwater Pollution Prevention Plan (SWPPP) has been prepared to address erosion and sediment control during construction (**Appendix B**). Best Management Practices (BMPs) such as silt fences and temporary erosion control measures will be implemented. Routine inspections and maintenance will ensure compliance with pollution prevention standards.

Minimum Requirement #3 – Source Control of Pollution:

Source control Best Management Practices (BMPs) will be implemented throughout the project to prevent pollutants from entering stormwater runoff. These practices focus on minimizing contamination risks through proper management of materials, vehicle maintenance, and waste disposal. The specific BMPs that will be employed include but are not limited to:

- **BMP C103: High Visibility Plastic or Metal Fence:** This BMP will be used to establish high visibility fencing around the construction site. The fence will serve to protect the site from unauthorized access, prevent materials from spilling out, and clearly delineate construction zones, reducing the risk of pollutant discharge into stormwater.
- **BMP C120: Temporary and Permanent Seeding:** Temporary and permanent seeding will be used to stabilize exposed soils and reduce erosion during and after construction. This practice will help establish vegetation that prevents runoff and soil erosion, promoting long-term site stabilization and reducing sediment in stormwater runoff.
- **BMP C123: Plastic Covering:** To prevent debris and other pollutants from being washed off-site, plastic coverings will be applied to piles of materials, such as soil or construction debris, where necessary. This will help control erosion and protect materials from being carried away by stormwater.
- **BMP C130: Surface Roughening:** Surface roughening will be implemented to improve the soil's ability to absorb water and reduce surface runoff. This technique involves roughening the surface of compacted areas to increase water infiltration, reduce erosion, and promote vegetation growth.

- **BMP C140: Dust Control:** Dust control measures will be applied to construction areas to minimize airborne particulates and prevent them from being washed into stormwater during rain events. Methods may include watering the site, using dust suppressants, or covering materials to keep dust levels under control.

These BMPs will work together to minimize the potential for stormwater pollution, ensuring that the site meets the necessary environmental standards and protects water quality throughout the construction process.

Minimum Requirement #4 – Preservation of Natural Drainage Systems/Outfalls:

The project has been designed with a focus on preserving and maintaining the natural drainage patterns of the site. To achieve this, vegetated flow paths and full dispersion techniques have been incorporated, ensuring that stormwater is controlled in a manner that mimics or exceeds pre-existing conditions. The existing site runoff is reduced due to the reduction of impervious surface area. The reduced runoff maintains the existing site outfall into the city's stormwater system within the ROW.

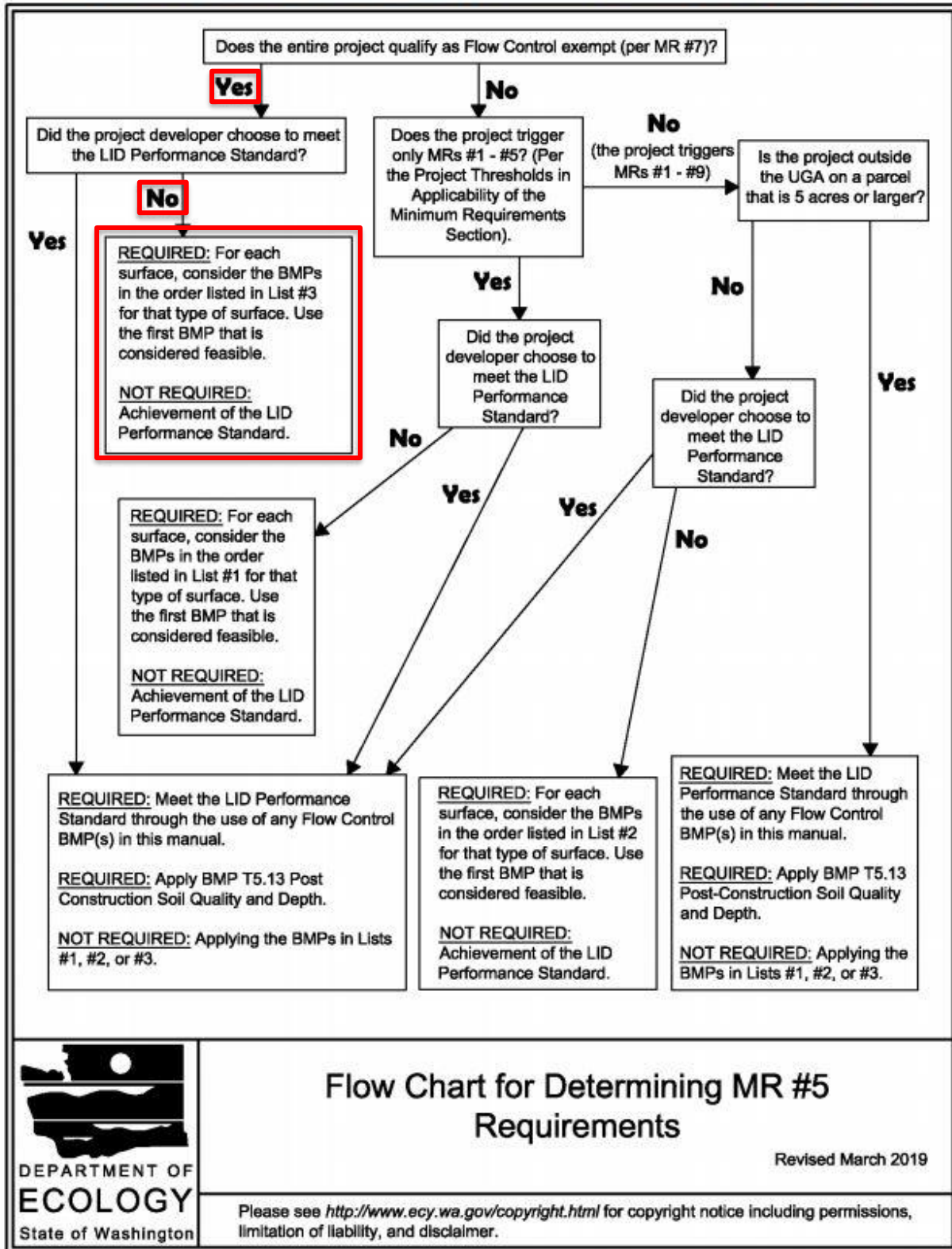
There are no streams, wetlands, or other hydrologic features present on or near the site, confirming that the project area is not directly influenced by such features. As previously noted, the reduction of impervious surfaces through this project design will result in a net decrease in runoff, thereby alleviating pressure on the existing conveyance system. This design will promote reduced impact on existing system components compared to the current site conditions, contributing to the overall enhancement of stormwater management and the preservation of natural drainage systems.

Minimum Requirement #5 – On-Site Stormwater Management:

The manual provides a flow chart for determining Minimum Requirement #5, see Figure I-3.3 below.

Per Minimum Requirement #7, this project qualifies as flow control exempt as the total of effective impervious surfaces is less than 10,000 square feet, the project does not convert three-fourths of an acre or more of native vegetation, pasture, scrub/shrub, or unmaintained non-native vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area. The project also does not result in 0.15 cubic feet per second (cfs) or greater increase in the 100-year flow frequency, as shown in the attached WWHM calculation (**Appendix D**).

Figure I-3.3: Flow Chart for Determining MR #5 Requirements



The flow chart above (Figure I-3.3) shows that the subject project is required to consider the BMPs in the order listed in List #3 on Table I-3.2 below. The chosen BMPs for this design are highlighted with an explanation below.

Table I-3.2: The List Approach for MR5 Compliance

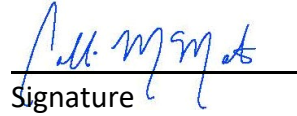
List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil 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 No Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems Not Enough Space
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections No Infiltration
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	
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	BMP T5.12: Sheet Flow Dispersion
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention or 4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	or BMP T5.11: Concentrated Flow Dispersion

- Surface Type: Lawn and Landscaped Areas
 - BMP T5.13: Post-Construction Soil Quality and Depth
 - Selected
- Surface Type: Roofs
 - BMP T5.10A: Downspout Full Infiltration
 - Per geotechnical report, infiltration is not feasible
 - BMP T5.10B: Downspout Dispersion Systems
 - There is not enough room between the existing structure and the property line for any of the dispersion systems to fit and meet the requirements. This includes Downspout Dispersion Trenches (25' flow path required), Standard Dispersion Trench with Grade Board (25' flow path required), and Downspout Splash Blocks (50' flow path required).
 - BMP T5.10C: Perforated Stub-out Connections
 - Per the Manual, Perforated Stub-out Connections are “intended to provide some infiltration during drier months.” Per the geotechnical report, infiltration design is not recommended.
 - This project will utilize the existing connection to the city stormwater system that is currently being utilized.
- Surface Type: Other Hard Surfaces
 - BMP T5.12: Sheet Flow Dispersion
 - While there is not 25' of separation available between the structure and the property line for this BMP to meet requirements, the 2-foot-wide transition zone will however be installed along the south edge of the driveway to help dispersion and reduce erosion. Site modeling shows stormwater will continue to flow to the streetside and ultimately utilize the existing stormwater catch basins within the right-of-way.

Please refer to the plans in **Appendix A** for more information and details on how the selected BMPs will be utilized within the project.

Certification:

"I hereby state that this Construction Stormwater Pollution Prevention Plan for Ankpura Residence has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Mercer Island does not and will not assume liability for the sufficiency, suitability, or performance of Construction SWPPP BMPs prepared by me."


Signature

03/5/2025
Date

Collin McMaster, P.E.
Vector Engineering, Inc.
2724 Black Lake Blvd, Ste 202
Tumwater, WA 98512
(360) 352-2477

Seal:



3/5/25

List of Appendices:

- A. Stormwater Management Plans**
- B. Construction Stormwater Pollution Prevention Plan (CSWPPP)**
- C. Geotechnical Memorandum**
- D. Calculations**

Appendix A

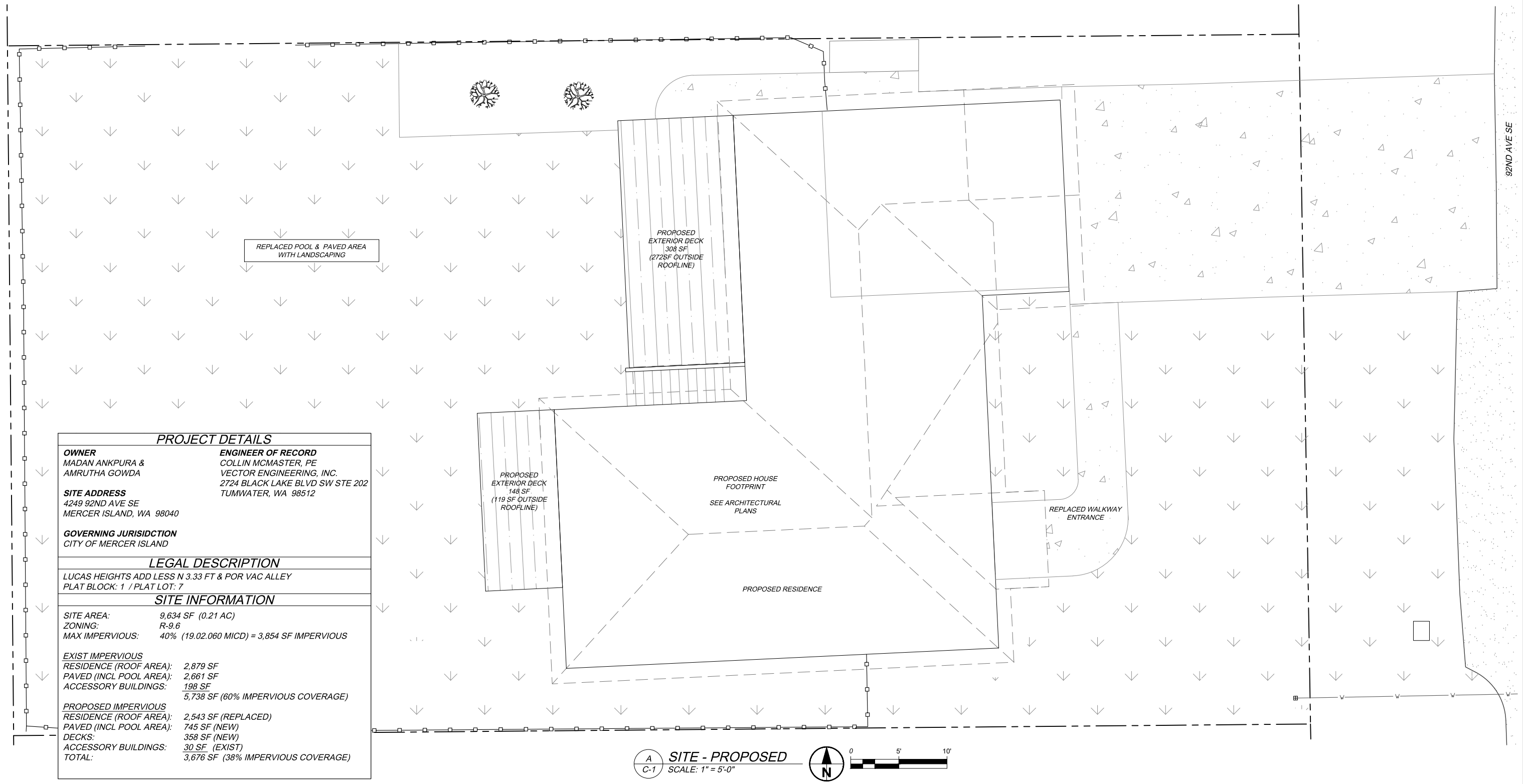
Stormwater Management Plans

ANKPURA RESIDENCE

4249 92nd AVENUE SE

MERCER ISLAND, WA 98040

PARCEL NO. 445730-0035



PROJECT DETAILS	
OWNER MADAN ANKPURA & AMRUTHA GOWDA	ENGINEER OF RECORD COLLIN MCMASTER, PE VECTOR ENGINEERING, INC. 2724 BLACK LAKE BLVD SW STE 202 TUMWATER, WA 98512
SITE ADDRESS 4249 92ND AVE SE MERCER ISLAND, WA 98040	
GOVERNING JURISDICTION CITY OF MERCER ISLAND	
LEGAL DESCRIPTION	
LUCAS HEIGHTS ADD LESS N 3.33 FT & POR VAC ALLEY PLAT BLOCK: 1 / PLAT LOT: 7	
SITE INFORMATION	
SITE AREA:	9,634 SF (0.21 AC)
ZONING:	R-9.6
MAX IMPERVIOUS:	40% (19.02.060 MICD) = 3,854 SF IMPERVIOUS
EXIST IMPERVIOUS	
RESIDENCE (ROOF AREA):	2,879 SF
PAVED (INCL POOL AREA):	2,661 SF
ACCESSORY BUILDINGS:	198 SF
	5,738 SF (60% IMPERVIOUS COVERAGE)
PROPOSED IMPERVIOUS	
RESIDENCE (ROOF AREA):	2,543 SF (REPLACED)
PAVED (INCL POOL AREA):	745 SF (NEW)
DECKS:	358 SF (NEW)
ACCESSORY BUILDINGS:	30 SF (EXIST)
TOTAL:	3,676 SF (38% IMPERVIOUS COVERAGE)

A SITE - PROPOSED
C-1 SCALE: 1" = 5'-0"

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DESIGNED BY: CJM	DATE	NO.	REVISION	BY						

**SCALES ARE
FOR FULL SIZE
PLANS. ADJUST
ACCORDINGLY**



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NORTHWEST INTERIOR & DESIGN

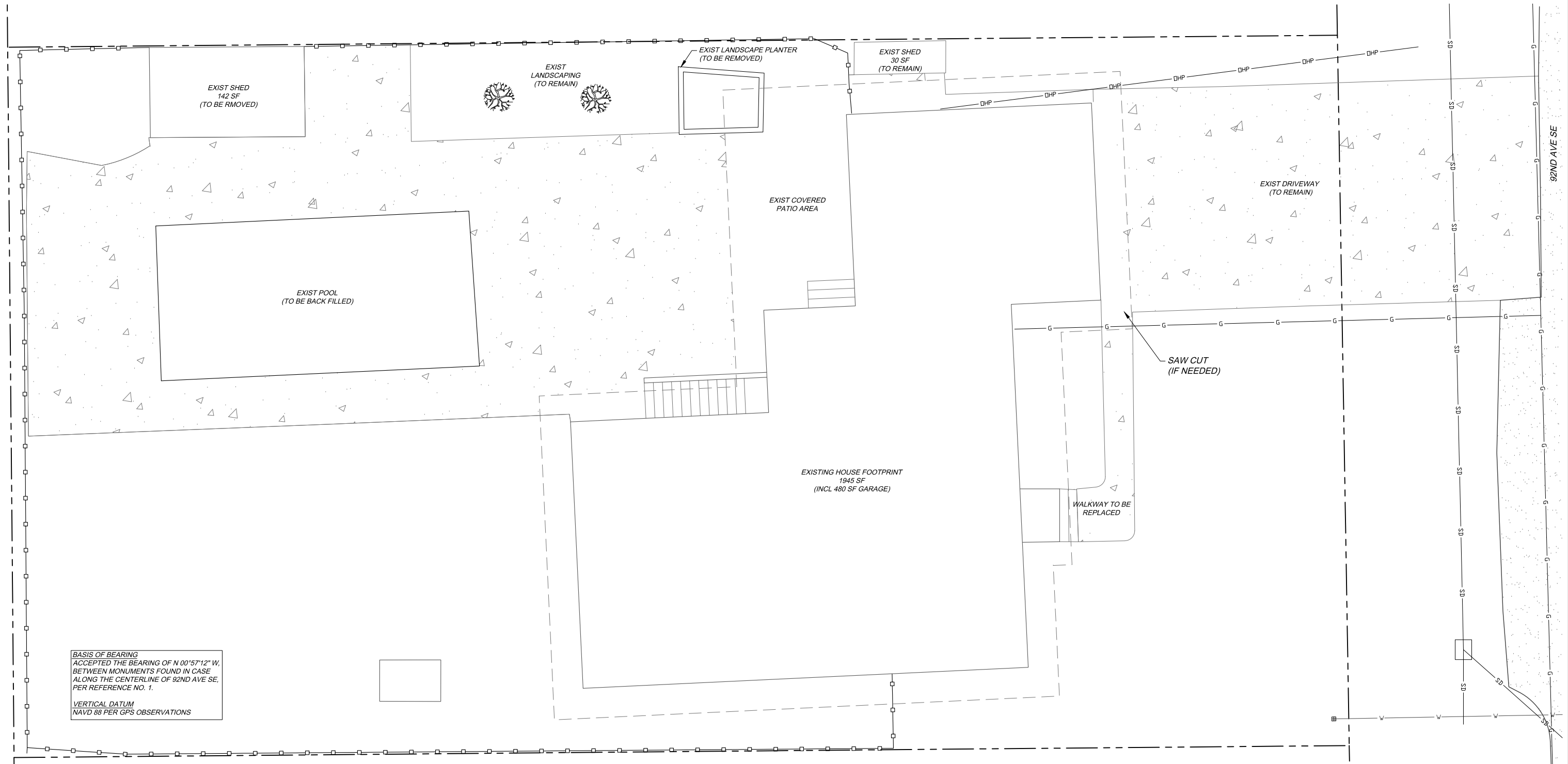
8708 WILLOWS ROAD NE
REDMOND, WA 98052

C-1

PROPOSED SITE
PLAN

SHT 1 OF 7

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BASIS OF BEARING
ACCEPTED THE BEARING OF N 00°57'12" W,
BETWEEN MONUMENTS FOUND IN CASE
ALONG THE CENTERLINE OF 92ND AVE SE,
PER REFERENCE NO. 1.

VERTICAL DATUM
NAVD 88 PER GPS OBSERVATIONS



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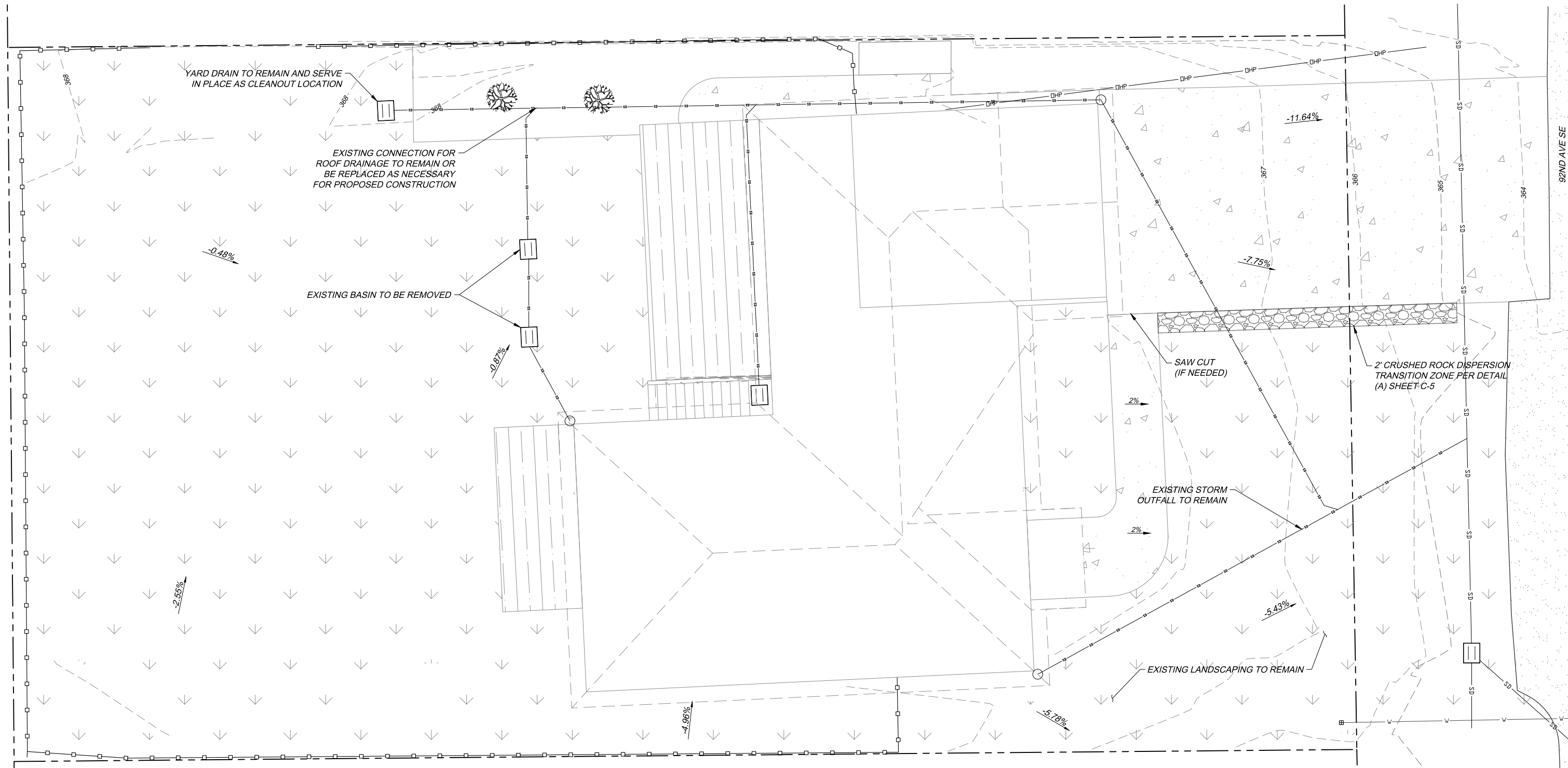
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C-2
EXISTING SITE
SHT 2 OF 7

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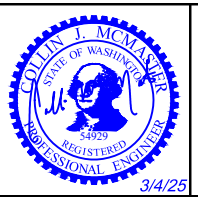


A
C-4 **GRADING & DRAINAGE**
SCALE: 1" = 5'-0"



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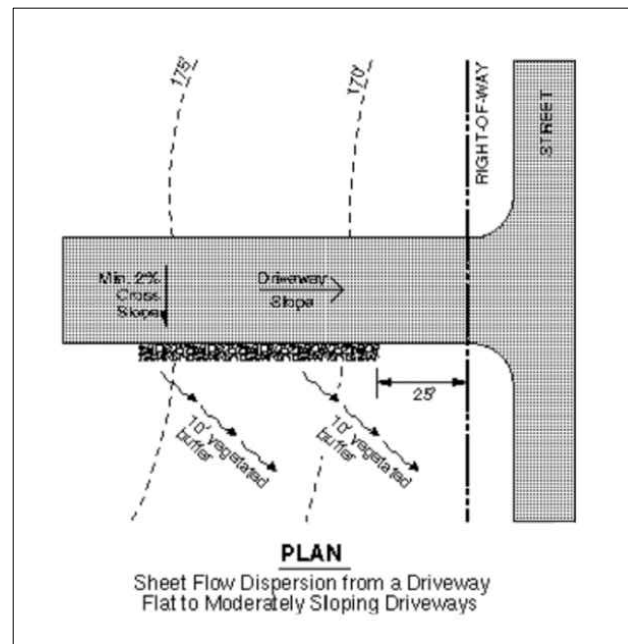


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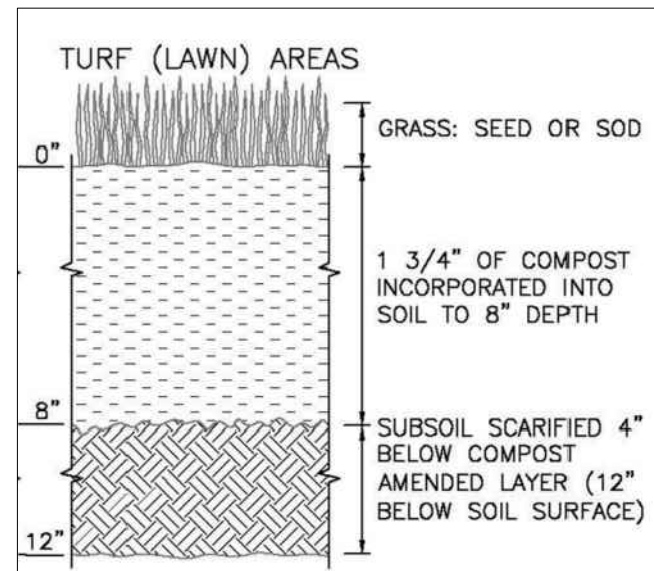
C-4
DRAINAGE PLAN
SHT 4 OF 7



A **BMP T5.12: SHEET FLOW DISPERSION**
C-5 SCALE: N.T.S.

SHEET FLOW DISPERSION:

- PROVIDE A 2-FOOT-WIDE TRANSITION ZONE TO DISCOURAGE CHANNELING BETWEEN THE EDGE OF THE IMPERVIOUS SURFACE (OR BUILDING EAVES) AND THE DOWNSLOPE VEGETATION.
- THIS TRANSITION ZONE MAY CONSIST OF AN EXTENSION OF SUBGRADE MATERIAL (CRUSHED ROCK), MODULAR PAVEMENT, DRAIN ROCK, OR OTHER MATERIAL ACCEPTABLE TO THE LOCAL PLAN APPROVAL AUTHORITY



B **SOIL AMENDMENT**
C-5 SCALE: N.T.S.

BMP T5.13: POST-CONSTRUCTION SOIL QUALITY AND DEPTH

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:
 - 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.
- MULCH PLANTING BEDS WITH 2 INCHES OF ORGANIC MATERIAL.
- USE COMPOST AND OTHER MATERIALS THAT MEET THE FOLLOWING ORGANIC CONTENT REQUIREMENTS:
 - 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.
 - CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIAL MEETING THE 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:
 - LEAVE UNDISTURBED NATIVE VEGETATION AND SOIL, AND PROTECT FROM COMPACTION DURING CONSTRUCTION.
 - 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.
 - 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.
 - 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.

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.

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Appendix B

Construction Stormwater Pollution Prevention Plan (CSWPPP)



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 1: Preserve Vegetation / Mark Clearing Limits

The goal of this element is to preserve native vegetation and to clearly show the limits of disturbance.

This element **does not** apply to my project because:

The site was cleared as part of clearing activity that is subject to an enforcement action and is re-vegetated. Restoration may be necessary to comply with Critical Area Regulations or NPDES requirements. Buffer Zones-BMP C102 may apply if Critical Areas exist on-site and buffer zones shall be protected.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the best management practices (BMPs) you will use:

The perimeter of the area to be cleared shall be marked prior to clearing operation with visible flagging, orange plastic barrier fencing and/or orange silt fencing as shown on the SWPPP site map. The total disturbed area shall be less than 7,000 square feet. Vehicles will only be allowed in the areas to be graded, so no compaction of the undeveloped areas will occur.

Additional Comments:

Site fencing shall be located downslope of the disturbed area to allow workers to move about the site. Since this project is a rebuild on the existing building foundation, work flow activity will need access to all portions of the perimeter of the project. An existing property fence shall serve as the perimeter on the North and East limit of activity.

Check the BMPs you will use:

- C101 Preserving Natural Vegetation C102 Buffer Zones C103 High Visibility Fence



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 2: Construction Access

The goal of this element is to provide a stabilized construction entrance/exit to prevent or reduce or sediment track out.

This element **does not** apply to my project because:

The driveway to the construction area already exists and will be used for construction access. All equipment and vehicles will be restricted to staying on that existing impervious surface.

Other Reason / Additional Comments:

Stabilized construction details have been added to the plans in the off chance they are required. Otherwise, BMP C105 is not planned to be used, and the existing construction site shall be accessed via existing paved driveway location.

If it **does** apply, describe the steps you will take and select the BMPs you will use:

A stabilized construction entrance will be installed prior to any vehicles entering the site, at the location shown on the SWPPP site map.

Additional Comments:

Check the BMPs you will use:

C105 Stabilized Construction Entrance / Exit

C106 Wheel Wash

C107 Construction Road / Parking Area Stabilization



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 3: Control Flow Rates

The goal of this element is to construct retention or detention facilities when necessary to protect properties and waterways downstream of development sites from erosion and turbid discharges.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Flow rates will be controlled by using SWPPP Element 4 sediment controls and BMP T5.13 Post-Construction Soil Quality and Depth if necessary.

Additional Comments:



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 4: Sediment Control

The goal of this element is to construct sediment control BMPs that minimize sediment discharges from the site.

This element **does not** apply to my project because:

The site has already been stabilized and re-vegetated.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Sediment control BMPs shall be placed at the locations shown on the SWPPP site map

Additional Comments:

Check the BMPs you will use:

C231 Brush Barrier

C233 Silt Fence

C235 Wattles

C232 Gravel Filter Berm

C234 Vegetated Strip



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 5: Stabilize Soils

The goal of this element is to stabilize exposed and unworked soils by implementing erosion control BMPs.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

- Exposed soils shall be worked during the week until they have been stabilized. Soil stockpiles will be located within the disturbed area shown on the SWPPP site map. Soil excavated for the foundation will be backfilled against the foundation and graded to drain away from the building. No soils shall remain exposed and unworked for more than 7 days from May 1 to September 30 or more than 2 days from October 1 to April 30. Once the disturbed landscape areas are graded, the grass areas will be amended using BMP T5.13 Post-Construction Soil Quality and Depth. All stockpiles will be covered with plastic or burlap if left unworked.

Additional Comments:

Check the BMPs you will use:

- C120 Temporary & Permanent Seeding
- C122 Nets & Blankets
- C124 Sodding
- C131 Gradient Terraces
- C235 Wattles
- C121 Mulching
- C123 Plastic Covering
- C125 Topsoil / Composting
- C140 Dust Control



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 6: Protect Slopes

The goal of this element is to design and construct cut-and-fill slopes in a manner to minimize erosion.

This element **does not** apply to my project because:

No cut slopes over 4 feet high or slopes steeper than 2 feet horizontal to 1 foot vertical, and no fill slopes over 4 feet high will exceed 3 feet horizontal to 1 foot vertical. Therefore, there is no requirement for additional engineered slope protection.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Additional Comments:

Check the BMPs you will use:

- | | | |
|---|---|---|
| <input type="checkbox"/> C120 Temporary & Permanent Seeding | <input type="checkbox"/> C205 Subsurface Drains | <input type="checkbox"/> C207 Check Dams |
| <input type="checkbox"/> C204 Pipe Slope Drains | <input type="checkbox"/> C206 Level Spreader | <input type="checkbox"/> C208 Triangular Silt Dike (Geotextile-Encased Check Dam) |



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 7: Protect Permanent Drain Inlets

The goal of this element is to protect storm drain inlets during construction to prevent stormwater runoff from entering the conveyance system without being filtered or treated.

*This element **does not** apply to my project because:*

- The site has open ditches in the right-of-way or private road right-of-way.
- There are no catch basins on or near the site.
- Other Reason / Additional Comments:

*If it **does** apply, describe the steps you will take and select the BMPs you will use:*

- Catch basins on the site or immediately off site in the right-of-way are shown on the SWPPP site map. Storm drain inlet protection shall be installed.

Additional Comments:

Check the BMPs you will use:

- C220 Storm Drain Inlet Protection



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 8: Stabilize Channels and Outlets

The goal of this element is to design, construct, and stabilize on-site conveyance channels to prevent erosion from entering existing stormwater outfalls and conveyance systems.

This element **does not** apply to my project because:

Construction will occur during the dry weather. No storm drainage channels or ditches shall be constructed either temporary or permanent. A small swale shall be graded to convey yard drainage around the structure using a shallow slope; it shall be seeded after grading and stabilized.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

A wattle shall be placed at the end of the swale to prevent erosion at the outlet of the swale.

Additional Comments:

Check the BMPs you will use:

C202 Channel Lining C207 Check Dams C209 Outlet Protection C235 Wattles



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 9: Control Pollutants

The goal of this element is to design, install, implement and maintain BMPs to minimize the discharge of pollutants from material storage areas, fuel handling, equipment cleaning, management of waste materials, etc.

This element **does not** apply to my project because:

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

- Any and all pollutants, chemicals, liquid products and other materials that have the potential to pose a threat to human health or the environment will be covered, contained, and protected from vandalism. All such products shall be kept under cover in a secure location on-site. Concrete handling shall follow BMP C151.

Additional Comments:

Check the BMPs you will use:

- | | |
|---|--|
| <input checked="" type="checkbox"/> C151 Concrete Handling | <input checked="" type="checkbox"/> C152 Sawcutting and Surfacing Pollution Prevention |
| <input type="checkbox"/> C153 Material Delivery, Storage, and Containment | <input type="checkbox"/> C154 Concrete Washout Area |



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 10: Control De-watering

The goal of this element is to handle turbid or contaminated dewatering water separately from stormwater.

This element **does not** apply to my project because:

No dewatering of the site is anticipated.

Other Reason / Additional Comments:

If it **does** apply, describe the steps you will take and select the BMPs you will use:

Additional Comments:

Check the BMPs you will use:

C203 Water Bars

C236 Vegetated Filtration

C206 Level Spreader



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 11: Maintain Best Management Practices

The goal of this element is to maintain and repair all temporary and permanent erosion and sediment control BMPs to assure continued performance.

Describe the steps you will take:

- Best Management Practices or BMPs shall be inspected and maintained during construction and removed within 30 days after the City Inspector or Engineer determines that the site is stabilized, provided that they may be removed when they are no longer needed.

Element 12: Manage the Project

The goal of this element is to ensure that the construction SWPPP is properly coordinated and that all BMPs are deployed at the proper time to achieve full compliance with City regulations throughout the project.

If it **does** apply, describe the steps you will take and select the BMPs you will use:

The Construction SWPPP will be implemented at all times. The applicable erosion control BMPs will be implemented in the following sequence:

- 1. Mark clearing limits
- 2. Install stabilized construction entrance
- 3. Install protection for existing drainage systems and permanent drain inlets
- 4. Establish staging areas for storage and handling polluted material and BMPs
- 5. Install sediment control BMPs
- 6. Grade and install stabilization measures for disturbed areas
- 7. Maintain BMPs until site stabilization, at which time they may be removed

Additional Comments:



CITY OF MERCER ISLAND

SECTION B: SMALL PROJECT CONSTRUCTION SWPPP NARRATIVE

Element 13: Protect Low Impact Development BMPs

The goal of this element is to protect on-site stormwater management BMPs (also known as “Low Impact Development BMPs”) from siltation and compaction during construction. On-site stormwater management BMPs used for runoff from roofs and other hard surfaces include: full dispersion, roof downspout full infiltration or dispersion systems, perforated stubout connections, rain gardens, bioretention systems, permeable pavement, sheetflow dispersion, and concentrated flow dispersion. Methods for protecting on-site stormwater management BMPs include sequencing the construction to install these BMPs at the latter part of the construction grading operations, excluding equipment from the BMPs and the associated areas, and using the erosion and sedimentation control BMPs listed below.

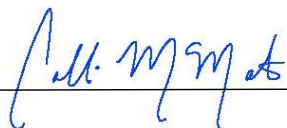
Describe the construction sequencing you will use:

Additional Comments:

The sequence shall be in accordance with Element 12.

Select the BMPs you will use:

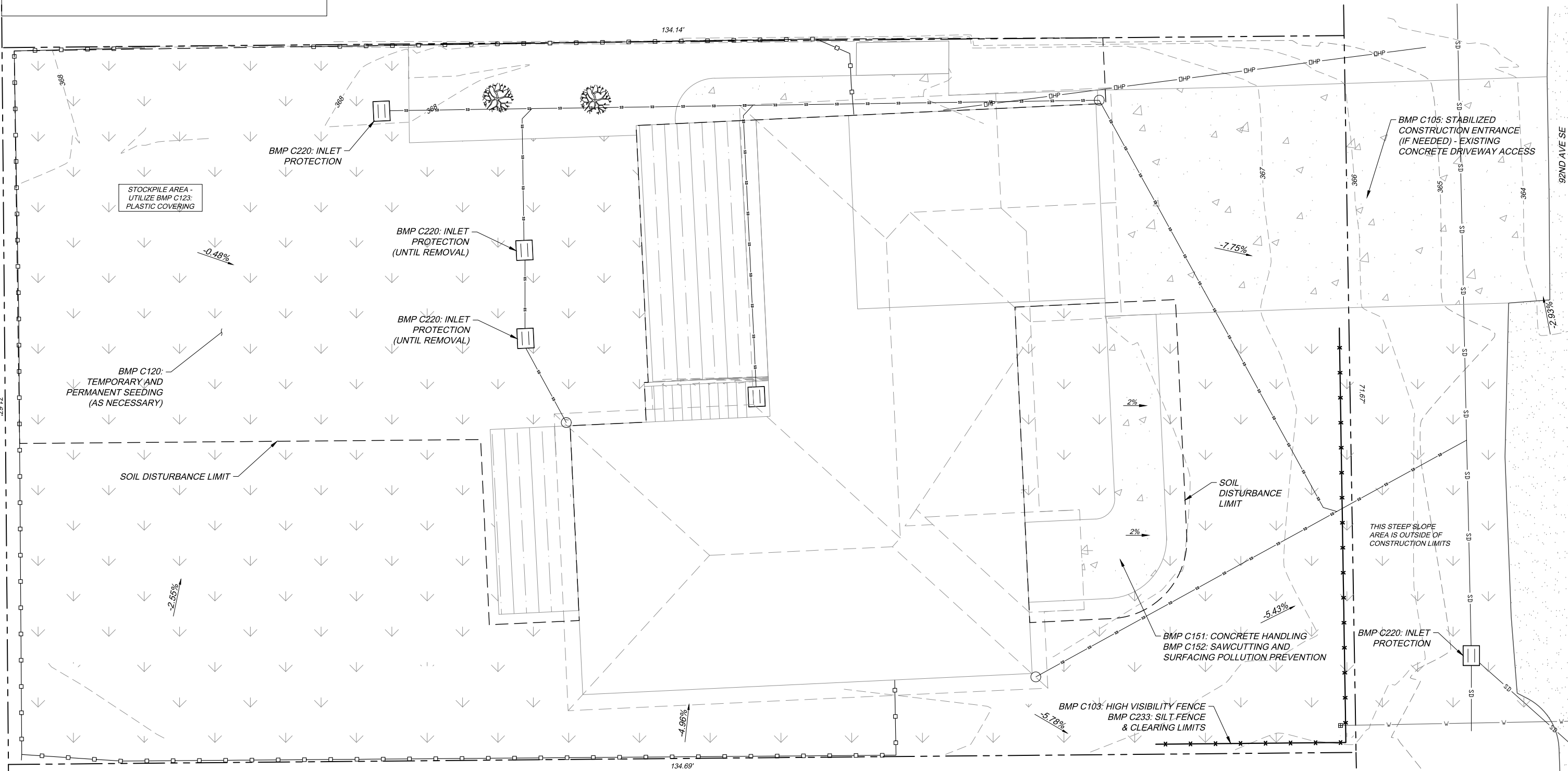
- C102 Buffer Zone C103 High Visibility Fence C231 Brush Barrier
- C233 Silt Fence C234 Vegetated Strip

Project Manager: 

Date: 3/5/2025

SITE INFORMATION

SOIL DISTURBANCE: 3,500SF



A EROSION CONTROL
C-3 SCALE: 1" = 5'-0"
 0 5' 10'

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FILE: Civil Design.dwg					
PROJECT: 25-NWID12					
CHECKED BY: CJM					
DETAILED BY: CJM					
DESIGNED BY: CJM					
DATE	NO.	REVISION	BY		

SCALES ARE FOR FULL SIZE PLANS. ADJUST ACCORDINGLY



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 8708 WILLOWS ROAD NE
 REDMOND, WA 98052

STANDARD CONSTRUCTION SWPPP NOTES

1. SITE INSPECTIONS SHALL BE CONDUCTED BY A PERSON WHO IS KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICES OF EROSION AND SEDIMENT CONTROL. FOR PROJECT SITES THAT REQUIRE A CONSTRUCTION SWPPP, A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE IDENTIFIED IN THE CONSTRUCTION SWPPP AND SHALL BE ON SITE OR ON CALL AT ALL TIMES.
2. APPROVAL OF THE CONSTRUCTION SWPPP DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION/DETENTION/INFILTRATION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THE CONSTRUCTION SWPPP AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE CONSTRUCTION SWPPP FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE STANDARDS FOR SURFACE WATER QUALITY, GROUNDWATER QUALITY, OR SEDIMENT QUALITY.
6. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE CONSTRUCTION SWPPP FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE DURING THE COURSE OF CONSTRUCTION, INCLUDING CONSTRUCTION ON INDIVIDUAL LOTS.
7. THE CONSTRUCTION SWPPP FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR. THE FACILITIES SHALL BE MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTION.
8. THE CONSTRUCTION SWPPP FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AT LEAST MONTHLY AND WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVENT ($\geq 1"$ RAINFALL IN 24 HOURS) BY THE APPLICANT/CONTRACTOR. THE FACILITIES SHALL BE MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTION.
9. STORM DRAIN INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. AT NO TIME SHALL MORE THAN 1 FOOT OR 1/3 OF THE BMP VOLUME (WHICHEVER IS LESS) OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A STORM DRAIN INLET PROTECTION BMP. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED AS PART OF PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSTREAM SYSTEM.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE INSPECTED DAILY AND CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 1 THROUGH APRIL 30, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM MAY 1 TO SEPTEMBER 30, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT-OF-WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINES, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHETHER AT FINAL GRADE OR NOT. THE CITY OF LACEY MAY DECREASE THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. CONTACT THE CITY FOR APPROVAL PRIOR TO ALL CLEARING, GRADING, AND OTHER SOILDISTURBING ACTIVITIES THAT OCCUR BETWEEN OCTOBER 1 AND APRIL 30. SUCH WORK SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE CITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATERS WILL BE PREVENTED. THE CITY MAY REQUIRE SUPPLEMENTAL SWPPP DOCUMENTATION FOR WET SEASON WORK.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED FROM EROSION.
15. HANDLE AND DISPOSE OF ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS THAT OCCUR ON SITE IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. USE SPILL PREVENTION MEASURES, SUCH AS DRIP PANS, WHEN CONDUCTING MAINTENANCE AND REPAIR OF VEHICLES AND EQUIPMENT.
17. REPORT SPILLS MONDAY THROUGH FRIDAY, 7:00 A.M. TO 3:30 P.M. (360) 491-5644. AFTER HOURS, YOU CAN LEAVE A VOICEMAIL AT THE NUMBER ABOVE, OR SELECT THE OPTION TO BE CONNECTED TO THURSTON COUNTY CENTRAL DISPATCH, WHO WILL NOTIFY THE CITY'S STAND-BY SPILL RESPONSE STAFF.

BMP C120: TEMPORARY AND PERMANENT SEEDING

- SEED MIXTURE AND APPLICATION RATE SHALL BE:
1. WHEN APPLIED WITH HYDROMULCH, APPLY IN TWO PHASES:
 - A. PHASE 1 – INSTALL ALL SEED AND FERTILIZER WITH 25 TO 30 PERCENT MULCH AND TACKIFIER ONTO SOIL IN THE FIRST LIFT.
 - B. PHASE 2 – INSTALL THE REST OF THE MULCH AND TACKIFIER IN THE SECOND LIFT.
 2. IF FEASIBLE, SEED BETWEEN APRIL 1 AND JUNE 30 OR BETWEEN SEPTEMBER 1 AND OCTOBER 1.
 3. SEED BEDS PLANTED BETWEEN JULY 1 AND AUGUST 30 SHALL BE IRRIGATED UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
 4. SEED BEDS PLANTED BETWEEN OCTOBER 1 AND MARCH 30 SHALL BE MULCHED WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
 5. CONFIRM THE INSTALLATION OF ALL REQUIRED SURFACE WATER CONTROL MEASURES PRIOR TO SEEDING.
 6. SEED BEDS SHALL BE FIRM AND ROUGH PRIOR TO SEEDING. WHERE COMPACTION IS REQUIRED FOR ENGINEERING PURPOSES, SLOPES SHALL BE TRACK WALKED BEFORE SEEDING.
 7. BACKBLADING OR SMOOTHING IS PROHIBITED ON SEED BEDS STEEPER THAN 4:1.
 8. IT IS RECOMMENDED THAT AREAS BEING SEEDED FOR FINAL LANDSCAPING CONDUCT SOIL TESTS TO DETERMINE THE EXACT TYPE AND QUANTITY OF FERTILIZER NEEDED. MINIMIZE USE OF FERTILIZER ADJACENT TO WATER BODIES AND WETLANDS.

BMP C123: PLASTIC COVERING NOTES

- INSTALLATION**
- PLASTIC SLOPE COVER MUST BE INSTALLED AS FOLLOWS:
 - RUN PLASTIC UP AND DOWN THE SLOPE, NOT ACROSS THE SLOPE.
 - PLASTIC MAY BE INSTALLED PERPENDICULAR TO A SLOPE IF THE SLOPE LENGTH IS LESS THAN 10 FEET.
 - PROVIDE A MINIMUM OF 8-INCH OVERLAP AT THE SEAMS.
 - ON LONG OR WIDE SLOPES, OR SLOPES SUBJECT TO WIND, TAPE ALL SEAMS.
 - 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.
 - 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.
 - 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.
 - 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.

BMP C151: CONCRETE HANDLING

INSTALLATION

- 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 PILING, 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 SURFACE POLLUTION

INSTALLATION

- 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.

FILE: Erosion Control Details.dwg					
PROJECT: 25-NWID12					
CHECKED BY: CJM					
DETAILED BY: CJM					
DESIGNED BY: CJM	DATE	NO.	REVISION	BY	

SCALES ARE FOR FULL SIZE PLANS. ADJUST ACCORDINGLY



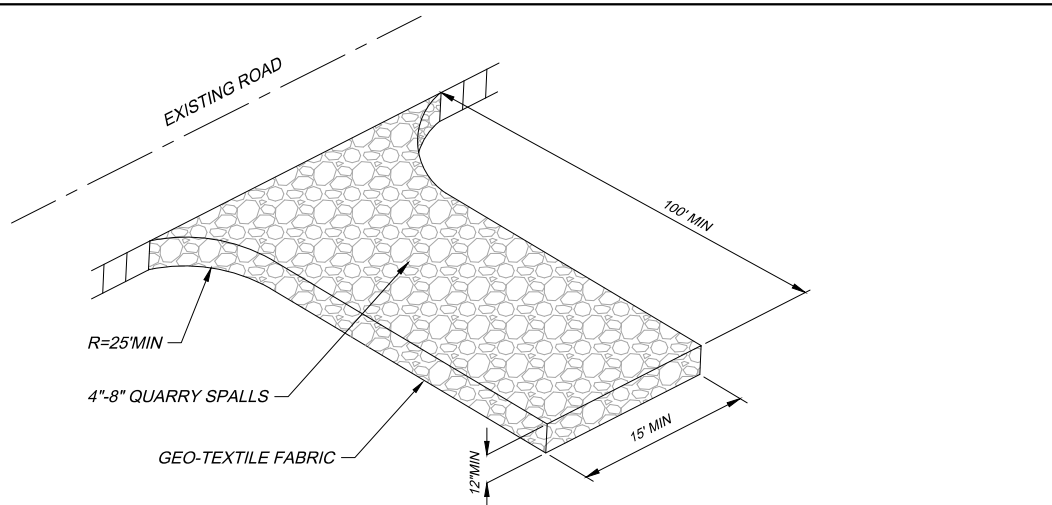
Vector
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8708 WILLOWS ROAD NE
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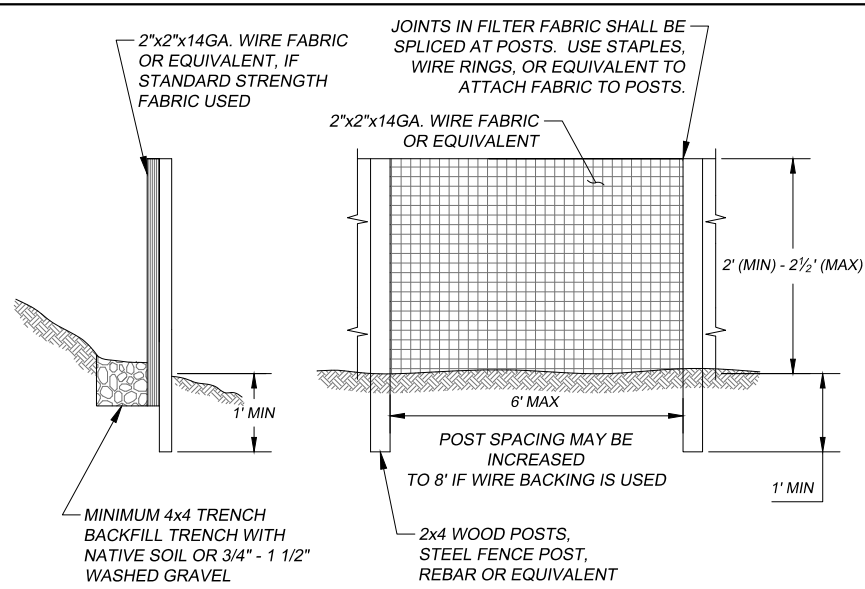
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CSWPP DETAILS
SHT 6 OF 7

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- BMP C105: STABILIZED CONSTRUCTION ENTRANCE/EXIT NOTES:**
1. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 100 FEET LONG. WIDTH SHALL BE AT LEAST 15 FEET AND BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED WHERE REQUIRED SIZE IS IMPRACTICAL.
 2. MATERIAL SHALL BE 4" TO 8" QUARRY SPALLS, A 4-INCH COURSE OF ASPHALT TREATED BASE (ATB), OR USE EXISTING PAVEMENT. DO NOT USE BROKEN/CRUSHED CONCRETE, CEMENT, OR CALCIUM CHLORIDE.
 3. 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 FOLLOWING STANDARDS:
 - GRAB TENSILE STRENGTH (ASTM D4751): 200 PSI MINIMUM
 - GRAB TENSILE ELONGATION (ASTM D4632): 30 PERCENT MAXIMUM
 - MULLEN BURST STRENGTH (ASTM D3786-80A): 400 PSI MINIMUM
 - AOS (ASTM D4751): 20 TO 45 (U.S. STANDARD SIEVE SIZE)
 4. FOR SINGLE-FAMILY RESIDENTIAL LOTS PAD MAY BE REDUCED IN LENGTH TO FIT SITE, TO NO LESS THAN 20 FEET LONG, AND IN DEPTH, TO 6 INCHES THICK WITH 4-INCH TO 6-INCH QUARRY SPALLS.
 5. ADDITIONAL QUARRY SPALLS SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
 6. IF THE ENTRANCE 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, AN INCREASE IN THE DIMENSIONS OF THE ENTRANCE, OR THE INSTALLATION OF A WHEEL WASH.

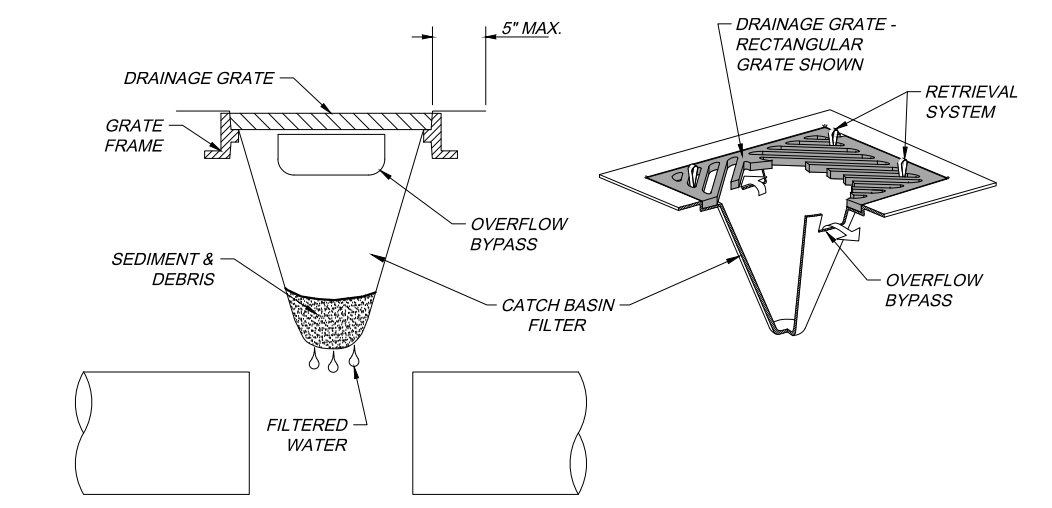
1 **BMP C105: STABILIZED CONSTRUCTION ENTRANCE**
SCALE: N.T.S.



GEOTEXTILE SPECIFICATIONS	
POLYMERIC MESH AOS (ASTM D4751)	0.60 mm MAX. FOR SLIT FILM WOVEN (#30 SIEVE) 0.30 mm FOR ALL OTHER GEOTEXTILE TYPES (#50 SIEVE) 0.15 mm MIN. FOR ALL FABRIC TYPES (#100 SIEVE)
WATER PERMITTIVITY (ASTM D4491)	0.02 SEC ⁻¹
GRAB TENSILE STRENGTH (ASTM D4632)	180 LB. MIN. FOR EXTRA STRENGTH 100 LB. MIN. FOR STANDARD STRENGTH
GRAB TENSILE ELONGATION (ASTM D4632)	30% MAXIMUM
ULTRAVIOLET RESISTANCE (ASTM D4355)	70% MINIMUM
ALL GEOTEXTILE PROPERTIES LISTED ABOVE ARE MINIMUM AVERAGE ROLL VALUES	

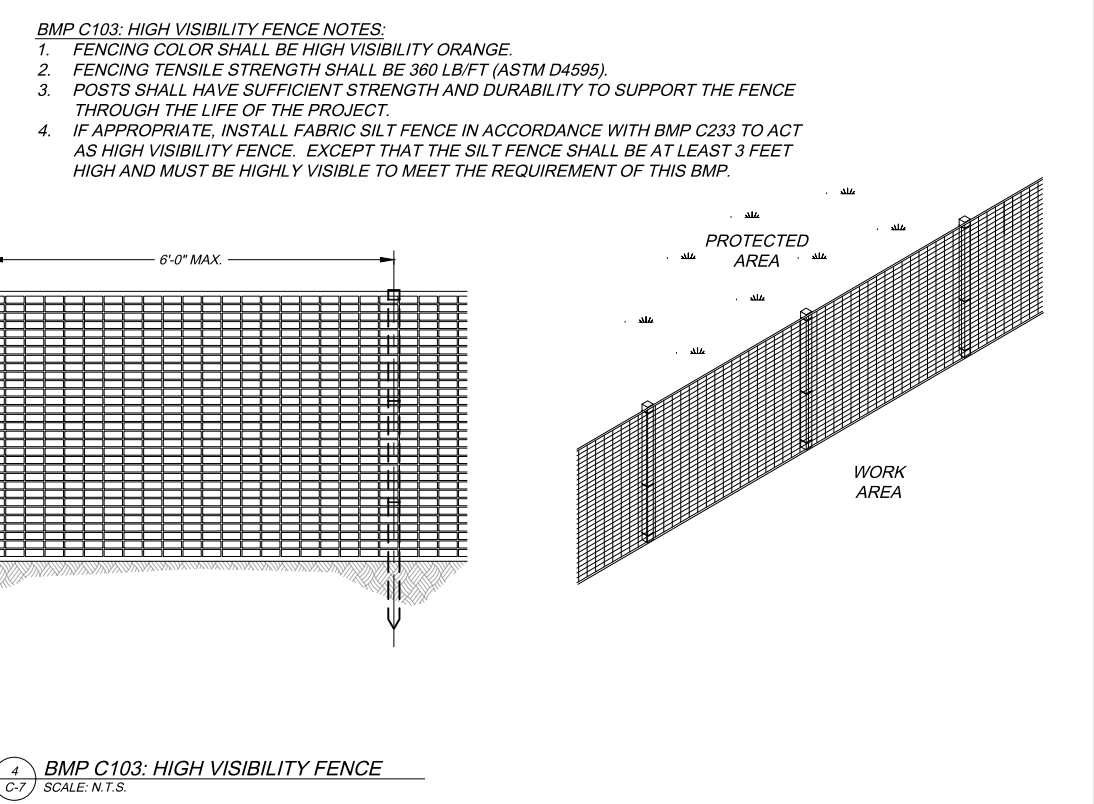
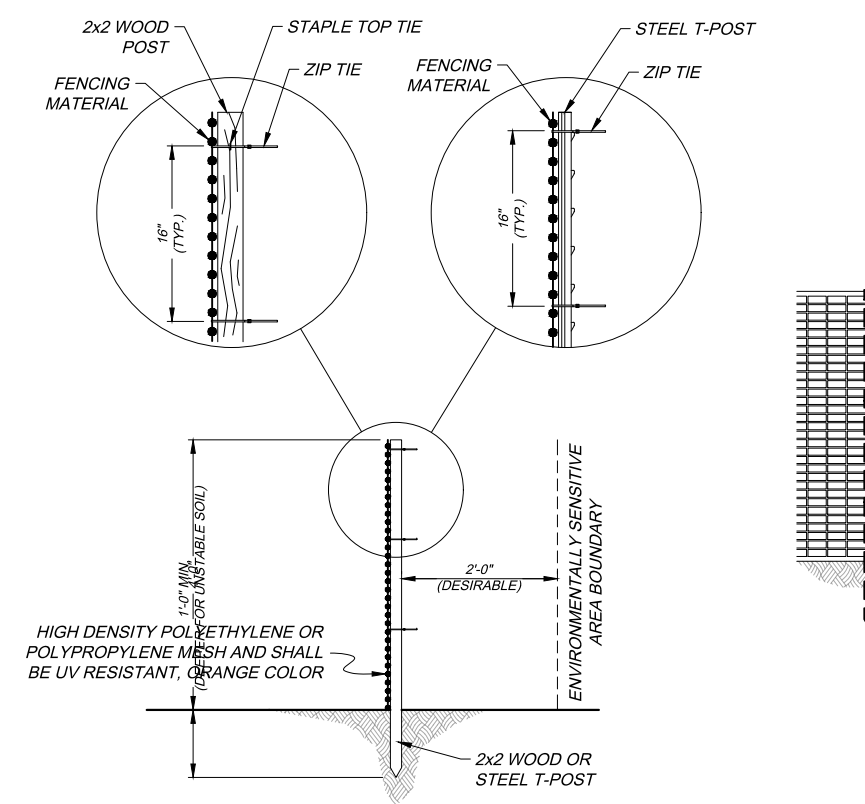
2 **BMP C233: SILT FENCE**
SCALE: N.T.S.

- BMP C233: SILT FENCE NOTES**
1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY SILT FENCES AT THE LOCATIONS SHOWN IN THE PLANS.
 2. CONSTRUCT SILT FENCES IN AREAS OF CLEARING, GRADING, OR DRAINAGE PRIOR TO STARTING THOSE ACTIVITIES.
 3. THE SILT FENCE SHALL HAVE A 2-FOOT MIN. AND A 2 1/2-FOOT MAX. HEIGHT ABOVE THE ORIGINAL GROUND SURFACE.
 4. THE FILTER FABRIC SHALL BE SEWN TOGETHER AT THE POINT OF MANUFACTURE TO FORM FILTER FABRIC LENGTHS AS REQUIRED. LOCATE ALL SEWN SEAMS AT SUPPORT POSTS. ALTERNATIVELY, TWO SECTIONS OF SILT FENCE CAN BE OVERLAPPED, PROVIDED THE CONTRACTOR CAN DEMONSTRATE, TO THE SATISFACTION OF THE ENGINEER, THAT THE OVERLAP IS LONG ENOUGH AND THAT THE ADJACENT FENCE SECTIONS ARE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.
 5. ATTACH THE FILTER FABRIC ON THE UP-SLOPE SIDE OF THE POSTS AND SECURE WITH STAPLES, WIRE, OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ATTACH THE FILTER FABRIC TO THE POSTS IN A MANNER THAT REDUCES THE POTENTIAL FOR TEARING.
 6. SUPPORT THE FILTER 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 FILTER 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 FILTER FABRIC IT SUPPORTS.
 8. BURY THE BOTTOM OF THE FILTER FABRIC 4-INCHES MIN. BELOW THE GROUND SURFACE. BACKFILL AND TAMP SOIL IN PLACE OVER THE BURIED PORTION OF THE FILTER FABRIC, SO THAT NO FLOW CAN PASS BENEATH THE 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 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-FOET. POSTS SHALL CONSIST OF EITHER:
 - 10.1. WOOD WITH DIMENSIONS OF 2-INCHES BY 2-INCHES WIDE MIN. AND A 3-FOET MIN. LENGTH. WOOD POSTS SHALL BE FREE OF DEFECTS SUCH AS KNOTS, SPLITS, OR GOUGES.
 - 10.2. NO. 6 STEEL REBAR OR LARGER.
 - 10.3. ASTM A 120 STEEL PIPE WITH A MINIMUM DIAMETER OF 1-INCH.
 - 10.4. U, T, L, OR C SHAPE STEEL POSTS WITH A MINIMUM WEIGHT OF 1.35 LBS./FT.
 - 10.5. 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 GRAVEL 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.
 - 12.1. GRAVEL CHECK DAMS SHALL BE APPROXIMATELY 1-FOOT DEEP AT THE BACK OF THE FENCE. GRAVEL 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.
 - 12.2. GRAVEL CHECK DAMS SHALL CONSIST OF CRUSHED SURFACING BASE COURSE, GRAVEL BACKFILL FOR WALLS, OR SHOULDER BALLAST. GRAVEL CHECK DAMS SHALL BE LOCATED EVERY 10 FEET ALONG THE FENCE WHERE THE FENCE MUST CROSS CONTOURS.



- BMP C220: INLET PROTECTION NOTES:**
1. SIZE THE CATCH BASIN FILTER (CBF) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
 2. THE CBF SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
 3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE CBF WITHOUT SPILLING THE COLLECTED MATERIAL.
 4. PERFORM MAINTENANCE WHEN DEPTH OF ACCUMULATED SEDIMENT AND DEBRIS REACHES APPROX. 3/4 THE HEIGHT OF THE FILTER (OR LESS WHEN SO SPECIFIED BY THE MANUFACTURER).
 5. AT ALL PROPOSED CATCH BASINS, CATCH BASIN PROTECTION SHALL ABE INSTALLED IMMEDIATELY UPON CATCH BASIN INSTALLATION AND SHALL REMAIN UNTIL FINAL SITE STABILIZATION.

3 **BMP C220: STORM DRAIN INLET PROTECTION**
SCALE: N.T.S.



4 **BMP C103: HIGH VISIBILITY FENCE**
SCALE: N.T.S.

X:\2025 Jobs\NWID12_Ankपुरa Residence\Engineering\Drawings\Erosion Control Details.dwg - Mar 05, 2025 - 9:29am

FILE: Erosion Control Details.dwg				
PROJECT: 25-NWID12				
CHECKED BY: CJM				
DETAILED BY: CJM				
DESIGNED BY: CJM	DATE	NO.	REVISION	BY

SCALES ARE FOR FULL SIZE PLANS. ADJUST ACCORDINGLY



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Appendix C

Geotechnical Memorandum



TECHNICAL MEMORANDUM

TO: Mr. Phillip Oppen, Operations Manager, Northwest Interiors & Design, LLC
FROM: Annabel Irwin, PE
DATE: February 21, 2025
RE: Summary of Geotechnical Engineering Services
Ankapura Residence
Mercer Island, Washington
Sage Project No. 074002

INTRODUCTION

Sage Geotechnical, LLC (Sage) provided geotechnical engineering services in support of the Ankapura Residence project, located at 4249 92nd Avenue Southeast in Mercer Island, Washington (site; Figure 1). Services were provided in accordance with the scope outlined in Sage's January 27, 2025, proposal. Findings are summarized herein.

This memorandum has been prepared with information provided by Vector Engineering, Inc. (project civil engineer) and Northwest Interiors & Design, LLC (NWID, project general contractor) and with data collected during Sage's geotechnical field exploration and laboratory testing programs.

PROJECT UNDERSTANDING

The site is developed with a single-family residence. The owners propose to add new landscaping features and retaining walls/rockeries to the exterior of the residence. They will also lower the basement and make improvements to the interior of the residence. Sage understands that the existing building framework will be reused and that the proposed improvements will necessitate additional stormwater management.

SITE CONDITIONS

The site is located in a residential neighborhood and is developed with a single-family residence, a pool, landscaping, and a paved driveway. Site topography is generally flat, and the driveway slopes down to the east at a vertical relief of approximately 3 feet (ft).

The site is located 120 ft west of a steep slope and several other geologically hazardous areas (Mercer Island, accessed February 18, 2025).

GEOLOGIC SETTING

Geologic information for the site and the surrounding area was obtained from the *Geologic Map of Surficial Deposits in the Seattle 30' x 60' Quadrangle, Washington* (Yount et al. 1993). Surficial deposits in the vicinity of the site are mapped as Fraser-age glacial till (Qgt), a unit that typically consists of a consolidated, heterogeneous mixture of boulders, cobbles, gravel, sand, and silt. This soil unit typically exhibits very low permeability and high shear strength.

The subsurface conditions observed in Sage's February 2025 explorations were generally consistent with the mapped geology.

SUBSURFACE CONDITIONS

On February 6, 2025, Sage observed NWID excavate two test pits (TP-1 and TP-2) at the approximate locations shown on Figure 2. Test pit TP-1 extended 10.2 ft below ground surface (bgs), and test pit TP-2 extended 10.0 ft bgs.

Sage coordinated and monitored the field explorations, collected representative soil samples, and maintained detailed logs of the subsurface soil and groundwater conditions observed. Subsurface conditions were described using the soil classification system shown on Figure 3, in general accordance with ASTM International (ASTM) standard D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. Summary test pit logs are presented on Figures 4 and 5.

Soil samples collected from the explorations were transported to Sage's geotechnical laboratory for further examination and testing. Laboratory test results are presented on Figure 6.

Soil Conditions

The soils observed underlying existing surface conditions (i.e., topsoil) were categorized into two units:

- **Recessional outwash:** Recessional outwash was observed in both test pits and typically consisted of silty sand with variable gravel content. The recessional outwash was in a medium dense, moist condition and extended 2.0 to 2.5 ft bgs.
- **Glacial till:** Glacial till was observed beneath the recessional outwash in both test pits and typically consisted of silty sand with variable gravel and cobble content. The glacial till was in a dense to very dense, moist condition and extended to the maximum depth explored (10.2 ft bgs).

Groundwater Conditions

During Sage's February 2025 field investigation, groundwater seepage was not observed in test pits TP-1 and TP-2. Iron staining, a groundwater indicator, was observed in both test pits, near the contact of the recessional outwash and glacial till units.

The groundwater conditions reported herein are for the specific date and locations indicated and may not be representative of other locations and/or times. Groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors. Site groundwater levels are expected to fluctuate seasonally, with maximum levels occurring during late winter and early spring.

CONCLUSIONS AND RECOMMENDATIONS

The site is underlain by dense to very dense glacial till. In Sage's opinion, the glacial till will provide adequate support for the extended basement and retaining walls/rockeries. Glacial till typically exhibits very low permeability; site soils are unsuitable for stormwater infiltration. The following recommendations should be incorporated into the project design.

Foundation Support

Shallow foundations should be constructed on a prepared subgrade that consists of medium dense to very dense native soil or on compacted structural fill that extends to such soil. At least 6 inches of structural fill should be placed over compacted native soil and directly beneath footings. Pockets of loose or unsuitable material should be overexcavated.

Where overexcavation is required, the overexcavation zone should extend beyond each side of the footing a horizontal distance equal to at least one-half of the overexcavation depth. For example, a 2-ft-wide footing with a 4-ft-deep overexcavation should have a 6-ft-wide overexcavation zone. The foundation design parameters in Table 1 should be used in conjunction with the complete recommendations in this memorandum.

Table 1. Design Parameters for Shallow Foundations

Allowable soil bearing pressure = 3,000 psf
Allowable coefficient of sliding resistance = 0.35
Allowable passive earth pressure = 300 pcf
Minimum foundation width = 18 inches (continuous), 24 inches (isolated)

ft = feet

pcf = pounds per cubic foot

psf = pounds per square foot

Sage used a safety factor of 3 to calculate the allowable soil bearing pressure in Table 1. When developing design parameters, Sage assumed that shallow foundations would be established on at least 6 inches of compacted structural fill placed over a uniformly firm, unyielding subgrade. The geotechnical engineer should evaluate foundation subgrades prior to the placement of formwork, rebar, or structural fill.

The allowable soil bearing pressure in Table 1 applies to dead and live loads, exclusive of the weight of the footing and any overlying backfill. The bearing pressure can be increased by one-third for transient loads, such as those induced by wind and seismic forces.

Sage recommends a minimum width of 18 inches for continuous wall footings and 24 inches for isolated column footings. Perimeter footings should be embedded at least 12 inches below the lowest adjacent grade, where the ground is flat. Interior footings should be embedded at least 6 inches below the nearest adjacent grade. Sage estimates that continuous and isolated foundations will settle less than 0.5 inches if constructed as recommended. Similarly loaded foundation elements will likely experience 0.5 inches or less of differential settlement over 50-ft spans. Settlement is expected to occur as loads are applied during construction.

An allowable coefficient of sliding resistance of 0.35, applied to vertical dead loads only, can be used to compute frictional resistance acting on the base of footings. This coefficient includes a factor of safety of 1.5 on the calculated ultimate value.

The passive resistance of properly compacted structural fill placed against the sides of foundations can be considered equivalent to a fluid with a density of 300 pounds per cubic foot (pcf). This foundation passive earth pressure has been reduced by a factor of 1.5 to limit deflections to less than 2 percent of the embedded depth. The passive earth pressure and friction components can be combined, provided the passive component does not exceed two-thirds of the total. The upper foot of soil should be excluded from the calculation, unless the foundation perimeter will be covered by a slab-on-grade or pavement.

Slabs-On-Grade

Slabs-on-grade should be installed on at least 6 inches of compacted structural fill placed over a uniformly firm, unyielding subgrade. A modulus of vertical subgrade reaction (subgrade modulus) can be used to design slabs-on-grade. The subgrade modulus will vary based on the dimensions of the slab and the magnitude of applied loads on the slab surface; slabs with larger dimensions and loads are influenced by soils to a greater depth. Sage recommends using a subgrade modulus of 250 pounds per cubic inch to design on-grade floor slabs. This subgrade modulus is for a 1-ft-by-1-ft square plate and is not the overall modulus of a larger area.

Interior slabs-on-grade should include a vapor barrier and a capillary break layer, designed and installed in accordance with industry standards.

Retaining Wall Design Parameters

Retaining walls should be designed with an equivalent fluid density of 35 pcf for the active condition and 55 pcf for the at-rest condition. A rectangular surcharge of $10H$ pounds per square foot, where H is the height of the wall, should be used for seismic loading. Sage assumes that the retaining walls will be backfilled with structural fill and wall drainage systems will be installed.

Infiltration Feasibility

The site is underlain by low-permeability glacial till. Low-permeability units, like dense glacial till, rock, and clay, are considered unsuitable for stormwater infiltration (Ecology 2019). As such, Sage does not recommend onsite stormwater infiltration.

Geologically Hazardous Areas

The site is located approximately 120 ft to the west of mapped geologically hazardous areas, including a landslide area, a protected slope, a potential slide hazard, a seismic hazard area, and an erosion hazard area (Mercer Island, accessed February 18, 2025). The nearest mapped fault is 0.5 miles north of the site (DNR, accessed February 19, 2025).

Section 19.07.160 of the *Mercer Island City Code* states that the largest buffer shall be applied in instances where more than one geologically hazardous area is mapped. The largest buffer required for the geologically hazardous areas mapped near the site is 75 ft from the top of the slope. The site is not located within a mapped geologically hazardous area or an associated buffer.

CONSTRUCTION CONSIDERATIONS

The following key points should be considered when developing project plans and specifications:

- **Stripping:** Sage observed up to 8 inches of topsoil in its February 2025 explorations. Topsoil should be stripped from areas designated for development. Stripped topsoil is not suitable for reuse as structural fill.
- **Subgrade preparation:** Before structural fill, formwork, or rebar is placed, the subgrade should be scarified; moisture-conditioned; and compacted to a firm, unyielding condition. The prepared subgrade should be proof-rolled in the presence of a qualified geotechnical engineer, who is familiar with the site and can check for soft/disturbed areas. Areas of limited access can be evaluated with a steel T-probe. If soft and/or disturbed subgrade soils are encountered, additional moisture conditioning and compaction should be completed to produce a firm, unyielding subgrade. Alternatively, unsuitable soils can be overexcavated and replaced with compacted structural fill.
- **Site soil:** Because site soils contain significant fines, adequate compaction could be difficult to achieve, particularly during periods of wet weather. Constituents larger than 6 inches in diameter should be removed from soils that will be reused as structural fill.
- **Oversized material:** Cobbles and boulders are often present in glacially derived soils, like recessional outwash and glacial till. Cobbles were observed in Sage's February 2025 explorations. Native soils that will be reused as structural fill should not contain constituents larger than 6 inches in diameter.
- **Import structural fill:** Gravel Borrow is a suitable source of import structural fill. Gravel Borrow should conform to the requirements in Section 9-03.14(1) of the Washington State Department of Transportation's *2025 Standard Specifications for Road, Bridge, and Municipal Construction* (hereinafter, *2025 WSDOT Standard Specifications*). During periods of wet weather, the fines content should not exceed 5 percent, based on the minus $\frac{3}{4}$ -inch fraction.
- **Fill placement and compaction:** Structural fill should be placed on an approved subgrade that consists of uniformly firm, unyielding native soil or of compacted structural fill that extends to such soil. Structural fill should be placed and compacted in accordance with the requirements in Section 2-03.3(14)C, Method C of the *2025 WSDOT Standard Specifications*. Method A is appropriate for non-structural areas, such as landscaping. Each layer of structural fill should be compacted to at least 95 percent of the maximum dry density, determined in accordance with the compaction control tests in Section 2-03.3(14)D of the *2025 WSDOT Standard Specifications*. Alternatively, the maximum dry density can be determined using ASTM standard test method D1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort* ($56,000 \text{ ft-lbf/ft}^3$ ($2,700 \text{ kN-m/m}^3$)).
- **Construction dewatering:** Temporary excavations should be dewatered to allow construction to be completed in the dry. Where shallow groundwater seepage is encountered, the use of conventional sumps and pumps should be sufficient to dewater excavations. The contractor will be responsible for the design, monitoring, and maintenance of dewatering systems.
- **Temporary slopes:** Temporary excavations should be completed in accordance with the requirements in Section 2-09 of the *2025 WSDOT Standard Specifications*. All applicable local, state, and federal safety codes should be followed.

The contractor will be responsible for actual excavation configurations and the maintenance of safe working conditions, including temporary excavation stability. Temporary excavations in excess of 4 ft should be shored or sloped in accordance with the requirements outlined in Safety

Standards for Construction Work, Part N (Washington Administrative Code Chapter 296-155). The soil likely to be exposed in the excavations should be considered Type C, with a maximum allowable excavation inclination of 1½ horizontal to 1 vertical (1½H:1V).

- **Permanent slopes:** Permanent cut-and-fill slopes should be no steeper than 2H:1V. This design recommendation does not apply to stormwater pond slopes, which are typically 3H:1V or flatter. Stormwater pond slopes should be designed in accordance with local stormwater codes. Permanent and temporary slopes should be protected from erosion and seeded or vegetated as soon as practical.
- **Footing drains:** Perimeter foundation footing drains should be included in the design of structures.

USE OF THIS TECHNICAL MEMORANDUM

Sage Geotechnical, LLC has prepared this technical memorandum for the exclusive use of Northwest Interiors & Design, LLC; Vector Engineering, Inc.; and their designated representatives for specific application to the Ankapura Residence project in Mercer Island, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Sage Geotechnical. Reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Sage Geotechnical, shall be at the user's sole risk. Sage Geotechnical warrants that, within the limitations of scope, schedule, and budget, its services have been provided in a manner consistent with that level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. Sage Geotechnical makes no other warranty, either express or implied.

CLOSING

We trust that this memorandum provides you with the information needed to proceed with the project. If you have questions or comments, or if we can be of further service, please contact Annabel Irwin at annabeli@sagegeotechnical.com.

SAGE GEOTECHNICAL, LLC

Annabel Irwin, PE
Senior Engineer



Lance Levine, PE
Senior Engineer

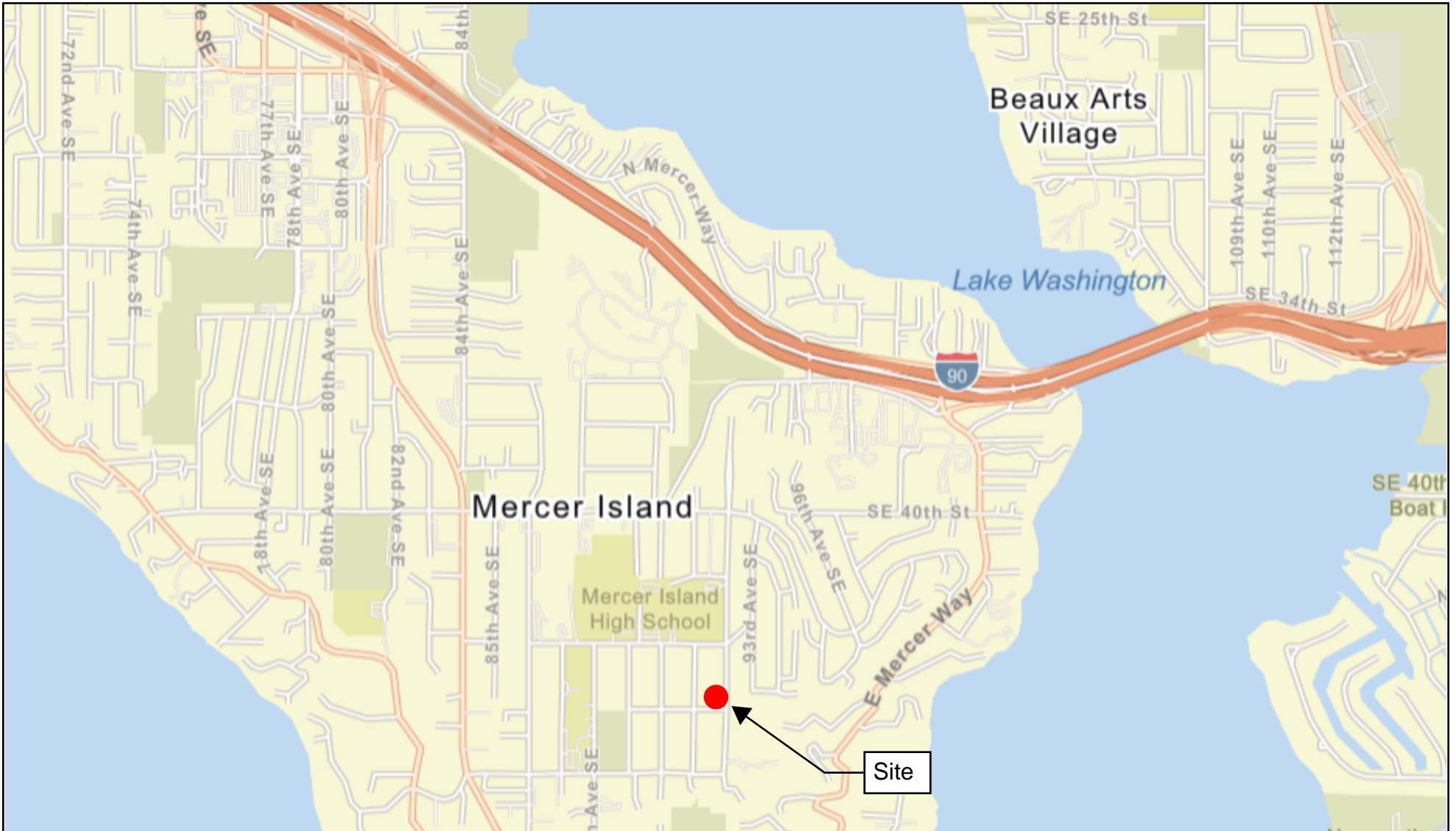
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Attachments: Figure 1. Vicinity Map
Figure 2. Site and Exploration Plan
Figure 3. Key to Test Pit Logs
Figures 4 and 5. Logs of Test Pits TP-1 and TP-2
Figure 6. Grain Size Analysis Results

REFERENCES

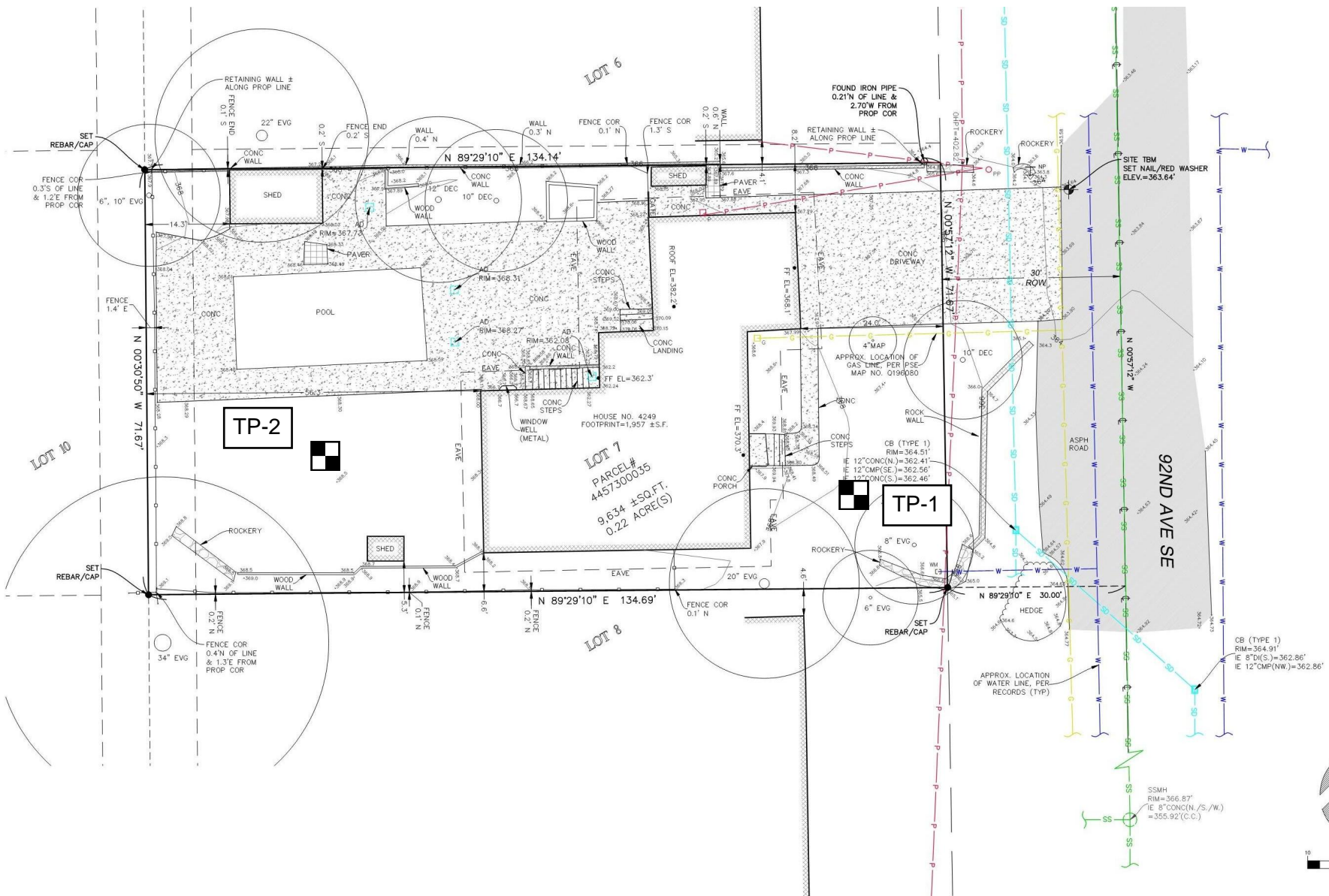
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Source: Esri 2025



Vicinity Map	
Ankapura Residence	
Mercer Island, Washington	Figure 1



 Approximate Test Pit Location and Designation

Site and Exploration Plan

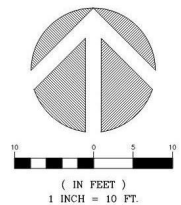
Ankapura Residence

Mercer Island, Washington

Figure 2



Source: Terrane 2021



Project: **Ankapura Residence**
 Project Location: **Mercer Island, Washington**
 Project Number: **074002**

Key to Test Pit Logs
Sheet 1 of 1

Depth (feet)	Sample Type	Sample Number	Material Type	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7

COLUMN DESCRIPTIONS

- 1** Depth (feet): Depth in feet below the ground surface.
- 2** Sample Type: Type of soil sample collected at the depth interval shown.
- 3** Sample Number: Sample identification number.
- 4** Material Type: Type of material encountered.
- 5** Graphic Log: Graphic depiction of the subsurface material encountered.
- 6** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
- 7** REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

- CHEM: Chemical tests to assess corrosivity
- COMP: Compaction test
- CONS: One-dimensional consolidation test
- LL: Liquid Limit, percent
- PI: Plasticity Index, percent
- GS: Grain size analysis
- w: Gravimetric water content
- 200: Wash sieve (No. 200 Sieve)






MATERIAL GRAPHIC SYMBOLS

 Silty SAND (SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

 Grab Sample

OTHER GRAPHIC SYMBOLS

-  Water level (at time of Excavation, ATD)
-  Water level (after waiting, AW)
-  Minor change in material properties within a stratum
-  Inferred/gradational contact between strata
-  Queried contact between strata

GENERAL NOTES

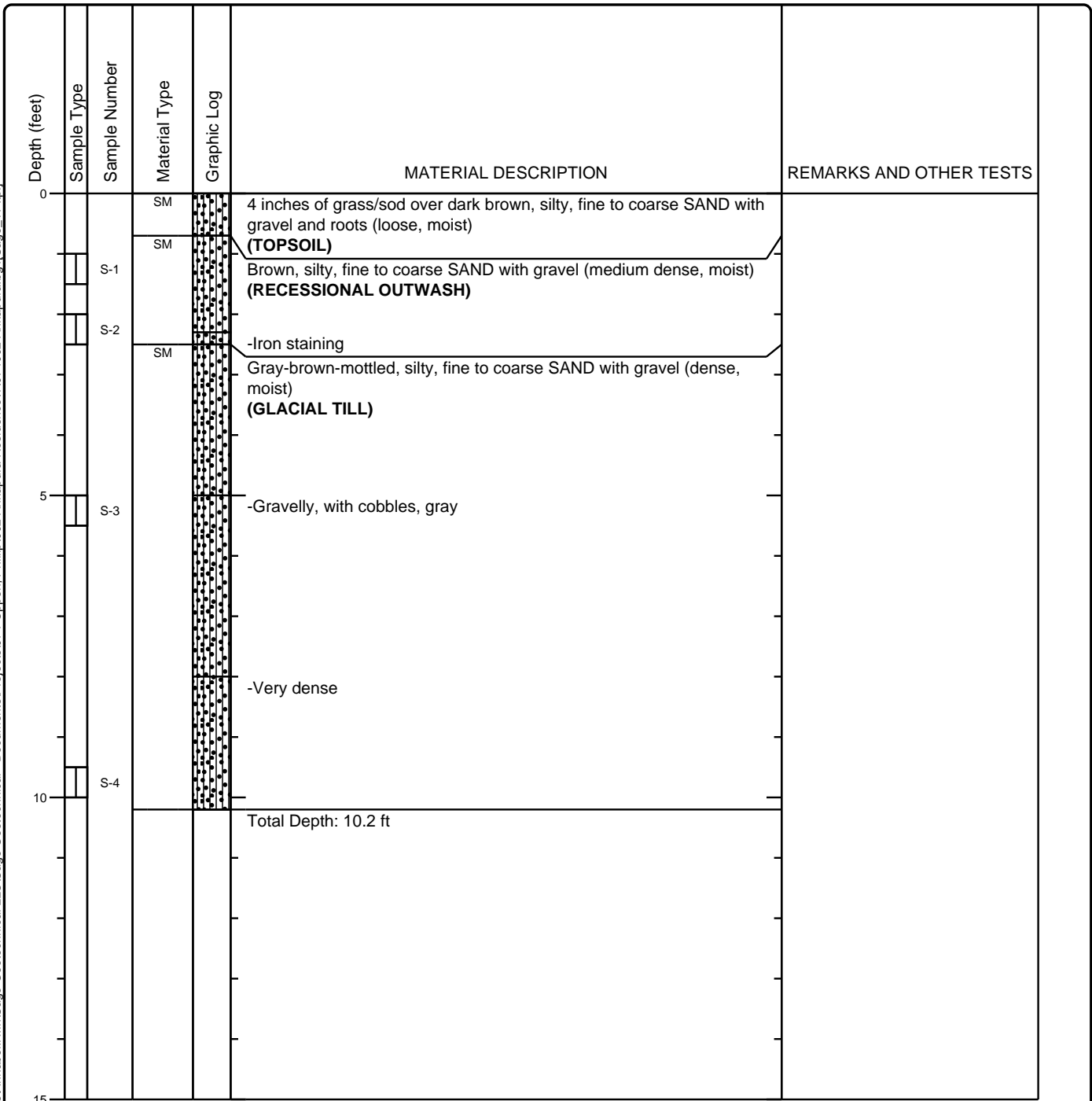
- 1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
- 2: Descriptions on these logs apply only at the specific exploration locations and at the time the explorations were completed. They are not warranted to be representative of subsurface conditions at other locations or times.

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Project: **Ankapura Residence**
 Project Location: **Mercer Island, Washington**
 Project Number: **074002**

Log of Test Pit TP-1
Sheet 1 of 1

Date(s) Explored 2-6-25	Logged By AMI	Checked By LGL
Excavation Method Excavator	Bucket Size/Type 24" Toothed	Total Depth of Test Pit 10.2 ft
Excavator Type Deere 50G	Excavation Contractor Northwest Interiors & Design, LLC	Approximate Surface Elevation Not measured
Groundwater Level and Date Measured Not measured	Sampling Method(s) Grab	Hammer Data N/A
Test Pit Backfill Spoils	Approximate Location 47.569434, -122.216387	



C:\Users\Annabellrwin\Sage_Geotechnical - Documents\Projects\074_Oppen, Phillip\002_Ankapura Residence\1074002_Ankapura.bq4[Sage_TP1.pj]

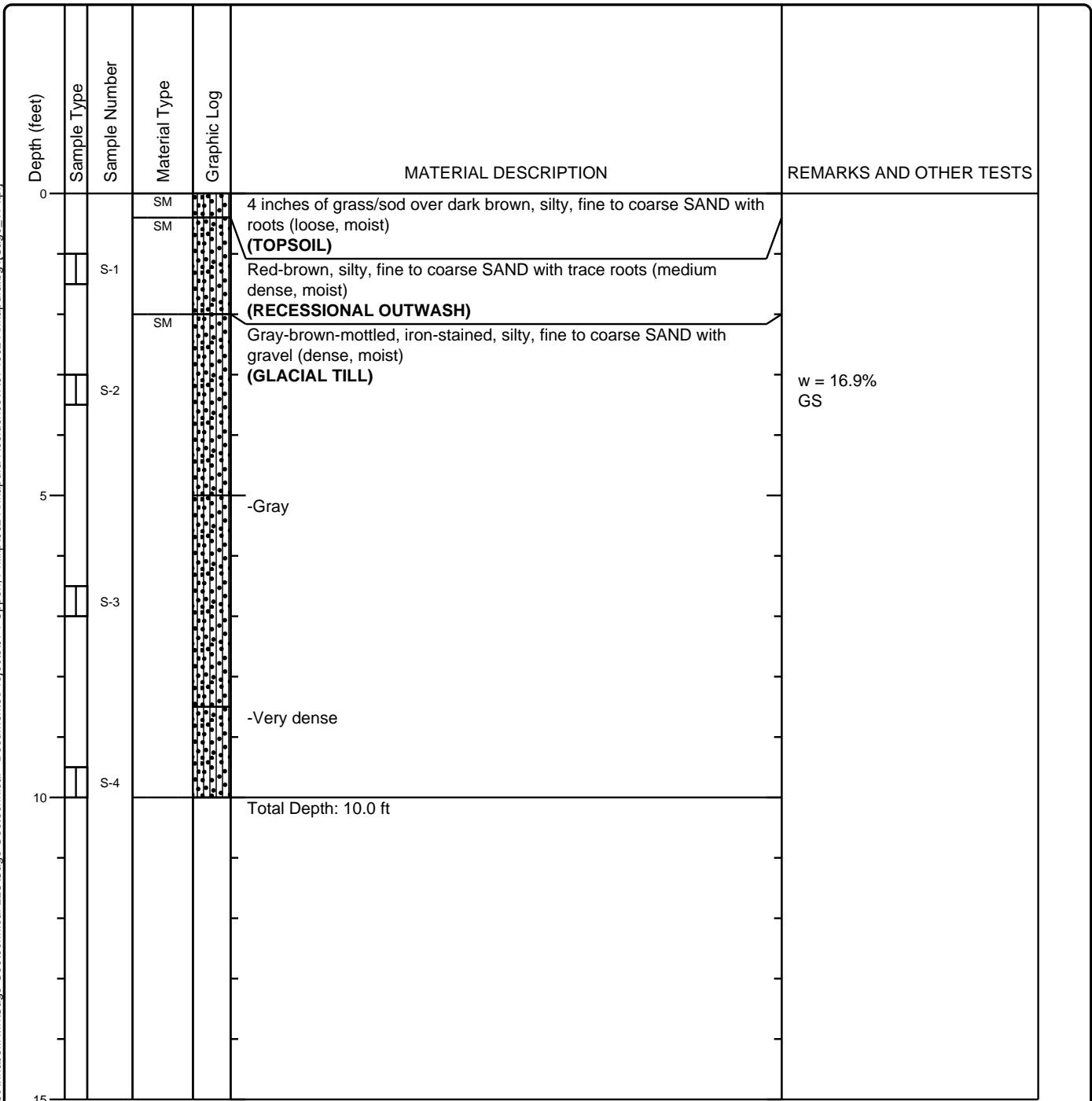


Figure 4

Project: **Ankapura Residence**
 Project Location: **Mercer Island, Washington**
 Project Number: **074002**

Log of Test Pit TP-2
Sheet 1 of 1

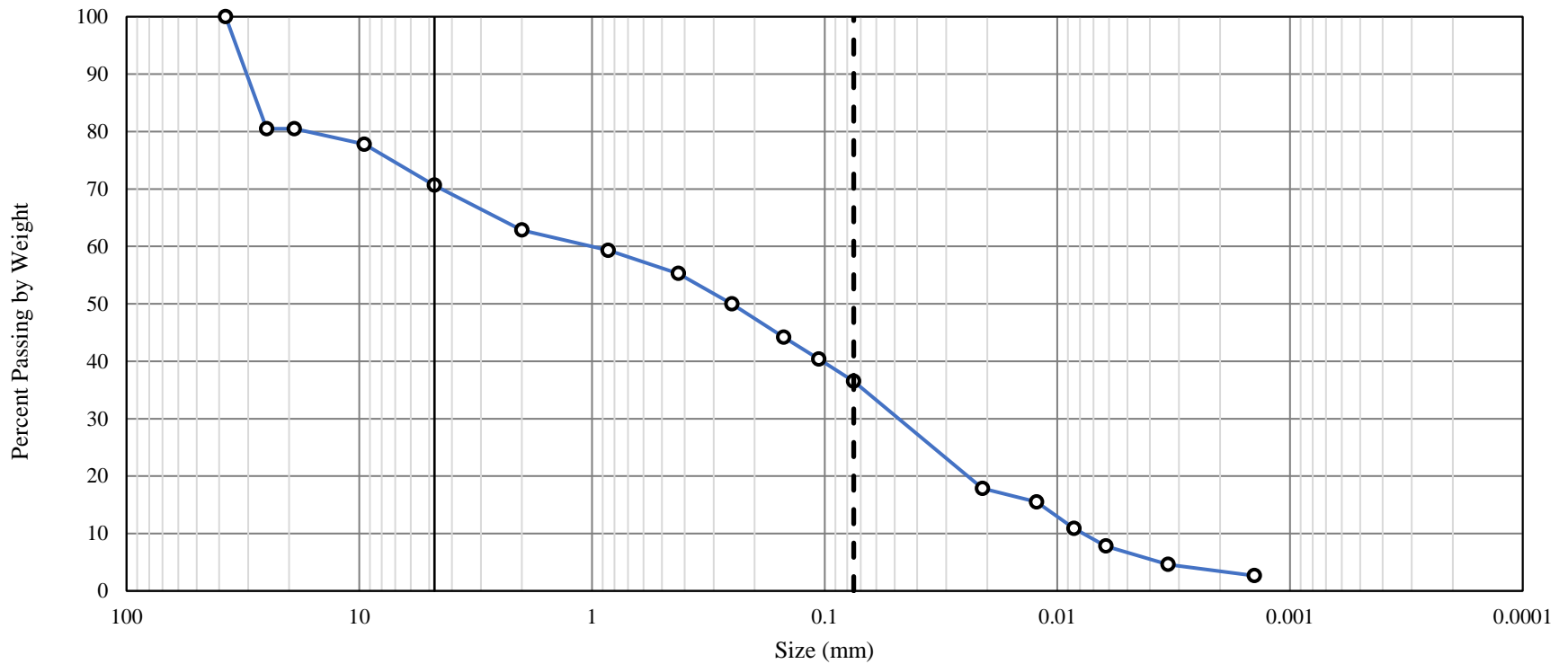
Date(s) Explored 2-6-25	Logged By AMI	Checked By LGL
Excavation Method Excavator	Bucket Size/Type 24" Toothed	Total Depth of Test Pit 10.0 ft
Excavator Type Deere 50G	Excavation Contractor Northwest Interiors & Design, LLC	Approximate Surface Elevation Not measured
Groundwater Level and Date Measured Not measured	Sampling Method(s) Grab	Hammer Data N/A
Test Pit Backfill Spoils	Approximate Location 47.569452, -122.216758	



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Figure 5



	Depth	w	D90	D60	D30	D10	Cu	Cc	% G	% S	% F	USCS
	(ft)	(%)	(mm)	(mm)	(mm)	(mm)	-	-	(%)	(%)	(%)	-
—○— TP2 S-2	3.0	16.9%	30.46	1.01	0.05	0.01	129.9	0.3	29.4	34.1	36.5	SM

w = as-received moisture content
 % G = percent gravel and larger
 % S = percent sand
 % F = percent fines
 USCS = Unified Soil Classification System group symbol
 To be well-graded: $1 < C_c < 3$, $C_u > 4$ for GW, $C_u > 6$ for SW



Grain Size Analysis Results ASTM D422		
Ankapura Residence		
Mercer Island, Washington	Figure	6

Appendix D

Calculations

WWHM2012
PROJECT REPORT

General Model Information

WWHM2012 Project Name: default
Site Name: Ankpura
Site Address: 4249 92nd Ave SE
City: Mercer Island
Report Date: 3/4/2025
Gage: Seatac
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2023/03/31
Version: 4.2.19

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.094
Pervious Total	0.094
Impervious Land Use	acre
ROOF TOPS FLAT	0.066
SIDEWALKS MOD	0.061
Impervious Total	0.127
Basin Total	0.221

Mitigated Land Use

Basin 1

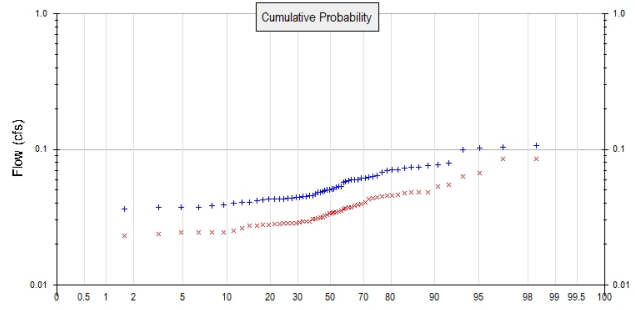
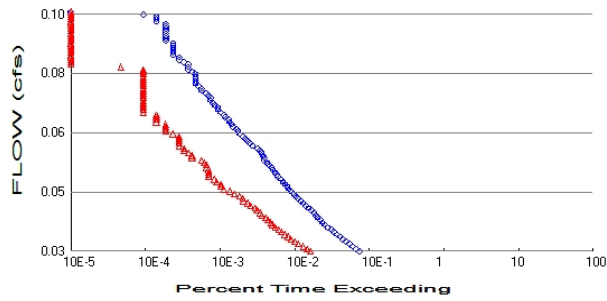
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.137
Pervious Total	0.137
Impervious Land Use	acre
ROOF TOPS FLAT	0.059
SIDEWALKS MOD	0.025
Impervious Total	0.084
Basin Total	0.221

Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0.094
 Total Impervious Area: 0.127

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.137
 Total Impervious Area: 0.084

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.052346
5 year	0.067147
10 year	0.077533
25 year	0.091353
50 year	0.102172
100 year	0.113452

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.034213
5 year	0.044958
10 year	0.052797
25 year	0.063557
50 year	0.072215
100 year	0.081444

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.067	0.044
1950	0.071	0.048
1951	0.044	0.031
1952	0.035	0.023
1953	0.041	0.026
1954	0.043	0.029
1955	0.049	0.031
1956	0.045	0.029
1957	0.051	0.034
1958	0.043	0.028

1959	0.046	0.029
1960	0.044	0.028
1961	0.043	0.028
1962	0.039	0.025
1963	0.045	0.029
1964	0.044	0.028
1965	0.053	0.035
1966	0.036	0.023
1967	0.064	0.046
1968	0.077	0.048
1969	0.048	0.031
1970	0.048	0.031
1971	0.058	0.037
1972	0.062	0.046
1973	0.037	0.024
1974	0.053	0.034
1975	0.059	0.038
1976	0.042	0.027
1977	0.044	0.028
1978	0.059	0.037
1979	0.076	0.048
1980	0.072	0.045
1981	0.052	0.034
1982	0.074	0.048
1983	0.061	0.040
1984	0.037	0.025
1985	0.051	0.034
1986	0.045	0.029
1987	0.070	0.046
1988	0.043	0.028
1989	0.063	0.039
1990	0.107	0.085
1991	0.079	0.055
1992	0.037	0.024
1993	0.041	0.024
1994	0.039	0.024
1995	0.047	0.030
1996	0.060	0.043
1997	0.050	0.035
1998	0.050	0.032
1999	0.104	0.067
2000	0.050	0.033
2001	0.059	0.037
2002	0.062	0.041
2003	0.057	0.036
2004	0.099	0.063
2005	0.042	0.027
2006	0.040	0.028
2007	0.102	0.085
2008	0.073	0.053
2009	0.070	0.044

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1067	0.0853
2	0.1041	0.0847
3	0.1019	0.0669

4	0.0994	0.0634
5	0.0788	0.0548
6	0.0766	0.0529
7	0.0759	0.0484
8	0.0742	0.0484
9	0.0735	0.0483
10	0.0724	0.0477
11	0.0710	0.0459
12	0.0703	0.0457
13	0.0700	0.0457
14	0.0673	0.0448
15	0.0638	0.0442
16	0.0632	0.0438
17	0.0622	0.0429
18	0.0617	0.0407
19	0.0610	0.0396
20	0.0599	0.0388
21	0.0594	0.0385
22	0.0592	0.0373
23	0.0586	0.0372
24	0.0580	0.0370
25	0.0575	0.0361
26	0.0535	0.0355
27	0.0532	0.0345
28	0.0522	0.0343
29	0.0513	0.0341
30	0.0509	0.0336
31	0.0501	0.0336
32	0.0500	0.0327
33	0.0497	0.0322
34	0.0491	0.0315
35	0.0481	0.0314
36	0.0480	0.0311
37	0.0468	0.0306
38	0.0457	0.0305
39	0.0453	0.0295
40	0.0450	0.0295
41	0.0449	0.0295
42	0.0445	0.0291
43	0.0443	0.0285
44	0.0439	0.0285
45	0.0435	0.0284
46	0.0431	0.0283
47	0.0429	0.0281
48	0.0429	0.0280
49	0.0428	0.0278
50	0.0425	0.0277
51	0.0416	0.0275
52	0.0408	0.0272
53	0.0407	0.0262
54	0.0401	0.0252
55	0.0387	0.0245
56	0.0386	0.0244
57	0.0373	0.0244
58	0.0372	0.0243
59	0.0371	0.0237
60	0.0362	0.0232
61	0.0349	0.0231

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0262	1565	345	22	Pass
0.0269	1412	311	22	Pass
0.0277	1270	279	21	Pass
0.0285	1156	237	20	Pass
0.0292	1051	215	20	Pass
0.0300	947	190	20	Pass
0.0308	872	173	19	Pass
0.0315	795	156	19	Pass
0.0323	713	141	19	Pass
0.0331	661	130	19	Pass
0.0338	592	118	19	Pass
0.0346	541	109	20	Pass
0.0354	499	102	20	Pass
0.0362	468	93	19	Pass
0.0369	433	87	20	Pass
0.0377	408	78	19	Pass
0.0385	387	73	18	Pass
0.0392	357	67	18	Pass
0.0400	326	63	19	Pass
0.0408	303	55	18	Pass
0.0415	282	50	17	Pass
0.0423	258	44	17	Pass
0.0431	238	43	18	Pass
0.0438	219	39	17	Pass
0.0446	208	33	15	Pass
0.0454	188	29	15	Pass
0.0461	180	24	13	Pass
0.0469	170	22	12	Pass
0.0477	158	22	13	Pass
0.0484	148	19	12	Pass
0.0492	139	18	12	Pass
0.0500	126	15	11	Pass
0.0507	121	15	12	Pass
0.0515	116	15	12	Pass
0.0523	108	15	13	Pass
0.0530	105	14	13	Pass
0.0538	97	14	14	Pass
0.0546	91	13	14	Pass
0.0553	83	12	14	Pass
0.0561	83	9	10	Pass
0.0569	81	9	11	Pass
0.0576	77	8	10	Pass
0.0584	73	7	9	Pass
0.0592	68	7	10	Pass
0.0600	58	6	10	Pass
0.0607	54	6	11	Pass
0.0615	50	6	12	Pass
0.0623	46	6	13	Pass
0.0630	43	6	13	Pass
0.0638	39	5	12	Pass
0.0646	37	4	10	Pass
0.0653	35	4	11	Pass
0.0661	32	4	12	Pass

0.0669	31	4	12	Pass
0.0676	29	3	10	Pass
0.0684	28	3	10	Pass
0.0692	25	3	12	Pass
0.0699	24	3	12	Pass
0.0707	22	2	9	Pass
0.0715	20	2	10	Pass
0.0722	20	2	10	Pass
0.0730	18	2	11	Pass
0.0738	17	2	11	Pass
0.0745	16	2	12	Pass
0.0753	16	2	12	Pass
0.0761	15	2	13	Pass
0.0768	14	2	14	Pass
0.0776	12	2	16	Pass
0.0784	12	2	16	Pass
0.0791	11	2	18	Pass
0.0799	10	2	20	Pass
0.0807	10	2	20	Pass
0.0814	10	2	20	Pass
0.0822	10	2	20	Pass
0.0830	10	2	20	Pass
0.0837	9	2	22	Pass
0.0845	8	2	25	Pass
0.0853	8	1	12	Pass
0.0861	8	0	0	Pass
0.0868	7	0	0	Pass
0.0876	6	0	0	Pass
0.0884	6	0	0	Pass
0.0891	5	0	0	Pass
0.0899	5	0	0	Pass
0.0907	5	0	0	Pass
0.0914	5	0	0	Pass
0.0922	5	0	0	Pass
0.0930	5	0	0	Pass
0.0937	4	0	0	Pass
0.0945	4	0	0	Pass
0.0953	4	0	0	Pass
0.0960	4	0	0	Pass
0.0968	4	0	0	Pass
0.0976	4	0	0	Pass
0.0983	4	0	0	Pass
0.0991	4	0	0	Pass
0.0999	3	0	0	Pass
0.1006	3	0	0	Pass
0.1014	3	0	0	Pass
0.1022	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0.0155 acre-feet

On-line facility target flow: 0.0216 cfs.

Adjusted for 15 min: 0.0216 cfs.

Off-line facility target flow: 0.0122 cfs.

Adjusted for 15 min: 0.0122 cfs.

LID Report

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

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Basin 1
0.22ac

Mitigated Schematic



Basin 1
0.22ac

Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN         1
UNIT SYSTEM 1
```

END GLOBAL

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      default.wdm
MESSU    25      Predefault.MES
          27      Predefault.L61
          28      Predefault.L62
          30      POCdefault1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```
PERLND    7
IMPLND    4
IMPLND    9
COPY      501
DISPLY    1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
1   Basin 1                      MAX                1   2   30   9
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1   1   1
501 1   1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
# # OPCODE ***
```

END OPCODE

PARM

```
# # K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
# - # User t-series Engl Metr ***
                               in out ***
```

```
7   A/B, Lawn, Flat           1   1   1   1   27   0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
7   0   0   1   0   0   0   0   0   0   0   0   0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
7   0   0   4   0   0   0   0   0   0   0   0   0   1   9
```

END PRINT-INFO

PWAT-PARM1

```

<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
7   0   0   0   0   0   0   0   0   0   0   0

```

END PWAT-PARM1

PWAT-PARM2

```

<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
7   0   5   0.8   400   0.05   0.3   0.996

```

END PWAT-PARM2

PWAT-PARM3

```

<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
7   0   0   2   2   0   0   0

```

END PWAT-PARM3

PWAT-PARM4

```

<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
7   0.1   0.5   0.25   0   0.7   0.25

```

END PWAT-PARM4

PWAT-STATE1

```

<PLS > *** Initial conditions at start of simulation
        ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
7   0   0   0   0   3   1   0

```

END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

```

<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
              in out ***
4   ROOF TOPS/FLAT   1   1   1   27   0
9   SIDEWALKS/MOD   1   1   1   27   0

```

END GEN-INFO

*** Section IWATER***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
4   0   0   1   0   0   0
9   0   0   1   0   0   0

```

END ACTIVITY

PRINT-INFO

```

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

```

END PRINT-INFO

IWAT-PARM1

```

<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
4   0   0   0   0   0
9   0   0   0   0   0

```

END IWAT-PARM1

IWAT-PARM2

```

<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
4   400   0.01   0.1   0.1
9   400   0.05   0.1   0.08

```



```

HYDR-INIT
RCHRES Initial conditions for each HYDR section ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

```

```

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

```

```
END EXT SOURCES
```

```

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

```

```

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

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

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

```

```
END MASS-LINK
```

```
END RUN
```

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN      1
UNIT SYSTEM      1
END GLOBAL
```

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      default.wdm
MESSU    25      Mitdefault.MES
          27      Mitdefault.L61
          28      Mitdefault.L62
          30      POCdefault1.dat
END FILES
```

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND        7
  IMPLND        4
  IMPLND        9
  COPY          501
  DISPLY        1
END INGRP
```

END OPN SEQUENCE

DISPLY

```
DISPLY-INF01
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   Basin 1          MAX          1   2   30   9
END DISPLY-INF01
```

END DISPLY

COPY

```
TIMESERIES
# - # NPT NMN ***
1   1   1   1
501 1   1   1
END TIMESERIES
```

END COPY

GENER

```
OPCODE
#   # OPCD ***
END OPCODE
PARM
#   #           K ***
END PARM
```

END GENER

PERLND

```
GEN-INFO
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #           User  t-series  Engl Metr ***
           in  out           ***
7   A/B, Lawn, Flat      1   1   1   1   27   0
END GEN-INFO
*** Section PWATER***
```

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL  PEST  NITR  PHOS  TRAC  ***
7   0   0   1   0   0   0   0   0   0   0   0   0
END ACTIVITY
```

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL  PEST  NITR  PHOS  TRAC  *****
7   0   0   4   0   0   0   0   0   0   0   0   0   1   9
```

END PRINT-INFO

PWAT-PARM1

```

<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
7   0   0   0   0   0   0   0   0   0   0   0

```

END PWAT-PARM1

PWAT-PARM2

```

<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
7   0   5   0.8   400   0.05   0.3   0.996

```

END PWAT-PARM2

PWAT-PARM3

```

<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
7   0   0   2   2   0   0   0

```

END PWAT-PARM3

PWAT-PARM4

```

<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
7   0.1   0.5   0.25   0   0.7   0.25

```

END PWAT-PARM4

PWAT-STATE1

```

<PLS > *** Initial conditions at start of simulation
        ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
7   0   0   0   0   3   1   0

```

END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

```

<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
              in out ***
4   ROOF TOPS/FLAT   1   1   1   27   0
9   SIDEWALKS/MOD   1   1   1   27   0

```

END GEN-INFO

*** Section IWATER***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
4   0   0   1   0   0   0
9   0   0   1   0   0   0

```

END ACTIVITY

PRINT-INFO

```

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

```

END PRINT-INFO

IWAT-PARM1

```

<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
4   0   0   0   0   0
9   0   0   0   0   0

```

END IWAT-PARM1

IWAT-PARM2

```

<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
4   400   0.01   0.1   0.1
9   400   0.05   0.1   0.08

```



```

HYDR-INIT
RCHRES Initial conditions for each HYDR section ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

```

```

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

```

```
END EXT SOURCES
```

```

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

```

```

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

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

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

```

```
END MASS-LINK
```

```
END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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