Stormwater Management Report

Middle Fork Spring Open Space Trail
200 West Stuart Road
Bellingham, Washington 98226

Prepared for
The Berger Partnership

Prepared by
Herrera Environmental Consultants, Inc.

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Middle Fork Spring Open Space Trail
200 West Stuart Road
Bellingham, Washington 98226

Prepared for
The Berger Partnership, P.S.
1927 Post Alley #2
Seattle, Washington 98101

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DRAFT
January 2, 2025

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Contents

Appendices

Tables

Figures

Project Overview

The City of Bellingham Parks and Recreation Department (Parks Department) acquired a 12.3-acre parcel at 200 West Stuart Road and is developing the Middle Fork Spring Open Space Trail (MFSOST), see Figure 1. This project will create a multi-use trail connecting Cordata Park, situated adjacent to the project parcel's northwest corner, to West Stuart Road at the southeastern corner. The project is principally on a 9.7-acre parcel (formerly 12.3 acres before a panhandle section extending to Meridian Street was separated) but will extend onto a currently unimproved portion of the West Stuart Road right of way (ROW) to connect to an existing sidewalk and a portion of Cordata Park to connect to an existing park trail. The project includes the trail, related improvements needed for grading (e.g., rockery walls) and stormwater management, and mitigation and enhancement plantings; no utilities are proposed.

The MFSOST project will construct a multi-use trail comprised of 10-foot-wide crushed aggregate segments (8-foot-wide trail with two 1-foot aggregate shoulders) and 10-foot-wide boardwalk segments. The project will include an extension of the existing cement concrete sidewalk on the north side of West Stuart Road to connect with the eastern end of the MFSOST crushed aggregate trail. Boardwalk trail segments will utilize minimal excavation foundations to minimize soil compaction and vegetation/root disturbance. Rockeries are proposed for trail locations with relatively steep existing cross slopes. Park benches and signage will be installed along the trail. A boardwalk or bridge may be designed and permitted in the future that would align within the West Stuart Road ROW to provide an east-west trail connection between the two existing ends of West Stuart Road. This report does not analyze any future West Stuart Road ROW trail connection.

The proposed improvements are considered new development, with over 5,000 square feet (sf) of new hard surface area. Per Section 15.42.060 of the Bellingham Municipal Code (BMC), Minimum Requirements Numbers (MR No.) 1 through 9 included in Subsection F of that same section and the requirements of the Washington State Department of Ecology's (Ecology) current (2024) Stormwater Management Manual for Western Washington (SWMMWW) apply to the project.

The proposed strategy for meeting the BMC and SWMMWW requirements is implementation of minimum excavation foundations and sheet flow dispersion. In addition to this stormwater site plan, a construction stormwater pollution prevention plan (SWPPP), and stormwater and pollutant control best management practices (BMPs) will be implemented.

Table 1 summarizes the existing and proposed hard surface areas within the MFSOST disturbance limits.

Table 1. Summary of Project Surfaces.

Description	Existing (sf)	Removed (sf)	Proposed Replaced (sf)	Proposed New (sf)
TDA #1–Wetland L (Squalicum Creek Watershed)				
Non-Pollution Generating (NPG) Hard Surface Area	0	0	0	5,736
Pollution Generating (NPG) Hard Surface Area	0	0	0	0
Total Hard Surface Area in TDA #1	0	0	0	5,736
TDA #2–Wetland T (Cordata Park Wetland A, Silver Creek Watershed)				
Non-Pollution Generating (NPG) Hard Surface Area	0	0	0	1,362
Pollution Generating (NPG) Hard Surface Area	0	0	0	0
Total Hard Surface Area in TDA #2	0	0	0	1,362
Project Totals				
Non-Pollution Generating (NPG) Hard Surface Area	0	0	0	7,098
Pollution Generating (NPG) Hard Surface Area	0	0	0	0
Total Hard Surface Area	0	0	0	7,098

TDA: threshold discharge area, sf: square feet

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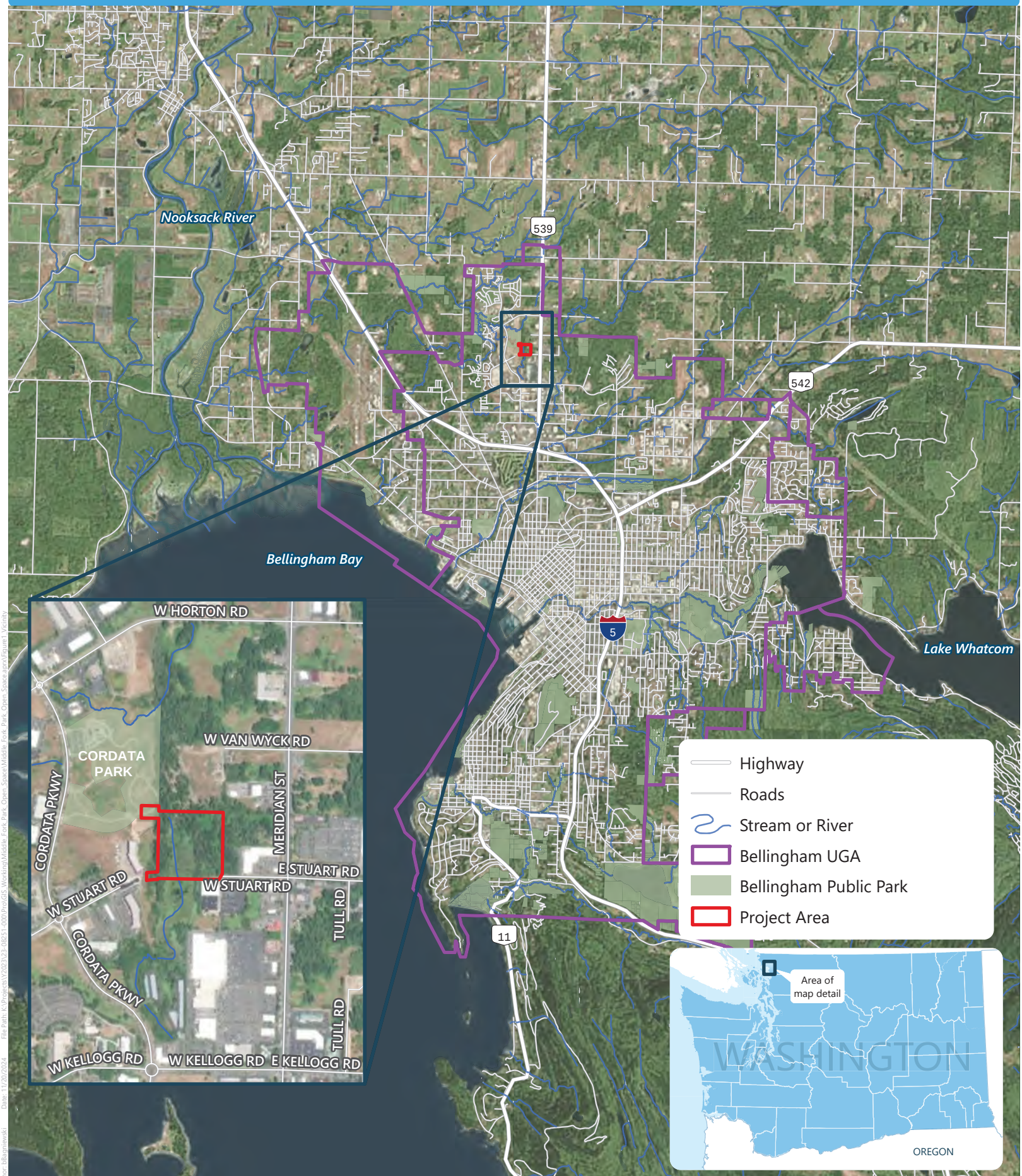
Figure 1.
Vicinity Map for Middle Fork Spring Open Space Trail.



Produced by Herrera Environmental Consultants (herrerainc.com) | Sources: USGS, WSDOT, City of Bellingham, Esri (Imagery, 2024)

0 1 2 4 Miles

File Path: K:\Projects\2023\23-08251-000\Pro\GIS_Working\Middle_Fork_Park_Open_Space\Middle_Fork_Park_Open_Space.aprx\Figure1_Vicinity
Date: 11/20/2024
Author: bBagniewski

Existing Conditions

Under existing conditions, areas within the MFSOST project disturbance limits on the 200 West Stuart Road parcel consist of upland and wetland forest across a rolling surface. Project areas within the West Stuart Road ROW are a mix of improved and unimproved. The West Stuart Road ROW south of the project parcel, west of the roadway end, consists of grass lawn and non-landscaped vegetation. The ROW to the east is fully improved with asphalt travel lanes, concrete curb and gutter, and concrete sidewalks. Areas within the MFSOST project disturbance limits on the Cordata Park parcel consist of upland and wetland pasture adjacent to an existing crushed aggregate trail.

Site area wetland complexes have varying amounts of standing water, depending on season and weather. Vegetation within the study area consists primarily of mixed deciduous and coniferous forest, dense thickets of Himalayan blackberry, and wetland vegetation. The City cleared large areas of Himalayan blackberry for access prior to field and survey work. Encampments were cleared at the same time, some debris from the encampments remains. Details of the onsite critical areas are provided in Appendix A.

A geotechnical engineering report was prepared by Associated Earth Sciences, Inc. for the study area (identified as "Guide Meridian Park"), see Appendix B. All subsurface explorations, conducted August 1, 2023, identified medium dense to very dense, brown to grayish brown, silty fine sand with varying amounts of gravel, interpreted to be Everson glaciomarine drift, below surficial topsoil. The glaciomarine drift soil is poorly draining and moisture sensitive.

The project site is within two Threshold Discharge Areas (TDAs). TDA #1 drains to Wetland L, the large wetland centrally located in the 200 West Stuart Road parcel. Wetland L discharges southerly to Middle Fork Spring Creek and is within the Squalicum Creek watershed. TDA #1 includes 9 wetlands in the vicinity of the project disturbance limits. A ridge is located near the center of TDA #1 dividing drainage west towards Wetland L and Middle Fork Spring Creek and east toward Wetlands A, B, C, D, E, and J. All areas of TDA #1 eventually drain to Wetland L and Middle Fork Spring Creek. TDA #2 drains northwesterly into Wetland T, which discharges northwesterly to Cordata Park's "Wetland A" stormwater facility that discharges to a tributary of East Bear Creek. TDA #2 is within the Silver Creek watershed. See plan sheets EX 02, EX 03, and EX 04 in Appendix C for existing conditions details. The boundary between TDA #1 and TDA #2 is shown in Appendix C on plan sheet 13.

Proposed Conditions

MFSOST improvements propose to construct 1,286 linear feet of trail consisting of crushed aggregate, boardwalk, and cement concrete segments, see Appendix C. The project proposes to disturb 0.509 acres within TDA #1 and 0.050 acres in TDA #2. The proposed disturbance area does not include any existing improvements, i.e., no hard surfaces are removed or replaced. The proposed project does not include any vehicular hard surfaces, i.e., no pollution-generating hard surfaces are proposed. Table 1 summarizes the existing and proposed hard surface areas within the MFSOST disturbance limits.

Impacted critical areas, either wetlands or wetland buffers, will be mitigated per the plan detailed in Appendix A. Compensatory critical areas mitigation includes 2,148 square feet of wetland enhancement, 4,500 square feet of buffer enhancement, 6,578 square feet of buffer restoration, and 12,886 square feet of added buffer as described in the MFSOST Critical Areas Report and Mitigation Plan: Wetlands and Fish and Wildlife Habitat Conservation Areas (Appendix A).

Offsite Analysis

The proposed project improvements discharge runoff to on-site wetlands that are tributary to Middle Fork Spring Creek and a tributary to East Bear Creek. Both downstream waterbodies consist of vegetated channels with varying degrees of cover and vegetation type.

The proposed project improvements in TDA #1 discharge runoff to several on-site wetlands that are tributary to Wetland L. Portion of the proposed improvements also discharge runoff to Wetland L without intermediary wetlands. Wetland L is the source of Middle Fork Spring Creek. Middle Fork Spring Creek is within the Squalicum Creek watershed. Middle Fork Spring Creek is tributary to Spring Creek, which is tributary to Baker Creek, which discharges to Squalicum Creek. Middle Fork Spring Creek has a 3,900-foot long culverted portion before its confluence with Spring Creek about 1.2 miles downstream of the project parcel.

The proposed project improvements in TDA #2 discharge runoff to Wetland T, which discharges to Cordata Park's "Wetland A" stormwater facility that discharges to a tributary of East Bear Creek. Cordata Park's "Wetland A" is both a wetland and a stormwater facility, receiving stormwater runoff from the park and non-park properties via sheet flow and formal stormwater conveyance networks. Cordata Park's "Wetland A" is the source of the tributary to East Bear Creek. The tributary to East Bear Creek receives stormwater runoff from other properties before its confluence with East Bear Creek about 0.42 miles downstream of Cordata Park's "Wetland A". East Bear Creek is within the Silver Creek watershed.

The proposed MFSOST improvements will meet SWMMWW minimum requirements and are predicted to have a minimal impact on downstream conveyance capacity, any existing localized flooding, and stream channel erosion.

Methods of Analysis

The Western Washington Hydrology Model 2012 Version 4.3.1 (WWHM) is used to evaluate the proposed project for the applicable Minimum Requirements. WWHM is an Ecology-approved long-term, as opposed to event-based, hydrology model based on the industry standard Hydrologic Simulation Program – FORTRAN (HSPF). The meteorological inputs for the model, precipitation and potential evaporation, are preloaded in the WWHM software package and chosen based on the user-specified project location. The MFSOST project location uses the WWHM Blaine precipitation gauge with a scaling factor of 0.857 and the Puyallup evaporation pan record adjusted with a pan evaporation factor of 0.76.

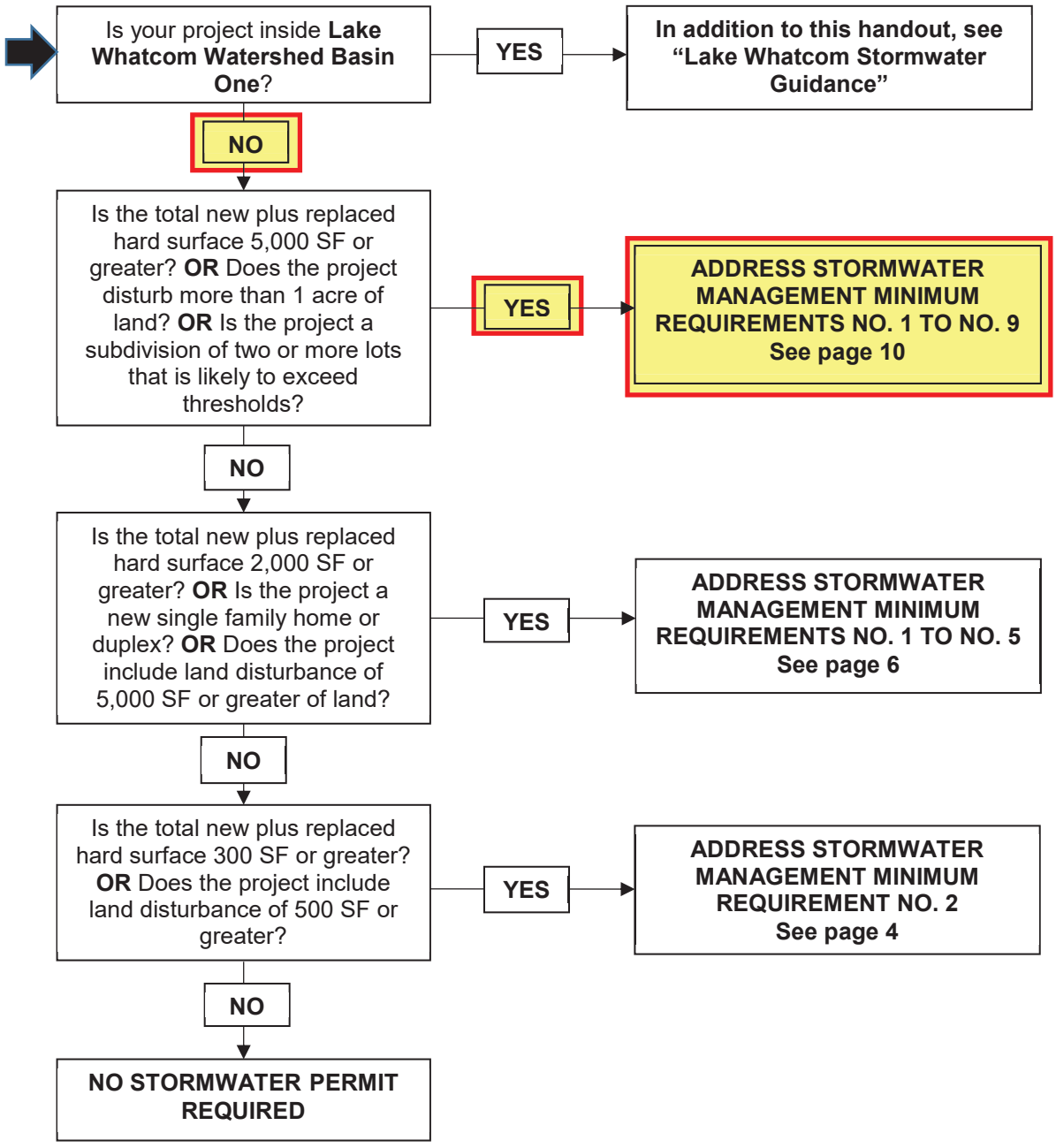
WWHM is used to evaluate Minimum Requirements No. 7: Flow Control. WWHM allows comparison of the predeveloped (forested) land use condition with the proposed land use condition for evaluation of the stream protection flow control standard (MR No. 7) for each TDA. See Appendix D for WWHM simulation details.

Minimum Requirements

As shown in Table 1, the proposed improvements exceed thresholds triggering MRs No. 1 through 9 of the SWMMWW and the BMC with over 5,000 sf of new hard surface. See Figure 2 for an annotated version of the Stormwater Management Determination Flow Chart from the City of Bellingham Stormwater Permit Submittal Requirements document.

STORMWATER MANAGEMENT DETERMINATION FLOW CHART

Follow the diagram using information from your hard surface calculation. Your answers will determine what stormwater management requirements are applicable to you. Further description of the requirements are in following pages.



MR No. 1: Preparation of a Stormwater Site Plan

This report, including the project drawings included in Appendix C and Stormwater Pollution Prevention Plan (SWPPP) in Appendix E, serve as the Stormwater Site Plan for this project.

MR No 2: Construction Stormwater Pollution Prevention

This project will disturb less than one acre of land, therefore coverage under Ecology's Construction Stormwater General Permit is not required. See Appendix E for the project's SWPPP, including all 13 Elements of Construction Stormwater Pollution Prevention.

MR No 3: Source Control of Pollution

Pollution sources within the proposed project site potentially include herbicide and pesticide when brought on-site for vegetation management. Good housekeeping measures will be employed to limit the use of chemical agents and to properly store hazardous chemicals and materials offsite. Mechanical methods of vegetation management will be employed to the extent feasible to maintain the proposed trail and plantings.

MR No 4: Preservation of Natural Drainage Systems and Outfalls

The proposed stormwater management strategy discharges runoff as similarly as possible to existing drainage patterns. The stormwater runoff from the project improvements will maintain natural drainage patterns by following existing overland flow pathways to Wetland L (TDA #1) or Wetland T and Cordata Park's "Wetland A" (TDA #2). The volume of runoff discharged to each waterbody from the project site varies from existing conditions due to changes in land cover but meets flow control (MR No. 7) and wetland protection (MR No. 8) requirements. Discharge from the project site is not projected to have any adverse impact on the receiving waterbodies.

MR No. 5: Onsite Stormwater Management

The proposed project triggers all nine Minimum Requirements and is new development within Bellingham's Urban Growth Area (UGA), therefore LID BMPs must be applied to all surfaces per List #2 in the SWMMWW or the LID Performance Standard must be achieved. MR No. 5 is achieved using the list approach. Each target surface of the proposed project applies an LID BMP on List #2, as feasible. List #2 is described in Table I–3.2, Volume I, SWMMWW.

List #2: Onsite Stormwater Management BMPs for Projects Triggering MRs No. 1 through 9 that are not Flow Control Exempt requires BMPs be considered for each target surface in the order listed; the first feasible BMP is to be used. The applicable target surface types and listed BMPs per List #2 are:

- Lawn and Landscaped Areas:
  - Post-Construction Soil Quality and Depth (BMP T5.13)
- Other Hard Surfaces:
  - Full Dispersion (BMP T5.30)
  - Permeable Pavements (BMP T5.15)
  - Bioretention (BMP T7.30)
  - Sheet Flow Dispersion (BMP T5.12) or Concentrated Flow Dispersion (BMP T5.11)

Lawn and Landscaped Areas

All landscaped and revegetated areas will meet the requirements of BMP T5.13: Post-Construction Soil Quality and Depth.

Roofs

This project does not propose roofs.

Other Hard Surfaces

The proposed project includes several non-roof hard surfaces including crushed aggregate trail segments and a cement concrete sidewalk extension. Full dispersion per BMP T5.30 is infeasible for the project's hard surfaces because the required flow path length of 100 feet through a native vegetation preserved area cannot be met given site constraints, principally wetland areas downstream of potential discharge locations.

Permeable pavement per BMP T5.15 and bioretention per BMP T7.30 are infeasible following geotechnical exploration that found unweathered glaciomarine drift underlying the project site. The glaciomarine drift has a high silt content and high relative density, making it have low permeability and therefore the drift "is not considered to be a suitable receptor for stormwater infiltration". Further, these soils are considered to be highly moisture-sensitive and subject to disturbance when wet. According to the geotechnical engineer, Infiltrated stormwater will tend to perch at a shallow depth and can migrate laterally, potentially pooling around adjacent structures and within one foot of the bottom of a permeable pavement. The project geotechnical engineer concludes "stormwater infiltration is not recommended for this project". See Appendix B for details. Additionally, implementation of bioretention facilities would require a greater area of disturbance with wetland buffers, requiring additional mitigation of impacts.

Sheet flow dispersion per BMP T5.12 is implemented where feasible along proposed aggregate trail segments, see Figure 3 and Figure 4. Sheet flow dispersion is infeasible for other trail segments and

concrete areas because the required flow path length of 10 feet for every 20 feet of impervious area width cannot be provided due to site constraints.

The boardwalk trail segments installed with minimal excavation foundations per SWMMWW BMP T5.19 are not considered hard surface.

Figure 3. MR No. 5 Sheet Flow Dispersion Areas (1 of 2).

Figure 4. MR No. 5 Sheet Flow Dispersion Areas (2 of 2).

MR No. 6: Runoff Treatment

The MFSOST project does not propose new or replaced pollution-generating hard or pervious surfaces. MR No. 6 is not applicable.

MR No. 7: Flow Control

Flow control requirements are applied per TDA. Within both TDA #1 and TDA #2, total new hard surface area is less than 10,000 sf (see Table 1), the total converted vegetation is less than 0.75 acres, and the difference in 100-year peak flow rate between the existing and proposed condition is less than 0.15 cfs; therefore, flow control BMPs are not required in either TDA per BMC 15.42.060.F.7.b. This determination assumes trail boardwalk segments installed with minimal excavation foundations per SWMMWW BMP T5.19 are not considered "impervious surface" per BMC and SWMMWW definitions and are therefore not considered effective impervious surface when determining TDA Thresholds for MR No. 7 (SWMMWW, Volume I, Chapter 3, page 126). The boardwalk trail segments will be installed with decking that allows light and water to pass through, the soil beneath the boardwalks will not be disturbed or compacted, and existing vegetation will be maintained to the maximum extent feasible. The structure will be constructed with at least 12 inches clearance from the ground surface to the bottom of the lowest structural element.

WWHM was used to evaluate the 100-year peak flow rate for existing and proposed conditions. For WWHM simulations, each target surface was classified by land cover (forest, pasture, lawn, impervious), soil (outwash, till, saturated), and slope (flat, moderate, steep). Per the geotechnical evaluation, all site soils are till soils unless within a delineated wetland, then they are saturated. Existing undeveloped topography is moderate except wetlands are flat. Existing and proposed developed topography is flat for all improvements, i.e., trail segments. Areas outside of the disturbance limits of the project are not included in WWHM simulations. See Table 2 for WWHM simulation parameters and results. See Appendix D for WWHM simulation details.

Table 2. Flow Control WWHM Simulation Parameters and Results.

Land Use Category	Predeveloped Condition	Proposed Condition
TDA #1 - Wetland L (Squalicum Creek Watershed)		
Forest, Till Soil, Moderate Slope Area (ac)	0.1851	0
Impervious, Flat Slope Area (ac)	0	0.0666
Impervious, Flat Slope Area Mitigated with Sheet Flow Dispersion (ac)[a]	0	0.0651
Lawn, Moderate Slope Sheet Flow Dispersion Area (ac)[b]	0	0.0535
Total Area (ac)	0.1851	0.1851
100 Year Peak Flow Rate (cfs)	0.0103	0.1175
Difference in 100 Year Peak Flow Rate (cfs)[c]	0.1072	

Table 2 (continued). Flow Control WWHM Simulation Parameters and Results.		
Land Use Category	**Predeveloped Condition**	**Proposed Condition**
TDA #2 - Wetland T (Cordata Park Wetland A, Silver Creek Watershed)		
Forest, Till Soil, Moderate Slope Area (ac)	0.0313	0
Impervious, Flat Slope Area (ac)	0	0.0313
Total Area (ac)	0.0313	0.0313
100 Year Peak Flow Rate (cfs)	0.0017	0.0246
Difference in 100 Year Peak Flow Rate (cfs)[c]	0.0229	

[a] Impervious area (aggregate trail segments) proposed to be mitigated by Sheet Flow Dispersion per BMP T5.12 is represented by a Lateral Flow Basin in WWHM discharging to another Lateral Flow Basin representing the dispersion area.

[b] The vegetated area receiving sheet flow discharge from the proposed impervious area being mitigated by Sheet Flow Dispersion per BMP T5.12 is represented by a WWHM Lateral Flow Basin. Dispersion area land use is Lawn per the SWMMWW guidance.

[c] A difference in 100-year peak flow rate of less than 0.15 cfs is a criteria for a TDA exemption from otherwise required Flow Control BMPs.

MR No. 8: Wetlands Protection

Both TDA #1 and TDA #2 are not required to provide Flow Control BMPs per the TDA Thresholds of MR No. 7. Therefore, Wetland Hydroperiod Protection is not required. General Protection and Protection from Pollutants will be provided for all on-site wetlands per the guidance in the SWMMWW.

General Protection

General protection is provided for each impacted wetland by creating a mitigation plan for wetland and buffer impacts (Appendix A), designing MFSOST improvements to avoid impacts, using natural (plantings) and physical (fences) barriers to avoid and reduce general physical impacts, dispersing stormwater runoff discharges to the wetlands using sheet flow dispersion (see MR No. 5 above), and including onsite signage.

Protection from Pollutants

Protection from pollutants is provided for each impacted wetland by creating a SWPPP (Appendix E) and implementing appropriate BMPs during construction, providing source control of pollutants (see MR No. 3 above), adhering to the City of Bellingham Park's Integrated Pest Management Plan, and implementing onsite stormwater management BMPs where practicable (see MR No. 5 above).

MR No. 9: Operations and Maintenance

Operations and maintenance guidance for the proposed stormwater improvements is included in Appendix F. The components included in the guidance are sheet flow dispersion standards and post-construction soil quality and depth. The guidance sheets will be retained in Parks Department offices for Parks Department staff to reference following construction. A maintenance activity log will be created for the site and shall indicate completed actions.

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Appendix A

Critical Area Report and Mitigation Plan

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Critical Areas Report and Mitigation Plan, Wetland and Fish and Wildlife Habitat Conservation Areas, Middle Fork Spring Open Space Trail (FKA Meridian Park Property) (December 2024) has been provided under separate cover.

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Appendix B

Geotechnical Report

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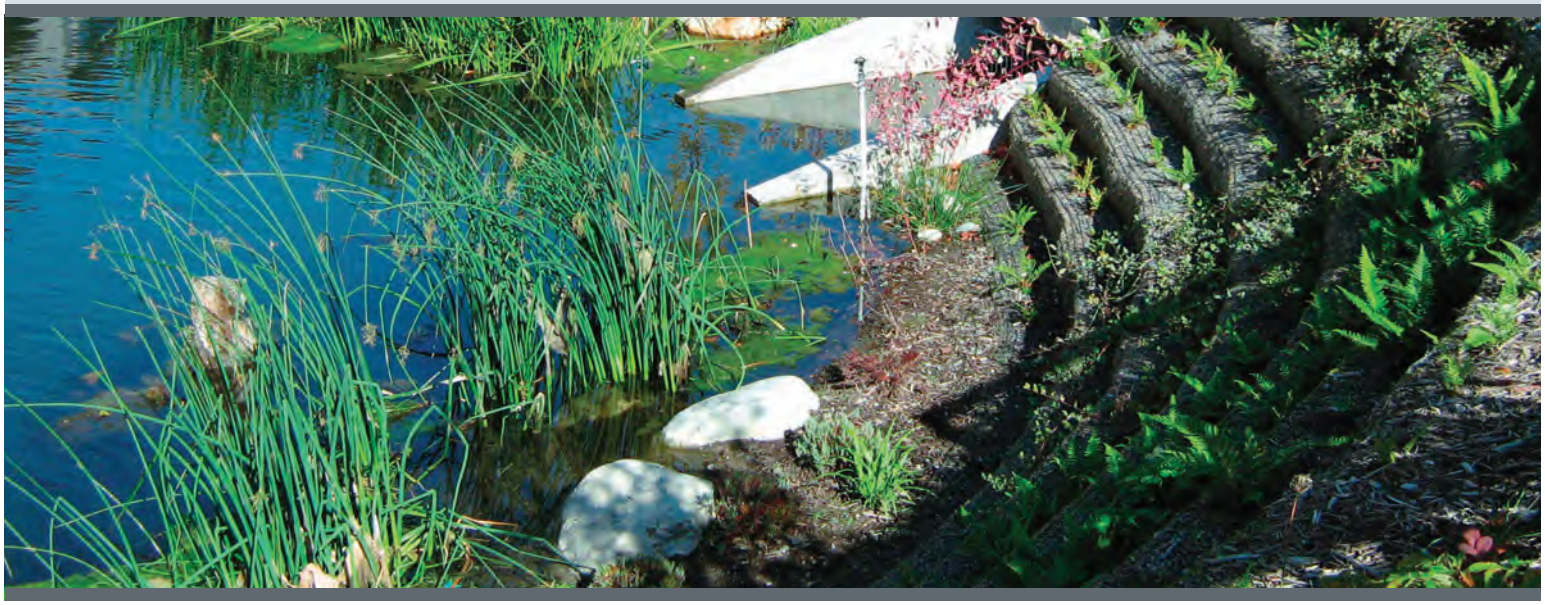


Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report

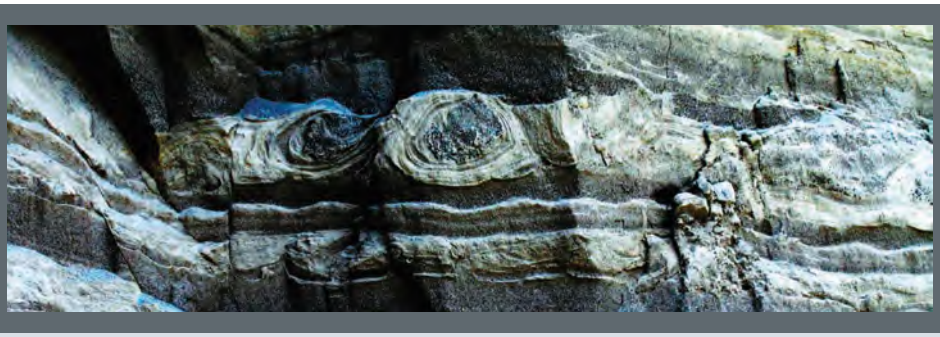
GUIDE MERIDIAN PARK

Bellingham, Washington

Prepared For:

BERGER PARTNERSHIP

Project No. 20230188E001
August 24, 2023



Associated Earth Sciences, Inc.

www.aesgeo.com

Kirkland | Mount Vernon | Tacoma

associated earth sciences incorporated

August 24, 2023
Project No. 20230188E001

Berger Partnership
1927 Post Alley, Suite 2
Seattle, Washington 98101

Attention: Jason Henry

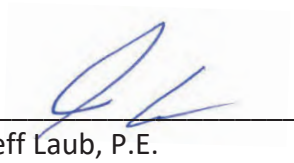
Subject: Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report
Guide Meridian Park
4447 Meridian Street
Bellingham, Washington

Dear Mr. Henry:

We are pleased to present this geotechnical engineering report for the subject property. This report summarizes the results of our subsurface exploration, geologic hazard, and geotechnical engineering studies, and offers recommendations for the design and development of the proposed home. Our recommendations are preliminary because project plans and construction details were not available at the time this report was written. We should be allowed to review the recommendations presented in this report and modify them, if needed, once final project plans have been formulated.

We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. If you should have any questions or if we can be of additional help to you, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington



Jeff Laub, P.E.
Associate Geotechnical Engineer

BLB/jh – 20230188E001-004

SUBSURFACE EXPLORATION, GEOLOGIC HAZARD, AND GEOTECHNICAL ENGINEERING REPORT

GUIDE MERIDIAN PARK

Bellingham, Washington

Prepared for:
Berger Partnership
1927 Post Alley, Suite 2
Seattle, Washington 98101

Prepared by:
Associated Earth Sciences, Inc.
911 5th Avenue
Kirkland, Washington 98033
425-827-7701

August 24, 2023
Project No. 20230188E001

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report, prepared by Associated Earth Sciences, Inc. (AESI), presents the results of our subsurface exploration, geologic hazard, and geotechnical engineering study for the subject project. Our recommendations are preliminary because project plans were not completed at the time of our study. Our understanding of the project is based on our conversations with the Client. The site location is shown on the "Vicinity Map," Figure 1. The approximate locations of the explorations completed for this study are shown on the "Existing Site and Exploration Plan," Figure 2 and "LiDAR-Based Shaded Relief," Figure 3. Copies of the exploration logs are included in Appendix A.

1.1 Purpose and Scope

The purpose of this study was to provide subsurface data to be used in the preliminary design and development of the subject project. Our study included reviewing available geologic literature, excavating three exploration pits, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and groundwater conditions. Geotechnical engineering studies were completed to assess geologic hazards and to formulate geotechnical recommendations for site preparation, grading, building foundations and floor slabs, allowable foundation soil bearing pressures, anticipated foundation settlement, and drainage considerations. This report summarizes our fieldwork and offers recommendations based on our present understanding of the project. We recommend that we be allowed to review the recommendations presented in this report and revise them, if needed, when the project design has been finalized.

1.2 Authorization

Our study was accomplished in general accordance with our scope of work and cost proposal, dated as revised June 21, 2023. This report has been prepared for the exclusive use of the Berger Partnership and their agents for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering and engineering geology practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

The subject site includes the existing undeveloped property located at 4447 Meridian Street in Bellingham, Washington (Whatcom County Parcel No. 46166). The subject site is approximately

12 acres and consists of a rectangular area with a panhandle extending eastward to Meridian Street. The eastern portion of the site is flat lying, to gently sloping down to the southwest and is heavily vegetated with brambles and a few trees. Near the midpoint of the larger portion of the site the topography slopes down to the west with an elevation drop of about 10 to 12 feet. This western portion of the site includes several surface water features, including wetlands and a small stream. We understand that the current plan includes the placement of several "tiny homes", with associated pedestrian access and utilities, on the eastern portion of the subject parcel. We were requested to explore the subsurface conditions on the eastern portion of the property in the vicinity of the proposed improvements to provide geotechnical recommendations for the planned project. No explorations were completed on the western side due to the presence of the stream and wetlands.

3.0 SUBSURFACE EXPLORATION

Our field study was completed on August 1, 2023 and included excavating three exploration pits to gain subsurface information about the site in locations provided by the client. The various types of materials, as well as the depths where characteristics of the materials changed, are indicated on the exploration logs presented in Appendix A. The depths indicated on the logs where conditions changed may represent gradational variations between material types in the field. The approximate locations of the exploration pits are shown on Figures 2 and 3.

The conclusions and recommendations presented in this report are based, in part, on the exploration pits completed for this study. The number, locations, and depths of the explorations were completed within site and budgetary constraints. Because of the nature of exploratory work below ground, interpolation of subsurface conditions between field explorations is necessary. It should be noted that subsurface conditions differing from those depicted on the logs may be present at the site due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of variations between the field explorations may not become fully evident until construction. If variations are observed at that time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Pits

For this study, three exploration pits were excavated by Northwest Excavating, an independent contractor working under subcontract to AESI, at the approximate locations shown on Figure 2 and Figure 3. The pits permitted direct, visual observation of subsurface conditions. Materials encountered in the exploration pits were studied and classified in the field by a geologist from our firm. The exploration pits were backfilled after examination and logging. Samples collected from the exploration pits were classified in the field and representative

portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, our visual reconnaissance of the site, and review of selected geologic literature. Detailed descriptions of the materials encountered in the explorations are provided on the exploration logs in Appendix A. The explorations generally encountered granular, glacially consolidated sediments at shallow depths throughout the site. The following section presents more detailed subsurface information organized from the shallowest (youngest) to the deepest (oldest) sediment types.

4.1 Stratigraphy

Fill

Although no fill soils were encountered in our explorations, we anticipate that fill is likely present around the perimeter of the site where grading of adjacent parcels may have been conducted. The existing fill is not suitable for foundation support.

Everson Glaciomarine Drift ($Qgdm_e$)

All explorations encountered medium dense to very dense, brown to grayish brown, silty fine sand with varying amounts of gravel, interpreted as Everson glaciomarine drift. These sediments were encountered directly below the surficial topsoil. Glaciomarine sediments were deposited from the melting out of floating debris-laden glacial ice and settled on the sea floor. Glaciomarine sediments were deposited during the Everson Interstade approximately 11,000 to 12,000 years ago while the land surface was depressed 500 to 600 feet as a result of ice loading that occurred during previous glaciations. After their deposition, portions of the Everson glaciomarine sediments were consolidated by advancing glacial ice during the Sumas stade of the Fraser glaciation. Regionally, the Everson glaciomarine deposits range from loose and unconsolidated to dense and glacially consolidated, with the consolidated portions of this unit typically present at topographic high points which had direct influence from glacial ice associated with the Sumas glaciation. At the subject site, the Everson glaciomarine sediments were generally observed to be glacially consolidated.

With proper preparation, the glaciomarine sediments are suitable for support of light to moderate structural loads. Portions of these sediments have a very high fine-grain content and are considered highly moisture-sensitive. Reuse of very silty, excavated glaciomarine drift

deposits in structural fill applications will be difficult to achieve proper compaction and is not recommended, particularly in wet weather conditions.

4.2 Geologic Mapping

Review of the regional geologic map of the area title *Geologic Map of the Bellingham 1:100,000 Quadrangle, Washington* (Lapen, Thomas J., 2000) indicates that the subject site is underlain by Everson interstade glaciomarine drift. Our interpretation of the sediments encountered in our explorations is in general agreement with the regional geologic map in that we encountered Everson glaciomarine drift underlying the site.

4.3 Soil Mapping

Review of regional soils mapping (*Soil Survey of King County Area, Washington*, U.S. Department of Agriculture [USDA], Soils Conservation Service [SCS] now referred to as Natural Resources Conservation Service [NRCS]) on the NRCS *Web Soil Survey* indicates that the subject site is underlain Whatcom silt loam, 8 to 15 percent slopes and Whatcom Labounty silt loams, 0 to 8 percent slopes. These soils are formed from the weathering of volcanic ash and loess over glaciomarine sediments. The NRCS indicates that the erosion hazard rating of the Whatcom silt loam and Whatcom Labounty silt loam is slight. Our interpretation of the sediments encountered in our explorations is generally consistent with the regional soils map.

4.4 Groundwater

Groundwater seepage was encountered at the location of exploration pit EP-3 at a depth of approximately 11.5 feet below ground surface. The seepage was observed within a discontinuous lens of sand with a generally lower fines content than the surrounding sediments. We interpret this groundwater to be representative of a zone of perched seepage within the otherwise low permeability glaciomarine sediments and not representative of the local groundwater table. Perched groundwater occurs when stormwater infiltrates through the relatively permeable zones of sandy glaciomarine sediments and becomes perched atop the dense, low-permeability, fine-grained sediments at depth. Except for the minor groundwater seepage observed within EP-3, shallow groundwater was not observed during our subsurface exploration at the site. The duration and quantity of groundwater seepage can be expected to vary with changes in seasonal precipitation, on- and off-site land usage, and other factors. The quantity and duration of flow from an excavation that encounters groundwater depends on topography, soil grain size, and season.

Surface water features at the subject site include a creek and several wet areas, predominately on the west side of the site. The spring on the west side of the site, Middle Fork Spring, runs north to south. The City of Bellingham's *Wetland Inventories Map, Washington Geologic Survey,*

Dated February 7, 2023, indicates the presence of wetlands on the site which are part of the "Wetland Inventory 2015" and "Site Specific Wetland Delineation" categories. During our site visit, we observed surface water features that roughly correspond to the locations shown on the City of Bellingham's *Wetland Inventories Map.*

II. GEOLOGIC HAZARDS AND MITIGATIONS

The following discussion of potential geologic hazards is based on the geologic conditions as observed and discussed herein.

5.0 STEEP SLOPE HAZARDS AND MITIGATION

Based on our review of available LiDAR-based topographic data and our visual reconnaissance of the site, the project site is gently sloping to flat with no significant slopes present on the subject parcel or on nearby parcels. No quantitative assessment of site slope stability was completed as part of this study, and none is warranted, in our opinion. Provided the recommendations in this report are followed, no additional mitigation for steep slopes is needed.

6.0 SEISMIC HAZARDS AND RECOMMENDED MITIGATION

The following discussion is a general assessment of seismic hazards that is intended to be useful to the project design team in terms of understanding seismic issues, and to the structural engineer for design.

All of Western Washington is at risk of strong seismic events resulting from movement of the tectonic plates associated with the Cascadia Subduction Zone (CSZ), where the offshore Juan de Fuca plate subducts beneath the continental North American plate. The site lies within a zone of strong potential shaking from subduction zone earthquakes associated with the CSZ. The CSZ can produce earthquakes up to magnitude 9.0, and the recurrence interval is estimated to be on the order of 500 years. Geologists infer the most recent subduction zone earthquake occurred in 1700 (Goldfinger et al., 2012). Three main types of earthquakes are typically associated with subduction zone environments: crustal, intraplate, and interplate earthquakes. Seismic records in the Puget Sound region document a distinct zone of shallow crustal seismicity (e.g., the Seattle Fault Zone). These shallow fault zones may include surficial expressions of previous seismic events, such as fault scarps, displaced shorelines, and shallow bedrock exposures. The shallow fault zones typically extend from the surface to depths ranging from 16 to 19 miles. A deeper zone of seismicity is associated with the subducting Juan de Fuca plate. Subduction zone seismic events produce intraplate earthquakes at depths ranging from 25 to 45 miles beneath the Puget Lowland including the 1949, 7.2-magnitude event; the 1965, 6.5-magnitude event; and the 2001, 6.8-magnitude event) and interplate earthquakes at shallow depths near the Washington coast including the 1700 earthquake, which had a magnitude of approximately 9.0. The 1949 earthquake appears to have been the largest in this region during recorded history and was centered in the Olympia area. Evaluation of earthquake

return rates indicates that an earthquake of the magnitude between 5.5 and 6.0 is likely within a given 20-year period.

Generally, there are four types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture, 2) seismically induced landslides or lateral spreading, 3) liquefaction, 4) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

6.1 Surficial Ground Rupture

The closest known fault to the subject property is the Boulder Creek Fault. The Boulder Creek Fault Zone is composed of at least two fault strands which are exposed in the Kendall and Canyon Creek Scarps (2.7 miles and 1.2 miles long, respectively). Based on a series of trenches dug across these scarps, it is thought the most recent seismic activity occurred about 1,000 years ago and produced a maximum reverse separation of between 16 to 28 inches. Given the parcel's relative distance from the fault zone, surficial ground rupture is not likely and no mitigations other than complying with 2018 International Building Code (IBC) seismic design recommendations are recommended.

6.2 Seismically Induced Landslides

As discussed in Section 5.0, it is our opinion that the risk of damage to the proposed project by landslides under seismic conditions is low due to the lack of significant slopes onsite or on neighboring parcels.

6.3 Liquefaction

Liquefaction is a process through which unconsolidated soil loses strength as a result of vibrations, such as those which occur during a seismic event. During normal conditions, the weight of the soil is supported by both grain-to-grain contacts and by the fluid pressure within the pore spaces of the soil below the water table. Extreme vibratory shaking can disrupt the grain-to-grain contact, increase the pore pressure, and result in a temporary decrease in soil shear strength. The soil is said to be liquefied when nearly all of the weight of the soil is supported by pore pressure alone. Liquefaction can result in deformation of the sediment and settlement of overlying structures. Areas most susceptible to liquefaction include those areas underlain by non-cohesive silt and sand with low relative densities, accompanied by a shallow water table. In our opinion, the potential risk of damage to the proposed structures by liquefaction is low due the presence of dense, glacially consolidated sediments at shallow depth and the lack of adverse groundwater conditions. No mitigation of liquefaction hazards is recommended.

6.4 Ground Motion/Seismic Site Class (2018 *International Building Code*)

Structural design of the buildings should follow 2018 IBC standards. We recommend that the project be designed in accordance with Site Class "D" as defined in IBC Table 20.3-1 of *American Society of Civil Engineers* (ASCE) *7 - Minimum Design Loads for Buildings and Other Structures*.

7.0 EROSION HAZARDS AND RECOMMENDED MITIGATION

The sediments underlying the proposed development area contain significant quantities of silt and fine sand and are considered to be highly sensitive to disturbance when wet and erosion where present below sloping areas. The NRCS has mapped the soils on the subject site as Whatcom silt loam, 8 to 15 percent slopes, and Whatcom Labounty silt loams, 0 to 8 percent slopes. The NRCS indicates that the erosion hazard rating of the Whatcom silt loam and Whatcom Labounty silt loam is slight. Based on this, the site does not classify as an Erosion Hazard Area as defined by Bellingham Municipal Code 16.55.510.

Although the sites do not meet the requirements to be classified as an Erosion Hazard Area, we recommend the following best management practices (BMPs) in order to mitigate on-site erosion and the potential for off-site sediment transport:

1. To the extent practical, earthwork should be avoided during the wet season, delineated by the City of Bellingham as October 1st through May 31st.

2. The winter performance of a site is dependent on a well-conceived plan for control of site erosion and stormwater runoff. The site plan should include ground-cover measures and staging areas. The contractor should be prepared to implement and maintain the required measures to reduce the amount of exposed ground.

3. Temporary erosion and sedimentation control (TESC) elements and perimeter flow control should be established prior to the start of grading.

4. During the wetter months of the year, or when significant storm events are predicted during the summer months, the work area should be stabilized so that if showers do occur, it can receive the rainfall without excessive erosion or sediment transport. The stabilization process should include establishing temporary stormwater conveyance channels through work areas to route runoff to the approved treatment/discharge facilities.

5. All areas of disturbed soil should be revegetated as soon as possible. If it is outside of the growing season, the disturbed areas should be covered with mulch. Straw mulch

provides a cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

6. Surface runoff and discharge should be controlled during and following development. Uncontrolled discharge may promote erosion and sediment transport.

7. Soils that are to be reused around the site should be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering stockpiles with plastic sheeting, or the use of silt fences around pile perimeters.

8. If the area of development will cover an area greater than 1 acre in size, it will be required to obtain a Construction Stormwater General Permit per the Washington State Department of Ecology (Ecology). Under this permit, a Certified Erosion and Sediment Control Lead (CESCL) will be required to make weekly site visits to monitor erosion control, BMPs, and levels for turbidity and pH. AESI is available to help prepare permit application documents and can provide CESCL monitoring as requested.

It is our opinion that with the proper implementation of the TESC plans and by field-adjusting appropriate erosion mitigation (BMPs) throughout construction, the potential adverse impacts from erosion hazards on the project may be mitigated.

III. DESIGN RECOMMENDATIONS

8.0 INTRODUCTION

Our explorations indicate that, from a geotechnical engineering standpoint, the proposed project is feasible provided the recommendations contained herein are properly followed. Sediments suitable for foundation support on the eastern portion of the site were encountered in our explorations at a relatively shallow depth and conventional spread footings may be used for foundation support.

9.0 SITE PREPARATION

Site preparation within the proposed building areas should include removal of all vegetation, topsoil, and any other deleterious materials. Any existing fill beneath planned footing and floor slab areas should be removed. Any depressions below planned final grades resulting from clearing activities should be backfilled with structural fill, as discussed under the "Structural Fill" section of this report. After stripping of the surficial sod/topsoil horizon has been completed, any remaining roots and stumps should be removed from structural areas. All soils disturbed by stripping and grubbing operations should be recompacted as described below for structural fill.

9.1 Temporary and Permanent Cut Slopes

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction based on the local conditions encountered at that time. For planning purposes, we anticipate that temporary, unsupported cut slopes in areas of existing fill or loose to medium dense, weathered glaciomarine sediments can be made at a maximum slope of 1.5H:1V (Horizontal:Vertical). Temporary, unsupported cut slopes within the dense to very dense, unweathered glaciomarine sediments can be planned at a maximum slope of 1H:1V. Temporary vertical cuts up to 4 feet in height may be planned in all of these materials. Flatter inclinations may be recommended in areas of seepage. As is typical with earthwork operations, some sloughing and raveling may occur, and cut slopes may have to be adjusted in the field. In addition, WISHA/OSHA regulations should be followed at all times.

Permanent cut slopes should not exceed an inclination of 2H:1V.

9.2 Site Disturbance

The glaciomarine drift underlying the proposed development area contains a high percentage of fine-grained (silt- and clay-sized) material. These soils are considered to be highly moisture-sensitive and subject to disturbance when wet. The contractor must use care during site preparation and excavation operations so that the underlying soils are not softened. If

disturbance occurs, the softened soils should be removed and the area brought to grade with structural fill.

Consideration should be given to protecting access and staging areas with an appropriate section of crushed rock or asphalt treated base (ATB). If crushed rock is considered for the access and staging areas, it should be underlain by engineering stabilization fabric (such as Mirafi® 500X or approved equivalent) to reduce the potential of fine-grained materials pumping up through the crushed rock during wet weather and turning the area to mud. The fabric will also aid in supporting construction equipment, thus reducing the amount of crushed rock required. We recommend that at least 10 inches of crushed rock be placed over the fabric. Crushed rock used for access and staging areas should have a particle size of at least 2 inches.

10.0 STRUCTURAL FILL

Placement of structural fill may be necessary to establish desired grades in some areas or to backfill utility trenches. All references to structural fill in this report refer to subgrade preparation, fill type, and placement and compaction of materials as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

10.1 Subgrade Compaction

After overexcavation/stripping has been performed to the satisfaction of the geotechnical engineer/engineering geologist, the exposed ground should be recompacted to a firm and unyielding condition. If the subgrade contains too much moisture, suitable recompaction may be difficult or impossible to attain and should probably not be attempted. In lieu of recompaction, the area to receive fill should be blanketed with washed rock or quarry spalls to act as a capillary break between the new fill and the wet subgrade. Where the exposed ground remains soft and further overexcavation is impractical, placement of an engineering stabilization fabric may be necessary to prevent contamination of the free-draining layer by silt migration from below.

After the exposed ground is approved, or a free-draining rock course is laid, structural fill may be placed to attain desired grades.

10.2 Structural Fill Compaction

Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 8-inch loose lifts, with each lift being compacted to at least 95 percent of the modified Proctor maximum dry density using *ASTM International* (ASTM) D-1557 as the standard. Utility trench backfill should be placed and compacted in accordance with applicable municipal codes and standards. The top of the compacted fill should extend horizontally a minimum distance of 3 feet beyond footings or pavement edges before sloping down at an

angle no steeper than 2H:1V. Fill slopes should either be overbuilt and trimmed back to final grade or surface-compacted to the specified density.

10.3 Moisture-Sensitive Fill

Soils in which the amount of fine-grained material (smaller than No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. The use of moisture-sensitive soil in structural fills should be limited to favorable dry weather conditions. Excavated glaciomarine drift sediments are suitable for use as structural fill provided that they are free of roots, oversized rocks, and other deleterious materials and exhibit a moisture content at the time of construction compatible with achieving the recommended compaction specification. Because the glaciomarine sediments contains a high percentage of silt, compaction of these sediments to the recommended minimum density will only be achievable over a narrow range of moisture contents. If the moisture content of the glaciomarine sediments is over optimum at the time of construction, moisture-conditioning could be achieved by aerating the soil during periods of warm, dry weather. Maximum rock size for structural fill applications should be limited to diameters of approximately 6 inches or less.

Construction equipment traversing the site when the silty on-site sediments are very moist or wet can cause considerable disturbance. If fill is placed during wet weather or if proper compaction of the natural materials cannot be attained, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction.

10.4 Structural Fill Testing

The contractor should note that any proposed fill soils must be evaluated by AESI prior to their use in fills. This would require that we have a sample of the material at least 3 business days in advance to perform a Proctor test and determine its field compaction standard.

A representative from our firm should observe the stripped subgrade and be present during placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses and any problem areas may be corrected at that time. It is important to understand that taking random compaction tests on a part-time basis will not assure uniformity or acceptable performance of a fill. As such, we are available to aid the owner in developing a suitable monitoring and testing frequency.

11.0 FOUNDATIONS

Spread footings may be used for building support when founded either directly on the medium dense to dense glaciomarine drift, or on structural fill placed over these sediments. If structural

fill is placed below footing areas, it should extend horizontally beyond the footing edges a distance equal to or greater than the thickness of the fill placed below the footings or 2 feet, whichever is less. We recommend that an allowable foundation soil bearing pressure of 2,000 psf be used for design purposes, including both dead and live loads. An increase in the allowable bearing pressure of one-third may be used for short-term wind or seismic loading.

11.1 Footing Depths

Perimeter footings for the proposed homes should be buried a minimum of 18 inches into the surrounding soil for frost protection. No minimum burial depth is required for interior footings; however, all footings must penetrate to the prescribed stratum, and no footings should be founded in or above loose, organic, or existing fill soils.

11.2 Footings Adjacent to Cuts

The area bounded by lines extending downward at 1H:1V from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM D-1557. In addition, a 1.5H:1V line extending down from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edges of steps or cuts in the bearing soils.

11.3 Footing Settlement

Anticipated settlement of footings founded as described above should be on the order of 1 inch or less. However, disturbed soil not removed from footing excavations prior to footing placement could result in increased settlements.

11.4 Footing Subgrade Bearing Verification

All footing subgrade areas should be observed by AESI prior to footing placement. Foundation bearing verification may be required by the City of Bellingham.

11.5 Foundation Drainage

Perimeter footing drains should be provided as discussed under the “Drainage Considerations” section of this report.

12.0 LATERAL WALL PRESSURES

All backfill behind walls or around foundations should be placed following our recommendations for structural fill and as described in this section of the report. Horizontally backfilled walls, that are free to yield laterally at least 0.1 percent of their height, may be designed using an equivalent fluid equal to 35 pcf. Fully restrained, horizontally backfilled, rigid

walls that cannot yield should be designed for an equivalent fluid of 55 pcf. Walls that retain sloping backfill at a maximum angle of 50 percent should be designed for 50 pcf for yielding conditions and 65 pcf for restrained conditions. If parking areas or driveways are adjacent to walls, a surcharge equivalent to 2 feet of retained soil should be added to the wall height in determining lateral design forces.

12.1 Wall Backfill

The lateral pressures presented above are based on the conditions of a uniform backfill consisting of imported sand and gravel compacted to 90 to 95 percent of ASTM D-1557. A higher degree of compaction is not recommended, as this will increase the pressure acting on the walls. A lower compaction may result in unacceptable settlement behind the walls. Thus, the compaction level is critical and must be tested by our firm during placement.

12.2 Wall Drainage

It is imperative that proper drainage be provided so that hydrostatic pressures do not develop against the walls. This would involve installation of a minimum 1-foot-wide blanket drain for the full wall height using imported, washed gravel against the walls.

12.3 Passive Resistance and Friction Factor

Lateral loads can be resisted by friction between the foundation and the supporting sediments, or by passive earth pressure acting on the buried portions of the foundations. The foundations must be backfilled with compacted structural fill to achieve the passive resistance provided below. We recommend the following allowable design parameters:

- Passive equivalent fluid = 250 pcf
- Coefficient of friction = 0.30

12.4 Seismic Surcharge

As required by the 2018 IBC, retaining wall design should include a seismic surcharge pressure in addition to the equivalent fluid pressures presented above. We recommend a seismic surcharge pressure of 9H and 11H psf where H is the wall height in feet for the “active” and “at-rest” loading conditions, respectively. The seismic surcharge should be modeled as a rectangular distribution with the resultant applied at the midpoint of the wall.

13.0 FLOOR SUPPORT

Slab-on-grade floors may be constructed either directly on the medium dense to very dense glaciomarine drift sediments or on structural fill placed over these materials. Areas of the slab subgrade that are disturbed (loosened) during construction should be recompacted to an

unyielding condition prior to placing the pea gravel as described below. If moisture intrusion through floor slabs is to be limited, we recommend that the floor slabs be constructed atop a capillary break consisting of a minimum thickness of 4 inches of washed pea gravel. The pea gravel should be overlain by a 10-mil (minimum thickness) plastic vapor retarder.

14.0 DRAINAGE CONSIDERATIONS

The glaciomarine drift sediments underlying the site contain significant amounts of silt and are considered to be highly moisture-sensitive. Traffic from vehicles and construction equipment across these sediments when they are very moist or wet will result in disturbance of the otherwise firm stratum. Therefore, prior to site work and construction, the contractor should be prepared to provide drainage and subgrade protection, as necessary.

14.1 Wall/Foundation Drains

All retaining and perimeter footing walls should be provided with a drain at the footing elevation. The drains should consist of rigid, perforated, polyvinyl chloride (PVC) pipe surrounded by washed gravel. The level of the perforations in the pipe should be set approximately 2 inches below the bottom of the footing, and the drains should be constructed with sufficient gradient to allow gravity discharge away from the buildings. All retaining walls should be lined with a minimum, 12-inch-thick washed gravel blanket provided to within 1 foot of finish grade and which ties into the footing drain. Roof and surface runoff should not discharge into the footing drain system but should be handled by a separate, rigid, tightline drain.

Exterior grades adjacent to walls should be sloped downward away from these structures to achieve surface drainage. Final exterior grades should promote free and positive drainage away from the buildings at all times. Water must not be allowed to pond or to collect adjacent to the foundation or within the immediate building area. It is recommended that a gradient of at least 3 percent for a minimum distance of 10 feet from the building perimeter be provided, except in paved locations. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure. Additionally, pavement subgrades should be crowned to provide drainage toward catch basins and pavement edges.

15.0 STORMWATER INFILTRATION FEASIBILITY

Due to the high silt content and high relative density of the unweathered glaciomarine drift, its permeability is low and it is not considered to be a suitable receptor for stormwater infiltration. Because of its looser condition, the permeability of the weathered soil horizon is higher, but it is also thin. Consequently, stormwater infiltrated into the weathered horizon will tend to perch at

shallow depth on top of the unweathered surface where it can migrate laterally, potentially pooling around building foundations. For these reasons, stormwater infiltration is not recommended for this project.

16.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

We recommend that we be allowed to review project plans when they are completed and to revise the recommendations presented in this report, if appropriate. We are also available to provide geotechnical engineering and monitoring services during construction. The integrity of the foundation system depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent.

We have enjoyed working with you on this study and are confident these recommendations will aid in the successful completion of your project. If you should have any questions or require further assistance, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Peter E. Linton, L.G.
Senior Staff Geologist

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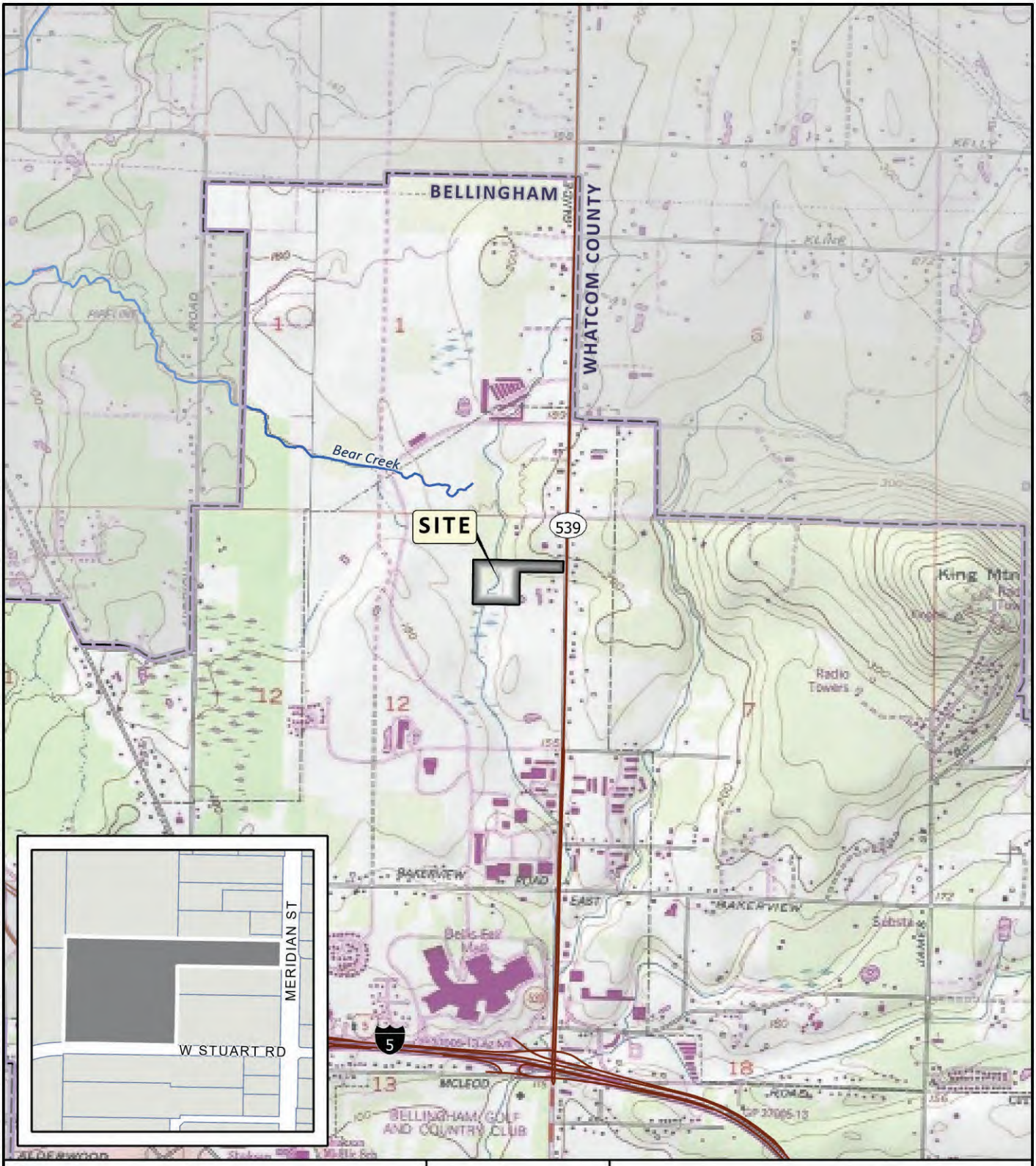
REGISTERED
PROFESSIONAL ENGINEER

Jeff P. Laub, PE., LG, LEG
Associate Engineer/Geology

Jeff Laub
Digitally signed by Jeff Laub
Date: 2023.08.24 11:55:25 -07'00'

Attachments:
Figure 1: Vicinity Map
Figure 2: Existing Site and Exploration Plan
Figure 3: LiDAR-Shaded Relief
Appendix A: Exploration Logs



DATA SOURCES / REFERENCES:
USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NATIONAL GEOGRAPHIC SOCIETY 2013
WHATCOM CO: STREETS 10/21, CITY LIMITS, PARCELS, 3/22
LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

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FEET

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

associated earth sciences incorporated

VICINITY MAP

GUIDE MERIDIAN PARK
BELLINGHAM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
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LEGEND

- SITE
- EXPLORATION PIT
- CONTOUR 2 FT
- CONTOUR 10 FT
- PARCEL

DATA SOURCES / REFERENCES:
PUGET SOUND LIDAR COMMISSION: BELLINGHAM 2013
ACQUIRED MARCH - APRIL 2013, GRID CELL SIZE IS 3'
CONTOURS DERIVED FROM LIDAR
WHATCOM CO.: PARCELS 3/22
CITY OF BELLINGHAM: ROADS 10/21
AERIAL: PICTOMETRY INT. 2022

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

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EXISTING SITE AND EXPLORATION PLAN

GUIDE MERIDIAN PARK
BELLINGHAM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
202300188E001	8/23	2

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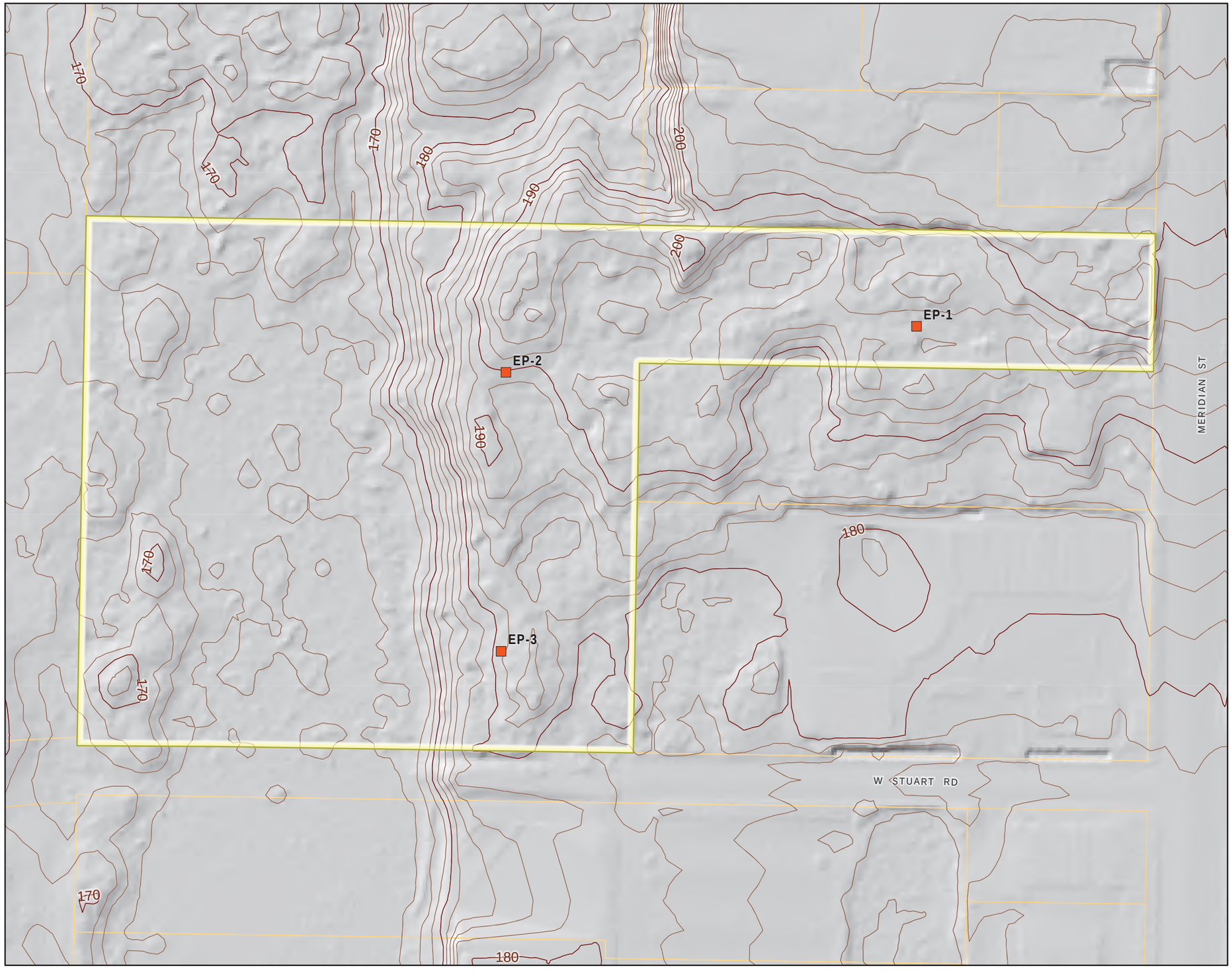

LEGEND

- SITE
- EXPLORATION PIT
- CONTOUR 2 FT
- CONTOUR 10 FT
- PARCEL

DATA SOURCES / REFERENCES:
PUGET SOUND LIDAR COMMISSION: BELLINGHAM 2013
ACQUIRED MARCH - APRIL 2013, GRID CELL SIZE IS 3'
CONTOURS DERIVED FROM LIDAR
WHATCOM CO.: PARCELS 3/22
CITY OF BELLINGHAM: ROADS 10/21
AERIAL: PICTOMETRY INT. 2022

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

N

0 120

FEET

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

associated earth sciences incorporated

LIDAR BASED SHADED RELIEF

GUIDE MERIDIAN PARK
BELLINGHAM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
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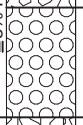
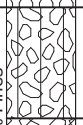
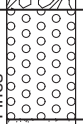
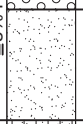
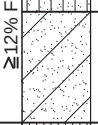
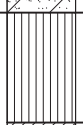
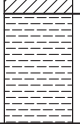
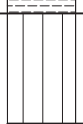
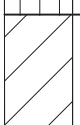
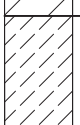
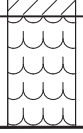
APPENDIX A

Exploration Logs

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[2]		GW	Well-graded gravel and gravel with sand, little to no fines
				GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥12% Fines[2]		GM	Silty gravel and silty gravel with sand
				GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[2]		SW	Well-graded sand and sand with gravel, little to no fines
				SP	Poorly-graded sand and sand with gravel, little to no fines
		≥12% Fines[2]		SM	Silty sand and silty sand with gravel
				SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50			ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
				CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
				OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More			MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
				CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
				OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils				PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT[3] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50
	Consistency	**SPT[3] blows/foot**
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

[4] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Some	5 to <12
Modifier (silty, sandy, gravelly)	12 to <30
Very *modifier* (silty, sandy, gravelly)	30 to <50

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

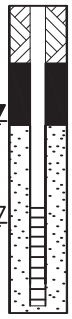
Symbols

Sampler Type and Description

- 10 / 15 / 20 Blows/6" or portion of 6"
- Split-Spoon Sampler (SPT)
- California Sampler
- Ring Sampler
- Continuous Sampling
- Grab Sample
- Portion not recovered

Groundwater depth

- ATD At time of drilling
- Static water level (date)



- Cement grout surface seal
- Bentonite seal
- Filter pack with blank casing section
- Screened casing or Hydrotip with filter pack
- End cap

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

(1) Percentage by dry weight
(2) Combined USCS symbols used for fines between 5% and 12%
(3) (SPT) Standard Penetration Test (ASTM D-1586)
(4) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

associated earth sciences incorporated

EXPLORATION LOG KEY

FIGURE: A1

associated earth sciences incorporated

Exploration Pit — EP-1

Guide Meridian Park — Sheet: 1 of 1

Bellingham, WA	Date: 8/1/23	Logged By: PL
20230188E001	Total Depth (ft): 12	Approved By: CMM

Depth (ft)	Description	USCS
	Elev.: ≈205 ft NAVD88	
0	**Everson Glaciomarine Drift**	
	Loose, moist, dark brown, silty, fine SAND, some gravel; small roots (SM).	
	Medium dense, moist, brown and orangish brown, silty, fine SAND, some gravel; unsorted (SM).	
2.5		
	Dense, moist, grayish brown with dark brown manganese staining, silty, fine SAND, some gravel; unsorted; scattered fine rootlets (SM).	
5		
	Oxidized fractures very moist; occasional cobbles; no more roots.	
7.5		
	Hard gravelly/cobbly digging.	
	Very dense, moist, grayish brown, silty, fine SAND, some gravel; unsorted (SM).	
10		
12.5	No seepage. No caving.	
15		
17.5		
20		

8/18/2023

20230188E001

associated earth sciences incorporated

Exploration Pit — EP-2

Guide Meridian Park — Sheet: 1 of 1

Bellingham, WA	Date: 8/1/23	Logged By: PL
20230188E001	Total Depth (ft): 12	Approved By: CMM

Depth (ft)	Description	USCS
	Elev.: ≈200 ft NAVD88	
0	**Everson Glaciomarine Drift**	
	Loose, moist, dark brown, silty, fine SAND, trace gravel; organics and roots (SM).	
	Medium dense, moist, light gray and orangish brown, silty, fine SAND, some gravel; unsorted (SM).	
2.5		
	Dense, moist, grayish brown, silty, fine SAND, some gravel; unsorted (SM)6.	
5		
7.5		
	Dense, grayish brown with occasional orangish brown and dark brown oxidation, silty, fine SAND, trace gravel; unsorted; scattered cobbles (SM).	
10		
12.5	No seepage. No caving.	
15		
17.5		
20		

8/18/2023

20230188E001

associated earth sciences incorporated

Exploration Pit EP-3

Guide Meridian Park Sheet: 1 of 1

Bellingham, WA	Date: 8/1/23	Logged By: PL
20230188E001	Total Depth (ft): 12	Approved By: CMM

Depth (ft)	Description	USCS
	Elev.: ≈200 ft NAVD88	
0	**Everson Glaciomarine Drift** Loose, moist, dark brown, silty, fine SAND, trace gravel; organics (roots) (SM).	
	Loose, very moist, tan and orangish brown, very silty, fine SAND, trace gravel (SM).	
2.5		
	Medium dense, moist, mottled brown and orangish brown, silty, fine SAND, some gravel; unsorted; sandier than previous samples (SM).	
5		
	Dense, moist, grayish brown, silty, fine SAND, some gravel; unsorted; breaks off in chunks (SM).	
7.5		
	Fine sand content increases; doesn't break off in chunks.	
10		
	Thin bed of wet, fine SAND, some silt.	
12.5	Minor groundwater seepage at 11.5 feet, water pools in base of excavation. No caving.	
15		
17.5		
20		

8/18/2023

20230188E001

Appendix C

Permit Drawings

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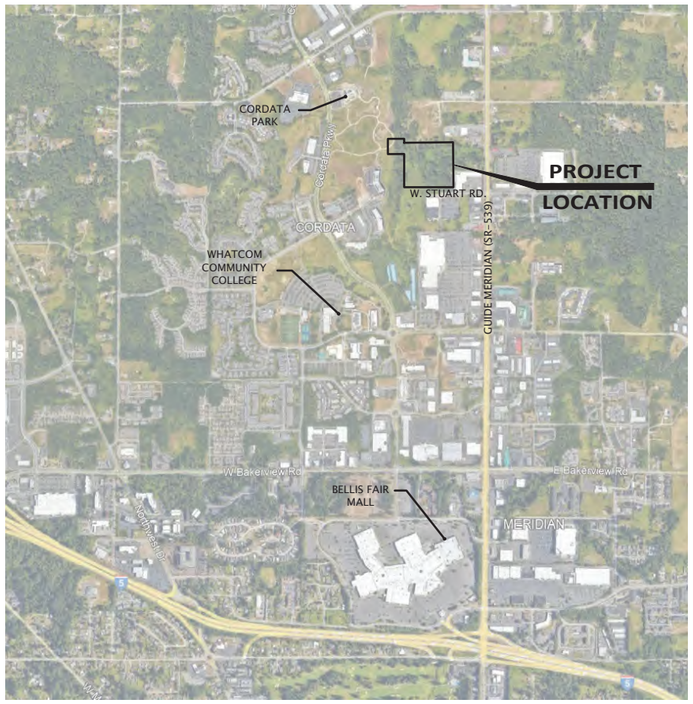
MIDDLE FORK SPRING OPEN SPACE TRAIL

BELLINGHAM PARKS AND RECREATION

60% PLAN SUBMITTAL

VICINITY MAP
NTS



DRAWING INDEX

SHEET	APPR.	DRAWING TITLE
1	G1 0.1	COVER SHEET
2	EX 02	TOPOGRAPHIC SURVEY + EXISTING CONDITIONS
3	EX 03	TOPOGRAPHIC SURVEY + EXISTING CONDITIONS
4	EX 04	TOPOGRAPHIC SURVEY + EXISTING CONDITIONS
5	G1.02	OVERALL KEY PLAN
6	G2.01	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
7	G2.02	TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS
8	G3.01	TREE REMOVAL AND CLEARING PLAN
9	G3.02	TREE REMOVAL AND CLEARING PLAN
10	G3.03	TREE REMOVAL AND CLEARING PLAN
11	G4.01	CRITICAL AREAS IMPACTS PLAN
12	G4.02	MITIGATION PLAN
13	C1.01	DRAINAGE PLAN
14	C1.02	DRAINAGE PLAN
15	C1.03	DRAINAGE PLAN
16	L1.01	LAYOUT AND MATERIALS PLAN
17	L1.02	LAYOUT AND MATERIALS PLAN
18	L1.03	LAYOUT AND MATERIALS PLAN
19	L2.01	GRADING PLAN
20	L2.02	GRADING PLAN
21	L2.03	GRADING PLAN
22	L3.01	LANDSCAPE DETAILS
23	L3.02	LANDSCAPE DETAILS
24	L3.03	LANDSCAPE DETAILS
25	L3.04	LANDSCAPE DETAILS
26	L4.00	PLANTING SCHEDULE AND NOTES
27	L4.01	PLANTING PLAN
28	L4.02	PLANTING PLAN
29	L4.03	PLANTING PLAN
30	L4.04	PLANTING DETAILS
31	L4.05	PLANTING DETAILS

PROJECT DESCRIPTION

PARK IMPROVEMENT PLANS WHICH INCLUDE A PROPOSED TRAIL AND BOARDWALK SYSTEM TO PROVIDE PEDESTRIAN CONNECTION FROM W. STUART ROAD TO CORDATA PARK.

SITE ADDRESS

200 W STUART RD., BELLINGHAM, WA

LEGAL DESCRIPTION

LOTS 1, 2, 3 AND 4, BLOCK 52, "BAKER VIEW ADDITION TO THE CITY OF BELLINGHAM", ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGES 40 TO 45, INCLUSIVE.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

CONTACTS

OWNER: DEPARTMENT OF PARKS & RECREATION
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PAUL T. KNIPPEL, PROJECT ENGINEER
PHONE: 360.778.7021
EMAIL: ptknippel@cob.org

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EMAIL: jasonh@bergerpartnership.com

JENNINFER GARCIA
PHONE: 206.325.6877
EMAIL: jenniferg@bergerpartnership.com

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CONTACT:
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EMAIL: nschaner@herrerainc.com

WETLANDS SPECIALIST: HERRERA ENVIRONMENTAL CONSULTANTS
CONTACT:
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PHONE: 360.939.3755
EMAIL: lhansen@herrerainc.com

GEOTECHNICAL ENGINEER: ASSOCIATED EARTH SCIENCES INC.
CONTACT:
JEFF LAUB
PHONE: 425.827.7701
EMAIL: jlaub@aesgeo.com

SURVEYOR: WILSON ENGINEERING
CONTACT:
PAUL JONATHAN DARROW
PHONE: 360.733.6100
EMAIL: pdarrow@wilsonengineering.com

WILSON ENGINEERING
WILSONENGINEERING.COM

HERRERA
Science + Planning + Design

PARTNERSHIP berger
1927 Post Alley, Ste. 2
Seattle, WA 98101
206 325 6877
bergerpartnership.com

STATE OF WASHINGTON
JASON K. HENRY
NO 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

	No	Revision	By	Date
	4			
	3			
	2			
	1			

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz.
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

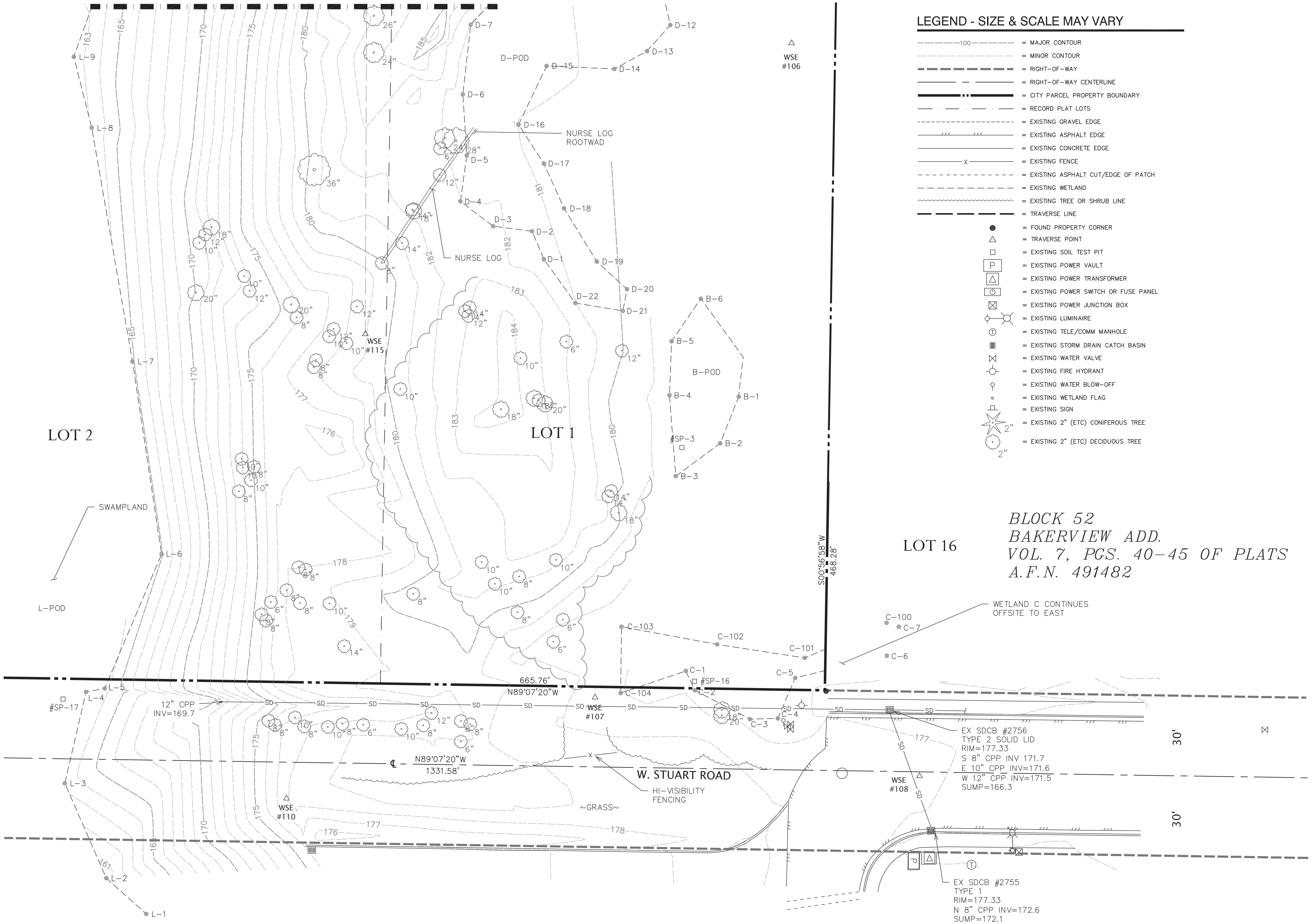
Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
G1.01 60% PLAN SUBMITTAL
COVER SHEET

SHEET 1 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

MATCHLINE – SEE SHEET 3, BOTTOM


LEGEND - SIZE & SCALE MAY VARY
= MAJOR CONTOUR
= MINOR CONTOUR
= RIGHT-OF-WAY
= RIGHT-OF-WAY CENTERLINE
= CITY PARCEL PROPERTY BOUNDARY
= RECORD PLAT LOTS
= EXISTING GRAVEL EDGE
= EXISTING ASPHALT EDGE
= EXISTING CONCRETE EDGE
= EXISTING FENCE
= EXISTING ASPHALT CUT/EDGE OF PATCH
= EXISTING WETLAND
= EXISTING TREE OR SHRUB LINE
= TRAVERSE LINE
= FOUND PROPERTY CORNER
= TRAVERSE POINT
= EXISTING SOIL TEST PIT
= EXISTING POWER VAULT
= EXISTING POWER TRANSFORMER
= EXISTING POWER SWITCH OR FUSE PANEL
= EXISTING POWER JUNCTION BOX
= EXISTING LUMINAIRE
= EXISTING TELE/COMM MANHOLE
= EXISTING STORM DRAIN CATCH BASIN
= EXISTING WATER VALVE
= EXISTING FIRE HYDRANT
= EXISTING WATER BLOW-OFF
= EXISTING WETLAND FLAG
= EXISTING SIGN
= EXISTING 2" (ETC) CONIFEROUS TREE
= EXISTING 2" (ETC) DECIDUOUS TREE
N
HORIZONTAL SCALE
20 0 20 40
SCALE FEET
LOT 2
LOT 1
LOT 16
BLOCK 52
BAKERVIEW ADD.
VOL. 7, PGS. 40-45 OF PLATS
A.F.N. 491482
NURSE LOG ROOTWAD
NURSE LOG
SWAMPLAND
L-POD
D-POD
B-POD
WSE #106
WSE #115
WSE #107
WSE #108
WSE #110
S00°56'58"W 468.28'
665.76'
N89°07'20"W
N89°07'20"W 1331.58'
W. STUART ROAD
HI-VISIBILITY FENCING
~GRASS~
12" CPP INV=169.7
WETLAND C CONTINUES OFFSITE TO EAST
30'
30'
EX SDCB #2756
TYPE 2 SOLID LID
RIM=177.33
S 8" CPP INV 171.7
E 10" CPP INV=171.6
W 12" CPP INV=171.5
SUMP=166.3
EX SDCB #2755
TYPE 1
RIM=177.33
N 8" CPP INV=172.6
SUMP=172.1

WILSON ENGINEERING

WILSONENGINEERING.COM

PRELIMINARY

PAUL JONATHAN DARROW
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR

DRAWN BY ARB

CHECKED BY PJD

CITY OF BELLINGHAM – PARKS DEPARTMENT

WASHINGTON

BELLINGHAM

MIDDLE SPRINGS TRAIL

EXISITNG CONDITIONS

DATE 11-8-2024

SCALE AS SHOWN

JOB NUMBER 2023-076

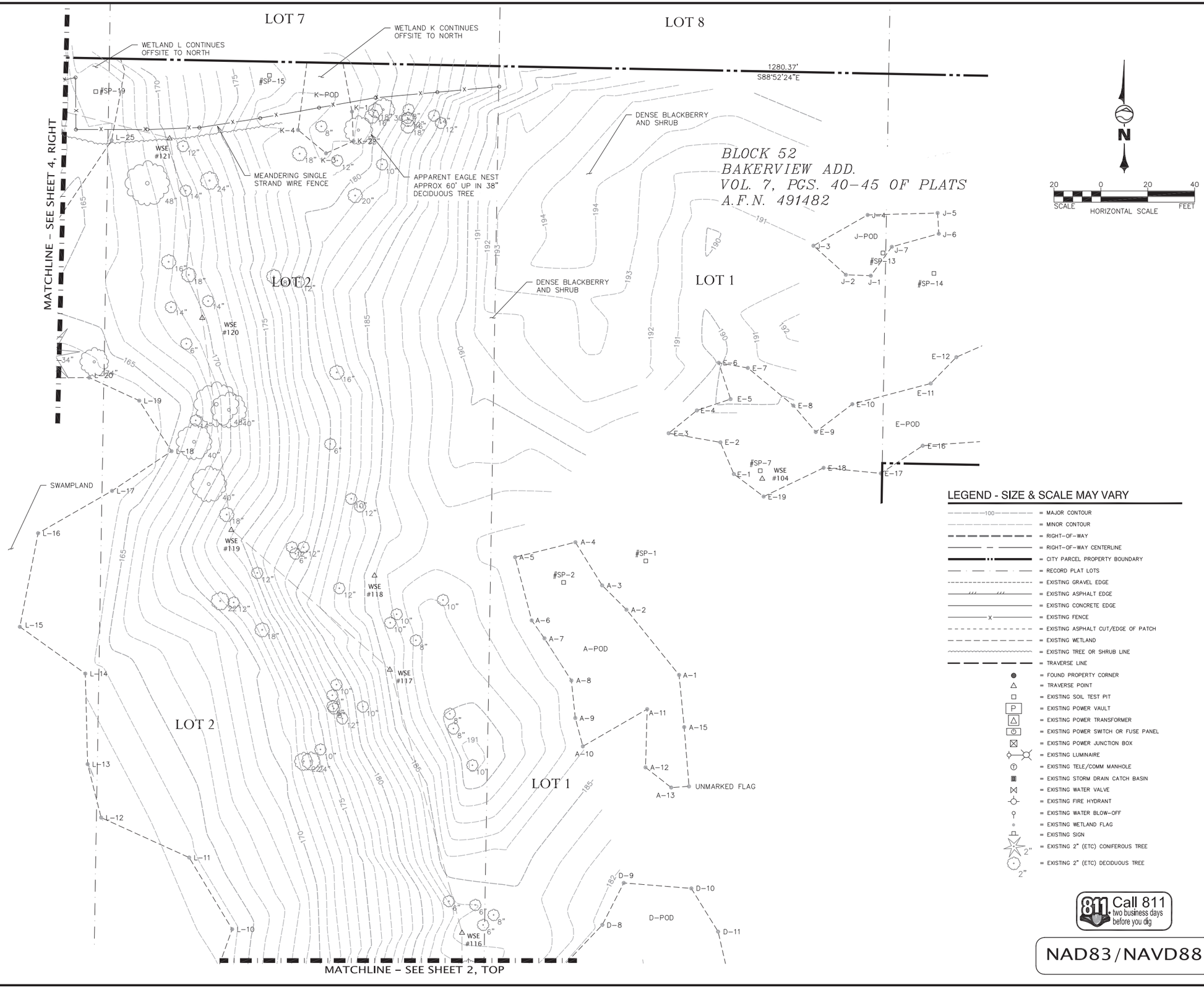
SHEET EX 02

PAGE 2 OF 4

811 Call 811 two business days before you dig

NAD83/NAVD88

PLOT SETTINGS: Bluebeam PDF, ANSI_D_(22.00_x_34.00_Inches), Landscape, 1:1, WE APWA_UNSCREENED.ctb
W:\2023\2023-076 BERGER COB TINY HOMES\DWG\23076 SV00.DWG - 11/8/2024 1:01 PM - Paul Darrow



LEGEND - SIZE & SCALE MAY VARY

- = MAJOR CONTOUR
- = MINOR CONTOUR
- = RIGHT-OF-WAY
- = RIGHT-OF-WAY CENTERLINE
- = CITY PARCEL PROPERTY BOUNDARY
- = RECORD PLAT LOTS
- = EXISTING GRAVEL EDGE
- = EXISTING ASPHALT EDGE
- = EXISTING CONCRETE EDGE
- = EXISTING FENCE
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- = EXISTING LUMINAIRE
- = EXISTING TELE/COMM MANHOLE
- = EXISTING STORM DRAIN CATCH BASIN
- = EXISTING WATER VALVE
- = EXISTING FIRE HYDRANT
- = EXISTING WATER BLOW-OFF
- = EXISTING WETLAND FLAG
- = EXISTING SIGN
- = EXISTING 2" (ETC) CONIFEROUS TREE
- = EXISTING 2" (ETC) DECIDUOUS TREE

811 Call 811 two business days before you dig

NAD83/NAVD88

WILSON ENGINEERING
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PRELIMINARY
PAUL THAN DARROW
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR

DRAWN BY	CHECKED BY
ARB/CLM	PJD

CITY OF BELLINGHAM – PARKS DEPARTMENT
WASHINGTON

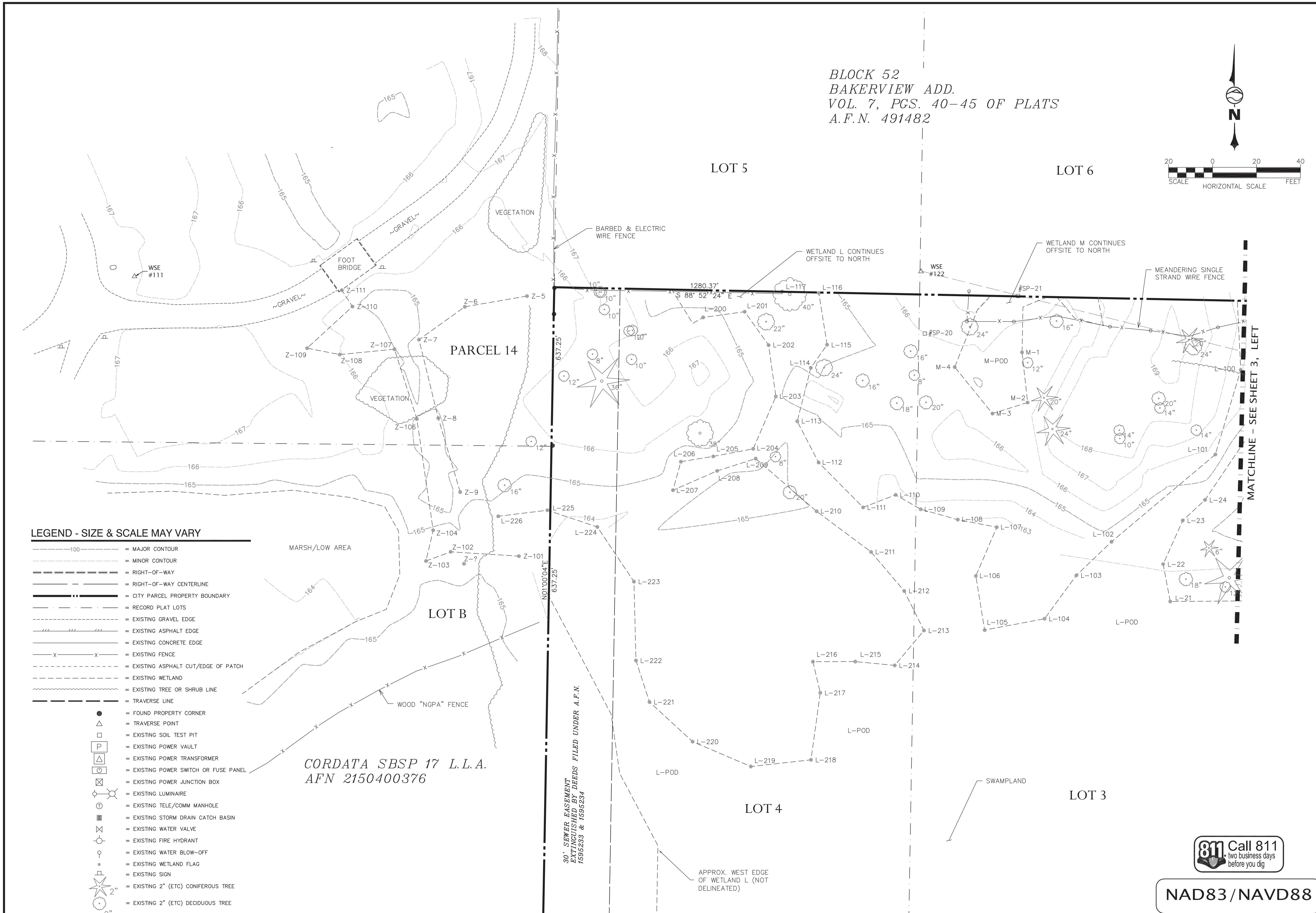
MIDDLE SPRINGS TRAIL

EXISTING CONDITIONS

DATE	SCALE	JOB NUMBER
11-8-2024	AS SHOWN	2023-076

SHEET EX 03

PAGE 3 OF 4


BLOCK 52
BAKERVIEW ADD.
VOL. 7, PGS. 40-45 OF PLATS
A.F.N. 491482
LOT 5
LOT 6
PARCEL 14
LOT B
LOT 4
LOT 3
CORDATA SBSP 17 L.L.A.
AFN 2150400376
30' SEWER EASEMENT
EXTINGUISHED BY DEEDS FILED UNDER A.F.N.
1595233 & 1595234
BARBED & ELECTRIC WIRE FENCE
WETLAND L CONTINUES OFFSITE TO NORTH
WETLAND M CONTINUES OFFSITE TO NORTH
MEANDERING SINGLE STRAND WIRE FENCE
MATCHLINE - SEE SHEET 3, LEFT
FOOT BRIDGE
~GRAVEL~
VEGETATION
MARSH/LOW AREA
WOOD "NGPA" FENCE
SWAMPLAND
APPROX. WEST EDGE OF WETLAND L (NOT DELINEATED)
1280.37'
S 88° 52' 24" E
N01°00'04"E
637.25'
L-POD
M-POD
WSE #111
WSE #122
SCALE
HORIZONTAL SCALE
FEET
N
LEGEND - SIZE & SCALE MAY VARY
= MAJOR CONTOUR
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= EXISTING POWER SWITCH OR FUSE PANEL
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= EXISTING STORM DRAIN CATCH BASIN
= EXISTING WATER VALVE
= EXISTING FIRE HYDRANT
= EXISTING WATER BLOW-OFF
= EXISTING WETLAND FLAG
= EXISTING SIGN
= EXISTING 2" (ETC) CONIFEROUS TREE
= EXISTING 2" (ETC) DECIDUOUS TREE
Call 811 two business days before you dig
NAD83/NAVD88

WILSON ENGINEERING
WILSONENGINEERING.COM

PRELIMINARY

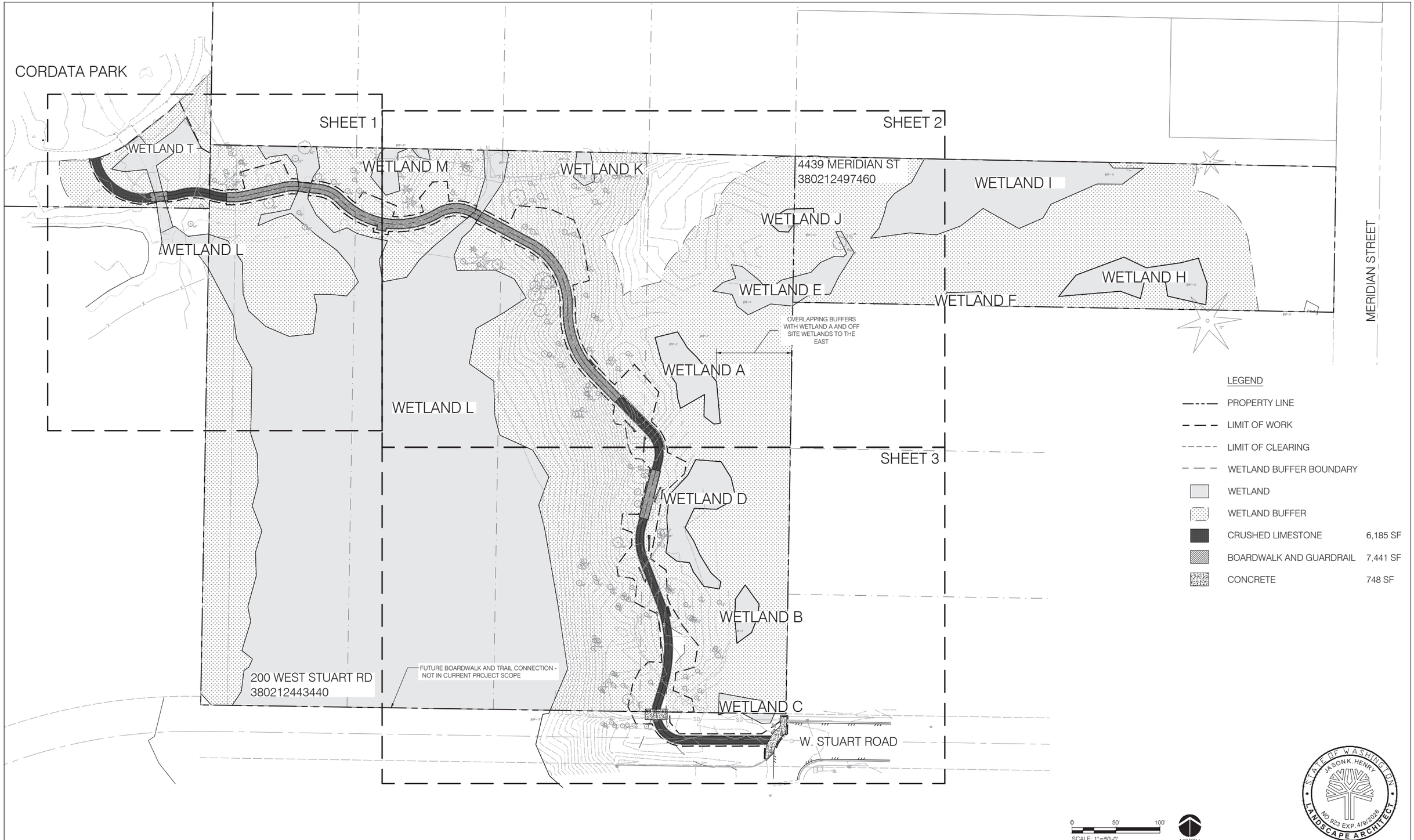
CITY OF BELLINGHAM - PARKS DEPARTMENT

BELLINGHAM, WASHINGTON

MIDDLE SPRINGS TRAIL

EXISTING CONDITIONS

DRAWN BY	ARB
CHECKED BY	PJD
DATE	11-8-2024
SCALE	AS SHOWN
JOB NUMBER	2023-076
SHEET	EX 04
PAGE	4 OF 4



Date	No.	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=50'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
G1.02 OVERALL KEY PLAN

SHEET 5 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

CORDATA PARK

WETLAND T AND IT'S BUFFER CONTINUES NORTH OF THE EXISTING TRAIL AND WAS NOT DELINEATED AS PART OF THIS PROJECT

EXISTING TRAIL

WETLAND T

WETLAND M

WETLAND K

WETLAND L

WATTLE

4439 MERIDIAN ST
380212497460

WETLAND I

WETLAND J

WETLAND E

WETLAND H

WETLAND F

MERIDIAN STREET

WETLAND A

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

WETLAND L

WETLAND D

SILT FENCE

WETLAND B

200 WEST STUART RD
380212443440

WETLAND C

STABILIZED CONSTRUCTION ACCESS

W. STUART ROAD

100'

WSDOT STORM DRAIN INLET PROTECTION PER I-40.20-00

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- SILT FENCE ALIGNED WITH CLEARING LIMIT
- WATTLE
- WETLAND
- STABILIZED CONSTRUCTION ENTRANCE 4"-8" QUARRY SPALLS
- EXISTING TREE TO BE REMOVED - FOR DEMOLITION NOTES SEE SHEET G3.01

0 50' 100'
SCALE: 1"=50'-0"

NORTH

STATE OF WASHINGTON · JASON K. HENRY · NO. 923 EXP. 4/9/2026 · LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=50'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
G2.01 60% PLAN SUBMITTAL
TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

SHEET 6 OF 31

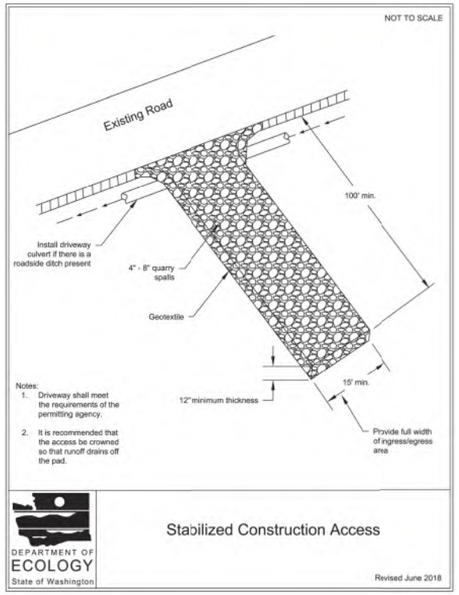
CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

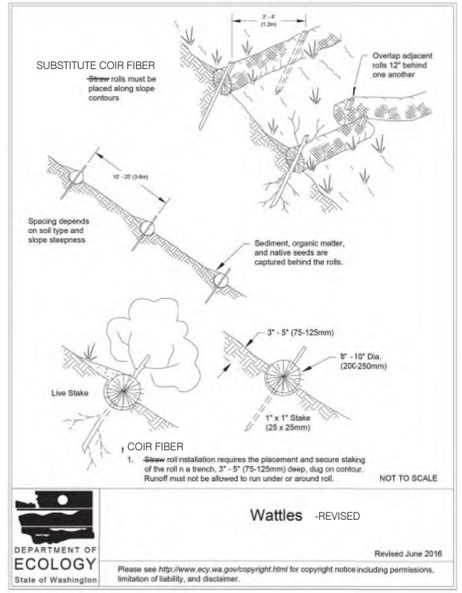
TEMPORARY EROSION AND SEDIMENT CONTROL NOTES

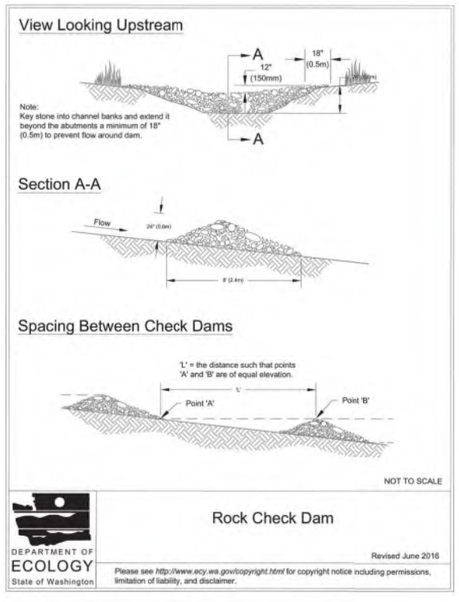
1. ALL CLEARING & GRADING CONSTRUCTION MUST BE IN ACCORDANCE WITH CITY OF BELLINGHAM (COB) CLEARING & GRADING STANDARDS, LAND USE CODE, UNIFORM BUILDING CODE, PERMIT CONDITIONS AND ALL OTHER APPLICABLE CODES, ORDINANCES AND STANDARDS. THE DESIGN ELEMENTS WITHIN THESE PLANS HAVE BEEN REVIEWED ACCORDING TO THESE REQUIREMENTS. ANY VARIANCE FROM ADOPTED EROSION CONTROL STANDARDS IS NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY THE CITY OF BELLINGHAM PRIOR TO CONSTRUCTION. IT SHALL BE THE SOLE RESPONSIBILITY OF THE APPLICANT AND THE PROJECT ENGINEER TO CORRECT ANY ERROR, OMISSION OR VARIATION FROM THE ABOVE REQUIREMENTS FOUND IN THESE PLANS.
2. APPROVAL OF THIS EROSION/SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTIONS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. A COPY OF THE APPROVED PLANS AND DRAWINGS MUST BE ON SITE DURING THE CONSTRUCTION. THE APPLICANT IS RESPONSIBLE FOR OBTAINING ANY OTHER REQUIRED OR RELATED PERMITS PRIOR TO BEGINNING CONSTRUCTION.
4. THE IMPLEMENTATIONS OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION ESTABLISHED.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM OR ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT LEAVE THE SITE.
7. ALL LOCATIONS OF EXISTING UTILITIES HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD, THEREFORE, BE CONSIDERED ONLY APPROXIMATE AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS AND TO DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
8. THE BOUNDARIES OF THE CLEARING LIMITS 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.
9. CLEARING SHALL BE LIMITED TO THE AREAS WITHIN THE APPROVED DISTURBANCE LIMITS. EXPOSED SOILS MUST BE COVERED AT THE END OF EACH WORKING DAY WHEN WORKING FROM OCTOBER 1 THROUGH APRIL 30. FROM MAY 1 THROUGH SEPTEMBER 30, EXPOSED SOILS MUST BE COVERED AT THE END OF EACH CONSTRUCTION WEEK AND ALSO AT THE THREAT OF RAIN.
10. AT NOT TIME SHALL MORE THAN ONE FOOT SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
11. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT.
12. THE CONTRACTOR MUST MAINTAIN A SWEEPER ON SITE DURING EARTHWORK AND IMMEDIATELY REMOVE SOIL THAT HAS BEEN TRACKED ONTO PAVED AREAS AS RESULT OF CONSTRUCTION.
13. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
14. ANY EXCAVATED MATERIAL REMOVED FROM THE CONSTRUCTION SITE AND DEPOSITED ON PROPERTY WITHIN THE CITY LIMITS MUST BE DONE IN COMPLIANCE WITH A VALID CITY OF BELLINGHAM PERMIT. LOCATIONS FOR THE MOBILIZATION AREA AND STOCKPILED MATERIAL MUST BE APPROVED BY THE INSPECTOR AT LEAST 24 HOURS IN ADVANCE OF ANY STOCKPILING.
15. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.

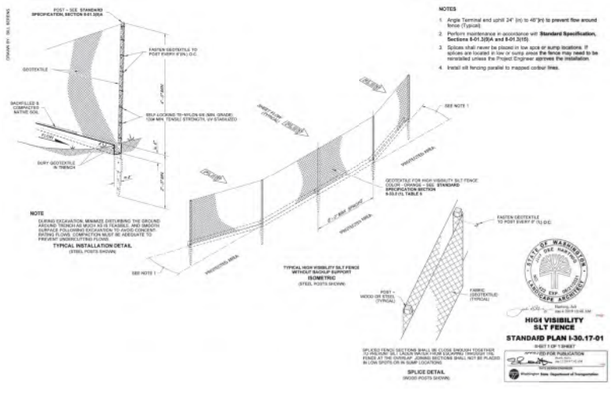
TREE PROTECTION DURING CONSTRUCTION NOTES

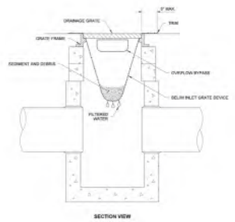
1. ALL EXISTING TREES TO REMAIN SHOULD BE PROTECTED DURING CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF BELLINGHAM AND AS DEPICTED ON THE LANDSCAPE PLANS. KEEP ALL WORK AND EQUIPMENT OUT OF THE DRIP LINE. ALL TREE PROTECTION FENCING INCLUDING HIGH VISIBILITY FLAGGING ATTACHED TO THE TREE PROTECTION FENCING AS DEPICTED ON THE LANDSCAPE PLANS PRIOR TO STARTING CONSTRUCTION ACTIVITIES.
2. IN LIMITED AREAS IT MAY BE NECESSARY TO WORK INSIDE THE DRIP LINES OF EXISTING TREES TO REMAIN. WHEN WORK INSIDE THE DRIP LINES IS NECESSARY, MINIMIZE THE EXTENT OF IMPACTS TO THE GREATEST DEGREE POSSIBLE BY USING HAND METHODS OR AN AIR SPADE. PROTECT IMPACTED AREAS UNDER THE DRIPLINE WITH A MINIMUM 6" DEPTH WOOD CHIP MULCH PLACED BENEATH 3/4" CONTINUOUS PLYWOOD TO PREVENT COMPACTION.
3. THE CONTRACTOR SHALL COORDINATE SUPERVISION BY THE PROJECT ARBORIST OF ALL GROUNDWORK WITHIN THE TREE PROTECTION FENCING TO ASSESS ROOT IMPACTS AND GUIDE ROOT CUTTING AS NECESSARY.THE CONTRACTOR SHALL ONLY CUT REQUIRED ROOTS LESS THAN 2" DIAMETER THAT INTERFERE WITH THE PROPOSED IMPROVEMENTS. EXPOSED ROOTS GREATER THAN 2" DIAMETER THAT ARE REQUIRED TO BE CUT IN ORDER TO CONSTRUCT THE PROPOSED IMPROVEMENTS ARE SUBJECT TO RESULT IN CHANGES TO THE PROPOSED GRADING.
4. EVEN WHEN THESE MEASURES ARE IN PLACE, MINIMIZE CONSTRUCTION ACTIVITIES INSIDE THE DRIPLINE AND DO NOT STORE OR STOCKPILE MATERIALS INSIDE THE DRIP LINE TO PREVENT SOIL COMPACTION. AVOID FOOT TRAFFIC IN THE ROOT ZONE.
5. REFER TO TREE REMOVAL AND CLEARING PLANS FOR ADDITIONAL TREE PROTECTION INFORMATION AND REQUIREMENTS.

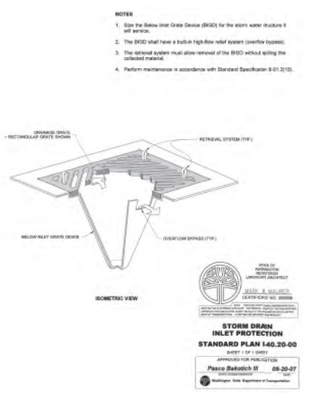


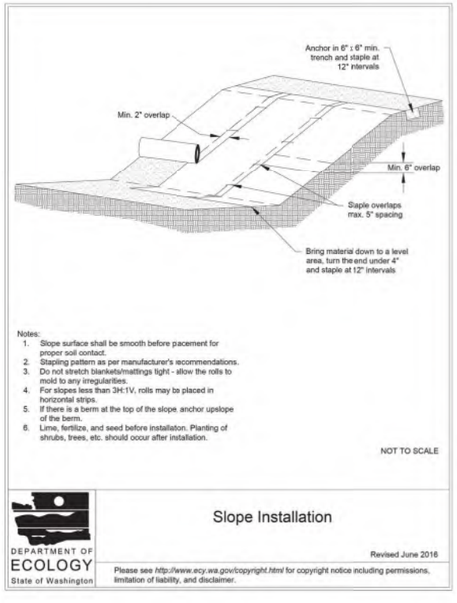












STATE OF WASHINGTON JASON K. HENRY NO. 923 EXP. 4/9/2026 LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER _____
DESIGNED/DRAWN _____
INSPECTOR _____

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. _____
Vert. 1"=

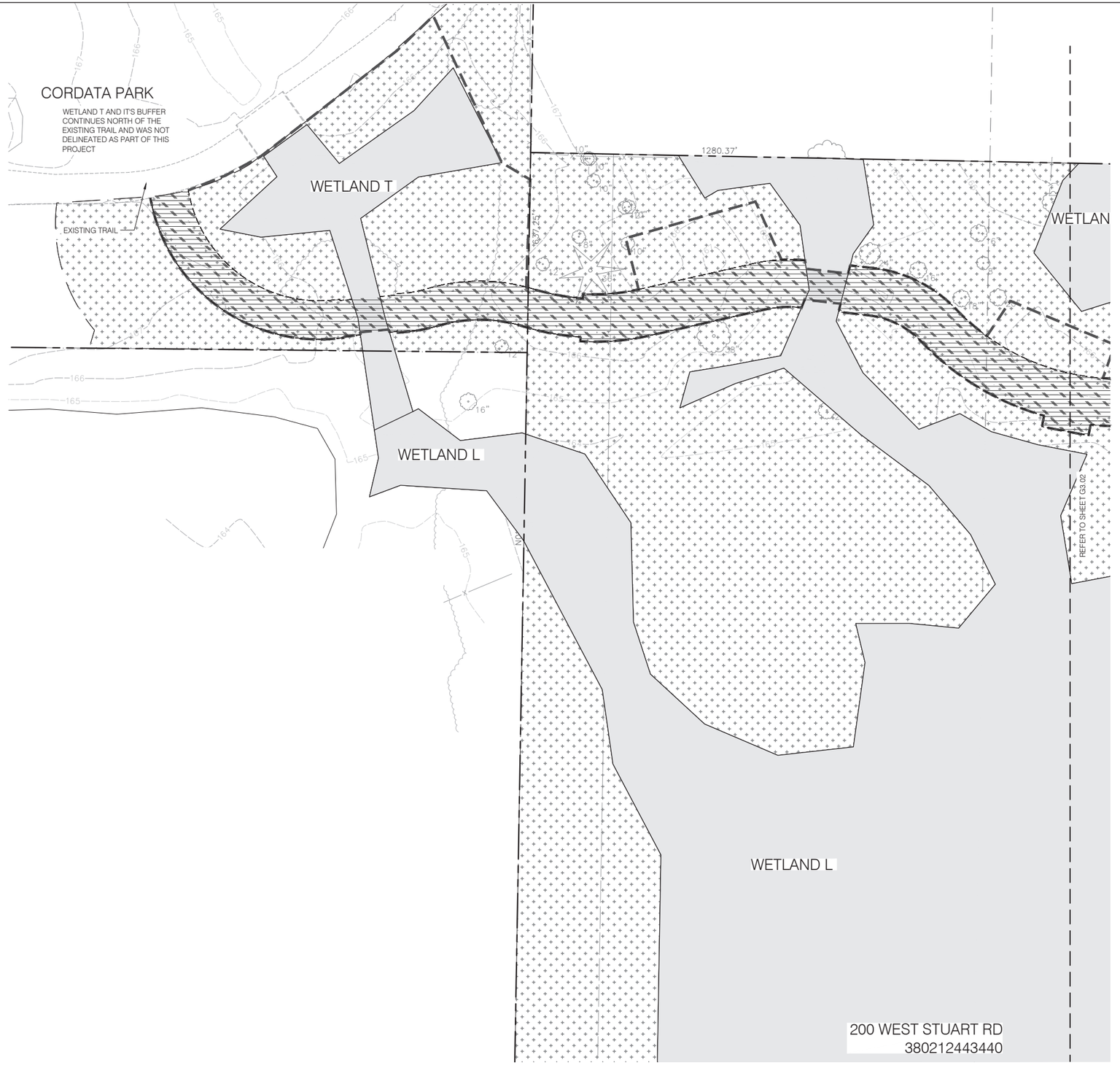
DATUM
NAD 83/98
NAVD 88

Job. No. _____
Date 12/06/2024
Field Bk. _____

MIDDLE FORK SPRING OPEN SPACE TRAIL
G2.02 60% PLAN SUBMITTAL
TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS

SHEET 7 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



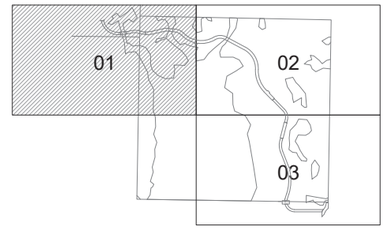
LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND BUFFER BOUNDARY
- EXISTING DECIDUOUS TREE TO REMAIN
- EXISTING CONIFER TO REMAIN
- EXISTING DECIDUOUS TREE TO BE REMOVED
- CLEAR AND GRUB

NOTES

1. FIELD VERIFY EXISTING TREE LOCATIONS AND NOTIFY PROJECT REPRESENTATIVE OF ANY INCONSISTENCIES WITH SURVEY.
2. PRESERVE AND PROTECT EXISTING TREES UNLESS OTHERWISE NOTED.
3. COORDINATE LIMITS INDICATE SELECTIVE REMOVAL OF VEGETATION.
4. LIMITED SURVEY INFORMATION AVAILABLE. CONTRACTOR TO COORDINATE FINAL DEMO AND CLEARING LIMITS WITH OWNER.
5. COORDINATE SITE CLEARING WITH NATIVE TOPSOIL AREAS TO BE STOCKPILED ON SITE FOR SITE RESTORATION.
6. ALL WOODY MATERIALS LESS THAN 8" DIAMETER DESIGNATED TO BE REMOVED TO BE CHIPPED AND REUSED ON SITE FOR RESTORATION.
7. ALL TREES INDICATED TO BE REMOVED OVER 8" DIAMETER TO BE EITHER USED FOR ON SITE RESTORATION OR CUT AND LEFT IN PLACE PERPENDICULAR TO TRAIL AS DIRECTED BY OWNER.
8. SHRUBS, STUMPS AND ROOTS SHALL BE CUT, SECTIONED, CHIPPED AND SPREAD THROUGHOUT WORK AREA IN NON-CONCENTRATED LIFTS; NOT EXCEEDING THREE (3) INCH DEPTH, OR HAUL OFF-SITE AND DISPOSE OF IN SUCH A MANNER AS TO MEET ALL STATE, COUNTY, AND MUNICIPAL, REGULATIONS. IN NO INSTANCE SHALL TREES, SHRUBS, OR ANY OTHER ORGANIC DEBRIS, EXCEPT CHIPPED MATERIAL, BE BURIED IN FILLS.
9. CONTRACTOR TO COORDINATE WITH OWNER FOR ON-SITE PLANT SALVAGE WITHIN CLEARING LIMITS.
10. CONTRACTOR SHALL REPAIR ANY ASPHALT DAMAGED BY CONSTRUCTION TRAFFIC.

KEY MAP
NTS



0 20' 40'
SCALE: 1"=20'-0"

NORTH

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN M.L.W.
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
G3.01 60% PLAN SUBMITTAL
TREE REMOVAL AND CLEARING PLAN

SHEET 8 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

WETLAND M

WETLAND K

1280.37'
S88°52'24"E

4439 MERIDIAN ST
380212497460

WETLAND J

WETLAND E

REFER TO SHEET G3.01

WETLAND L

WETLAND A

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

REFER TO SHEET G3.03

200 WEST STUART RD
380212443440

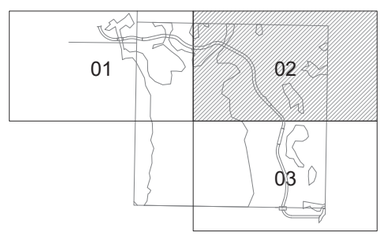
LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- EXISTING DECIDUOUS TREE TO REMAIN
- EXISTING CONIFER TO REMAIN
- EXISTING DECIDUOUS TREE TO BE REMOVED
- CLEAR AND GRUB

NOTES

1. FOR DEMOLITION NOTES SEE SHEET G3.01.

KEY MAP
NTS



0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
LANDSCAPE ARCHITECT
NO 923 EXP. 4/9/2026

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
G3.02 TREE REMOVAL AND CLEARING PLAN

SHEET 9 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

LEGEND

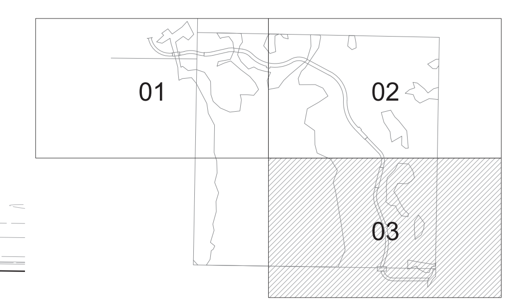
- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- EXISTING DECIDUOUS TREE TO REMAIN
- EXISTING CONIFER TO REMAIN
- EXISTING DECIDUOUS TREE TO BE REMOVED
- CLEAR AND GRUB

NOTES

1. FOR DEMOLITION NOTES SEE SHEET G3.01.

KEY MAP

NTS



0 20' 40'
SCALE: 1"=20'-0"
NORTH

No	Date	Revision	By
4			
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2			
1			

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

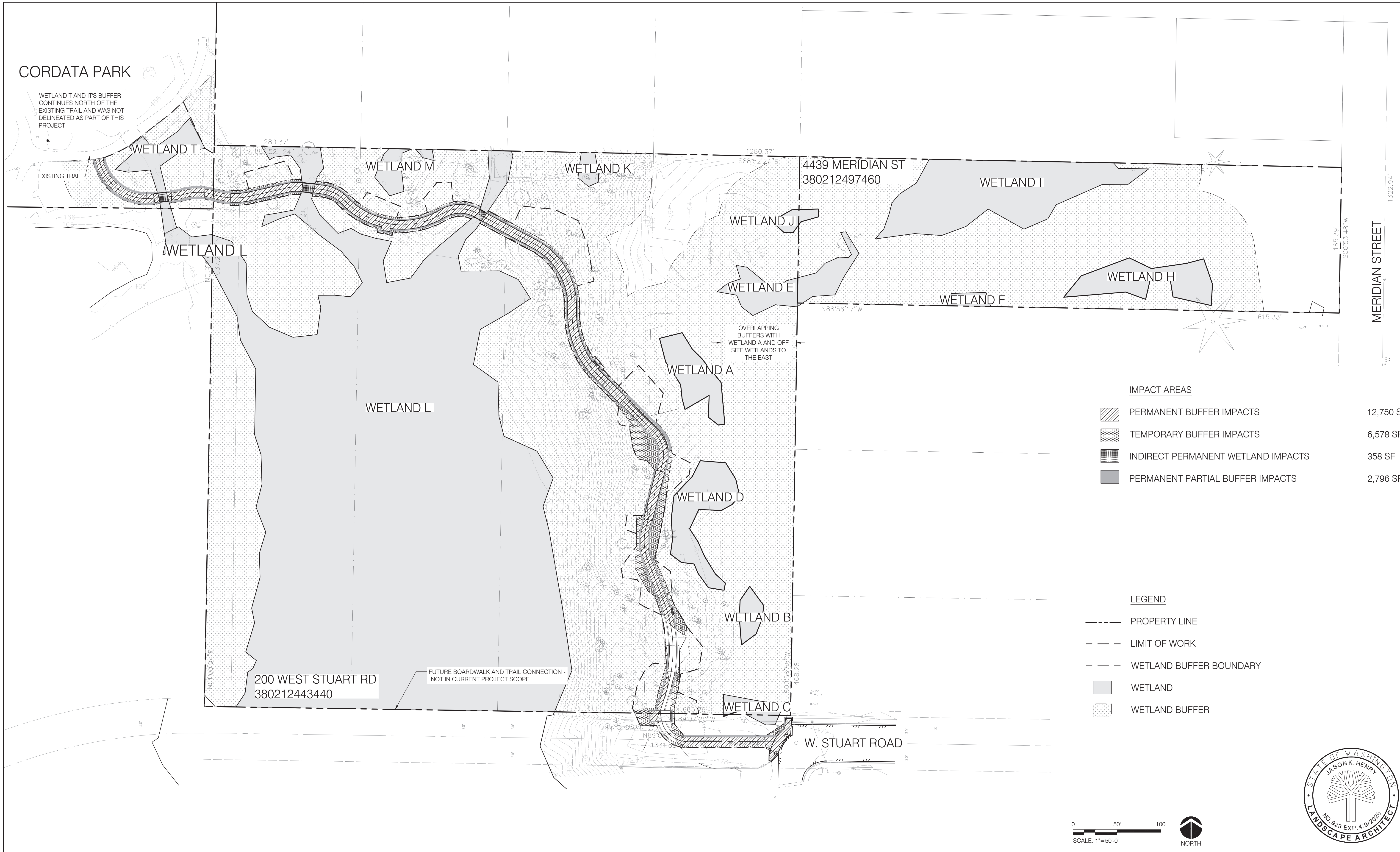
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
G3.03 TREE REMOVAL AND CLEARING PLAN

SHEET 10 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021


CORDATA PARK
WETLAND T AND IT'S BUFFER CONTINUES NORTH OF THE EXISTING TRAIL AND WAS NOT DELINEATED AS PART OF THIS PROJECT
EXISTING TRAIL
WETLAND T
WETLAND M
WETLAND K
4439 MERIDIAN ST
380212497460
WETLAND I
WETLAND J
WETLAND L
WETLAND E
WETLAND H
WETLAND F
MERIDIAN STREET
OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST
WETLAND A
WETLAND L
WETLAND D
WETLAND B
200 WEST STUART RD
380212443440
FUTURE BOARDWALK AND TRAIL CONNECTION - NOT IN CURRENT PROJECT SCOPE
WETLAND C
W. STUART ROAD
IMPACT AREAS
PERMANENT BUFFER IMPACTS 12,750 SF
TEMPORARY BUFFER IMPACTS 6,578 SF
INDIRECT PERMANENT WETLAND IMPACTS 358 SF
PERMANENT PARTIAL BUFFER IMPACTS 2,796 SF
LEGEND
PROPERTY LINE
LIMIT OF WORK
WETLAND BUFFER BOUNDARY
WETLAND
WETLAND BUFFER
SCALE: 1"=50'-0"
NORTH
STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
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CITY OF BELLINGHAM, WASHINGTON
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Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
G4.01 60% PLAN SUBMITTAL
CRITICAL AREAS IMPACTS PLAN

SHEET 11 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

CORDATA PARK

EXISTING TRAIL

WETLAND T

WETLAND M

WETLAND K

05 L3.03 COB PARK NATIVE GROWTH PORTECTION AREA SIGN

4439 MERIDIAN ST
380212497460

WETLAND I

WETLAND J

WETLAND L

NO EQUIPMENT SHALL ENTER WETLANDS. CONSTRUCTION ACTIVITY IN AREAS ONLY ACCESSIBLE BY CROSSING WETLAND BOUNDARIES SHALL BE COMPLETED WITH HAND TOOLS ONLY

WETLAND E

WETLAND H

WETLAND F

MERIDIAN STREET

05 L3.03 COB PARK NATIVE GROWTH PORTECTION AREA SIGN

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

WETLAND A

WETLAND L

WETLAND D

05 L3.03 COB PARK NATIVE GROWTH PORTECTION AREA SIGN

WETLAND B

200 WEST STUART RD
380212443440

FUTURE BOARDWALK AND TRAIL CONNECTION - NOT IN CURRENT PROJECT SCOPE

WETLAND C

W. STUART ROAD

MITIGATION AREAS

BUFFER ENHANCEMENT	4,500 SF
BUFFER RESTORATION (FOREST)	6,347 SF
BUFFER RESTORATION (GRASS)	231 SF
WETLAND ENHANCEMENT	2,148 SF
ADDED BUFFER	12,886 SF

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND BUFFER BOUNDARY
- WETLAND
- WETLAND BUFFER

0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
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CITY ENGINEER M.L.W.
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CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=50'-0"
Vert. 1"=

DATUM
NAD 83/98
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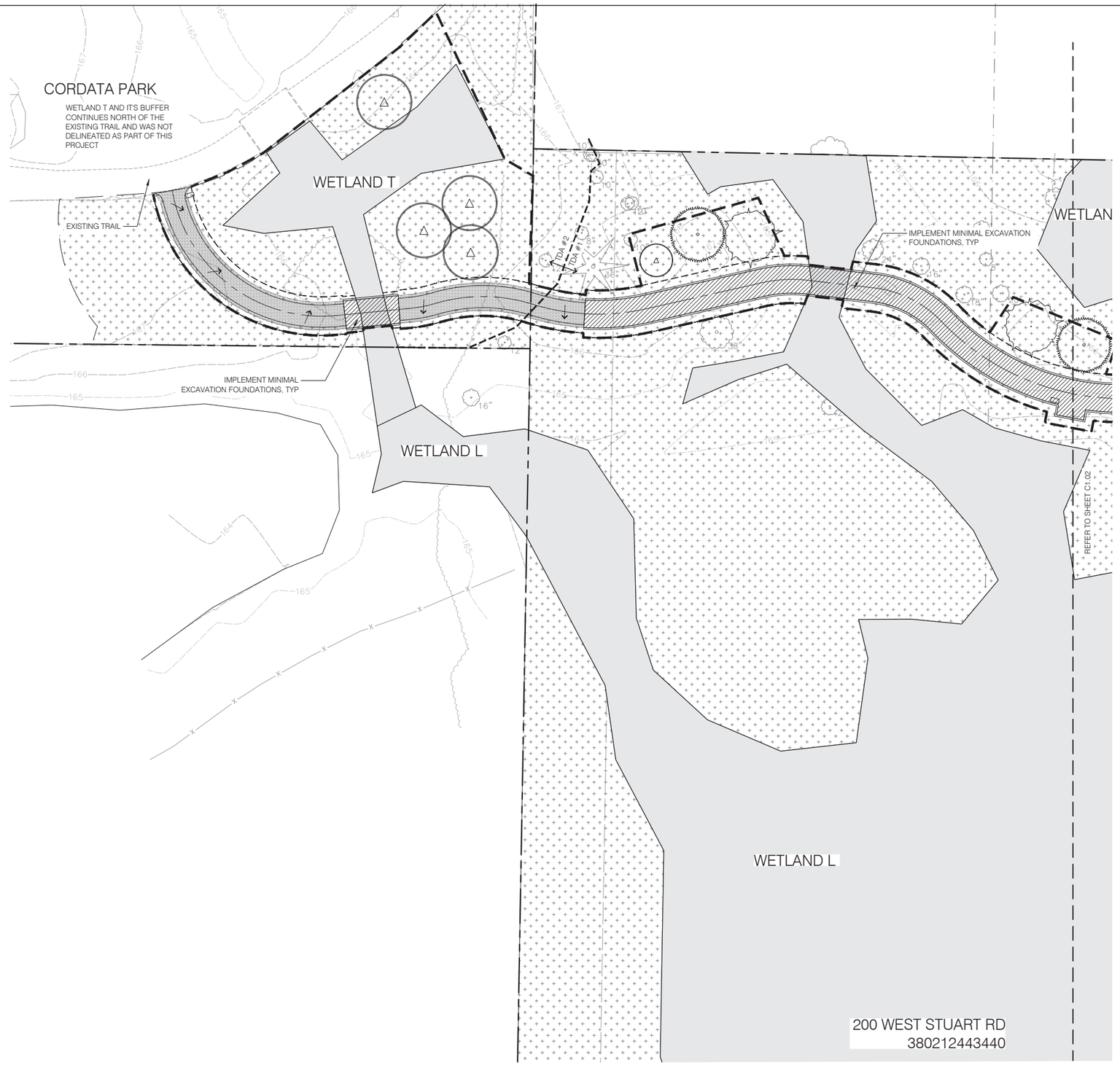
Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
G4.02
60% PLAN SUBMITTAL
MITIGATION PLAN

SHEET 12 OF 31

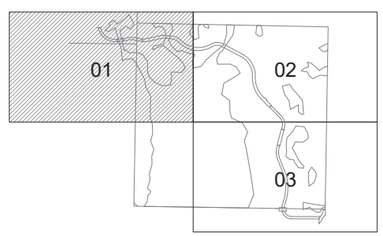
CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE
- HARD SURFACE MITIGATED BY SHEETFLOW DISPERSION
- STORMWATER RUNOFF FLOW DIRECTION

KEY MAP
NTS



SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
C1.01 DRAINAGE PLAN

SHEET 13 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

WETLAND M

WETLAND K

IMPLEMENT MINIMAL EXCAVATION FOUNDATIONS, TYP

4439 MERIDIAN ST
380212497460

WETLAND J

WETLAND E

REFER TO SHEET C1.01

WETLAND L

WETLAND A

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

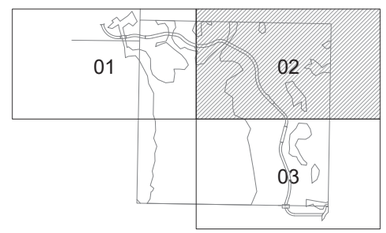
REFER TO SHEET C1.03

200 WEST STUART RD
380212443440

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE
- HARD SURFACE MITIGATED BY SHEETFLOW DISPERSION
- STORMWATER RUNOFF FLOW DIRECTION

KEY MAP
NTS



STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

0 20' 40'
SCALE: 1"=20'-0"

NORTH

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
C1.02 DRAINAGE PLAN

SHEET 14 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

REFER TO SHEET C1.02

WETLAND L

WETLAND D

WETLAND B

WETLAND C

IMPLEMENT MINIMAL EXCAVATION FOUNDATIONS, TYP

BMP T5.12 - SHEET FLOW DISPERSION, TYP.

GRADE BREAK

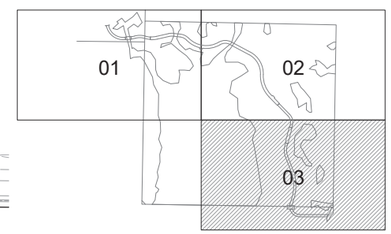
W. STUART RD

200 WEST STUART RD
380212443440

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE
- HARD SURFACE MITIGATED BY SHEETFLOW DISPERSION
- STORMWATER RUNOFF FLOW DIRECTION

KEY MAP
NTS



0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

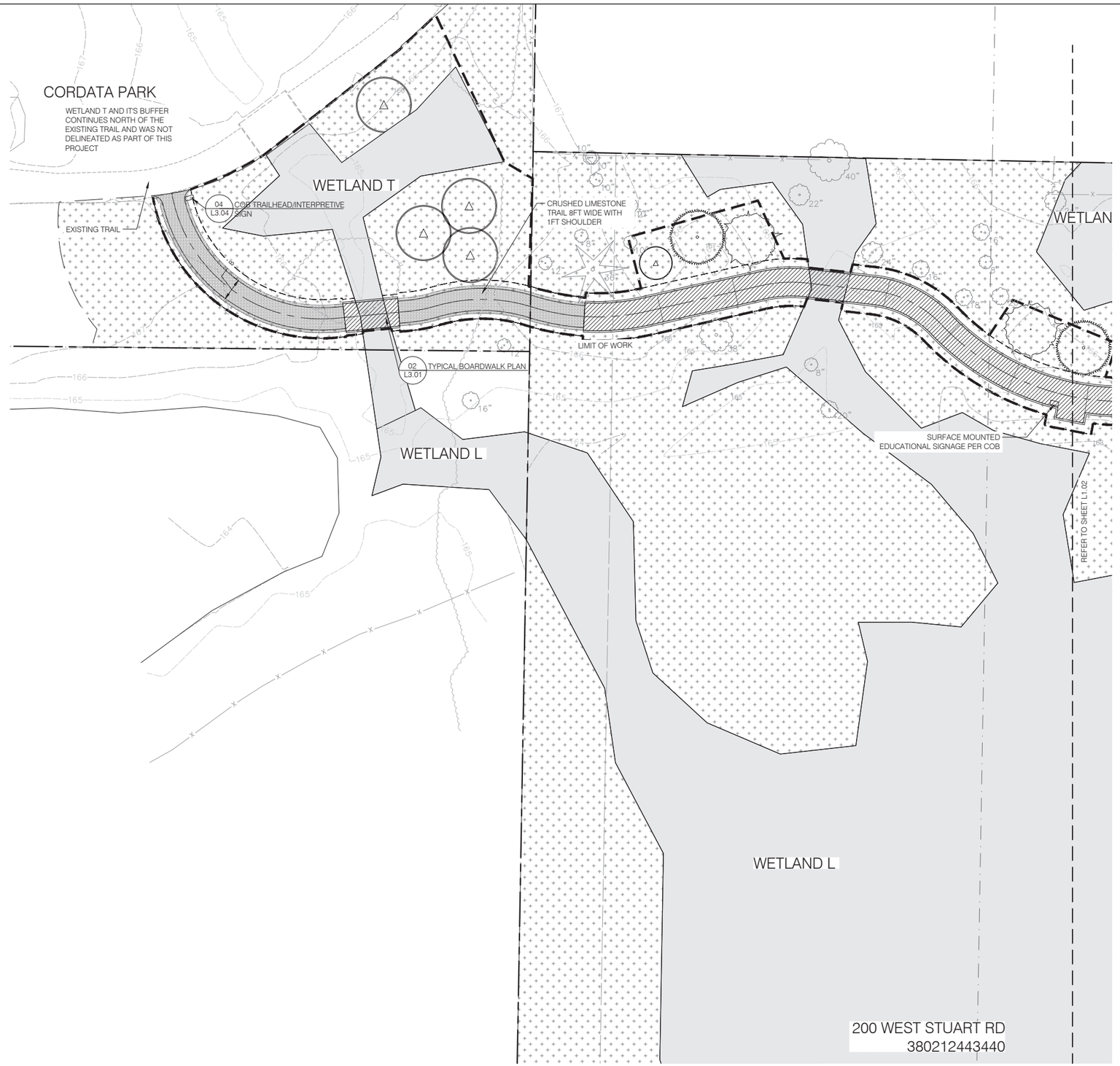
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
C1.03
60% PLAN SUBMITTAL
DRAINAGE PLAN

SHEET 15 OF 31

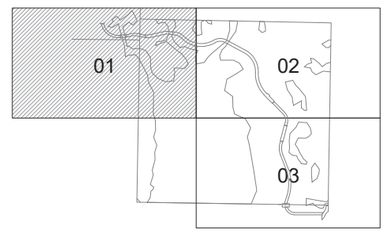
CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE

KEY MAP
NTS



SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L1.01 LAYOUT AND MATERIALS PLAN

SHEET 16 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

WETLAND M

WETLAND K

4439 MERIDIAN ST
380212497460

WETLAND J

WETLAND E

LIMIT OF WORK

LIMIT OF WORK

LIMIT OF WORK

REFER TO SHEET L1.01

02 L3.01 TYPICAL BOARDWALK PLAN

WETLAND L

WETLAND A

LIMIT OF WORK

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

04 L3.03 COB WAY FINDING SIGN POST

CRUSHED LIMESTONE TRAIL 8FT. WIDE WITH 1FT SHOULDER

LARGE WOODY DEBRIS

04 L3.03 EAGLE EDUCATIONAL SIGNAGE PER COB

ROCKERY

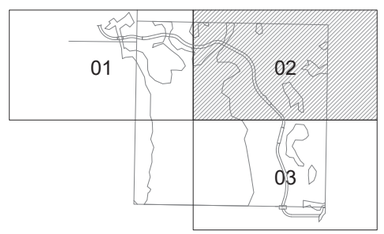
200 WEST STUART RD
380212443440

REFER TO SHEET L1.03

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE

KEY MAP
NTS



0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L1.02 LAYOUT AND MATERIALS PLAN

SHEET 17 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

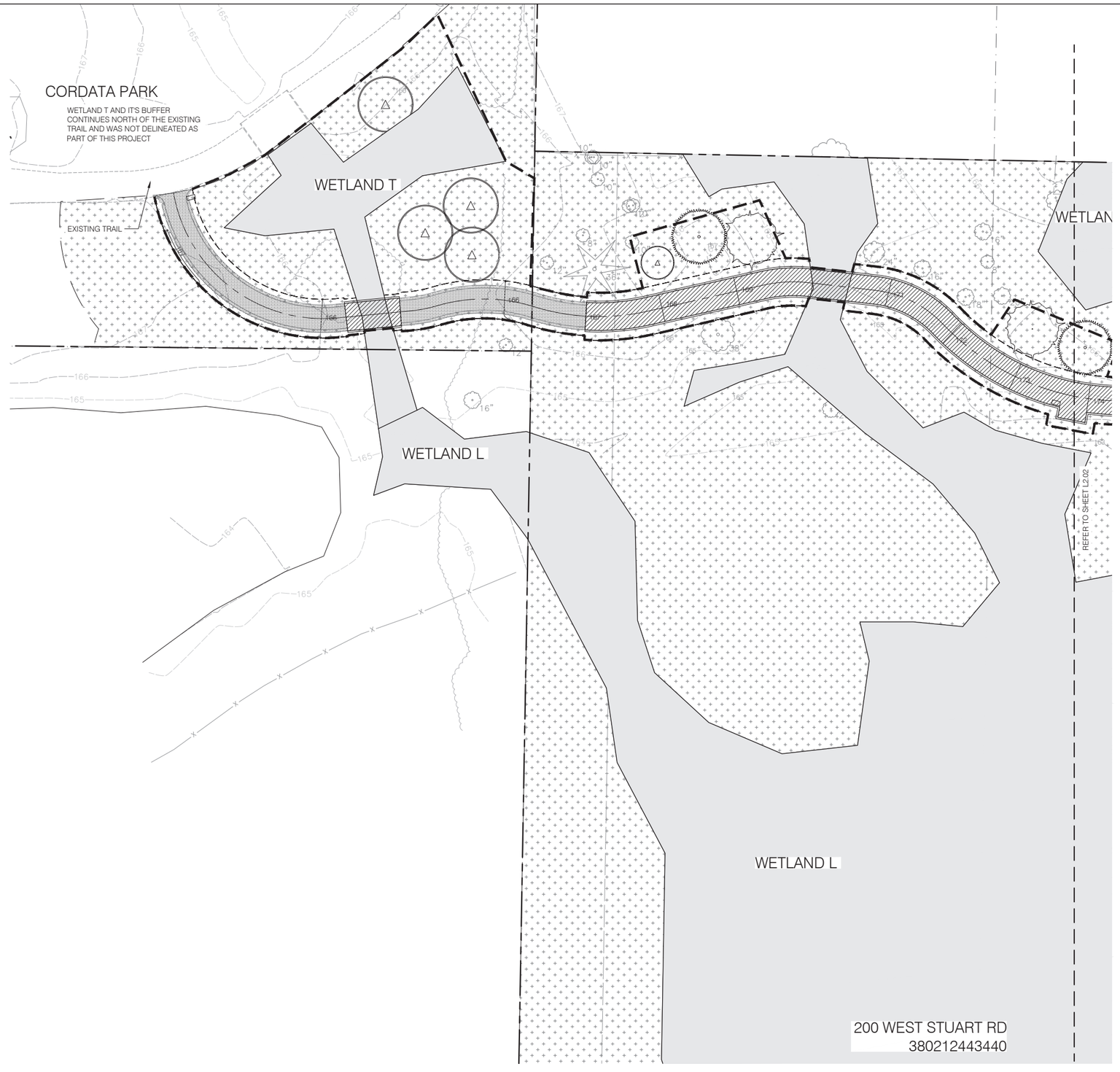
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L1.03 LAYOUT AND MATERIALS PLAN

SHEET 18 OF 31

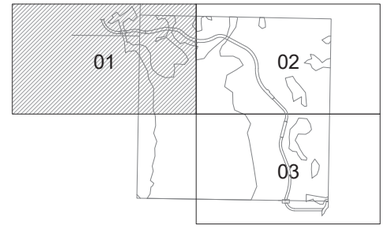
CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND BUFFER BOUNDARY
- EXISTING CONTOURS
- PROPOSED CONTOURS
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE

KEY MAP
NTS



SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
L2.01
60% PLAN SUBMITTAL
GRADING PLAN

SHEET 19 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

WETLAND M

WETLAND K

4439 MERIDIAN ST
380212497460

WETLAND J

WETLAND E

REFER TO SHEET L2.01

WETLAND L

WETLAND A

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

TOW 190.0

TOW 192.0

TOW 191.0

TOW 190.0

TOW 189.0

TOW 188.0

TOW 187.0

TOW 186.0

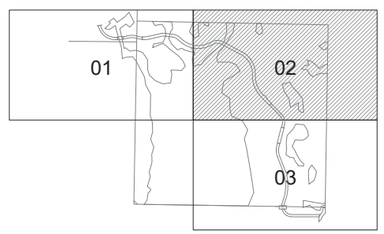
REFER TO SHEET L2.03

200 WEST STUART RD
380212443440

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- LIMIT OF CLEARING
- WETLAND BUFFER BOUNDARY
- EXISTING CONTOURS
- PROPOSED CONTOURS
- WETLAND
- WETLAND BUFFER
- CRUSHED LIMESTONE
- BOARDWALK
- CONCRETE

KEY MAP
NTS



0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No.	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L2.02 GRADING PLAN

SHEET 20 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L2.03 GRADING PLAN

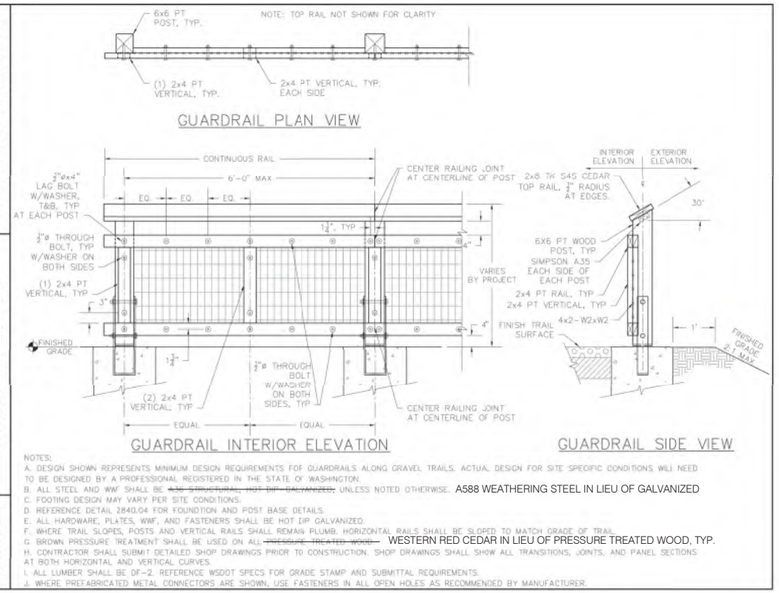
SHEET 21 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

PARKS AND RECREATION
DESIGN AND DEVELOPMENT
March 25, 2024

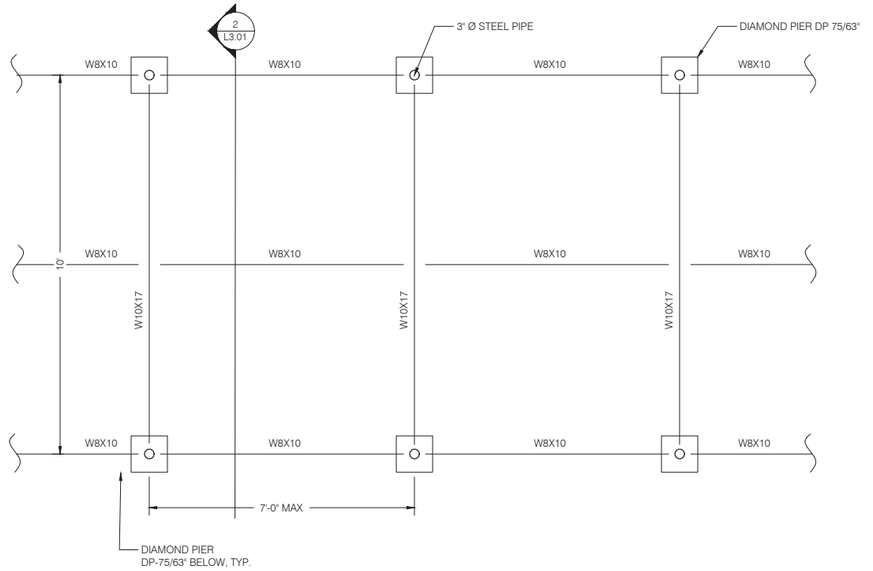
CITY OF BELLINGHAM
WOOD GUARDRAIL ELEVATION
Scale: 1/2" = 1'-0"

DRAWING
2840.03

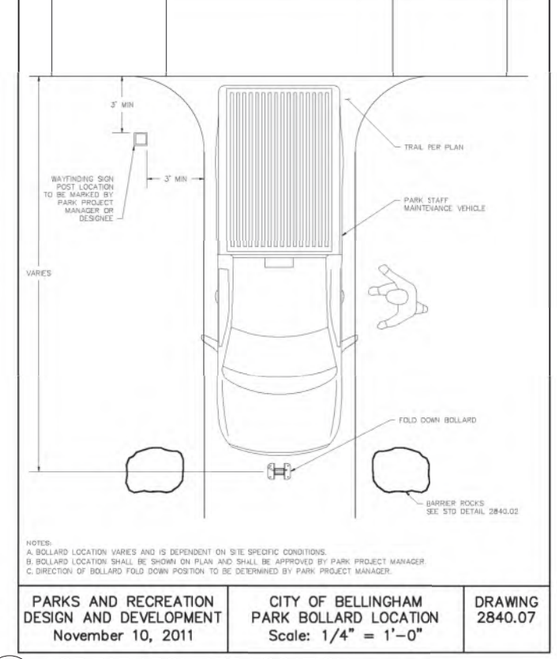


NOTES:
A. DESIGN SHOWN REPRESENTS MINIMUM DESIGN REQUIREMENTS FOR GUARDRAILS ALONG GRAVEL TRAILS. ACTUAL DESIGN FOR SITE SPECIFIC CONDITIONS WILL NEED TO BE DESIGNED BY A PROFESSIONAL REGISTERED IN THE STATE OF WASHINGTON.
B. ALL STEEL AND WW SHALL BE ~~HOT DIP GALVANIZED~~, UNLESS NOTED OTHERWISE. A588 WEATHERING STEEL IN LIEU OF GALVANIZED
C. FOOTING DESIGN MAY VARY PER SITE CONDITIONS.
D. REFERENCE DETAIL 2840.04 FOR FOUNDTION AND POST BASE DETAILS.
E. ALL HARDWARE, PLATES, WW, AND FASTENERS SHALL BE HOT DIP GALVANIZED.
F. WHERE TRAIL SLOPES, POSTS AND VERTICAL RAILS SHALL REMAIN PLUMB. HORIZONTAL RAILS SHALL BE SLOPED TO MATCH GRADE OF TRAIL.
G. BROWN PRESSURE TREATMENT SHALL BE USED ON ALL ~~PRESSURE TREATED WOOD~~ WESTERN RED CEDAR IN LIEU OF PRESSURE TREATED WOOD, TYP.
H. CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS PRIOR TO CONSTRUCTION. SHOP DRAWINGS SHALL SHOW ALL TRANSITIONS, JOINTS, AND PANEL SECTIONS AT BOTH HORIZONTAL AND VERTICAL CURVES.
I. ALL LUMBER SHALL BE DF-2. REFERENCE WSDOT SPECS FOR GRADE STAMP AND SUBMITTAL REQUIREMENTS.
J. WHERE PREFABRICATED METAL CONNECTORS ARE SHOWN, USE FASTENERS IN ALL OPEN HOLES AS RECOMMENDED BY MANUFACTURER.

01 COB WOOD GUARDRAIL ELEVATION - REVISED
SCALE: 1/2"=1'-0"



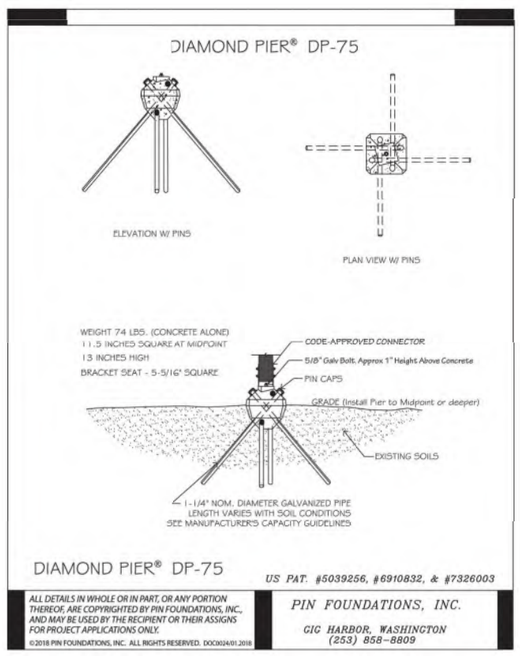
02 TYPICAL BOARDWALK PLAN
SCALE: 1/2"=1'-0"



NOTES:
A. BOLLARD LOCATION VARIES AND IS DEPENDENT ON SITE SPECIFIC CONDITIONS.
B. BOLLARD LOCATION SHALL BE SHOWN ON PLAN AND SHALL BE APPROVED BY PARK PROJECT MANAGER.
C. DIRECTION OF BOLLARD FOLD DOWN POSITION TO BE DETERMINED BY PARK PROJECT MANAGER.

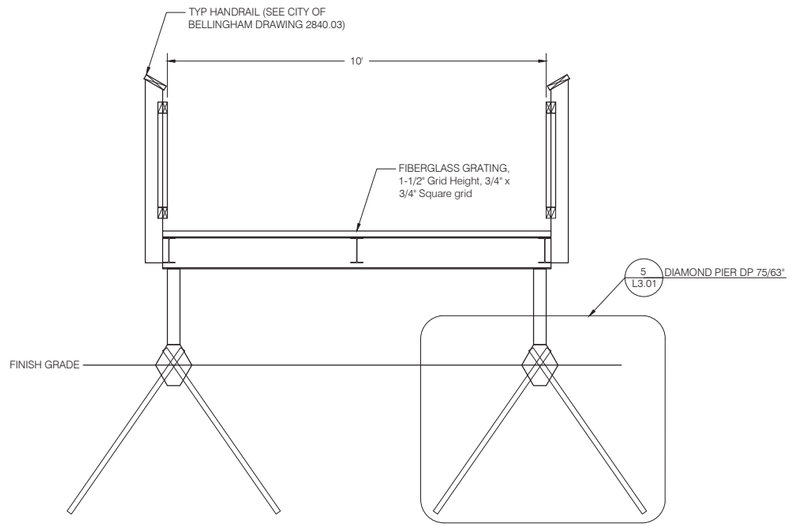
PARKS AND RECREATION DESIGN AND DEVELOPMENT November 10, 2011	CITY OF BELLINGHAM PARK BOLLARD LOCATION Scale: 1/4" = 1'-0"	DRAWING 2840.07

03 COB PARK BOLLARD LOCATION
SCALE: 1/4" = 1'-0"



PIN FOUNDATIONS, INC.
GIG HARBOR, WASHINGTON
(253) 858-8809

04 DIAMOND PIER DP 75
SCALE: 1/2"=1'-0"



05 TYPICAL BOARDWALK SECTION
SCALE: 1/2"=1'-0"

No	Date	Revision	By
4			
3			
2			
1			

PROJECT ENGINEER _____
DESIGNED/DRAWN _____
INSPECTOR _____

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.I.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. _____
Vert. 1"=

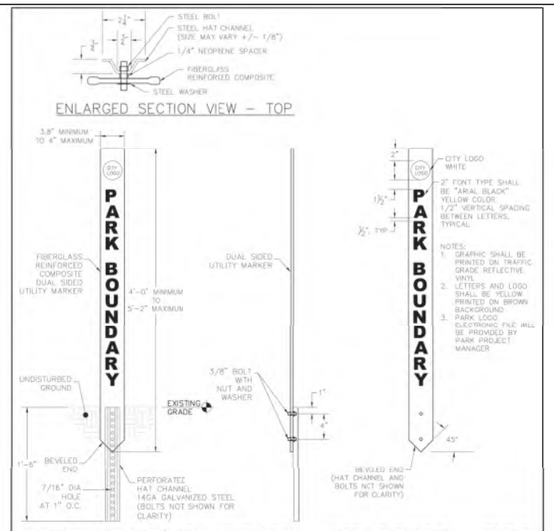
DATUM
NAD 83/98
NAVD 88

Job. No. _____
Date 12/06/2024
Field Bk. _____

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L3.01 LANDSCAPE DETAILS

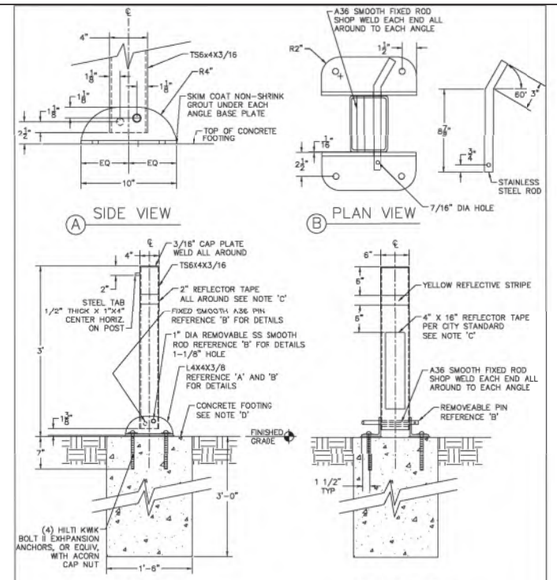
SHEET 22 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



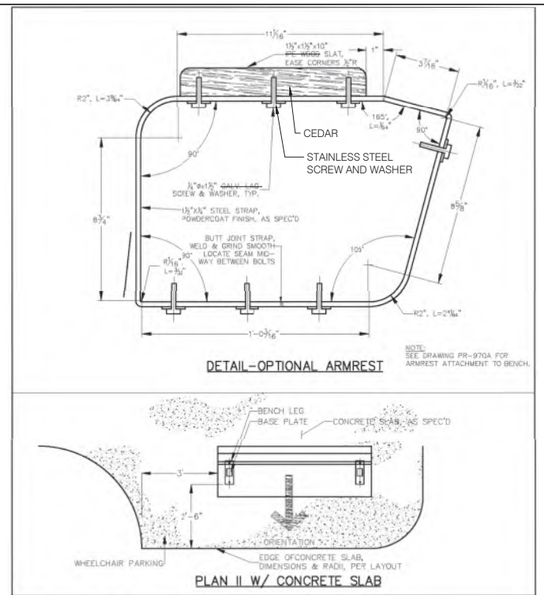
PARKS AND RECREATION DESIGN AND DEVELOPMENT MAY 11, 2018	CITY OF BELLINGHAM PARK BOUNDARY MARKER Scale: 1" = 1'-0"	DRAWING 10430.07

01 COB PARK BOUNDARY MARKER
SCALE: 1"=1'-0"



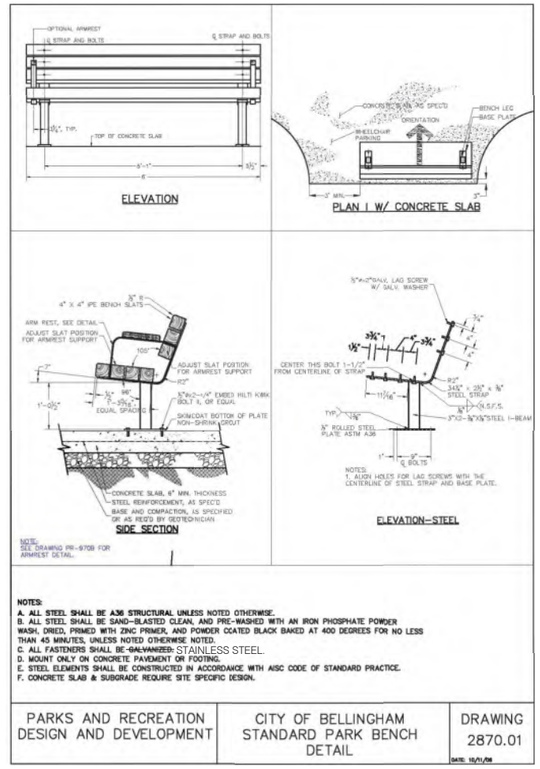
PARKS AND RECREATION DESIGN AND DEVELOPMENT last edit August 09, 2007	CITY OF BELLINGHAM FOLD DOWN BOLLARD DETAIL	DRAWING 02840.01

02 COB FOLD DOWN BOLLARD
SCALE: NTS



PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM STANDARD PARK BENCH DETAIL–ARMREST	DRAWING 2870.02 DATE: 10/11/06

03 COB PARK BENCH ARMREST- REVISED
SCALE: NTS



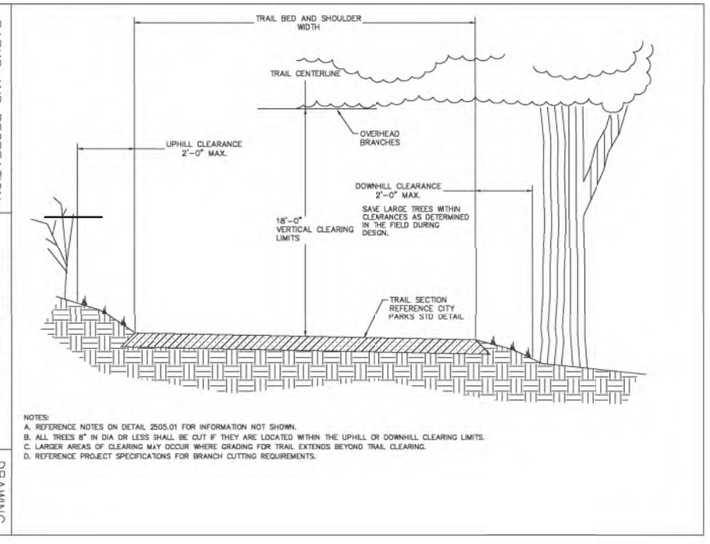
PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM STANDARD PARK BENCH DETAIL	DRAWING 2870.01 DATE: 10/11/06

04 COB PARK BENCH - REVISED
SCALE: NTS

PARKS AND RECREATION DESIGN AND DEVELOPMENT July 10, 2009

CITY OF BELLINGHAM TRAIL CLEARING SCALE 3/8" = 1'-0"

DRAWING 2505.03

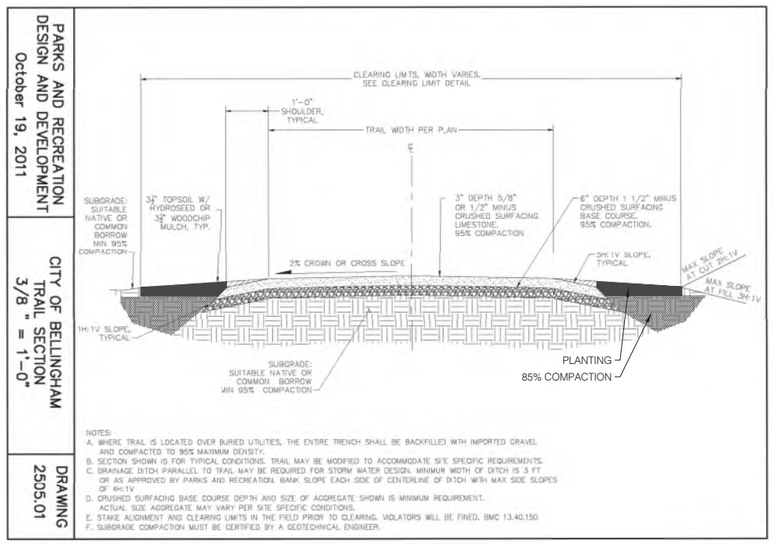


05 COB TRAIL CLEARING
SCALE: 3/8"=1'-0"

PARKS AND RECREATION DESIGN AND DEVELOPMENT October 19, 2011

CITY OF BELLINGHAM TRAIL SECTION 3/8 " = 1'-0"

DRAWING 2535.01



06 COB TRAIL SECTION - REVISED
SCALE: 3/8"=1'-0"

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

No	Date	Revision	By
4			
3			
2			
1			

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS F.C.J.
CITY ENGINEER M.I.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. _____
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No. _____
Date 12/06/2024
Field Bk. _____

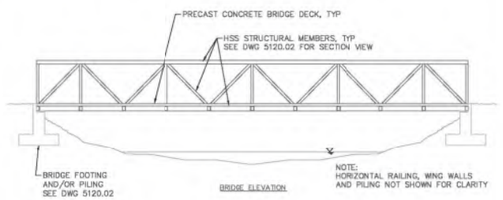
MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L3.02 LANDSCAPE DETAILS

SHEET 23 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

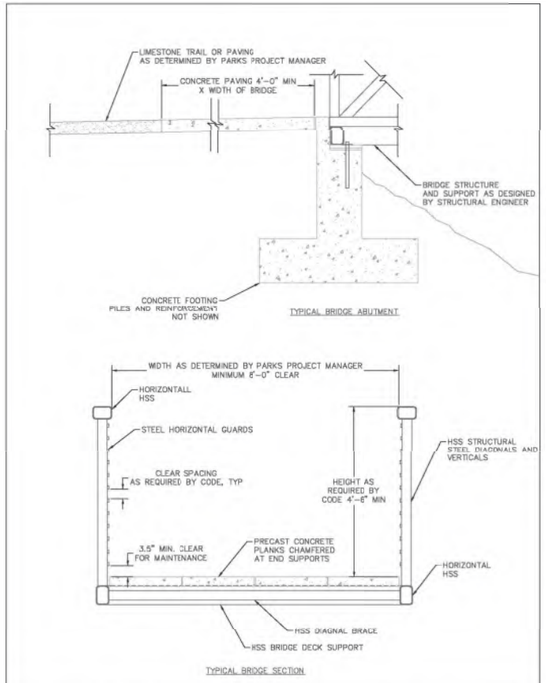
MANUFACTURED PEDESTRIAN BRIDGE

A. BRIDGE DESIGN SHALL BE STANDARD TRUSS CONSTRUCTED OF WEATHERED HSS STRUCTURAL STEEL WITH A CONCRETE BRIDGE DECK AS SHOWN BELOW.
B. ALL CONSTRUCTION AND DESIGN IS TO BE IN ACCORDANCE WITH THE PROVISIONS OF THE INTERNATIONAL BUILDING CODE (IBC) AS ADOPTED BY THE CITY OF BELLINGHAM.
C. PROVIDE A COMPLETE, INTEGRATED SET OF BRIDGE MANUFACTURER'S STANDARD COMPONENTS THAT FORM A BRIDGE. INCLUDE PRIMARY AND SECONDARY FRAMING AND ACCESSORIES.
D. INFORMATION ON THIS DRAWING ESTABLISHES REQUIREMENTS FOR SYSTEM'S AESTHETIC EFFECTS, AS INDICATED BY SIZES, RELATIONSHIPS AND PROFILES OF COMPONENTS.
   1. DO NOT MODIFY INTENDED AESTHETIC EFFECTS, AS JUDGED SOLELY BY PARK PROJECT MANAGER, EXCEPT WITH PRIOR APPROVAL BY PARK PROJECT MANAGER. IF MODIFICATIONS ARE PROPOSED, SUBMIT COMPREHENSIVE EXPLANATORY DATA FOR REVIEW.
E. MANUFACTURER QUALIFICATIONS: A FIRM WITH AT LEAST FIVE YEARS EXPERIENCE IN MANUFACTURING PEDESTRIAN BRIDGE SYSTEMS SIMILAR TO THOSE INDICATED FOR THE PROJECT. THE FIRM SHALL BE AISC CERTIFIED FOR THIS TYPE OF CONSTRUCTION.
   1. ENGINEERING RESPONSIBILITY: PROVIDE COMPREHENSIVE ENGINEERING ANALYSIS AND DESIGN BY A QUALIFIED STRUCTURAL ENGINEER REGISTERED WITH WASHINGTON STATE (HEREAFTER REFERRED TO AS "STRUCTURAL ENGINEER").
F. PROVIDE FRAMING AND DECKING SYSTEMS CAPABLE OF WITHSTANDING THE EFFECTS OF GRAVITY AND ENVIRONMENTAL LOADS AS SPECIFIED BY STRUCTURAL ENGINEER. DESIGN FOR THERMAL MOVEMENTS WITHOUT OVER STRESSING OR FAILURE OF COMPONENTS OR CONNECTIONS.
G. BRIDGE SYSTEM DESIGN: AS SPECIFIED BY STRUCTURAL ENGINEER
   1. PRIMARY FRAME TYPE: PARALLEL CHORD TRUSS WITH VERTICAL ENDS BUILT UP OF HSS STEEL SECTIONS AS INDICATED ON DRAWINGS IN PRATT, FINK, OR WARREN WEB CONFIGURATIONS. OVERHEAD (PORTAL) BRACING IS PROHIBITED.
   2. DESIGN THE BRIDGE TO HAVE DEPTHS, SPANS, CLEARANCES AND GENERAL CONFIGURATIONS AS SHOWN. NOMINAL CHANGES TO SUIT THE MANUFACTURER'S SYSTEMS WILL BE ACCEPTED PROVIDED THAT THE INSIDE CLEARANCE, MINIMUM SPAN AND REQUIRED TOP OF RAIL HEIGHT WILL NOT CHANGE. THE BRIDGE SHALL BE DESIGNED TO ACCOMMODATE FLOOD STAGE REQUIRED BY THE REGULATORY AGENCIES. NO PORTION OF THE STRUCTURE SHALL BE ALLOWED BELOW BOTTOM OF STEEL ELEVATION AS MANDATED BY THE REGULATORY AGENCIES.
H. DECK SYSTEM DESIGN: THE DECK SYSTEM WILL BE CAST-IN-PLACE OR PRECAST CONCRETE. FINISH SHALL BE MEDIUM-COARSE BROOM FINISH. IF CAST-IN-PLACE IS USED, LEAVE-IN-PLACE FORM SYSTEMS WILL NOT BE PERMITTED.
   1. PLACEMENT OF WET CONCRETE ON THE DECK AFTER THE BRIDGE IS PLACED IN ITS FINAL LOCATION WILL NOT BE PERMITTED.
I. PROVIDE FRAMING AND DECKING SYSTEMS CAPABLE OF WITHSTANDING THE EFFECTS OF GRAVITY AND ENVIRONMENTAL LOADS AS INDICATED BY THE STRUCTURAL ENGINEER INCLUDING DEAD, LIVE, SNOW, WIND, CONSTRUCTION, AND SEISMIC EFFECTS COMBINED AS REQUIRED BY THE APPLICABLE CODE.
J. MINIMUM LIVE LOADS SHALL BE IN ACCORDANCE WITH THE IBC AS ADOPTED BY THE CITY OF BELLINGHAM.
K. DESIGN FOR MINIMUM VEHICLE LOAD OF 10,000 POUNDS
L. SUBMIT SHOP DRAWINGS FOR ABUTMENT REINFORCEMENT AND BRIDGE STEEL.
M. ALL STEEL SHALL BE ASTM A588 OR ASTM A847 WEATHERING STEEL EXCEPT CONCRETE REINFORCEMENT AND PILING.
N. CAMBER SHALL BE AS SPECIFIED BY THE STRUCTURAL ENGINEER.
O. THE BRIDGE SHALL BE DESIGNED FOR VIBRATION.
P. WELDING: QUALIFY PERSONNEL ACCORDING TO AWS D1.1, "STRUCTURAL WELDING CODE – STEEL"
Q. COMPLY WITH APPLICABLE PROVISIONS OF THE FOLLOWING SPECIFICATIONS AND DOCUMENTS:
   1. AISC "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS – ALLOWABLE STRESS DESIGN AND PLASTIC"
   2. ASTM A 6 "SPECIFICATION FOR GENERAL REQUIREMENTS FOR ROLLED STEEL PLATES, SHAPES, SHEETING PILING, AND BARS FOR STRUCTURAL USE"
   3. ERECTION TOLERANCES: AISC S303, "STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
R. ALL EXPOSED SURFACES OF WEATHERING STEEL SHALL BE CLEANED IN ACCORDANCE WITH SSPC SP-6, COMMERCIAL BLAST CLEANING.
S. DESIGN ABUTMENTS AND FOOTINGS. COORDINATE SIZE AND LOCATION OF CONCRETE FOUNDATIONS AND CASTING OF ANCHOR-BOLT INSERTS INTO FOUNDATION WALLS AND FOOTINGS.
T. DESIGN COMPONENTS AND FABRICATE FRAMING TO PRODUCE CLEAN, SMOOTH CUTS AND BENDS. PUNCH ALL HOLES OF PROPER SIZE, SHAPE AND LOCATION.
U. DESIGN AND FABRICATE ALL WEATHERING STEEL PARTS SO AS TO AVOID LOCATIONS WHICH WILL IMPEDE OR PREVENT DEVELOPMENT OF THE SURFACE OXIDE COATING.
V. SHOP FABRICATE ALL COMPONENTS



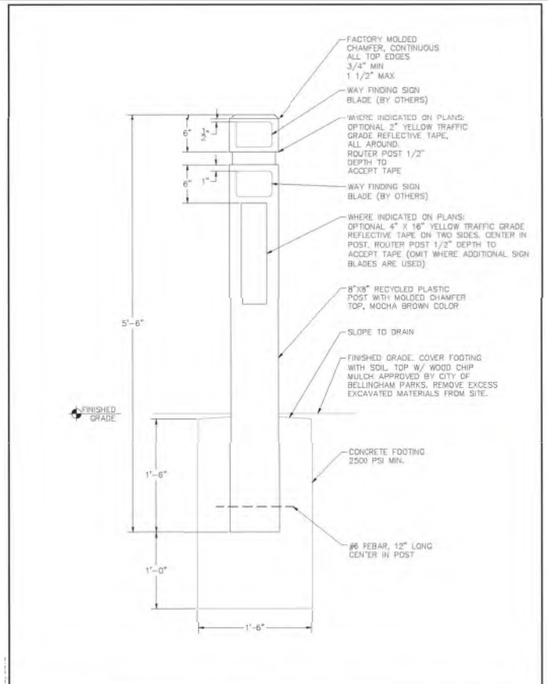
PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM PEDESTRIAN BRIDGE GENERAL DESIGN & NOTES	DRAWING 5120.01
April 24, 2009		

01 COB PEDESTRIAN BRIDGE GENERAL DESIGN AND NOTES
SCALE: NTS



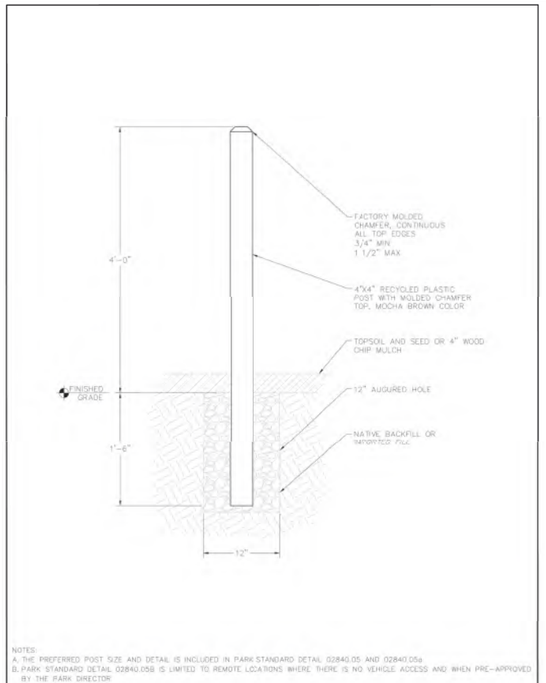
PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM PEDESTRIAN BRIDGE ABUTMENT AND SECTION	DRAWING 5120.02
June 2, 2008		

02 COB PEDESTRIAN BRIDGE ABUTMENT AND SECTION
SCALE: NTS



PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM SIGN POST DIRECT BURY	DRAWING 02840.05
SEPTEMBER 3, 2015		

03 COB SIGN POST DIRECT BURY
SCALE: NTS



NOTES:
A. THE PREFERRED POST SIZE AND DETAIL IS INCLUDED IN PARK STANDARD DETAIL 02840.05 AND 02840.05a
B. PARK STANDARD DETAIL 02840.05B IS LIMITED TO REMOTE LOCATIONS WHERE THERE IS NO VEHICLE ACCESS AND WHEN PRE-APPROVED BY THE PARK DIRECTOR

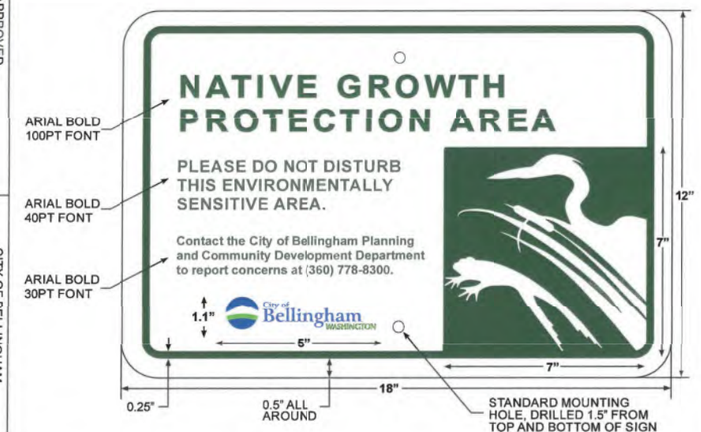
PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM WAY FINDING SIGN POST DIRECT BURY (SMALL POST)	DRAWING 02840.05B
JUNE 29, 2017		

04 COB WAY FINDING SIGN POST
SCALE: NTS

APPROVED
City Engineer
15 DEC 2021
Date

CITY OF BELLINGHAM
NATIVE GROWTH PROTECTION AREA (WETLAND) SIGN

DRAWING
EN-2001



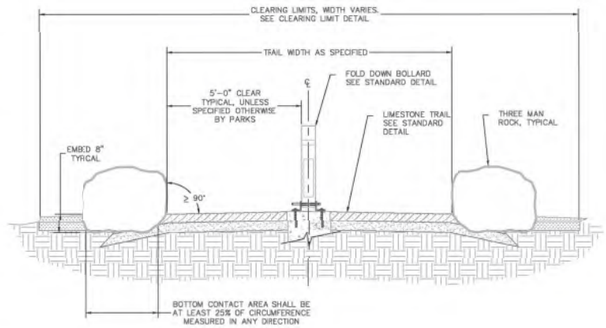
NOTES:
A. COLOR FOR FONT AND BORDER: C=79 M=33 Y=84 K=21.
B. LOCATION: SHALL BE AS SHOWN IN THE PLANS, OR AS MARKED IN THE FIELD BY CITY OF BELLINGHAM STAFF.
C. SIGNS SHALL BE FABRICATED IN ACCORDANCE WITH WSDOT AND MUTCD STANDARDS FOR TRAFFIC SIGNS.
D. SIGN SHALL BE MOUNTED ON PROTECTIVE FENCE OR STANDARD METAL STREET SIGN POST (COB PUBLIC WORKS STANDARD DETAIL TC-320 – STREET SIGN POST DETAIL).
E. GRAPHIC ELECTRONIC FILE WILL BE SUPPLIED BY CITY STAFF. GRAPHIC SHALL BE PRINTED ON WHITE BACKGROUND AS INDICATED ABOVE ON TRAFFIC GRADE REFLECTIVE VINYL.

05 COB PARK NATIVE GROWTH PORTECTION AREA SIGN
SCALE: NTS

PARKS AND RECREATION
DESIGN AND DEVELOPMENT
February 21, 2008

CITY OF BELLINGHAM
BARRIERS
ROCK

DRAWING
02840.02



NOTES:
A. ROCK MATERIAL SHALL MEET THE REQUIREMENTS STATED IN THE WSDOT STANDARD SPECIFICATIONS SECTION 9-13.7
B. ROCK MATERIAL SHALL BE APPROVED BY THE CITY OF BELLINGHAM PARKS PRIOR TO ORDERING MATERIAL. PROVIDE MINIMUM 24 HR NOTICE.
C. THE CLEAR SPACING BETWEEN ROCKS IN A ROW SHALL BE 5FT, UNLESS SPECIFIED OTHERWISE BY PARKS
D. ROCK COLOR SHALL BE AT LEAST 50% DARK GRAY, BROWN, TAUPE, BLACK OR GREEN, AS APPROVED BY PARK LANDSCAPE ARCHITECT.

06 COB BARRIERS - ROCK
SCALE: NTS

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS F.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. _____
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

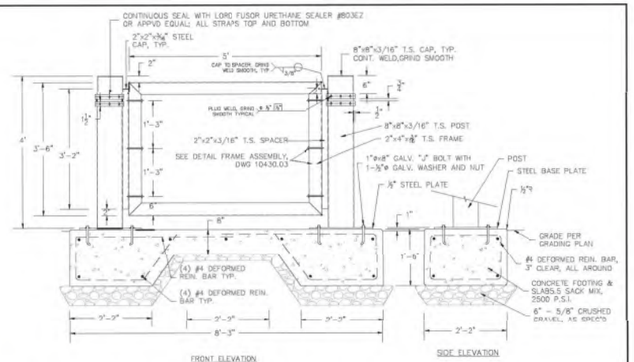
Job. No. _____
Date 12/06/2024
Field Bk. _____

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L3.03 LANDSCAPE DETAILS

SHEET 24 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

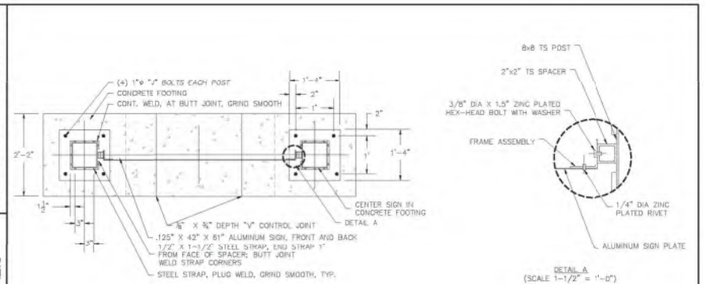
PARKS AND RECREATION DESIGN AND DEVELOPMENT FEBRUARY 18, 2010	CITY OF BELLINGHAM NEIGHBORHOOD PARK SIGN DOUBLE SIDED(ELEVATION VIEW)	DRAWING 10430.04



NOTES:
A. INSTALL SIGN PLUMB AND LEVEL. SKIMCOAT BOTTOM OF BASE PLATE WITH NON-SHRINK, NON-METALLIC GROUT.
B. ALL STEEL SHALL COMPLY WITH ASTM A500, UNLESS NOTED OTHERWISE. OWNER MAY SUBSTITUTE A36 STRUCTURAL STEEL.
C. STEEL ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AISC CODE OF STANDARD PRACTICE.
D. ALL STEEL SHALL BE SAND-BLASTED CLEAN, AND PRE-WASHED WITH AN IRON PHOSPHATE POWDER WASH, DRIED, PRIMED WITH ZINC PRIMER, AND POWDER COATED THE COLOR NOTED ABOVE, BAKED AT 400 DEGREES FOR NO LESS THAN 45 MINUTES, UNLESS NOTED OTHERWISE.
E. ALL FASTENERS SHALL BE ~~GALVANIZED~~ OR STAINLESS STEEL.
F. FOUNDATION DESIGN IS SHOWN FOR LEVEL GROUND ONLY WITH AN ASSUMED SOIL BEARING STRENGTH OF 1500 PSF, WHICH SHALL BE BE CONFIRMED BY A PROFESSIONAL ENGINEER/GEOTECHNICAL ENGINEER BEFORE COMMENCING WORK.
G. ALL WELDS SHALL BE CONTINUOUS AND ALL AROUND. GRIND SMOOTH UNLESS OTHERWISE NOTED. WELDS SHALL BE GROUND SMOOTH BEFORE POWDER COATED.
H. CLEAR, WEED, GRADE, MULCH, OR SEED SURROUNDING SITE AS SPECIFIED. RESTORE DISTURBED AREA IN ACCORDANCE WITH PARK STANDARDS.
I. COLORS SHALL BE AS FOLLOWS:
POST & BASE PLATE: MATTHEWS MP#10269 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #7021 DARK GRAY, EGGSHELL FINISH
SIGNFRAME, SPACER & ALUMINUM SIGN BODY (BODY BACK ONLY): MATHEWS #MP14185, AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH PANTONE PMS 560C DARK GREEN, EGGSHELL FINISH.
POST STRAP COLOR: MATTHEWS #MP04863 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #3072 SM SOL TRIBO, EGGSHELL FINISH, MATCHES PANTONE 7535C
SIGN GRAPHICS: SHALL BE PRODUCED FROM DIGITAL FILES PROVIDED BY THE OWNER AND PROVIDED TO THE CONTRACTOR FOR PRODUCTION AND ASSEMBLY , AND PLOTTED ON A TRAFFIC GRADE VINYL SELF ADHESIVE MEDIUM THAT MEETS WSDOT STANDARDS.
THE FINISH SHALL BE NON-REFLECTIVE.

01 COB WOOD NEIGHBORHOOD PARK SIGN DOUBLE SIDED (ELEVATION VIEW) - REVISED
SCALE: NTS

PARKS AND RECREATION DESIGN AND DEVELOPMENT FEBRUARY 18, 2010	CITY OF BELLINGHAM NEIGHBORHOOD PARK SIGN SINGLE SIDED (PLAN VIEW)	DRAWING 10430.02



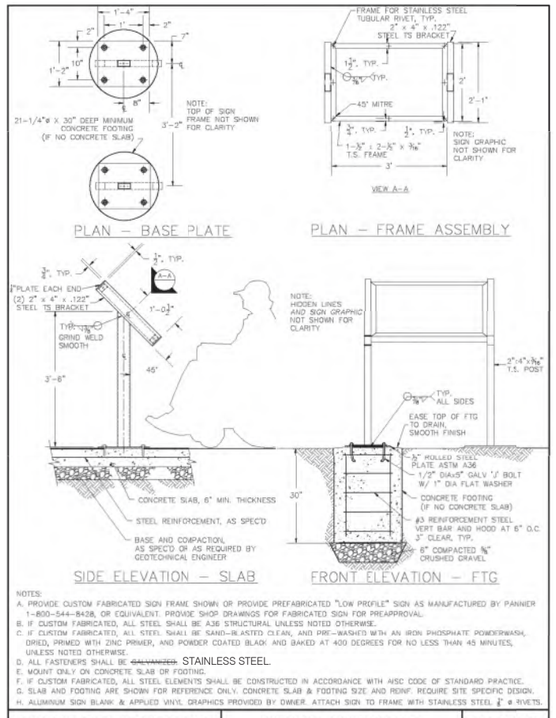
NOTES:
A. INSTALL SIGN PLUMB AND LEVEL. SKIMCOAT BOTTOM OF BASE PLATE WITH NON-SHRINK, NON-METALLIC GROUT.
B. ALL STEEL SHALL COMPLY WITH ASTM A500, UNLESS NOTED OTHERWISE. OWNER MAY SUBSTITUTE A36 STRUCTURAL STEEL.
C. STEEL ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AISC CODE OF STANDARD PRACTICE.
D. ALL STEEL SHALL BE SAND-BLASTED CLEAN, AND PRE-WASHED WITH AN IRON PHOSPHATE POWDER WASH, DRIED, PRIMED WITH ZINC PRIMER, AND POWDER COATED THE COLOR NOTED ABOVE, BAKED AT 400 DEGREES FOR NO LESS THAN 45 MINUTES, UNLESS NOTED OTHERWISE.
E. ALL FASTENERS SHALL BE ~~GALVANIZED~~ OR STAINLESS STEEL.
F. FOUNDATION DESIGN IS SHOWN FOR LEVEL GROUND ONLY WITH AN ASSUMED SOIL BEARING STRENGTH OF 1500 PSF, WHICH SHALL BE BE CONFIRMED BY A PROFESSIONAL ENGINEER/GEOTECHNICAL ENGINEER BEFORE COMMENCING WORK.
G. ALL WELDS SHALL BE CONTINUOUS AND ALL AROUND. GRIND SMOOTH UNLESS OTHERWISE NOTED. WELDS SHALL BE GROUND SMOOTH BEFORE POWDER COATED.
H. CLEAR, WEED, GRADE, MULCH, OR SEED SURROUNDING SITE AS SPECIFIED. RESTORE DISTURBED AREA IN ACCORDANCE WITH PARK STANDARDS.
I. COLORS SHALL BE AS FOLLOWS:
POST & BASE PLATE: MATTHEWS MP#10269 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #7021 DARK GRAY, EGGSHELL FINISH
SIGNFRAME, SPACER & ALUMINUM SIGN BODY (BODY BACK ONLY): MATHEWS #MP14185, AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH PANTONE PMS 560C DARK GREEN, EGGSHELL FINISH.
POST STRAP COLOR: MATTHEWS #MP04863 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #3072 SM SOL TRIBO, EGGSHELL FINISH, MATCHES PANTONE 7535C
SIGN GRAPHICS: SHALL BE PRODUCED FROM DIGITAL FILES PROVIDED BY THE OWNER AND PROVIDED TO THE CONTRACTOR FOR PRODUCTION AND ASSEMBLY , AND PLOTTED ON A TRAFFIC GRADE VINYL SELF ADHESIVE MEDIUM THAT MEETS WSDOT STANDARDS.
THE FINISH SHALL BE NON-REFLECTIVE.

02 COB NEIGHBORHOOD PARK SIGN SINGLE SIDED (PLAN VIEW) - REVISED
SCALE: NTS

NOTES:
1. SIGN MAY BE MOUNTED ON WETLAND BOUNDARY FENCE OR STANDARD METAL STREET SIGN POST (COB PUBLIC WORKS STANDARD DETAIL TC-320 - STREET SIGN POST DETAIL).
2. LOCATION: SHALL BE AS SHOWN IN THE PLANS, OR AS MARKED IN THE FIELD BY PARK PROJECT MANAGER.
3. SIGN HEIGHT, IF MOUNTED ON SIGN POST:
3.1. AS DETERMINED BY THE PARK PROJECT MANAGER.
3.2. WITHIN 3' OF OUTSIDE EDGE OF SHOULDER OF TRAIL: 7' MEASURED FROM FINISH GRADE TO BOTTOM OF SIGN
3.3. OUTSIDE 3' OF OUTSIDE EDGE OF SHOULDER OF TRAIL: AS SHOWN IN THE PLANS.
4. SIGNS SHALL BE FABRICATED IN ACCORDANCE WITH WSDOT AND MUTCD STANDARDS FOR TRAFFIC SIGNS.
5. GRAPHIC SHALL BE PRINTED AS INDICATED ABOVE ON TRAFFIC GRADE REFLECTIVE VINYL.
F. GRAPHIC ELECTRONIC FILE WILL BE SUPPLIED BY PARK PROJECT MANAGER. GRAPHIC SHALL BE PRINTED ON WHITE BACKGROUND ON TRAFFIC GRADE REFLECTIVE VINYL.

PARKS AND RECREATION DESIGN AND DEVELOPMENT JANUARY 26, 2015	CITY OF BELLINGHAM STAY ON TRAIL SIGN Scale: 3" = 1'-0"	DRAWING 10430.10

03 COB STAY ON TRAIL SIGN
SCALE: 3"=1'-0"

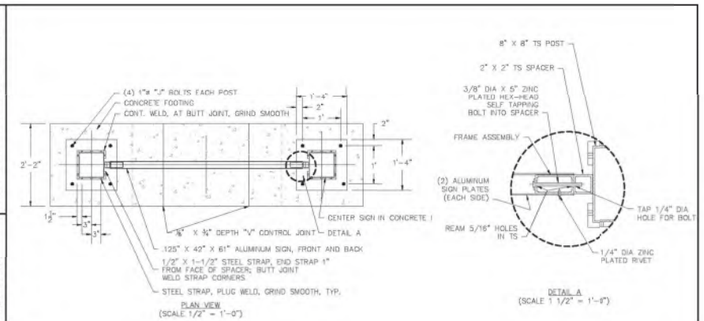


NOTES:
A. PROVIDE CUSTOM FABRICATED SIGN FRAME SHOWN OR PROVIDE PREFABRICATED "LOW PROFILE" SIGN AS MANUFACTURED BY PANNIER 1-800-544-8428, OR EQUIVALENT. PROVIDE SHOP DRAWINGS FOR FABRICATED SIGN FOR PREAPPROVAL.
B. IF CUSTOM FABRICATED, ALL STEEL SHALL BE A36 STRUCTURAL UNLESS NOTED OTHERWISE.
C. IF CUSTOM FABRICATED, ALL STEEL SHALL BE SAND-BLASTED CLEAN, AND PRE-WASHED WITH AN IRON PHOSPHATE POWDERWASH, DRIED, PRIMED WITH ZINC PRIMER, AND POWDER COATED BLACK AND BAKED AT 400 DEGREES FOR NO LESS THAN 45 MINUTES, UNLESS NOTED OTHERWISE.
D. ALL FASTENERS SHALL BE ~~GALVANIZED~~ STAINLESS STEEL.
E. MOUNT ONLY ON CONCRETE SLAB OR FOOTING.
F. IF CUSTOM FABRICATED, ALL STEEL ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AISC CODE OF STANDARD PRACTICE.
G. SLAB AND FOOTING ARE SHOWN FOR REFERENCE ONLY. CONCRETE SLAB & FOOTING SIZE AND REINF. REQUIRE SITE SPECIFIC DESIGN.
H. ALUMINUM SIGN BLANK & APPLIED VINYL GRAPHICS PROVIDED BY OWNER. ATTACH SIGN TO FRAME WITH STAINLESS STEEL 3/8" ø RIVETS.

PARKS AND RECREATION DESIGN AND DEVELOPMENT February 19, 2010	CITY OF BELLINGHAM TRAILHEAD/INTERPRETIVE SIGN Scale: 1/2" = 1'-0"	DRAWING 10430.06

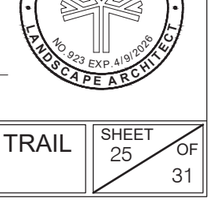
04 COB TRAILHEAD/INTERPRETIVE SIGN - REVISED
SCALE: 1/2"=1'-0"

PARKS AND RECREATION DESIGN AND DEVELOPMENT FEBRUARY 18, 2010	CITY OF BELLINGHAM NEIGHBORHOOD PARK SIGN DOUBLE SIDED (PLAN VIEW)	DRAWING 10430.05



NOTES:
A. INSTALL SIGN PLUMB AND LEVEL. SKIMCOAT BOTTOM OF BASE PLATE WITH NON-SHRINK, NON-METALLIC GROUT.
B. ALL STEEL SHALL COMPLY WITH ASTM A500, UNLESS NOTED OTHERWISE. OWNER MAY SUBSTITUTE A36 STRUCTURAL STEEL.
C. STEEL ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AISC CODE OF STANDARD PRACTICE.
D. ALL STEEL SHALL BE SAND-BLASTED CLEAN, AND PRE-WASHED WITH AN IRON PHOSPHATE POWDER WASH, DRIED, PRIMED WITH ZINC PRIMER, AND POWDER COATED THE COLOR NOTED ABOVE, BAKED AT 400 DEGREES FOR NO LESS THAN 45 MINUTES, UNLESS NOTED OTHERWISE.
E. ALL FASTENERS SHALL BE ~~GALVANIZED~~ OR STAINLESS STEEL.
F. FOUNDATION DESIGN IS SHOWN FOR LEVEL GROUND ONLY WITH AN ASSUMED SOIL BEARING STRENGTH OF 1500 PSF, WHICH SHALL BE BE CONFIRMED BY A PROFESSIONAL ENGINEER/GEOTECHNICAL ENGINEER BEFORE COMMENCING WORK.
G. ALL WELDS SHALL BE CONTINUOUS AND ALL AROUND. GRIND SMOOTH UNLESS OTHERWISE NOTED. WELDS SHALL BE GROUND SMOOTH BEFORE POWDER COATED.
H. CLEAR, WEED, GRADE, MULCH, OR SEED SURROUNDING SITE AS SPECIFIED. RESTORE DISTURBED AREA IN ACCORDANCE WITH PARK STANDARDS.
I. COLORS SHALL BE AS FOLLOWS:
POST & BASE PLATE: MATTHEWS MP#10269 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #7021 DARK GRAY, EGGSHELL FINISH
SIGNFRAME, SPACER & ALUMINUM SIGN BODY (BODY BACK ONLY): MATHEWS #MP14185, AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH PANTONE PMS 560C DARK GREEN, EGGSHELL FINISH.
POST STRAP COLOR: MATTHEWS #MP04863 AUTO BODY PAINT W/ PRIMER, SATIN FINISH, OR MATCH DRYLAC RAL #3072 SM SOL TRIBO, EGGSHELL FINISH, MATCHES PANTONE 7535C
SIGN GRAPHICS: SHALL BE PRODUCED FROM DIGITAL FILES PROVIDED BY THE OWNER AND PROVIDED TO THE CONTRACTOR FOR PRODUCTION AND ASSEMBLY , AND PLOTTED ON A TRAFFIC GRADE VINYL SELF ADHESIVE MEDIUM THAT MEETS WSDOT STANDARDS.
THE FINISH SHALL BE NON-REFLECTIVE.

04 COB NEIGHBORHOOD PARK SIGN DOUBLE SIDED (PLAN VIEW)
SCALE: NTS



No	Date	Revision	By
4			
3			
2			
1			

PROJECT ENGINEER _____
DESIGNED/DRAWN M.I.W.
INSPECTOR _____

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER _____
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. _____
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No. _____
Date 12/06/2024
Field Bk. _____

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L3.04 LANDSCAPE DETAILS

SHEET 25 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

4,463 SF BUFFER ENHANCEMENT PLANTING

QTY	BOTANICAL NAME	COMMON NAME	CONDITION	GRADE (MIN. SIZE)	SPACING
4	CORNUS SERICEA	RED TWIG DOGWOOD	B/C	2 YEARS 18" MINIMUM	5' O.C.
4	DESCHAMPSIA CESPITOSA	PACIFIC HAIRGRASS		/ ONE GALLON	
4	HOLODISCUS DISCOLOR	OCEANSPRAY			
4	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE			
4	PHYSOCARPUS DISCOLOR	PACIFIC NINEBARK			
4	ROSA NUTKANA	NOOTKA ROSE			
4	SAMBUCUS RACEMOSA	RED ELDERBERRY			
4	SIDALCEA HENERSONII	HENDERSON'S CHECKERMALLOW			
4	RUBUS SPECTABILIS	SALMONBERRY			

6,848 SF BUFFER RESTORATION PLANTING

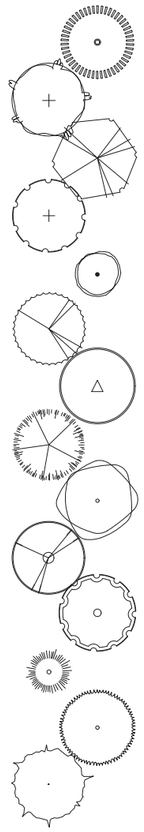
QTY	BOTANICAL NAME	COMMON NAME	CONDITION	GRADE (MIN. SIZE)	SPACING
37	ACER CIRCINATUM	VINE MAPLE	B/C	2 YEARS 18" MINIMUM	5' O.C.
40	DICENTRA FORMOSA	BLEEDING HEART		/ ONE GALLON	
60	GAULTHERIA SHALLON	SALAL			
60	POLYSTICHUM MUNITUM	WESTERN SWORD FERN			
40	RANUNCULUS OCCIDENTALIS	WESTERN BUTTERCUP			
40	RIBES SANGUINEUM	RED FLOWERING CURRENT			
20	ROSA NUTKANA	NOOTKA ROSE			
40	RUBUS SPECTABILIS	SALMONBERRY			
20	SAMBUCUS RACEMOSA	RED ELDERBERRY			
40	SISYRINCHIUM ANGUSTIFOLIUM	BLUE EYED GRASS			
40	SYMPHORICARPOS ALBUS	SNOWBERRY			

2,148 SF WETLAND ENHANCEMENT PLANTING

QTY	BOTANICAL NAME	COMMON NAME	SIZE/SPACING		DETAIL
25	LONICERA INVOLUCRATA	BLACK TWINBERRY	B/C	2 YEARS 18" MINIMUM	5' O.C.
10	ROSA NUTKANA	NOOTKA ROSE		/ ONE GALLON	
25	ROSA PISOCARPA	PEA-FRUITED ROSE			
10	SAMBUCUS RACEMOSA	RED ELDERBERRY			
18	SPIRAEA DOUGLASII	HARDHACK			

231 SF SEED MIX - TURF BLEND TO MATCH EXISTING

2,769 SF MULCH



TREES

QTY	BOTANICAL NAME	COMMON NAME	SIZE/HT
4	ABIES GRANDIS	GRAND FIR	5 GAL / 4' HT. MIN.
2	ACER GLABRUM VAR. DOUGLASSII	DOUGLAS MAPLE	5 GAL / 4' HT. MIN.
2	ALNUS RUBRA	RED ALDER	5 GAL / 4' HT. MIN.
2	AMELANCHIER ALNIFOLIA	SERVICEBERRY	5 GAL / 4' HT. MIN.
2	CORYLUS CORNUTA	BEAKED HAZELNUT	5 GAL / 4' HT. MIN.
1	PICEA SITCHENSIS	SITKA SPRUCE	5 GAL / 4' HT. MIN.
13	POPULUS TREMULOIDES	QUAKING ASPEN	5 GAL / 4' HT. MIN.
3	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	5 GAL / 4' HT. MIN.
3	PRUNUS EMARGINATA	BITTER CHERRY	5 GAL / 4' HT. MIN.
2	SALIX IASIANDRA	PACIFIC WILLOW	5 GAL / 4' HT. MIN.
1	SALIX SITCHENSIS	SITKA WILLOW	5 GAL / 4' HT. MIN.
2	TAXUS BREVIFOLIA	WESTERN YEW	5 GAL / 4' HT. MIN.
4	THUJA PLICATA	WESTERN RED CEDAR	5 GAL / 4' HT. MIN.
6	TSUGA HETEROPHYLLA	WESTERN HEMLOCK	5 GAL / 4' HT. MIN.

GENERAL PLANTING NOTES

1. PROPOSED TREE LOCATIONS WITHIN LIMITS OF WORK BUT OUTSIDE OF CLEARING LIMITS TO BE INSTALLED BY HAND AND ON FOOT, NO EQUIPMENT PERMITTED IN THIS ZONE. LOCATIONS FOR THESE TREES TO BE FLAGGED IN FIELD AS NEEDED TO AVOID EXISTING TREE ROOTS.

STATE OF WASHINGTON · JASON K. HENRY · NO 923 EXP. 4/9/2026 · LANDSCAPE ARCHITECT

No	Date	Revision	By
4			
3			
2			
1			

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

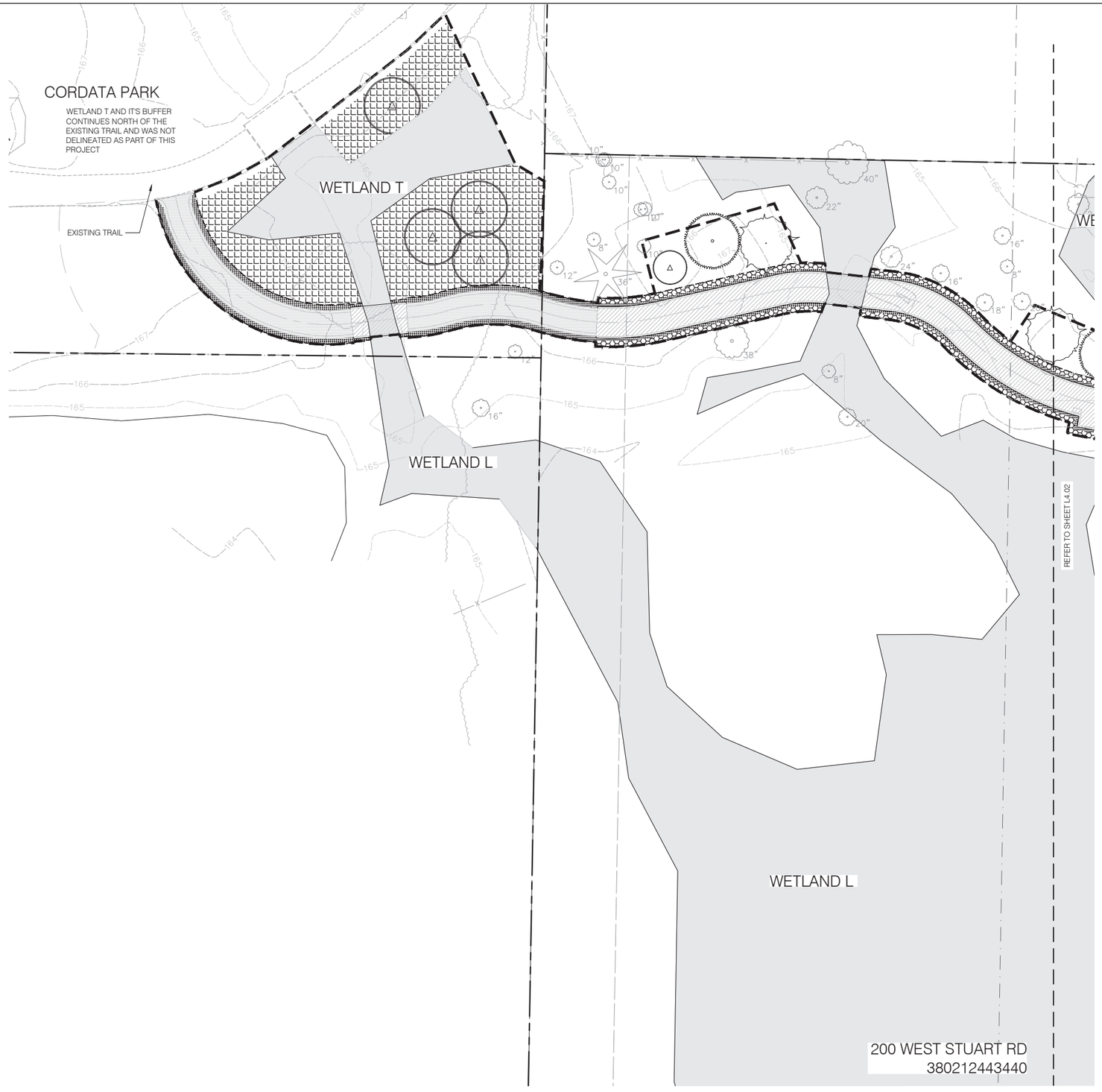
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L4.00 PLANTING SCHEDULE AND NOTES

SHEET 26 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



TREE LEGEND

- ABIES GRANDIS / GRAND FIR
- ACER GLABRUM VAR. DOUGLASSII /DOUGLAS MAPLE
- ALNUS RUBRA RED ALDER
- AMELANCHIER ALNIFOLIA SERVICEBERRY
- CORYLUS CORNUTA BEAKED HAZELNUT
- PICEA SITCHENSIS SITKA SPRUCE
- POPULUS TREMULOIDES QUAKING ASPEN
- PSEUDOTSUGA MENZIESII DOUGLAS FIR
- PRUNUS EMARGINATA BITTER CHERRY
- SALIX IASIANDRA PACIFIC WILLOW
- SALIX SITCHENSIS SITKA WILLOW
- TAXUS BREVIFOLIA WESTERN YEW
- THUJA PLICATA WESTERN RED CEDAR
- TSUGA HETEROPHYLLA WESTERN HEMLOCK

SHRUB LEGEND

- BUFFER ENHANCEMENT PLANTING
- BUFFER RESTORATION PLANTING
- WETLAND ENHANCEMENT PLANTING
- SEED MIX - TURF BLEND TO MATCH EXISTING
- MULCH

NOTES:
1. FOR FULL PLANTING SCHEDULE SEE SHEET L4.00

0 20' 40'
SCALE: 1"=20'-0"

NORTH

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
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CITY ENGINEER M.L.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
L4.01
60% PLAN SUBMITTAL
PLANTING PLAN

SHEET 27 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

WETLAND M

WETLAND K

WETLAND J

WETLAND E

WETLAND L

WETLAND A

4439 MERIDIAN ST
380212497460

200 WEST STUART RD
380212443440

REFER TO SHEET L4.01

REFER TO SHEET L4.03

OVERLAPPING BUFFERS WITH WETLAND A AND OFF SITE WETLANDS TO THE EAST

TREE LEGEND

- ABIES GRANDIS / GRAND FIR
- ACER GLABRUM VAR. DOUGLASSII /DOUGLAS MAPLE
- ALNUS RUBRA RED ALDER
- AMELANCHIER ALNIFOLIA SERVICEBERRY
- CORYLUS CORNUTA BEAKED HAZELNUT
- PICEA SITCHENSIS SITKA SPRUCE
- POPULUS TREMULOIDES QUAKING ASPEN
- PSEUDOTSUGA MENZIESII DOUGLAS FIR
- PRUNUS EMARGINATA BITTER CHERRY
- SALIX IASIANDRA PACIFIC WILLOW
- SALIX SITCHENSIS SITKA WILLOW
- TAXUS BREVIFOLIA WESTERN YEW
- THUJA PLICATA WESTERN RED CEDAR
- TSUGA HETEROPHYLLA WESTERN HEMLOCK

SHRUB LEGEND

- BUFFER ENHANCEMENT PLANTING
- BUFFER RESTORATION PLANTING
- WETLAND ENHANCEMENT PLANTING
- SEED MIX - TURF BLEND TO MATCH EXISTING
- MULCH

NOTES:
1. FOR FULL PLANTING SCHEDULE SEE SHEET L4.00

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0 20' 40'
SCALE: 1"=20'-0"

NORTH

Date	No	Revision	By
	4		
	3		
	2		
	1		

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CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
L4.02
60% PLAN SUBMITTAL
PLANTING PLAN

SHEET 28 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

TREE LEGEND

- ABIES GRANDIS / GRAND FIR
- ACER GLABRUM VAR. DOUGLASSII /DOUGLAS MAPLE
- ALNUS RUBRA RED ALDER
- AMELANCHIER ALNIFOLIA SERVICEBERRY
- CORYLUS CORNUTA BEAKED HAZELNUT
- PICEA SITCHENSIS SITKA SPRUCE
- POPULUS TREMULOIDES QUAKING ASPEN
- PSEUDOTSUGA MENZIESII DOUGLAS FIR
- PRUNUS EMARGINATA BITTER CHERRY
- SALIX IASIANDRA PACIFIC WILLOW
- SALIX SITCHENSIS SITKA WILLOW
- TAXUS BREVIFOLIA WESTERN YEW
- THUJA PLICATA WESTERN RED CEDAR
- TSUGA HETEROPHYLLA WESTERN HEMLOCK

SHRUB LEGEND

- BUFFER ENHANCEMENT PLANTING
- BUFFER RESTORATION PLANTING
- WETLAND ENHANCEMENT PLANTING
- SEED MIX - TURF BLEND TO MATCH EXISTING
- MULCH

NOTES:
1. FOR FULL PLANTING SCHEDULE SEE SHEET L4.00

STATE OF WASHINGTON · JASON K. HENRY · NO. 923 EXP. 4/9/2026 · LANDSCAPE ARCHITECT

	No	Revision	By
	4		
	3		
	2		
	1		
Date			

PROJECT ENGINEER
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ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1"=20'-0"
Vert. 1"=

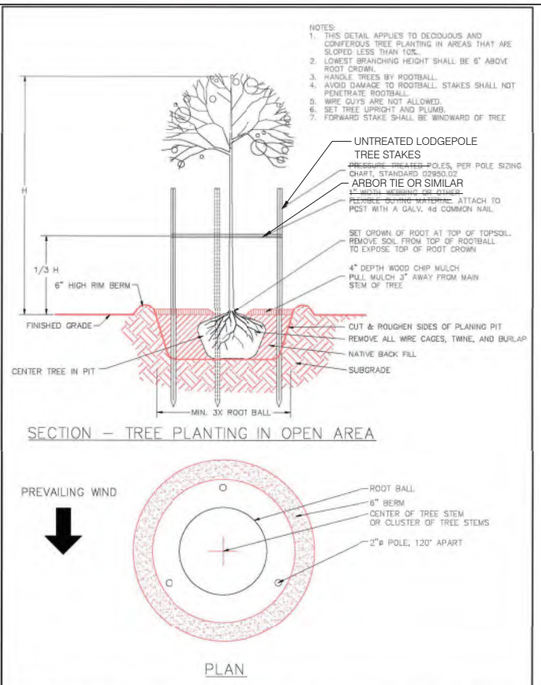
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L4.03 PLANTING PLAN

SHEET 29 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



PARKS AND RECREATION DESIGN AND DEVELOPMENT DECEMBER 19, 2011	CITY OF BELLINGHAM TREE PLANTING IN OPEN AREAS	DRAWING 02950.01

01 COB TREE PLANTING IN OPEN AREAS - REVISED
SCALE: NTS

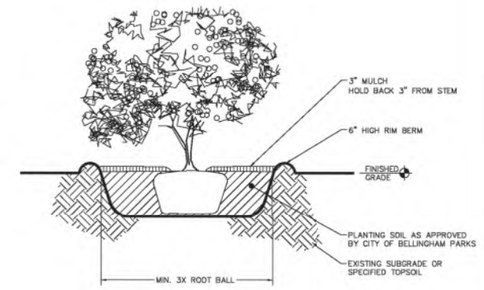
This chart provides the Contractor correct pole sizing data according to tree size.

TREE HEIGHT (H) IN FT.	GUY AT 1/3 (H) TREE HEIGHT IN FT.	POLE DEPTH BELOW (H) IN FT.	POLE LENGTH (FT.)	POLE DIAMETER (IN.)
20	6.7	3	11	3
18	6	3	10	3
16	5.3	3	10	3
14	4.7	3	10	3
12	4	3	8	2
10	3.3	3	8	2
8	2.7	2	6	2
6	2	2	6	2
4	1.3	2	4	2
* 0-2	0.7	1	AS NEEDED	1

* USE 1" WIDTH TREE TAPE AS GUY MATERIAL

PARKS AND RECREATION DESIGN AND DEVELOPMENT DECEMBER 19, 2011	CITY OF BELLINGHAM TREE PLANTING IN OPEN AREAS – POLE SIZING CHART	DRAWING 02950.02

02 COB TREE PLANTING IN OPEN AREAS - POLE SIZING CHART
SCALE: NTS



PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM SHRUB PLANTING	DRAWING 02950.03

03 COB SHRUB PLANTING
SCALE: NTS

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
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DIRECTOR PUBLIC WORKS E.C.J.
CITY ENGINEER M.I.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz.
Vert. 1"=

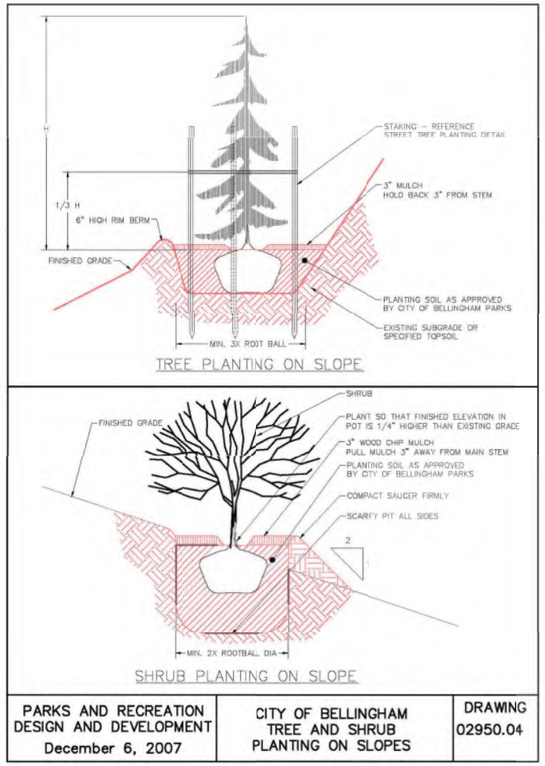
DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L4.04 PLANTING DETAILS

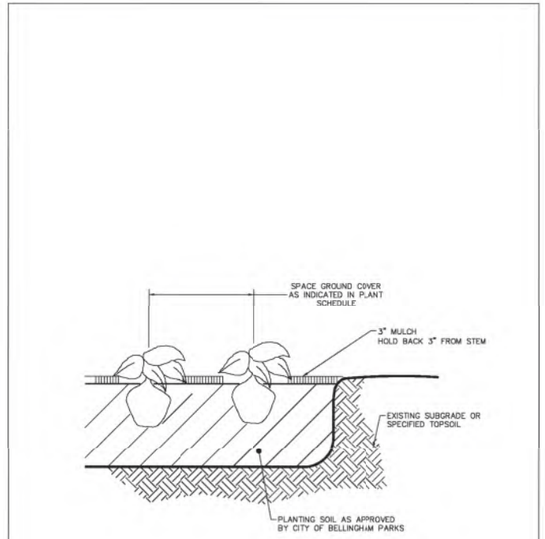
SHEET 30 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021



PARKS AND RECREATION DESIGN AND DEVELOPMENT December 6, 2007	CITY OF BELLINGHAM TREE AND SHRUB PLANTING ON SLOPES	DRAWING 02950.04

01 COB TREE AND SHRUB PLANTING ON SLOPES
SCALE: NTS



PARKS AND RECREATION DESIGN AND DEVELOPMENT	CITY OF BELLINGHAM GROUND COVER PLANTING	DRAWING 02950.05

02 COB GROUND COVER PLANTING
SCALE: NTS

STATE OF WASHINGTON
JASON K. HENRY
NO. 923 EXP. 4/9/2026
LANDSCAPE ARCHITECT

Date	No	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER
DESIGNED/DRAWN
INSPECTOR

DIRECTOR PUBLIC WORKS F.C.J.
CITY ENGINEER M.I.W.
ASSISTANT DIRECTOR M.A.O.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz.
Vert. 1"=

DATUM
NAD 83/98
NAVD 88

Job. No.
Date 12/06/2024
Field Bk.

MIDDLE FORK SPRING OPEN SPACE TRAIL
60% PLAN SUBMITTAL
L4.05 PLANTING DETAILS

SHEET 31 OF 31

CONTACT PERSON: PAUL KNIPPEL , PROJECT ENGINEER AT 360-778-7021

Appendix D

WWHM Simulation Report

HERRERA
Science + Planning + Design

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WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 24-1217_MFSOST_60pct_Disp
Site Name:
Site Address:
City:
Report Date: 12/18/2024
Gage: Blaine
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 0.857
Version Date: 2024/06/28
Version: 4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year

Landuse Basin Data
Predeveloped Land Use

Pre_TDA1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.1851
Pervious Total	0.1851
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.1851

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Pre_TDA2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.0313
Pervious Total	0.0313
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.0313

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 2	POC 2

Mitigated Land Use

Mit_TDA1

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.0666
Impervious Total	0.0666
Basin Total	0.0666

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Mit_TDA1_SheetflowDisp

Bypass:	No
Impervious Land Use	acre
ROADS FLAT	0.0651

Element Flow Componant:
Surface
Componant Flows To:
Mit_TDA1_DispersionArea

Mit_TDA1_DispersionArea

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Mod	.0535

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Mit_TDA2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.0313
Impervious Total	0.0313
Basin Total	0.0313

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

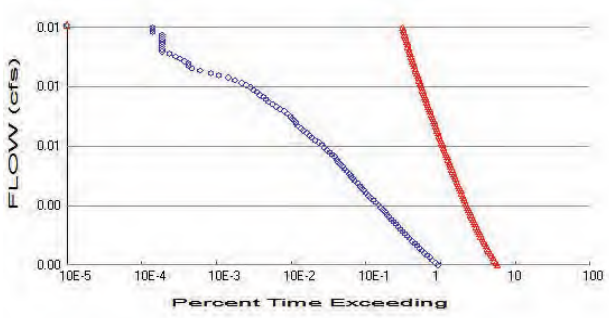
POC 2	POC 2

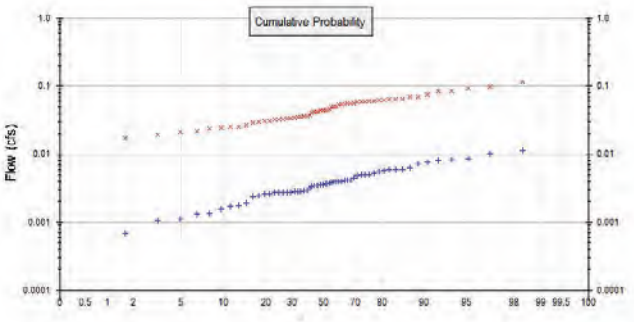
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1 ← TDA #1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.1851
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.0535
Total Impervious Area: 0.1317

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.003661
5 year	0.005764
10 year	0.007039
25 year	0.008484
50 year	0.009442
100 year	0.010306

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.043518
5 year	0.062914
10 year	0.075966
25 year	0.092594
50 year	0.105045
100 year	0.117536

Difference in 100-year Return Period Flow Rate:
0.117536 cfs - 0.010306 cfs = 0.10723 cfs

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.004	0.036
1950	0.004	0.076
1951	0.006	0.034
1952	0.001	0.022
1953	0.002	0.025
1954	0.003	0.069
1955	0.002	0.041
1956	0.003	0.056
1957	0.008	0.055
1958	0.002	0.056

1959	0.003	0.030
1960	0.004	0.032
1961	0.003	0.017
1962	0.003	0.045
1963	0.003	0.050
1964	0.006	0.064
1965	0.008	0.084
1966	0.007	0.059
1967	0.005	0.044
1968	0.005	0.045
1969	0.003	0.042
1970	0.001	0.024
1971	0.005	0.026
1972	0.003	0.058
1973	0.003	0.025
1974	0.004	0.031
1975	0.003	0.035
1976	0.006	0.065
1977	0.003	0.098
1978	0.004	0.055
1979	0.003	0.062
1980	0.006	0.042
1981	0.002	0.064
1982	0.006	0.044
1983	0.003	0.032
1984	0.011	0.085
1985	0.005	0.054
1986	0.010	0.092
1987	0.004	0.061
1988	0.003	0.024
1989	0.004	0.118
1990	0.005	0.055
1991	0.004	0.038
1992	0.004	0.033
1993	0.003	0.034
1994	0.002	0.015
1995	0.004	0.031
1996	0.006	0.060
1997	0.008	0.058
1998	0.001	0.021
1999	0.008	0.062
2000	0.001	0.036
2001	0.000	0.050
2002	0.003	0.037
2003	0.001	0.029
2004	0.003	0.070
2005	0.004	0.042
2006	0.004	0.044
2007	0.004	0.050
2008	0.002	0.020
2009	0.004	0.033

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0114	0.1175
2	0.0101	0.0983
3	0.0085	0.0922

4	0.0084	0.0852
5	0.0081	0.0841
6	0.0076	0.0761
7	0.0072	0.0703
8	0.0063	0.0690
9	0.0060	0.0647
10	0.0059	0.0639
11	0.0059	0.0638
12	0.0057	0.0620
13	0.0056	0.0619
14	0.0053	0.0609
15	0.0051	0.0599
16	0.0051	0.0592
17	0.0050	0.0582
18	0.0049	0.0582
19	0.0045	0.0564
20	0.0041	0.0559
21	0.0041	0.0554
22	0.0041	0.0549
23	0.0040	0.0548
24	0.0040	0.0536
25	0.0040	0.0504
26	0.0040	0.0501
27	0.0039	0.0500
28	0.0037	0.0453
29	0.0037	0.0450
30	0.0036	0.0442
31	0.0036	0.0441
32	0.0035	0.0441
33	0.0035	0.0424
34	0.0034	0.0423
35	0.0034	0.0415
36	0.0034	0.0412
37	0.0032	0.0378
38	0.0029	0.0367
39	0.0029	0.0361
40	0.0028	0.0358
41	0.0028	0.0351
42	0.0028	0.0340
43	0.0028	0.0336
44	0.0028	0.0332
45	0.0028	0.0328
46	0.0028	0.0322
47	0.0027	0.0322
48	0.0026	0.0309
49	0.0026	0.0307
50	0.0025	0.0297
51	0.0024	0.0291
52	0.0019	0.0263
53	0.0017	0.0253
54	0.0017	0.0250
55	0.0016	0.0241
56	0.0013	0.0236
57	0.0013	0.0217
58	0.0011	0.0213
59	0.0011	0.0195
60	0.0007	0.0172
61	0.0005	0.0149

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0018	19815	123478	623	Fail
0.0019	18157	117681	648	Fail
0.0020	16634	112398	675	Fail
0.0021	15299	107393	701	Fail
0.0021	14104	102688	728	Fail
0.0022	13009	98431	756	Fail
0.0023	12016	94389	785	Fail
0.0024	11131	90539	813	Fail
0.0024	10371	86903	837	Fail
0.0025	9614	83438	867	Fail
0.0026	8917	80187	899	Fail
0.0027	8290	77235	931	Fail
0.0028	7700	74454	966	Fail
0.0028	7097	71759	1011	Fail
0.0029	6598	69086	1047	Fail
0.0030	6136	66712	1087	Fail
0.0031	5745	64444	1121	Fail
0.0031	5379	62220	1156	Fail
0.0032	5029	60103	1195	Fail
0.0033	4671	58113	1244	Fail
0.0034	4353	56274	1292	Fail
0.0034	4072	54370	1335	Fail
0.0035	3835	52638	1372	Fail
0.0036	3576	50863	1422	Fail
0.0037	3339	49194	1473	Fail
0.0038	3121	47740	1529	Fail
0.0038	2909	46264	1590	Fail
0.0039	2691	44831	1665	Fail
0.0040	2488	43441	1746	Fail
0.0041	2310	42093	1822	Fail
0.0041	2130	40810	1915	Fail
0.0042	2013	39633	1968	Fail
0.0043	1889	38457	2035	Fail
0.0044	1778	37302	2097	Fail
0.0044	1658	36211	2184	Fail
0.0045	1538	35142	2284	Fail
0.0046	1437	34072	2371	Fail
0.0047	1350	33046	2447	Fail
0.0048	1270	32083	2526	Fail
0.0048	1194	31142	2608	Fail
0.0049	1122	30222	2693	Fail
0.0050	1048	29345	2800	Fail
0.0051	966	28511	2951	Fail
0.0051	914	27720	3032	Fail
0.0052	872	26907	3085	Fail
0.0053	812	26180	3224	Fail
0.0054	753	25431	3377	Fail
0.0054	699	24725	3537	Fail
0.0055	643	24062	3742	Fail
0.0056	589	23378	3969	Fail
0.0057	547	22715	4152	Fail
0.0058	500	22073	4414	Fail
0.0058	449	21539	4797	Fail
0.0059	404	20933	5181	Fail

0.0060	375	20347	5425	Fail
0.0061	343	19808	5774	Fail
0.0061	313	19278	6159	Fail
0.0062	288	18803	6528	Fail
0.0063	264	18315	6937	Fail
0.0064	249	17877	7179	Fail
0.0064	234	17393	7432	Fail
0.0065	222	16893	7609	Fail
0.0066	209	16420	7856	Fail
0.0067	190	15960	8400	Fail
0.0068	173	15545	8985	Fail
0.0068	152	15137	9958	Fail
0.0069	137	14705	10733	Fail
0.0070	120	14324	11936	Fail
0.0071	107	13971	13057	Fail
0.0071	98	13595	13872	Fail
0.0072	91	13259	14570	Fail
0.0073	81	12930	15962	Fail
0.0074	75	12592	16789	Fail
0.0074	67	12307	18368	Fail
0.0075	62	11982	19325	Fail
0.0076	54	11685	21638	Fail
0.0077	46	11379	24736	Fail
0.0078	38	11092	29189	Fail
0.0078	31	10827	34925	Fail
0.0079	23	10551	45873	Fail
0.0080	18	10252	56955	Fail
0.0081	13	9986	76815	Fail
0.0081	10	9743	97430	Fail
0.0082	9	9509	105655	Fail
0.0083	9	9259	102877	Fail
0.0084	8	9045	113062	Fail
0.0084	7	8840	126285	Fail
0.0085	6	8635	143916	Fail
0.0086	5	8455	169100	Fail
0.0087	4	8269	206725	Fail
0.0088	4	8068	201700	Fail
0.0088	4	7899	197475	Fail
0.0089	4	7743	193575	Fail
0.0090	4	7591	189775	Fail
0.0091	4	7396	184900	Fail
0.0091	4	7223	180575	Fail
0.0092	4	7069	176725	Fail
0.0093	3	6902	230066	Fail
0.0094	3	6767	225566	Fail
0.0094	3	6620	220666	Fail

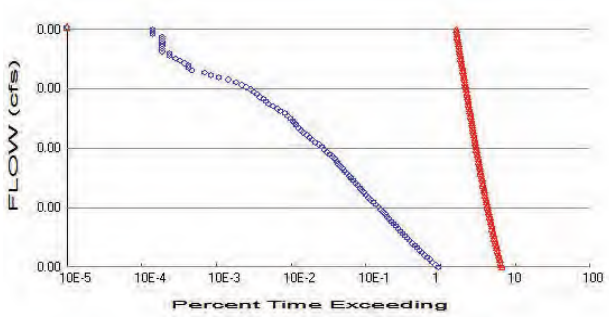
The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

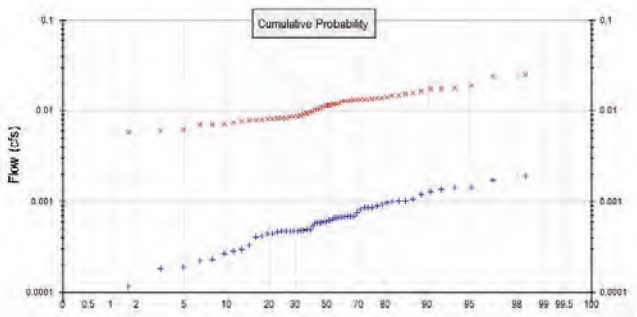
Water Quality

Water Quality BMP Flow and Volume for POC #1

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

POC 2 ← TDA #2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.0313
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 0.0313

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.000619
5 year	0.000975
10 year	0.00119
25 year	0.001435
50 year	0.001597
100 year	0.001743

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.010888
5 year	0.014515
10 year	0.016923
25 year	0.019982
50 year	0.022276
100 year	0.024585

Difference in 100-year Return Period Flow Rate:
0.024585 cfs - 0.001743 cfs = 0.022842 cfs

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	0.001	0.008
1950	0.001	0.019
1951	0.001	0.008
1952	0.000	0.008
1953	0.000	0.009
1954	0.001	0.016
1955	0.000	0.010
1956	0.000	0.013
1957	0.001	0.013
1958	0.000	0.013
1959	0.000	0.008

1960	0.001	0.014
1961	0.000	0.006
1962	0.000	0.016
1963	0.000	0.014
1964	0.001	0.015
1965	0.001	0.018
1966	0.001	0.014
1967	0.001	0.010
1968	0.001	0.010
1969	0.000	0.009
1970	0.000	0.007
1971	0.001	0.007
1972	0.001	0.013
1973	0.000	0.007
1974	0.001	0.008
1975	0.000	0.010
1976	0.001	0.013
1977	0.000	0.024
1978	0.001	0.013
1979	0.000	0.013
1980	0.001	0.012
1981	0.000	0.016
1982	0.001	0.011
1983	0.000	0.008
1984	0.002	0.018
1985	0.001	0.011
1986	0.002	0.018
1987	0.001	0.014
1988	0.001	0.011
1989	0.001	0.025
1990	0.001	0.011
1991	0.001	0.009
1992	0.001	0.009
1993	0.001	0.008
1994	0.000	0.006
1995	0.001	0.008
1996	0.001	0.013
1997	0.001	0.012
1998	0.000	0.006
1999	0.001	0.012
2000	0.000	0.009
2001	0.000	0.013
2002	0.001	0.009
2003	0.000	0.008
2004	0.000	0.015
2005	0.001	0.011
2006	0.001	0.012
2007	0.001	0.012
2008	0.000	0.006
2009	0.001	0.008

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	0.0019	0.0252
2	0.0017	0.0243
3	0.0014	0.0191
4	0.0014	0.0177

5	0.0014	0.0177
6	0.0013	0.0175
7	0.0012	0.0164
8	0.0011	0.0159
9	0.0010	0.0155
10	0.0010	0.0148
11	0.0010	0.0147
12	0.0010	0.0141
13	0.0009	0.0139
14	0.0009	0.0138
15	0.0009	0.0136
16	0.0009	0.0134
17	0.0009	0.0134
18	0.0008	0.0134
19	0.0008	0.0134
20	0.0007	0.0133
21	0.0007	0.0130
22	0.0007	0.0129
23	0.0007	0.0129
24	0.0007	0.0128
25	0.0007	0.0123
26	0.0007	0.0120
27	0.0007	0.0118
28	0.0006	0.0117
29	0.0006	0.0116
30	0.0006	0.0114
31	0.0006	0.0114
32	0.0006	0.0111
33	0.0006	0.0110
34	0.0006	0.0106
35	0.0006	0.0104
36	0.0006	0.0103
37	0.0005	0.0099
38	0.0005	0.0096
39	0.0005	0.0094
40	0.0005	0.0092
41	0.0005	0.0089
42	0.0005	0.0088
43	0.0005	0.0088
44	0.0005	0.0087
45	0.0005	0.0084
46	0.0005	0.0084
47	0.0005	0.0083
48	0.0004	0.0082
49	0.0004	0.0081
50	0.0004	0.0080
51	0.0004	0.0078
52	0.0003	0.0078
53	0.0003	0.0077
54	0.0003	0.0075
55	0.0003	0.0072
56	0.0002	0.0071
57	0.0002	0.0071
58	0.0002	0.0061
59	0.0002	0.0061
60	0.0001	0.0059
61	0.0001	0.0057

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0003	19881	141209	710	Fail
0.0003	18206	138257	759	Fail
0.0003	16683	135412	811	Fail
0.0003	15353	132760	864	Fail
0.0004	14149	130194	920	Fail
0.0004	13041	127734	979	Fail
0.0004	12050	125381	1040	Fail
0.0004	11150	123028	1103	Fail
0.0004	10393	120783	1162	Fail
0.0004	9640	118686	1231	Fail
0.0004	8949	116612	1303	Fail
0.0005	8318	114601	1377	Fail
0.0005	7721	112612	1458	Fail
0.0005	7116	110751	1556	Fail
0.0005	6613	108848	1645	Fail
0.0005	6143	107051	1742	Fail
0.0005	5756	105318	1829	Fail
0.0005	5390	103607	1922	Fail
0.0005	5037	101896	2022	Fail
0.0006	4682	100292	2142	Fail
0.0006	4365	98709	2261	Fail
0.0006	4083	97212	2380	Fail
0.0006	3837	95651	2492	Fail
0.0006	3585	94132	2625	Fail
0.0006	3345	92699	2771	Fail
0.0006	3129	91309	2918	Fail
0.0006	2917	89897	3081	Fail
0.0007	2699	88485	3278	Fail
0.0007	2494	87224	3497	Fail
0.0007	2319	85897	3704	Fail
0.0007	2139	84657	3957	Fail
0.0007	2016	83395	4136	Fail
0.0007	1895	82176	4336	Fail
0.0007	1782	80999	4545	Fail
0.0008	1663	79823	4799	Fail
0.0008	1541	78647	5103	Fail
0.0008	1441	77492	5377	Fail
0.0008	1355	76422	5640	Fail
0.0008	1271	75353	5928	Fail
0.0008	1196	74283	6210	Fail
0.0008	1123	73235	6521	Fail
0.0008	1050	72251	6881	Fail
0.0009	969	71246	7352	Fail
0.0009	916	70262	7670	Fail
0.0009	874	69342	7933	Fail
0.0009	815	68359	8387	Fail
0.0009	755	67460	8935	Fail
0.0009	701	66605	9501	Fail
0.0009	644	65706	10202	Fail
0.0009	591	64829	10969	Fail
0.0010	548	63974	11674	Fail
0.0010	501	63118	12598	Fail
0.0010	449	62284	13871	Fail
0.0010	408	61471	15066	Fail

0.0010	377	60701	16101	Fail
0.0010	345	59910	17365	Fail
0.0010	313	59140	18894	Fail
0.0011	290	58349	20120	Fail
0.0011	265	57579	21727	Fail
0.0011	249	56851	22831	Fail
0.0011	235	56188	23909	Fail
0.0011	223	55504	24889	Fail
0.0011	209	54798	26219	Fail
0.0011	191	54114	28331	Fail
0.0011	175	53472	30555	Fail
0.0012	153	52766	34487	Fail
0.0012	139	52103	37484	Fail
0.0012	121	51483	42547	Fail
0.0012	107	50884	47555	Fail
0.0012	98	50221	51245	Fail
0.0012	91	49601	54506	Fail
0.0012	81	48959	60443	Fail
0.0012	75	48317	64422	Fail
0.0013	68	47697	70142	Fail
0.0013	62	47120	76000	Fail
0.0013	54	46521	86150	Fail
0.0013	46	45922	99830	Fail
0.0013	39	45387	116376	Fail
0.0013	31	44788	144477	Fail
0.0013	23	44189	192126	Fail
0.0013	18	43633	242405	Fail
0.0014	15	43120	287466	Fail
0.0014	10	42564	425640	Fail
0.0014	9	42008	466755	Fail
0.0014	9	41516	461288	Fail
0.0014	8	40960	512000	Fail
0.0014	7	40510	578714	Fail
0.0014	6	40018	666966	Fail
0.0015	5	39527	790540	Fail
0.0015	5	39056	781120	Fail
0.0015	4	38585	964625	Fail
0.0015	4	38115	952875	Fail
0.0015	4	37666	941650	Fail
0.0015	4	37217	930425	Fail
0.0015	4	36789	919725	Fail
0.0015	4	36340	908500	Fail
0.0016	4	35933	898325	Fail
0.0016	3	35484	1182800	Fail
0.0016	3	35035	1167833	Fail
0.0016	3	34628	1154266	Fail

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

Water Quality

Water Quality BMP Flow and Volume for POC #2

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

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   24-1217_MFSOST_60pct_Disp.wdm
MESSU       25   Pre24-1217_MFSOST_60pct_Disp.MES
            27   Pre24-1217_MFSOST_60pct_Disp.L61
            28   Pre24-1217_MFSOST_60pct_Disp.L62
            30   POC24-1217_MFSOST_60pct_Disp1.dat
            31   POC24-1217_MFSOST_60pct_Disp2.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      COPY       501
      COPY       502
      DISPLY       1
      DISPLY       2
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Pre_TDA1                   MAX                    1    2   30    9
    2        Pre_TDA2                   MAX                    1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         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           ***
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         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  *********
   11         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 ***
   11         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
   11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11            0.2       0.5      0.35         6       0.5       0.7
  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
   11              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

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

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3
```

```
  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre_TDA1***
PERLND  11                      0.1851     COPY   501     12
PERLND  11                      0.1851     COPY   501     13
Pre_TDA2***
PERLND  11                      0.0313     COPY   502     12
PERLND  11                      0.0313     COPY   502     13

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

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1



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

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

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

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

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

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

SPEC-ACTIONS
```

```
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    502 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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   24-1217_MFSOST_60pct_Disp.wdm
MESSU       25   Mit24-1217_MFSOST_60pct_Disp.MES
            27   Mit24-1217_MFSOST_60pct_Disp.L61
            28   Mit24-1217_MFSOST_60pct_Disp.L62
            31   POC24-1217_MFSOST_60pct_Disp2.dat
            30   POC24-1217_MFSOST_60pct_Disp1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       1
      IMPLND      16
      PERLND      38
      COPY       502
      COPY       501
      COPY         1
      DISPLY       2
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    2        Mit_TDA2                  MAX                    1    2   31    9
    1        Mit_TDA1_DispersionArea   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  502         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   38     C, Lawn, Mod            1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   38         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  *********
   38         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 ***
   38         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
   38              0       4.5      0.03       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   38              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   38            0.1      0.25      0.25         6       0.5      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
   38              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
   16         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    4    1    9
   16         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     ***
    1         0    0    0    0    0
   16         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >       IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
   16            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
   16              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
   16              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Mit_TDA1_SheetflowDisp***
IMPLND  16                      1.2168     PERLND  38     50
Mit_TDA1***
IMPLND   1                      0.0666     COPY   501     15
IMPLND   1                      0.0666     COPY   601     15
Mit_TDA1_DispersionArea***
PERLND  38                      0.0535     COPY   501     12
PERLND  38                      0.0535     COPY   501     13
Mit_TDA2***
IMPLND   1                      0.0313     COPY   502     15

******Routing******
IMPLND  16                      0.0651     COPY     1     15
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



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

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

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

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

```
  END PRINT-INFO

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
COPY     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 FLOW     ENGL      REPL
COPY   602 OUTPUT MEAN   1 1     48.4      WDM    902 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

  MASS-LINK       50
IMPLND     IWATER SURO                     PERLND         EXTNL  SURLI
  END MASS-LINK   50


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Appendix E

Stormwater Pollution Prevention Plan (SWPPP)

HERRERA
Science + Planning + Design

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Construction Stormwater General Permit (CSWGP)

Stormwater Pollution Prevention Plan (SWPPP)

for

Middle Fork Spring Open Space Trail

Prepared for:
Department of Ecology
NW Regional Office

Permittee / Owner	Developer	Operator / Contractor
City of Bellingham Parks and Recreation	City of Bellingham Parks and Recreation	

4510 Cordata Parkway, Bellingham, WA 98226

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number

SWPPP Prepared By

Name	Organization	Contact Phone Number
Neil Schaner, PE	Herrera Environmental Consultants	(360) 684-1743

SWPPP Preparation Date
November 2024

Project Construction Dates

Activity / Phase	Start Date	End Date

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BFO	Bellingham Field Office of the Department of Ecology
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	Carbon Dioxide
CRO	Central Regional Office of the Department of Ecology
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Eastern Regional Office of the Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMEW	Stormwater Management Manual for Eastern Washington
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
SWRO	Southwest Regional Office of the Department of Ecology
TMDL	Total Maximum Daily Load
VFO	Vancouver Field Office of the Department of Ecology
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

Project Information (1.0)

Project/Site Name: Middle Fork Spring Open Space Trail (MFSOST)
Street/Location: 200 West Stuart Road
City: Bellingham State: WA Zip code: 98226
Subdivision: Cordata and Meridian Neighborhood
Receiving waterbody:
TDA #1: Middle Fork Spring Creek → Spring Creek → Baker Creek → Squalicum Creek → Bellingham Bay
TDA #2: East Bear Creek → Bear Creek → Silver Creek → Bellingham Bay

Existing Conditions (1.1)

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: 9.7 (parcel area)

Disturbed acreage: 0.56 (MFSOST disturbance limits)

Existing structures: None.

Landscape topography: The topography of the project area is rolling with a general slope to the south except for the northwestern portion of the project area, which flows north-northwest. A ridge is located near the center of the project area that drains west towards Wetland L and Middle Fork Spring Creek, which is relatively flat.

Drainage patterns: The project site is within two Threshold Discharge Areas (TDAs). TDA #1 drains to Wetland L, the large wetland centrally located in the 200 West Stuart Road parcel. TDA #1 includes 9 wetlands in the vicinity of the project disturbance limits. A ridge is located near the center of TDA #1 dividing drainage west towards Wetland L and Middle Fork Spring Creek and east toward Wetlands A, B, C, D, E, and J. All areas of TDA #1 eventually drain to Wetland L and Middle Fork Spring Creek. TDA #2 drains northwesterly toward Wetland T and Cordata Park's "Wetland A" stormwater facility that discharges to a tributary of East Bear Creek

Existing Vegetation: Vegetation within the study area consists primarily of mixed deciduous and coniferous forest, dense thickets of Himalayan blackberry, and wetland vegetation.

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes): The project will work over Wetlands L and T and wetland buffers. Work will occur within 200 feet of Wetlands A, B, C, D, E, J, K, and M. Middle Fork Spring Creek originates in the southwestern portion of the site. No significant steep slopes are present on site.

List of known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody: A portion of the site drains to East Bear Creek, which is tributary to Bear Creek, Silver Creek, and eventually Bellingham Bay. East Bear Creek is not listed for any impairments on Ecology's Water Quality Atlas. Bear Creek and Silver Creek are listed for

Bacteria and Dissolved Oxygen on Ecology's Water Quality Atlas. The portion of Bellingham Bay where Silver Creek discharges is not listed for any impairments on Ecology's Water Quality Atlas. The other portion of the site drains to Middle Fork Spring Creek which drains to Spring Creek, which is a tributary to Baker Creek which is listed for Dissolved Oxygen and Bacteria. Baker Creek is a tributary to Squalicum Creek which is listed for Bacteria. Squalicum Creek discharges to a portion of Bellingham Bay that is listed for Methyl Mercury and Bacteria.

Proposed Construction Activities (1.2)

Description of site development (example: subdivision):

This project will construct a multi-use trail connecting Cordata Park, situated adjacent to the project parcel's northwest corner, to West Stuart Road at the southeastern corner.

Description of construction activities (example: site preparation, demolition, excavation):

Installation of TESC BMPs, site preparation, tree removal, boardwalk construction with minimal excavation foundations, rockery installation, soil compaction, crushed aggregate pavement construction, park bench and signage installation, cement concrete installation, and planting. No equipment will enter wetlands and construction activity in areas accessible by crossing wetland boundaries will be completed with hand tools only.

Description of site drainage including flow from and onto adjacent properties. Must be consistent with Site Map in Appendix A:

Stormwater runoff from parcels adjacent to the east and north is conveyed onsite through overland flow.

Description of final stabilization (example: extent of revegetation, paving, landscaping):

All surfaces within the project limits will be stabilized with crushed aggregate, cement concrete, and mulched landscape.

Contaminated Site Information:

Proposed activities regarding contaminated soils or groundwater (example: on-site treatment system, authorized sanitary sewer discharge):

None known.

Construction Stormwater Best Management Practices (BMPs) (2.0)

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e. hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

The 12 Elements (2.1)

Element 1: Preserve Vegetation / Mark Clearing Limits (2.1.1)

The disturbance limits shall be marked with high visibility fencing, and any vegetation that is not necessary to be removed for the construction of the project shall be marked with high visibility fencing at its dripline.

List and describe BMPs:	C103: High Visibility Fence
	C233: High Visibility Silt Fence
Installation Schedules:	Prior to land disturbance
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 2: Establish Construction Access (2.1.2)

Construction access to and from southern portion only of the project site shall be the proposed location as shown on the TESC Plan.

List and describe BMPs:	C105: Stabilized Construction Access
Installation Schedules:	Prior to land disturbance
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 3: Control Flow Rates (2.1.3)

Stormwater flows shall be reduced through dispersion over vegetated flow paths.

Will you construct stormwater retention and/or detention facilities?

No

Will you use permanent infiltration ponds or other low impact development (example: rain gardens, bio-retention, porous pavement) to control flow during construction?

No

List and describe BMPs:	N/A
Installation Schedules:	N/A
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 4: Install Sediment Controls (2.1.4)

Sediment shall be controlled by keeping surfaces stabilized, installing straw wattles, installing silt fence, and scheduling. Once grading is complete, structural fill, gravel, and concrete shall be placed as soon as possible. Excavation shall be scheduled to minimize the total disturbed area exposed at any one time.

List and describe BMPs:	C162: Scheduling
	C233 Silt Fence
	C235: Wattles
	Stabilized surfaces
Installation Schedules:	Install BMPs prior to land disturbance
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 5: Stabilize Soils (2.1.5)

Soils shall be stabilized by placing finished surfacing material, mulch, plastic sheeting, or gravel.

West of the Cascade Mountains Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

Anticipated project dates: Start date: 6/1/2026 End date: 9/1/2026

Will you construct during the wet season?
No

List and describe BMPs: C120: Temporary and Permanent Seeding

C121: Mulching

C123: Plastic Covering

Stabilized surfaces

Installation Schedules: During earthmoving activities

Inspection and Maintenance plan: Daily

Responsible Staff: CESCL

Element 6: Protect Slopes (2.1.6)

No steep slopes are proposed – moderate slopes shall be stabilized by plastic covering or seeding.

Will steep slopes be present at the site during construction?

No

List and describe BMPs:	C120: Temporary and Permanent Seeding
	C121: Mulching
	C123 Plastic Covering
	C130: Surface Roughening
Installation Schedules:	During excavation and grading activities
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 7: Protect Drain Inlets (2.1.7)

Catch basin inlet protection shall be placed in drain inlets indicated on the TESC Plan.

List and describe BMPs:	C220: Inlet Protection
Installation Schedules:	Prior to demolition, sawcutting, and land disturbance
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 8: Stabilize Channels and Outlets (2.1.8)

Maintain existing vegetation and soil structure in all channels and outlets.

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

List and describe BMPs:	C101: Preserve Natural Vegetation
Installation Schedules:	N/A
Inspection and Maintenance plan:	Weekly, as needed
Responsible Staff:	CESCL

Element 9: Control Pollutants (2.1.9)

The following pollutants are anticipated to be present on-site:

Table 2 – Pollutants

Pollutant (and source, if applicable)
Fuel and oil for construction vehicles
Concrete form release agents
Sawcutting slurry

The Contractor shall have spill kits onsite appropriate for each vehicle and fuel type. Concrete form release agents shall be used sparingly, and stored under cover in a spill-proof container. Paint and sealants shall be stored under cover in a spill-proof container.

List and describe BMPs: C152: Sawcutting and Surfacing Pollution Prevention
C153: Material Delivery, Storage and Containment

Installation Schedules: Ongoing

Inspection and Maintenance plan: Daily

Responsible Staff: CESCL

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?

No

Will wheel wash or tire bath system BMPs be used during construction?

No

Will pH-modifying sources be present on-site?

Yes

Table 3 – pH-Modifying Sources

	Bulk cement
	New concrete washing or curing waters
	Concrete pumping and mixer washout waters
	Recycled concrete

List and describe BMPs:	C151: Concrete Handling
	C152: Sawcutting and Surfacing Pollution Prevention
	C153: Material Delivery, Storage and Containment
	C154: Concrete Washout Area
Installation Schedules:	Ongoing
Inspection and Maintenance plan:	Daily
Responsible Staff:	CESCL

Adjust pH of stormwater if outside the range of 6.5 to 8.5 su.

Obtain written approval from Ecology before using chemical treatment with the exception of CO_2 or dry ice to modify pH.

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Element 10: Control Dewatering (2.1.10)

Dewatering is not proposed for this project.

List and describe BMPs:	N/A
Installation Schedules:	N/A
Inspection and Maintenance plan:	N/A
Responsible Staff:	N/A

Element 11: Maintain BMPs (2.1.11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification (see *Volume II of the SWMMWW or Chapter 7 of the SWMMEW*).

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

Element 12: Manage the Project (2.1.12)

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:
    - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
    - Site inspections and monitoring will be conducted in accordance with Special Condition S4 of the CSWGP. Sampling locations are indicated on the Site Map. Sampling station(s) are located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
    - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Table 5 – Management

x	Design the project to fit the existing topography, soils, and drainage patterns
x	Emphasize erosion control rather than sediment control
x	Minimize the extent and duration of the area exposed
x	Keep runoff velocities low
x	Retain sediment on-site
x	Thoroughly monitor site and maintain all ESC measures
x	Schedule major earthwork during the dry season
	Other (please describe)

Element 13: Protect Low Impact Development (LID) BMPs (2.1.13)

Sheet flow dispersion is proposed for specific segments of crushed aggregate trail. Dispersion areas will be protected from sedimentation and compaction by fencing them off from upstream areas and stabilizing upstream areas.

Pollution Prevention Team (3.0)

Table 7 – Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)		
Resident Engineer	Neil Schaner	(360) 684-1743
Emergency Ecology Contact		
Emergency Permittee/ Owner Contact		
Non-Emergency Owner Contact	Paul Knippel	(360) 778-7021
Monitoring Personnel		
Ecology Regional Office	Shawn Hopkins	(360) 255-4400

Monitoring and Sampling Requirements (4.0)

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

Complete the following paragraph for sites that discharge to impaired waterbodies for fine sediment, turbidity, phosphorus, or pH:

None of the project's direct receiving water bodies are impaired for fine sediment, turbidity, phosphorus, or pH. Bear Creek is impaired for dissolved oxygen and bacteria, Nooksack River is impaired for dissolved oxygen and temperature, and Bellingham Bay is impaired for dissolved oxygen. Baker Creek is impaired for dissolved oxygen and bacteria. All stormwater and dewatering discharges from the site are subject to an **effluent limit** of 8.5 su for pH and/or 25 NTU for turbidity.

Site Inspection (4.1)

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The discharge point(s) are indicated on the Site Map (see Appendix A) and in accordance with the applicable requirements of the CSWGP.

Stormwater Quality Sampling (4.2)

Turbidity Sampling (4.2.1)

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity:

Check the analysis method you will use:

Table 8 – Turbidity Sampling Method

X	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours. https://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue
    - Central Region (Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima): (509) 575-2490
    - Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
    - Southwest Region (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum,): (360) 407-6300
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Transparency is 33 cm (or greater).

- Compliance with the water quality limit for turbidity is achieved.
    - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
    - 1% - 10% over background turbidity, if background is 50 NTU or greater
- The discharge stops or is eliminated.

pH Sampling (4.2.2)

pH monitoring is required for “Significant concrete work” (i.e. greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH:

Check the analysis method you will use:

Table 8 – pH Sampling Method

X	pH meter
	pH test kit
	Wide range pH indicator paper

Discharges to 303(d) or Total Maximum Daily Load (TMDL) Waterbodies (5.0)

303(d) Listed Waterbodies (5.1)

Is the receiving water 303(d) (Category 5) listed for turbidity, fine sediment, phosphorus, or pH?

No

Reporting and Record Keeping (6.0)

Record Keeping (6.1)

Site Log Book (6.1.1)

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

Records Retention (6.1.2)

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

Updating the SWPPP (6.1.3)

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

Reporting (6.2)

Discharge Monitoring Reports (6.2.1)

Cumulative soil disturbance is one (1) acre or larger; therefore, Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

To sign up for WQWebDMR go to:
https://www.ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

Notification of Noncompliance (6.2.2)

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Specific information to be included in the noncompliance report is found in Special Condition S5.F.3 of the CSWGP.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- Central Region at (509) 575-2490 for Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, or Yakima County
- Eastern Region at (509) 329-3400 for Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County
- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County
- Southwest Region at (360) 407-6300 for Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum

Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

Appendix A:

Site Maps

SEE PERMIT DRAWINGS IN APPENDIX C OF THE STORMWATER MANAGEMENT REPORT.

Appendix B:

BMP Details

BMP C101: Preserving Natural Vegetation

Purpose

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

Conditions of Use

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

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

Design and Installation Specifications

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

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

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

Plants need protection from three kinds of injuries:

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

between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

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

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields and power, water, and/or sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:
    - Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
    - Backfill the trench as soon as possible.
    - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered are:

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

Maintenance Standards

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

immediately and visibility restored.

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

Washington State Department of Ecology

2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)

Publication No. 24-10-013

BMP C103: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

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

Conditions of Use

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

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

Design and Installation Specifications

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

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

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

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

Fences shall not be wired or stapled to trees.

Maintenance Standards

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C105: Stabilized Construction Access

Purpose

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

Conditions of Use

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

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

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

Design and Installation Specifications

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

Table II-4.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value

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

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

Alternative Material Specification

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

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

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

Table II-4.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½″	99 to 100
2″	65 to 100

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

Notes:

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

Maintenance Standards

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

- If the access is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the access, or the installation of BMP C106: Wheel Wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction access(es), BMP C103: High-Visibility Fence shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Figure II-4.1: Stabilized Construction Access

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Approved as Functionally Equivalent

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

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C120: Temporary and Permanent Seeding

Purpose

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

Conditions of Use

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

Table II-4.4: Seeding Windows in Western Washington

Month	Seeding Recommendations
January	Seeding requires a cover of mulch or an erosion control blanket until 75% grass cover is established
February	
March	
April	Optimum seeding window
May	
June	
July	Seeding requires irrigation until 75% grass cover is established

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

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over the top of hydroseed. Before allowing water to flow in vegetated channels, establish a 75% vegetation cover. If vegetated channels cannot be established by seed before water flow, install sod or prevegetated mats in the channel bottom over top of hydromulch and erosion control blankets.
- Confirm the installation of all required stormwater control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre (lb/acre) of mulch with 3% tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only, and not landscaping, may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Vegetation establishment can be enhanced by one of the following two approaches:
    - Approach 1: Enhance vegetation establishment by dividing the hydromulch operation into two phases:
        - Phase 1 – Install all seed and fertilizer with 25% to 30% mulch and tackifier onto the soil in the first lift.
        - Phase 2 – Install the remaining mulch and tackifier over the first lift.
    - Approach 2: Vegetation can also be enhanced by:
        - Installing the mulch, seed, fertilizer, and tackifier in one lift;

- Spreading or blowing straw over the top of the hydromulch at a rate of about 800 to 1,000 lb/acre; or
- Holding straw in place with a standard tackifier.

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

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

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

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

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

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90

Common Name	Latin Name	% Weight	% Purity	% Germination
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba* or *Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90

Common Name	Latin Name	% Weight	% Purity	% Germination
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

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

Fertilizers

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

the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

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

Maintenance Standards

- Reseed any seeded areas that fail to establish at least 75% cover (100% cover for areas that receive sheet or concentrated flows) of all seeded areas after 3 months of active growth following germination during the growing season. If reseeding is ineffective, use an alternate method, such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.
- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Functionally Equivalent

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

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Washington State Department of Ecology

2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)

Publication No. 24-10-013

BMP C121: Mulching

Purpose

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

Conditions of Use

As a temporary cover measure, mulch should be used:

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

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

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

- Cottonseed meal;
- Fibers made of wood, recycled cellulose, hemp, or kenaf;
- Compost;
- Or blends of these.

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

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

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

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

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

Design and Installation Specifications

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

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

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

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

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

Table II-4.7: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	**Quality Standards**	Air-dried; free from undesirable seed and coarse material.
	Application Rates	2" to 3" thick; 5 bales per 1,000 sf or 2 to 3 tons per acre
	Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas, straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier because even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species, and it has no significant long-term benefits. Straw should only be used if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	**Quality Standards**	No growth inhibiting factors.

Mulch Material	Guideline	Description
	Application Rates	Approx. 35-45 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre
	Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.
Compost	**Quality Standards**	No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". Compost makes an excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125: Topsoiling / Composting or BMP T5.13: Post-Construction Soil Quality and Depth. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use compost near wetlands if biosolids are included. Do not use compost near phosphorous impaired water bodies.
Chipped Site Vegetation	**Quality Standards**	Gradations from fines to 6 inches in length for texture, variation, and interlocking properties. Include a mix of various sizes so that the average size is between 2 and 4 inches.
	Application Rates	2" thick minimum.
	Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approximately 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If permanent seeding or planting is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. Note: Thick application of this material over existing grass, herbaceous species, and some groundcovers could smother and kill vegetation.
Wood-Based Mulch	**Quality Standards**	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs. per cubic yard).
	Remarks	This material is often called "wood straw" or "hog fuel". The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	**Quality Standards**	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.

Mulch Material	Guideline	Description
	Application Rates	2" thick minimum.
	Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95% of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between 1/16 and 0.5 inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. See specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

Maintenance Standards

The thickness of the mulch cover must be maintained.

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

BMP C123: Plastic Covering

Purpose

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

Conditions of Use

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

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

Design and Installation Specifications

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

Maintenance Standards

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

Approved as Functionally Equivalent

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

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Washington State Department of Ecology

2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)

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BMP C130: Surface Roughening

Purpose

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

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

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends on the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure II-4.5: Surface Roughening by Tracking and Contour Furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.

- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking", or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

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

Figure II-4.5: Surface Roughening by Tracking and Contour Furrows

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BMP C151: Concrete Handling

Purpose

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

Conditions of Use

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

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

Disposal options for concrete, in order of preference are:

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

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.

    - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
    - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

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

Conditions of Use

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

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

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate groundwater or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening, or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose of process water in a manner that does not violate groundwater or surface water quality standards.

- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C153: Material Delivery, Storage, and Containment

Purpose

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

Conditions of Use

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

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

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (October 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children’s wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in “bus boy” trays or concrete mixing trays.

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days.
- Secondary containment facilities shall be covered at all times, except when in active use.
- Keep material storage areas clean, organized, and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1 - Water resistant nylon bag
    - 3 - Oil absorbent socks 3”x 4’
    - 2 - Oil absorbent socks 3”x 10’
    - 12 - Oil absorbent pads 17”x19”
    - 1 - Pair splash resistant goggles
    - 3 - Pairs nitrile gloves
    - 10 - Disposable bags with ties
    - Instructions

Maintenance Standards

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C154: Concrete Washout Area

Purpose

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

Conditions of Use

Concrete washout areas are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete truck drums are washed on-site.

  Note that auxiliary concrete truck components (e.g. chutes and hoses) and small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) may be washed 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.

Design and Installation Specifications

Implementation

- Perform washout of concrete truck drums at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete onto non-formed areas, or into storm drains, open ditches, streets, or streams.
- 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 excess concrete to be dumped on-site, except in designated concrete washout areas as allowed above.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.

- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.
- Concrete washout areas shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for the contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each concrete washout area to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate concrete washout areas at least 50 feet from sensitive areas such as storm drains, open ditches, water bodies, or wetlands.
- Allow convenient access to the concrete washout area for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access the concrete washout area, prevent track-out with a pad of rock or quarry spalls (see BMP C105: Stabilized Construction Access). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of concrete washout areas you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, concrete washout areas should be placed in multiple locations for ease of use by concrete truck drivers.

Concrete Truck Washout Procedures

- Washout of concrete truck drums shall be performed in designated concrete washout areas only.

- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated concrete washout areas or properly disposed of off-site.

Concrete Washout Area Installation

- Concrete washout areas should be constructed as shown in the figures below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
- Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Lath and flagging should be commercial type.
- Liner seams shall be installed in accordance with manufacturers' recommendations.
- Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout areas are in place prior to the commencement of concrete work.
- Once concrete wastes are washed into the designated washout area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.
- During periods of concrete work, inspect the concrete washout areas daily to verify continued performance.
    - Check overall condition and performance.
    - Check remaining capacity (% full).
    - If using self-installed concrete washout areas, verify plastic liners are intact and sidewalls are not damaged.
    - If using prefabricated containers, check for leaks.
- Maintain the concrete washout areas to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Concrete washout areas must be cleaned, or new concrete washout areas must be constructed and ready for use once the concrete washout area is 75% full.
- If the concrete washout area is nearing capacity, vacuum and dispose of the waste material in an approved manner.

    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
    - Do not discharge to the sanitary sewer without local approval.
    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.
    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from a self-installed concrete washout area, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Concrete Washout Areas

- When concrete washout areas are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct concrete washout areas shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the concrete washout areas shall be backfilled, repaired, and stabilized to prevent erosion.

Figure II-4.7: Concrete Washout Area with Wood Planks

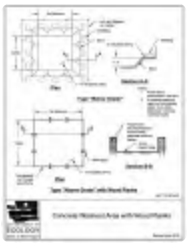

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Figure II-4.8: Concrete Washout Area with Straw Bales

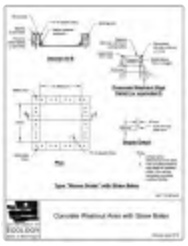

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Figure II-4.9: Prefabricated Concrete Washout Container with Ramp

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BMP C162: Scheduling

Purpose

Sequencing a construction project can reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sediment control (ESC) measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of ground cover leaves a site vulnerable to erosion. Construction sequencing that limits land clearing, provides timely installation of ESC BMPs, and restores protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

BMP C220: Inlet Protection

Purpose

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

Conditions of Use

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

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

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

Table II-4.11: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved / Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			

Type of Inlet Protection	Emergency Overflow	Applicable for Paved / Earthen Surfaces	Conditions of Use
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

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

- Provide a depth of 1 to 2 feet as measured from the crest of the inlet structure.
- Side slopes of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

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

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

Figure II-4.17: Block and Gravel Filter

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Gravel and Wire Mesh Filter

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

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

Catch Basin Filters

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

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

Curb Inlet Protection with Wooden Weir

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

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

Block and Gravel Curb Inlet Protection

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

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

Figure II-4.18: Block and Gravel Curb Inlet Protection

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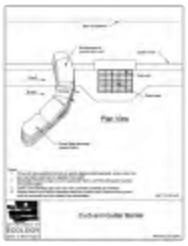
Curb and Gutter Sediment Barrier

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

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

Figure II-4.19: Curb and Gutter Barrier



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Maintenance Standards

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

Approved as Functionally Equivalent

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

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

BMP C233: Silt Fence

Purpose

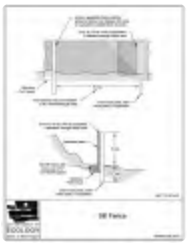
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

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

Figure II-4.22: Silt Fence



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Design and Installation Specifications

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

Table II-4.12: Geotextile Fabric Standards for Silt Fence

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

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.

- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- 100% biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-4.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

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

10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of one of the following:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.
    - Check dams shall be approximately 1 foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-4.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:
    1. The base of both end posts must be at least 2 to 4 inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.
    3. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-

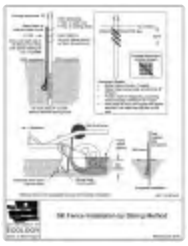
inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.

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

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

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

Figure II-4.23: Silt Fence Installation by Slicing Method



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Maintenance Standards

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

BMP C235: Wattles

Purpose

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

Conditions of Use

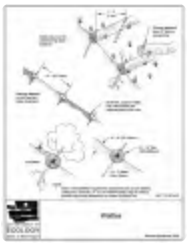
- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - On exposed soils during the period of short construction delays, or over winter months.
    - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness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

Design Criteria

- Wattles shall consist of cylinders of plant material such as weed-free straw, coir, wood chips, excelsior, or wood fiber or shavings encased within netting made of natural plant fibers unaltered by synthetic materials.
- See Figure II-4.24: Wattles for typical construction details.
- Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.
- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Place wattles in shallow trenches, staked along the contour of disturbed or newly constructed slopes. Dig narrow trenches across the slope (on contour) to a depth of 3 to 5 inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5 to 7 inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact it using hand tamping or other methods.

- Construct trenches at intervals of 10 to 25 feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and overlap the ends of adjacent wattles 12 inches behind one another.
- Install stakes at each end of the wattle, and at 4 foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 0.75 x 0.75 x 24 inches minimum. Willow cuttings or 3/8 inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Figure II-4.24: Wattles



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Maintenance Standards

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

Approved as Functionally Equivalent

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

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

Washington State Department of Ecology
2024 Stormwater Management Manual for Western Washington (2024 SWMMWW)
Publication No. 24-10-013

Appendix C:

Site Inspection Form

Construction Stormwater Site Inspection Form

Project Name **Middle Fork Spring Open Space Trail** Permit # _____ Inspection Date _____ Time _____

Name of Certified Erosion Sediment Control Lead (CESCL) or qualified inspector if *less than one acre*
Print Name: _____

Approximate rainfall amount since the last inspection (in inches): _____

Approximate rainfall amount in the last 24 hours (in inches): _____

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

_____

_____

_____

_____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: _____

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

Construction Stormwater Site Inspection Form

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits, natural resource areas (streams, wetlands, buffers, trees) protected with barriers or similar BMPs? (high visibility recommended)						
2 Construction Access	Construction access is stabilized with quarry spalls or equivalent BMP to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way was cleaned thoroughly at the end of the day or more frequent as necessary.						
3 Control Flow Rates	Are flow control measures installed to control stormwater volumes and velocity during construction and do they protect downstream properties and waterways from erosion?						
	If permanent infiltration ponds are used for flow control during construction, are they protected from siltation?						
4 Sediment Controls	All perimeter sediment controls (e.g. silt fence, wattles, compost socks, berms, etc.) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
	Sediment control BMPs (sediment ponds, traps, filters etc.) have been constructed and functional as the first step of grading.						
	Stormwater runoff from disturbed areas is directed to sediment removal BMP.						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
5 Stabilize Soils Cont.	Are stockpiles stabilized from erosion, protected with sediment trapping measures and located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						
6 Protect Slopes	Has stormwater and ground water been diverted away from slopes and disturbed areas with interceptor dikes, pipes and or swales?						
	Is off-site storm water managed separately from stormwater generated on the site?						
	Is excavated material placed on uphill side of trenches consistent with safety and space considerations?						
	Have check dams been placed at regular intervals within constructed channels that are cut down a slope?						
7 Drain Inlets	Storm drain inlets made operable during construction are protected.						
	Are existing storm drains within the influence of the project protected?						
8 Stabilize Channel and Outlets	Have all on-site conveyance channels been designed, constructed and stabilized to prevent erosion from expected peak flows?						
	Is stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream conveyance systems?						
9 Control Pollutants	Are waste materials and demolition debris handled and disposed of to prevent contamination of stormwater?						
	Has cover been provided for all chemicals, liquid products, petroleum products, and other material?						
	Has secondary containment been provided capable of containing 110% of the volume?						
	Were contaminated surfaces cleaned immediately after a spill incident?						
	Were BMPs used to prevent contamination of stormwater by a pH modifying sources?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
9 Cont.	Wheel wash wastewater is handled and disposed of properly.						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Is all Bioretention and Rain Garden Facilities protected from sedimentation with appropriate BMPs?						
	Is the Bioretention and Rain Garden protected against over compaction of construction equipment and foot traffic to retain its infiltration capabilities?						
	Permeable pavements are clean and free of sediment and sediment laden-water runoff. Muddy construction equipment has not been on the base material or pavement.						
	Have soiled permeable pavements been cleaned of sediments and pass infiltration test as required by stormwater manual methodology?						
	Heavy equipment has been kept off existing soils under LID facilities to retain infiltration rate.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) _____ (Signature) _____ Date: _____

Title/Qualification of Inspector: _____

Appendix D:

Construction Stormwater General Permit (CSWGP)

Issuance Date: November 18, 2020
Effective Date: January 1, 2021
Expiration Date: December 31, 2025

CONSTRUCTION STORMWATER GENERAL PERMIT

National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity

State of Washington
Department of Ecology
Olympia, Washington 98504

In compliance with the provisions of
Chapter 90.48 Revised Code of Washington
(State of Washington Water Pollution Control Act)
and
Title 33 United States Code, Section 1251 et seq.
The Federal Water Pollution Control Act (The Clean Water Act)

Until this permit expires, is modified, or revoked, Permittees that have properly obtained coverage under this general permit are authorized to discharge in accordance with the special and general conditions that follow.

Vincent McGowan, P.E.
Water Quality Program Manager
Washington State Department of Ecology

TABLE OF CONTENTS

LIST OF TABLES

SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions within this permit for additional submittal requirements. Appendix A provides a list of definitions. Appendix B provides a list of acronyms.

Table 1 Summary of Required Submittals

Permit Section	Submittal	Frequency	First Submittal Date
S5.A and S8	High Turbidity/Transparency Phone Reporting	As Necessary	Within 24 hours
S5.B	Discharge Monitoring Report	Monthly*	Within 15 days following the end of each month
S5.F and S8	Noncompliance Notification – Telephone Notification	As necessary	Within 24 hours
S5.F	Noncompliance Notification – Written Report	As necessary	Within 5 Days of non-compliance
S9.D	Request for Chemical Treatment Form	As necessary	Written approval from Ecology is required prior to using chemical treatment (with the exception of dry ice, CO_2 or food grade vinegar to adjust pH)
G2	Notice of Change in Authorization	As necessary	
G6	Permit Application for Substantive Changes to the Discharge	As necessary	
G8	Application for Permit Renewal	1/permit cycle	No later than 180 days before expiration
S2.A	Notice of Permit Transfer	As necessary	
G19	Notice of Planned Changes	As necessary	
G21	Reporting Anticipated Non-compliance	As necessary	

NOTE: *Permittees must submit electronic Discharge Monitoring Reports (DMRs) to the Washington State Department of Ecology monthly, regardless of site discharge, for the full duration of permit coverage. Refer to Section S5.B of this General Permit for more specific information regarding DMRs.

Table 2 Summary of Required On-site Documentation

Document Title	Permit Conditions
Permit Coverage Letter	See Conditions S2, S5
Construction Stormwater General Permit (CSWGP)	See Conditions S2, S5
Site Log Book	See Conditions S4, S5
Stormwater Pollution Prevention Plan (SWPPP)	See Conditions S5, S9
Site Map	See Conditions S5, S9

SPECIAL CONDITIONS

S1. PERMIT COVERAGE

A. Permit Area

This Construction Stormwater General Permit (CSWGP) covers all areas of Washington State, except for federal operators and Indian Country as specified in Special Condition S1.E.3 and 4.

B. Operators Required to Seek Coverage Under this General Permit

1. Operators of the following construction activities are required to seek coverage under this CSWGP:

    a. Clearing, grading and/or excavation that results in the disturbance of one or more acres (including off-site disturbance acreage related to construction-support activity as authorized in S1.C.2) and discharges stormwater to surface waters of the State; and clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more and discharge stormwater to surface waters of the State.

        i. This category includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, and discharge to surface waters of the State (that is, forest practices that prepare a site for construction activities); and

    b. Any size construction activity discharging stormwater to waters of the State that the Washington State Department of Ecology (Ecology):

        i. Determines to be a significant contributor of pollutants to waters of the State of Washington.

        ii. Reasonably expects to cause a violation of any water quality standard.

2. Operators of the following activities are not required to seek coverage under this CSWGP (unless specifically required under Special Condition S1.B.1.b, above):

    a. Construction activities that discharge all stormwater and non-stormwater to groundwater, sanitary sewer, or combined sewer, and have no point source discharge to either surface water or a storm sewer system that drains to surface waters of the State.

    b. Construction activities covered under an Erosivity Waiver (Special Condition S1.F).

    c. Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

C. Authorized Discharges

1. ***Stormwater Associated with Construction Activity.*** Subject to compliance with the terms and conditions of this permit, Permittees are authorized to discharge stormwater associated with construction activity to surface waters of the State or to a storm sewer system that drains to surface waters of the State. (Note that "surface waters of the

State" may exist on a construction site as well as off site; for example, a creek running through a site.)

2. ***Stormwater Associated with Construction Support Activity.*** This permit also authorizes stormwater discharge from support activities related to the permitted construction site (for example, an on-site portable rock crusher, off-site equipment staging yards, material storage areas, borrow areas, etc.) provided:

    a. The support activity relates directly to the permitted construction site that is required to have an NPDES permit; and

    b. The support activity is not a commercial operation serving multiple unrelated construction projects, and does not operate beyond the completion of the construction activity; and

    c. Appropriate controls and measures are identified in the Stormwater Pollution Prevention Plan (SWPPP) for the discharges from the support activity areas.

3. ***Non-Stormwater Discharges.*** The categories and sources of non-stormwater discharges identified below are authorized conditionally, provided the discharge is consistent with the terms and conditions of this permit:

    a. Discharges from fire-fighting activities.

    b. Fire hydrant system flushing.

    c. Potable water, including uncontaminated water line flushing.

    d. Hydrostatic test water.

    e. Uncontaminated air conditioning or compressor condensate.

    f. Uncontaminated groundwater or spring water.

    g. Uncontaminated excavation dewatering water (in accordance with S9.D.10).

    h. Uncontaminated discharges from foundation or footing drains.

    i. Uncontaminated or potable water used to control dust. Permittees must minimize the amount of dust control water used.

    j. Routine external building wash down that does not use detergents.

    k. Landscape irrigation water.

The SWPPP must adequately address all authorized non-stormwater discharges, except for discharges from fire-fighting activities, and must comply with Special Condition S3. At a minimum, discharges from potable water (including water line flushing), fire hydrant system flushing, and pipeline hydrostatic test water must undergo the following: dechlorination to a concentration of 0.1 parts per million (ppm) or less, and pH adjustment to within 6.5 – 8.5 standard units (su), if necessary.

D. Prohibited Discharges

The following discharges to waters of the State, including groundwater, are prohibited:

1. Concrete wastewater

2. Wastewater from washout and clean-up of stucco, paint, form release oils, curing compounds and other construction materials.

3. Process wastewater as defined by 40 Code of Federal Regulations (CFR) 122.2 (See Appendix A of this permit).

4. Slurry materials and waste from shaft drilling, including process wastewater from shaft drilling for construction of building, road, and bridge foundations unless managed according to Special Condition S9.D.9.j.

5. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.

6. Soaps or solvents used in vehicle and equipment washing.

7. Wheel wash wastewater, unless managed according to Special Condition S9.D.9.

8. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed according to Special Condition S9.D.10.

E. Limits on Coverage

Ecology may require any discharger to apply for and obtain coverage under an individual permit or another more specific general permit. Such alternative coverage will be required when Ecology determines that this CSWGP does not provide adequate assurance that water quality will be protected, or there is a reasonable potential for the project to cause or contribute to a violation of water quality standards.

The following stormwater discharges are not covered by this permit:

1. Post-construction stormwater discharges that originate from the site after completion of construction activities and the site has undergone final stabilization.

2. Non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance, from which there is natural runoff as excluded in 40 CFR Subpart 122.

3. Stormwater from any federal operator.

4. Stormwater from facilities located on ***Indian Country*** as defined in 18 U.S.C.§1151, except portions of the Puyallup Reservation as noted below.

   Indian Country includes:

   a. All land within any Indian Reservation notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation.

   b. All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

   c. All off-reservation federal trust lands held for Native American Tribes.

Puyallup Exception: Following the *Puyallup Tribes of Indians Land Settlement Act of 1989*, 25 U.S.C. §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.

5. Stormwater from any site covered under an existing NPDES individual permit in which stormwater management and/or treatment requirements are included for all stormwater discharges associated with construction activity.

6. Stormwater from a site where an applicable Total Maximum Daily Load (TMDL) requirement specifically precludes or prohibits discharges from construction activity.

F. Erosivity Waiver

Construction site operators may qualify for an Erosivity Waiver from the CSWGP if the following conditions are met:

1. The site will result in the disturbance of fewer than five (5) acres and the site is not a portion of a common plan of development or sale that will disturb five (5) acres or greater.

2. Calculation of Erosivity "R" Factor and Regional Timeframe:

    a. The project's calculated rainfall erosivity factor ("R" Factor) must be less than five (5) during the period of construction activity, (See the CSWGP homepage http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html for a link to the EPA's calculator and step by step instructions on computing the "R" Factor in the *EPA Erosivity Waiver Fact Sheet*). The period of construction activity starts when the land is first disturbed and ends with final stabilization. In addition:

    b. The entire period of construction activity must fall within the following timeframes:

        i. For sites west of the Cascades Crest: June 15 – September 15.

        ii. For sites east of the Cascades Crest, excluding the Central Basin: June 15 – October 15.

        iii. For sites east of the Cascades Crest, within the Central Basin: no timeframe restrictions apply. The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches. For a map of the Central Basin (Average Annual Precipitation Region 2), refer to: http://www.ecy.wa.gov/programs/wq/stormwater/construction/resourcesguidance.html.

3. Construction site operators must submit a complete Erosivity Waiver certification form at least one week before disturbing the land. Certification must include statements that the operator will:

    a. Comply with applicable local stormwater requirements; and

    b. Implement appropriate erosion and sediment control BMPs to prevent violations of water quality standards.

4. This waiver is not available for facilities declared significant contributors of pollutants as defined in Special Condition S1.B.1.b or for any size construction activity that could

reasonably expect to cause a violation of any water quality standard as defined in Special Condition S1.B.1.b.ii.

5. This waiver does not apply to construction activities which include non-stormwater discharges listed in Special Condition S1.C.3.

6. If construction activity extends beyond the certified waiver period for any reason, the operator must either:

   a. Recalculate the rainfall erosivity "R" factor using the original start date and a new projected ending date and, if the "R" factor is still under 5 *and* the entire project falls within the applicable regional timeframe in Special Condition S1.F.2.b, complete and submit an amended waiver certification form before the original waiver expires; *or*

   b. Submit a complete permit application to Ecology in accordance with Special Condition S2.A and B before the end of the certified waiver period.

S2. APPLICATION REQUIREMENTS

A. Permit Application Forms

1. *Notice of Intent Form*

a. Operators of new or previously unpermitted construction activities must submit a complete and accurate permit application (Notice of Intent, or NOI) to Ecology.

b. Operators must apply using the electronic application form (NOI) available on Ecology's website (http://ecy.wa.gov/programs/wq/stormwater/construction/index.html). Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, Washington 98504-7696

c. The operator must submit the NOI at least 60 days before discharging stormwater from construction activities and must submit it prior to the date of the first public notice (See Special Condition S2.B, below, for details). The 30-day public comment period begins on the publication date of the second public notice. Unless Ecology responds to the complete application in writing, coverage under the general permit will automatically commence on the 31st day following receipt by Ecology of a *completed* NOI, or the issuance date of this permit, whichever is later; unless Ecology specifies a later date in writing as required by WAC173-226-200(2). See S8.B for Limits on Coverage for New Discharges to TMDL or 303(d)-Listed Waters.

d. If an applicant intends to use a Best Management Practice (BMP) selected on the basis of Special Condition S9.C.4 ("demonstrably equivalent" BMPs), the applicant must notify Ecology of its selection as part of the NOI. In the event the applicant selects BMPs after submission of the NOI, the applicant must provide notice of the

selection of an equivalent BMP to Ecology at least 60 days before intended use of the equivalent BMP.

e. Applicants must notify Ecology if they are aware of contaminated soils and/or groundwater associated with the construction activity. Provide detailed information with the NOI (as known and readily available) on the nature and extent of the contamination (concentrations, locations, and depth), as well as pollution prevention and/or treatment BMPs proposed to control the discharge of soil and/or groundwater contaminants in stormwater. Examples of such detail may include, but are not limited to:

   i. List or table of all known contaminants with laboratory test results showing concentration and depth,

   ii. Map with sample locations,

   iii. Related portions of the Stormwater Pollution Prevention Plan (SWPPP) that address the management of contaminated and potentially contaminated construction stormwater and dewatering water,

   iv. Dewatering plan and/or dewatering contingency plan.

2. ***Transfer of Coverage Form***

The Permittee can transfer current coverage under this permit to one or more new operators, including operators of sites within a Common Plan of Development, provided:

   i. The Permittee submits a complete Transfer of Coverage Form to Ecology, signed by the current and new discharger and containing a specific date for transfer of permit responsibility, coverage and liability (including any Administrative Orders associated with the permit); and

   ii. Ecology does not notify the current discharger and new discharger of intent to revoke coverage under the general permit. If this notice is not given, the transfer is effective on the date specified in the written agreement.

When a current discharger (Permittee) transfers a portion of a permitted site, the current discharger must also indicate the remaining permitted acreage after the transfer. Transfers do not require public notice.

3. ***Modification of Coverage Form***

Permittees must notify Ecology regarding any changes to the information provided on the NOI by submitting an Update/Modification of Permit Coverage form in accordance with General Conditions G6 and G19. Examples of such changes include, but are not limited to:

   i. Changes to the Permittee's mailing address,

   ii. Changes to the on-site contact person information, and

   iii. Changes to the area/acreage affected by construction activity.

B. Public Notice

For new or previously unpermitted construction activities, the applicant must publish a public notice at least one time each week for two consecutive weeks, at least 7 days apart, in a newspaper with general circulation in the county where the construction is to take place. The notice must be run after the NOI has been submitted and must contain:

1. A statement that "*The applicant is seeking coverage under the Washington State Department of Ecology's Construction Stormwater NPDES and State Waste Discharge General Permit*."
2. The name, address, and location of the construction site.
3. The name and address of the applicant.
4. The type of construction activity that will result in a discharge (for example, residential construction, commercial construction, etc.), and the total number of acres to be disturbed over the lifetime of the project.
5. The name of the receiving water(s) (that is, the surface water(s) to which the site will discharge), or, if the discharge is through a storm sewer system, the name of the operator of the system and the receiving water(s) the system discharges to.
6. The statement: *Any persons desiring to present their views to the Washington State Department of Ecology regarding this application, or interested in Ecology's action on this application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173-201A-320. Comments can be submitted to: Department of Ecology, PO Box 47696, Olympia, Washington 98504-7696 Attn: Water Quality Program, Construction Stormwater*.

S3. COMPLIANCE WITH STANDARDS

A. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), groundwater quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the Federal water quality criteria applicable to Washington. (40 CFR Part 131.45) Discharges that are not in compliance with these standards are prohibited.

B. Prior to the discharge of stormwater and non-stormwater to waters of the State, the Permittee must apply All Known, Available, and Reasonable methods of prevention, control, and Treatment (AKART). This includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

C. Ecology presumes that a Permittee complies with water quality standards unless discharge monitoring data or other site-specific information demonstrates that a discharge causes or contributes to a violation of water quality standards, when the Permittee complies with the following conditions. The Permittee must fully:

1. Comply with all permit conditions, including; planning, sampling, monitoring, reporting, and recordkeeping conditions.

2. Implement stormwater BMPs contained in stormwater management manuals published or approved by Ecology, or BMPs that are demonstrably equivalent to BMPs contained in stormwater management manuals published or approved by Ecology, including the proper selection, implementation, and maintenance of all applicable and appropriate BMPs for on-site pollution control. (For purposes of this section, the stormwater manuals listed in Appendix 10 of the *Phase I Municipal Stormwater Permit* are approved by Ecology.)

D. Where construction sites also discharge to groundwater, the groundwater discharges must also meet the terms and conditions of this CSWGP. Permittees who discharge to groundwater through an injection well must also comply with any applicable requirements of the Underground Injection Control (UIC) regulations, Chapter 173-218 WAC.

S4. MONITORING REQUIREMENTS, BENCHMARKS, AND REPORTING TRIGGERS

A. Site Log Book

The Permittee must maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements, including the installation and maintenance of BMPs, site inspections, and stormwater monitoring.

B. Site Inspections

Construction sites one (1) acre or larger that discharge stormwater to surface waters of the State must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Sites less than one (1) acre may have a person without CESCL certification conduct inspections. (See Special Conditions S4.B.3 and B.4, below, for detailed requirements of the Permittee's CESCL.)

Site inspections must include all areas disturbed by construction activities, all BMPs, and all stormwater discharge points under the Permittee's operational control.

1. The Permittee must have staff knowledgeable in the principles and practices of erosion and sediment control. The CESCL (sites one acre or more) or inspector (sites less than one acre) must have the skills to assess the:

    a. Site conditions and construction activities that could impact the quality of stormwater; and

    b. Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. The SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times. The CESCL (sites one (1) acre or more) must obtain this certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology. (See BMP C160 in the manual, referred to in Special Condition S9.C.1 and 2.)

2. The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. BMP effectiveness must be evaluated to

determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.

Based on the results of the inspection, the Permittee must correct the problems identified, by:

a. Reviewing the SWPPP for compliance with Special Condition S9 and making appropriate revisions within 7 days of the inspection.

b. Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs, within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.

c. Documenting BMP implementation and maintenance in the site log book.

3. The CESCL or inspector must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one (1) day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one (1) inspection is required that week.) Inspection frequency may be reduced to once every calendar month for inactive sites that are temporarily stabilized.

4. The Permittee must summarize the results of each inspection in an inspection report or checklist and enter the report/checklist into, or attach it to, the site log book. At a minimum, each inspection report or checklist must include:

   a. Inspection date and time.

   b. Weather information.

   c. The general conditions during inspection.

   d. The approximate amount of precipitation since the last inspection.

   e. The approximate amount of precipitation within the last 24 hours.

   f. A summary or list of all implemented BMPs, including observations of all erosion/sediment control structures or practices.

   g. A description of:

      i. BMPs inspected (including location).

      ii. BMPs that need maintenance and why.

      iii. BMPs that failed to operate as designed or intended, and

      iv. Where additional or different BMPs are needed, and why.

   h. A description of stormwater discharged from the site. The Permittee must note the presence of suspended sediment, turbidity, discoloration, and oil sheen, as applicable.

i. Any water quality monitoring performed during inspection.

j. General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made following the inspection.

k. An implementation schedule for the remedial actions that the Permittee plans to take if the site inspection indicates that the site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.

l. A summary report of the inspection.

m. The name, title, and signature of the person conducting the site inspection, a phone number or other reliable method to reach this person, and the following statement: *I certify that this report is true, accurate, and complete to the best of my knowledge and belief.*

Table 3 Summary of Primary Monitoring Requirements

Size of Soil Disturbance[1]	Weekly Site Inspections	Weekly Sampling w/ Turbidity Meter	Weekly Sampling w/ Transparency Tube	Weekly pH Sampling[2]	CESCL Required for Inspections?
Sites that disturb less than 1 acre, but are part of a larger Common Plan of Development	Required	Not Required	Not Required	Not Required	No
Sites that disturb 1 acre or more, but fewer than 5 acres	Required	Sampling Required – either method[3]		Required	Yes
Sites that disturb 5 acres or more	Required	Required	Not Required[4]	Required	Yes

[1] Soil disturbance is calculated by adding together all areas that will be affected by construction activity. Construction activity means clearing, grading, excavation, and any other activity that disturbs the surface of the land, including ingress/egress from the site.

[2] If construction activity results in the disturbance of 1 acre or more, and involves significant concrete work (1,000 cubic yards of concrete or recycled concrete placed or poured over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer stormwater collection system that drains to other surface waters of the State, the Permittee must conduct pH sampling in accordance with Special Condition S4.D.

[3] Sites with one or more acres, but fewer than 5 acres of soil disturbance, must conduct turbidity or transparency sampling in accordance with Special Condition S4.C.4.a or b.

[4] Sites equal to or greater than 5 acres of soil disturbance must conduct turbidity sampling using a turbidity meter in accordance with Special Condition S4.C.4.a.

C. Turbidity/Transparency Sampling Requirements

1. Sampling Methods

    a. If construction activity involves the disturbance of five (5) acres or more, the Permittee must conduct turbidity sampling per Special Condition S4.C.4.a, below.

    b. If construction activity involves one (1) acre or more but fewer than five (5) acres of soil disturbance, the Permittee must conduct either transparency sampling *or* turbidity sampling per Special Condition S4.C.4.a or b, below.

2. Sampling Frequency

    a. The Permittee must sample all discharge points at least once every calendar week when stormwater (or authorized non-stormwater) discharges from the site or enters any on-site surface waters of the state (for example, a creek running through a site); sampling is not required on sites that disturb less than an acre.

    b. Samples must be representative of the flow and characteristics of the discharge.

    c. Sampling is not required when there is no discharge during a calendar week.

    d. Sampling is not required outside of normal working hours or during unsafe conditions.

    e. If the Permittee is unable to sample during a monitoring period, the Permittee must include a brief explanation in the monthly Discharge Monitoring Report (DMR).

    f. Sampling is not required before construction activity begins.

    g. The Permittee may reduce the sampling frequency for temporarily stabilized, inactive sites to once every calendar month.

3. Sampling Locations

    a. Sampling is required at all points where stormwater associated with construction activity (or authorized non-stormwater) is discharged off site, including where it enters any on-site surface waters of the state (for example, a creek running through a site).

    b. The Permittee may discontinue sampling at discharge points that drain areas of the project that are fully stabilized to prevent erosion.

    c. The Permittee must identify all sampling point(s) in the SWPPP and on the site map and clearly mark these points in the field with a flag, tape, stake or other visible marker.

    d. Sampling is not required for discharge that is sent directly to sanitary or combined sewer systems.

    e. The Permittee may discontinue sampling at discharge points in areas of the project where the Permittee no longer has operational control of the construction activity.

4. Sampling and Analysis Methods

   a. The Permittee performs turbidity analysis with a calibrated turbidity meter (turbidimeter) either on site or at an accredited lab. The Permittee must record the results in the site log book in nephelometric turbidity units (NTUs).

   b. The Permittee performs transparency analysis on site with a 1¾ inch diameter, 60 centimeter (cm)-long transparency tube. The Permittee will record the results in the site log book in centimeters (cm).

Table 4 Monitoring and Reporting Requirements

Parameter	Unit	Analytical Method	Sampling Frequency	Benchmark Value
Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs
Transparency	Cm	Manufacturer instructions, or Ecology guidance	Weekly, if discharging	33 cm

5. Turbidity/Transparency Benchmark Values and Reporting Triggers

   The benchmark value for turbidity is 25 NTUs. The benchmark value for transparency is 33 centimeters (cm). Note: Benchmark values do not apply to discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus; these discharges are subject to a numeric effluent limit for turbidity. Refer to Special Condition S8 for more information and follow S5.F – Noncompliance Notification for reporting requirements applicable to discharges which exceed the numeric effluent limit for turbidity.

   a. Turbidity 26 – 249 NTUs, or Transparency 32 – 7 cm:

      If the discharge turbidity is 26 to 249 NTUs; or if discharge transparency is 32 to 7 cm, the Permittee must:

      i. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs, and no later than 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

      ii. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.

      iii. Document BMP implementation and maintenance in the site log book.

   b. Turbidity 250 NTUs or greater, or Transparency 6 cm or less:

      If a discharge point's turbidity is 250 NTUs or greater, or if discharge transparency is less than or equal to 6 cm, the Permittee must complete the reporting and adaptive

management process described below. For discharges which are subject to a numeric effluent limit for turbidity, see S5.F – Noncompliance Notification.

i. Within 24 hours, telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) number (or through Ecology's Water Quality Permitting Portal [WQWebPortal] – Permit Submittals when the form is available), in accordance with Special Condition S5.A.

- **Central Region** (Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton): (509) 575-2490
- **Eastern Region** (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
- **Northwest Region** (Kitsap, Snohomish, Island, King, San Juan, Skagit, Whatcom): (425) 649-7000
- **Southwest Region** (Grays Harbor, Lewis, Mason, Thurston, Pierce, Clark, Cowlitz, Skamania, Wahkiakum, Clallam, Jefferson, Pacific): (360) 407-6300

These numbers and a link to the ERTS reporting page are also listed at the following website: http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html.

ii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

iii. Sample discharges daily until:

a) Turbidity is 25 NTUs (or lower); or

b) Transparency is 33 cm (or greater); or

c) The Permittee has demonstrated compliance with the water quality standard for turbidity:

1) No more than 5 NTUs over background turbidity, if background is less than 50 NTUs, or

2) No more than 10% over background turbidity, if background is 50 NTUs or greater; or

*Note: background turbidity in the receiving water must be measured immediately upstream (upgradient) or outside of the area of influence of the discharge.

d) The discharge stops or is eliminated.

iv. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within seven (7) days of the date the discharge exceeded the benchmark.

v. Document BMP implementation and maintenance in the site log book.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with permit benchmarks.

D. pH Sampling Requirements – Significant Concrete Work or Engineered Soils

If construction activity results in the disturbance of 1 acre or more, *and* involves significant concrete work (significant concrete work means greater than 1000 cubic yards placed or poured concrete or recycled concrete used over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer system that drains to surface waters of the State, the Permittee must conduct pH sampling as set forth below. Note: In addition, discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for high pH are subject to a numeric effluent limit for pH; refer to Special Condition S8.

1. The Permittee must perform pH analysis on site with a calibrated pH meter, pH test kit, or wide range pH indicator paper. The Permittee must record pH sampling results in the site log book.

2. During the applicable pH monitoring period defined below, the Permittee must obtain a representative sample of stormwater and conduct pH analysis at least once per week.

    a. For sites with significant concrete work, the Permittee must begin the pH sampling period when the concrete is first placed or poured and exposed to precipitation, and continue weekly throughout and after the concrete placement, pour and curing period, until stormwater pH is in the range of 6.5 to 8.5 (su).

    b. For sites with recycled concrete where monitoring is required, the Permittee must begin the weekly pH sampling period when the recycled concrete is first exposed to precipitation and must continue until the recycled concrete is fully stabilized with the stormwater pH in the range of 6.5 to 8.5 (su).

    c. For sites with engineered soils, the Permittee must begin the pH sampling period when the soil amendments are first exposed to precipitation and must continue until the area of engineered soils is fully stabilized.

3. The Permittee must sample pH in the sediment trap/pond(s) or other locations that receive stormwater runoff from the area of significant concrete work or engineered soils before the stormwater discharges to surface waters.

4. The benchmark value for pH is 8.5 standard units. Anytime sampling indicates that pH is 8.5 or greater, the Permittee must either:

    a. Prevent the high pH water (8.5 or above) from entering storm sewer systems or surface waters of the state; *or*

    b. If necessary, adjust or neutralize the high pH water until it is in the range of pH 6.5 to 8.5 (su) using an appropriate treatment BMP such as carbon dioxide (CO_2) sparging, dry ice or food grade vinegar. The Permittee must obtain written approval from Ecology before using any form of chemical treatment other than CO_2 sparging, dry ice or food grade vinegar.

S5. REPORTING AND RECORDKEEPING REQUIREMENTS

A. High Turbidity Reporting

Anytime sampling performed in accordance with Special Condition S4.C indicates turbidity has reached the 250 NTUs or more (or transparency less than or equal to 6 cm), high turbidity reporting level, the Permittee must notify Ecology within 24 hours of analysis either by calling the applicable Ecology Region's Environmental Report Tracking System (ERTS) number by phone or by submitting an electronic ERTS report (through Ecology's Water Quality Permitting Portal (WQWebPortal) – Permit Submittals when the form is available). See the CSWGP website for links to ERTS and the WQWebPortal. (http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html) Also, see phone numbers in Special Condition S4.C.5.b.i.

B. Discharge Monitoring Reports (DMRs)

Permittees required to conduct water quality sampling in accordance with Special Conditions S4.C (Turbidity/Transparency), S4.D (pH), S8 (303[d]/TMDL sampling), and/or G12 (Additional Sampling) must submit the results to Ecology.

Permittees must submit monitoring data using Ecology's WQWebDMR web application accessed through Ecology's Water Quality Permitting Portal.

Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper copy DMR at:

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

Permittees who obtain a waiver not to use WQWebDMR must use the forms provided to them by Ecology; submittals must be mailed to the address above. Permittees must submit DMR forms to be received by Ecology within 15 days following the end of each month.

If there was no discharge during a given monitoring period, all Permittees must submit a DMR as required with "no discharge" entered in place of the monitoring results. DMRs are required for the full duration of permit coverage (from the first full month following the effective date of permit coverage up until Ecology has approved termination of the coverage). For more information, contact Ecology staff using information provided at the following website: www.ecy.wa.gov/programs/wq/permits/paris/contacts.html.

C. Records Retention

The Permittee must retain records of all monitoring information (site log book, sampling results, inspection reports/checklists, etc.), Stormwater Pollution Prevention Plan, copy of the permit coverage letter (including Transfer of Coverage documentation) and any other documentation of compliance with permit requirements for the entire life of the construction project and for a minimum of five (5) years following the termination of permit coverage. Such information must include all calibration and maintenance records, and records of all data used to complete the application for this permit. This period of retention must be extended during

the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

D. Recording Results

For each measurement or sample taken, the Permittee must record the following information:

1. Date, place, method, and time of sampling or measurement.
2. The first and last name of the individual who performed the sampling or measurement.
3. The date(s) the analyses were performed.
4. The first and last name of the individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

E. Additional Monitoring by the Permittee

If the Permittee samples or monitors any pollutant more frequently than required by this permit using test procedures specified by Special Condition S4 of this permit, the sampling results for this monitoring must be included in the calculation and reporting of the data submitted in the Permittee's DMR.

F. Noncompliance Notification

In the event the Permittee is unable to comply with any part of the terms and conditions of this permit, and the resulting noncompliance may cause a threat to human health or the environment (such as but not limited to spills or fuels or other materials, catastrophic pond or slope failure, and discharges that violate water quality standards), or exceed numeric effluent limitations (see S8 – Discharges to 303(d) or TMDL Waterbodies), the Permittee must, upon becoming aware of the circumstance:

1. Notify Ecology within 24 hours of the failure to comply by calling the applicable Regional office ERTS phone number (refer to Special Condition S4.C.5.b.i, or go to https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue to find contact information for the regional offices.)
2. Immediately take action to prevent the discharge/pollution, or otherwise stop or correct the noncompliance, and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to Ecology within five (5) days of becoming aware of the violation (See S5.F.3, below, for details on submitting results in a report).
3. Submit a detailed written report to Ecology within five (5) days of the time the Permittee becomes aware of the circumstances, unless requested earlier by Ecology. The report must be submitted using Ecology's Water Quality Permitting Portal (WQWebPortal) – Permit Submittals, unless a waiver from electronic reporting has been granted according to S5.B. The report must contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Permittee must report any unanticipated bypass and/or upset that exceeds any effluent limit in the permit in accordance with the 24-hour reporting requirement contained in 40 C.F.R. 122.41(l)(6).

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply. Upon request of the Permittee, Ecology may waive the requirement for a written report on a case-by-case basis, if the immediate notification is received by Ecology within 24 hours.

G. Access to Plans and Records

1. The Permittee must retain the following permit documentation (plans and records) on site, or within reasonable access to the site, for use by the operator or for on-site review by Ecology or the local jurisdiction:

    a. General Permit

    b. Permit Coverage Letter

    c. Stormwater Pollution Prevention Plan (SWPPP)

    d. Site Log Book

    e. Erosivity Waiver (if applicable)

2. The Permittee must address written requests for plans and records listed above (Special Condition S5.G.1) as follows:

    a. The Permittee must provide a copy of plans and records to Ecology within 14 days of receipt of a written request from Ecology.

    b. The Permittee must provide a copy of plans and records to the public when requested in writing. Upon receiving a written request from the public for the Permittee's plans and records, the Permittee must either:

        i. Provide a copy of the plans and records to the requester within 14 days of a receipt of the written request; *or*

        ii. Notify the requester within 10 days of receipt of the written request of the location and times within normal business hours when the plans and records may be viewed; and provide access to the plans and records within 14 days of receipt of the written request; *or*

            Within 14 days of receipt of the written request, the Permittee may submit a copy of the plans and records to Ecology for viewing and/or copying by the requester at an Ecology office, or a mutually agreed location. If plans and records are viewed and/or copied at a location other than at an Ecology office, the Permittee will provide reasonable access to copying services for which a reasonable fee may be charged. The Permittee must notify the requester within 10 days of receipt of the request where the plans and records may be viewed and/or copied.

S6. PERMIT FEES

The Permittee must pay permit fees assessed by Ecology. Fees for stormwater discharges covered under this permit are established by Chapter 173-224 WAC. Ecology continues to assess permit fees until the permit is terminated in accordance with Special Condition S10 or revoked in accordance with General Condition G5.

S7. SOLID AND LIQUID WASTE DISPOSAL

The Permittee must handle and dispose of solid and liquid wastes generated by construction activity, such as demolition debris, construction materials, contaminated materials, and waste materials from maintenance activities, including liquids and solids from cleaning catch basins and other stormwater facilities, in accordance with:

A. Special Condition S3, Compliance with Standards.

B. WAC 173-216-110.

C. Other applicable regulations.

S8. DISCHARGES TO 303(d) OR TMDL WATERBODIES

A. Sampling and Numeric Effluent Limits For Certain Discharges to 303(d)-Listed Water Bodies

1. Permittees who discharge to segments of water bodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorus, must conduct water quality sampling according to the requirements of this section, and Special Conditions S4.C.2.b-f and S4.C.3.b-d, and must comply with the applicable numeric effluent limitations in S8.C and S8.D.

2. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current listing by Ecology of impaired waters (Category 5) that exists on January 1, 2021, or the date when the operator's complete permit application is received by Ecology, whichever is later.

B. Limits on Coverage for New Discharges to TMDL or 303(d)-Listed Waters

Construction sites that discharge to a TMDL or 303(d)-listed waterbody are not eligible for coverage under this permit *unless* the operator:

1. Prevents exposing stormwater to pollutants for which the waterbody is impaired, and retains documentation in the SWPPP that details procedures taken to prevent exposure on site; *or*

2. Documents that the pollutants for which the waterbody is impaired are not present at the site, and retains documentation of this finding within the SWPPP; *or*

3. Provides Ecology with data indicating the discharge is not expected to cause or contribute to an exceedance of a water quality standard, and retains such data on site with the SWPPP. The operator must provide data and other technical information to Ecology that sufficiently demonstrate:

    a. For discharges to waters without an EPA-approved or -established TMDL, that the discharge of the pollutant for which the water is impaired will meet in-stream water quality criteria at the point of discharge to the waterbody; *or*

    b. For discharges to waters with an EPA-approved or -established TMDL, that there is sufficient remaining wasteload allocation in the TMDL to allow construction stormwater discharge and that existing dischargers to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with water quality standards.

    Operators of construction sites are eligible for coverage under this permit only after Ecology makes an affirmative determination that the *discharge will not cause or contribute to the existing impairment or exceed the TMDL.*

C. Sampling and Numeric Effluent Limits for Discharges to Water Bodies on the 303(d) List for Turbidity, Fine Sediment, or Phosphorus

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus must conduct turbidity sampling in accordance with Special Condition S4.C.2 and comply with either of the numeric effluent limits noted in Table 5 below.

2. As an alternative to the 25 NTUs effluent limit noted in Table 5 below (applied at the point where stormwater [or authorized non-stormwater] is discharged off-site), Permittees may choose to comply with the surface water quality standard for turbidity. The standard is: no more than 5 NTUs over background turbidity when the background turbidity is 50 NTUs or less, or no more than a 10% increase in turbidity when the background turbidity is more than 50 NTUs. In order to use the water quality standard requirement, the sampling must take place at the following locations:

    a. Background turbidity in the 303(d)-listed receiving water immediately upstream (upgradient) or outside the area of influence of the discharge.

    b. Turbidity at the point of discharge into the 303(d)-listed receiving water, inside the area of influence of the discharge**.**

3. Discharges that exceed the numeric effluent limit for turbidity constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit must sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

Table 5 Turbidity, Fine Sediment & Phosphorus Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled	Unit	Analytical Method	Sampling Frequency	Numeric Effluent Limit[1]
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs, at the point where stormwater is discharged from the site; ***OR*** In compliance with the surface water quality standard for turbidity (S8.C.2.a)

[1] Permittees subject to a numeric effluent limit for turbidity may, at their discretion, choose either numeric effluent limitation based on site-specific considerations including, but not limited to, safety, access and convenience.

D. Discharges to Water Bodies on the 303(d) List for High pH

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for high pH must conduct pH sampling in accordance with the table below, and comply with the numeric effluent limit of pH 6.5 to 8.5 su (Table 6).

Table 6 pH Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled/Units	Analytical Method	Sampling Frequency	Numeric Effluent Limit
High pH	pH /Standard Units	pH meter	Weekly, if discharging	In the range of 6.5 – 8.5 su

2. At the Permittee's discretion, compliance with the limit shall be assessed at one of the following locations:

   a. Directly in the 303(d)-listed waterbody segment, inside the immediate area of influence of the discharge; *or*

   b. Alternatively, the Permittee may measure pH at the point where the discharge leaves the construction site, rather than in the receiving water.

3. Discharges that exceed the numeric effluent limit for pH (outside the range of 6.5 – 8.5 su) constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit must sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

E. Sampling and Limits for Sites Discharging to Waters Covered by a TMDL or another Pollution Control Plan

1. Discharges to a waterbody that is subject to a Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus must be consistent with the TMDL. Refer to http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/TMDLbyWria.html for more information on TMDLs.

    a. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges must be consistent with any specific waste load allocations or requirements established by the applicable TMDL.

        i. The Permittee must sample discharges weekly, unless otherwise specified by the TMDL, to evaluate compliance with the specific waste load allocations or requirements.

        ii. Analytical methods used to meet the monitoring requirements must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136.

        iii. Turbidity and pH methods need not be accredited or registered unless conducted at a laboratory which must otherwise be accredited or registered.

    b. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but has not identified specific requirements, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    c. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    d. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

S9. STORMWATER POLLUTION PREVENTION PLAN

The Permittee must prepare and properly implement an adequate Stormwater Pollution Prevention Plan (SWPPP) for construction activity in accordance with the requirements of this permit beginning with initial soil disturbance and until final stabilization.

A. The Permittee's SWPPP must meet the following objectives:

1. To identify best management practices (BMPs) which prevent erosion and sedimentation, and to reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. To prevent violations of surface water quality, groundwater quality, or sediment management standards.

3. To control peak volumetric flow rates and velocities of stormwater discharges.

B. General Requirements

1. The SWPPP must include a narrative and drawings. All BMPs must be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative must include documentation to explain and justify the pollution prevention decisions made for the project. Documentation must include:

    a. Information about existing site conditions (topography, drainage, soils, vegetation, etc.).

    b. Potential erosion problem areas.

    c. The 13 elements of a SWPPP in Special Condition S9.D.1-13, including BMPs used to address each element.

    d. Construction phasing/sequence and general BMP implementation schedule.

    e. The actions to be taken if BMP performance goals are not achieved—for example, a contingency plan for additional treatment and/or storage of stormwater that would violate the water quality standards if discharged.

    f. Engineering calculations for ponds, treatment systems, and any other designed structures. When a treatment system requires engineering calculations, these calculations must be included in the SWPPP. Engineering calculations do not need to be included in the SWPPP for treatment systems that do not require such calculations.

2. The Permittee must modify the SWPPP if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The Permittee must then:

    a. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the inspection or investigation.

    b. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than 10 days from the inspection or investigation. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.

    c. Document BMP implementation and maintenance in the site log book.

    The Permittee must modify the SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

C. Stormwater Best Management Practices (BMPs)

BMPs must be consistent with:

1. *Stormwater Management Manual for Western Washington* (most current approved edition at the time this permit was issued), for sites west of the crest of the Cascade Mountains; *or*

2. *Stormwater Management Manual for Eastern Washington* (most current approved edition at the time this permit was issued), for sites east of the crest of the Cascade Mountains; *or*

3. Revisions to the manuals listed in Special Condition S9.C.1 & 2, or other stormwater management guidance documents or manuals which provide an equivalent level of pollution prevention, that are approved by Ecology and incorporated into this permit in accordance with the permit modification requirements of WAC 173-226-230; *or*

4. Documentation in the SWPPP that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable stormwater management manuals, including:

    a. The technical basis for the selection of all stormwater BMPs (scientific, technical studies, and/or modeling) that support the performance claims for the BMPs being selected.

    b. An assessment of how the selected BMP will satisfy AKART requirements and the applicable federal technology-based treatment requirements under 40 CFR part 125.3.

D. SWPPP – Narrative Contents and Requirements

The Permittee must include each of the 13 elements below in Special Condition S9.D.1-13 in the narrative of the SWPPP and implement them unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP.

1. Preserve Vegetation/Mark Clearing Limits

    a. Before beginning land-disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.

    b. Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

2. Establish Construction Access

    a. Limit construction vehicle access and exit to one route, if possible.

    b. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.

    c. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.

    d. If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pickup and transport of the sediment to a controlled sediment disposal area.

    e. Conduct street washing only after sediment removal in accordance with Special Condition S9.D.2.d.

    f. Control street wash wastewater by pumping back on site or otherwise preventing it from discharging into systems tributary to waters of the State.

3. Control Flow Rates

    a. Protect properties and waterways downstream of construction sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site, as required by local plan approval authority.

    b. Where necessary to comply with Special Condition S9.D.3.a, construct stormwater infiltration or detention BMPs as one of the first steps in grading. Assure that detention BMPs function properly before constructing site improvements (for example, impervious surfaces).

    c. If permanent infiltration ponds are used for flow control during construction, protect these facilities from sedimentation during the construction phase.

4. Install Sediment Controls

    The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must:

    a. Construct sediment control BMPs (sediment ponds, traps, filters, infiltration facilities, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.

    b. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.

    c. Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Special Condition S9.D.3.a.

    d. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.

    e. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.

    f. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

5. Stabilize Soils

    a. The Permittee must stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include, but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion

control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.

b. The Permittee must control stormwater volume and velocity within the site to minimize soil erosion.

c. The Permittee must control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.

d. Depending on the geographic location of the project, the Permittee must not allow soils to remain exposed and unworked for more than the time periods set forth below to prevent erosion.

West of the Cascade Mountains Crest
During the dry season (May 1 - September 30): 7 days
During the wet season (October 1 - April 30): 2 days

East of the Cascade Mountains Crest, except for Central Basin*
During the dry season (July 1 - September 30): 10 days
During the wet season (October 1 - June 30): 5 days

The Central Basin*, East of the Cascade Mountains Crest
During the dry Season (July 1 - September 30): 30 days
During the wet season (October 1 - June 30): 15 days

***Note: The Central Basin** is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches.

e. The Permittee must stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.

f. The Permittee must stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

g. The Permittee must minimize the amount of soil exposed during construction activity.

h. The Permittee must minimize the disturbance of steep slopes.

i. The Permittee must minimize soil compaction and, unless infeasible, preserve topsoil.

6. Protect Slopes

a. The Permittee must design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).

b. The Permittee must divert off-site stormwater (run-on) or groundwater away from slopes and disturbed areas with interceptor dikes, pipes, and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.

c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.

i. West of the Cascade Mountains Crest: Temporary pipe slope drains must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Temporary pipe slope drains must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

d. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.

e. Place check dams at regular intervals within constructed channels that are cut down a slope.

7. Protect Drain Inlets

a. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

b. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

8. Stabilize Channels and Outlets

a. Design, construct and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:

i. West of the Cascade Mountains Crest: Channels must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the WWHM to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Channels must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

b. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches at the outlets of all conveyance systems.

9. Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The Permittee must:

a. 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.

b. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. Minimize storage of hazardous materials on-site. Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume of the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.

c. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

d. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.

e. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.

f. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, recycled concrete stockpiles, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. (Also refer to the definition for "concrete wastewater" in Appendix A – Definitions.)

g. Adjust the pH of stormwater or authorized non-stormwater if necessary to prevent an exceedance of groundwater and/or surface water quality standards.

h. Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete truck drums onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or groundwater. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to groundwater or surface waters of the State is

prohibited. At no time shall concrete be washed off into the footprint of an area where an infiltration BMP will be installed.

i. Obtain written approval from Ecology before using any chemical treatment, with the exception of CO_2, dry ice or food grade vinegar, to adjust pH.

j. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

10. Control Dewatering

a. Permittees must discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff at the site, in conjunction with BMPs to reduce sedimentation before discharge to a sediment trap or sediment pond.

b. Permittees may discharge clean, non-turbid dewatering water, such as well-point groundwater, to systems tributary to, or directly into surface waters of the State, as specified in Special Condition S9.D.8, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.

c. Other dewatering treatment or disposal options may include:

i. Infiltration

ii. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.

iii. Ecology-approved on-site chemical treatment or other suitable treatment technologies (See S9.D.9.i, regarding chemical treatment written approval).

iv. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.

v. Use of a sedimentation bag with discharge to a ditch or swale for small volumes of localized dewatering.

d. Permittees must handle highly turbid or contaminated dewatering water separately from stormwater.

11. Maintain BMPs

a. Permittees must maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.

b. Permittees must remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

12. Manage the Project

    a. Phase development projects to the maximum degree practicable and take into account seasonal work limitations.

    b. Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with Special Condition S4.

    c. Maintain, update, and implement the SWPPP in accordance with Special Conditions S3, S4, and S9.

13. Protect Low Impact Development (LID) BMPs

    The primary purpose of on-site LID Stormwater Management is to reduce the disruption of the natural site hydrology through infiltration. LID BMPs are permanent facilities.

    a. Permittees must protect all LID BMPs (including, but not limited to, Bioretention and Rain Garden facilities) from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden facilities. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the facility must include removal of sediment and any sediment-laden bioretention/ rain garden soils, and replacing the removed soils with soils meeting the design specification.

    b. Permittees must maintain the infiltration capabilities of LID BMPs by protecting against compaction by construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

    c. Permittees must control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.

    d. Permittees must clean permeable pavements fouled with sediments or no longer passing an initial infiltration test using local stormwater manual methodology or the manufacturer's procedures.

    e. Permittees must keep all heavy equipment off existing soils under LID BMPs that have been excavated to final grade to retain the infiltration rate of the soils.

E. SWPPP – Map Contents and Requirements

The Permittee's SWPPP must also include a vicinity map or general location map (for example, a USGS quadrangle map, a portion of a county or city map, or other appropriate map) with enough detail to identify the location of the construction site and receiving waters within one mile of the site.

The SWPPP must also include a legible site map (or maps) showing the entire construction site. The following features must be identified, unless not applicable due to site conditions.

1. The direction of north, property lines, and existing structures and roads.

2. Cut and fill slopes indicating the top and bottom of slope catch lines.

3. Approximate slopes, contours, and direction of stormwater flow before and after major grading activities.

4. Areas of soil disturbance and areas that will not be disturbed.

5. Locations of structural and nonstructural controls (BMPs) identified in the SWPPP.

6. Locations of off-site material, stockpiles, waste storage, borrow areas, and vehicle/equipment storage areas.

7. Locations of all surface water bodies, including wetlands.

8. Locations where stormwater or non-stormwater discharges off-site and/or to a surface waterbody, including wetlands.

9. Location of water quality sampling station(s), if sampling is required by state or local permitting authority.

10. Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

11. Location or proposed location of LID facilities.

S10. NOTICE OF TERMINATION

Partial terminations of permit coverage are not authorized.

A. The site is eligible for termination of coverage when it has met any of the following conditions:

1. The site has undergone final stabilization, the Permittee has removed all temporary BMPs (except biodegradable BMPs clearly manufactured with the intention for the material to be left in place and not interfere with maintenance or land use), and all stormwater discharges associated with construction activity have been eliminated; *or*

2. All portions of the site that have not undergone final stabilization per Special Condition S10.A.1 have been sold and/or transferred (per Special Condition S2.A), and the Permittee no longer has operational control of the construction activity; *or*

3. For residential construction only, the Permittee has completed temporary stabilization and the homeowners have taken possession of the residences.

B. When the site is eligible for termination, the Permittee must submit a complete and accurate Notice of Termination (NOT) form, signed in accordance with General Condition G2, to:

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

When an electronic termination form is available, the Permittee may choose to submit a complete and accurate Notice of Termination (NOT) form through the Water Quality Permitting Portal rather than mailing a hardcopy as noted above.

The termination is effective on the 31st calendar day following the date Ecology receives a complete NOT form, unless Ecology notifies the Permittee that termination request is denied because the Permittee has not met the eligibility requirements in Special Condition S10.A.

Permittees are required to comply with all conditions and effluent limitations in the permit until the permit has been terminated.

Permittees transferring the property to a new property owner or operator/Permittee are required to complete and submit the Notice of Transfer form to Ecology, but are not required to submit a Notice of Termination form for this type of transaction.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this general permit must be consistent with the terms and conditions of this general permit. Any discharge of any pollutant more frequent than or at a level in excess of that identified and authorized by the general permit must constitute a violation of the terms and conditions of this permit.

G2. SIGNATORY REQUIREMENTS

A. All permit applications must bear a certification of correctness to be signed:

1. In the case of corporations, by a responsible corporate officer.
2. In the case of a partnership, by a general partner of a partnership.
3. In the case of sole proprietorship, by the proprietor.
4. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

B. All reports required by this permit and other information requested by Ecology (including NOIs, NOTs, and Transfer of Coverage forms) must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to Ecology.
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

C. Changes to authorization. If an authorization under paragraph G2.B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G2.B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section must make the following certification:

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G3. RIGHT OF INSPECTION AND ENTRY

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records are kept under the terms and conditions of this permit.

B. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.

C. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G4. GENERAL PERMIT MODIFICATION AND REVOCATION

This permit may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. When a change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this permit.

B. When effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of dischargers covered under this permit.

C. When a water quality management plan containing requirements applicable to the category of dischargers covered under this permit is approved, or

D. When information is obtained that indicates cumulative effects on the environment from dischargers covered under this permit are unacceptable.

G5. REVOCATION OF COVERAGE UNDER THE PERMIT

Pursuant to Chapter 43.21B RCW and Chapter 173-226 WAC, the Director may terminate coverage for any discharger under this permit for cause. Cases where coverage may be terminated include, but are not limited to, the following:

A. Violation of any term or condition of this permit.

B. Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts.

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

D. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

E. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations.

F. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC.

G. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.

The Director may require any discharger under this permit to apply for and obtain coverage under an individual permit or another more specific general permit. Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within ninety (90) days from the time of revocation and is submitted along with a complete individual permit application form.

G6. REPORTING A CAUSE FOR MODIFICATION

The Permittee must submit a new application, or a supplement to the previous application, whenever a material change to the construction activity or in the quantity or type of discharge is anticipated which is not specifically authorized by this permit. This application must be submitted at least sixty (60) days prior to any proposed changes. Filing a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G7. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit will be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G8. DUTY TO REAPPLY

The Permittee must apply for permit renewal at least 180 days prior to the specified expiration date of this permit. The Permittee must reapply using the electronic application form (NOI) available on Ecology's website. Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

G9. REMOVED SUBSTANCE

The Permittee must not re-suspend or reintroduce collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to the final effluent stream for discharge to state waters.

G10. DUTY TO PROVIDE INFORMATION

The Permittee must submit to Ecology, within a reasonable time, all information that Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology, upon request, copies of records required to be kept by this permit [40 CFR 122.41(h)].

G11. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment at the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G14. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Special Condition S5.F, and; 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G15. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G16. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G17. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G18. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or imprisonment of not more than four (4) years, or both.

G19. REPORTING PLANNED CHANGES

The Permittee must, as soon as possible, give notice to Ecology of planned physical alterations, modifications or additions to the permitted construction activity. The Permittee should be aware that, depending on the nature and size of the changes to the original permit, a new public notice and other permit process requirements may be required. Changes in activities that require reporting to Ecology include those that will result in:

A. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

B. A significant change in the nature or an increase in quantity of pollutants discharged, including but not limited to: a 20% or greater increase in acreage disturbed by construction activity.

C. A change in or addition of surface water(s) receiving stormwater or non-stormwater from the construction activity.

D. A change in the construction plans and/or activity that affects the Permittee's monitoring requirements in Special Condition S4.

Following such notice, permit coverage may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G20. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to Ecology, it must promptly submit such facts or information.

G21. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee must give advance notice to Ecology by submission of a new application or supplement thereto at least forty-five (45) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of

operation and degradation of effluent quality, must be scheduled during non-critical water quality periods and carried out in a manner approved by Ecology.

G22. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT

Any discharger authorized by this permit may request to be excluded from coverage under the general permit by applying for an individual permit. The discharger must submit to the Director an application as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. These reasons will fully document how an individual permit will apply to the applicant in a way that the general permit cannot. Ecology may make specific requests for information to support the request. The Director will either issue an individual permit or deny the request with a statement explaining the reason for the denial. When an individual permit is issued to a discharger otherwise subject to the construction stormwater general permit, the applicability of the construction stormwater general permit to that Permittee is automatically terminated on the effective date of the individual permit.

G23. APPEALS

A. The terms and conditions of this general permit, as they apply to the appropriate class of dischargers, are subject to appeal by any person within 30 days of issuance of this general permit, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this general permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. Consideration of an appeal of general permit coverage of an individual discharger is limited to the general permit's applicability or nonapplicability to that individual discharger.

C. The appeal of general permit coverage of an individual discharger does not affect any other dischargers covered under this general permit. If the terms and conditions of this general permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

G24. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

G25. BYPASS PROHIBITED

A. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited for stormwater events below the design criteria for stormwater management. Ecology may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, 3 or 4) is applicable.

1. Bypass of stormwater is consistent with the design criteria and part of an approved management practice in the applicable stormwater management manual.

2. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health.

3. Bypass of stormwater is unavoidable, unanticipated, and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

   c. Ecology is properly notified of the bypass as required in Special Condition S5.F of this permit.

4. A planned action that would cause bypass of stormwater and has the potential to result in noncompliance of this permit during a storm event.

   The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

   a. A description of the bypass and its cause

   b. An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.

   c. A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

   d. The minimum and maximum duration of bypass under each alternative.

   e. A recommendation as to the preferred alternative for conducting the bypass.

   f. The projected date of bypass initiation.

   g. A statement of compliance with SEPA.

   h. A request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated.

   i. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

5. For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above must be considered during

preparation of the Stormwater Pollution Prevention Plan (SWPPP) and must be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

Ecology will consider the following before issuing an administrative order for this type bypass:

a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve, conditionally approve, or deny the request. The public must be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under RCW 90.48.120.

B. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

APPENDIX A – DEFINITIONS

AKART is an acronym for "**A**ll **K**nown, **A**vailable, and **R**easonable methods of prevention, control, and **T**reatment." AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants and controlling pollution associated with a discharge.

Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which was completed and approved by EPA before January 1, 2021, or before the date the operator's complete permit application is received by Ecology, whichever is later. TMDLs completed after a complete permit application is received by Ecology become applicable to the Permittee only if they are imposed through an administrative order by Ecology, or through a modification of permit coverage.

Applicant means an *operator* seeking coverage under this permit.

Benchmark means a pollutant concentration used as a permit threshold, below which a pollutant is considered unlikely to cause a water quality violation, and above which it may. When pollutant concentrations exceed benchmarks, corrective action requirements take effect. Benchmark values are not water quality standards and are not numeric effluent limitations; they are indicator values.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control stormwater associated with construction activity, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Buffer means an area designated by a local jurisdiction that is contiguous to and intended to protect a sensitive area.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Calendar Day A period of 24 consecutive hours starting at 12:00 midnight and ending the following 12:00 midnight.

Calendar Week (same as **Week**) means a period of seven consecutive days starting at 12:01 a.m. (0:01 hours) on Sunday.

Certified Erosion and Sediment Control Lead (CESCL) means a person who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (See BMP C160 in the SWMM).

Chemical Treatment means the addition of chemicals to stormwater and/or authorized non-stormwater prior to filtration and discharge to surface waters.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, and 97-117; USC 1251 et seq.

Combined Sewer means a sewer which has been designed to serve as a sanitary sewer and a storm sewer, and into which inflow is allowed by local ordinance.

Common Plan of Development or Sale means a site where multiple separate and distinct construction activities may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include: 1) phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a development where lots are sold to separate builders); 2) a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development; 3) projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility; and 4) linear projects such as roads, pipelines, or utilities. If the project is part of a common plan of development or sale, the disturbed area of the entire plan must be used in determining permit requirements.

Composite Sample means a mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increases while maintaining a constant time interval between the aliquots.

Concrete Wastewater means any water used in the production, pouring and/or clean-up of concrete or concrete products, and any water used to cut, grind, wash, or otherwise modify concrete or concrete products. Examples include water used for or resulting from concrete truck/mixer/pumper/tool/chute rinsing or washing, concrete saw cutting and surfacing (sawing, coring, grinding, roughening, hydro-demolition, bridge and road surfacing). When stormwater comingles with concrete wastewater, the resulting water is considered concrete wastewater and must be managed to prevent discharge to waters of the State, including groundwater.

Construction Activity means land disturbing operations including clearing, grading or excavation which disturbs the surface of the land (including off-site disturbance acreage related to construction-support activity). Such activities may include road construction, construction of residential houses, office buildings, or industrial buildings, site preparation, soil compaction, movement and stockpiling of topsoils, and demolition activity.

Construction Support Activity means off-site acreage that will be disturbed as a direct result of the construction project and will discharge stormwater. For example, off-site equipment staging yards, material storage areas, borrow areas, and parking areas.

Contaminant means any hazardous substance that does not occur naturally or occurs at greater than natural background levels. See definition of “hazardous substance” and WAC 173-340-200.

Contaminated soil means soil which contains contaminants, pollutants, or hazardous substances that do not occur naturally or occur at levels greater than natural background.

Contaminated groundwater means groundwater which contains contaminants, pollutants, or hazardous substances that do not occur naturally or occur at levels greater than natural background.

Demonstrably Equivalent means that the technical basis for the selection of all stormwater BMPs is documented within a SWPPP, including:

1. The method and reasons for choosing the stormwater BMPs selected.
2. The pollutant removal performance expected from the BMPs selected.

3. The technical basis supporting the performance claims for the BMPs selected, including any available data concerning field performance of the BMPs selected.
4. An assessment of how the selected BMPs will comply with state water quality standards.
5. An assessment of how the selected BMPs will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment (AKART).

Department means the Washington State Department of Ecology.

Detention means the temporary storage of stormwater to improve quality and/or to reduce the mass flow rate of discharge.

Dewatering means the act of pumping groundwater or stormwater away from an active construction site.

Director means the Director of the Washington State Department of Ecology or his/her authorized representative.

Discharger means an owner or operator of any facility or activity subject to regulation under Chapter 90.48 RCW or the Federal Clean Water Act.

Domestic Wastewater means water carrying human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such groundwater infiltration or surface waters as may be present.

Ecology means the Washington State Department of Ecology.

Engineered Soils means the use of soil amendments including, but not limited, to Portland cement treated base (CTB), cement kiln dust (CKD), or fly ash to achieve certain desirable soil characteristics.

Equivalent BMPs means operational, source control, treatment, or innovative BMPs which result in equal or better quality of stormwater discharge to surface water or to groundwater than BMPs selected from the SWMM.

Erosion means the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Erosion and Sediment Control BMPs means BMPs intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, sediment traps, and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs.

Federal Operator is an entity that meets the definition of "Operator" in this permit and is either any department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal government of the United States, or another entity, such as a private contractor, performing construction activity for any such department, agency, or instrumentality.

Final Stabilization (same as **fully stabilized** or **full stabilization**) means the completion of all soil disturbing activities at the site and the establishment of permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See the applicable Stormwater Management Manual for more information on vegetative cover expectations and equivalent permanent stabilization measures.

Groundwater means water in a saturated zone or stratum beneath the land surface or a surface waterbody.

Hazardous Substance means any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (5) and (6), or any dangerous or extremely dangerous waste as designated by rule under chapter 70.105 RCW; any hazardous sub-stance as defined in RCW 70.105.010(14) or any hazardous substance as defined by rule under chapter 70.105 RCW; any substance that, on the effective date of this section, is a hazardous substance under section 101(14) of the federal cleanup law, 42U.S.C., Sec. 9601(14); petroleum or petroleum products; and any substance or category of substances, including solid waste decomposition products, determined by the director by rule to present a threat to human health or the environment if released into the environment. The term hazardous substance does not include any of the following when contained in an underground storage tank from which there is not a release: crude oil or any fraction thereof or petroleum, if the tank is in compliance with all applicable federal, state, and local law.

Injection Well means a well that is used for the subsurface emplacement of fluids. (See **Well**.)

Jurisdiction means a political unit such as a city, town or county; incorporated for local self-government.

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the State from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington State Department of Ecology.

Notice of Intent (NOI) means the application for, or a request for coverage under this general permit pursuant to WAC 173-226-200.

Notice of Termination (NOT) means a request for termination of coverage under this general permit as specified by Special Condition S10 of this permit.

Operator means any party associated with a construction project that meets either of the following two criteria:

- The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Permittee means individual or entity that receives notice of coverage under this general permit.

pH means a liquid's measure of acidity or alkalinity. A pH of 7 is defined as neutral. Large variations above or below this value are considered harmful to most aquatic life.

pH Monitoring Period means the time period in which the pH of stormwater runoff from a site must be tested a minimum of once every seven days to determine if stormwater pH is between 6.5 and 8.5.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, and container from which pollutants are or may be discharged to surface waters of the State. This term does not include return flows from irrigated agriculture. (See the Fact Sheet for further explanation)

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste. This term does not include sewage from vessels within the meaning of section 312 of the CWA, nor does it include dredged or fill material discharged in accordance with a permit issued under section 404 of the CWA.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of waters of the State; including change in temperature, taste, color, turbidity, or odor of the waters; or such discharge of any liquid, gaseous, solid, radioactive or other substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish or other aquatic life.

Process Wastewater means any non-stormwater which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. If stormwater commingles with process wastewater, the commingled water is considered process wastewater.

Receiving Water means the waterbody at the point of discharge. If the discharge is to a storm sewer system, either surface or subsurface, the receiving water is the waterbody to which the storm system discharges. Systems designed primarily for other purposes such as for groundwater drainage, redirecting stream natural flows, or for conveyance of irrigation water/return flows that coincidentally convey stormwater are considered the receiving water.

Representative means a stormwater or wastewater sample which represents the flow and characteristics of the discharge. Representative samples may be a grab sample, a time-proportionate *composite sample*, or a flow proportionate sample. Ecology's Construction Stormwater Monitoring Manual provides guidance on representative sampling.

Responsible Corporate Officer for the purpose of signatory authority means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sanitary Sewer means a sewer which is designed to convey domestic wastewater.

Sediment means the fragmented material that originates from the weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Sedimentation means the depositing or formation of sediment.

Sensitive Area means a waterbody, wetland, stream, aquifer recharge area, or channel migration zone.

SEPA (State Environmental Policy Act) means the Washington State Law, RCW 43.21C.020, intended to prevent or eliminate damage to the environment.

Significant Amount means an amount of a pollutant in a discharge that is amenable to available and reasonable methods of prevention or treatment; or an amount of a pollutant that has a reasonable potential to cause a violation of surface or groundwater quality or sediment management standards.

Significant Concrete Work means greater than 1000 cubic yards placed or poured concrete or recycled concrete used over the life of a project.

Significant Contributor of Pollutants means a facility determined by Ecology to be a contributor of a significant amount(s) of a pollutant(s) to waters of the State of Washington.

Site means the land or water area where any "facility or activity" is physically located or conducted.

Source Control BMPs means physical, structural or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater. A few examples of source control BMPs are erosion control practices, maintenance of stormwater facilities, constructing roofs over storage and working areas, and directing wash water and similar discharges to the sanitary sewer or a dead end sump.

Stabilization means the application of appropriate BMPs to prevent the erosion of soils, such as, temporary and permanent seeding, vegetative covers, mulching and matting, plastic covering and sodding. See also the definition of Erosion and Sediment Control BMPs.

Storm Drain means any drain which drains directly into a *storm sewer system*, usually found along roadways or in parking lots.

Storm Sewer System means a means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains designed or used for collecting or conveying stormwater. This does not include systems which are part of *a combined sewer* or Publicly Owned Treatment Works (POTW), as defined at 40 CFR 122.2.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface waterbody, or a constructed infiltration facility.

Stormwater Management Manual (SWMM) or **Manual** means the technical Manual published by Ecology for use by local governments that contain descriptions of and design criteria for BMPs to prevent, control, or treat pollutants in stormwater.

Stormwater Pollution Prevention Plan (SWPPP) means a documented plan to implement measures to identify, prevent, and control the contamination of point source discharges of stormwater.

Surface Waters of the State includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Temporary Stabilization means the exposed ground surface has been covered with appropriate materials to provide temporary stabilization of the surface from water or wind erosion. Materials include, but are not limited to, mulch, riprap, erosion control mats or blankets and temporary cover crops. Seeding alone is not considered stabilization. Temporary stabilization is not a substitute for the more permanent “final stabilization.”

Total Maximum Daily Load (TMDL) means a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet state water quality standards. Percentages of the total maximum daily load are allocated to the various pollutant sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The TMDL calculations must include a "margin of safety" to ensure that the waterbody can be protected in case there are unforeseen events or unknown sources of the pollutant. The calculation must also account for seasonable variation in water quality.

Transfer of Coverage (TOC) means a request for transfer of coverage under this general permit as specified by Special Condition S2.A of this permit.

Treatment BMPs means BMPs that are intended to remove pollutants from stormwater. A few examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

Transparency means a measurement of water clarity in centimeters (cm), using a 60 cm transparency tube. The transparency tube is used to estimate the relative clarity or transparency of water by noting the depth at which a black and white Secchi disc becomes visible when water is released from a value in the bottom of the tube. A transparency tube is sometimes referred to as a “turbidity tube.”

Turbidity means the clarity of water expressed as nephelometric turbidity units (NTUs) and measured with a calibrated turbidimeter.

Uncontaminated means free from any contaminant. See definition of “contaminant” and WAC 173-340-200.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Waste Load Allocation (WLA) means the portion of a receiving water’s loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality based effluent limitation (40 CFR 130.2[h]).

Water-Only Based Shaft Drilling is a shaft drilling process that uses water only and no additives are involved in the drilling of shafts for construction of building, road, or bridge foundations.

Water Quality means the chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose.

Waters of the State includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the State" as defined in Chapter 90.48 RCW, which include lakes, rivers, ponds, streams, inland waters, underground waters, salt

waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Well means a bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension. (See **Injection Well**.)

Wheel Wash Wastewater means any water used in, or resulting from the operation of, a tire bath or wheel wash (BMP C106: Wheel Wash), or other structure or practice that uses water to physically remove mud and debris from vehicles leaving a construction site and prevent track-out onto roads. When stormwater comingles with wheel wash wastewater, the resulting water is considered wheel wash wastewater and must be managed according to Special Condition S9.D.9.

APPENDIX B – ACRONYMS

AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
BMP	Best Management Practice
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CKD	Cement Kiln Dust
cm	Centimeters
CPD	Common Plan of Development
CTB	Cement-Treated Base
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
FR	Federal Register
LID	Low Impact Development
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SWMM	Stormwater Management Manual
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality
WWHM	Western Washington Hydrology Model

Appendix F

Operations and Maintenance Guidance

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V-A.27 Maintenance Standards - Downspout, Sheet Flow, and Concentrated Dispersion Systems

Table V-A.26: Maintenance Standards - Downspout, Sheet Flow, and Concentrated Dispersion Systems

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Splash Block (Downspout Dispersion)				
Splash block	B		Water is being directed towards building structure	Reconfigure/ repair blocks to direct water away from building structure
	B		Water disrupts soil media	Reconfigure/ repair blocks
Transition Zone (Sheet Flow Dispersion)				
Transition zone	A		Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than 2 foot of width	Repair/replace transition zone to meet design criteria and eliminate concentrated flows
Dispersion Trench (Downspout Dispersion)				
Dispersion trench	A		Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” from edge of trench; intent is to prevent erosion damage)	• Remove debris from trench surface, if necessary • Realign notched grade board or other distributor type, if possible • Rebuild trench to standards, if necessary

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface of trench	Fall and Spring		Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow from facility	Remove/dispose in accordance with local solid waste requirements
	A, W		Vegetation/moss present on drain rock surface impedes sheet flow from facility	Maintain open, freely draining drain rock surface
Pipe(s) to trench	A, W		Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc.	Remove/ dispose
	A, W		Pipe from sump to trench or drywell has accumulated sediment or is plugged	Clear sediment from inlet/outlet pipe screen and inlet/outlet pipe
	A, W		Cracked, collapsed, broken, or misaligned drain pipes	• Repair/seal cracks • Replace when repair is insufficient
Sump	A		Sediment in the sump	• Remove/ dispose in accordance with local solid waste requirements • Clear sediment from inlet/outlet pipe screen and/or inlet/outlet pipe
Access lid	A		Cannot be easily opened	Repair/ replace
	A		Buried	Refer to record drawings for design intent. If the access lid was designed to be exposed, expose and restore to surface grade
	A		Cover missing	Replace

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Rock Pad (Concentrated Flow Dispersion)				
Rock pad	A		Only one layer of rock exists above native soil in area 6 square feet or larger, or any exposure of native soil	• Replace/ repair rock pad to meet design standards • Enlarge pad size or add additional courses of rock, if necessary
	A		Soil erosion in or adjacent to rock pad	Repair/replace rock pad to meet design standards
Dispersal Area				
Dispersal area (general)	B, S		Erosion (gullies/ rills) greater than 2 inches deep in dispersal area	Eliminate cause of erosion and stabilize damaged area (regrade, rock, revegetate)
	B, S		Accumulated sediment or debris to extent that blocks or channelizes flow path	• Remove excess sediment or debris • Identify and control the sediment source (if feasible)
Ponded water	B, S		Standing surface water in dispersion area remains for more than 3 days after the end of a storm event	Identify the cause of the standing water (e.g. grade depressions, compacted soil) and take appropriate actions to address the problem (e.g. regrade to eliminate depressions or aerate/ amend soils)
Plant establishment	B	Once every 1-2 weeks or as needed during prolonged dry periods [b]	Dispersal area vegetation in establishment period (1-2 years, or additional 3rd year during extreme dry weather)	Water weekly during periods of no rain to ensure plant establishment

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Vegetation	As needed		Poor vegetation cover such that erosion is occurring	• Ensure proper care (e.g. watering) • Assess for nutrient deficiencies • Replant as needed with appropriate plant species for the soil and moisture conditions • Consider amending soils to promote plant health
	B, S		Vegetation inhibits dispersed flow along flow path	Trim, weed or replant to restore dispersed flow path
Storage Sump				
Sump	A		Accumulated sediment in the sump	• Remove/ dispose in accordance with local solid waste requirements • Clear sediment from inlet/outlet pipe screen and/or inlet/outlet pipe
Access lid	A		Cannot be easily opened	Repair/ replace
	A		Buried	Expose and restore to surface grade
	A		Cover missing	Replace
Pest Control				
General Pests	As needed		Signs of pest infestations (IPM protocol threshold(s) are exceeded)	Follow IPM protocols for weed and pest management

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Mosquitoes	B, S		Standing surface water in dispersion area remains for more than 3 days after the end of a storm	• Identify the cause of the standing water and take appropriate actions to address the problem (see “Ponded water”) • Do not use pesticides or Bacillus thuringiensis israelensis (Bti)
Rodents	As needed		Rodent holes or mounds disturb dispersion flow paths	Fill and compact soil around the holes and vegetate to restore flow path

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

a) Frequency: A = Annually; B = Biannually (twice per year); W = At least once during the wet season (for debris/clog related maintenance, this visit should occur in the early fall, after deciduous trees have lost their leaves); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

b) Inspection should occur during plant establishment period (1-2 years, or additional 3rd year during extreme dry weather).

IPM - Integrated Pest Management

Source: (Herrera and WSC, 2013)

V-A.29 Maintenance Standards - Post-Construction Soil Quality and Depth

Table V-A.28: Maintenance Standards - Post-Construction Soil Quality and Depth

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Soil media (maintain high organic soil content)	A		Vegetation not fully covering ground surface or vegetation health is poor	• Maintain 2 to 3 inches of mulch over bare areas in landscape beds • Add plants if sufficient space • Re-seed bare turf areas until the vegetation fully covers ground surface
		Ongoing	None (routine maintenance)	Return leaf fall and shredded woody materials from the landscape to the site when possible in order to replenish soil nutrients and structure
		Ongoing	None (routine maintenance)	On turf areas, “grasscycle” (mulch-mow or leave the clippings) to build turf health
		Ongoing	None (routine maintenance)	Avoiding use of pesticides (bug and weed killers), like “weed & feed”, which damage the soil
		A	None (routine maintenance)	• Where fertilization is needed (mainly turf and annual flower beds), a moderate fertilization program should be used which relies on compost, natural fertilizers or slow-release synthetic balanced fertilizers • Follow IPM protocols for fertilization procedures

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Soil media (maintain infiltration)	A[b]		Soils become waterlogged, do not appear to be infiltrating	• To remediate compaction, aerate soil, till to at least 8-inch depth, or further amend soil with compost and re-till • If areas are turf, aerate compacted areas and topdress them with 1/4 to 1/2 inch of compost to renovate them • If drainage is still slow, consider investigating alternative causes (e.g. high wet season groundwater levels, low permeability soils) • Also consider site use and protection from compacting activities
Erosion / Scouring	A, W, S		Areas of potential erosion are visible	• Identify and address cause of erosion (e.g. concentrate flow entering area, channelization of runoff) and stabilize damaged area (regrade, rock, vegetation, erosion control matting) • For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made.
Grass / Vegetation		A	Less than 75% of planted vegetation is healthy with a generally good appearance	• Take appropriate maintenance actions (e.g. remove/ replace plants) • If problem persists, evaluate if vegetation is appropriate for the location (e.g. exposure, soil, soil moisture)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Noxious weeds		M (March – October, preceding seed dispersal)	Listed noxious vegetation is present (refer to current county noxious weed list)	• By law, class A & B noxious weeds must be removed, bagged and disposed as garbage immediately • Reasonable attempts must be made to remove and dispose of class C noxious weeds • Watch for and respond to new occurrences of especially aggressive weeds such as Himalayan blackberry, Japanese knotweed, morning glory, English ivy, and reed canary grass to avoid invasions • It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality; use of herbicides and pesticides may be prohibited in some jurisdictions
Weeds		M (March – October, preceding seed dispersal)	Weeds are present	• Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate • Follow IPM protocols for weed management

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

a) Frequency: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season (for debris/clog related maintenance, this visit should occur in the early fall, after deciduous trees have lost their leaves); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

b) Inspection should occur during a storm event.

IPM - Integrated Pest Management

Source: (Herrera and WSC, 2013)