TUTTLE ENGINEERING AND MANAGEMENT

2019

CITY OF MUKILTEO

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Stormwater Report

61st Place West Culvert Improvement Project

61st Place West
Mukilteo, WA 98275

Prepared For Owner:
City of Mukilteo Public Works Dept.
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March 29, 2019

ENGINEERS CERTIFICATION

I, Matthew Randall, a Professional Engineer registered in the State of Washington as a Civil Engineer, do hereby declare that the technical information report titled *Stormwater Report for 61st Place West Culvert Improvement Project* and dated March 29, 2019 was prepared by or under my personal supervision, and that said report was prepared in accordance with generally accepted engineering practices.

I hereby affirm, to the best of my knowledge, information, and belief, that the subject report was prepared in full compliance with the Washington State Department of Ecology (DOE) *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014* (Manual) and *Mukilteo Municipal Code* (MMC) Section 13.12.

Matthew R. Randall, P.E.

3-29-19

Date

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1 EXECUTIVE SUMMARY

1.1 Objectives

This stormwater report has been prepared to demonstrate that repairs to and construction of the 61st Place West Culvert Improvement Project (Project) is feasible and that stormwater controls can successfully mitigate impacts created by improvements to the culvert and adjacent roadway improvements. This report is to be used to guide the design and preparation of plans and the management of construction activities. Complete civil design plans, details, and specifications shall be submitted as part of the City of Mukilteo's (City) permit application process.

1.2 Background

The site is located at approximately 9000 61st Place West in Mukilteo, Washington. See Appendix A for a vicinity map. The property lies within Section 17, Township 28 North, Range 04 E, in Snohomish County and is within the city of limits of the City of Mukilteo.

This Project will replace an existing deficient culvert with a new box culvert, improving both stream function and road conditions. The existing 54-foot-long, 24-inch-diameter multi-sloped CMP culvert will be removed and replaced with a new box culvert that is 40 feet long, 8 feet wide, and 6.8 feet tall. The project will also reposition the culvert south of its original location, create a roughened channel with engineered cascades along approximately 350 linear feet of stream (about 75 feet upstream and 250 feet downstream), and raise the road. These changes will accommodate the new culvert's size, the site's steep topography, and the existing, 8-inch-diameter sewer line running along the roadway and under the existing culvert. The existing culvert under 61st Place West is not fish-passable. The new culvert will be fish-passable.

The proposed stormwater management design will consist of collecting surface runoff from the realigned and regraded roadway in new roadside catch basins, collecting shallow groundwater in a curtain drain constructed along the interface of the road and uphill slope and conveying it to the creek in a new storm pipe system. Stormwater will outfall via a new outfall within the culvert structure into Smuggler's Gulch. The project is required to comply with Minimum Requirements No. 1 through 5. See Section 4 of this document for Minimum Requirements for Redevelopment Projects.

1.3 Method of approach

This analysis is provided to describe the proposed project and to assure stormwater management concepts meet the requirements of the City of Mukilteo per City Code and the Washington State Department of Ecology (DOE) *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014* (Manual). Per the City, the project must utilize the Manual, Vol. 1, Chapter 2 to determine which thresholds will be exceeded based on the proposed improvements and which corresponding Minimum Requirements need to be addressed. Results of this process, documented in the remainder of this report, are used to analyze and design the necessary Best Management Practices (BMPs) to manage stormwater to achieve requirements of the Manual.

2 EXISTING CONDITIONS

A site visit was conducted to assess site conditions and develop a strategy to mitigate stormwater runoff.

2.1 Land Use

The project site generally consists of a public roadway paved with asphalt crossing over an existing culvert pipe through which water from Smuggler's Gulch flows. The roadway exists to provide a connection between the properties along 61st Place West to the south and 88th Street SW.

2.2 Vegetation

The adjacent lots are forested with large trees and forest vegetation (ferns, blackberries). Two paved driveways abut the roadway at the beginning of the project (southwest end) and then end (northeast end) of the project.

2.3 Existing Soil Conditions

Per the attached geotechnical report from Associated Earth Sciences, Inc., site soils are "loose/soft to medium stiff, silty fine sand and sandy silt (p. 3)." Stormwater typically infiltrates through the top layer of soil and perches on the silty layer beneath. See Appendix B.

2.4 Topography

61st Place West traverses hillside slopes that range between 1:1 and 2:1. The project sits at the bottom of the slope as road as it crosses Smuggler's Gulch before climbing back up the hill. On average, most of the hill slopes down towards the gulch and Puget Sound at approximately 1.5:1 (horizontal to vertical). Within the project limits, roadway longitudinal slopes range from 9% near the beginning of the project to 3% at the end of the project. Steep slopes border both sides of the roadway. The elevation of the road at the south end of the project is approximately 69. The elevation of the road near the lowest proposed catch basin is approximately 66. The elevation of the road at the north end of the project is approximately 70. The project

2.5 Off-site Analysis

The project is not required to provide an offsite analysis because the project does not propose to add 5,000 square feet of new hard surface per the Manual I-3.1.3. Currently, roadway runoff is collected in catch basins or roadside ditches and conveyed downhill to Smuggler's Gulch.

3 DEVELOPED CONDITIONS

A Stormwater Control Plan is developed to analyze the most effective BMPs for application to the proposed developed condition.

3.1 Developed Site Hydrology

For the developed condition, we analyzed the replacement and addition of 3,954 square feet of asphalt roadway surface areas and concrete gutter and approximately 446 square feet of gravel shoulder adjacent to the roadway prism (4,400 SF of total hard surface). See the Road and Storm Plan and Profile within Appendix C. Roadway runoff will be directed westward across the pavement to an extruded asphalt curb or concrete gutter. Runoff will be conveyed to one of two new catch basins. Catch basins will also be located to at the base of the slope south of the proposed vehicle turnout to collect storm flows from the public storm system upstream of the project along 61st Place West.

Surface runoff from the slope uphill north of the culvert will be constructed along the northeast side of the culvert to collect hillside runoff to ensure it doesn't sheet across the roadway. A curtain drain will be installed along the base of the slope near the vehicle pullout. The curtain drain will convey stormwater to the new piped storm system.

All stormwater from the roadway will be conveyed via a new storm drain system to the new culvert and ultimately to Smuggler's Gulch.

3.2 Flow Control, Water Quality Treatment

Per the DOE Manual, the project does not add or replace enough hard surface to be required to address flow control and water quality treatment requirements. See Section 4 of this report for more information on the Minimum Requirements.

4 MINIMUM STORMWATER MANAGEMENT REQUIREMENTS

The Manual summarizes the requirements and stormwater management practices governing the design of this project. The DOE has provided a simple flowchart (Figure I-2.4.2, see Appendix D) to determine which Minimum Requirements must be addressed based on the amount of pervious and impervious surfaces that exist and are proposed to be installed or replaced for the project. Utilizing the areas listed in section 3.1, the project will add over 2,000 square feet of new hard surface area in the form of asphalt pavement repair and widening and gravel shoulder. In accordance with Volume 1, Chapter 3 of the Manual, the project is required to address Minimum Requirements 1 through 5 for all new and replaced hard surfaces and the land disturbed. The project does not add 5,000 square feet or more of new hard surfaces, convert ¾ acres or more of vegetation to lawn or landscaped areas, or convert 2.5 acres or more of native vegetation to pasture.

The project is a stream improvement and culvert replacement project that includes roadway replacement and improvements. However, the new and replaced hard surfaces do not exceed 5,000 square feet or add more than 50% to the existing hard surface area within the project limits. As such, no additional requirements are necessitated.

The project must address Minimum Requirements #1 through #5 of the Manual. These will be addressed in the remainder of this report:

1. Preparation of Stormwater Site Plans
2. Construction Stormwater Pollution Prevention (SWPP)
3. Source Control of Pollution
4. Preservation of Natural Drainage Systems and Outfalls
5. On-site Stormwater Management

The following sub-sections describe how the project will comply with each Minimum Requirement.

4.1 Minimum Requirement No. 1 – Preparation of Stormwater Site Plans

"All projects meeting the thresholds in Section 2.4 (of the Manual) shall prepare a Stormwater Site Plan for local government review. Stormwater Site Plans shall use site-appropriate development principles, as required and encouraged by local development codes, to retain native vegetation and minimize impervious surfaces to the extent feasible. Stormwater Site Plans shall be prepared in accordance with Chapter 3 of this volume."

This report and the attached plans serve as the Site Stormwater Plan. The Site Stormwater Plan was prepared in accordance with Volume I, Chapter 3 of the Manual.

4.2 Minimum Requirement No. 2 – Construction Stormwater Pollution Prevention (SWPP)

"All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Projects which result in 2,000 square feet or more of new plus replaced hard surface area, or which disturb 7,000 square feet or more of land must prepare a Construction SWPP Plan (SWPPP) as part of the Stormwater Site Plan."

As stated in section 3.1, the project will result in more than 2,000 square feet of new plus replaced hard surface area. All 13 Elements of the SWPPP have been considered and controls to address them are outlined below in text and within the attached stormwater site plan drawings.

4.2.1 Element 1: Preserve Vegetation/Mark Clearing Limits

- "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."
- "Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable."

Relevant BMPs:
BMP C101 - Preserve Natural Vegetation
BMP C103 - High Visibility Fence

Site-Specific Note:
The project site is generally within the public right-of-way or within a streambed. A portion of the work required to replace the culvert and improve the streambed necessitates construction activities to be conducted within a temporary construction easement which may require tree protection or removal. Clearing and Grubbing will occur along the roadway edge. Trees to remain will be clearly marked to prevent damage as shown on the plans. Disturbance of vegetation and forest outside the limits of construction is to be avoided. Flagging will define the construction limits.

4.2.2 Element 2: Establish Construction Access

- "Limit construction vehicle access and exit to one route, if possible."
- "Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto public roads."
- "Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads."
- "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 pick up and transport the sediment to a controlled sediment disposal area."
- "Conduct street washing only after sediment is removed in accordance with the above bullet."
- "Control street wash wastewater by pumping back on-site, or otherwise prevent it from discharging into systems tributary to waters of the State."

Relevant BMPs:
BMP C105 – Stabilized Construction Entrance
BMP C107 – Construction Road/Parking Area Stabilization

Site-Specific Note:

The contractor will utilize the existing paved surface area as a construction access and parking area. The contractor will be required to monitor the existing roadway for sediment tracking from the project site. Sediment removal from the roadway will be completed by shoveling or sweeping.

4.2.3 Element 3: Control Flow Rates

- "Protect properties and waterways downstream of development 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."
- "Where necessary to comply with the bullet above, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (e.g. impervious surfaces)."
- "If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase."

Relevant BMPs:
BMP C207 – Check Dams
BMP C235 – Wattles

Site-Specific Note:

Because the project is a linear roadway project, wattles or compost socks will be installed on contour downhill of proposed land-disturbing activities to prevent sediment-laden water from flowing into the stream. Wattles will be installed in the adjacent ditch as check dams. Due to the minimal area of disturbance on this linear project, stormwater detention is not required for this project.

4.2.4 Element 4: Install Sediment Controls

- "Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants."
- "Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place."
- "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."
- "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 in Element #3, bullet #1."
- "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."

- "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."

Relevant BMPs:
BMP C220 – Storm Drain Inlet Protection
BMP C235 – Wattles
BMP C240 – Sediment Trap, if necessary
BMP C241 – Sediment Pond, if necessary

Site-Specific Note:
The project is both a linear roadway repair project and a streambed realignment and improvement project. Extensive earthwork is not proposed for the roadway portion of the project outside of the roadway prism. Significant earthwork will be required to create the stair-stepping streambed. Regular roadway cleanup and storm drain inlet protection are proposed for sediment control. As necessary, the contractor will install erosion control BMPs downslope of all earth disturbing activities.

4.2.5 Element 5: Stabilize Soils

- "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 early on areas to be paved, and dust control."
- "Control stormwater volume and velocity within the site to minimize soil erosion."
- "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."
- "Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
  - During the dry season (May 1 - Sept. 30): 7 days
  - During the wet season (October 1 - April 30): 2 days"
- "Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast."
- "Stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels."
- "Minimize the amount of soil exposed during construction activity."
- "Minimize the disturbance of steep slopes."
- "Minimize soil compaction and, unless infeasible, preserve topsoil."

Relevant BMPs:
BMP C120 – Temporary and Permanent Seeding
BMP C121 – Mulching
BMP C123 – Plastic Covering
BMP C125 – Topsoiling/Composting
BMP C130 – Surface Roughening

Site-Specific Note:
It is not expected that the small areas of disturbed soil within the roadway improvements portion of the project will remain in such a way as to create sediment-laden runoff issues. Slope stabilization along the toe of the slope will be completed using gravel shoulders, gabion walls, and streambed improvements.

4.2.6 Element 6: Protect Slopes

- "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)."
- "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."
- "At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion."
    - "Temporary pipe slope drains must handle the peak 10-minute velocity of flow from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year and 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."
- "Place excavated material on the uphill side of trenches, consistent with safety and space considerations."
- "Place check dams at regular intervals within constructed channels that are cut down a slope."

Relevant BMPs:
BMP C120 – Temporary and Permanent Seeding
BMP C123 – Plastic Covering
BMP C130 – Surface Roughening

Site-Specific Note:
All disturbed surfaces and slopes less than 3:1 slope are to be mulched or have hog fuel placed on them until such a time that they can be seeded. Disturbed slopes steeper than 3:1 are to be covered with plastic until they can be stabilized with quarry spalls. All disturbed soils not proposed to be covered with quarry spalls will be permanently seeded.

4.2.7 Element 7: Protect Drain Inlets

- "Protect all storm drain inlets made operable during construction so that stormwater runoff shall not enter the conveyance system without first being filtered or treated to remove sediment."
- "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)."

Relevant BMPs:
BMP C220 – Storm Drain Inlet Protection

Site-Specific Note:
Inlet protection is to be installed in proposed catch basins and is to remain for the duration of construction.

4.2.8 Element 8: Stabilize Channels and Outlets

- "Design, construct, and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:
  - Channels must handle the peak 10-minute velocity of flow 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 Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped area."
- "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."

Relevant BMPs:
BMP C207 – Check Dams
BMP C209 – Outlet Protection

Site-Specific Note:
Temporary on-site conveyance is not proposed or expected for this project. Most of the work will consist of improving the streambed. The existing ditch east of the roadway will remain until the storm system and vehicle pullout are constructed. If construction requires temporary conveyance, check dams and outlet protection will be utilized to prevent erosion from peak flows as required. Check dams will be installed in the adjacent public stormwater ditch to ensure that any sediment-laden water that may come from the project area will be managed prior to the water continuing down the roadside ditch towards the stream.

4.2.9 Element 9: Control Pollutants

- "Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants."
- "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."
- "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. 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 contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment."

- "Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident."
- "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 application, or to the sanitary sewer, with local sewer district approval."
- "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."
- "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, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping, and mixer washout waters."
- "Adjust the pH of stormwater if necessary to prevent violations of water quality standards."
- "Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on-site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited."
- "Obtain written approval from Ecology before using chemical treatment other than CO2 or dry ice to adjust pH."

Relevant BMPs:
BMP C151 - Concrete Handling
BMP C152 - Sawcutting and Surfacing Pollution Prevention
BMP C153 – Material Delivery, Storage and Containment Area
BMP C154 - Concrete Washout Area

Site-Specific Note:
All contaminated materials from cleaning shall be disposed off-site at an approved waste facility. Concrete shall be handled, and a concrete washout area shall be provided near the construction parking area as needed.

4.2.10 Element 10: Control Dewatering

- "Discharge foundation, vault, and trench de-watering water, which has similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond."
- "Discharge clean, non-turbid de-watering water, such as well-point groundwater, to systems tributary to, or directly into surface waters of the State, as specified in Element #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."
- "Handle highly turbid or otherwise contaminated dewatering water separately from stormwater."
- "Other treatment or disposal options may include:
  1. Infiltration.

2. Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
3. Ecology-approved on-site chemical treatment or other suitable treatment technologies.
4. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
5. Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering."

Relevant BMPs:

BMP C201 – Grass-lined Channels
BMP C235 – Wattles
BMP C240 - Sediment Trap

Site-Specific Note:
At this time, dewatering is only expected for the culvert portion of the project. It is assumed that some dewatering will be required to maintain a dry excavation for construction of the base of the new culvert. It is not expected that dewatering will be required for the roadway repair or installation of the storm system. However, if dewatering of the stormwater pipe trench or storm structure is required, the contractor will employ BMPs to control and treat pollution on-site to protect the nearby stream and slopes.

4.2.11 Element 11: Maintain BMPs

- "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."
- "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."

Relevant BMPs:

BMP C150 – Materials on Hand
BMP C160 – Certified Erosion and Sediment Control Lead

Site-Specific Note:
The contractor shall assign an individual to inspect all temporary and permanent erosion and sediment control BMPs utilized on the project. Repairs shall be made immediately to minimize any impacts. Temporary BMPs shall not be removed until final stabilization is complete, or the BMP is no longer required.

4.2.12 Element 12: Manage the Project

- "Phase development projects to the maximum degree practicable and consider seasonal work limitations."
- "Inspection and monitoring – Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Projects regulated under the Construction Stormwater General Permit must conduct site inspections and monitoring in accordance with Special Condition S4 of the Construction Stormwater General Permit."
- "Maintain, update, and implement the SWPPP."

- "Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites disturbing less than one acre may have a CESCL or a person without CESCL certification conduct inspections. By the initiation of construction, the SWPPP must identify the CESCL or inspector, who must be present on-site or on-call at all times."
- "The CESCL or inspector (project sites less than one acre) must have the skills to assess the:
  - Site conditions and construction activities that could impact the quality of stormwater.
  - Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges."
- "The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They must evaluate the effectiveness of BMPs and 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, construction site operators must correct the problems identified by:
  - Reviewing the SWPPP for compliance with the 13 construction SWPPP elements and making appropriate revisions within 7 days of the inspection.
  - Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems not later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, the construction site operator may request an extension within the initial 10-day response period."
- "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 day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The CESCL or inspector may reduce the inspection frequency for temporary stabilized, inactive sites to once every calendar month."

Relevant BMPs:
BMP C150 - Materials on Hand
BMP C160 - Certified Erosion and Sediment Control Lead
BMP C162 - Scheduling

Site-Specific Note:
The project disturbs less than one acre of land. Therefore, coverage under the NPDES Construction General Stormwater Permit will not be required and a CESCL is not needed. The contractor shall assign an individual to inspect and to manage the erosion control BMPs.

4.2.13 Element 13: Protect Low Impact Development BMP's

Site-Specific Note:
LID facilities are not proposed for this project. Therefore, this BMP is not applicable.

4.3 Minimum Requirement No. 3 – Source Control of Pollution

"All known, available and reasonable source control BMPs must be applied to all projects. Source control BMPs must be selected, designed, and maintained according to this manual. The intention of source control BMPs is to prevent stormwater from coming in contact with pollutants. They are a cost-effective means of reducing pollutants in stormwater, and, therefore, should be a first consideration in all projects."

During construction, if sediment is tracked off the project site, the Contractor will thoroughly clean public roads at the end of each day or more frequently if required. Sediment collected from the cleaning process shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. The Contractor will be allowed to wash the street only after sediment is removed in an aforementioned manner.

During construction, the contractor shall apply and use all known, available, and reasonable source control BMPs to prevent spills from reaching the existing and proposed stormwater management facilities and adjacent critical areas. After construction, the City will be responsible for implementing Source Control BMPs that prevent spills or excess use of materials needed for landscape maintenance and operation. All Source Control BMPs must be selected, designed, and maintained according to the Manual.

4.4 Minimum Requirement No. 4 – Preservation of Natural Drainage Systems and Outfalls

"Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down-gradient properties. All outfalls require energy dissipation."

This project does not change the location of existing drainage outfalls. Natural drainage patterns shall be maintained, and discharges from the project shall occur at or near the existing location to the public storm system. Stormwater from new impervious surfaces will be collected before sheeting downslope to protect the downgradient properties.

4.5 Minimum Requirement No. 5 – On-Site Stormwater Management

"Projects shall employ On-site Stormwater Management BMPs in accordance with the following projects thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts. Projects triggering Minimum Requirements #1 through #5, shall either use on-site stormwater Management BMPs from List #1 (of the Manual) or meet the Low Impact Development Performance Standard."

The project proposes to address the requirements defined in List #1 of the Manual. The following describes whether each BMP is feasible for the described surface:

Lawn and landscaped areas:

- Post-Construction Soil Quality and Depth in accordance with BMP T5.13.

This is a feasible BMP to manage all disturbed areas not proposed as impervious or hard surfaces, when on slopes less than 33%. However, because of the steep slopes encountered throughout the project limits, no areas exist where the disturbed areas will be on slopes less than 33%. As such, this BMP is not a feasible option for this project.

Roofs:
Roofs are not proposed for this project. Therefore, the requirements for roofs are not applicable.

Other Hard Surfaces:

- Full Dispersion in accordance with BMP T5.30

This is an infeasible BMP as it requires that at least 65% of the site remain in a forested or native condition and a 100 feet long vegetated flow path to disperse runoff. Additionally, the slope of the flow path must be no steeper than 15% for any 20-foot reach of the flow path. The project will not be able to meet these requirements.

- Permeable pavement in accordance with BMP T5.15.

Infiltration within 50 feet of the top of slopes greater than 20% and over 10 feet of vertical relief is not recommended. The adjacent slopes have been shown to be erosive. This is not feasible.

- Raingardens, BMP T5.14A, or Bioretention, BMP T7.30, that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.

Infiltration within 50 feet of the top of slopes greater than 20% and over 10 feet of vertical relief is not recommended. The adjacent slopes have been shown to be erosive. This is not feasible.

- Sheet Flow Dispersion in accordance with BMP T5.12, or Concentrated Flow Dispersion in accordance with BMP T5.11.

This BMP is to be used for flat or moderately sloped surfaces (less than 15% slope). The adjacent slopes are greater than 15% making this BMP infeasible.

Due to the limiting constraints of available space and steep slopes within the project limits, on-site stormwater management is not possible. Stormwater flowing across the asphalt roadway will be directed by an asphalt curb or concrete gutter to a storm system on the south side of the culvert. That storm system will also collect flow from the uphill 61st Place West storm system and convey the complete flow to an outfall within the culvert. See Site Plans in Appendix C. Storm pipe calculations and bypass grate calculations are included in Appendix D.

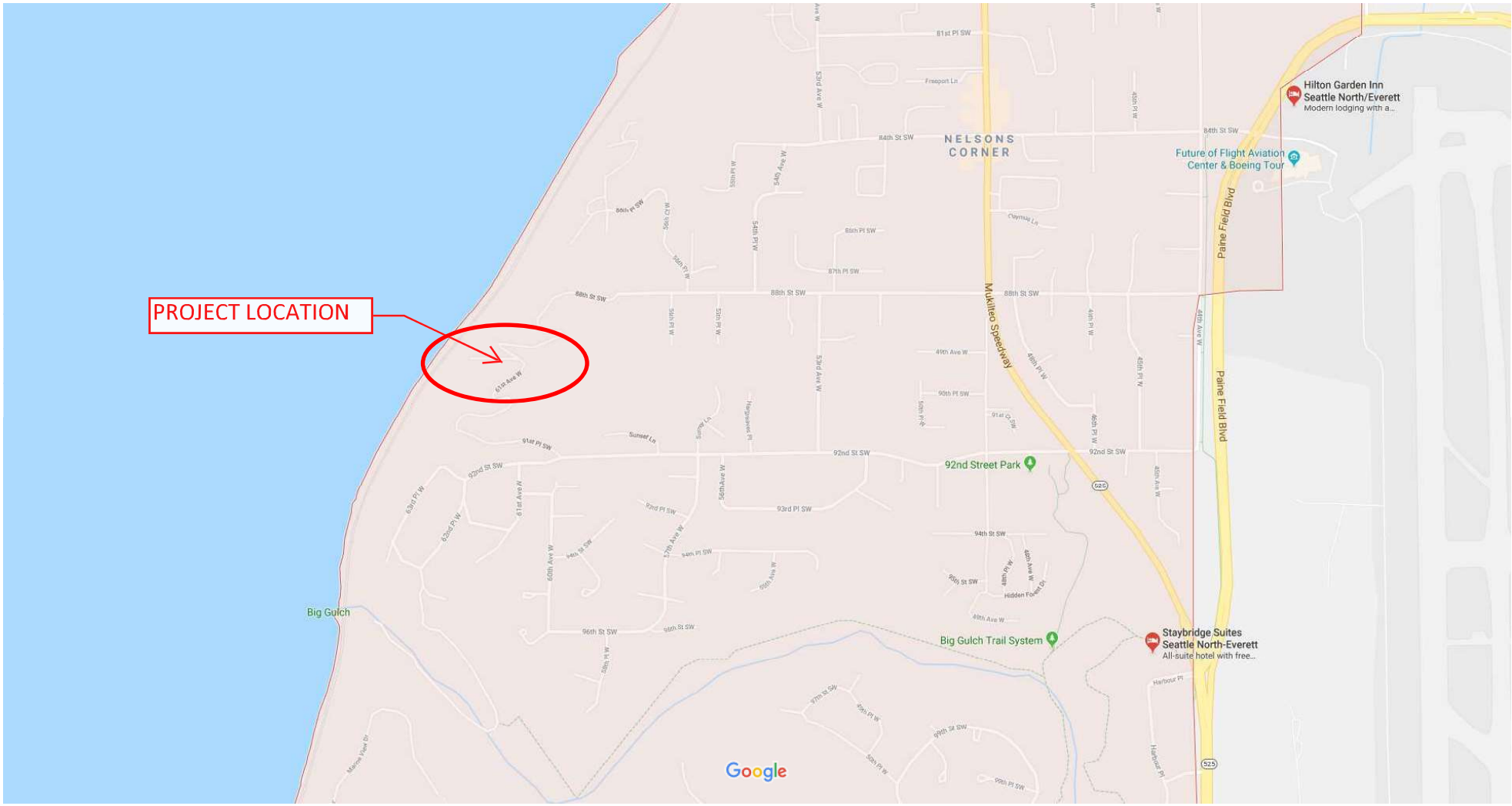
5 APPENDIX

APPENDIX A - VICINITY MAP
APPENDIX B – SOIL INFORMATION
APPENDIX C – SITE STORMWATER PLAN
APPENDIX D – BMP DESIGN

APPENDIX A - VICINITY MAP

Google Maps Mukilteo

VICINITY MAP



Mukilteo
Washington

APPENDIX B – SOIL INFORMATION

associated earth sciences incorporated

April 16, 2015
Project No. EE140704A

Tuttle Engineering and Management
275 West Rio Vista Avenue, Suite 1
P.O. Box 1547
Burlington, Washington 98233

Attention: Mr. John R. Tuttle

Subject: Subsurface Exploration and Geotechnical Assessment
61st Place West Culvert Replacement
Mukilteo, Washington

Dear Mr. Tuttle:

Associated Earth Sciences, Inc. (AESI) is pleased to present this report describing our subsurface exploration and geotechnical assessment for the planned 61st Place West culvert replacement. Our services were completed in general accordance with our proposal dated January 6, 2015. Our report has been prepared for the exclusive use of Tuttle Engineering and Management, and their agents, for specific application to this project. Within the limitations of scope and schedule, our services have been performed in accordance with generally accepted local geotechnical engineering practices in effect at the time our report was prepared. No other warranty, express or implied, is made.

PROJECT DESCRIPTION

The project site is located in the 8900 block of 61st Place West at the point where a small stream passes below the road through a corrugated metal culvert. The approximate location of the site is shown on the "Vicinity Map," Figure 1. It is our understanding that the culvert is undersized and has been prone to flooding and/or plugging. Conceptual plans for mitigation of this problem include replacing some or all of the existing culvert with a new, larger corrugated metal pipe (CMP) or a box culvert.

PURPOSE AND SCOPE

The purpose of our study was to characterize shallow subsurface conditions at the proposed culvert alignment, such that we can derive conclusions and geotechnical recommendations concerning support of the proposed CMP or box culvert. Our scope of work included the following tasks.

- Conducting a visual surface reconnaissance of the proposed culvert site and immediate vicinity.
- Advancing two exploration borings to depths 31½ feet below the existing ground surface near the south side of the culvert.
- Visual classification of all soil samples obtained from our exploration borings.
- Analysis of the field data to derive conclusions and recommendations in context with the proposed culvert.
- Preparation of this report.

Figure 2 illustrates the approximate locations of our exploration borings. Copies of the exploration logs are included in Appendix A.

SURFACE CONDITIONS

The stream corridor above and below the culvert is naturally forested and vegetated with thick brush. An undated topographic survey of the site was reviewed at the time of our study. Based on our field measurements and plan review, the existing culvert is approximately 55 feet long. Given the total fall along the length of the culvert of approximately 8 feet the average inclination of the culvert is approximately 14 percent. The embankment between the road surface and the culvert on the west (downstream) side of the road is approximately 10 feet high with an inclination of approximately 0.8H:1V (Horizontal:Vertical). The face of this embankment is constructed of concrete rubble. The existing culvert is approximately 24 inches in diameter.

SUBSURFACE EXPLORATION

Subsurface exploration for our study was conducted on March 23, 2015. The number, locations, and depths of the explorations were completed within site access and budgetary constraints. Our exploration procedures are described below. The various types of sediments, as well as the depths where characteristics of the sediments changed, are indicated on the exploration logs presented in Appendix A. The depths shown on the logs should be regarded as

only an approximation; the actual changes between sediment types are often gradational and/or undulating.

The conclusions and recommendations presented in this report are based, in part, on conditions encountered in the explorations completed for this study. Due to the nature of subsurface exploratory work, is necessary to interpolate and extrapolate soil conditions between and beyond the field explorations. Differing subsurface conditions could be present outside the area of the explorations due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations might not become fully evident until construction. If variations are observed at that time, it could be necessary to modify specific conclusions or recommendations in this report.

Exploration Borings

In order to evaluate subsurface conditions for the project, two exploration borings were drilled near the south side of the culvert, approximately where shown on Figure 2. The borings were drilled using a limited access, track-mounted hollow-stem auger drill rig. During drilling, soil samples were collected at depth intervals of approximately 2.5 to 5 feet using the standard penetration test (SPT) procedure in accordance with *American Society for Testing and Materials* (ASTM):D 1586. This test and sampling method consists of driving a standard, 2-inch outside-diameter, split barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N-Value"), or blow count. If a total of 50 blows is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The Standard Penetration Resistance provides a measure of the relative density of granular soils, or the relative consistency of cohesive soils; these values are plotted on the boring logs in Appendix A.

The exploration borings were continuously observed and logged by an AESI geologist. The samples obtained from the split-barrel, SPT samplers were classified in the field and representative portions placed in water-tight containers. The samples were then transported to our laboratory for further visual classification.

Stratigraphy

Sediments encountered generally consisted of loose/soft to medium stiff, silty fine sand and sandy silt. At the location of boring EB-1, these sediments were underlain at a depth of approximately 30 feet by very stiff to hard, laminated silt. More detailed descriptions of the

sediments encountered in our borings, organized from the youngest (shallowest) to oldest (deepest) sediment types are provided below.

Fill

Although no fill soils were encountered in our borings, fill associated with construction of the road and installation of the existing culvert and other underground utilities is known to underlie the project area. Although the composition and quality of the existing fill is unknown, given the elevation of the culvert on the downstream (west) side of the road relative to the road surface, the maximum thickness of the existing fill is anticipated to be approximately 10 feet thick. The fill embankment on the west (downstream) side of the road is faced with concrete rubble.

Slide Debris

Sediments encountered in the upper portions of both borings generally consisted of loose, silty to very silty fine sand with variable gravel content and soft to stiff, sandy silt with chunks of hard silt. These sediments contained variable quantities of wood debris throughout, including what appeared to be a log at a depth of approximately 29 to 30 feet in boring EB-1. We interpret these sediments to be representative of slide debris. At the location of boring EB-1 the slide debris extended to a depth of approximately 31 feet. At the location of boring EB-2, the slide debris extended beyond the maximum depth explored of approximately 31.5 feet.

Pre-Fraser Sediments

Sediments encountered below the slide debris in boring EB-1 generally consisted of very stiff to hard, laminated silt. These sediments were distinguished from the overlying slide debris by their high relative consistency and intact laminations. We interpret these sediments to be representative of sediments deposited prior to the most recent glaciation of the project region. The most recent glaciation of the project region, known as the Fraser Glaciation, ended approximately 12,500 years ago. At the location of boring EB-1, the pre-Fraser sediments extended beyond the maximum depth explored of approximately 31.5 feet.

Ground Water

Ground water was observed at the time of drilling in boring EB-1 at a depth of approximately 4.5 feet. The depth at which seepage was observed at this location appears to lie slightly below the elevation of the culvert invert adjacent to the upstream (east) side of the road. Exploration boring EB-2 was completed as a 1.5-inch-diameter monitoring well (monitoring well MW-1) to allow monitoring of the static ground water level at this location. The monitoring well was developed immediately following its installation using an inertial pump. Approximately 3 gallons of water were purged from the well during development. A static ground water level

of approximately 9.9 feet below ground surface was measured in the well on April 3, 2015, 11 days after well installation and development. The static ground water elevation is approximately equal to the invert elevation of the culvert on the downstream (west) side of the road. An electronic data logger was installed in the well subsequent to development to allow long-term monitoring of the ground water level at this location. At both boring locations, the sediments below the depth at which seepage was first observed appeared to remain saturated to the full depth explored.

CONCLUSIONS AND RECOMMENDATIONS

As previously discussed, conceptual plans call for replacing all or some of the existing culvert with either a new CMP culvert or a box culvert. Geotechnical recommendations for both of these options are discussed below.

Removal of the Existing Culvert

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 native sediments can be made at a maximum slope of 1.5H:1V (Horizontal:Vertical). Flatter inclinations are 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, temporary slopes should comply with appropriate state and federal regulations concerning maximum inclinations, and the contractor should be made responsible for worker safety as dictated by actual site conditions. Due to site constraints there might not be enough room to lay back the temporary slopes at the recommended inclination. Therefore temporary shoring will be required. Temporary shoring may consist of trench-box shoring or other approved mechanical methods. We do not recommend temporary slopes steeper than recommended above. The existing embankment material is variable and in a loose condition and could be unpredictable if attempts are made to over-steepen temporary cuts.

Embankment Stability

The existing embankment on the west (downstream) side of the road is constructed at an inclination of approximately 0.8H:1V over a height of approximately 10 feet. The face of the embankment is predominantly recycled concrete pieces that are stacked allowing some over steepening. Although in our opinion no fill was encountered in our explorations and its composition is therefore unknown, it is likely that the stability of the embankment is fairly low given its height and inclination. We do not infer an imminent risk of slope failure under the

existing conditions; however the embankment could become less stable if there is a significant change in prevailing conditions, such as increased traffic loading, precipitation, snowmelt, or river flow. Recommendations regarding minimum inclination for structural fill slopes are provided in the "Structural Fill" section of this report.

CMP Culvert

To successfully support the overlying road embankment fill, a CMP culvert will transfer the vertical soil overburden stresses to the sides of the pipe (haunches) by slightly flattening from its initial shape. Thus, good compaction of fill soils placed around the haunches of the pipe is critical to prevent excessive lateral movement of the pipe, and a decrease of vertical support. It is difficult to obtain good compaction of fill placed beneath the curved mid line (spring line) of the pipe. Therefore, we recommend that the culvert pipe utilize pea gravel bedding up to the spring line of the pipes. Structural fill should be used for culvert backfill above the spring line of the pipe. The structural fill should be placed and compacted in accordance with the criteria defined below in the "Structural Fill" section of this report.

In order to reduce the potential for surface water from migrating through the backfill around the pipe, potentially resulting in long-term undermining of the pipe and overlying road, we recommend that backfill placed within 4 feet of the inlet or headwall to the culvert consist of a low permeability seepage collar consisting of controlled density fill (CDF).

Structural Fill

After overexcavation/stripping has been completed, the upper 12 inches of 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 recompaction of the exposed ground is tested and approved, or a free-draining rock course is laid, structural fill may be placed to attain desired grades.

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:D 1557 as the standard. Roadway and 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 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.

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. The natural on-site sediments contain a high percentage of fine-grained material. At the time of our exploration, the moisture contents of these sediments were well above the optimum for achieving suitable compaction. Portions of these sediments also contained abundant wood debris. For this reason, the natural sediments underlying the site are not considered suitable for use as structural fill.

Construction equipment traversing the site when the on-site soils are very moist or wet can cause considerable disturbance. If fill is placed during wet weather or if proper compaction 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.

All backfill material placed around and over the new culvert should comply with the manufacturer's recommendations. To reduce the need for rigorous backfill compaction, which could potentially distort the culvert, a uniformly graded gravel is generally recommended for culvert backfill.

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 inspect 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.

Box Culvert

Foundation Support

The existing fill and slide debris sediments underlying the site are not suitable for foundation support. Accordingly, we recommend that a deep foundation system consisting of small-diameter, driven pipe piles be used for support of the proposed box culvert. Recommended pipe pile capacities are given below in Table 1.

Table 1
Recommended Pipe Pile Capacities

Nominal Pipe Diameter	Minimum Wall Thickness	Minimum Hammer Size	Allowable Axial Capacity	Driving Time (seconds/inch)
2-inch	Schedule 80	90 lb. jackhammer	4 kips	60
3-inch	Schedule 40	850 foot-lbs.	12 kips	12
4-inch	Schedule 40	1500 foot-lbs.	20 kips	12
6-inch	Schedule 40	1500 foot-lbs.	30 kips	16

In order for the stated pile capacities to apply, the pipe piles should be driven to refusal, which is defined as less than 1 inch of penetration during the specified period of continuous driving. The pipe piles should also completely penetrate the existing fill and slide debris. At the location of boring EB-1, the slide debris extended to a depth of approximately 31 feet. At the location of boring EB-2, the bottom of the slide debris was not encountered within the maximum depth explored of approximately 31.5 feet. No lateral capacity would be provided by vertically installed pipe piles. Lateral capacity could be attained through the use of batter piles. An AESI representative must observe installation of all pipe piling.

Erosion Considerations

As previously discussed, the average inclination of the existing culvert is approximately 14 percent. Given that the existing culvert has been periodically overwhelmed, it is apparent that heavy flows can occur in the stream during peak flow events. The natural sediments underlying the site consist of loose, silty, fine sand and soft to stiff, sandy silt. These sediments are highly sensitive to erosion and down-cutting when exposed to concentrated flows. The anticipated heavy flow and steep inclination of the flow path have the potential to result in accelerated erosion and scour of the exposed stream bed inside the box culvert. Mitigation of stream scour inside the box culvert could be achieved using a system of check dams and/or coarse aggregate, possibly in conjunction with a geotextile. More specific recommendations regarding mitigation of stream scour could be provided by AESI once maximum stream volume and velocity has been determined.

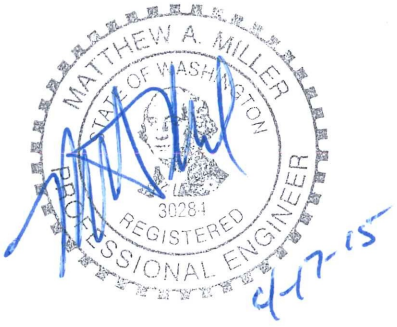
Construction Monitoring

AESI is available to provide field monitoring and consultation during the new culvert installation. Our geotechnical services could include observation of pile installation, evaluation of fill placement, and review of material submittals.

CLOSURE

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report or other geotechnical aspects of the project, please call us at your earliest convenience.

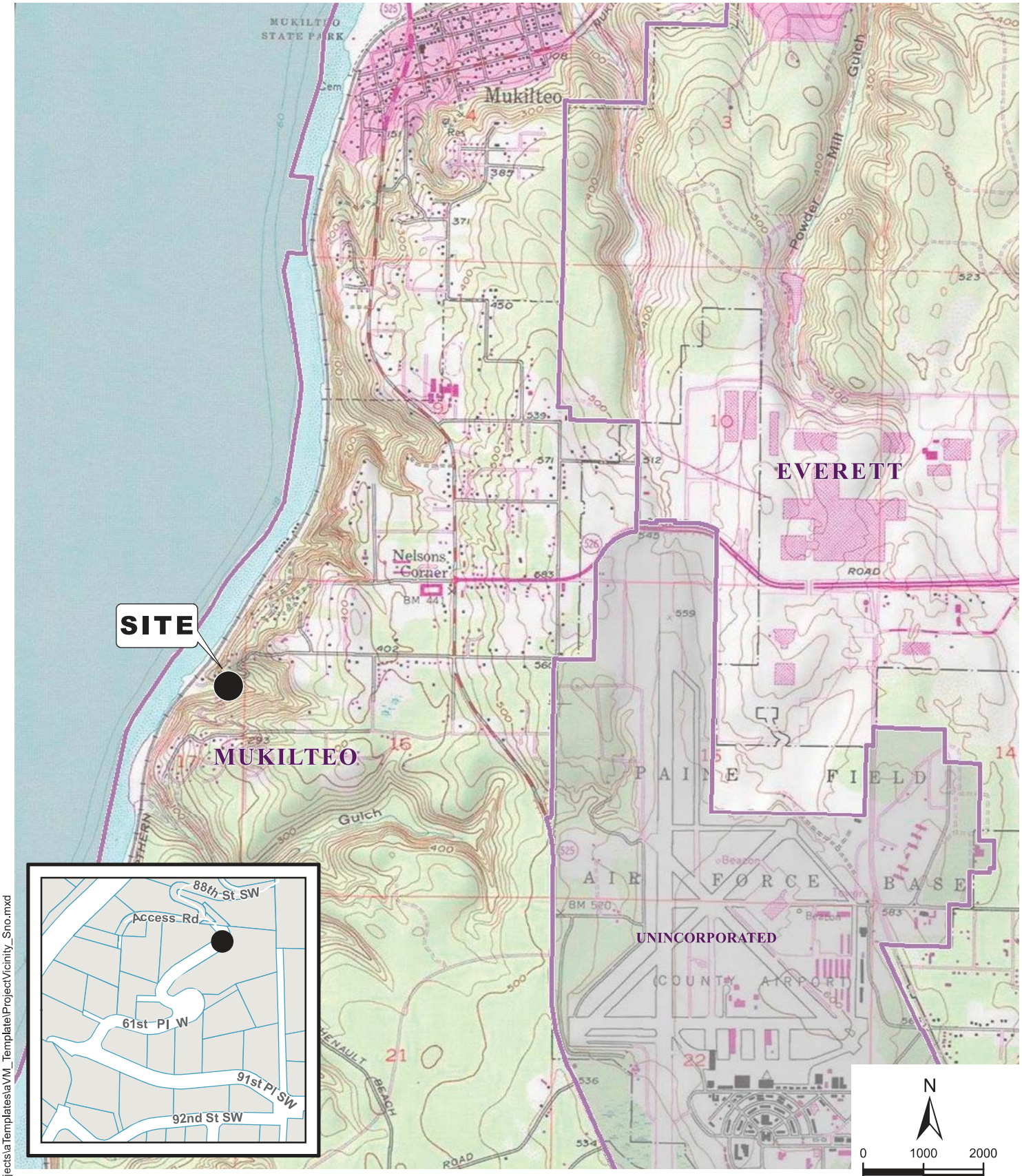
Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Everett, Washington



Timothy J. Peter, L.G., L.E.G., L.Hg.
Senior Project Geologist

Mathew A. Miller, P.E.
Principal Engineer

Attachments:
Figure 1: Vicinity Map
Figure 2: Site and Exploration Sketch
Appendix A: Exploration Boring Logs



REFERENCE: USGS, SNOHOMISH CO

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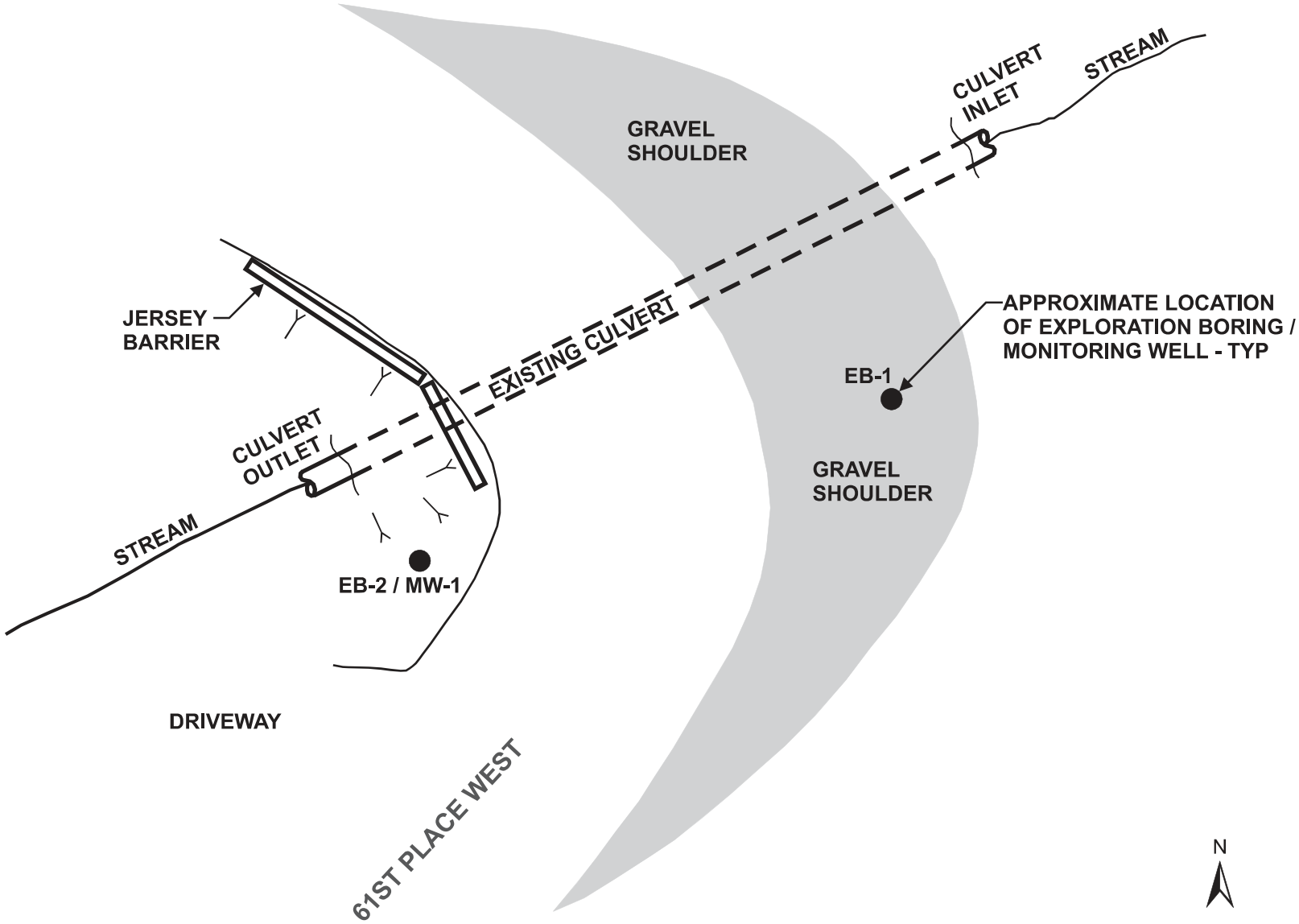
VICINITY MAP

61ST PLACE CULVERT REPLACEMENT
MUKILTEO, WASHINGTON

FIGURE 1

DATE 4/15

PROJ. NO. EE140704A



REFERENCE: SKETCH

140704 61st Place West Culvert \ 140704 F2 Site and Exploration Plan.cdr

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SITE AND EXPLORATION SKETCH

61ST PLACE WEST CULVERT
MUKILTEO, WASHINGTON

FIGURE 2
DATE 4/15
PROJ. NO. EE140704A

APPENDIX A

Exploration Boring 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 [5]	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 [5]	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 [5]	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 [5]	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 [2] 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 [2] 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)

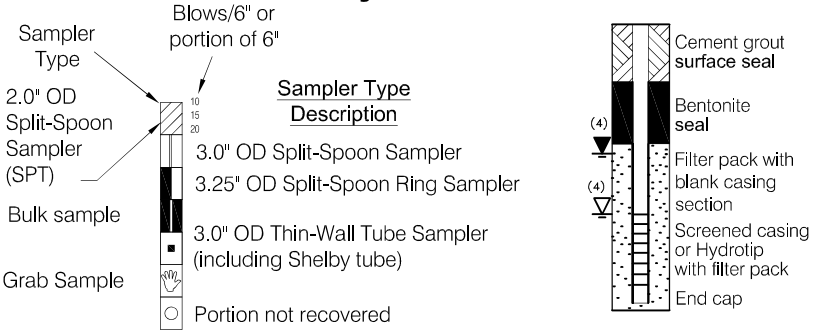
[3] Estimated Percentage

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



(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
▼ ATD = At time of drilling
▽ Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 12%

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.

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Exploration Log

Project Number	Exploration Number	Sheet
EE140704A	EB-1	1 of 1

Project Name	61st Place West Culvert	Ground Surface Elevation (ft)	Unknown
Location	Mukilteo, WA	Datum	N/A
Driller/Equipment	Geologic Drill / Mini Track	Date Start/Finish	3/23/15,3/23/15
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	6 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Slide Debris					
		S-1		Very moist, brownish gray, gravelly, silty to very silty SAND; stratified (SM).		▼	6 5 5	▲10	
5		S-2		Wet, brown to gray, sandy to very sandy SILT, moderately abundant organics (ML).			1 1 1	▲2	
		S-3		Wet, gray, silty to very silty SAND (SM).			1 3 3	▲6	
10		S-4		Wet, greenish gray, fine sandy SILT (SM).			1 3 7	▲10	
				Wet, gray, gravelly, silty SAND (SM).					
15		S-5		Contains lenses of silt and gravel; scattered pieces of wood.			4 21 19	▲40	
20		S-6		Wet, gray, SILT, some fine sand, scattered pieces of wood (ML).			4 5 8	▲13	
25		S-7		Contains pieces of hard silt. Wood in tip of sampler. (Smooth drilling action to 30 feet.) (Difficult drilling 29 to 30 feet - wood?)			5 7 10	▲17	
30		S-8		Wet, gray, gravelly, silty SAND (SM). Abundant shredded wood debris in upper portion of sampler.			4 9 15	▲24	
				Pre-Fraser Sediments					
				Wet, gray, coarse SILT; laminated (ML).					
				Bottom of exploration boring at 31.5 feet					

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: TJP
Approved by: JNS

AESIBOR 140704.GPJ April 6, 2015

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Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
EE140704A	EB-2 / MW-1	1 of 1

Project Name	61st Place West Culvert	Location	Mukilteo, WA
Elevation (Top of Well Casing)	Unknown	Surface Elevation (ft)	Unknown
Water Level Elevation	Unknown	Date Start/Finish	3/23/15,3/23/15
Drilling/Equipment	Geologic Drill / Mini Track	Hole Diameter (in)	7 inches
Hammer Weight/Drop	140# / 30"		

Depth (ft)	WELL CONSTRUCTION	ST	Blows/6"	DESCRIPTION
	Flush mount monument J-Plug Concrete seal 0 to 1.5 feet			**Slide Debris**
	Bentonite chips 1.5 to 4 feet		2 2 2	Very moist, brown, fine sandy SILT, abundant roots (ML).
5	1.5-inch I.D. PVC casing: 0 to 5 feet		2 2 2	Very moist, brown, silty to very silty fine SAND, some gravel, trace organics (SM).
	10/20 Silica sand 4 to 16 feet		9 10 9	Becomes gray. Abundant wood debris (most of sample is wood debris).
10			2 1 2	Becomes wet, uniformly very silty, trace wood. (Gravelly drilling action.)
15	Slip cap 1.5-inch I.D. PVC well screen: 0.010-inch slot width, 5 to 15 feet Bentonite chips 16 to 25 feet		5 3 4	Contains gravelly lenses.
20			5 6 5	Becomes gravelly throughout. Becomes brown (fine organics) from 20.5 to 21 feet
25	Caved material		2 4 7	Wet, gray, fine sandy SILT, some gravel (fractured), trace organics; contains pieces of hard silt (ML).
30			1 3 3	Becomes greenish gray; contains wood and other fine organic; contains pieces of hard silt.
	Well tag #BAH-914			Boring terminated at 31.5 feet. Well completed at 15 feet on 3/23/15.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level (4/3/15)
- Water Level at time of drilling (ATD)

Logged by: TJP

Approved by: JNS

NWWELL- B 140704.GPJ BORING.GDT 4/6/15

APPENDIX C – SITE STORMWATER PLAN

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CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

90% DESIGN REVIEW SET – DECEMBER 2018

SHEET INDEX

SHT. NO.	DESCRIPTION
C1	TITLE SHEET, VICINITY MAP, AND SHEET INDEX
~~C2~~	~~SUMMARY OF QUANTITIES~~
C3	OVERALL IMPROVEMENTS PLAN
C4	CITY NOTES, LEGEND, AND ABBREVIATIONS
C5	EXISTING CONDITIONS, SITE PREPARATION, AND EROSION CONTROL PLAN
C6	EXISTING CONDITIONS, SITE PREPARATION, AND EROSION CONTROL PLAN
C7	STORMWATER POLLUTION PREVENTION PLAN
C8	STREAM AND CULVERT PLAN AND PROFILE
C9	STREAM AND CULVERT PLAN AND PROFILE
~~C10~~	~~STREAM CROSS SECTIONS AND DETAILS~~
~~C11~~	~~STRUCTURAL WALL PLAN AND PROFILES~~
~~C12~~	~~STRUCTURAL WALL DETAILS~~
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C14	ROAD AND STORM PLAN AND PROFILE
C15	PROJECT DETAILS AND NOTES
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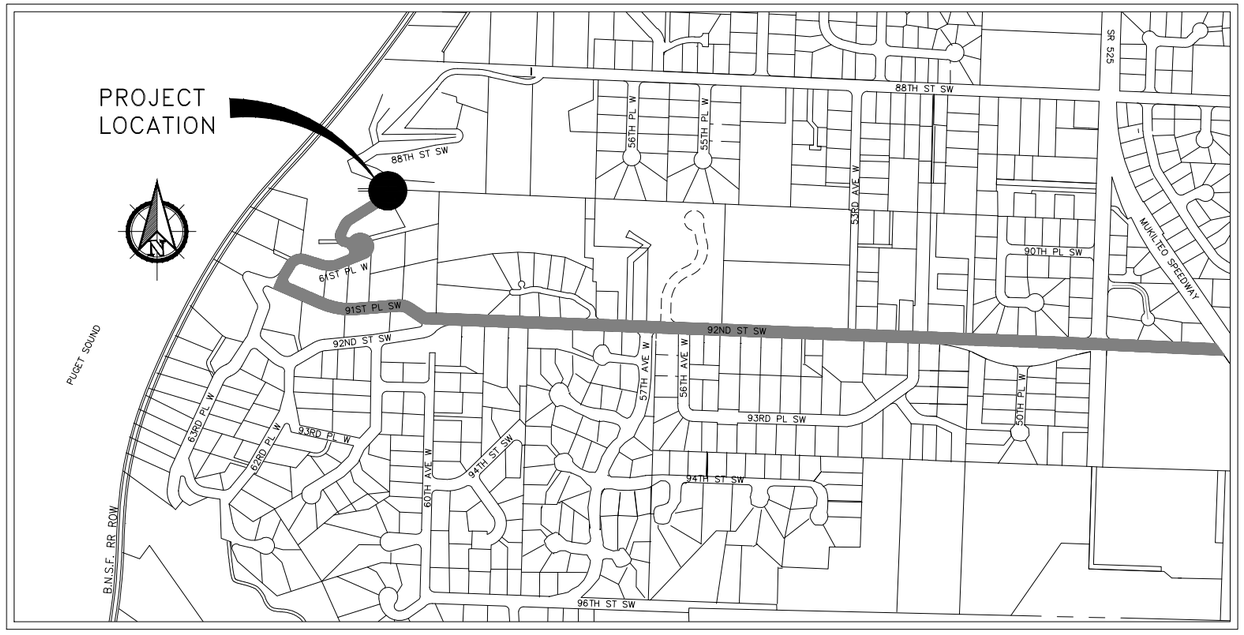
~~C18~~	~~HORIZONTAL ALIGNMENT PLAN~~
~~S1~~	~~RIGHT OF WAY AND SURVEY CONTROL~~
~~T1~~	~~PLANTING PLAN~~
~~T2~~	~~PLANTING PLAN~~
~~T3~~	~~PLANTING DETAILS~~



VICINITY MAP
SECTION 17, TWP. 28N., RGE. 04E., W.M.
NOT TO SCALE

CITY OF MUKILTEO EXECUTIVE STAFF

MAYOR
JENNIFER GREGERSON

CITY COUNCIL
BOB CHAMPION – COUNCIL MEMBER
CHRISTINE COOK – COUNCIL MEMBER
RICHARD EMERY – COUNCIL MEMBER
SARAH KNELLER – COUNCIL MEMBER
ANNA ROHRBOUGH – COUNCIL MEMBER
STEVE SCHMALZ – COUNCIL MEMBER
SCOTT WHELPLEY – COUNCIL MEMBER

PUBLIC WORKS DIRECTOR
MICK MATHESON, P.E.

CITY CLERK
JANET KEEFE

PROJECT DESCRIPTION

THIS CONTRACT PROVIDES FOR IMPROVEMENT OF AN EXISTING, DEFICIENT STREAM CROSSING WITH A NEW BOX CULVERT, IMPROVING BOTH STREAM FUNCTION AND ADJACENT ROADWAY CONDITIONS IN THE WESTERN PORTION OF THE CITY OF MUKILTEO. THE EXISTING 54–FOOT LONG, 24–INCH DIAMETER METAL CULVERT WILL BE REMOVED AND REPLACED WITH A NEW 40–FOOT LONG, 8.0–FOOT WIDE BY 6.8–FOOT TALL CONCRETE BOX CULVERT. THE PROJECT WILL ALSO RECREATE 320 LINEAR FEET OF STREAM CHANNEL, CONSTRUCT RETAINING WALLS, RELOCATE EXISTING UTILITIES, AND RECONSTRUCT THE EXISTING ROADWAY. WORK INVOLVES REMOVAL OF CERTAIN EXISTING SITE FEATURES; CLEARING AND GRUBBING; ROADWAY AND CHANNEL EXCAVATION; STRUCTURE EXCAVATION AND INSTALLATION OF A BOX CULVERT AND FOUNDATION; CONSTRUCTING STACKED, STONE–FILLED BLOCK RETAINING WALLS; GRADING WITH GRAVEL BORROW AND CRUSHED SURFACING; INSTALLING A STORM DRAINAGE COLLECTION AND CONVEYANCE SYSTEM FOR ROADWAY RUNOFF AND GROUNDWATER; INSTALLING CONCRETE GUTTERS; PAVING WITH HMA; INSTALLING GUARDRAIL; INSTALLING PLANTINGS FOR MITIGATION OF DISTURBANCES CREATED DURING CONSTRUCTION WITHIN STREAM RECREATION AREAS; PERMANENT SIGNING; EROSION CONTROL BEST MANAGEMENT PRACTICES; RESTORING OFF–ROADWAY VEGETATED AREAS; AND OTHER WORK, ALL IN ACCORDANCE WITH THE ATTACHED CONTRACT PLANS, THESE CONTRACT PROVISIONS, AND THE STANDARD SPECIFICATIONS.

CALL TWO BUSINESS DAYS BEFORE YOU DIG

811 Know what's below. 811 before you dig.

CONTACT PERSONNEL

CONTACT NAME	AGENCY	PHONE
ANDREA SWISSTACK	CITY OF MUKILTEO	(425) 263–8081
JOHN R. TUTTLE	TUTTLE ENGINEERING AND MANAGEMENT	(360) 899–5953
CASEY BROWN	COMCAST	(425) 263–5345
JEANNE COLEMAN	PUGET SOUND ENERGY	(425) 424–6876
ANDREW RIFE	PUBLIC UTILITIES DISTRICT	(425) 783–8559
RICK MATTHEWS	MUKILTEO WATER DISTRICT (WATER)	(425) 355–3355
ROGER DARLING	MUKILTEO WATER DISTRICT (SEWER)	(425) 355–3355
TIM RENNICK	FRONTIER (FORMERLY VERIZON)	(425) 263–4025

APPROVED FOR CONSTRUCTION:

MICK MATHESON, P.E.
CITY PUBLIC WORKS DIRECTOR

DATE

TUTTLE ENGINEERING AND MANAGEMENT
275 WEST RIO VISTA AVENUE, SUITE 1 BURLINGTON, WA 98233
O: (360) 899-5953 | W: WWW.TUTTLE-TEAM.COM

Constructed By: Date:

Aerial Mapping & Control Survey Firm: Date: Field BK/PG: OS Cntl Pnts:

Recorded Survey: SNOHOMISH COUNTY AF– _ Vol/Bk Page

Surveyed By: ASPI Date: MAY 2015 Field Bk/Pg: Datum: NAVD '88

Drawn By: TTH Checked By: JRT

XREF Filename: Filename:

NO.	DATE	BY	REVISION

PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: — Vert: —
Designed By: JRT
Inspected By:
W.O. No.:
Date: 12–07–2018

CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT
11930 Cyrus Way Mukilteo, Washington 98275
OFFICE: 425–263–8000 FAX: 425–290–1009
https://mukilteowa.gov

JOHN RAYMOND TUTTLE STATE OF WASHINGTON 43718 REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

TITLE SHEET, VICINITY MAP, AND SHEET INDEX

SHEET NO. C1

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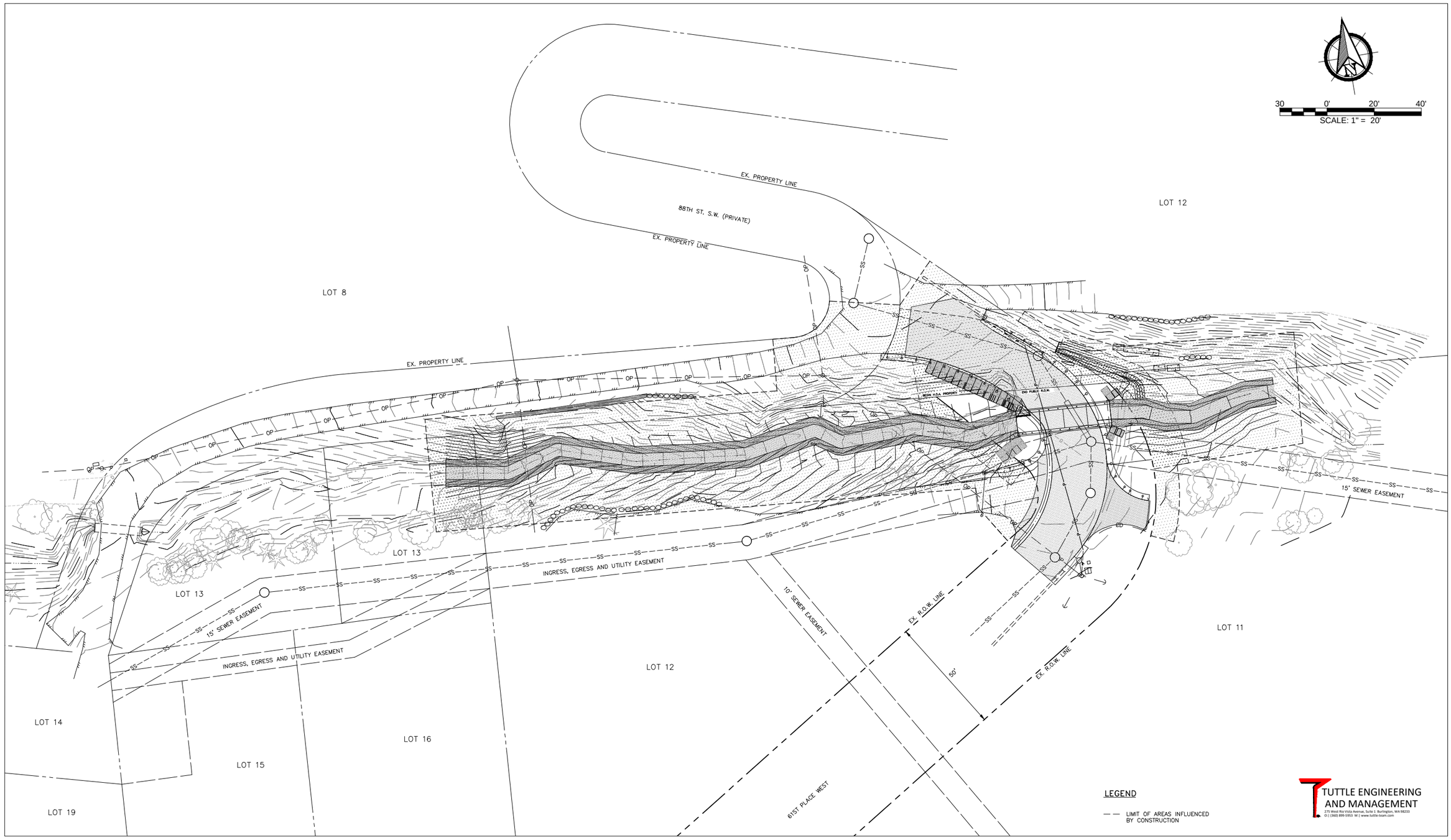

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GIS Cntl Pnts:

Recorded Survey:
SNOHOMISH COUNTY
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ASPI
Date: MAY 2015
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Datum: NAVD 88

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Checked By:
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NO.	DATE	BY	REVISION

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CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT

11930 Cyrus Way Mukilteo, Washington 98275
OFFICE: 425-263-8000 FAX: 425-290-1009
https://mukilteowa.gov

JOHN RAYMOND TUTTLE
STATE OF WASHINGTON
43718
REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

OVERALL IMPROVEMENTS PLAN

SHEET NO.
C3

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APPENDIX B - CONSTRUCTION NOTES

B.1 GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT CITY OF MUKILTEO DEVELOPMENT STANDARDS; THE CURRENT EDITION OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION; AND THE ADOPTED EDITION OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
2. ALL WORK WITHIN THE CITY RIGHT-OF-WAY SHALL BE SUBJECT TO THE INSPECTION OF THE CITY.
3. PRIOR TO ANY SITE CONSTRUCTION INCLUDING CLEARING/LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER OR PROJECT BIOLOGIST) AS REQUIRED BY THESE PLANS. THE CONTRACTOR SHALL CONTACT THE CITY TO OBTAIN THE NAME AND PHONE NUMBER OF THE PROJECT SURVEYOR RESPONSIBLE FOR DELINEATING THESE LIMITS.
4. THE CONTRACTOR IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE CITY. FOR INFORMATION, THE CONTRACTOR SHALL CONTACT THE PROJECT MANAGER (ANDREA SWISSTACK, 425-263-8081) OR THE PROJECT BIOLOGIST (BRAD THIELE, 206-634-9193).
5. PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE CITY OF MUKILTEO PLANNING & COMMUNITY DEVELOPMENT AT 425-263-8000 TO SCHEDULE A PRECONSTRUCTION CONFERENCE.
6. DATA TO SUPPORT CREATION OF AS-BUILT DRAWINGS WILL BE COLLECTED BY THE CONTRACTOR TO DOCUMENT INSTALLATION AND ANY PLAN CHANGES MADE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL KEEP A SET OF PLANS ON-SITE AT ALL TIMES FOR RECORDING AS-BUILT INFORMATION. THIS SET SHALL BE SUBMITTED TO THE PROJECT MANAGER AT COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL ACCEPTANCE OF WORK
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS FOR UTILITY, ROAD, AND RIGHT-OF-WAY CONSTRUCTION.
9. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPP) FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPP PLANS PRIOR TO ANY GRADING OR LAND CLEARING ACTIVITIES. AN INSPECTION BY THE CITY OF THESE FACILITIES SHALL BE ARRANGED FOR BY THE CONTRACTOR PRIOR TO ANY GRADING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR EROSION HAS PASSED.
10. SEDIMENT-LADEN WATER SHALL NOT ENTER THE NATURAL DRAINAGE SYSTEM.
11. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) OR SWPPP SUPERVISOR SHALL BE RESPONSIBLE FOR MAINTAINING THE CONSTRUCTION SWPP FACILITIES, AS OUTLINED IN THE APPROVED SWPPP, OR AS MODIFIED FROM TIME TO TIME. CONTACT INFORMATION FOR THE CESCL (OR SWPPP SUPERVISOR) FOR THE PROJECT SHALL BE GIVEN TO THE CITY BY THE CONTRACTOR AT THE PRECONSTRUCTION CONFERENCE.
12. NONCOMPLIANCE WITH THE REQUIREMENTS FOR EROSION CONTROLS, WATER QUALITY, AND CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVALS, AND BOND FORECLOSURES.
13. TRENCH BACKFILL OF NEW UTILITIES AND STORM DRAINAGE FACILITIES SHALL BE COMPACTED TO 95% MAXIMUM DENSITY (MODIFIED PROCTOR) UNDER ROADWAYS AND 90% MAXIMUM DENSITY (MODIFIED PROCTOR) OFF ROADWAYS. COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) AND 2-03.3(14)D OF THE WSDOT STANDARD SPECIFICATIONS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF UTILITIES SHOWN ON CONSTRUCTION PLANS ARE BASED ON BEST RECORDS AVAILABLE AND ARE SUBJECT TO VARIATION. FOR ASSISTANCE IN UTILITY LOCATION, CALL 811.
15. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER WHEN CONFLICTS EXIST BETWEEN THE PLANS AND FIELD CONDITIONS. CONFLICTS SHALL BE RESOLVED (INCLUDING PLAN AND PROFILE REVISIONS) AND RESUBMITTED FOR APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.
16. A RIGHT-OF-WAY PERMIT AND APPROVAL OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE OBTAINED FROM THE CITY PRIOR TO ANY ON-SITE GRADING.

B.2 SITE GRADING AND CONSTRUCTION SWPPP NOTES

1. PRIOR TO ANY SITE WORK, INCLUDING CLEARING, LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR AS REQUIRED BY THESE PLANS. THE CONTRACTOR SHALL CONTACT THE CITY TO OBTAIN THE NAME AND PHONE NUMBER OF THE PROJECT SURVEYOR .
2. SOILS IN MUKILTEO OFTEN CONTAIN FINER PARTICLES WHICH WILL PASS THROUGH SEDIMENT TRAPS UNTREATED AND HAVE EXTREMELY LONG SETTLING TIMES. THEREFORE, THE NEED TO CONTROL EROSION FROM THE SITE IS THE FIRST PRIORITY AND IS EMPHASIZED BY THESE NOTES.
3. STOCKPILES ARE TO BE LOCATED IN SAFE AREAS AND ADEQUATELY PROTECTED BY TEMPORARY SEEDING AND MULCHING, OR PERIMETER BMP.
4. THE PROJECT WILL DISTURB MORE THAN ONE (1) ACRE OF LAND, THUS A CONSTRUCTION NPDES PERMIT IS REQUIRED AND A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE ASSIGNED TO THE SITE.
5. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARDS.
6. THE SURFACE OF ALL SLOPES SHALL BE COMPACTED. THIS MAY BE ACCOMPLISHED BY OVER-BUILDING THE SLOPES, THEN CUTTING BACK TO FINAL GRADES; OR BY COMPACTING EACH LIFT AS THE SLOPE IS BEING CONSTRUCTED. ALL SLOPES SHALL BE COMPACTED BY THE END OF EACH WORKING DAY.
7. A WET WEATHER EROSION CONTROL PLAN MUST BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON OR BEFORE SEPTEMBER 1, IF THE PROJECT IS PROPOSING TO ACTIVELY CLEAR, GRADE, OR OTHERWISE DISTURB 1,000 SQUARE FEET OR MORE OF SOIL DURING THE PERIOD BETWEEN OCTOBER 1 AND APRIL 30. OTHER THRESHOLDS FOR A WET WEATHER EROSION CONTROL PLAN INCLUDE PROJECTS THAT:
   A. HAVE AN AREA OR AREAS THAT DRAIN, BY PIPE, OPEN DITCH, SHEET FLOW, OR A COMBINATION OF THESE TO A TRIBUTARY WATER, AND THE TRIBUTARY WATER IS ONE-QUARTER MILE OR LESS DOWNSTREAM; OR
   B. HAVE SLOPES STEEPER THAN 15 PERCENT ADJACENT OR ON-SITE; OR
   C. HAVE HIGH POTENTIAL FOR SEDIMENT TRANSPORT; OR
   D. HAVE A CRITICAL AREA OR CRITICAL AREA BUFFER ON-SITE, OR WITHIN 50 FEET OF THE SITE;
   E. OR HAVE HIGH GROUNDWATER TABLE OR SPRINGS.

B.3 TEMPORARY SEEDING GENERAL NOTES

1. USE SEEDING THROUGHOUT THE PROJECT ON DISTURBED AREAS THAT HAVE REACHED FINAL GRADE OR THAT WILL REMAIN UNWORKED FOR MORE THAN 30 DAYS.
2. THE OPTIMUM SEEDING WINDOWS ARE APRIL 1 THROUGH JUNE 30 AND SEPTEMBER 1 THROUGH OCTOBER 1.
3. BETWEEN OCTOBER 1 AND MARCH 30 SEEDING REQUIRES A COVER OF MULCH WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
4. REVIEW ALL DISTURBED AREAS IN LATE AUGUST TO EARLY SEPTEMBER AND COMPLETE ALL SEEDING BY THE END OF SEPTEMBER.
   A. MULCH IS REQUIRED AT ALL TIMES FOR SEEDING. MULCH CAN BE APPLIED ON TOP OF THE SEED OR SIMULTANEOUSLY BY HYDROSEEDING (SEE ECOLOGY BMP C121 MULCHING FOR SPECIFICATIONS).
   B. SEED AND MULCH ALL DISTURBED AREAS NOT OTHERWISE VEGETATED AT FINAL SITE STABILIZATION.

B.4 MAINTENANCE OF SILTATION BARRIERS

1. SILTATION BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED EROSION CONTROL ELEMENTS, ESPECIALLY END-RUNS AND SEDIMENT BUILD-UP. NECESSARY REPAIRS TO BARRIERS SHALL BE ACCOMPLISHED THE SAME DAY.
2. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RAINFALL. SEDIMENT DEPOSITS MUST BE REMOVED WHEN THE SEDIMENT LEVEL REACHES APPROXIMATELY ONE-HALF THE SILTATION BARRIER HEIGHT.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE CHECK DAM IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

B.5 STORM DRAINAGE GENERAL NOTES

1. ALL PIPE SHALL BE PLACED ACCORDING TO DIVISION 7 OF THE WSDOT STANDARD SPECIFICATIONS.
2. BACKFILL SHALL BE PLACED EQUALLY ON BOTH SIDES OF THE PIPE. EACH LIFT SHALL BE THOROUGHLY COMPACTED. COMPACTED LIFTS MUST EXTEND TO THE SIDE OF THE TRENCH. BACKFILL OVER THE PIPE SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 7-08.3(3) THE WSDOT STANDARD SPECIFICATIONS.
3. ALL GRATES LOCATED IN THE GUTTER FLOW LINE (INLET AND CATCH BASIN) SHALL BE DEPRESSED 0.1 FEET BELOW A PROJECTED FLOW LINE ELEVATION, EXCEPT FOR STRUCTURES REQUIRING SOLID LIDS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL MANHOLE, INLET AND CATCH BASIN FRAMES AND GRATES TO GRADE JUST PRIOR TO CURB INSTALLATION AND/OR PAVING.
5. VANED GRATES ARE REQUIRED ON ALL STORM STRUCTURES. ALL CATCH BASINS AND MANHOLES SHALL HAVE LOCKING LIDS. ROLLED GRATES ARE NOT APPROVED FOR USE.
6. POLYPROPYLENE SAFETY STEPS AND LADDER STEPS SHALL BE PROVIDED IN ALL MANHOLES AND SHALL BE POSITIONED CORRECTLY WITH THE BOLT AREAS ON THE RIM.
7. CATCH BASIN FRAMES AND GRATES SHALL BE OLYMPIC FOUNDRY MODEL SM60, SM52, OR SM44, LOCKING TYPE OR EQUIVALENT. MODEL SM52 SHALL BE REFERRED TO AS A "THRU-CURB INLET" ON THE PLANS.
8. PRIOR TO SIDEWALK CONSTRUCTION; BACK OF WALL DRAIN LINES OR ANY BEHIND THE SIDEWALK DRAINS MUST BE INSTALLED AS REQUIRED. PIPE SHALL BE PVC 3034, OR SDR-35. LOCATIONS OF THESE INSTALLATIONS SHALL BE SHOWN ON THE AS-BUILT CONSTRUCTION PLANS SUBMITTED TO THE CITY.
9. STORMWATER DETENTION FACILITIES, STORM PIPING, AND CATCH BASINS SHALL BE FLUSHED AND CLEANED BY THE CONTRACTOR PRIOR TO:
   A. CITY OF MUKILTEO FINAL ACCEPTANCE OF THE PROJECT AND;
   B. UPON COMMENCEMENT AND COMPLETION OF THE WARRANTY PERIOD. AN INVOICE DETAILING THE FLUSHING AND CLEANING SHALL BE PROVIDED TO THE CITY.
11. ALL PIPES SHALL BE INSTALLED WITH RUBBER GASKETS AS PER MANUFACTURER'S RECOMMENDATIONS.
12. UPON REQUEST BY THE CITY INSPECTOR, ALL PIPE RUNS SHALL PASS THE LOW PRESSURE AIR TEST REQUIREMENTS OF SECTION 7-04.3(1) E AND F OF THE WSDOT STANDARD SPECIFICATIONS. PIPE RUNS SHALL BE TESTED WITH PIPE LOADED AND COMPACTED TO FINISH GRADE.
13. UPON REQUEST BY THE CITY INSPECTOR, PIPE SHALL BE SUBJECT TO MANDREL TESTING (MANDREL SIZE = 90% OF NOMINAL PIPE DIAMETER).
14. PIPE SHALL BE STORED ON-SITE IN SHIPPING BUNKS ON A FLAT LEVEL SURFACE. THIS REQUIREMENT WILL BE STRICTLY ENFORCED. FAILURE TO COMPLY MAY RESULT IN REJECTION OF THE PIPE AND/OR FUTURE RESTRICTION ON USE OF MATERIAL.
15. COUPLINGS SHALL BE INTEGRAL BELL AND SPIGOT OR DOUBLE BELL SEPARATE COUPLINGS. SPLIT COUPLINGS WILL NOT BE ALLOWED.
16. ALL NON-PERFORATED METAL PIPE SHALL HAVE NEOPRENE GASKETS AT THE JOINTS. O-RING GASKETS MAY BE USED FOR TYPE-F COUPLING BANDS.
17. CULVERT ENDS SHALL BE BEVELED TO MATCH SIDE SLOPES. FIELD CUTTING OF CULVERT ENDS IS PERMITTED WHEN APPROVED BY THE CITY.
18. ALL FIELD CUT CULVERT PIPE SHALL BE TREATED AS REQUIRED IN THE STANDARD SPECIFICATIONS OR GENERAL SPECIAL PROVISIONS.

SYMBOL AND LINE LEGEND

FOUND REBAR AND CAP	EXISTING RIGHT OF WAY LINE
EXISTING STORM DRAIN MANHOLE	EXISTING PROPERTY LINE
EXISTING STORM DRAIN CATCH BASIN	EXISTING CURB AND GUTTER
EXISTING FIRE HYDRANT	EXISTING EDGE OF GRAVEL
EXISTING WATER METER	EXISTING EDGE OF PAVEMENT
EXISTING WATER VALVE	EXISTING SANITARY SEWER LINE
EXISTING UTILITY POLE	EXISTING STORM DRAIN LINE
EXISTING POLE ANCHOR	EXISTING WATER LINE
EXISTING SIGN	EXISTING FIBER OPTIC LINE
EXISTING LIGHT POLE	EXISTING UNDERGROUND ELECTRICAL
EXISTING ELECTRICAL JUNCTION BOX	EXISTING OVERHEAD POWER LINE
EXISTING WATER/POWER METER	EXISTING OVERHEAD TELEPHONE LINE
EXISTING TREE	EXISTING GAS LINE
ASPHALT	EXISTING CONTOUR
CONCRETE	EXISTING THALWEG OF STREAM
CATCH BASIN	GUARDRAIL
MANHOLE	DITCH OR ASPHALT FLOWLINE
SIGN	STORM DRAIN LINE
INLET PROTECTION	SANITARY SEWER LINE
SURVEY CONTROL POINT	FILL LIMIT LINE
	CUT LIMIT LINE
	COMPOST SOCK
	HIGH VISIBILITY SILT FENCE
	PARCEL NUMBER
	ASPHALT ROAD SURFACE
	CURTAIN DRAIN

ABBREVIATIONS

ASPH	ASPHALT	EST	ESTIMATE	MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES	SD	STORM DRAIN
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	EVCE	END VERTICAL CURVE ELEVATION	N	NORTH/NORTHING	SF	SQUARE FEET
BMP	BEST MANAGEMENT PRACTICE	EVCS	END VERTICAL CURVE STATION	NAD	NORTH AMERICAN DATUM	SR	STATE ROUTE
BVCE	BEGIN VERTICAL CURVE ELEVATION	EX/EXST	EXISTING	NAVD	NORTH AMERICAN VERTICAL DATUM	SSCO	SANITARY SEWER CLEANOUT
BVCS	BEGIN VERTICAL CURVE STATION	EXT	EXTRUDED	NGVD	NATIONAL GEODETIC VERTICAL DATUM	SSMH	SANITARY SEWER MANHOLE
CB	CATCH BASIN	FH	FIRE HYDRANT	NO	NUMBER	STA	STATION
CL/C-L	CLASS/CENTERLINE	GA	GUY ANCHOR	NTS	NOT TO SCALE	SY	SQUARE YARDS
CMP	CORRUGATED METAL PIPE	GRAV	GRAVEL	OC	ON CENTER	TAE	THICKENED ASPHALT EDGE
COM	CITY OF MUKILTEO	GV	GATE VALVE	OHWM	ORDINARY HIGH WATER MARK	TF	TRANSFORMER
COMB	COMBINATION	HMA	HOT MIX ASPHALT	PB	POWER BOX	TYP	TYPICAL
CONC	CONCRETE	HORIZ	HORIZONTAL	PM	POWER METER	UP	UTILITY POLE
CPEP	CORRUGATED POLYETHYLENE PIPE	IE	INVERT ELEVATION	PP	POWER POLE	VERT	VERTICAL
CY	CUBIC YARDS	JB	JUNCTION BOX	PROP	PROPOSED	WAC	WASHINGTON ADMINISTRATIVE CODE
DEC	DECIDUOUS	LAND	LANDSCAPING	PSI	PER SQUARE INCH	WM	WATER METER
D.I.	DUCTILE IRON	LF	LINEAR FEET	PVC	POLYVINYL CHLORIDE	WMS	WATER METERS
DIA	DIAMETER	LP	LIGHT POLE	PV	POWER VAULT	WR	WATER RISER
DR	DRIVE	LS	LUMP SUM	PVI	POINT OF VERTICAL INTERSECTION	WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
E	EAST/EASTING	LT	LEFT	R	RADIUS	WV	WATER VALVE
EA	EACH	LVC	LENGTH OF VERTICAL CURVE	R.O.W.	RIGHT OF WAY	WVS	WATER VALVES
ELEV	ELEVATION	MB	MAILBOX	RD	ROAD		
		MIN	MINIMUM	RT	RIGHT		
		MPH	MILES PER HOUR				

TUTTLE ENGINEERING AND MANAGEMENT
275 West Rio Vista Avenue, Suite 1 Burlington, WA 98233
| O: (360) 899-5953 | W: www.tuttle-team.com

Constructed By: Date:

Aerial Mapping & Control Survey Firm: Date: Field Bk/Pg: QIS Cntl Pnts:

Recorded Survey: SNOHOMISH COUNTY AF#_____ Vol/Bk Page

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CITY OF MUKILTEO

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PUBLIC WORKS DEPARTMENT

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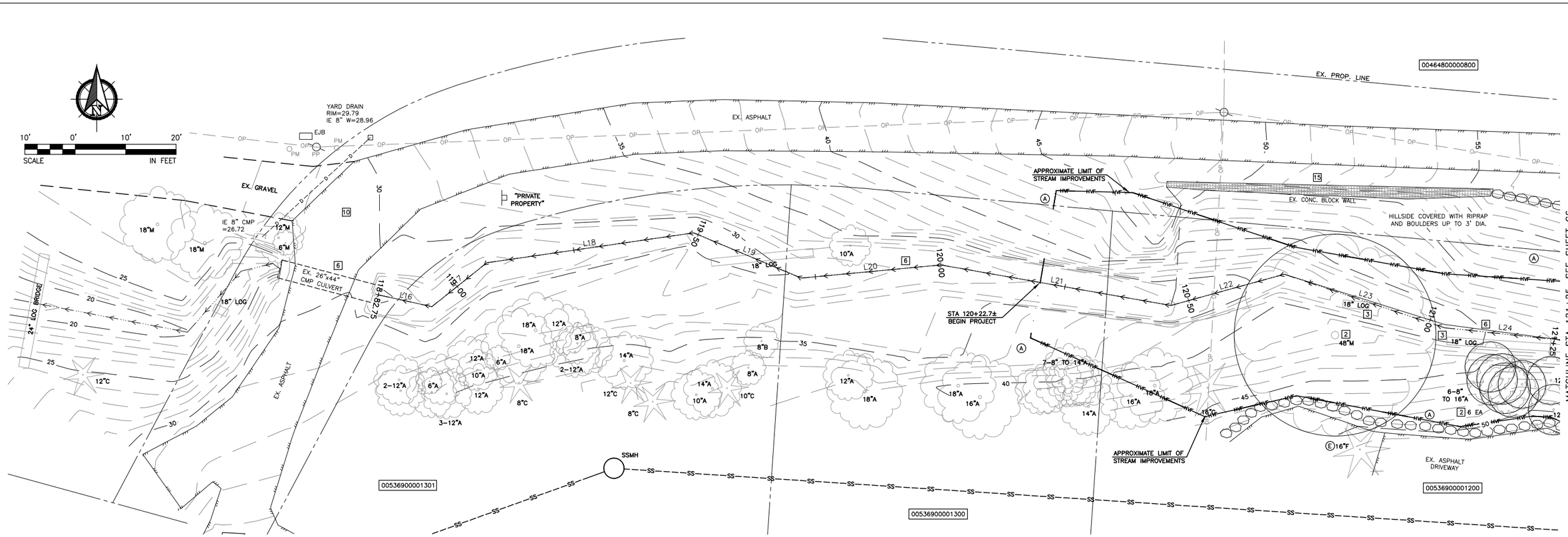
JOHN RAYMOND TUTTLE STATE OF WASHINGTON 43718 REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

CITY NOTES, LEGEND, AND ABBREVIATIONS

SHEET NO. C4

P:\T14-004 61st Place Culvert\Eng\Drawings\Plan Sheets\C05-C06 - Existing Cond, Prep, Erosion, and Alignment.dwg - C5 - Existing Conditions - Matt - 3/29/2019 8:43 AM



☐ SITE PREPARATION NOTES

1. NOTE NOT USED ON THIS SHEET.
2. CLEAR EXISTING TREE AND RETAIN EXISTING STUMP AND ROOT WAD. TREE STEM SHALL BE PLACED PERPENDICULAR ALONG AND WITHIN THE STREAM CHANNEL. ANY ROOT WADS SHALL BE PLACED AT THE EDGE OF THE STREAM CHANNEL.
3. SAWCUT AND REMOVE SECTION OF EXISTING WOODY DEBRIS TO THE VERTICAL AND HORIZONTAL EXCAVATION LIMITS OF CONSTRUCTION. RETAIN PORTIONS OF DEBRIS SECURELY EMBEDDED IN THE EXISTING GROUND THAT FALL OUTSIDE THESE LIMITS.
4. NOTE NOT USED ON THIS SHEET.
5. NOTE NOT USED ON THIS SHEET.
6. RETAIN FUNCTION OF EXISTING DRAINAGE CONVEYANCE SYSTEM THROUGHOUT CONSTRUCTION.
7. NOTE NOT USED ON THIS SHEET.
8. NOTE NOT USED ON THIS SHEET.
9. NOTE NOT USED ON THIS SHEET.
10. RETAIN FULL USE OF EXISTING DRIVEWAY FOR VEHICULAR AND PEDESTRIAN USE UNTIL IMPROVEMENTS ARE COMPLETE.
11. NOTE NOT USED ON THIS SHEET.
12. NOTE NOT USED ON THIS SHEET.
13. NOTE NOT USED ON THIS SHEET.
14. NOTE NOT USED ON THIS SHEET.
15. AVOID ALL CONTACT WITH EXISTING RETAINING WALL.

○ EROSION CONTROL NOTES

A. INSTALL ENVIRONMENTAL CONTROL (HIGH VISIBILITY SILT) FENCING AS SHOWN AS A MEANS OF REDIRECTING AND MITIGATING RUNOFF AND ALSO A MEANS OF DELINEATING WORK AREAS. RESET AS PHASED CONSTRUCTION ACTIVITIES OR PRESERVATION OF ACCESS TO OFF-SITE RESIDENTIAL USES MANDATE. POINTS OF CONCENTRATED RUNOFF WILL BE REDIRECTED TO ADJACENT DITCHES OR THE STREAM. SEE WSDOT STANDARD PLAN I-30.17-00. CARE SHALL BE TAKEN DURING INSTALLATION OF FENCING NEAR EXISTING UTILITY LINES. AS APPLICABLE, POSITION FENCING WITHIN EXISTING RIGHT-OF-WAY SO AS NOT TO DISTURB PRIVATE PROPERTY.

B. NOTE NOT USED ON THIS SHEET.

C. NOTE NOT USED ON THIS SHEET.

D. NOTE NOT USED ON THIS SHEET.

E. CONTRACTOR TO PROVIDE PROTECTION AND RETAINAGE OF EXISTING TREES AND ROOT SYSTEMS TO THE GREATEST EXTENT IN THIS AREA. PROTECTION TO BE COORDINATED THROUGH THE PROJECT ENGINEER.

F. NOTE NOT USED ON THIS SHEET.

GENERAL NOTES

1. LINEWORK FOR EXISTING UTILITIES REPRESENTS A BEST EFFORT TO SHOW THE EXISTING LOCATION OF THESE UTILITIES AT THE TIME OF SURVEY. THE CONTRACTOR SHALL FIELD-VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES WITHIN WORK AREAS PRIOR TO CONSTRUCTION OF IMPROVEMENTS.
2. CONTOURS ARE SHOWN AT A ONE-FOOT INTERVAL.
3. CONTRACTOR TO PROVIDE PRECAUTIONS FOR VEHICULAR AND PEDESTRIAN SAFETY DURING ALL CONSTRUCTION ACTIVITIES. SEE TRAFFIC CONTROL PLAN FOR SPECIFICS ON LANE CLOSURES. REVISED LAYOUTS SHALL BE SUBMITTED TO AND APPROVED BY THE PROJECT ENGINEER. SIGNS WITHIN WORK AREAS SHALL BE IN ACCORDANCE WITH WSDOT STANDARD PLANS AND MUTCD.
4. NO AREAS OUTSIDE THE PUBLIC RIGHT-OF-WAY HAVE BEEN RETAINED AS POTENTIAL CONSTRUCTION STAGING OR STOCKPILING AREAS. THE CONTRACTOR SHALL COORDINATE ON HIS OR HER OWN TO IDENTIFY AREAS TO STAGE EQUIPMENT AND STORE MATERIALS. IF AN AREA IS RETAINED, THEN THE CONTRACTOR SHALL INSTALL ALL NECESSARY BEST MANAGEMENT PRACTICES TO PROTECT ADJACENT AND DOWNSTREAM PROPERTIES AND WATER BODIES.
5. THE CONTRACTOR SHALL PROVIDE TEMPORARY STREAM DIVERSION MEASURES AS REQUIRED TO MAINTAIN STREAM FLOWS THROUGHOUT CONSTRUCTION. ANY DEWATERING DEVICES SHALL DISCHARGE INTO A SEDIMENT TRAP, SEDIMENT POND, OR OTHER DEVICE APPROVED BY THE ENGINEER.

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Aerial Mapping & Control Survey
Firm:
Date:
GIS Cntl Pnts:

Recorded Survey:
SNOHOMISH COUNTY
AF#_____
Vol/Bk: _____ Page

Surveyed By: ASPI
Date: MAY 2015
Field Bk/Pg:
Datum: NAVD 88

Drawn By: TTH
Checked By: JRT

Constructed By:
Date:

XREF Filename:
Filename:

NO.	DATE	BY	REVISION

PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: 1"=10' Vert: –
Designed By: JRT
Inspected By:
W.O. No.:
Date: 12-07-2018

CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT

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JOHN RAYMOND TUTTLE STATE OF WASHINGTON 43718 REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

EXISTING CONDITIONS, SITE PREPARATION, AND EROSION CONTROL PLAN

SHEET NO.
C5

P:\1714-004 61st Place Culvert\Eng\Drawings\Plan Sheets\C05-C06 - Existing Cond, Prep, Erosion, and Alignment.dwg - C6 - Existing Conditions - Matt - 1/29/2019 8:47 AM

10' 0' 10' 20'
SCALE IN FEET

EXISTING SANITARY STRUCTURES TABLE

SSMH1 RIM=68.11 CTR CH=61.47 (8" N,S) SSMH2 RIM=66.27 IE=61.12 (8" S) IE=61.30 (8" E) IE=60.49 (8" NW,W)	SSMH 3 RIM=66.74 CTR CH=61.58 (8" SE,NW) IE=62.40 (6" NE) SSMH4 RIM=70.88 CTR CH=64.85 (8" N,SE)

EXISTING STORM STRUCTURES TABLE

CULV1 EX. 12" CPEP CULVERT OUTLET IE=67.41 CULV2 4" PVC PIPE DRAIN INLET IE=NOT FOUND OUTLET IE=63.42 CULV3 24" CMP CULVERT INLET IE=63.05 ANGLE POINT IE=±60.0 OUTLET IE=56.53	CULV4 EX. 12" CMP CULVERT INLET IE=64.57 OUTLET TOP=64.49 OUTLET IE NOT FOUND CULV5 EX. 12" CONC CULVERT OUTLET IE=66.87 INLET IE=67.64

MATCHLINE STA 121+25, SEE SHEET C5

STA 123+84.4± END PROJECT

61ST PLACE WEST
EX. ASPHALT ROADWAY

00464800000800
00464800001200
00536900001200
00536900001101

SITE PREPARATION NOTES

1. CLEAR EXISTING TREE AND GRUB ALL ASSOCIATED SUBSURFACE VEGETATIVE MATERIALS.
2. CLEAR EXISTING TREE AND RETAIN EXISTING STUMP AND ROOT WAD. TREE STEM SHALL BE PLACED PERPENDICULAR ALONG AND WITHIN THE STREAM CHANNEL. ANY ROOT WADS SHALL BE PLACED AT THE EDGE OF THE STREAM CHANNEL.
3. SAWCUT AND REMOVE SECTION OF EXISTING WOODY DEBRIS TO THE VERTICAL AND HORIZONTAL EXCAVATION LIMITS OF CONSTRUCTION. RETAIN PORTIONS OF DEBRIS SECURELY EMBEDDED IN THE EXISTING GROUND THAT FALL OUTSIDE THESE LIMITS.
4. REMOVE EXISTING CONCRETE BANK ARMORING.
5. SAWCUT, REMOVE, AND DISPOSE OF EXISTING ASPHALT PAVEMENT. REMOVAL TIMELINE DEPENDANT UPON PHASED TRAFFIC CONTROL AND CONSTRUCTION ACTIVITIES. CLEAN AND TACK ALL ASPHALT EDGES PRIOR TO PAVING. SEAL ALL JOINTS AFTER PAVING WITH PG64-22 BINDER.
6. RETAIN FUNCTION OF EXISTING DRAINAGE CONVEYANCE SYSTEM THROUGHOUT CONSTRUCTION.
7. REMOVE EXISTING STORM STRUCTURE TO ACCOMMODATE STORM SYSTEM IMPROVEMENTS. RETAIN UNTIL STORM SYSTEM IS IN-PLACE AND FUNCTIONING. REMOVAL TIMELINE DEPENDANT UPON PHASED TRAFFIC CONTROL AND CONSTRUCTION ACTIVITIES.
8. SALVAGE EXISTING KEYSTONE LANDSCAPING BRICKS. BRICKS SHALL REMAIN THE PROPERTY OWNER'S PROPERTY. THE CONTRACTOR SHALL REMOVE, STORE, PROTECT, AND RESET BRICKS TO A LOCATION DEFINED BY THE PROJECT ENGINEER.
9. SALVAGE EXISTING CONCRETE AND PLASTIC BARRIER. BARRIER SHALL REMAIN THE CITY'S PROPERTY. THE CONTRACTOR SHALL LOAD, HAUL, DELIVER, AND UNLOAD BARRIER TO A LOCATION DEFINED BY THE PROJECT ENGINEER.
10. RETAIN FULL USE OF EXISTING DRIVEWAY FOR VEHICULAR AND PEDESTRIAN USE UNTIL IMPROVEMENTS ARE COMPLETE.
11. CONTRACTOR TO POTHOLE EXISTING UTILITIES TO DETERMINE NEED FOR POSSIBLE RELOCATIONS.
12. REMOVE SECTION OF EXISTING CHAIN LINK FENCE AS SHOWN. EXISTING POST SHALL BE USED TO DETERMINE LIMIT OF REMOVAL.
13. SALVAGE EXISTING CHAIN LINK FENCING. THE CONTRACTOR SHALL DISASSEMBLE, STORE, AND PROTECT PRIOR TO RESETTING.
14. SALVAGE EXISTING "DO NOT ENTER" SIGN AND RESET TO LOCATION SHOWN ON THE ROADWAY PLAN AND PROFILE DRAWING.
15. AVOID ALL CONTACT WITH EXISTING RETAINING WALL.

EROSION CONTROL NOTES

A. INSTALL ENVIRONMENTAL CONTROL (HIGH VISIBILITY SILT) FENCING AS SHOWN AS A MEANS OF REDIRECTING AND MITIGATING RUNOFF AND ALSO A MEANS OF DELINEATING WORK AREAS. RESET AS PHASED CONSTRUCTION ACTIVITIES OR PRESERVATION OF ACCESS TO OFF-SITE RESIDENTIAL USES MANDATE. POINTS OF CONCENTRATED RUNOFF WILL BE REDIRECTED TO ADJACENT DITCHES OR THE STREAM. SEE WSDOT STANDARD PLAN I-30.17-00. CARE SHALL BE TAKEN DURING INSTALLATION OF FENCING NEAR EXISTING UTILITY LINES. AS APPLICABLE, POSITION FENCING WITHIN EXISTING RIGHT-OF-WAY SO AS NOT TO DISTURB PRIVATE PROPERTY.

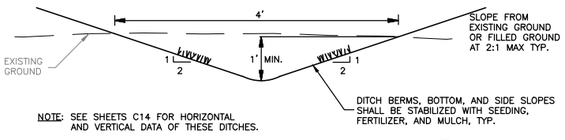
B. INSTALL TEMPORARY CONVEYANCE DITCH PER DETAIL 1 ON THIS SHEET TO BYPASS EXISTING SITE RUNOFF THROUGH WORK AREAS. THIS DITCH WILL BECOME A PERMANENT DITCH IN LATER PHASES OF THE PROJECT. SEE DETAIL 6/C16 FOR FINAL CONVEYANCE DITCH CONFIGURATION.

C. INSTALL COMPOST SOCKS ON EDGE OF NEWLY INSTALLED ROADWAY SURFACES TO REDIRECT UPSTREAM RUNOFF AWAY FROM WORK AREAS. SOCKS INSTALLED ON THESE SURFACES WILL BE SECURED WITH SAND BAGS. POINTS OF CONCENTRATED RUNOFF WILL BE REDIRECTED TO ADJACENT DITCHES OR THE STREAM. RESET AS PHASED CONSTRUCTION ACTIVITIES OR PRESERVATION OF ACCESS MANDATE. SEE WSDOT STANDARD PLAN I-30.40-01 FOR NOTES ON SOCK INSTALLATION.

D. INSTALL A CATCH BASIN INSERT IN EACH NEW CATCH BASIN AFTER IT HAS BEEN INSTALLED PER STANDARD PLAN I-40.20-00.

E. CONTRACTOR TO PROVIDE PROTECTION AND RETAINAGE OF EXISTING TREES AND ROOT SYSTEMS TO THE GREATEST EXTENT IN THIS AREA. PROTECTION TO BE COORDINATED THROUGH THE PROJECT ENGINEER.

F. INSTALL COMPOST SOCKS WITHIN EXISTING, TEMPORARY, AND FINAL DRAINAGE CONVEYANCES AS SHOWN. SEE WSDOT STANDARD PLAN I-30.40-01 FOR NOTES ON SOCK INSTALLATION.



NOTE: SEE SHEETS C14 FOR HORIZONTAL AND VERTICAL DATA OF THESE DITCHES.

TEMPORARY CONVEYANCE DITCH DETAIL 1
STA 40+00 TO STA 40+44.2 NTS

NOTES:
1. TEMPORARY DITCHES SHALL BECOME PERMANENT DITCHES IN LATER PHASES OF THE PROJECT. SEE DETAIL 6/C16 FOR FINAL DITCH CONFIGURATION.

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Aerial Mapping & Control Survey
Firm:
Date:
Doc. No.
GIS Cntl Pnts:
Field Bk/Pg:

Recorded Survey:
SNOHOMISH COUNTY
AF#
Vol/Bk Page

Surveyed By:
ASPI
Date: MAY 2015
Field Bk/Pg:
Datum: NAVD 88

Drawn By: TTH
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61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

EXISTING CONDITIONS, SITE PREPARATION, AND EROSION CONTROL PLAN

SHEET NO. C6

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

ELEMENT 1 - MARK CLEARING LIMITS:

1. 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.
2. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM DEGREE PRACTICABLE.

SUGGESTED BEST MANAGEMENT PRACTICE (BMP/BMPS) TO BE USED:

- **BMP C101: PRESERVING NATURAL VEGETATION**
- **BMP C103: HIGH VISIBILITY PLASTIC OR METAL FENCE**

ELEMENT 2 - ESTABLISH CONSTRUCTION ACCESS

1. LIMIT CONSTRUCTION VEHICLE ACCESS AND EXIT TO ONE ROUTE, IF POSSIBLE.
2. STABILIZE ACCESS POINTS WITH A PAD OF QUARRY SPALLS, CRUSHED ROCK, OR OTHER EQUIVALENT BMPS, TO MINIMIZE TRACKING OF SEDIMENT ONTO PUBLIC ROADS.
3. LOCATE WHEEL WASH OR TIRE BATHS ON SITE, IF THE STABILIZED CONSTRUCTION ENTRANCE IS NOT EFFECTIVE IN PREVENTING TRACKING SEDIMENT ONTO ROADS.
4. 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 PICK UP AND TRANSPORT THE SEDIMENT TO A CONTROLLED SEDIMENT DISPOSAL AREA.
5. CONDUCT STREET WASHING ONLY AFTER SEDIMENT IS REMOVED IN ACCORDANCE WITH THE ABOVE BULLET.
6. CONTROL STREET WASH WASTEWATER BY PUMPING BACK ON-SITE, OR OTHERWISE PREVENT IT FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C105: STABILIZED CONSTRUCTION ENTRANCE**
- **BMP C107: CONSTRUCTION ROAD/PARKING AREA STABILIZATION**

ELEMENT 3 - CONTROL FLOW RATES

1. PROTECT PROPERTIES AND WATERWAYS DOWNSTREAM OF DEVELOPMENT 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.
2. WHERE NECESSARY TO COMPLY WITH THE BULLET ABOVE, CONSTRUCT STORMWATER RETENTION OR DETENTION FACILITIES AS ONE OF THE FIRST STEPS IN GRADING. ASSURE THAT DETENTION FACILITIES FUNCTION PROPERLY BEFORE CONSTRUCTING SITE IMPROVEMENTS (E.G. IMPERVIOUS SURFACES).
3. IF PERMANENT INFILTRATION PONDS ARE USED FOR FLOW CONTROL DURING CONSTRUCTION, PROTECT THESE FACILITIES FROM SILTATION DURING THE CONSTRUCTION PHASE.

SUGGESTED BMPS TO BE USED:

- **BMP C207: CHECK DAMS**
- **BMP C235: WATTLES**

ELEMENT 4 - INSTALL SEDIMENT CONTROLS

1. DESIGN, INSTALL, AND MAINTAIN EFFECTIVE EROSION CONTROLS AND SEDIMENT CONTROLS TO MINIMIZE THE DISCHARGE OF POLLUTANTS.
2. CONSTRUCT SEDIMENT CONTROL BMPS (SEDIMENT PONDS, TRAPS, FILTERS, ETC.) AS ONE OF THE FIRST STEPS IN GRADING. THESE BMPS SHALL BE FUNCTIONAL BEFORE OTHER LAND DISTURBING ACTIVITIES TAKE PLACE
3. 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.
4. 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 IN ELEMENT #3, BULLET #1.
5. 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.
6. 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.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C220: STORM DRAIN INLET PROTECTION**
- **BMP C235: WATTLES**
- **BMP C240: SEDIMENT TRAP, IF NECESSARY**
- **BMP C241: SEDIMENT POND, IF NECESSARY**

ELEMENT 5 - STABILIZE SOILS

1. 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 EARLY ON AREAS TO BE PAVED, AND DUST CONTROL.
2. CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION.
3. 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.
4. SOILS MUST NOT REMAIN EXPOSED AND UNWORKED FOR MORE THAN THE TIME PERIODS SET FORTH BELOW TO PREVENT EROSION:
   - DURING THE DRY SEASON (MAY 1 - SEPT. 30): 7 DAYS
   - DURING THE WET SEASON (OCTOBER 1 - APRIL 30): 2 DAYS
5. STABILIZE SOILS AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST.
6. STABILIZE SOIL STOCKPILES FROM EROSION, PROTECTED WITH SEDIMENT TRAPPING MEASURES, AND WHERE POSSIBLE, BE LOCATED AWAY FROM STORM DRAIN INLETS, WATERWAYS, AND DRAINAGE CHANNELS.
7. MINIMIZE THE AMOUNT OF SOIL EXPOSED DURING CONSTRUCTION ACTIVITY.
8. MINIMIZE THE DISTURBANCE OF STEEP SLOPES.
9. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C120: TEMPORARY AND PERMANENT SEEDING**
- **BMP C121: MULCHING**
- **BMP C125: TOPSOILING/COMPOSTING**
- **BMP C127: PLASTIC COVERING**
- **BMP C130: SURFACE ROUGHENING**

ELEMENT 6 - PROTECT SLOPES

1. 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).
2. 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.
3. AT THE TOP OF SLOPES, COLLECT DRAINAGE IN PIPE SLOPE DRAINS OR PROTECTED CHANNELS TO PREVENT EROSION.
   - TEMPORARY PIPE SLOPE DRAINS MUST HANDLE THE PEAK 10-MINUTE VELOCITY OF FLOW FROM A TYPE 1A, 10-YEAR, 24-HOUR FREQUENCY STORM FOR THE DEVELOPED CONDITION. ALTERNATIVELY, THE 10-YEAR AND 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.
4. PLACE EXCAVATED MATERIAL ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS.
5. PLACE CHECK DAMS AT REGULAR INTERVALS WITHIN CONSTRUCTED CHANNELS THAT ARE CUT DOWN A SLOPE.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C120: TEMPORARY AND PERMANENT SEEDING**
- **BMP C127: PLASTIC COVERING**
- **BMP C130: SURFACE ROUGHENING**

ELEMENT 7: PROTECT DRAIN INLETS

1. PROTECT ALL STORM DRAIN INLETS MADE OPERABLE DURING CONSTRUCTION SO THAT STORMWATER RUNOFF SHALL NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT.
2. 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).

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C220: STORM DRAIN INLET PROTECTION**
- **BMP C235: WATTLES**

ELEMENT 8: STABILIZE CHANNELS AND OUTLETS

1. DESIGN, CONSTRUCT, AND STABILIZE ALL ON-SITE CONVEYANCE CHANNELS TO PREVENT EROSION FROM THE FOLLOWING EXPECTED PEAK FLOWS:
   - CHANNELS MUST HANDLE THE PEAK 10-MINUTE VELOCITY OF FLOW 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 WESTERN WASHINGTON HYDROLOGY MODEL (WWHM) TO PREDICT FLOWS, BARE SOIL AREAS SHOULD BE MODELED AS "LANDSCAPED" AREA.
2. 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.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C207: CHECK DAMS**
- **BMP C209: OUTLET PROTECTION**

ELEMENT 9: CONTROL POLLUTANTS

1. DESIGN, INSTALL, IMPLEMENT AND MAINTAIN EFFECTIVE POLLUTION PREVENTION MEASURES TO MINIMIZE THE DISCHARGE OF POLLUTANTS.
2. 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.
3. 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. 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 CONTAINED IN THE LARGEST TAKE WITHIN THE CONTAINMENT STRUCTURE. DOUBLE-WALLED TANKS DO NOT REQUIRE ADDITIONAL SECONDARY CONTAINMENT.
4. CONDUCT MAINTENANCE, FUELING, AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES USING SPILL PREVENTION AND CONTROL MEASURES. CLEAN CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY SPILL INCIDENT.
5. 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 APPLICATION, OR TO THE SANITARY SEWER, WITH LOCAL SEWER DISTRICT APPROVAL.
6. 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.
7. 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, WASTE STREAMS GENERATED FROM CONCRETE GRINDING AND SAWING, EXPOSED AGGREGATE PROCESSES, DEWATERING CONCRETE VAULTS, CONCRETE PUMPING, AND MIXER WASHOUT WATERS.
8. ADJUST THE PH OF STORMWATER IF NECESSARY TO PREVENT VIOLATIONS OF WATER QUALITY STANDARDS.
9. ASSURE THAT WASHOUT OF CONCRETE TRUCKS IS PERFORMED OFF-SITE OR IN DESIGNATED CONCRETE WASHOUT AREAS ONLY. DO NOT WASH OUT CONCRETE TRUCKS ONTO THE GROUND, OR INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS. DO NOT DUMP EXCESS CONCRETE ON-SITE, EXCEPT IN DESIGNATED CONCRETE WASHOUT AREAS. CONCRETE SPILLAGE OR CONCRETE DISCHARGE TO SURFACE WATERS OF THE STATE IS PROHIBITED.
10. OBTAIN WRITTEN APPROVAL FROM ECOLOGY BEFORE USING CHEMICAL TREATMENT OTHER THAN CO2 OR DRY ICE TO ADJUST PH.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C151: CONCRETE HANDLING**
- **BMP C152: SAWCUTTING AND SURFACE POLLUTION PREVENTION**
- **BMP C153: MATERIAL DELIVERY, STORAGE AND CONTAINMENT AREA**
- **BMP C154: CONCRETE WASHOUT AREA**

ELEMENT 10: CONTROL DE-WATERING

1. DISCHARGE FOUNDATION, VAULT, AND TRENCH DE-WATERING WATER, WHICH HAS SIMILAR CHARACTERISTICS TO STORMWATER RUNOFF AT THE SITE, INTO A CONTROLLED CONVEYANCE SYSTEM BEFORE DISCHARGE TO A SEDIMENT TRAP OR SEDIMENT POND.
2. DISCHARGE CLEAN, NON-TURBID DE-WATERING WATER, SUCH AS WELL-POINT GROUNDWATER, TO SYSTEMS TRIBUTARY TO, OR DIRECTLY INTO SURFACE WATERS OF THE STATE, AS SPECIFIED IN ELEMENT #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.
3. HANDLE HIGHLY TURBID OR OTHERWISE CONTAMINATED DEWATERING WATER SEPARATELY FROM STORMWATER.
4. OTHER TREATMENT OR DISPOSAL OPTIONS MAY INCLUDE:
   - INFILTRATION.
   - TRANSPORT OFF-SITE IN A VEHICLE, SUCH AS A VACUUM FLUSH TRUCK, FOR LEGAL DISPOSAL IN A MANNER THAT DOES NOT POLLUTE STATE WATERS.
   - ECOLOGY-APPROVED ON-SITE CHEMICAL TREATMENT OR OTHER SUITABLE TREATMENT TECHNOLOGIES.
   - SANITARY OR COMBINED SEWER DISCHARGE WITH LOCAL SEWER DISTRICT APPROVAL, IF THERE IS NO OTHER OPTION.
   - USE OF A SEDIMENTATION BAG WITH OUTFALL TO A DITCH OR SWALE FOR SMALL VOLUMES OF LOCALIZED DEWATERING.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C201: GRASS-LINED CHANNELS**
- **BMP C235: WATTLES**
- **BMP C240: SEDIMENT TRAP, IF NECESSARY**

ELEMENT 11: MAINTAIN BMPS

1. 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.
2. 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.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C150: MATERIALS ON HAND**
- **BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD**

ELEMENT 12: MANAGE THE PROJECT

1. PHASE DEVELOPMENT PROJECTS TO THE MAXIMUM DEGREE PRACTICABLE AND CONSIDER SEASONAL WORK LIMITATIONS.
2. INSPECTION AND MONITORING - INSPECT, MAINTAIN AND REPAIR ALL BMPS AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. PROJECTS REGULATED UNDER THE CONSTRUCTION STORMWATER GENERAL PERMIT MUST CONDUCT SITE INSPECTIONS AND MONITORING IN ACCORDANCE WITH SPECIAL CONDITION S4 OF THE CONSTRUCTION STORMWATER GENERAL PERMIT.
3. MAINTAINING AN UPDATED CONSTRUCTION SWPPP - MAINTAIN, UPDATE, AND IMPLEMENT THE SWPPP.
4. PROJECTS THAT DISTURB ONE OR MORE ACRES MUST HAVE SITE INSPECTIONS CONDUCTED BY A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL). PROJECT SITES DISTURBING LESS THAN ONE ACRE MAY HAVE A CESCL OR A PERSON WITHOUT CESCL CERTIFICATION CONDUCT INSPECTIONS. BY THE INITIATION OF CONSTRUCTION, THE SWPPP MUST IDENTIFY THE CESCL OR INSPECTOR, WHO MUST BE PRESENT ON-SITE OR ON-CALL AT ALL TIMES.
5. THE CESCL OR INSPECTOR (PROJECT SITES LESS THAN ONE ACRE) MUST HAVE THE SKILLS TO ASSESS THE:
   - SITE CONDITIONS AND CONSTRUCTION ACTIVITIES THAT COULD IMPACT THE QUALITY OF STORMWATER.
   - EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES USED TO CONTROL THE QUALITY OF STORMWATER DISCHARGES.
6. THE CESCL OR INSPECTOR MUST EXAMINE STORMWATER VISUALLY FOR THE PRESENCE OF SUSPENDED SEDIMENT, TURBIDITY, DISCOLORATION, AND OIL SHEEN. THEY MUST EVALUATE THE EFFECTIVENESS OF BMPS AND 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, CONSTRUCTION SITE OPERATORS MUST CORRECT THE PROBLEMS IDENTIFIED BY:
   - REVIEWING THE SWPPP FOR COMPLIANCE WITH THE 13 CONSTRUCTION SWPPP ELEMENTS AND MAKING APPROPRIATE REVISIONS WITHIN 7 DAYS OF THE INSPECTION.
   - IMMEDIATELY BEGINNING THE PROCESS OF FULLY IMPLEMENTING AND MAINTAINING APPROPRIATE SOURCE CONTROL AND/OR TREATMENT BMPS AS SOON AS POSSIBLE, ADDRESSING THE PROBLEMS NOT LATER THAN WITHIN 10 DAYS OF THE INSPECTION. IF INSTALLATION OF NECESSARY TREATMENT BMPS IS NOT FEASIBLE WITHIN 10 DAYS, THE CONSTRUCTION SITE OPERATOR MAY REQUEST AN EXTENSION WITHIN THE INITIAL 10-DAY RESPONSE PERIOD.
7. 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 DAY DO NOT REQUIRE DAILY INSPECTIONS. FOR EXAMPLE, IF A STORMWATER POND DISCHARGES CONTINUOUSLY OVER THE COURSE OF A WEEK, ONLY ONE INSPECTION IS REQUIRED THAT WEEK.) THE CESCL OR INSPECTOR MAY REDUCE THE INSPECTION FREQUENCY FOR TEMPORARY STABILIZED, INACTIVE SITES TO ONCE EVERY CALENDAR MONTH.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C150: MATERIALS ON HAND**
- **BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD**
- **BMP C162: SCHEDULING**

ELEMENT 13: PROTECT LOW IMPACT DEVELOPMENT BMPS

1. PROTECT ALL BIORETENTION AND RAIN GARDEN BMPS 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 BMPS. RESTORE THE BMPS TO THEIR FULLY FUNCTIONING CONDITION IF THEY ACCUMULATE SEDIMENT DURING CONSTRUCTION. RESTORING THE BMP MUST INCLUDE REMOVAL OF SEDIMENT AND ANY SEDIMENT-LADEN BIORETENTION/RAIN GARDEN SOILS AND REPLACING THE REMOVED SOILS WITH SOILS MEETING THE DESIGN SPECIFICATION.
2. PREVENT COMPACTING BIORETENTION AND RAIN GARDEN BMPS BY EXCLUDING CONSTRUCTION EQUIPMENT AND FOOT TRAFFIC. PROTECT COMPLETED LAWN AND LANDSCAPED AREAS FROM COMPACTION DUE TO CONSTRUCTION EQUIPMENT.
3. 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.
4. PAVEMENT FOULED WITH SEDIMENTS OR NO LONGER PASSING AN INITIAL INFILTRATION TEST MUST BE CLEANED USING PROCEDURES IN ACCORDANCE WITH THIS MANUAL OR THE MANUFACTURER'S PROCEDURES.
5. KEEP ALL HEAVY EQUIPMENT OFF EXISTING SOILS UNDER LID FACILITIES THAT HAVE BEEN EXCAVATED TO FINAL GRADE TO RETAIN THE INFILTRATION RATE OF THE SOILS.

SUGGESTED BMP/BMPS TO BE USED:

- **BMP C103: HIGH VISIBILITY FENCE**
- **BMP C200: INTERCEPTOR DIKE AND SWALE**
- **BMP C204: PIPE SLOPE DRAINS**
- **BMP C207: CHECK DAMS**
- **BMP C233: SILT FENCE (HIGH VISIBILITY)**
- **BMP C235: WATTLES**

EROSION AND SEDIMENT CONTROL NOTES

1. TEMPORARY EROSION/WATER POLLUTION MEASURES WILL BE REQUIRED IN ACCORDANCE WITH THE WSDOT STANDARD SPECIFICATIONS AND THE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
2. A CERTIFIED EROSION AND SEDIMENT CONTROL SUPERVISOR IS REQUIRED. THE ESC SUPERVISOR MUST HAVE ATTENDED AN EROSION AND SEDIMENT CONTROL CLASS WITHIN THREE YEARS OF THE START OF CONSTRUCTION AND MUST PROVIDE A VALID CERTIFICATION CARD.
3. THE CERTIFIED EROSION AND SEDIMENT CONTROL SUPERVISOR WILL OVERSEE AND BE RESPONSIBLE FOR IMPLEMENTATION, INSPECTION, AND MAINTENANCE OF ALL EROSION CONTROL (ESC) FACILITIES. FACILITIES SHALL BE INSPECTED DAILY AND MAINTAINED TO ENSURE PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS AND AFTER EVERY SIGNIFICANT STORM EVENT OF THE FACILITIES DURING THE WET SEASON (OCTOBER 1 TO APRIL 30) AND MONTHLY REVIEWS DURING THE DRY SEASON (MAY 1 TO SEPTEMBER 30). WRITTEN RECORDS SHALL BE TURNED INTO THE PROJECT ENGINEER OR INSPECTOR ON A WEEKLY BASIS AT THE WEEKLY SCHEDULED PROJECT MEETINGS.
4. THE TEMPORARY ESC FACILITIES SHOWN WITHIN THESE PLANS ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD. ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS. AS CONSTRUCTION PROGRESSES AND SEASONAL CONDITIONS DICTATE, THE EROSION CONTROL FACILITIES SHALL BE MAINTAINED AND/OR MODIFIED BY THE CONTRACTOR AS REQUIRED BY THE CITY OF MUKILTEO TO ENSURE ADEQUATE EROSION AND SEDIMENTATION CONTROL.
5. PLAN AND IMPLEMENT PROPER CLEARING AND GRADING OF THE SITE. IT IS IMPORTANT ONLY TO CLEAR THE AREAS NEEDED, THUS KEEPING EXPOSED AREAS TO A MINIMUM. THE CONTRACTOR SHALL PHASE LAND DISTURBING ACTIVITIES SO ONLY THOSE AREAS ACTIVELY BEING WORKED ARE UNCOVERED.
6. ANY REQUIRED OR ESTABLISHED BUFFER AREAS ARE TO BE PROTECTED. MARK CLEARING LIMITS BY INSTALLING FENCING TO DESIGNATE PROTECTED AREAS PRIOR TO INITIATING LAND DISTURBANCE. LEAVE ALL UNSTABLE STEEP SLOPES IN NATURAL VEGETATION.
7. SOIL SHALL BE MANAGED IN A MANNER THAT DOES NOT PERMANENTLY COMPACT OR DETERIORATE THE CAPACITY OF FUNCTION OF PERMANENT STORMWATER FACILITIES. CONSTRUCTION PRACTICES MUST NOT CAUSE DAMAGE TO OR COMPROMISE THE DESIGN OF PERMANENT INFILTRATION AREAS.
8. ALL EROSION CONTROL DEVICES SHALL BE IN PLACE PER THE APPROVED SET OF PLANS PRIOR TO CONSTRUCTION.
9. STABILIZED CONSTRUCTION ENTRANCES AND ROADS SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED DURING THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED SUCH AS WASH PADS TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN. NO MUD IS ALLOWED TO ENTER ONTO CITY STREETS.
10. ANY SOILS EXPOSED THAT WILL NOT BE DISTURBED FOR TWO (2) DAYS DURING THE WET SEASON OR SEVEN (7) DAYS IN THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED ESC METHODS (SEEDING. MULCHING, PLASTIC COVERINGS, ETC.).
11. TWO (2) WEEKS PRIOR TO THE BEGINNING OF THE WET SEASON (OCTOBER 1). ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY WHICH CAN BE SEEDED IN PREPARATION FOR THE WINTER RAINS. AS IDENTIFIED, DISTURBED AREAS SHALL BE SEEDED WITHIN ONE (1) WEEK OF THE BEGINNING OF THE WET SEASON. A SKETCH MAP OF THOSE AREAS TO BE SEEDED SHALL BE SUBMITTED TO THE PROJECT ENGINEER. THE PROJECT ENGINEER CAN REQUIRE SEEDING IN ADDITIONAL AREAS IN ORDER TO PROTECT SURFACE WATERS, ADJACENT PROPERTIES, OR DRAINAGE FACILITIES.
12. ALL CATCH BASINS ON THIS PROJECT SHALL HAVE APPROVED SEDIMENT TRAP INSERTS INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF EACH NEW CATCH BASIN AND IMMEDIATELY BEFORE CONSTRUCTION WITHIN ALL APPLICABLE EXISTING CATCH BASINS. REMOVAL OF THESE INSERTS AT COMPLETION OF CONSTRUCTION SHALL BE AS DIRECTED BY THE CITY INSPECTOR.
13. CONTROL OF POLLUTANTS: ALL POLLUTANTS, OTHER THAN THE SEDIMENT THAT OCCUR ON SITE DURING CONSTRUCTION, SHALL BE HANDLED AND DISPOSED OF IN A MANNER, AND AS DIRECTED BY THE CITY INSPECTOR, THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER OR SURFACE WATERS.
14. ALL TEMPORARY EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPS) SHALL BE REMOVED WITHIN THIRTY DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED AND AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.

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Aerial Mapping & Control Survey Firm: Date: Field Bk/Pg: QIS Cnt Pnts:
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Surveyed By: ASPI Date: MAY 2015 Field Bk/Pg: Datum: NAVD '88
Drawn By: TTH Checked By: JRT
Constructed By: Date:
XREF Filename: Filename:

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PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: — Vert: —
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Inspected By:
W.O. No.:
Date: 12-07-2018

CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT
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JOHN RAYMOND TUTTLE — STATE OF WASHINGTON — 43718 — REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

STORMWATER POLLUTION PREVENTION PLAN

SHEET NO. C7

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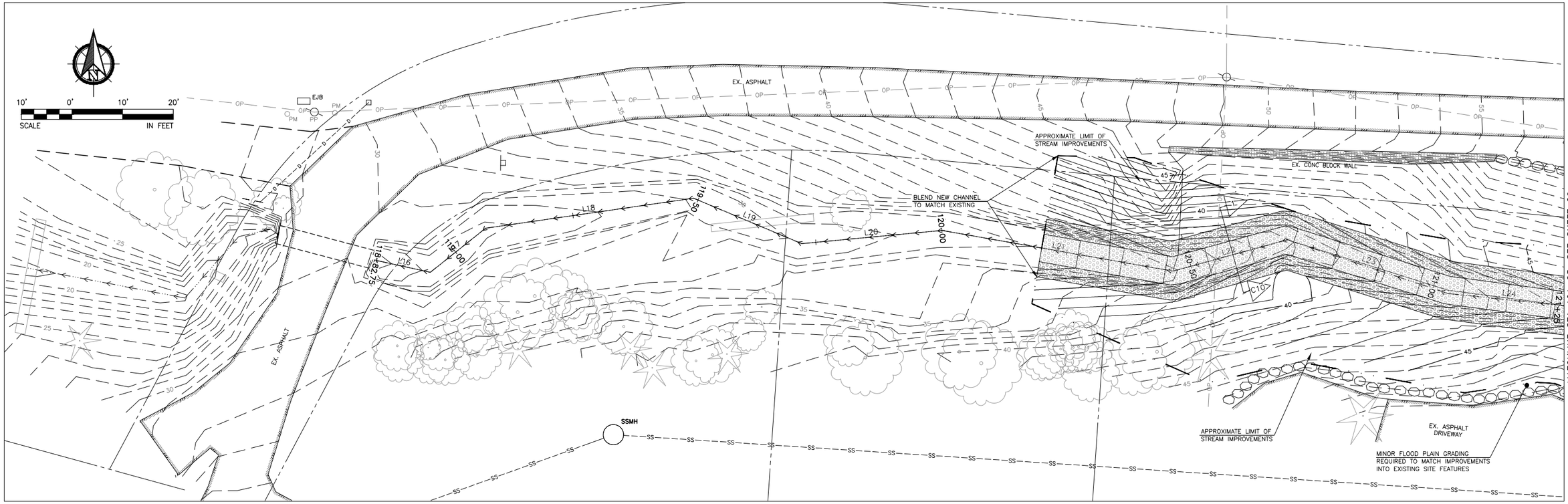


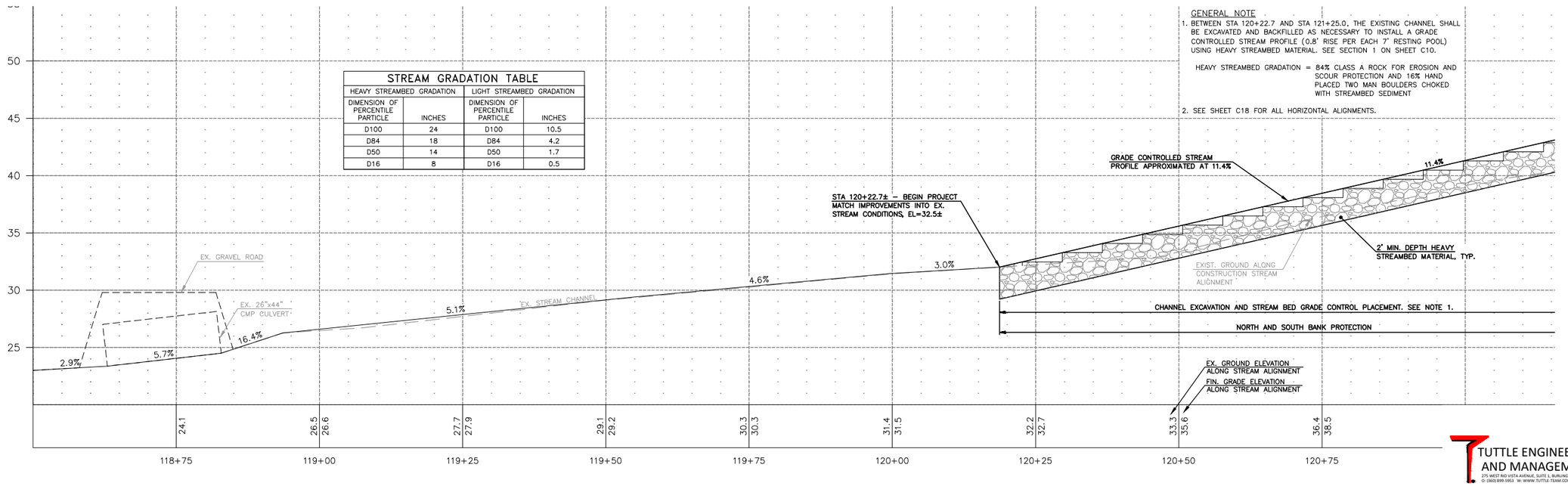
STREAM GRADATION TABLE			
HEAVY STREAMBED GRADATION		LIGHT STREAMBED GRADATION	
DIMENSION OF PERCENTILE PARTICLE	INCHES	DIMENSION OF PERCENTILE PARTICLE	INCHES
D100	24	D100	10.5
D84	18	D84	4.2
D50	14	D50	1.7
D16	8	D16	0.5

GENERAL NOTE

1. BETWEEN STA 120+22.7 AND STA 121+25.0, THE EXISTING CHANNEL SHALL BE EXCAVATED AND BACKFILLED AS NECESSARY TO INSTALL A GRADE CONTROLLED STREAM PROFILE (0.8' RISE PER EACH 7' RESTING POOL) USING HEAVY STREAMBED MATERIAL. SEE SECTION 1 ON SHEET C10.

   HEAVY STREAMBED GRADATION = 84% CLASS A ROCK FOR EROSION AND SCOUR PROTECTION AND 16% HAND PLACED TWO MAN BOULDERS CHOKED WITH STREAMBED SEDIMENT

2. SEE SHEET C18 FOR ALL HORIZONTAL ALIGNMENTS.



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61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

STREAM AND CULVERT PLAN AND PROFILE

SHEET NO.
C8

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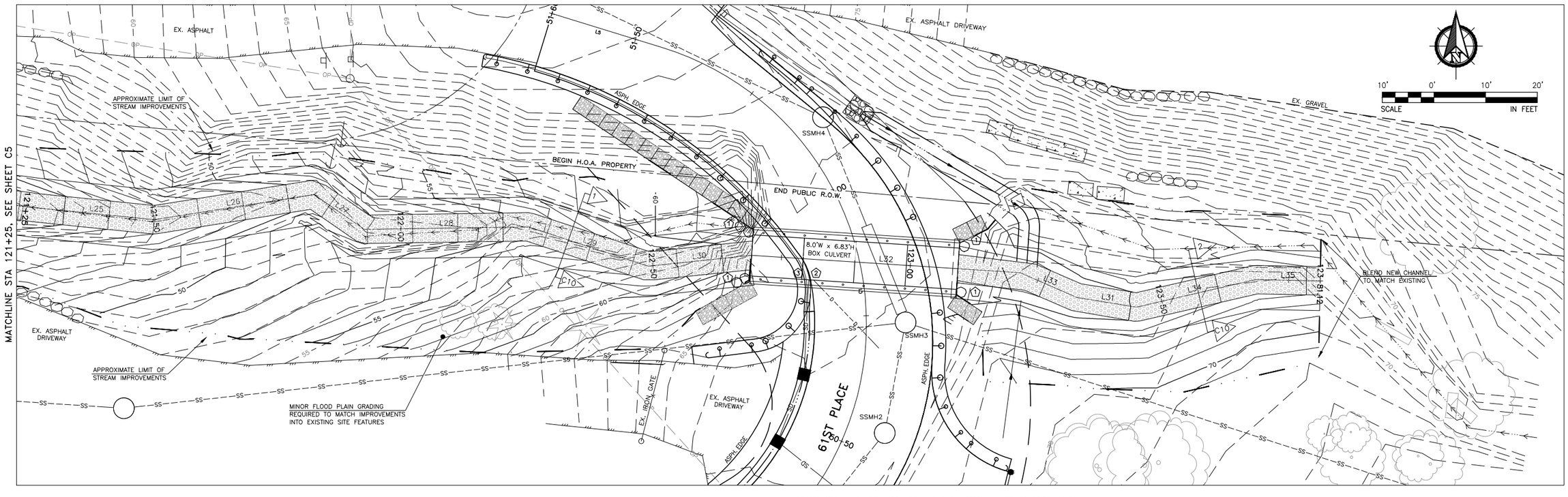

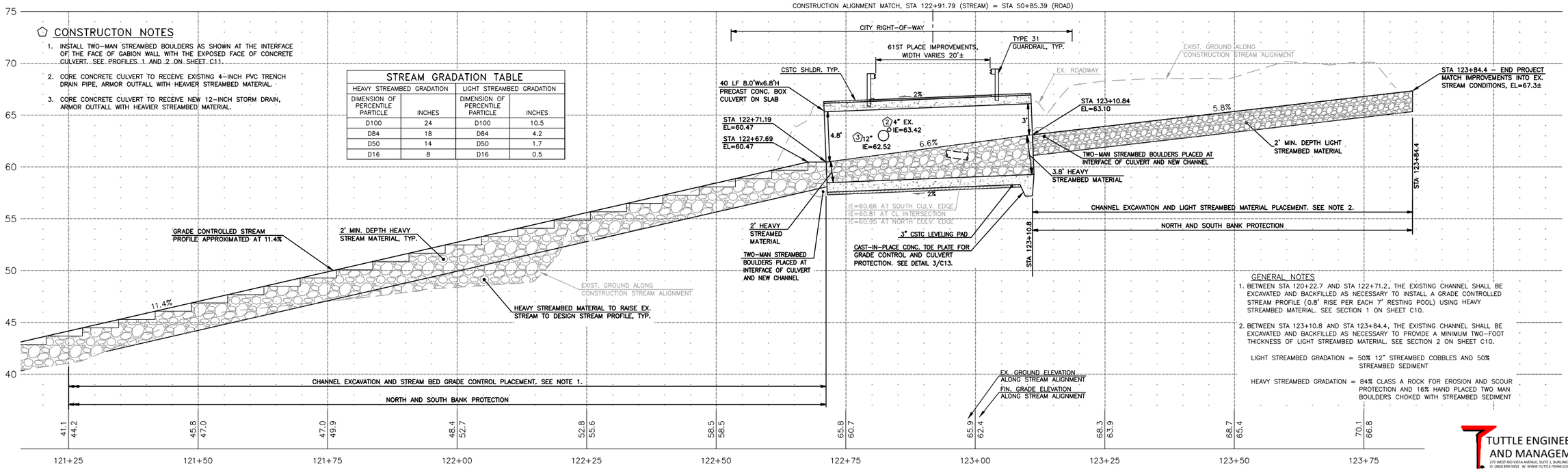

GENERAL NOTES

1. BETWEEN STA 120+22.7 AND STA 122+71.2, THE EXISTING CHANNEL SHALL BE EXCAVATED AND BACKFILLED AS NECESSARY TO INSTALL A GRADE CONTROLLED STREAM PROFILE (0.8' RISE PER EACH 7' RESTING POOL) USING HEAVY STREAMBED MATERIAL. SEE SECTION 1 ON SHEET C10.
2. BETWEEN STA 123+10.8 AND STA 123+84.4, THE EXISTING CHANNEL SHALL BE EXCAVATED AND BACKFILLED AS NECESSARY TO PROVIDE A MINIMUM TWO-FOOT THICKNESS OF LIGHT STREAMBED MATERIAL. SEE SECTION 2 ON SHEET C10.

LIGHT STREAMBED GRADATION = 50% 12" STREAMBED COBBLES AND 50% STREAMBED SEDIMENT

HEAVY STREAMBED GRADATION = 84% CLASS A ROCK FOR EROSION AND SCOUR PROTECTION AND 16% HAND PLACED TWO MAN BOULDERS CHOKED WITH STREAMBED SEDIMENT

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61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

STREAM AND CULVERT PLAN AND PROFILE

SHEET NO. C9

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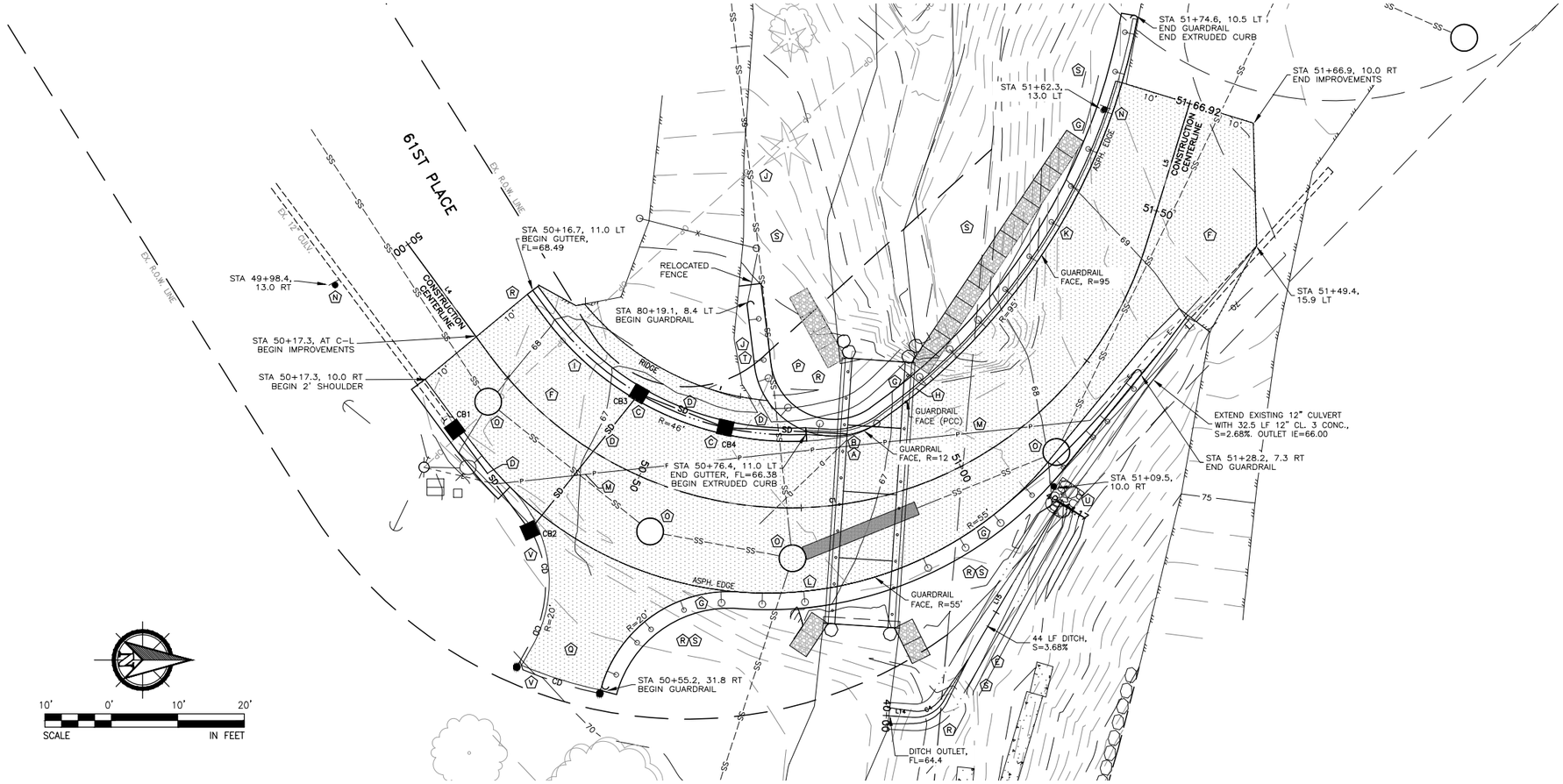


GENERAL NOTES

1. INVERT ELEVATION INFORMATION PROVIDED FOR PROPOSED STORM SEWER STRUCTURES IS MEASURED TO THE CENTER OF THE STRUCTURE.
2. LENGTH INFORMATION PROVIDED FOR PROPOSED STORM PIPING IS MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
3. CONTOURS ARE SHOWN AT A ONE–FOOT INTERVAL.
4. VERTICAL LOCATIONS OF UTILITIES ARE SHOWN FOR DISPLAY PURPOSES ONLY. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION OF IMPROVEMENTS ADJACENT TO UTILITIES WITHIN WORK AREA LIMITS.

⬠ CONSTRUCTION NOTES

A. CUT AND REMOVE ±15 LF OF EXISTING 4" PVC TRENCH DRAIN LINE. CORE CONCRETE BOX CULVERT, THEN MATCH OUTLET FLUSH WITH INSIDE FACE OF BOX CULVERT AND PROVIDE WATERTIGHT GROUT PENETRATION.

B. CORE CONCRETE BOX CULVERT TO RECEIVE 12" STORM DRAIN, THEN MATCH OUTLET FLUSH WITH INSIDE FACE OF BOX CULVERT AND PROVIDE WATERTIGHT GROUT PENETRATION.

C. INSTALL TYPE 1 CATCH BASIN WITH RECTANGULAR FRAME AND GRATE PER STANDARD PLANS B–5.20–02 AND B–30.10–03, OR B–30.40–03.

D. INSTALL STORM DRAIN LINE PER WSDOT STANDARD PLAN B–55.20–02.

E. INSTALL ROADWAY CONVEYANCE DITCH PER DETAIL 6/C16.

F. INSTALL ROADWAY IMPROVEMENTS PER DETAIL 1/C15. MATCH IMPROVEMENTS AGAINST EXISTING PAVEMENT MATERIAL AND BLEND REPAIR INTO LIMITS OF SAWCUTTING.

G. CONSTRUCT GRAVEL SHOULDER PER DETAIL 1/C15.

H. INSTALL EXTRUDED CURB (TYPE 1) PER STANDARD PLANS F–10.40–03 AND F–10.42–00.

I. CONSTRUCT REINFORCED CEMENT CONC. GUTTER PER DETAIL 4/C16.

J. PROVIDE DRIVEWAY SHOULDER GRADING PER DETAIL 1/C15.

K. INSTALL BEAM GUARDRAIL (TYPE 31) RUN WITH STEEL POSTS PER WSDOT STANDARD PLANS C–20.10–04, C–1B, C–20.14–03 (CASE 1–31), C–20.40–06, C–20.42–05 (CASE 22AD–31), C–22.45–03, AND C–23.60–04.

L. INSTALL BEAM GUARDRAIL (TYPE 31) RUN WITH STEEL POSTS PER WSDOT STANDARD PLANS C–20.10–04, C–1B, C–20.14–03 (CASE 2–31), C–20.40–06, AND C–22.45–03.

M. EXISTING UNDERGROUND POWER SUPPLY LINE TO BE RELOCATED BY PUGET SOUND ENERGY (PSE). CONTRACTOR TO COORDINATE WITH PSE IN THESE INSTALLATION EFFORTS.

N. INSTALL CURVE SIGN (W1–1L OR W1–1R) WITH 15 MPH ADVISORY SPEED PLAQUE (W13–1P).

O. ADJUST EXISTING MANHOLE FRAME AND COVER TO FINISHED ASPHALT GRADE.

P. RESET CHAIN LINK FENCING TO THE LOCATION DEFINED BY THE PROJECT ENGINEER.

Q. INSTALL ASPHALT TURNAROUND PER DETAIL 5/C16.

R. PROVIDE GRADING THAT ALLOWS POSITIVE SURFACE FLOWS TOWARD DRAINAGE CONVEYANCES.

S. RESTORE DISTURBED AREAS ACCORDING TO PLANTING PLAN AND DETAILS. SEED, FERTILIZE, AND MULCH DISTURBED AREAS OUTSIDE PLANTING PLAN LIMITS.

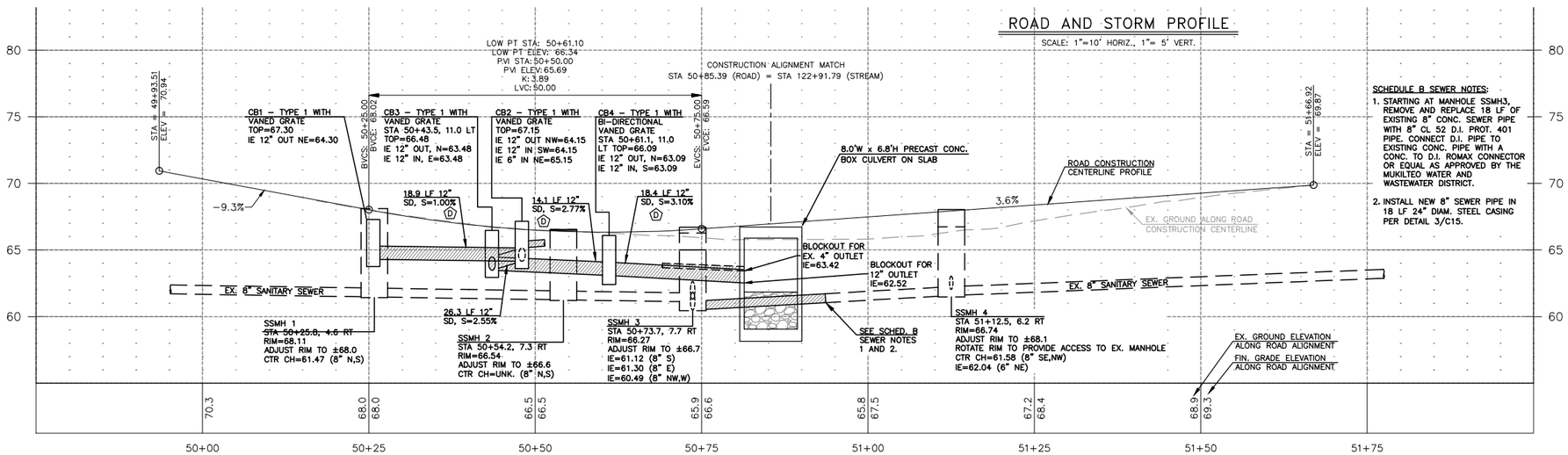
T. RESTORE OR REPLACE EXISTING LANDSCAPING AS DIRECTED BY THE ENGINEER.

U. INSTALL QUARRY SPALL OUTLET PROTECTION PER DETAIL 7/C16.

V. INSTALL CURTAIN DRAIN WITH CLEANOUTS PER DETAILS 8/C16 AND 9/C16.

ROAD AND STORM PROFILE

SCALE: 1"=10' HORIZ., 1"= 5' VERT.



SCHEDULE B SEWER NOTES:

1. STARTING AT MANHOLE SSMH3, REMOVE AND REPLACE 18 LF OF EXISTING 8" CONC. SEWER PIPE WITH 8" CL 52 D.I. PROT. 401 PIPE. CONNECT D.I. PIPE TO EXISTING CONC. PIPE WITH A CONC. TO D.I. ROMAX CONNECTOR OR EQUAL AS APPROVED BY THE MUKILTEO WATER AND WASTEWATER DISTRICT.
2. INSTALL NEW 8" SEWER PIPE IN 18 LF 24" DIAM. STEEL CASING PER DETAIL 3/C15.

TUTTLE ENGINEERING AND MANAGEMENT
P.O. Box 1547, Burlington, WA 98233 | O: (360) 899-1953
M: (360) 920-7030 E: JTUTTLE@TUTTLE-TEAM.COM

Constructed By: Date:

Aerial Mapping & Control Survey Firm: Date: Field Bk/Pg: Pnts: GIS Cntl Pnts:

Recorded Survey: SNOHOMISH COUNTY AF#_____ Vol/Bk_____ Page_____

Surveyed By: ASPI Date: MAY 2015 Field Bk/Pg: Datum: NAVD 88

Drawn By: TTH Checked By: JRT

XREF Filename: Filename:

NO.	DATE	BY	REVISION

PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: 1"=10' Vert: 1"=5'
Designed By: JRT
Inspected By:
W.O. No.:
Date: 12–07–2018

CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT

11930 Cyrus Way Mukilteo, Washington 98275
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https://mukilteowa.gov

JOHN RAYMOND TUTTLE STATE OF WASHINGTON 43718 REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

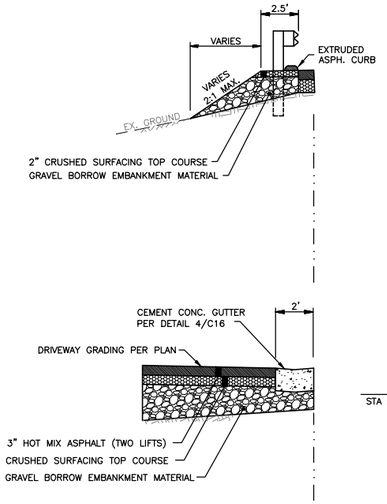
ROAD AND STORM PLAN AND PROFILE

SHEET NO. C14

TUTTLE ENGINEERING AND MANAGEMENT
675 West Rio Vista, Suite 1 Burlington, WA 98233 | O: (360) 899-5953
M:(360) 920-7030 E: JTUTTLE@TUTTLE-TEAM.COM

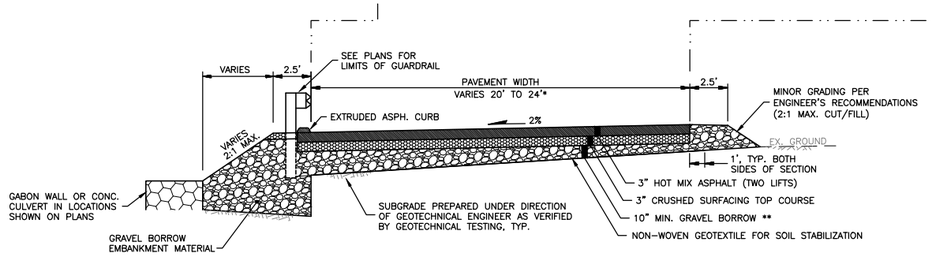
GENERAL NOTES

1. SEE THE STRUCTURAL WALL PLAN AND DETAIL SHEETS FOR WALL AND BOX CULVERT CONSTRUCTION LIMITS.
2. SEE THE ROAD AND STORM PLAN AND PROFILE SHEET FOR THE LIMITS OF ROADWAY, STORM DRAINAGE, AND PAVING.
3. ALL DEPTHS SHOWN ARE COMPACTED DEPTHS. COURSES SHALL NOT EXCEED THE DEPTHS DEFINED IN THE STANDARD SPECIFICATIONS.



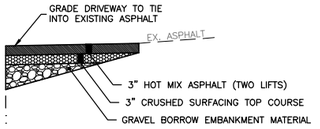
END SECTION B
STA 51+57.7 (LT) TO STA 51+74.6 (LT)

END SECTION A
STA 50+16.7 (LT) TO STA 50+76.4 (LT)

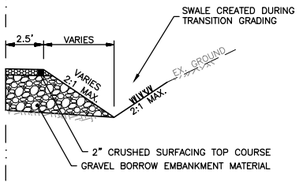


ROADWAY SECTION DETAIL (1)
LOOKING UPSTATION TO THE NORTH NTS
STA 50+76.4 (LT) TO STA 51+57.7 (LT)
STA 50+17.9 (RT) TO STA 50+35.6 (RT)

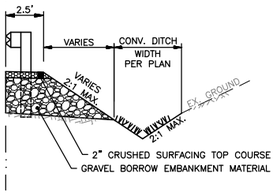
* SEE SHEET C14 FOR PAVEMENT WIDTHS.
** 10" MIN. GRAVEL BORROW DEPTH MAY NOT BE REALIZED IN AREAS WHERE BOX CULVERT ENCROACHES INTO THIS DEPTH.



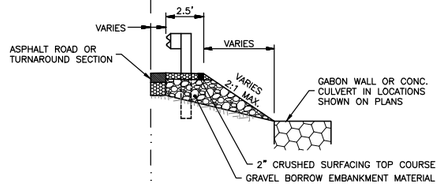
END SECTION H
STA 51+38.0 (RT) TO STA 51+66.9 (RT)



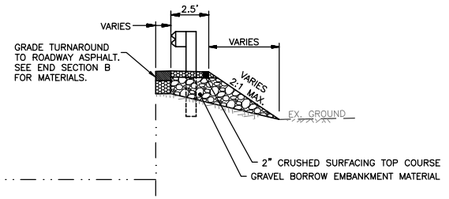
END SECTION G
STA 51+28.2 (RT) TO STA 51+38.0 (RT)



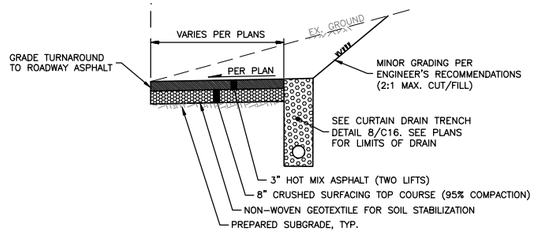
END SECTION F
STA 50+89.4 (RT) TO STA 51+09.0 (RT)



END SECTION E
STA 50+72.6 (RT) TO STA 50+89.4 (RT)



END SECTION D
STA 50+55.3 (RT) TO STA 50+72.6 (RT)
STA 51+09.0 (RT) TO STA 51+28.2 (RT)



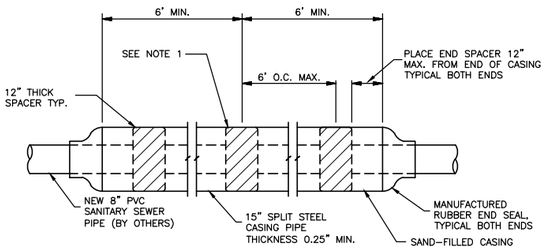
END SECTION C
STA 50+35.6 (RT) TO STA 50+55.3 (RT)

GRAVEL BORROW WITHIN

2) GRAVEL BORROW WITHIN EXISTING STREETS AND RIGHT-OF-WAY

File: ..\..\..\P,S&E\Std Plans\MWW TRENCH DETAIL.pdf
Missing or invalid reference

SANITARY SEWER TYPICAL TRENCH SECTION DETAIL (2)
NORTH AND SOUTH OF CULVERT NTS



GENERAL NOTES

1. IF REQUIRED, ONE SPACER SHALL BE PLACED ON THE SPIGOT END OF EACH PIPE SEGMENT AT THE LINE MARKING THE LIMIT OF INSERTION INTO THE BELL, WHEN THE JOINT IS COMPLETE, THE SPACER SHALL BE IN CONTACT WITH THE BELL OF THE JOINT.

SANITARY SEWER CASING INSTALLATION DETAIL (3)
NTS

Aerial Mapping & Control Survey
Firm:
Date:
Field Bk/Pg:
GIS Cntl Pnts:

Recorded Survey: SNOHOMISH COUNTY
AF#
Vol/Bk Page

Surveyed By: ASPI
Date: MAY 2015
Field Bk/Pg:
Datum: NAVD '88

Drawn By: TTH
Checked By: JRT

XREF Filename:
Filename:

NO.	DATE	BY	REVISION

PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: — Vert: —
Designed By: JRT
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Date: 12-07-2018

CITY OF MUKILTEO

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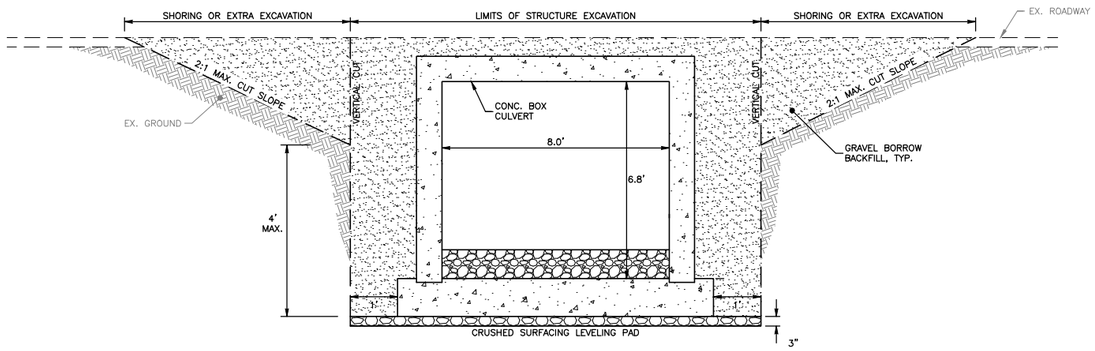
JOHN RAYMOND TUTTLE — STATE OF WASHINGTON — 43718 — REGISTERED PROFESSIONAL ENGINEER

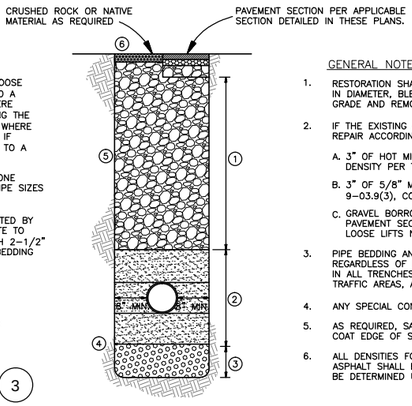
61ST PLACE WEST CULVERT IMPROVEMENT PROJECT

PROJECT DETAILS AND NOTES

SHEET NO. C15



TYPICAL BOX CULVERT EXCAVATION DETAIL (1)
NTS



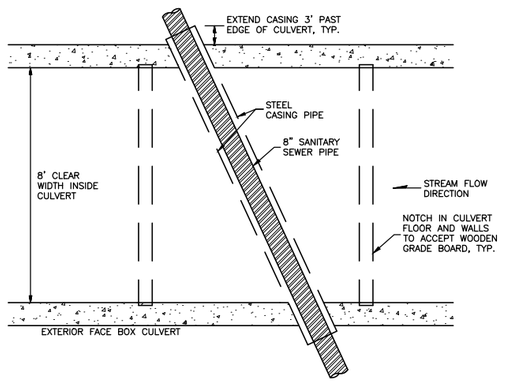
TRENCH NOTES

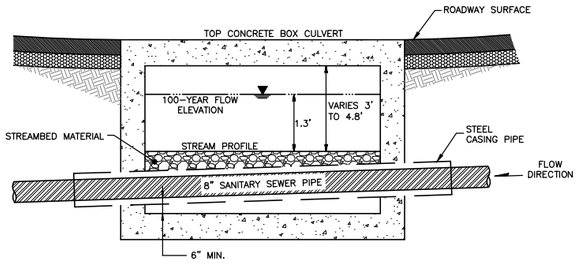
1. GRAVEL BORROW, PER SECTION 9-03.14, PLACED IN LOOSE LIFTS NOT EXCEEDING 8" IN DEPTH AND COMPACTED TO A MINIMUM OF 95% MAXIMUM DENSITY AT LOCATIONS WHERE REQUIRED AND/OR SPECIFIED. THE PERCENTAGE PASSING THE #200 SIEVE SHALL NOT EXCEED 5%. NATIVE MATERIAL, WHERE DEEMED ACCEPTABLE BY THE ENGINEER, MAY BE USED IF PLACED IN LIFTS NOT EXCEEDING 12" AND COMPACTED TO A MINIMUM OF 90%.
2. SEE STANDARD PLAN B-55.20-00 FOR STORM PIPE ZONE BEDDING AND BACKFILL REQUIREMENTS FOR VARYING PIPE SIZES AND MATERIALS.
3. IN TRENCHES WITH SOFT, YIELDING MATERIAL, AS DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL OVER-EXCAVATE TO ONE-FOOT BELOW THE PIPE INVERT AND BACKFILL WITH 2-1/2" MINUS BALLAST AGGREGATE TO THE BOTTOM OF PIPE BEDDING PER STANDARD SPECIFICATION 9-03.9(1).
4. UNDISTURBED EARTH.
5. TRENCH LINE.
6. SURFACE RESTORATION SHALL BE IN ACCORDANCE WITH GENERAL NOTE 1.

GENERAL NOTES

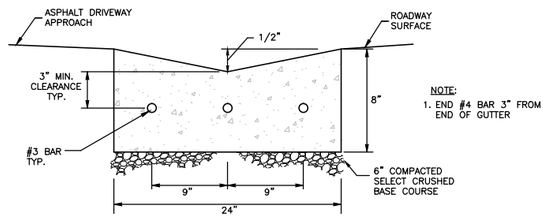
1. RESTORATION SHALL CONSIST OF REMOVING ALL ROCKS GREATER THAN 1" IN DIAMETER, BLENDING THE TOP OF THE TRENCH WITH THE SURROUNDING GRADE AND REMOVING ALL SPOILS FROM THE SITE.
2. IF THE EXISTING ASPHALT ROADWAY OR DRIVEWAY AREAS ARE DISTURBED, REPAIR ACCORDING TO THE FOLLOWING REQUIREMENTS:
   A. 3" OF HOT MIX ASPHALT PER SECTION 5-04, COMPACTED TO 91% RICE DENSITY PER THE STANDARD SPECIFICATIONS.
   B. 3" OF 5/8" MINUS CRUSHED SURFACING TOP COURSE PER SECTION 9-03.9(3), COMPACTED TO 95% OF MAXIMUM DENSITY.
   C. GRAVEL BORROW PER SECTION 9-03.14, AS NECESSARY TO PREPARE THE PAVEMENT SECTION, COMPACTED TO 95% OF MAXIMUM DENSITY. PLACE IN LOOSE LIFTS NOT EXCEEDING EIGHT INCHES.
3. PIPE BEDDING AND COVER MATERIAL SHALL BE USED IN ALL TRENCHES REGARDLESS OF LOCATION. GRAVEL BORROW TRENCH BACKFILL SHALL BE USED IN ALL TRENCHES UNDER CRUSHED ROCK, CONSTRUCTION, AND PERMANENT TRAFFIC AREAS, AND WITHIN FOUR FEET OF THE ABOVE-MENTIONED CONDITIONS.
4. ANY SPECIAL CONDITIONS MUST FIRST BE APPROVED BY THE ENGINEER.
5. AS REQUIRED, SAWCUT EXISTING ASPHALT ONE-FOOT BEYOND EDGE OF TRENCH. TACK COAT EDGE OF SAWCUT AND SEAL JOINT WITH CSS-1 AND SAND, APPLIED WITH HEAT.
6. ALL DENSITIES FOR GRAVEL SHALL BE PROCTORED USING ASTM D-1557 TESTING. ASPHALT SHALL BE PROCTORED USING STATE APPROVED METHODS. DENSITIES SHALL BE DETERMINED USING A NUCLEAR DENSOMETER CONFORMING TO ASTM D-2950.

TYPICAL UTILITY PIPE TRENCH DETAIL (3)
FOR STORM LINE INSTALLATIONS NTS



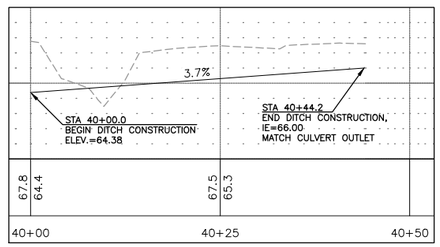


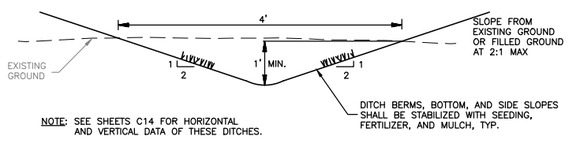
SANITARY SEWER/CULVERT PASS THROUGH DETAIL (2)
NTS



NOTE:
1. END #4 BAR 3" FROM END OF GUTTER

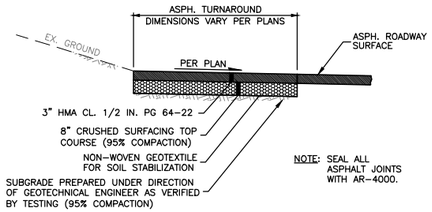
REINFORCED CEMENT CONCRETE GUTTER DETAIL (4)
NTS





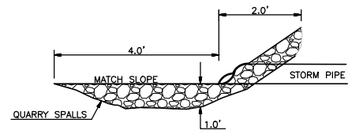
NOTE: SEE SHEETS C14 FOR HORIZONTAL AND VERTICAL DATA OF THESE DITCHES.

ROADWAY CONVEYANCE PROFILE AND DITCH DETAIL (6)
STA 40+00 TO STA 40+44.2 NTS

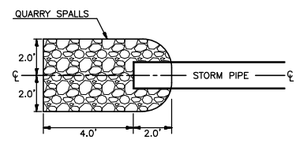


NOTE: SEAL ALL ASPHALT JOINTS WITH AR-4000.

ASPHALT TURNAROUND DETAIL (5)
NTS

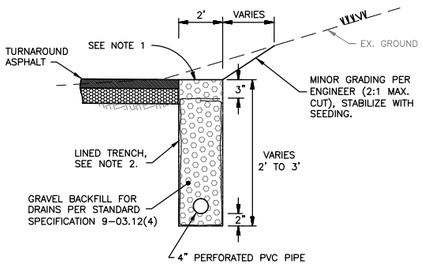


SECTION VIEW



PLAN VIEW

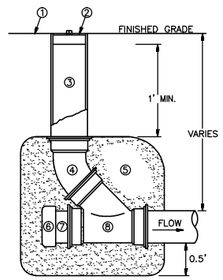
QUARRY SPALL PROTECTION DETAIL (7)
NTS



GENERAL NOTES

1. RESTORATION SHALL CONSIST OF REMOVING ALL NATIVE MATERIAL AND BLENDING THE TOP OF THE TRENCH INTO SURROUNDING SURFACES AND TOPOGRAPHY.
2. TRENCH SHALL CONTAIN A 4" PERFORATED PVC DRAIN PIPE SURROUNDED BY GRAVEL BACKFILL FOR DRAINS PER WSDOT STANDARD SPEC. 9-03.12(4) AND WRAPPED WITH NON-WOVEN GEOTEXTILE FABRIC PER WSDOT STANDARD SPEC. 9-33.2(1) - TABLE 2. PROVIDE SIX-INCH OVERLAP AT ALL SEAMS. CONNECT TO SITE STORM SYSTEM PER CIVIL PLAN.

CURTAIN DRAIN TRENCH DETAIL (8)
NTS



① RESTORATION IN ACCORDANCE WITH TYPICAL UTILITY PIPE TRENCH DETAIL FOUND WITHIN THIS PLAN SET
② THREADED PVC PLUG
③ PVC STAND PIPE - SIZE TO PLAN
④ PVC 45° BEND - SIZE TO PLAN
⑤ COMPACTED SAND
⑥ PVC CAP OR PIPE AS DEFINED ON DRAINAGE PLAN
⑦ SHORT PVC STUB - SIZE TO PLAN
⑧ PVC 45° WYE - SIZE TO PLAN

STORM/SANITARY CLEANOUT ASSEMBLY DETAIL (9)
INSTALLED IN NON-TRAFFIC AREAS -- NTS

Aerial Mapping & Control Survey
Firm:
Date:
Field Bk/Pg:
GIS Cntl Pnts:

Recorded Survey: SNOHOMISH COUNTY
AF-
Vol/Bk Page

Surveyed By: ASPI
Date: MAY 2015
Field Bk/Pg:
Datum: NAVD '88

Drawn By: TTH
Checked By: JRT

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NO.	DATE	BY	REVISION

PLAN PRINTED AT 11"x17" DEPICTS A 1:2 SCALE RATIO (I.E. 1"=10' TO 1"=20')

Scale: Horiz: — Vert: —
Designed By: JRT
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W.O. No.:
Date: 12-07-2018

CITY OF MUKILTEO

CITY OF MUKILTEO
PUBLIC WORKS DEPARTMENT

11930 Cyrus Way Mukilteo, Washington 98275
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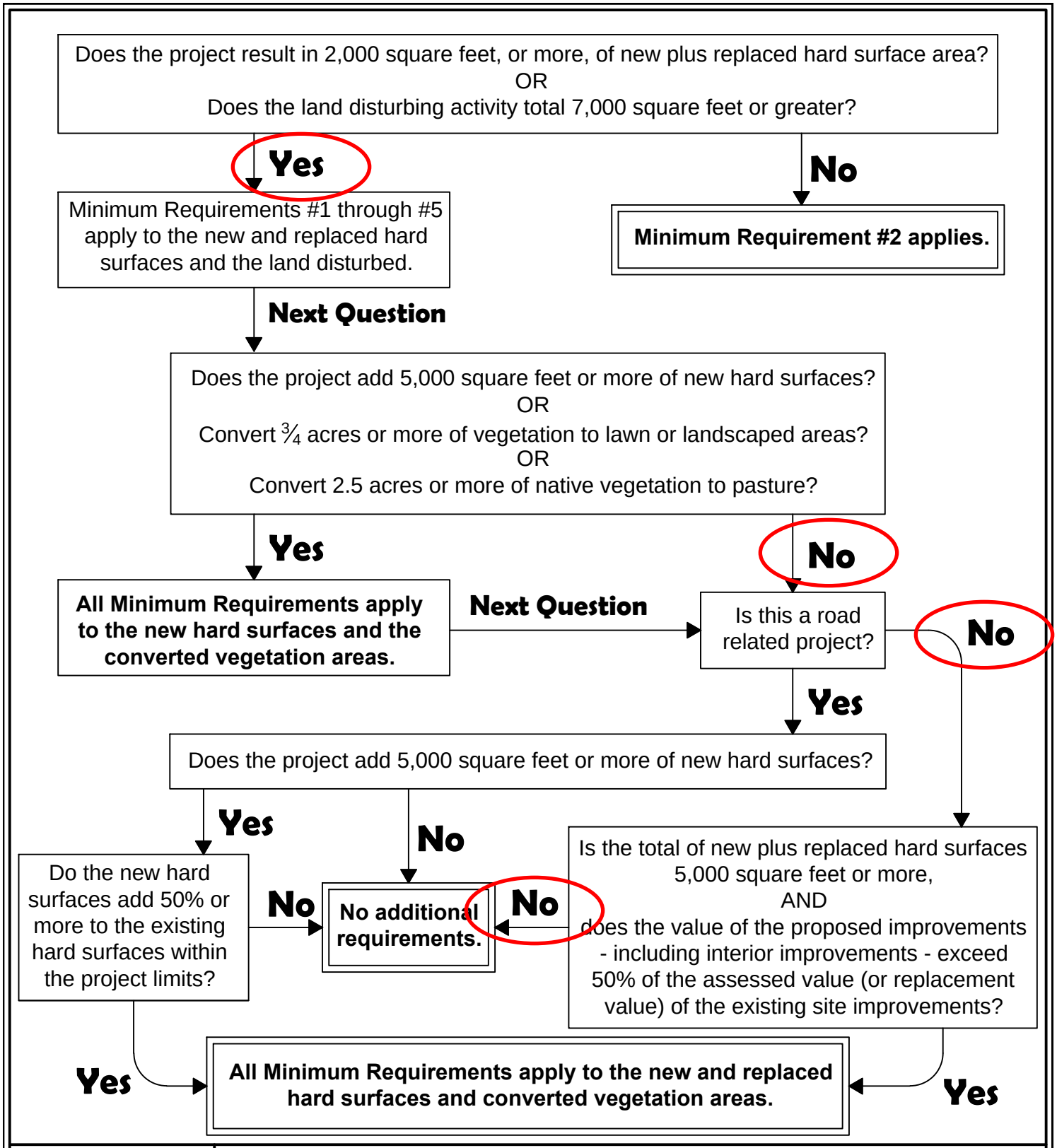
JOHN RAYMOND TURTLE STATE OF WASHINGTON 43718 REGISTERED PROFESSIONAL ENGINEER

61ST PLACE WEST
CULVERT IMPROVEMENT
PROJECT

PROJECT DETAILS AND NOTES

SHEET NO.
C16

APPENDIX D – BMP DESIGN



DEPARTMENT OF ECOLOGY
State of Washington

Figure I-2.4.2
Flow Chart for Determining Requirements for Redevelopment

Revised June 2015

BMP DESIGN CALCULATIONS

Pipe Sizing Calculations

Assumptions:

Minimum Pipe Diameter, D = 12" (1') as upstream storm pipe is 12" diameter.
Minimum Pipe Slope, per plan, S = 1% (0.01 ft/ft)
n = 0.012

Use Manning's Equation for a pipe flowing full to determine minimum pipe diameter

$$Q_{MAX} = \frac{0.464}{n} \times D^{8/3} \times S^{1/2}$$

Calculations:

$$Q_{MAX} = \frac{0.464}{0.012} \times 1^{8/3} \times 0.01^{1/2}$$

Q_{MAX} = 3.87 CFS

Summing Q_{100} per the attached Grate Bypass Calculations including the uphill flow as calculated for the 61st Place Wall project (see the Comments section under each drainage area) using the Rational Method
Q_{100} = 1.053 CFS

3.87 CFS > 1.05 CFS
The pipe has enough capacity to convey the 100-year storm event.

61st PLACE WEST CULVERT IMPROVEMENT PROJECT - BYPASS FLOW CALCULATIONS

Grate Bypass Flows - Continuous Gutter Condition (UPHILL TO CB1)

Drainage area (A): X ft2 — Profile grade: 9.30%
0.000 acres — Road cross slope: 2.00%

Design Parameters:

T = 5 min.
C = 0.9
I = 2 in/hr (10-year)
Grate Width = 1.48 ft

Sta.	Average Width	Length	Area (ft2)	Q (cfs)	Sum Q	Gutter Slope (ft/ft)	Cross Slope (ft/ft)	G.W.	Flow Depth (ft)	Bypass Width Zd (ft)	Velocity (ft/sec)	Bypass Flow (cfs)
-	- - - -	- - - - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - -	- - -	- - -	- - -	- - - -
-	- - - -	- - - - - -	X	0.542	0.542	0.0930	0.020	2.50	0.07	3.69	4.22	0.027

Design Flow Output => Collected: 0.515 ft3/sec
Bypass flow: 0.027 ft3/sec

Comments:

Q is the Q10 flow from the upstream storm system that outfalls at the limit of the project. Q10 was determined using the Rational Method as part of the design of the 61st Place Wall project storm system. Q100, below, was determined as part of the same project.

* Meets final bypass flow criteria as defined under Section 5-5.1 of the Hydraulics Manual.

Q100= 0.785 CFS I=2.9 in/hr (100-year storm event)

Grate Bypass Flows - Continuous Gutter Condition (CB1-CB2)

Drainage area (A): 0 ft2 — Profile grade: 5.80%
0.000 acres — Road cross slope: 2.00%

Design Parameters:

T = 5 min.
C = 0.9
I = 2 in/hr (10-year)
Grate Width = 1.48 ft

Sta.	Average Width	Length	Area (ft2)	Q (cfs)	Sum Q	Gutter Slope (ft/ft)	Cross Slope (ft/ft)	G.W.	Flow Depth (ft)	Bypass Width Zd (ft)	Velocity (ft/sec)	Bypass Flow (cfs)
287	- - - -	- - - - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - -	- - -	- - -	- - -	- - - -
414			0.0	0.000	0.027	0.0580	0.020	2.50	0.03	1.30	9.87	0.000

Design Flow Output => Collected: 0.000 ft3/sec
Bypass flow: 0.000 ft3/sec plus previous bypass: 0.027 ft3/sec = 0.027 ft3/sec *

Comments:

* Meets final bypass flow criteria as defined under Section 5-5.1 of the Hydraulics Manual.

Q100= 0.000 CFS I=2.9 in/hr (100-year storm event)

Grate Bypass Flows - Continuous Gutter Condition (CB3)

Drainage area (A): 427 ft2 — Profile grade: 9.30%
0.010 acres — Road cross slope: 2.00%

Design Parameters:

T = 5 min.
C = 0.9
I = 2 in/hr (10-year)
Grate Width = 1.48 ft

Sta.	Average Width	Length	Area (ft2)	Q (cfs)	Sum Q	Gutter Slope (ft/ft)	Cross Slope (ft/ft)	G.W.	Flow Depth (ft)	Bypass Width Zd (ft)	Velocity (ft/sec)	Bypass Flow (cfs)
- -	- - - -	- - - - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - -	- - -	- - -	- - -	- - - -
- -			427.0	0.018	0.018	0.0930	0.020	1.48	0.02	1.02	2.11	0.000

Design Flow Output => Collected: 0.018 ft3/sec
Bypass flow: 0.000 ft3/sec plus previous bypass: 0.000 ft3/sec = 0.000 ft3/sec *

Comments:

* Meets final bypass flow criteria as defined under Section 5-5.1 of the Hydraulics Manual.
Q100= 0.026 CFS I=2.9 in/hr (100-year storm event)

Grate Bypass Flows - Sag Condition (CB3 to CB4)

Drainage area (A): 4047 ft2 — Profile grade: 0.01%
0.093 acres — Road cross slope: 2.00%

Design Parameters:

T = 5 min.
C = 0.9 0.26325207
I = 2.9 in/hr (50-year)
Grate Width = 1.48 ft

Sta.	Average Width	Length	Area (ft2)	Q (cfs)	Sum Q	Gutter Slope (ft/ft)	Cross Slope (ft/ft)	G.W.	Flow Depth (ft)	Bypass Width Zd (ft)	Velocity (ft/sec)	Bypass Flow (cfs)
	- - - -	- - - - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - -	- - -	- - -	- - -	- - - -
			4047.0	0.018	0.018	0.0001	0.020	1.48	0.07	3.68	0.15	0.004
			1385.0									

Design Flow Output => Collected: 0.013 ft3/sec
Ponding flow: 0.004 ft3/sec

Comments:

Q100= 0.242 CFS I=2.9 in/hr (100-year storm event)

Total Flow (Q100) in System

Q100= 1.053