



Technical Memorandum #5



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Subject: Drainage Requirements and Preliminary Analysis

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Date: July 26, 2017

This design memorandum presents criteria, recommendations, and other relevant information for project consideration on the above referenced subject.

Acknowledgement:

Significant discussion and agency comments during review are incorporated and reflected by date-revision, when shown. Information presented herein represents final concurrence and direction on referenced subject.	<u>Otak</u>	<i>initials</i>
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Introduction

The purpose of this technical memorandum is to present design standards and provide a summary of the preliminary analysis and for stormwater management requirements for the West Side Trail project.

Design References

The trail will be designed and constructed within WSDOT SR202 right-of-way. The following design reference will be used

Washington State Department of Transportation (WSDOT) Publications

- Highway Runoff Manual (M 31-16), April 2014 – February, 2016 Supplement
- Hydraulics Manual (M 23-03), March, 2017
- Design Manual (M 22-01), July 2016
- Standard Specifications for Road, Bridge, and Municipal Construction (M 41-10), 2016
- Maintenance (M 51-01), June, 2017

Existing Site Conditions

The conditions of the site along the trail corridor consist of the existing two-lane highway, State Route 202 (SR202) through rural residential (Zone R-4) land, with grass-lined ditches that collect roadway runoff. The trail corridor runs parallel to the highway, on the south side of the roadway, just outside of the 100-year floodplain of the Snoqualmie River.

Within the project limits, three known culvert crossings convey roadway runoff from the south side of SR202 to the north side of the highway where it is presumed to enter the Snohomish River 100-year floodplain within ¼ mile of leaving WSDOT right-of-way. The drainage system north of SR202 is within private properties and the number of potential Threshold Discharge Areas (TDA) for the project has not been field verified at the time and therefore the design requirements are based on the assumption the project is within a single TDA.

The length of the total project is approximately 0.9 miles. From the westerly project limits at SE 40th St. easterly to 324th Ave. SE a 6-foot wide paved path is proposed. From 324th Ave SE, easterly to the east project limits at SE 42nd St., a 12-foot wide paved trail is proposed with a 2-foot gravel shoulder on each side. The non-motorized trail will be designed as a multi-use trail/shared use path.

The new and replaced impervious surface areas within the project limits are shown in Table 1, below. Existing impervious area shown in the table quantifies the SR202 eastbound roadway surface’s drainage area, and other impervious areas between the edge of the SR202 roadway and the right-of-way, i.e. existing driveways and/or streets. Replaced impervious area shown in the table quantifies all existing roadway or driveway pollution generating impervious surface (PGIS) and any existing sidewalk or pathway non-pollution generating impervious surface (NPGIS) that will be replaced with impervious area (either PGIS or NPGIS) as part of the West Side Trail project improvements. New impervious area shown in the table quantifies all paved surfaces, including roadway, driveway, sidewalk, or other hardscape, that will be constructed as part of the West Side Trail project improvements in areas that are either vegetated or gravel in the present condition. New Pollution Generating Impervious Surface area shown in the table quantifies all paved surfaces, including roadway, driveways, or other hardscape, that will be constructed as part of the West Side Trail project improvements with the intended use to provide vehicular access, in areas that are either vegetated or gravel in the present condition.

Table 1: Summary of Project’s Impervious Areas

Existing Impervious Area (SF)	Replaced Impervious Area (SF)	New Impervious Area (SF)	New Pollution Generating Impervious Surface (PGIS) Area (SF)
108,950	10,460	66,445	3,550

Stormwater Management Requirements Assessment

The project storm water management evaluation has been conducted for the proposed improvements following the guidelines and procedures described in the Highway Runoff Manual (HRM). The West Side Trail project falls within the “road-related” project designation per the HRM and is subject to the drainage requirements as outlined in flow diagram Figures 3.1, 3.2 and 3.3. These diagrams identify the minimum requirements and threshold limits for impervious surfaces and land disturbances that apply to this project, based on the following nine HRM minimum requirements:

Minimum Requirement #1 – Storm water Planning

Impacts associated with storm water management and planning are being evaluated as the design progresses. Construction plans for the storm water management improvements are at the preliminary design level, as included in the preliminary design submittal.

Minimum Requirement #2 – Construction Storm water Pollution Prevention Plan (SWPPP)

Construction storm water prevention is documented in the Temporary Erosion and Sediment Control (TESC) Plans that are part of the preliminary design.

Minimum Requirement #3 – Source Control of Pollutants

Minimum Requirement #3 is not applicable for this project because the project’s primary feature is a non-motorized, multi-use paved trail that is non-pollution generating.

Minimum Requirement #4 – Maintaining the Natural Drainage System

Within the project limits, three known culvert crossings convey roadway runoff from the south side of SR202 to the north side of the highway that ultimately flows into the Snoqualmie River floodplain. Runoff from the proposed improvements will drain to existing enclosed pipe systems upstream of the existing outfalls. The existing downstream natural drainage system and outfalls north of SR202 lie within private properties and have not been field verified at this time, they will be maintained as the design progresses.

Minimum Requirement #5 – Runoff Treatment

The project’s primary feature is a non-motorized, multi-use paved trail that is non-pollution generating. At locations where the trail crosses streets or existing driveways, new pollution generating impervious surface (PGIS) will be added. Over the length of the project site, the total of the proposed new PGIS is less than 5,000 square feet (see Table 1), and therefore no runoff treatment is required.

Minimum Requirement #6 – Flow Control

Over the length of the project, the total proposed impervious surface exceeds 5,000 square feet (see Table 1) and is required to provide flow control for the added impervious area per the HRM Figures 3-1 through 3-3. However, the current flow path for runoff leaving the site directly discharges into the Snoqualmie River, listed in the HRM’s as a “Flow Control Exempt Surface Waterbody”. In

order to meet this flow control exemption, all six of the following requirements indicated below (shown in the HRM Section 3-3.6.2) must be met:

1. *Direct discharge to the exempt receiving water does not result in the diversion of drainage area from perennial streams classified as Types 1, 2, 3, or 4 in the State of Washington Interim Water Typing System; or Types "S," "F," or "Np" in the Permanent Water Typing System; or from any Category IV wetland;*
Meets Requirement: Direct discharge to the exempt receiving water (Snoqualmie River) will not result in the diversion of any drainage area from a perennial stream or Category IV wetland because no changes are proposed to the existing drainage patterns or flow paths.
2. *Flow-splitting devices or drainage BMPs are applied to route natural runoff volumes from the project site to any downstream Type 5 stream or Category IV wetland;*
Meets Requirement: There are no Type 5 streams or Category IV wetlands downstream of the project between the existing discharge point and the exempt receiving water (Snoqualmie River).
3. *The project site must be drained by a conveyance system that is comprised entirely of constructed conveyance elements (such as pipes, ditches, or drainage channels) and that extends to the ordinary high water mark of the exempt receiving water, unless, in order to avoid construction activities in sensitive areas, flows are properly dispersed before reaching the buffer zone of the sensitive areas, flows are properly dispersed before reaching the buffer zone of the sensitive or critical area*
Unconfirmed at this time: The existing conveyance systems north of SR202 are within private properties and have not been field verified at this time.
4. *The conveyance system between the project site and the exempt receiving water must have a hydraulic capacity sufficient to convey discharges under future build-out conditions from all project and nonproject areas, if applicable, from which runoff is collected.*
Unconfirmed at this time: The existing conveyance systems north of SR202 are within private properties and have not been field verified, nor has the capacity been analyzed at this time.
5. *Any erodible elements of the constructed conveyance system for the area must be adequately stabilized to prevent erosion under future build-out conditions from areas that contribute flow to the system*
Unconfirmed at this time: Design and construction of onsite conveyance systems will be in accordance with WSDOT standards. The existing conveyance systems north of SR202 are within private properties and have not been field verified at the time.
6. *If the discharge is to a stream that leads to a wetland or to a wetland that has an outflow to a stream, both this requirement and Minimum Requirement 7 apply.*
Meets Requirement: None of the existing outfalls, all of which will be preserved and maintained as the design progresses, discharge into a stream leading to a wetland or into a wetland that has an outflow to a stream. One of the existing drainage outfalls

currently discharges to within the Reduced Buffer for Wetland A, a Category II wetland, as indicated in Technical Memorandum #1 - Environmental Site Review.

Pending confirmation of the unconfirmed requirements listed for the flow control exemptions, it is expected that flow control will not be required. However, where siting along the length of the trail is feasible, localized infiltration facilities (including infiltration trenches and bioretention raingardens) are currently being proposed as on-site infiltration BMPs to reduce the overall flows to the existing roadway ditch and downstream systems for a significant portion of the increased runoff associated with the trail improvements. These locations are shown in the preliminary design as a conceptual layout for location and footprint, but will require infiltration testing to validate feasibility and size. A geotechnical investigation performed by GeoEngineers' August 2017 and summarized in Preliminary Geotechnical Engineering Services report indicates infiltration rates between 0.6 inches per hour to 3.3 inches per hour. Additionally, this report indicates groundwater was not encountered with hand auger testing at depths up to 4 feet below ground surface. These infiltration rates, in addition to other favorable soil characteristics observed and noted in this report are viewed as feasible for design.

Minimum Requirement #7 – Wetlands Protection

Minimum Requirement #7 is not applicable for this project because no wetlands, aquatic areas, or wildlife habitat conservation areas were delineated within the project limits (see the "Environmental Site Review" memorandum), and because none of the existing outfalls on the north side of SR202 discharge into a wetland.

Minimum Requirement #8 – Incorporating Watershed/Basin Planning into Storm water Management

The Washington Department of Ecology and King County's Snoqualmie-Skykomish Watershed website provides several watershed documents for public use. The West Side Trail project is outside of the basin boundaries described in all of the available planning documents; therefore Minimum Requirement #8 is not applicable for this project.

Minimum Requirement #9 – Operation and Maintenance

Operation and maintenance of any proposed storm water management features will be consistent with the practices outlined in the HRM. Documents to address the Operation and Maintenance will be prepared during final design.

The large majority of the new impervious area added by the trail will be non-pollution generating and therefore exempt from the water quality treatment requirement (Minimum Requirement #5). Pending field investigation and analysis of the existing natural downstream drainage pattern, this project is anticipated to be exempt from flow control (Minimum Requirement #6) as well, because of its proximity to the flow-control exempt Snoqualmie River.

Proposed Storm water Management Improvements

Infiltration facilities are proposed as on-site BMPs to reduce flows of the increased runoff associated with the trail improvements and it is assumed that these facilities (including infiltration trenches and

bioretention raingardens) along the length of the trail will provide flow control for a majority of the new impervious area. Furthermore, it is anticipated that excess runoff volumes, beyond the capacity of the infiltration facilities, will be discharged under the WSDOT HRM flow control exemption criteria. However, off-site run-on and on-site runoff conditions have not been field verified or hydraulically analyzed to determine whether all of the flow control exemption criteria (Minimum Requirement #6) have been met.

While the new pollution generating impervious surface area proposed for the project does not exceed the thresholds outlined in the HRM, some water quality BMPs are provided by the proposed infiltration trenches and bioretention raingardens and will enhance the existing roadway ditches.

Some culvert replacements and upgrades associated with driveway reconstruction will occur along the project length as well as regrading of existing ditches in areas where the trail construction footprint encroaches on the existing ditch footprint.

Conclusions and Recommendations

The proposed conveyance and storm water improvements for the West Side Trail project will meet the WSDOT HRM requirements for storm water management based on the new impervious area proposed for the project, proposed infiltration flow control facilities, and supplemental application of flow control exemptions along SR202. The project takes advantage of on-site opportunities to the greatest extent feasible by including infiltration BMPs. In addition, the project proposes to utilize the direct discharge to a flow control exempt water body (Snoqualmie River) exemption from Minimum Requirement #6 - Flow Control for any runoff that exceeds the capacity of the infiltration flow control facilities.

The following is recommended during final design to confirm preliminary assumptions:

1. Field verify and analyze the downstream conveyance systems from the project outfall to the Snoqualmie River.
2. Confirm infiltration rates and design facility sizes during final design.

Exhibit ____

Significant Discussion Topics during Agency (Client) Memorandum Review

The below summary represent relevant discussion occurring during agency memorandum review in validating presented information and incorporating memorandum changes to reflect final agency direction.

[To be completed at time of final concurrence]