Contract Provisions and Plans

For Construction of:

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT
PROJECT #WA402229
SRFB Project No. 18-1490R

SKAGIT COUNTY PUBLIC WORKS DEPARTMENT

Ovenell Slough (Cedar Grove Culvert) Replacement
Skagit County Project #WA402229
SRFB Project No. 18-1490R

This Contract provides for the replacement of an existing road culvert at Ovenell Slough and Cedar Grove Avenue in Skagit County, near Concrete, Washington. The work includes, but is not limited to: removal of an existing culvert, construction of a new channel beneath the proposed structure within the Skagit County right-of-way; installation of a new pre-cast concrete girder single span bridge with pile foundations; installation of scour protection in the form of an engineered log jam; improvements to the trail approaches on either side of the bridge and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications

Schedule: All work is to be completed within 110 working days from Notice to Proceed.

Measurement & Payment: Each item will be per the bid proposal.

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT

Skagit County Project #WA402229
SRFB Project No. 18-1490R

SKAGIT COUNTY, WASHINGTON

2021
SKAGIT COUNTY
DEPARTMENT OF PUBLIC WORKS
MOUNT VERNON, WASHINGTON 98273-5625

NOTICE TO ALL PLAN HOLDERS

Copies of the Plans and specifications are available at Skagit County Public Works, 1800 Continental Place, Mount Vernon, Washington 98273-5625. Telephone: (360) 416-1400. You may receive the bid information electronically; copies of the plans and specifications are available at: http://www.skagitcounty.net/rfp

APPROVED:

Paul A. Randall-Grutter, P.E.
County Engineer

MAPS, PLANS, AND SPECIFICATIONS APPROVED:

BOARD OF COUNTY COMMISSIONERS
SKAGIT COUNTY, WASHINGTON

Lisa Janicki, Chair

Peter Browning, Commissioner

Ron Wesen, Commissioner

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT

Skagit County Project #WA402229
SRFB Project No. 18-1490R

CERTIFICATION

I hereby certify that these contract documents were prepared by me or under my direct supervision, and that I am a duly registered Professional Engineer under the laws of the State of Washington.

Engineers of Record

Certification of all sections
Division 1

Paul A. Randall-Grutter, P.E.
Skagit County

Certification of Divisions 2-9
Section 2-09 and Division 6

Anne M. F. Streufert, P.E., S.E.
KPFF

Sections 2-01, 2-02, 5-04, 8-01 and 8-07

Justin Matthews, P.E.

Sections 8-02, 8-30, 9-10 and 9-37

Leif Embertson, P.E.

NOTICE OF CALL FOR BIDS

NOTICE IS HEREBY GIVEN by SKAGIT COUNTY that sealed bids will be received and publicly opened in the Commissioners' Hearing Room, 1800 Continental Place, Mount Vernon, WA 98273 on **Monday, October 18, 2021 at the hour of 2:45 p.m.,** or as soon thereafter as possible. Attendance will be remote by computer, tablet or smart phone:
https://us06web.zoom.us/j/87180001980?pwd=cEVGUGkxZ3NkQkhYSnhBMEo2RTQrdz09
or by telephone: 1 253 215 8782; Meeting ID: 871 8000 1980 Passcode: 143573

PROJECT DESCRIPTION: Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229, SRFB Project No. 18-1490R

This Contract provides for the replacement of an existing road culvert at Ovenell Slough and Cedar Grove Avenue in Skagit County, near Concrete, Washington. The work includes, but is not limited to: removal of an existing culvert, construction of a new channel beneath the proposed structure within the Skagit County right-of-way; installation of a new pre-cast concrete girder single span bridge with pile foundations; installation of scour protection in the form of an engineered log jam; improvements to the trail approaches on either side of the bridge and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications

The time limit for physical completion of work is a total of 110 WORKING DAYS. The Engineer's Estimate Range is $531,190 to $615,062.

Contractor and all subcontractors shall have a contractor's license to work in the State of Washington.

Information, copies of maps, plans, specifications, and addenda for this project will be available on-line beginning **September 30, 2021** at http://www.skagitcounty.net/rfp or obtained at Skagit County Public Works Department, 1800 Continental Place, Mount Vernon, Washington; (360) 416-1400. Contractors who download plans and specifications are advised to e-mail kelleym@co.skagit.wa.us to be added to plan holders list to receive any addenda that may be issued.

An optional, non-mandatory pre-bid meeting will be held **Tuesday, October 5th at 11:00 a.m. at the project site, just north of 8165 Cedar Grove, Concrete, WA 98237.** All technical questions regarding this project are to be submitted **no later than 3:00 p.m., Friday, October 8, 2021** in writing to Emily Derenne, Project Manager, or by e-mail to emilyjd@co.skagit.wa.us with the subject line reading, **"Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229"**. All project specific questions and response to answers for this project will be available on-line as received. **All Addenda will be posted on-line for this project by 5:00 p.m. Monday, October 11, 2021**. If further Addenda are required, the bid opening will be postponed.

All bid envelopes must be plainly marked on the outside, "**Sealed Bid for Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229".** Sealed bids shall be received by one of the following delivery methods before **Monday, October 18, 2021 at the hour of 2:45 p.m**. Proposals are to be submitted on the forms provided in the Bid Proposal Packet. Incomplete proposals and proposals received after the time fixed for the opening cannot be considered. Oral, telephonic, telegraphic, electronic or faxed proposals will not be accepted. All bidding shall be based upon compliance with the Contract Provisions and Plans.

1. **Hand delivered**: Bids delivered in person shall be received only at the office of the SKAGIT COUNTY COMMISSIONERS, Reception Desk, 1800 Continental Place, Suite 100, Mount Vernon, WA 98273-5625.
2. **Via mail**: Bids shall be mailed to the SKAGIT COUNTY COMMISSIONERS, 1800 Continental Place, Suite 100, Mount Vernon, WA 98273-5625.

BID GUARANTY: No bid will be considered unless accompanied by a surety company bid bond, or a certified or cashier's check payable to the order of Skagit County for a sum not less than five percent (5%) of the total amount of the bid. A Contract Bond covering performance and payment will be required with the contract. Washington State Prevailing Wage Rates apply to this contract and bidders are advised to consider this charge when tabulating bids.

Skagit County reserves the right to reject any or all bids, and the right to waive any informalities or irregularities in any bid or in any bidding and to further award the Project to the lowest, responsive, responsible bidder whose bid complies with all of the prescribed formalities, as it best serves the interest of Skagit County. After the date and hour set for the opening of bids, no bidder may withdraw its bid unless the award of the contract is delayed for a period exceeding forty five (45) calendar days following bid opening. All bidders agree to be bound by their bids until the expiration of this stated time period.

Skagit County, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252,42 U.S.C. 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award

For questions regarding Skagit County's Title VI Program, you may contact the Public Works Department's Title VI Liaison, Grace K. Kane, P.E., at (360) 416-1400

The Board of Skagit County Commissioners reserves the right to reject any or all bids.

NOTICE GIVEN BY ORDER OF THE BOARD OF SKAGIT COUNTY COMMISSIONERS this 27 day of September, 2021.

Clerk of the Board

Published: Skagit Valley Herald and the Daily Journal of Commerce – September 30 and October 7, 2021

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INTRODUCTION TO THE SPECIAL PROVISIONS

(December 10, 2020 APWA GSP)

The work on this project shall be accomplished in accordance with the *Standard Specifications for Road, Bridge and Municipal Construction*, 2021 edition, as issued by the Washington State Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter (hereafter "Standard Specifications"). The Standard Specifications, as modified or supplemented by these Special Provisions, all of which are made a part of the Contract Documents, shall govern all of the Work.

These Special Provisions are made up of both General Special Provisions (GSPs) from various sources, which may have project-specific fill-ins; and project-specific Special Provisions. Each Provision either supplements, modifies, or replaces the comparable Standard Specification, or is a new Provision. The deletion, amendment, alteration, or addition to any subsection or portion of the Standard Specifications is meant to pertain only to that particular portion of the section, and in no way should it be interpreted that the balance of the section does not apply.

The project-specific Special Provisions are not labeled as such. The GSPs are labeled under the headers of each GSP, with the effective date of the GSP and its source. For example:

(March 8, 2013 APWA GSP)
(April 1, 2013 WSDOT GSP)
(May 1, 2013 SkagitR)

Also incorporated into the Contract Documents by reference are:

- *Manual on Uniform Traffic Control Devices for Streets and Highways*, currently adopted edition, with Washington State modifications, if any
- *Standard Plans for Road, Bridge and Municipal Construction*, WSDOT/APWA, current edition

Contractor shall obtain copies of these publications, at Contractor's own expense.

Division 1
General Requirements

DESCRIPTION OF WORK

(March 13, 1995)
This Contract provides for the improvement of *** Ovenell Slough and Cedar Grove Avenue. The work includes, but is not limited to: removal of an existing culvert, construction of a new channel beneath the proposed structure within the Skagit County right-of-way; installation of a new pre-cast concrete girder single span bridge with pile foundations; installation of scour protection in the form of an engineered log jam; improvements to the trail approaches on either side of the bridge *** and other work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications.

DEFINITION AND TERMS

1-01.3 Definitions

(January 4, 2016 APWA GSP)

Delete the heading **Completion Dates** and the three paragraphs that follow it, and replace them with the following:

Dates

Bid Opening Date
The date on which the Contracting Agency publicly opens and reads the Bids.

Award Date
The date of the formal decision of the Contracting Agency to accept the lowest responsible and responsive Bidder for the Work.

Contract Execution Date
The date the Contracting Agency officially binds the Agency to the Contract.

Notice to Proceed Date
The date stated in the Notice to Proceed on which the Contract time begins.

Substantial Completion Date
The day the Engineer determines the Contracting Agency has full and unrestricted use and benefit of the facilities, both from the operational and safety standpoint, any remaining traffic disruptions will be rare and brief, and only minor incidental work, replacement of temporary substitute facilities, plant establishment periods, or correction or repair remains for the Physical Completion of the total Contract.

Physical Completion Date
The day all of the Work is physically completed on the project. All documentation required by the Contract and required by law does not necessarily need to be furnished by the Contractor by this date.

Completion Date
The day all the Work specified in the Contract is completed and all the obligations of the Contractor under the contract are fulfilled by the Contractor. All documentation required by the Contract and required by law must be furnished by the Contractor before establishment of this date.

Final Acceptance Date
The date on which the Contracting Agency accepts the Work as complete.

Supplement this Section with the following:

All references in the Standard Specifications, Amendments, or WSDOT General Special Provisions, to the terms “Department of Transportation”, “Washington State Transportation Commission”, “Commission”, “Secretary of Transportation”, “Secretary”, “Headquarters”, and “State Treasurer” shall be revised to read “Contracting Agency”.

All references to the terms “State” or “state” shall be revised to read “Contracting Agency” unless the reference is to an administrative agency of the State of Washington, a State statute or regulation, or the context reasonably indicates otherwise.

All references to “State Materials Laboratory” shall be revised to read “Contracting Agency designated location”.

All references to “final contract voucher certification” shall be interpreted to mean the Contracting Agency form(s) by which final payment is authorized, and final completion and acceptance granted.

Additive
A supplemental unit of work or group of bid items, identified separately in the Bid Proposal, which may, at the discretion of the Contracting Agency, be awarded in addition to the base bid.

Alternate
One of two or more units of work or groups of bid items, identified separately in the Bid Proposal, from which the Contracting Agency may make a choice between different methods or material of construction for performing the same work.

Business Day
A business day is any day from Monday through Friday except holidays as listed in Section 1-08.5.

Contract Bond
The definition in the Standard Specifications for “Contract Bond” applies to whatever bond form(s) are required by the Contract Documents, which may be a combination of a Payment Bond and a Performance Bond.

Contract Documents
See definition for “Contract”.

Contract Time
The period of time established by the terms and conditions of the Contract within which the Work must be physically completed.

Notice of Award
The written notice from the Contracting Agency to the successful Bidder signifying the Contracting Agency’s acceptance of the Bid Proposal.

Notice to Proceed
The written notice from the Contracting Agency or Engineer to the Contractor authorizing and directing the Contractor to proceed with the Work and establishing the date on which the Contract time begins.

Traffic
Both vehicular and non-vehicular traffic, such as pedestrians, bicyclists, wheelchairs, and equestrian traffic.

1-02 BID PROCEDURES AND CONDITIONS

1-02.1 Prequalification of Bidders

Delete this section and replace it with the following:

1-02.1 Qualifications of Bidder

(January 24, 2011 APWA GSP)

Before award of a public works contract, a bidder must meet at least the minimum qualifications of RCW 39.04.350(1) to be considered a responsible bidder and qualified to be awarded a public works project.

1-02.2 Plans and Specifications

(June 27, 2011 APWA GSP)

Delete this section and replace it with the following:

Information as to where Bid Documents can be obtained or reviewed can be found in the Call for Bids (Advertisement for Bids) for the work.

After award of the contract, plans and specifications will be issued to the Contractor at no cost as detailed below:

To Prime Contractor	No. of Sets	Basis of Distribution
Reduced plans (11" x 17")	*** 4 ***	Furnished automatically upon award.
Contract Provisions	*** 4 ***	Furnished automatically upon award.
Large plans (e.g., 22" x 34")	*** 2 ***	Furnished only upon request.

Additional plans and Contract Provisions may be obtained by the Contractor from the source stated in the Call for Bids, at the Contractor's own expense.

Examination of Plans, Specifications and Site of Work

1-02.4(2) Subsurface Information

The second sentence in the first paragraph is revised to read:

(******)
The Geotechnical Report, including boring logs, is included as an appendix to the Special Provisions and shall be considered as part of the Contract.

1-02.5 Proposal Forms

(July 31, 2017 APWA GSP)

Delete this section and replace it with the following:

The Proposal Form will identify the project and its location and describe the work. It will also list estimated quantities, units of measurement, the items of work, and the materials to be furnished at the unit bid prices. The bidder shall complete spaces on the proposal form that call for, but are not limited to, unit prices; extensions; summations; the total bid amount; signatures; date; and, where applicable, retail sales taxes and acknowledgment of addenda; the bidder's name, address, telephone number, and signature; the bidder's UDBE/DBE/M/WBE commitment, if applicable; a State of Washington Contractor's Registration Number; and a Business License Number, if applicable. Bids shall be completed by typing or shall be printed in ink by hand, preferably in black ink. The required certifications are included as part of the Proposal Form.

The Contracting Agency reserves the right to arrange the proposal forms with alternates and additives, if such be to the advantage of the Contracting Agency. The bidder shall bid on all alternates and additives set forth in the Proposal Form unless otherwise specified.

Preparation of Proposal

Add the following new section:

1-02.6(1) Recycled Materials Proposal

(January 4, 2016 APWA GSP)

The Bidder shall submit with the Bid, its proposal for incorporating recycled materials into the project, using the form provided in the Contract Provisions.

1-02.10 Withdrawing, Revising, or Supplementing Proposal

(July 23, 2015 APWA GSP)

Delete this section, and replace it with the following:

After submitting a physical Bid Proposal to the Contracting Agency, the Bidder may withdraw, revise, or supplement it if:

1. The Bidder submits a written request signed by an authorized person and physically delivers it to the place designated for receipt of Bid Proposals, and
2. The Contracting Agency receives the request before the time set for receipt of Bid Proposals, and
3. The revised or supplemented Bid Proposal (if any) is received by the Contracting Agency before the time set for receipt of Bid Proposals.

If the Bidder's request to withdraw, revise, or supplement its Bid Proposal is received before the time set for receipt of Bid Proposals, the Contracting Agency will return the unopened Proposal package to the Bidder. The Bidder must then submit the revised or supplemented package in its entirety. If the Bidder does not submit a revised or supplemented package, then its bid shall be considered withdrawn.

Late revised or supplemented Bid Proposals or late withdrawal requests will be date recorded by the Contracting Agency and returned unopened. Mailed, emailed, or faxed requests to withdraw, revise, or supplement a Bid Proposal are not acceptable.

Public Opening of Proposals

(July 14, 2018 SkagitR)

Section 1-02.12 is supplemented with the following:

Sealed bids shall be received at the time and location specified in the Call for Bids, unless modified by addenda.

1-02.13 Irregular Proposals

(October 1, 2020 APWA GSP)

Delete this section and replace it with the following:

1. A Proposal will be considered irregular and will be rejected if:

a. The Bidder is not prequalified when so required;
b. The authorized Proposal form furnished by the Contracting Agency is not used or is altered;
c. The completed Proposal form contains any unauthorized additions, deletions, alternate Bids, or conditions;
d. The Bidder adds provisions reserving the right to reject or accept the award, or enter into the Contract;
e. A price per unit cannot be determined from the Bid Proposal;
f. The Proposal form is not properly executed;
g. The Bidder fails to submit or properly complete a Subcontractor list, if applicable, as required in Section 1-02.6;
h. The Bidder fails to submit or properly complete a Disadvantaged Business Enterprise Certification, if applicable, as required in Section 1-02.6;
i. The Bidder fails to submit written confirmation from each DBE firm listed on the Bidder's completed DBE Utilization Certification that they are in agreement with the bidder's DBE participation commitment, if applicable, as required in Section 1-02.6, or if the written confirmation that is submitted fails to meet the requirements of the Special Provisions;
j The Bidder fails to submit DBE Good Faith Effort documentation, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to demonstrate that a Good Faith Effort to meet the Condition of Award was made;
k. The Bidder fails to submit a DBE Bid Item Breakdown form, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to meet the requirements of the Special Provisions;
l. The Bidder fails to submit DBE Trucking Credit Forms, if applicable, as required in Section 1-02.6, or if the documentation that is submitted fails to meet the requirements of the Special Provisions;
m. The Bid Proposal does not constitute a definite and unqualified offer to meet the material terms of the Bid invitation; or
n. More than one Proposal is submitted for the same project from a Bidder under the same or different names.

2. A Proposal may be considered irregular and may be rejected if:
   a. The Proposal does not include a unit price for every Bid item;
   b. Any of the unit prices are excessively unbalanced (either above or below the amount of a reasonable Bid) to the potential detriment of the Contracting Agency;
   c. Receipt of Addenda is not acknowledged;
   d. A member of a joint venture or partnership and the joint venture or partnership submit Proposals for the same project (in such an instance, both Bids may be rejected); or
   e. If Proposal form entries are not made in ink.

1-02.14 Disqualification of Bidders

(May 17, 2018 APWA GSP, Option A)

Delete this section and replace it with the following:

A Bidder will be deemed not responsible if the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1), as amended.

The Contracting Agency will verify that the Bidder meets the mandatory bidder responsibility criteria in RCW 39.04.350(1). To assess bidder responsibility, the Contracting Agency reserves the right to request documentation as needed from the Bidder and third parties concerning the Bidder's compliance with the mandatory bidder responsibility criteria.

If the Contracting Agency determines the Bidder does not meet the mandatory bidder responsibility criteria in RCW 39.04.350(1) and is therefore not a responsible Bidder, the Contracting Agency shall notify the Bidder in writing, with the reasons for its determination. If the Bidder disagrees with this determination, it may appeal the determination within two (2) business days of the Contracting Agency's determination by presenting its appeal and any additional information to the Contracting Agency. The Contracting Agency will consider the appeal and any additional information before issuing its final determination. If the final determination affirms that the Bidder is not responsible, the Contracting Agency will not execute a contract with any other Bidder until at least two business days after the Bidder determined to be not responsible has received the Contracting Agency's final determination.

1-02.15 Pre Award Information

(August 14, 2013 APWA GSP)

Revise this section to read:

Before awarding any contract, the Contracting Agency may require one or more of these items or actions of the apparent lowest responsible bidder:

1. A complete statement of the origin, composition, and manufacture of any or all materials to be used,
2. Samples of these materials for quality and fitness tests,
3. A progress schedule (in a form the Contracting Agency requires) showing the order of and time required for the various phases of the work,
4. A breakdown of costs assigned to any bid item,
5. Attendance at a conference with the Engineer or representatives of the Engineer,
6. Obtain, and furnish a copy of, a business license to do business in the city or county where the work is located.
7. Any other information or action taken that is deemed necessary to ensure that the bidder is the lowest responsible bidder.

Award and Execution of Contract

Consideration of Bids

1-03.1(1) Identical Bid Totals

(January 4, 2016 APWA GSP)

Revise this section to read:

After opening Bids, if two or more lowest responsive Bid totals are exactly equal, then the tie-breaker will be the Bidder with an equal lowest bid, that proposed to use the highest percentage of recycled materials in the Project, per the form submitted with the Bid Proposal. If those percentages are also exactly equal, then the tie-breaker will be determined by drawing as follows: Two or more slips of paper will be marked as follows: one marked "Winner" and the other(s) marked "unsuccessful". The slips will be folded to make the marking unseen. The slips will be placed inside a box. One authorized

representative of each Bidder shall draw a slip from the box. Bidders shall draw in alphabetic order by the name of the firm as registered with the Washington State Department of Licensing. The slips shall be unfolded and the firm with the slip marked "Winner" will be determined to be the successful Bidder and eligible for Award of the Contract. Only those Bidders who submitted a Bid total that is exactly equal to the lowest responsive Bid, and with a proposed recycled m aterials percentage that is exactly equal to the highest proposed recycled materials amount, are eligible to draw.

1-03.3 Execution of Contract

(October 1, 2005 APWA GSP)

Revise this section to read:

Copies of the Contract Provisions, including the unsigned Form of Contract, will be available for signature by the successful bidder on the first business day following award. The number of copies to be executed by the Contractor will be determined by the Contracting Agency.

Within *** 21 *** calendar days after the award date, the successful bidder shall return the signed Contracting Agency-prepared contract, an insurance certification as required by Section 1-07.18, and a satisfactory bond as required by law and Section 1-03.4. Before execution of the contract by the Contracting Agency, the successful bidder shall provide any pre-award information the Contracting Agency may require under Section 1-02.15.

Until the Contracting Agency executes a contract, no proposal shall bind the Contracting Agency nor shall any work begin within the project limits or within Contracting Agency-furnished sites. The Contractor shall bear all risks for any work begun outside such areas and for any materials ordered before the contract is executed by the Contracting Agency.

If the bidder experiences circumstances beyond their control that prevents return of the contract documents within the calendar days after the award date stated above, the Contracting Agency may grant up to a maximum of ***10 *** additional calendar days for return of the documents, provided the Contracting Agency deems the circumstances warrant it.

1-03.4 Contract Bond

(July 23, 2015 APWA GSP)

Delete the first paragraph and replace it with the following:

The successful bidder shall provide executed payment and performance bond(s) for the full contract amount. The bond may be a combined payment and performance bond; or be separate payment and performance bonds. In the case of separate payment and performance bonds, each shall be for the full contract amount. The bond(s) shall:

1. Be on Contracting Agency-furnished form(s);
2. Be signed by an approved surety (or sureties) that:
   a. Is registered with the Washington State Insurance Commissioner, and
   b. Appears on the current Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner,
3. Guarantee that the Contractor will perform and comply with all obligations, duties, and conditions under the Contract, including but not limited to the duty and obligation

to indemnify, defend, and protect the Contracting Agency against all losses and claims related directly or indirectly from any failure:

a. Of the Contractor (or any of the employees, subcontractors, or lower tier subcontractors of the Contractor) to faithfully perform and comply with all contract obligations, conditions, and duties, or

b. Of the Contractor (or the subcontractors or lower tier subcontractors of the Contractor) to pay all laborers, mechanics, subcontractors, lower tier subcontractors, material person, or any other person who provides supplies or provisions for carrying out the work;

4. Be conditioned upon the payment of taxes, increases, and penalties incurred on the project under titles 50, 51, and 82 RCW; and
5. Be accompanied by a power of attorney for the Surety's officer empowered to sign the bond; and
6. Be signed by an officer of the Contractor empowered to sign official statements (sole proprietor or partner). If the Contractor is a corporation, the bond(s) must be signed by the president or vice president, unless accompanied by written proof of the authority of the individual signing the bond(s) to bind the corporation (i.e., corporate resolution, power of attorney, or a letter to such effect signed by the president or vice president).

1-03.7 Judicial Review

(November 30, 2018 APWA GSP)
Revise this section to read:

Any decision made by the Contracting Agency regarding the Award and execution of the Contract or Bid rejection shall be conclusive subject to the scope of judicial review permitted under Washington Law. Such review, if any, shall be timely filed in the Superior Court of the county where the Contracting Agency headquarters is located, provided that where an action is asserted against a county, RCW 36.01.050 shall control venue and jurisdiction.

SCOPE OF THE WORK

1-04.2 Coordination of Contract Documents, Plans, Special Provisions, Specifications, and Addenda

(December 10, 2020 APWA GSP)
Revise the second paragraph to read:

Any inconsistency in the parts of the contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 2 over 3, 3 over 4, and so forth):

1. Addenda,
2. Proposal Form,
3. Special Provisions,
4. Contract Plans,
5. Standard Specifications,
6. Contracting Agency's Standard Plans or Details (if any), and
7. WSDOT Standard Plans for Road, Bridge, and Municipal Construction.

Changes

Section 1-04.4 is supplemented with the following:

(April 30, 2020)

Change Orders will be transmitted electronically to the Contractor for signature. The Contractor shall apply all signatures electronically using the software provided by the Contracting Agency. Within 21 days of execution of the Contract, the Contractor shall submit a Type 1 Working Drawing consisting of the names, email addresses, and text-message capable phone numbers for the authorized change order signers and shall bear the name, phone number and email of the officer providing this authorization. Delegation of authority to sign Change Orders shall be by the officer authorized to sign the Contract in accordance with Section 1-02.1.

CONTROL OF WORK

Conformity With And Deviations From Plans And Stakes

Section 1-05.4 is supplemented with the following:

(August 7, 2017)

Contractor Surveying - Structure

Copies of the Contracting Agency provided primary survey control data are available for the bidder's inspection at the office of the Engineer.

The Contractor shall be responsible for setting, maintaining, and resetting all alignment stakes, slope stakes, and grades necessary for the construction of bridges, noise walls, and retaining walls. Except for the survey control data to be furnished by the Contracting Agency, calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Contractor's responsibility.

The Contractor shall inform the Engineer when monuments are discovered that were not identified in the Plans and construction activity may disturb or damage the monuments. All monuments noted on the plans “DO NOT DISTURB” shall be protected throughout the length of the project or be replaced at the Contractors expense.

Detailed survey records shall be maintained, including a description of the work performed on each shift, the methods utilized, and the control points used. The record shall be adequate to allow the survey to be reproduced. A copy of each day's record shall be provided to the Engineer within three working days after the end of the shift.

The meaning of words and terms used in this provision shall be as listed in "Definitions of Surveying and Associated Terms" current edition, published by the American Congress on Surveying and Mapping and the American Society of Civil Engineers.

The survey work by the Contractor shall include but not be limited to the following:

1. Verify the primary horizontal and vertical control furnished by the Contracting Agency, and expand into secondary control by adding stakes and hubs as well as additional survey control needed for the project. Provide descriptions of secondary control to the Contracting Agency. The description shall include coordinates and elevations of all secondary control points.

2. Establish, by placing hubs and/or marked stakes, the location with offsets of foundation shafts and piles.

3. Establish offsets to footing centerline of bearing for structure excavation.

4. Establish offsets to footing centerline of bearing for footing forms.

5. Establish wing wall, retaining wall, and noise wall horizontal alignment.

6. Establish retaining wall top of wall profile grade.

7. Establish elevation benchmarks for all substructure formwork.

8. Check elevations at top of footing concrete line inside footing formwork immediately prior to concrete placement.

9. Check column location and pier centerline of bearing at top of footing immediately prior to concrete placement.

10. Establish location and plumbness of column forms, and monitor column plumbness during concrete placement.

11. Establish pier cap and crossbeam top and bottom elevations and centerline of bearing.

12. Check pier cap and crossbeam top and bottom elevations and centerline of bearing prior to and during concrete placement.

13. Establish grout pad locations and elevations.

14. Establish structure bearing locations and elevations, including locations of anchor bolt assemblies.

15. Establish box girder bottom slab grades and locations.

16. Establish girder and/or web wall profiles and locations.

17. Establish diaphragm locations and centerline of bearing.

18. Establish roadway slab alignment, grades and provide dimensions from top of girder to top of roadway slab. Set elevations for deck paving machine rails.

19. Establish traffic barrier and curb profile.

20. Profile all girders prior to the placement of any deadload or construction live load that may affect the girder's profile.

The Contractor shall provide the Contracting Agency copies of any calculations and staking data when requested by the Engineer.

To facilitate the establishment of these lines and elevations, the Contracting Agency will provide the Contractor with the following primary survey and control information:

1. Descriptions of two primary control points used for the horizontal and vertical control. Primary control points will be described by reference to the project alignment and the coordinate system and elevation datum utilized by the project. In addition, the Contracting Agency will supply horizontal coordinates for the beginning and ending points and for each Point of Intersection (PI) on each alignment included in the project.

2. Horizontal coordinates for the centerline of each bridge pier.

3. Computed elevations at top of bridge roadway decks at one-tenth points along centerline of each girder web. All form grades and other working grades shall be calculated by the Contractor.

The Contractor shall give the Contracting Agency three weeks notification to allow adequate time to provide the data outlined in Items 2 and 3 above. The Contractor shall ensure a surveying accuracy within the following tolerances:

	Vertical	Horizontal
1. Stationing on structures		±0.02 feet
2. Alignment on structures		±0.02 feet
3. Superstructure elevations	±0.01 feet variation from plan elevation	
4. Substructure	±0.02 feet variation from Plan grades.	

The Contracting Agency may spot-check the Contractor's surveying. These spot-checks will not change the requirements for normal checking by the Contractor.

When staking the following items, the Contractor shall perform independent checks from different secondary control to ensure that the points staked for these items are within the specified survey accuracy tolerances:

Piles
Shafts
Footings
Columns

The Contractor shall calculate coordinates for the points associated with piles, shafts, footings and columns. The Contracting Agency will verify these coordinates prior to issuing approval to the Contractor for commencing with the survey work. The Contracting Agency will require up to seven calendar days from the date the data is received to issuing approval.

Contract work to be performed using contractor-provided stakes shall not begin until the stakes are approved by the Contracting Agency. Such approval shall not relieve the Contractor of responsibility for the accuracy of the stakes.

Payment

Payment will be made for the following bid item when included in the proposal:

"Structure Surveying", lump sum.

The lump sum contract price for "Structure Surveying" shall be full pay for all labor, equipment, materials, and supervision utilized to perform the Work specified, including any resurveying, checking, correction of errors, replacement of missing or damaged stakes, and coordination efforts.

(August 7, 2017)

Contractor Surveying - Roadway

Copies of the Contracting Agency provided primary survey control data are available for the bidder's inspection at the office of the Engineer.

The Contractor shall be responsible for setting, maintaining, and resetting all alignment stakes, slope stakes, and grades necessary for the construction of the roadbed, drainage, surfacing, paving, channelization and pavement marking, illumination and signals, guardrails and barriers, and signing. Except for the survey control data to be furnished by the Contracting Agency, calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Contractor's responsibility.

The Contractor shall inform the Engineer when monuments are discovered that were not identified in the Plans and construction activity may disturb or damage the monuments. All monuments noted on the plans “DO NOT DISTURB” shall be protected throughout the length of the project or be replaced at the Contractors expense.

Detailed survey records shall be maintained, including a description of the work performed on each shift, the methods utilized, and the control points used. The record shall be adequate to allow the survey to be reproduced. A copy of each day's record shall be provided to the Engineer within three working days after the end of the shift.

The meaning of words and terms used in this provision shall be as listed in "Definitions of Surveying and Associated Terms" current edition, published by the American Congress on Surveying and Mapping and the American Society of Civil Engineers.

The survey work shall include but not be limited to the following:

1. Verify the primary horizontal and vertical control furnished by the Contracting Agency, and expand into secondary control by adding stakes and hubs as well as additional survey control needed for the project. Provide descriptions of secondary control to the Contracting Agency. The description shall include coordinates and elevations of all secondary control points.

2. Establish, the centerlines of all alignments, by placing hubs, stakes, or marks on centerline or on offsets to centerline at all curve points (PCs, PTs, and PIs) and at points on the alignments spaced no further than 50 feet.

3. Establish clearing limits, placing stakes at all angle points and at intermediate points not more than 50 feet apart. The clearing and grubbing limits shall be 5 feet beyond the toe of a fill and 10 feet beyond the top of a cut unless otherwise shown in the Plans.

4. Establish grading limits, placing slope stakes at centerline increments not more than 50 feet apart. Establish offset reference to all slope stakes. If Global Positioning Satellite (GPS) Machine Controls are used to provide grade control, then slope stakes may be omitted at the discretion of the Contractor

5. Establish the horizontal and vertical location of all drainage features, placing offset stakes to all drainage structures and to pipes at a horizontal interval not greater than 25 feet.

6. Establish roadbed and surfacing elevations by placing stakes at the top of subgrade and at the top of each course of surfacing. Subgrade and surfacing stakes shall be set at horizontal intervals not greater than 50 feet in tangent sections, 25 feet in curve sections with a radius less than 300 feet, and at 10-foot intervals in intersection radii with a radius less than 10 feet. Transversely, stakes shall be placed at all locations where the roadway slope changes and at additional points such that the transverse spacing of stakes is not more than 12 feet. If GPS Machine Controls are used to provide grade control, then roadbed and surfacing stakes may be omitted at the discretion of the Contractor.

7. Establish intermediate elevation benchmarks as needed to check work throughout the project.

8. Provide references for paving pins at 25-foot intervals or provide simultaneous surveying to establish location and elevation of paving pins as they are being placed.

9. For all other types of construction included in this provision, (including but not limited to channelization and pavement marking, illumination and signals, guardrails and barriers, and signing) provide staking and layout as necessary to adequately locate, construct, and check the specific construction activity.

10. Contractor shall determine if changes are needed to the profiles or roadway sections shown in the Contract Plans in order to achieve proper smoothness and drainage where matching into existing features, such as a smooth transition from new pavement to existing pavement. The Contractor shall submit these changes to the Engineer for review and approval 10 days prior to the beginning of work.

The Contractor shall provide the Contracting Agency copies of any calculations and staking data when requested by the Engineer.

To facilitate the establishment of these lines and elevations, the Contracting Agency will provide the Contractor with primary survey control information consisting of descriptions of two primary control points used for the horizontal and vertical control, and descriptions of two additional primary control points for every additional three miles of project length. Primary control points will be described by reference to the project alignment and the coordinate system and elevation datum utilized by the project. In addition, the Contracting Agency will supply horizontal coordinates for the beginning and ending points and for each Point of Intersection (PI) on each alignment included in the project.

The Contractor shall ensure a surveying accuracy within the following tolerances:

	Vertical	Horizontal
Slope stakes	±0.10 feet	±0.10 feet
Subgrade grade stakes set 0.04 feet below grade	±0.01 feet	±0.5 feet (parallel to alignment) ±0.1 feet (normal to alignment)
Stationing on roadway	N/A	±0.1 feet
Alignment on roadway	N/A	±0.04 feet
Surfacing grade stakes	±0.01 feet	±0.5 feet (parallel to alignment) ±0.1 feet (normal to alignment)
Roadway paving pins for surfacing or paving	±0.01 feet	±0.2 feet (parallel to alignment) ±0.1 feet (normal to alignment)

The Contracting Agency may spot-check the Contractor's surveying. These spot-checks will not change the requirements for normal checking by the Contractor.

When staking roadway alignment and stationing, the Contractor shall perform independent checks from different secondary control to ensure that the points staked are within the specified survey accuracy tolerances.

The Contractor shall calculate coordinates for the alignment. The Contracting Agency will verify these coordinates prior to issuing approval to the Contractor for commencing with the work. The Contracting Agency will require up to seven calendar days from the date the data is received.

Contract work to be performed using contractor-provided stakes shall not begin until the stakes are approved by the Contracting Agency. Such approval shall not relieve the Contractor of responsibility for the accuracy of the stakes.

Stakes shall be marked in accordance with Standard Plan A10.10. When stakes are needed that are not described in the Plans, then those stakes shall be marked, at no additional cost to the Contracting Agency as ordered by the Engineer.

Payment

Payment will be made for the following bid item when included in the proposal:

"Roadway Surveying", lump sum.

The lump sum contract price for "Roadway Surveying" shall be full pay for all labor, equipment, materials, and supervision utilized to perform the Work specified, including any resurveying, checking, correction of errors, replacement of missing or damaged stakes, and coordination efforts.

(April 2, 2018)
Contractor Surveying – ADA Features

ADA Feature Staking Requirements
The Contractor shall be responsible for setting, maintaining, and resetting all alignment stakes, and grades necessary for the construction of the ADA features. Calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Contractor's responsibility. The Contractor shall build the ADA features within the specifications in the Standard Plans and contract documents.

ADA Feature As-Built Measurements
The Contractor shall be responsible for providing electronic As-Built records of all ADA feature improvements completed in the Contract.

The survey work shall include but not be limited to completing the measurements, recording the required measurements and completing other data fill-ins found on the ADA Measurement Forms, and transmitting the electronic Forms to the Engineer. The ADA Measurement Forms are found at the following website location:

http://www.wsdot.wa.gov/Design/ADAGuidance.htm

In the instance where an ADA Feature does not meet accessibility requirements, all work to replace non-conforming work and then to measure, record the as-built measurements, and transmit the electronic Forms to the Engineer shall be completed at no additional cost to the Contracting Agency, as ordered by the Engineer.

Payment
Payment will be made for the following bid item that is included in the Proposal:

"ADA Features Surveying", lump sum.

The unit Contract price per lump sum for "ADA Features Surveying" shall be full pay for all the Work as specified.

(******)
Payment
Payment for Surveying will be made in accordance with Section 1-04.1 for the following bid item:

"Contractor Surveying", lump sum.

The lump sum contract price for "Contractor Surveying" shall be full pay for all labor, equipment, materials, and supervision utilized to perform the work included to complete the work for “Contractor Surveying-Structure", “Contractor Surveying- Roadway” and “ADA Features Surveying” as specified.

1-05.7 Removal of Defective and Unauthorized Work
(October 1, 2005 APWA GSP)
Supplement this section with the following:

If the Contractor fails to remedy defective or unauthorized work within the time specified in a written notice from the Engineer, or fails to perform any part of the work required by the Contract Documents, the Engineer may correct and remedy such work as may be identified in the written notice, with Contracting Agency forces or by such other means as the Contracting Agency may deem necessary.

If the Contractor fails to comply with a written order to remedy what the Engineer determines to be an emergency situation, the Engineer may have the defective and unauthorized work corrected immediately, have the rejected work removed and replaced, or have work the Contractor refuses to perform completed by using Contracting Agency or other forces. An emergency situation is any situation when, in the opinion of the Engineer, a delay in its remedy could be potentially unsafe, or might cause serious risk of loss or damage to the public.

Direct or indirect costs incurred by the Contracting Agency attributable to correcting and remedying defective or unauthorized work, or work the Contractor failed or refused to perform, shall be paid by the Contractor. Payment will be deducted by the Engineer from monies due, or to become due, the Contractor. Such direct and indirect costs shall include in particular, but without limitation, compensation for additional professional services required, and costs for repair and replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's unauthorized work.

No adjustment in contract time or compensation will be allowed because of the delay in the performance of the work attributable to the exercise of the Contracting Agency's rights provided by this Section.

The rights exercised under the provisions of this section shall not diminish the Contracting Agency's right to pursue any other avenue for additional remedy or damages with respect to the Contractor's failure to perform the work as required.

Delete Section 1-05.8 and replace it with the following:

1-05.8 Staging Area

(******)
There is a risk of high water in the Skagit River during project construction. It could reach the project site either from the south or from the north. See the Hydraulic Report in the Appendices to these specifications for more information.

In the case of flooding, the Contractor is responsible for any debris deposited or damage to the site if the water surface elevation reaches below the 10-year WSEL. The costs of cleanup shall be incidental to the cost of construction.

If flooding occurs and the water surface elevation is above the 10-year WSEL, the costs of cleanup will be paid per Section 1-09.6.

The Contractor shall have a contingency plan in place to provide safety for persons, equipment and environment if floodwater occurs in the project limits, during the duration of construction. The contingency plan shall be submitted to the Engineer prior to mobilization. Costs to prepare and implement the contingency plan shall be incidental to the unit costs of associated bid items.

1-05.11 Final Inspection

Delete this section and replace it with the following:

1-05.11 Final Inspections and Operational Testing

(October 1, 2005 APWA GSP)

1-05.11(1) Substantial Completion Date

When the Contractor considers the work to be substantially complete, the Contractor shall so notify the Engineer and request the Engineer establish the Substantial Completion Date. The Contractor's request shall list the specific items of work that remain to be completed in order to reach physical completion. The Engineer will schedule an inspection of the work with the Contractor to determine the status of completion. The Engineer may also establish the Substantial Completion Date unilaterally.

If, after this inspection, the Engineer concurs with the Contractor that the work is substantially complete and ready for its intended use, the Engineer, by written notice to the Contractor, will set the Substantial Completion Date. If, after this inspection the Engineer does not consider the work substantially complete and ready for its intended use, the Engineer will, by written notice, so notify the Contractor giving the reasons therefor.

Upon receipt of written notice concurring in or denying substantial completion, whichever is applicable, the Contractor shall pursue vigorously, diligently and without unauthorized interruption, the work necessary to reach Substantial and Physical Completion. The Contractor shall provide the Engineer with a revised schedule indicating when the Contractor expects to reach substantial and physical completion of the work.

The above process shall be repeated until the Engineer establishes the Substantial Completion Date and the Contractor considers the work physically complete and ready for final inspection.

1-05.11(2) Final Inspection and Physical Completion Date

When the Contractor considers the work physically complete and ready for final inspection, the Contractor by written notice, shall request the Engineer to schedule a final inspection. The Engineer will set a date for final inspection. The Engineer and the Contractor will then make a final inspection and the Engineer will notify the Contractor in writing of all particulars in which the final inspection reveals the work incomplete or unacceptable. The Contractor shall immediately take such corrective measures as are necessary to remedy the listed deficiencies. Corrective work shall be pursued vigorously, diligently, and without interruption until physical completion of the listed deficiencies. This process will continue until the Engineer is satisfied the listed deficiencies have been corrected.

If action to correct the listed deficiencies is not initiated within 7 days after receipt of the written notice listing the deficiencies, the Engineer may, upon written notice to the Contractor, take whatever steps are necessary to correct those deficiencies pursuant to Section 1-05.7.

The Contractor will not be allowed an extension of contract time because of a delay in the performance of the work attributable to the exercise of the Engineer's right hereunder.

Upon correction of all deficiencies, the Engineer will notify the Contractor and the Contracting Agency, in writing, of the date upon which the work was considered physically complete. That date shall constitute the Physical Completion Date of the contract, but shall not imply acceptance of the work or that all the obligations of the Contractor under the contract have been fulfilled.

1-05.11(3) Operational Testing

It is the intent of the Contracting Agency to have at the Physical Completion Date a complete and operable system. Therefore when the work involves the installation of machinery or other mechanical equipment; street lighting, electrical distribution or signal systems; irrigation systems; buildings; or other similar work it may be desirable for the Engineer to have the Contractor operate and test the work for a period of time after final inspection but prior to the physical completion date. Whenever items of work are listed in the Contract Provisions for operational testing they shall be fully tested under operating conditions for the time period specified to ensure their acceptability prior to the Physical Completion Date. During and following the test period, the Contractor shall correct any items of workmanship, materials, or equipment which prove faulty, or that are not in first class operating condition. Equipment, electrical controls, meters, or other devices and equipment to be tested during this period shall be tested under the observation of the Engineer, so that the Engineer may determine their suitability for the purpose for which they were installed. The Physical Completion Date cannot be established until testing and corrections have been completed to the satisfaction of the Engineer.

The costs for power, gas, labor, material, supplies, and everything else needed to successfully complete operational testing, shall be included in the unit contract prices related to the system being tested, unless specifically set forth otherwise in the proposal.

Operational and test periods, when required by the Engineer, shall not affect a manufacturer's guaranties or warranties furnished under the terms of the contract.

1-05.13 Superintendents, Labor and Equipment of Contractor

(August 14, 2013 APWA GSP)

Delete the sixth and seventh paragraphs of this section.

Add the following new section:

1-05.16 Water and Power

(October 1, 2005 APWA GSP)

The Contractor shall make necessary arrangements, and shall bear the costs for power and water necessary for the performance of the work, unless the contract includes power and water as a pay item.

Add the following new section:

1-05.18 Record Drawings

(March 8, 2013 APWA GSP)

The Contractor shall maintain one set of full size plans for Record Drawings, updated with clear and accurate red-lined field revisions on a daily basis, and within 2 business

days after receipt of information that a change in Work has occurred. The Contractor shall not conceal any work until the required information is recorded.

This Record Drawing set shall be used for this purpose alone, shall be kept separate from other Plan sheets, and shall be clearly marked as Record Drawings. These Record Drawings shall be kept on site at the Contractor's field office, and shall be available for review by the Contracting Agency at all times. The Contractor shall bring the Record Drawings to each progress meeting for review.

The preparation and upkeep of the Record Drawings is to be the assigned responsibility of a single, experienced, and qualified individual. The quality of the Record Drawings, in terms of accuracy, clarity, and completeness, is to be adequate to allow the Contracting Agency to modify the computer-aided drafting (CAD) Contract Drawings to produce a complete set of Record Drawings for the Contracting Agency without further investigative effort by the Contracting Agency.

The Record Drawing markups shall document all changes in the Work, both concealed and visible. Items that must be shown on the markups include but are not limited to:

- Actual dimensions, arrangement, and materials used when different than shown in the Plans.
- Changes made by Change Order or Field Order.
- Changes made by the Contractor.
- Accurate locations of storm sewer, sanitary sewer, water mains and other water appurtenances, structures, conduits, light standards, vaults, width of roadways, sidewalks, landscaping areas, building footprints, channelization and pavement markings, etc. Include pipe invert elevations, top of castings (manholes, inlets, etc.).

If the Contract calls for the Contracting Agency to do all surveying and staking, the Contracting Agency will provide the elevations at the tolerances the Contracting Agency requires for the Record Drawings.

When the Contract calls for the Contractor to do the surveying/staking, the applicable tolerance limits include, but are not limited to the following:

	Vertical	Horizontal
As-built sanitary & storm invert and grate elevations	± 0.01 foot	± 0.01 foot
As-built monumentation	± 0.001 foot	± 0.001 foot
As-built waterlines, inverts, valves, hydrants	± 0.10 foot	± 0.10 foot
As-built ponds/swales/water features	± 0.10 foot	± 0.10 foot
As-built buildings (fin. Floor elev.)	± 0.01 foot	± 0.10 foot
As-built gas lines, power, TV, Tel, Com	± 0.10 foot	± 0.10 foot
As-built signs, signals, etc.	N/A	± 0.10 foot

Making Entries on the Record Drawings:

- Use erasable colored pencil (not ink) for all markings on the Record Drawings, conforming to the following color code:

- Additions - Red
- Deletions - Green
- Comments - Blue
- Dimensions - Graphite
- Provide the applicable reference for all entries, such as the change order number, the request for information (RFI) number, or the approved shop drawing number.
- Date all entries.
- Clearly identify all items in the entry with notes similar to those in the Contract Drawings (such as pipe symbols, centerline elevations, materials, pipe joint abbreviations, etc.).

The Contractor shall certify on the Record Drawings that said drawings are an accurate depiction of built conditions, and in conformance with the requirements detailed above. The Contractor shall submit final Record Drawings to the Contracting Agency. Contracting Agency acceptance of the Record Drawings is one of the requirements for achieving Physical Completion.

Payment will be made for the following bid item:

Record Drawings (Minimum Bid $ 500)	Lump Sum

Payment for this item will be made on a prorated monthly basis for work completed in accordance with this section up to 75% of the lump sum bid. The final 25% of the lump sum item will be paid upon submittal and approval of the completed Record Drawings set prepared in conformance with these Special Provisions.

A minimum bid amount has been entered in the Bid Proposal for this item. The Contractor must bid at least that amount.

CONTROL OF MATERIAL

1-06.6 Recycled Materials

(January 4, 2016 APWA GSP)

Delete this section, including its subsections, and replace it with the following:

The Contractor shall make their best effort to utilize recycled materials in the construction of the project. Approval of such material use shall be as detailed elsewhere in the Standard Specifications.

Prior to Physical Completion the Contractor shall report the quantity of recycled materials that were utilized in the construction of the project for each of the items listed in Section 9-03.21. The report shall include hot mix asphalt, recycled concrete aggregate, recycled glass, steel furnace slag and other recycled materials (e.g. utilization of on-site material and aggregates from concrete returned to the supplier). The Contractor's report shall be provided on DOT form 350-075 Recycled Materials Reporting.

LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

1-07.1 Laws to be Observed

(October 1, 2005 APWA GSP)

Supplement this section with the following:

In cases of conflict between different safety regulations, the more stringent regulation shall apply.

The Washington State Department of Labor and Industries shall be the sole and paramount administrative agency responsible for the administration of the provisions of the Washington Industrial Safety and Health Act of 1973 (WISHA).

The Contractor shall maintain at the project site office, or other well known place at the project site, all articles necessary for providing first aid to the injured. The Contractor shall establish, publish, and make known to all employees, procedures for ensuring immediate removal to a hospital, or doctor's care, persons, including employees, who may have been injured on the project site. Employees should not be permitted to work on the project site before the Contractor has established and made known procedures for removal of injured persons to a hospital or a doctor's care.

The Contractor shall have sole responsibility for the safety, efficiency, and adequacy of the Contractor's plant, appliances, and methods, and for any damage or injury resulting from their failure, or improper maintenance, use, or operation. The Contractor shall be solely and completely responsible for the conditions of the project site, including safety for all persons and property in the performance of the work. This requirement shall apply continuously, and not be limited to normal working hours. The required or implied duty of the Engineer to conduct construction review of the Contractor's performance does not, and shall not, be intended to include review and adequacy of the Contractor's safety measures in, on, or near the project site.

Section 1-07.1 is supplemented with the following:

(May 13, 2020)

In response to COVID-19, the Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP) in conformance with Section 1-07.4(2) as supplemented in these specifications, **COVID-19 Health and Safety Plan (CHSP)**.

1-07.2 State Taxes

Delete this section, including its sub-sections, in its entirety and replace it with the following:

1-07.2 State Sales Tax

(June 27, 2011 APWA GSP)

The Washington State Department of Revenue has issued special rules on the State sales tax. Sections 1-07.2(1) through 1-07.2(3) are meant to clarify those rules. The Contractor should contact the Washington State Department of Revenue for answers to questions in this area. The Contracting Agency will not adjust its payment if the Contractor bases a bid on a misunderstood tax liability.

The Contractor shall include all Contractor-paid taxes in the unit bid prices or other contract amounts. In some cases, however, state retail sales tax will not be included. Section 1-07.2(2) describes this exception.

The Contracting Agency will pay the retained percentage (or release the Contract Bond if a FHWA-funded Project) only if the Contractor has obtained from the Washington State Department of Revenue a certificate showing that all contract-related taxes have been paid (RCW 60.28.051). The Contracting Agency may deduct from its payments to the Contractor any amount the Contractor may owe the Washington State Department of Revenue, whether the amount owed relates to this contract or not. Any amount so deducted will be paid into the proper State fund.

1-07.2(1) State Sales Tax — Rule 171

WAC 458-20-171, and its related rules, apply to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used primarily for foot or vehicular traffic. This includes storm or combined sewer systems within and included as a part of the street or road drainage system and power lines when such are part of the roadway lighting system. For work performed in such cases, the Contractor shall include Washington State Retail Sales Taxes in the various unit bid item prices, or other contract amounts, including those that the Contractor pays on the purchase of the materials, equipment, or supplies used or consumed in doing the work.

1-07.2(2) State Sales Tax — Rule 170

WAC 458-20-170, and its related rules, apply to the constructing and repairing of new or existing buildings, or other structures, upon real property. This includes, but is not limited to, the construction of streets, roads, highways, etc., owned by the state of Washington; water mains and their appurtenances; sanitary sewers and sewage disposal systems unless such sewers and disposal systems are within, and a part of, a street or road drainage system; telephone, telegraph, electrical power distribution lines, or other conduits or lines in or above streets or roads, unless such power lines become a part of a street or road lighting system; and installing or attaching of any article of tangible personal property in or to real property, whether or not such personal property becomes a part of the realty by virtue of installation.

For work performed in such cases, the Contractor shall collect from the Contracting Agency, retail sales tax on the full contract price. The Contracting Agency will automatically add this sales tax to each payment to the Contractor. For this reason, the Contractor shall not include the retail sales tax in the unit bid item prices, or in any other contract amount subject to Rule 170, with the following exception.

Exception: The Contracting Agency will not add in sales tax for a payment the Contractor or a subcontractor makes on the purchase or rental of tools, machinery, equipment, or consumable supplies not integrated into the project. Such sales taxes shall be included in the unit bid item prices or in any other contract amount.

1-07.2(3) Services

The Contractor shall not collect retail sales tax from the Contracting Agency on any contract wholly for professional or other services (as defined in Washington State Department of Revenue Rules 138 and 244).

Sanitation

(July 14, 2016 SkagitR)
1-07.4(1) General

Section 1-07.4(1) is supplemented with the following:

The Contractor shall provide employees with portable sanitary stations on site. These portable sanitary stations shall comply with all State Department of Health or other agency requirements; shall be kept clean, neat and sanitized; and shall not create any public nuisance.

Health Hazards

Section 1-07.4(2) is supplemented with the following:

(May 13, 2020)
COVID-19 Health and Safety Plan (CHSP)

The Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP). The CHSP shall be prepared and submitted as a Type 2 Working Drawing prior to beginning physical Work. The CHSP shall be based on the most current State and Federal requirements. If the State or Federal requirements are revised, the CHSP shall be updated as necessary to conform to the current requirements.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the look ahead schedule required under Section 1-08.3(2)D. If the conditions change on the project, or a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including State workers in the field, Contractor personnel, consultants, project staff, subcontractors, suppliers and anyone on the project site, staging areas, or yards.

COVID-19 Health and Safety Plan (CHSP) Inspection

The Contractor shall grant full and unrestricted access to the Engineer for CHSP Inspections. The Engineer (or designee) will conduct periodic compliance inspections on the project site, staging areas, or yards to verify that any ongoing work activity is following the CHSP plan. If the Engineer becomes aware of a noncompliance incident either through a site inspection or other means, the Contractor will be notified immediately (within 1 hour). The Contractor shall immediately remedy the noncompliance incident or suspend all or part of the associated work activity. The Contractor shall satisfy the Engineer that the noncompliance incident has been corrected before the suspension will end.

Environmental Regulations

Section 1-07.5 is supplemented with the following:

(September 20, 2010)

Environmental Commitments

The following Provisions summarize the requirements, in addition to those required elsewhere in the Contract, imposed upon the Contracting Agency by the various documents referenced in the Special Provision **Permits and Licenses**. Throughout the work, the Contractor shall comply with the following requirements:

(******)

The Contractor shall notify the Engineer a minimum of *** 15 *** calendar days prior to commencing any work in sensitive areas, mitigation areas, defishing needs, and wetland buffers. Installation of construction fencing is excluded from this notice requirement.

The Contracting Agency will conduct de-fishing within the temporary isolation walls. The Contractor shall not work in the water before the de-fishing has occurred.

(******)

The Contractor shall not stage equipment or hazardous materials overnight below the 10-year flood water surface elevation (WSEL). Hazardous material shall never be staged below the 10-year WSEL, even during work hours. Equipment that is not being used shall not be staged below the 10-year WSEL during work hours.

(April 2, 2018)

The Contractor may begin Work below the Ordinary High Water Line on *** July 1st*** and must complete all the Work by *** September 30th***.

(August 3, 2009)

Payment

All costs to comply with this special provision for the environmental commitments and requirements are incidental to the contract and are the responsibility of the Contractor. The Contractor shall include all related costs in the associated bid prices of the contract.

State Department of Ecology

Section 1-07.5(3) is supplemented with the following:

(April 2, 2018)

The following Provisions summarize the requirements, in addition to those required elsewhere in the Contract, imposed upon the Contracting Agency by the Washington State Department of Ecology. Throughout the work, the Contractor shall comply with the following requirements:

(August 3, 2009)

A mixing zone is established within which the turbidity standard is waived during actual in-water work. The mixing zone is established to only temporarily allow exceeding the turbidity criteria (such as a few hours or days) and is not authorization to exceed the turbidity standard for the entire duration of the construction. The mixing zone shall not exceed *** beyond the isolation walls 100 feet (when the slough is running less than 10 cubic feet per second) or 200 feet (if the slough is running between 10 and 100 cubic feet per second) *** downstream from the construction area.

(April 2, 2018)

All costs to comply with this special provision are incidental to the Contract and are the responsibility of the Contractor. The Contractor shall include all related costs in the associated bid prices of the Contract.

U.S. Army Corps of Engineers

Section 1-07.5(5) is supplemented with the following:

(April 2, 2018)
The following Provisions summarize the requirements, in addition to those required elsewhere in the Contract, imposed upon the Contracting Agency by the U.S. Army Corps of Engineers. Throughout the work, the Contractor shall comply with the following requirements:

(February 25, 2013)
Temporary structures and dewatering of areas under the jurisdiction of the U.S. Army Corps of Engineers must maintain normal downstream flows and prevent upstream and downstream flooding to the maximum extent practicable.

(August 3, 2009)
Heavy equipment working in wetlands or mudflats must be placed on mats or other measures taken to minimize soil disturbance as approved by the Engineer.

(April 2, 2018)
All costs to comply with this special provision are incidental to the Contract and are the responsibility of the Contractor. The Contractor shall include all related costs in the associated bid prices of the Contract.

Permits and Licenses

Section 1-07.6 is supplemented with the following:

(August 30, 2016 SkagitF)
The Contracting Agency has obtained the below-listed permit(s) for this project. A copy of the permit(s) is attached as an appendix for informational purposes. All contacts with the permitting agencies, concerning the below-listed permit(s), shall be made through the Engineer. The Contractor shall obtain additional permits as necessary. All costs to obtain and comply with additional permits shall be included in the applicable bid items for the Work involved. Copies of these permits are required to be onsite at all times.

***

Name of Document	Permitting Agency	Permit Reference No.
Department of the Army Nationwide Permit (NWP) #14	Corps of Engineers Seattle District	NWS-2020-1240
Hydraulic Project Approval	Department of Fish & Wildlife	2021-4-239+01
Water Quality Certification	Department of Ecology	Ref. #139732

***

Load Limits

Section 1-07.7 is supplemented with the following:

(March 13, 1995)

If the sources of materials provided by the Contractor necessitates hauling over roads other than State Highways, the Contractor shall, at the Contractor's expense, make all arrangements for the use of the haul routes.

Wages

General

Section 1-07.9(1) is supplemented with the following:

(January 6, 2020)
The Federal wage rates incorporated in this contract have been established by the Secretary of Labor under United States Department of Labor General Decision No. WA20200001.

The State rates incorporated in this contract are applicable to all construction activities associated with this contract.

1-07.9(5) Required Documents

(January 3, 2020 APWA GSP)

Delete this section and replace it with the following:

General

All "Statements of Intent to Pay Prevailing Wages", "Affidavits of Wages Paid" and Certified Payrolls, including a signed Statement of Compliance for Federal-aid projects, shall be submitted to the Engineer and the State L&I online Prevailing Wage Intent & Affidavit (PWIA) system.

Intents and Affidavits

On forms provided by the Industrial Statistician of State L&I, the Contractor shall submit to the Engineer the following for themselves and for each firm covered under RCW 39.12 that will or has provided Work and materials for the Contract:

1. The approved "Statement of Intent to Pay Prevailing Wages" State L&I's form number F700-029-000. The Contracting Agency will make no payment under this Contract until this statement has been approved by State L&I and reviewed by the Engineer.

2. The approved "Affidavit of Prevailing Wages Paid", State L&I's form number F700-007-000. The Contracting Agency will not grant Completion until all approved Affidavit of Wages paid for the Contractor and all Subcontractors have been received by the Engineer. The Contracting Agency will not release to the Contractor any funds retained under RCW 60.28.011 until "Affidavit of Prevailing Wages Paid" forms have been approved by State L&I and all of the approved forms have been submitted to the Engineer for every firm that worked on the Contract.

The Contractor is responsible for requesting these forms from State L&I and for paying any fees required by State L&I.

Certified Payrolls

Certified payrolls are required to be submitted by the Contractor for themselves, all Subcontractors and all lower tier subcontractors. The payrolls shall be submitted weekly on all Federal-aid projects and no less than monthly on State funded projects.

Penalties for Noncompliance

The Contractor is advised, if these payrolls are not supplied within the prescribed deadlines, any or all payments may be withheld until compliance is achieved. In addition, failure to provide these payrolls may result in other sanctions as provided by State laws (RCW 39.12.050) and/or Federal regulations (29 CFR 5.12).

Contractor's Responsibility for Work

Repair of Damage

Section 1-07.13(4) is revised to read:

(August 6, 2001)

The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Sections 1-07.13(1), 1-07.13(2) or 1-07.13(3), payment will be made in accordance with Section 1-04.4. Payment will be limited to repair of damaged work only. No payment will be made for delay or disruption of work.

Protection and Restoration of Property

Vegetation Protection and Restoration

Section 1-07.16(2) is supplemented with the following:

(August 2, 2010)

Vegetation and soil protection zones for trees shall extend out from the trunk to a distance of 1 foot radius for each inch of trunk diameter at breast height.

Vegetation and soil protection zones for shrubs shall extend out from the stems at ground level to twice the radius of the shrub.

Vegetation and soil protection zones for herbaceous vegetation shall extend to encompass the diameter of the plant as measured from the outer edge of the plant.

Archaeological and Historical Objects

Section 1-07.16(4) is supplemented with the following:

(December 6, 2004)

The project area potentially contains archaeological or historical objects that may have significance from a historical or scientific standpoint. To protect these objects from damage or destruction, the Contracting Agency, at its discretion and expense, may monitor the Contractor’s operations, conduct various site testing and perform recovery and removal of such objects when necessary.

The Contractor may be required to conduct its operations in a manner that will accommodate such activities, including the reserving of portions of the work area for site testing, exploratory operations and recovery and removal of such objects as

directed by the Engineer. If such activities are performed by consultants retained by the Contracting Agency, the Contractor shall provide them adequate access to the project site.

Added work necessary to uncover, fence, dewater, or otherwise protect or assist in such testing, exploratory operations and salvaging of the objects as ordered by the Engineer shall be paid by force account as provided in Section 1-09.6. If the discovery and salvaging activities require the Engineer to suspend the Contractor's work, any adjustment in time will be determined by the Engineer pursuant to Section 1-08.8.

To provide a common basis for all bidders, the Contracting Agency has entered an amount for the item "Archaeological and Historical Salvage" in the Proposal to become a part of the total bid by the Contractor.

1-07.18 Public Liability and Property Damage Insurance

Delete this section in its entirety, and replace it with the following:

1-07.18 Insurance

(January 4, 2016 APWA GSP)

1-07.18(1) General Requirements

A. The Contractor shall procure and maintain the insurance described in all subsections of section 1-07.18 of these Special Provisions, from insurers with a current A. M. Best rating of not less than A-: VII and licensed to do business in the State of Washington. The Contracting Agency reserves the right to approve or reject the insurance provided, based on the insurer's financial condition.

B. The Contractor shall keep this insurance in force without interruption from the commencement of the Contractor's Work through the term of the Contract and for thirty (30) days after the Physical Completion date, unless otherwise indicated below.

C. If any insurance policy is written on a claims made form, its retroactive date, and that of all subsequent renewals, shall be no later than the effective date of this Contract. The policy shall state that coverage is claims made, and state the retroactive date. Claims-made form coverage shall be maintained by the Contractor for a minimum of 36 months following the Completion Date or earlier termination of this Contract, and the Contractor shall annually provide the Contracting Agency with proof of renewal. If renewal of the claims made form of coverage becomes unavailable, or economically prohibitive, the Contractor shall purchase an extended reporting period ("tail") or execute another form of guarantee acceptable to the Contracting Agency to assure financial responsibility for liability for services performed.

D. The Contractor's Automobile Liability, Commercial General Liability and Excess or Umbrella Liability insurance policies shall be primary and non-contributory insurance as respects the Contracting Agency's insurance, self-insurance, or self-insured pool coverage. Any insurance, self-insurance, or self-insured pool coverage maintained by the Contracting Agency shall be excess of the Contractor's insurance and shall not contribute with it.

E. The Contractor shall provide the Contracting Agency and all additional insureds with written notice of any policy cancellation, within two business days of their receipt of such notice.

F. The Contractor shall not begin work under the Contract until the required insurance has been obtained and approved by the Contracting Agency

G. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the Contracting Agency may, after giving five business days' notice to the Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the Contracting Agency on demand, or at the sole discretion of the Contracting Agency, offset against funds due the Contractor from the Contracting Agency.

H. All costs for insurance shall be incidental to and included in the unit or lump sum prices of the Contract and no additional payment will be made.

1-07.18(2) Additional Insured

All insurance policies, with the exception of Workers Compensation, and of Professional Liability and Builder's Risk (if required by this Contract) shall name the following listed entities as additional insured(s) using the forms or endorsements required herein:

- the Contracting Agency and its officers, elected officials, employees, agents, and volunteers

The above-listed entities shall be additional insured(s) for the full available limits of liability maintained by the Contractor, irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract, and irrespective of whether the Certificate of Insurance provided by the Contractor pursuant to 1-07.18(4) describes limits lower than those maintained by the Contractor.

For Commercial General Liability insurance coverage, the required additional insured endorsements shall be at least as broad as ISO forms CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

1-07.18(3) Subcontractors

The Contractor shall cause each Subcontractor of every tier to provide insurance coverage that complies with all applicable requirements of the Contractor-provided insurance as set forth herein, except the Contractor shall have sole responsibility for determining the limits of coverage required to be obtained by Subcontractors.

The Contractor shall ensure that all Subcontractors of every tier add all entities listed in 1-07.18(2) as additional insureds, and provide proof of such on the policies as required by that section as detailed in 1-07.18(2) using an endorsement as least as broad as ISO CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.

Upon request by the Contracting Agency, the Contractor shall forward to the Contracting Agency evidence of insurance and copies of the additional insured endorsements of each Subcontractor of every tier as required in 1-07.18(4) Verification of Coverage.

1-07.18(4) Verification of Coverage

The Contractor shall deliver to the Contracting Agency a Certificate(s) of Insurance and endorsements for each policy of insurance meeting the requirements set forth herein when the Contractor delivers the signed Contract for the work. Failure of Contracting Agency to demand such verification of coverage with these insurance requirements or failure of Contracting Agency to identify a deficiency from the insurance documentation provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

Verification of coverage shall include:

1. An ACORD certificate or a form determined by the Contracting Agency to be equivalent.
2. Copies of all endorsements naming Contracting Agency and all other entities listed in 1-07.18(2) as additional insured(s), showing the policy number. The Contractor may submit a copy of any blanket additional insured clause from its policies instead of a separate endorsement.
3. Any other amendatory endorsements to show the coverage required herein.
4. A notation of coverage enhancements on the Certificate of Insurance shall not satisfy these requirements – actual endorsements must be submitted.

Upon request by the Contracting Agency, the Contractor shall forward to the Contracting Agency a full and certified copy of the insurance policy(s). If Builders Risk insurance is required on this Project, a full and certified copy of that policy is required when the Contractor delivers the signed Contract for the work.

1-07.18(5) Coverages and Limits

The insurance shall provide the minimum coverages and limits set forth below. Contractor's maintenance of insurance, its scope of coverage, and limits as required herein shall not be construed to limit the liability of the Contractor to the coverage provided by such insurance, or otherwise limit the Contracting Agency's recourse to any remedy available at law or in equity.

All deductibles and self-insured retentions must be disclosed and are subject to approval by the Contracting Agency. The cost of any claim payments falling within the deductible or self-insured retention shall be the responsibility of the Contractor. In the event an additional insured incurs a liability subject to any policy's deductibles or self-insured retention, said deductibles or self-insured retention shall be the responsibility of the Contractor.

1-07.18(5)A Commercial General Liability

Commercial General Liability insurance shall be written on coverage forms at least as broad as ISO occurrence form CG 00 01, including but not limited to liability arising from premises, operations, stop gap liability, independent contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured contract. There shall be no exclusion for liability arising from explosion, collapse or underground property damage.

The Commercial General Liability insurance shall be endorsed to provide a per project general aggregate limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.

Contractor shall maintain Commercial General Liability Insurance arising out of the Contractor's completed operations for at least three years following Substantial Completion of the Work.

Such policy must provide the following minimum limits:

$1,000,000	Each Occurrence
$2,000,000	General Aggregate
$2,000,000	Products & Completed Operations Aggregate
$1,000,000	Personal & Advertising Injury each offence
$1,000,000	Stop Gap / Employers' Liability each accident

1-07.18(5)B Automobile Liability

Automobile Liability shall cover owned, non-owned, hired, and leased vehicles; and shall be written on a coverage form at least as broad as ISO form CA 00 01. If the work involves the transport of pollutants, the automobile liability policy shall include MCS 90 and CA 99 48 endorsements.

Such policy must provide the following minimum limit:

$1,000,000	Combined single limit each accident

1-07.18(5)C Workers' Compensation

The Contractor shall comply with Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington.

1-07.24 Rights of Way

(July 23, 2015 APWA GSP)

Delete this section and replace it with the following:

Street Right of Way lines, limits of easements, and limits of construction permits are indicated in the Plans. The Contractor's construction activities shall be confined within these limits, unless arrangements for use of private property are made.

Generally, the Contracting Agency will have obtained, prior to bid opening, all rights of way and easements, both permanent and temporary, necessary for carrying out the work. Exceptions to this are noted in the Bid Documents or will be brought to the Contractor's attention by a duly issued Addendum.

Whenever any of the work is accomplished on or through property other than public Right of Way, the Contractor shall meet and fulfill all covenants and stipulations of any easement agreement obtained by the Contracting Agency from the owner of the private property. Copies of the easement agreements may be included in the Contract Provisions or made available to the Contractor as soon as practical after they have been obtained by the Engineer.

Whenever easements or rights of entry have not been acquired prior to advertising, these areas are so noted in the Plans. The Contractor shall not proceed with any portion of the work in areas where right of way, easements or rights of entry have not been acquired until the Engineer certifies to the Contractor that the right of way or easement is available or that the right of entry has been received. If the Contractor is delayed due to acts of omission on the part of the Contracting Agency in obtaining easements, rights of entry or right of way, the Contractor will be entitled to an extension of time. The Contractor agrees that such delay shall not be a breach of contract.

Each property owner shall be given 48 hours notice prior to entry by the Contractor. This includes entry onto easements and private property where private improvements must be adjusted.

The Contractor shall be responsible for providing, without expense or liability to the Contracting Agency, any additional land and access thereto that the Contractor may desire for temporary construction facilities, storage of materials, or other Contractor needs. However, before using any private property, whether adjoining the work or not, the Contractor shall file with the Engineer a written permission of the private property owner, and, upon vacating the premises, a written release from the property owner of each property disturbed or otherwise interfered with by reasons of construction pursued under this contract. The statement shall be signed by the private property owner, or proper authority acting for the owner of the private property affected, stating that permission has been granted to use the property and all necessary permits have been obtained or, in the case of a release, that the restoration of the property has been satisfactorily accomplished. The statement shall include the parcel number, address, and date of signature. Written releases must be filed with the Engineer before the Completion Date will be established.

1-08 PROSECUTION AND PROGRESS

Add the following new section:

1-08.0 Preliminary Matters

(May 25, 2006 APWA GSP)

Add the following new section:

1-08.0(1) Preconstruction Conference

(******)

Prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, the Engineer and such other interested parties as may be invited. The purpose of the preconstruction conference will be:

1. To review the initial progress schedule;
2. To establish a working understanding among the various parties associated or affected by the work;
3. To establish and review procedures for progress payment, notifications, approvals, submittals, etc.;
4. To establish normal working hours for the work;
5. To review safety standards and traffic control; and
6. To discuss such other related items as may be pertinent to the work.

The Contractor shall prepare and submit at the preconstruction conference the following:

1. A breakdown of all lump sum items;
2. A preliminary schedule of working drawing submittals; and
3. A list of material sources for approval if applicable.
4. The SPCC Plan
5. A list of Emergency Contacts including those for after working hours.

Add the following new section:

1-08.0(2) Hours of Work
(December 8, 2014 APWA GSP)

Except in the case of emergency or unless otherwise approved by the Engineer, the normal working hours for the Contract shall be any consecutive 8-hour period between 7:00 a.m. and 6:00 p.m. Monday through Friday, exclusive of a lunch break. If the Contractor desires different than the normal working hours stated above, the request must be submitted in writing prior to the preconstruction conference, subject to the provisions below. The working hours for the Contract shall be established at or prior to the preconstruction conference.

All working hours and days are also subject to local permit and ordinance conditions (such as noise ordinances).

If the Contractor wishes to deviate from the established working hours, the Contractor shall submit a written request to the Engineer for consideration. This request shall state what hours are being requested, and why. Requests shall be submitted for review no later than *** five (5) working days *** prior to the day(s) the Contractor is requesting to change the hours.

If the Contracting Agency approves such a deviation, such approval may be subject to certain other conditions, which will be detailed in writing. For example:

1. On non-Federal aid projects, requiring the Contractor to reimburse the Contracting Agency for the costs in excess of straight-time costs for Contracting Agency representatives who worked during such times. (The Engineer may require designated representatives to be present during the work. Representatives who may be deemed necessary by the Engineer include, but are not limited to: survey crews; personnel from the Contracting Agency's material testing lab; inspectors; and other Contracting Agency employees or third party consultants when, in the opinion of the Engineer, such work necessitates their presence.)
2. Considering the work performed on Saturdays, Sundays, and holidays as working days with regard to the contract time.
3. Considering multiple work shifts as multiple working days with respect to contract time even though the multiple shifts occur in a single 24-hour period.
4. If a 4-10 work schedule is requested and approved the non working day for the week will be charged as a working day.
5. If Davis Bacon wage rates apply to this Contract, all requirements must be met and recorded properly on certified payroll

1-08.1 Subcontracting
(December 19, 2019 APWA GSP, Option A)

Prior to any subcontractor or lower tier subcontractor beginning work, the Contractor shall submit to the Engineer a certification (WSDOT Form 420-004) that a written agreement between the Contractor and the subcontractor or between the subcontractor and any lower tier subcontractor has been executed. This certification shall also guarantee that these

subcontract agreements include all the documents required by the Special Provision Federal Agency Inspection.

A Subcontractor or lower tier Subcontractor will not be permitted to perform any work under the contract until the following documents have been completed and submitted to the Engineer:

1. Request to Sublet Work (WSDOT Form 421-012), and
2. Contractor and Subcontractor or Lower Tier Subcontractor Certification for Federal-aid Projects (WSDOT Form 420-004).

The Contractor shall submit to the Engineer a completed Monthly Retainage Report (WSDOT Form 272-065) within 15 calendar days after receipt of every monthly progress payment until every Subcontractor and lower tier Subcontractor's retainage has been released.

The ninth paragraph, beginning with "On all projects, …" is revised to read:

The Contractor shall certify to the actual amount received from the Contracting Agency and amounts paid to all firms that were used as Subcontractors, lower tier subcontractors, manufacturers, regular dealers, or service providers on the Contract. This includes all Disadvantaged, Minority, Small, Veteran or Women's Business Enterprise firms. This Certification shall be submitted to the Engineer on a monthly basis each month between Execution of the Contract and Physical Completion of the Contract using the application available at: https://wsdot.diversitycompliance.com. A monthly report shall be submitted for every month between Execution of the Contract and Physical Completion regardless of whether payments were made or work occurred.

Progress Schedule

Progress Schedule Types

1-08.3(2)B Type B Progress Schedule

(March 13, 2012 APWA GSP)

Revise the first paragraph to read:

The Contractor shall submit a preliminary Type B Progress Schedule at or prior to the preconstruction conference. The preliminary Type B Progress Schedule shall comply with all of these requirements and the requirements of Section 1-08.3(1), except that it may be limited to only those activities occurring within the first 60-working days of the project.

Revise the first sentence of the second paragraph to read:

The Contractor shall submit *** 2 *** copies of a Type B Progress Schedule depicting the entire project no later than 21-calendar days after the preconstruction conference.

1-08.4 Prosecution of Work

Delete this section and replace it with the following:

1-08.4 Notice to Proceed and Prosecution of Work

(July 23, 2015 APWA GSP)

Notice to Proceed will be given after the contract has been executed and the contract bond and evidence of insurance have been approved and filed by the Contracting Agency. The Contractor shall not commence with the work until the Notice to Proceed has been given by the Engineer. The Contractor shall commence construction activities on the project site within ten days of the Notice to Proceed Date, unless otherwise approved in writing. The Contractor shall diligently pursue the work to the physical completion date within the time specified in the contract. Voluntary shutdown or slowing of operations by the Contractor shall not relieve the Contractor of the responsibility to complete the work within the time(s) specified in the contract.

When shown in the Plans, the first order of work shall be the installation of high visibility fencing to delineate all areas for protection or restoration, as described in the Contract. Installation of high visibility fencing adjacent to the roadway shall occur after the placement of all necessary signs and traffic control devices in accordance with 1-10.1(2). Upon construction of the fencing, the Contractor shall request the Engineer to inspect the fence. No other work shall be performed on the site until the Contracting Agency has accepted the installation of high visibility fencing, as described in the Contract.

Time for Completion

Section 1-08.5 is supplemented with the following:

(March 13, 1995)
This project shall be physically completed within *** 110 *** working days.

1-08.5 Time for Completion

(******)
Revise the third and fourth paragraphs to read:

Contract time shall begin on the first working day following the Notice to Proceed Date.

Each working day shall be charged to the contract as it occurs, until the contract work is physically complete. If substantial completion has been granted and all the authorized working days have been used, charging of working days will cease. Each week the Engineer will provide the Contractor a statement that shows the number of working days: (1) charged to the contract the week before; (2) specified for the physical completion of the contract; and (3) remaining for the physical completion of the contract. The statement will also show the nonworking days and any partial or whole day the Engineer declares as unworkable. Within 10 calendar days after the date of each statement, the Contractor shall file a written protest of any alleged discrepancies in it. To be considered by the Engineer, the protest shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of time disputed. By not filing such detailed protest in that period, the Contractor shall be deemed as having accepted the statement as correct. If the Contractor is approved to work 10 hours a day and 4 days a week (a 4-10 schedule) and the fifth day of the week in which a 4-10 shift is worked would ordinarily be charged as a working day then the fifth day of that week will be charged as a working day whether or not the Contractor works on that day.

Revise the sixth paragraph to read:

The Engineer will give the Contractor written notice of the completion date of the contract after all the Contractor's obligations under the contract have been performed by the Contractor. The following events must occur before the Completion Date can be established:

1. The physical work on the project must be complete; and
2. The Contractor must furnish all documentation required by the contract and required by law, to allow the Contracting Agency to process final acceptance of the contract. The following documents must be received by the Project Engineer prior to establishing a completion date:
   a. Certified Payrolls (per Section 1-07.9(5)).
   b. Material Acceptance Certification Documents
   c. Monthly Reports of Amounts Credited as DBE Participation, as required by the Contract Provisions.
   d. Final Contract Voucher Certification
   e. Copies of the approved "Affidavit of Prevailing Wages Paid" for the Contractor and all Subcontractors
   f. Property owner releases per Section 1-07.24

Suspension of Work

Section 1-08.6 is supplemented with the following:

(January 2, 2018)
Contract time may be suspended for procurement of critical materials (Procurement Suspension). In order to receive a Procurement Suspension, the Contractor shall within 21 calendar days after execution by the Contracting Agency, place purchase orders for all materials deemed critical by the Contracting Agency for physical completion of the contract. The Contractor shall provide copies of purchase orders for the critical materials. Such purchase orders shall disclose the purchase order date and estimated delivery dates for such critical material.

The Contractor shall show procurement of the materials listed below as activities in the Progress Schedule. If the approved Progress Schedule indicates that the materials procurement are critical activities, and if the Contractor has provided documentation that purchase orders are placed for the critical materials within the prescribed 21 calendar days, then contract time will be suspended upon physical completion of all critical work except that work dependent upon the below listed critical materials:

*** precast prestressed concrete girders and bridge railings ***

Charging of contract time will resume upon delivery of the critical materials to the Contractor or 120 calendar days after execution by the Contracting Agency, whichever occurs first.

MEASUREMENT AND PAYMENT

Weighing Equipment

1-09.2(5) Measurement

(May 2, 2017 APWA GSP)

Revise the first paragraph to read:

Scale Verification Checks – At the Engineer's discretion, the Engineer may perform verification checks on the accuracy of each batch, hopper, or platform scale used in weighing contract items of Work.

1-09.6 Force Account

(July 14, 2016 SkagitR)

Section 1-09.6 is supplemented with the following:

Payment for unanticipated work performed during construction will be made using the below listed estimated bid items when they are included in the bid proposal:

"Unanticipated Minor Structure Revisions", FA
The Unanticipated Minor Structure Revisions bid item is to be used when minor structural revisions are required due to unanticipated conflicts in the structural design. Engineer approval will be required prior to performing the work.

"Unanticipated Dewatering", FA
The Unanticipated Dewatering bid item is to be used when unanticipated ground water impacts the site work. Engineer approval will be required prior to performing the work.

"Unanticipated Repair/Restoration of Public and Private Facilities", FA
The Unanticipated Repair/Restoration of Public and Private Facilities bid item is to be used when unanticipated property damage occurs through no fault of the Contractor or Contracting Agency. Engineer approval will be required prior to performing the work.

Measurement and payment will be made by force account as provided in section 1-09.6.

(October 10, 2008 APWA GSP)

Supplement this section with the following:

The Contracting Agency has estimated and included in the Proposal, dollar amounts for all items to be paid per force account, only to provide a common proposal for Bidders. All such dollar amounts are to become a part of Contractor's total bid. However, the Contracting Agency does not warrant expressly or by implication, that the actual amount of work will correspond with those estimates. Payment will be made on the basis of the amount of work actually authorized by Engineer.

1-09.7 Mobilization

(July 14, 2016 SkagitF)

Section 1-09.7 is supplemented with following:

Construction Staging Area

No area is provided in this contract for contractor lay-down, staging, and personnel parking. The Contractor must specifically arrange with any property owners for use of their properties and the property owner shall set the conditions of the lease for such property.

1-09.9 Payments

(March 13, 2012 APWA GSP)

Delete the first four paragraphs and replace them with the following:

The basis of payment will be the actual quantities of Work performed according to the Contract and as specified for payment.

The Contractor shall submit a breakdown of the cost of lump sum bid items at the Preconstruction Conference, to enable the Project Engineer to determine the Work performed on a monthly basis. A breakdown is not required for lump sum items that include a basis for incremental payments as part of the respective Specification. Absent a lump sum breakdown, the Project Engineer will make a determination based on information available. The Project Engineer's determination of the cost of work shall be final.

Progress payments for completed work and material on hand will be based upon progress estimates prepared by the Engineer. A progress estimate cutoff date will be established at the preconstruction conference.

The initial progress estimate will be made not later than 30 days after the Contractor commences the work, and successive progress estimates will be made every month thereafter until the Completion Date. Progress estimates made during progress of the work are tentative, and made only for the purpose of determining progress payments. The progress estimates are subject to change at any time prior to the calculation of the final payment.

The value of the progress estimate will be the sum of the following:

1. Unit Price Items in the Bid Form — the approximate quantity of acceptable units of work completed multiplied by the unit price.
2. Lump Sum Items in the Bid Form — based on the approved Contractor's lump sum breakdown for that item, or absent such a breakdown, based on the Engineer's determination.
3. Materials on Hand — 100 percent of invoiced cost of material delivered to Job site or other storage area approved by the Engineer.
4. Change Orders — entitlement for approved extra cost or completed extra work as determined by the Engineer.

Progress payments will be made in accordance with the progress estimate less:

1. Retainage per Section 1-09.9(1), on non FHWA-funded projects;
2. The amount of progress payments previously made; and

3. Funds withheld by the Contracting Agency for disbursement in accordance with the Contract Documents.

Progress payments for work performed shall not be evidence of acceptable performance or an admission by the Contracting Agency that any work has been satisfactorily completed. The determination of payments under the contract will be final in accordance with Section 1-05.1.

Disputes and Claims

1-09.11(3) Time Limitation and Jurisdiction

(November 30, 2018 APWA GSP)

Revise this section to read*:*

For the convenience of the parties to the Contract it is mutually agreed by the parties that any claims or causes of action which the Contractor has against the Contracting Agency arising from the Contract shall be brought within 180 calendar days from the date of final acceptance (Section 1-05.12) of the Contract by the Contracting Agency; and it is further agreed that any such claims or causes of action shall be brought only in the Superior Court of the county where the Contracting Agency headquarters is located, provided that where an action is asserted against a county, RCW 36.01.050 shall control venue and jurisdiction. The parties understand and agree that the Contractor's failure to bring suit within the time period provided, shall be a complete bar to any such claims or causes of action. It is further mutually agreed by the parties that when any claims or causes of action which the Contractor asserts against the Contracting Agency arising from the Contract are filed with the Contracting Agency or initiated in court, the Contractor shall permit the Contracting Agency to have timely access to any records deemed necessary by the Contracting Agency to assist in evaluating the claims or action.

Claims Resolution

1-09.13(3) Claims $250,000 or Less

(October 1, 2005 APWA GSP)

Delete this section and replace it with the following:

The Contractor and the Contracting Agency mutually agree that those claims that total $250,000 or less, submitted in accordance with Section 1-09.11 and not resolved by nonbinding ADR processes, shall be resolved through litigation unless the parties mutually agree in writing to resolve the claim through binding arbitration.

1-09.13(3)A Administration of Arbitration

(November 30, 2018 APWA GSP)

Revise the third paragraph to read:

The Contracting Agency and the Contractor mutually agree to be bound by the decision of the arbitrator, and judgment upon the award rendered by the arbitrator may be entered in the Superior Court of <u>the county in which the Contracting Agency's headquarters is located, provided that where claims subject to arbitration are asserted against a county, RCW 36.01.050 shall control venue and jurisdiction of the Superior Court</u>. The decision of the arbitrator and the specific basis for the decision shall be in writing. The arbitrator shall use the Contract as a basis for decisions.

TEMPORARY TRAFFIC CONTROL

Payment

Section 1-10.5 is supplemented with the following:

(******)
Providing safety control for vehicles turning on and off roadways is the responsibility of the Contractor. All costs associated with this work shall be incidental to the unit bid items.

Division 2
Earthwork

CLEARING, GRUBBING, AND ROADSIDE CLEANUP

Construction Requirements

Clearing

Section 2-01.3(1) is supplemented with the following

(******)
Clear the existing pavement of all organic overgrowth material to provide a clean existing pavement surface where shown in the plans. Use mechanical or hand devices to ensure existing pavement is not damaged. Sweep existing pavement surface to remove any organic residual soil.

Payment

Section 2-01.5 is supplemented with the following

(******)
All costs associated with the clearing and cleaning of the existing pavement shall be included in the unit bid price for “Clearing and Grubbing”

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Construction Requirements

Section 2-02.3 is supplemented with the following:

(******)

Removal of Structures and Obstructions

The following items shall be included in the item “Removal of Structures and Obstructions”:

Item	Quantity
Remove existing 24” culvert ends	12 LF
Remove and resetting ecology blocks	7 EA
Removal of Existing Pavement	4,060 SF

STRUCTURE EXCAVATION

Section 2-09 is supplemented with the following:

(******)

Temporary Isolation Walls

Description

Isolation walls will be required to be installed prior to any in-water or habitat restoration work. The isolation walls shall surround the area where in-water excavation or habitat restoration will occur. This work consists of design, furnishing, installing, and removing temporary isolation walls at the locations shown in the Plans.

Construction Requirements

The isolation walls shall be Contractor designed. The design shall provide a structure that will isolate excavation and restoration work from the adjacent river/slough, including preventing fish from entering the in-water work area and preventing sediment from entering the adjacent river/slough. Water flow rates shall be based on the project Hydraulic Report, which is attached to this contract as an appendix. Other design requirements shall conform to the requirements of Section 2-09.3(3)D.

The Contractor shall submit Type 2E Working Drawings and calculations showing the proposed methods and construction details in accordance with 2-09.3(3)D.

Installation and removal of the temporary isolation walls shall conform to the requirements of section 2-09.3(3)D.

Approximate locations of the walls are shown on the plans. The locations shown on the plans are based on the water level at the time of project survey. The Contractor shall identify the location and length of the isolation walls based on the water conditions at the time of construction to meet the design requirements in the plans and specifications.

The top of wall elevations shall be based on the 10-year water surface elevation. If water elevations at the time of construction are higher than the top of wall elevations shown in the plans, to owner's project Representative shall be notified immediately.

All materials used to construct the isolation walls shall be removed from the site by the Contractor after construction is complete.

Payment

Payment will be made, in accordance with Section 1-09.3, for each of the following Bid items that are included in the Proposal:

"Temporary Isolation Walls", lump sum.

Division 5
Structures

5-04 Hot Mix Asphalt

(July 18, 2018 APWA GSP)

Delete Section 5-04 and amendments, Hot Mix Asphalt and replace it with the following:

5-04.1 Description

This Work shall consist of providing and placing one or more layers of plant-mixed hot mix asphalt (HMA) on a prepared foundation or base in accordance with these Specifications and the lines, grades, thicknesses, and typical cross-sections shown in the Plans. The manufacture of HMA may include warm mix asphalt (WMA) processes in accordance with these Specifications. WMA processes include organic additives, chemical additives, and foaming.

HMA shall be composed of asphalt binder and mineral materials as may be required, mixed in the proportions specified to provide a homogeneous, stable, and workable mixture.

5-04.2 Materials

Materials shall meet the requirements of the following sections:

Asphalt Binder	9-02.1(4)
Cationic Emulsified Asphalt	9-02.1(6)
Anti-Stripping Additive	9-02.4
HMA Additive	9-02.5
Aggregates	9-03.8
Recycled Asphalt Pavement	9-03.8(3)B
Mineral Filler	9-03.8(5)
Recycled Material	9-03.21
Portland Cement	9-01
Sand	9-03.1(2)
(As noted in 5-04.3(5)C for crack sealing)	
Joint Sealant	9-04.2
Foam Backer Rod	9-04.2(3)A

The Contract documents may establish that the various mineral materials required for the manufacture of HMA will be furnished in whole or in part by the Contracting Agency. If the documents do not establish the furnishing of any of these mineral materials by the Contracting Agency, the Contractor shall be required to furnish such materials in the amounts required for the designated mix. Mineral materials include coarse and fine aggregates, and mineral filler.

The Contractor may choose to utilize recycled asphalt pavement (RAP) in the production of HMA. The RAP may be from pavements removed under the Contract, if any, or pavement material from an existing stockpile.

The Contractor may use up to 20 percent RAP by total weight of HMA with no additional sampling or testing of the RAP. The RAP shall be sampled and tested at a frequency of one sample for every 1,000 tons produced and not less than ten samples per project. The asphalt content and gradation test data shall be reported to the Contracting Agency when submitting the mix design for approval on the QPL. The Contractor shall include the RAP as part of the mix design as defined in these Specifications.

The grade of asphalt binder shall be as required by the Contract. Blending of asphalt binder from different sources is not permitted.

The Contractor may only use warm mix asphalt (WMA) processes in the production of HMA with 20 percent or less RAP by total weight of HMA. The Contractor shall submit to the Engineer for approval the process that is proposed and how it will be used in the manufacture of HMA.

Production of aggregates shall comply with the requirements of Section 3-01. Preparation of stockpile site, the stockpiling of aggregates, and the removal of aggregates from stockpiles shall comply with the requirements of Section 3-02.

5-04.2(1) How to Get an HMA Mix Design on the QPL

If the contractor wishes to submit a mix design for inclusion in the Qualified Products List (QPL), please follow the WSDOT process outlined in Standard Specification 5-04.2(1).

5-04.2(1)A Vacant

5-04.2(2) Mix Design – Obtaining Project Approval

No paving shall begin prior to the approval of the mix design by the Engineer.

Nonstatistical evaluation will be used for all HMA not designated as Commercial HMA in the contract documents.

Commercial evaluation will be used for Commercial HMA and for other classes of HMA in the following applications: sidewalks, road approaches, ditches, slopes, paths, trails, gores, prelevel, and pavement repair. Other nonstructural applications of HMA accepted by commercial evaluation shall be as approved by the Project Engineer. Sampling and testing of HMA accepted by commercial evaluation will be at the option of the Project Engineer. The Proposal quantity of HMA that is accepted by commercial evaluation will be excluded from the quantities used in the determination of nonstatistical evaluation.

Nonstatistical Mix Design. Fifteen days prior to the first day of paving the contractor shall provide one of the following mix design verification certifications for Contracting Agency review;

- The WSDOT Mix Design Evaluation Report from the current WSDOT QPL, or one of the mix design verification certifications listed below.
- The proposed HMA mix design on WSDOT Form 350-042 with the seal and certification (stamp & sig-nature) of a valid licensed Washington State Professional Engineer.

- The Mix Design Report for the proposed HMA mix design developed by a qualified City or County laboratory that is within one year of the approval date.**

The mix design shall be performed by a lab accredited by a national authority such as Laboratory Accreditation Bureau, L-A-B for Construction Materials Testing, The Construction Materials Engineering Council (CMEC's) ISO 17025 or AASHTO Accreditation Program (AAP) and shall supply evidence of participation in the AASHTO: resource proficiency sample program.

Mix designs for HMA accepted by Nonstatistical evaluation shall;

- Have the aggregate structure and asphalt binder content determined in accordance with WSDOT Standard Operating Procedure 732 and meet the requirements of Sections 9-03.8(2), except that Hamburg testing for ruts and stripping are at the discretion of the Engineer, and 9-03.8(6).
- Have anti-strip requirements, if any, for the proposed mix design determined in accordance with AASHTO T 283 or T 324, or based on historic anti-strip and aggregate source compatibility from previous WSDOT lab testing.

At the discretion of the Engineer, agencies may accept verified mix designs older than 12 months from the original verification date with a certification from the Contractor that the materials and sources are the same as those shown on the original mix design.

Commercial Evaluation Approval of a mix design for "Commercial Evaluation" will be based on a review of the Contractor's submittal of WSDOT Form 350-042 (For commercial mixes, AASHTO T 324 evaluation is not required) or a Mix Design from the current WSDOT QPL or from one of the processes allowed by this section. Testing of the HMA by the Contracting Agency for mix design approval is not required.

For the Bid Item Commercial HMA, the Contractor shall select a class of HMA and design level of Equivalent Single Axle Loads (ESAL's) appropriate for the required use.

5-04.2(2)B Using Warm Mix Asphalt Processes

The Contractor may elect to use additives that reduce the optimum mixing temperature or serve as a compaction aid for producing HMA. Additives include organic additives, chemical additives and foaming processes. The use of Additives is subject to the following:

- Do not use additives that reduce the mixing temperature more than allowed in Section 5-04.3(6) in the production of mixtures.
- Before using additives, obtain the Engineer's approval using WSDOT Form 350-076 to describe the proposed additive and process.

5-04.3 Construction Requirements

5-04.3(1) Weather Limitations

Do not place HMA for wearing course on any Traveled Way beginning October 1st through March 31st of the following year without written concurrence from the Engineer.

Do not place HMA on any wet surface, or when the average surface temperatures are less than those specified below, or when weather conditions otherwise prevent the proper handling or finishing of the HMA.

Minimum Surface Temperature for Paving

Compacted Thickness (Feet)	Wearing Course	Other Courses
Less than 0.10	55◦F	45◦F
0.10 to .20	45◦F	35◦F
More than 0.20	35◦F	35◦F

5-04.3(2) Paving Under Traffic

When the Roadway being paved is open to traffic, the requirements of this Section shall apply.

The Contractor shall keep intersections open to traffic at all times except when paving the intersection or paving across the intersection. During such time, and provided that there has been an advance warning to the public, the intersection may be closed for the minimum time required to place and compact the mixture. In hot weather, the Engineer may require the application of water to the pavement to accelerate the finish rolling of the pavement and to shorten the time required before reopening to traffic.

Before closing an intersection, advance warning signs shall be placed and signs shall also be placed marking the detour or alternate route.

During paving operations, temporary pavement markings shall be maintained throughout the project. Temporary pavement markings shall be installed on the Roadway prior to opening to traffic. Temporary pavement markings shall be in accordance with Section 8-23.

All costs in connection with performing the Work in accordance with these requirements, except the cost of temporary pavement markings, shall be included in the unit Contract prices for the various Bid items involved in the Contract.

5-04.3(3) Equipment

5-04.3(3)A Mixing Plant

Plants used for the preparation of HMA shall conform to the following requirements:

1. **Equipment for Preparation of Asphalt Binder** – Tanks for the storage of asphalt binder shall be equipped to heat and hold the material at the required temperatures. The heating shall be accomplished by steam coils, electricity, or

other approved means so that no flame shall be in contact with the storage tank. The circulating system for the asphalt binder shall be designed to ensure proper and continuous circulation during the operating period. A valve for the purpose of sampling the asphalt binder shall be placed in either the storage tank or in the supply line to the mixer.

2. **Thermometric Equipment** – An armored thermometer, capable of detecting temperature ranges expected in the HMA mix, shall be fixed in the asphalt binder feed line at a location near the charging valve at the mixer unit. The thermometer location shall be convenient and safe for access by Inspectors. The plant shall also be equipped with an approved dial-scale thermometer, a mercury actuated thermometer, an electric pyrometer, or another approved thermometric instrument placed at the discharge chute of the drier to automatically register or indicate the temperature of the heated aggregates. This device shall be in full view of the plant operator.
3. **Heating of Asphalt Binder** – The temperature of the asphalt binder shall not exceed the maximum recommended by the asphalt binder manufacturer nor shall it be below the minimum temperature required to maintain the asphalt binder in a homogeneous state. The asphalt binder shall be heated in a manner that will avoid local variations in heating. The heating method shall provide a continuous supply of asphalt binder to the mixer at a uniform average temperature with no individual variations exceeding 25°F. Also, when a WMA additive is included in the asphalt binder, the temperature of the asphalt binder shall not exceed the maximum recommended by the manufacturer of the WMA additive.
4. **Sampling and Testing of Mineral Materials** – The HMA plant shall be equipped with a mechanical sampler for the sampling of the mineral materials. The mechanical sampler shall meet the requirements of Section 1-05.6 for the crushing and screening operation. The Contractor shall provide for the setup and operation of the field testing facilities of the Contracting Agency as provided for in Section 3-01.2(2).
5. **Sampling HMA** – The HMA plant shall provide for sampling HMA by one of the following methods:
    a. A mechanical sampling device attached to the HMA plant.
    b. Platforms or devices to enable sampling from the hauling vehicle without entering the hauling vehicle.

5-04.3(3)B Hauling Equipment

Trucks used for hauling HMA shall have tight, clean, smooth metal beds and shall have a cover of canvas or other suitable material of sufficient size to protect the mixture from adverse weather. Whenever the weather conditions during the work shift include, or are forecast to include, precipitation or an air temperature less than 45°F or when time from loading to unloading exceeds 30 minutes, the cover shall be securely attached to protect the HMA.

The contractor shall provide an environmentally benign means to prevent the HMA mixture from adhering to the hauling equipment. Excess release agent shall be drained prior to filling hauling equipment with HMA. Petroleum derivatives or other coating material that contaminate or alter the characteristics of the HMA shall not be used. For live bed trucks, the conveyer shall be in operation during the process of applying the release agent.

5-04.3(3)C Pavers

HMA pavers shall be self-contained, power-propelled units, provided with an internally heated vibratory screed and shall be capable of spreading and finishing courses of HMA plant mix material in lane widths required by the paving section shown in the Plans.

The HMA paver shall be in good condition and shall have the most current equipment available from the manufacturer for the prevention of segregation of the HMA mixture installed, in good condition, and in working order. The equipment certification shall list the make, model, and year of the paver and any equipment that has been retrofitted.

The screed shall be operated in accordance with the manufacturer's recommendations and shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, segregating, or gouging the mixture. A copy of the manufacturer's recommendations shall be provided upon request by the Contracting Agency. Extensions will be allowed provided they produce the same results, including ride, density, and surface texture as obtained by the primary screed. Extensions without augers and an internally heated vibratory screed shall not be used in the Traveled Way.

When specified in the Contract, reference lines for vertical control will be required. Lines shall be placed on both outer edges of the Traveled Way of each Roadway. Horizontal control utilizing the reference line will be permitted. The grade and slope for intermediate lanes shall be controlled automatically from reference lines or by means of a mat referencing device and a slope control device. When the finish of the grade prepared for paving is superior to the established tolerances and when, in the opinion of the Engineer, further improvement to the line, grade, cross-section, and smoothness can best be achieved without the use of the reference line, a mat referencing device may be substituted for the reference line. Substitution of the device will be subject to the continued approval of the Engineer. A joint matcher may be used subject to the approval of the Engineer. The reference line may be removed after the completion of the first course of HMA when approved by the Engineer. Whenever the Engineer determines that any of these methods are failing to provide the necessary vertical control, the reference lines will be reinstalled by the Contractor.

The Contractor shall furnish and install all pins, brackets, tensioning devices, wire, and accessories necessary for satisfactory operation of the automatic control equipment.

If the paving machine in use is not providing the required finish, the Engineer may suspend Work as allowed by Section 1-08.6. Any cleaning or solvent type liquids spilled on the pavement shall be thoroughly removed before paving proceeds.

5-04.3(3)D Material Transfer Device or Material Transfer Vehicle

A Material Transfer Device/Vehicle (MTD/V) shall only be used with the Engineer's approval, unless other-wise required by the contract.

Where an MTD/V is required by the contract, the Engineer may approve paving without an MTD/V, at the request of the Contractor. The Engineer will determine if an equitable adjustment in cost or time is due.

When used, the MTD/V shall mix the HMA after delivery by the hauling equipment and prior to laydown by the paving machine. Mixing of the HMA shall be sufficient to obtain a uniform temperature throughout the mixture. If a windrow elevator is used, the length of the windrow may be limited in urban areas or through intersections, at the discretion of the Engineer.

To be approved for use, an MTV:

1. Shall be self-propelled vehicle, separate from the hauling vehicle or paver.
2. Shall not be connected to the hauling vehicle or paver.
3. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
4. Shall mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
5. Shall mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

To be approved for use, an MTD:

1. Shall be positively connected to the paver.
2. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
3. Shall mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
4. Shall mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

5-04.3(3)E Rollers

Rollers shall be of the steel wheel, vibratory, oscillatory, or pneumatic tire type, in good condition and capable of reversing without backlash. Operation of the roller shall be in accordance with the manufacturer's recommendations. When ordered by the Engineer for any roller planned for use on the project, the Contractor shall provide a copy of the manufacturer's recommendation for the use of that roller for compaction of HMA. The number and weight of rollers shall be sufficient to compact the mixture in compliance with the requirements of Section 5-04.3(10). The use of equipment that results in crushing of the aggregate will not be permitted. Rollers producing pickup, washboard, uneven compaction of the surface, displacement of the mixture or other undesirable results shall not be used.

5-04.3(4) Preparation of Existing Paved Surfaces

When the surface of the existing pavement or old base is irregular, the Contractor shall bring it to a uniform grade and cross-section as shown on the Plans or approved by the Engineer.

Preleveling of uneven or broken surfaces over which HMA is to be placed may be accomplished by using an asphalt paver, a motor patrol grader, or by hand raking, as approved by the Engineer.

Compaction of preleveling HMA shall be to the satisfaction of the Engineer and may require the use of small steel wheel rollers, plate compactors, or pneumatic rollers to avoid bridging across preleveled areas by the compaction equipment. Equipment used for the compaction of preleveling HMA shall be approved by the Engineer.

Before construction of HMA on an existing paved surface, the entire surface of the pavement shall be clean. All fatty asphalt patches, grease drippings, and other objectionable matter shall be entirely removed from the existing pavement. All pavements or bituminous surfaces shall be thoroughly cleaned of dust, soil, pavement grindings, and other foreign matter. All holes and small depressions shall be filled with an appropriate class of HMA. The surface of the patched area shall be leveled and compacted thoroughly. Prior to the application of tack coat, or paving, the condition of the surface shall be approved by the Engineer.

A tack coat of asphalt shall be applied to all paved surfaces on which any course of HMA is to be placed or abutted; except that tack coat may be omitted from clean, newly paved surfaces at the discretion of the Engineer. Tack coat shall be uniformly applied to cover the existing pavement with a thin film of residual asphalt free of streaks and bare spots at a rate between 0.02 and 0.10 gallons per square yard of retained asphalt. The rate of application shall be approved by the Engineer. A heavy application of tack coat shall be applied to all joints. For Roadways open to traffic, the application of tack coat shall be limited to surfaces that will be paved during the same working shift. The spreading equipment shall be equipped with a thermometer to indicate the temperature of the tack coat material.

Equipment shall not operate on tacked surfaces until the tack has broken and cured. If the Contractor's operation damages the tack coat it shall be repaired prior to placement of the HMA.

The tack coat shall be CSS-1, or CSS-1h emulsified asphalt. The CSS-1 and CSS-1h emulsified asphalt may be diluted once with water at a rate not to exceed one part water to one part emulsified asphalt. The tack coat shall have sufficient temperature such that it may be applied uniformly at the specified rate of application and shall not exceed the maximum temperature recommended by the emulsified asphalt manufacturer.

5-04.3(4)A Crack Sealing

5-04.3(4)A1 General

When the Proposal includes a pay item for crack sealing, seal all cracks ¼ inch in width and greater.

Cleaning: Ensure that cracks are thoroughly clean, dry and free of all loose and foreign material when filling with crack sealant material. Use a hot compressed air lance to dry and warm the pavement surfaces within the crack immediately prior to filling a crack with the sealant material. Do not overheat pavement. Do not use direct flame dryers. Routing cracks is not required.

Sand Slurry: For cracks that are to be filled with sand slurry, thoroughly mix the components and pour the mixture into the cracks until full. Add additional CSS-1 cationic emulsified asphalt to the sand slurry as needed for workability to ensure the mixture will completely fill the cracks. Strike off the sand slurry flush with the existing pavement surface and allow the mixture to cure. Top off cracks that were not completely filled with additional sand slurry. Do not place the HMA overlay until the slurry has fully cured.

The sand slurry shall consist of approximately 20 percent CSS-1 emulsified asphalt, approximately 2 percent portland cement, water (if required), and the remainder clean Class 1 or 2 fine aggregate per section 9-03.1(2). The components shall be thoroughly mixed and then poured into the cracks and joints until full. The following day, any cracks or joints that are not completely filled shall be topped off with additional sand slurry. After the sand slurry is placed, the filler shall be struck off flush with the existing pavement surface and allowed to cure. The HMA overlay shall not be placed until the slurry has fully cured. The requirements of Section 1-06 will not apply to the portland cement and sand used in the sand slurry.

In areas where HMA will be placed, use sand slurry to fill the cracks.

In areas where HMA will not be placed, fill the cracks as follows:

1. Cracks ¼ inch to 1 inch in width - fill with hot poured sealant.
2. Cracks greater than 1 inch in width – fill with sand slurry.

Hot Poured Sealant: For cracks that are to be filled with hot poured sealant, apply the material in accordance with these requirements and the manufacturer's recommendations. Furnish a Type 1 Working Drawing of the manufacturer's product information and recommendations to the Engineer prior to the start of work, including the manufacturer's recommended heating time and temperatures, allowable storage time and temperatures after initial heating, allowable reheating criteria, and application temperature range. Confine hot poured sealant material within the crack. Clean any overflow of sealant from the pavement surface. If, in the opinion of the Engineer, the Contractor's method of sealing the cracks with hot poured sealant results in an excessive amount of material on the pavement surface, stop and correct the operation to eliminate the excess material.

5-04.3(4)A2 Crack Sealing Areas Prior to Paving

In areas where HMA will be placed, use sand slurry to fill the cracks.

5-04.3(4)A3 Crack Sealing Areas Not to be Paved

In areas where HMA will not be placed, fill the cracks as follows:

A. Cracks ¼ inch to 1 inch in width - fill with hot poured sealant.
B. Cracks greater than 1 inch in width – fill with sand slurry.

5-04.3(4)B Vacant

5-04.3(4)C Pavement Repair

The Contractor shall excavate pavement repair areas and shall backfill these with HMA in accordance with the details shown in the Plans and as marked in the field. The Contractor shall conduct the excavation operations in a manner that will protect the pavement that is to remain. Pavement not designated to be removed that is damaged as a result of the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Contracting Agency. The Contractor shall excavate only within one lane at a time unless approved otherwise by the Engineer. The Contractor shall not excavate more area than can be completely finished during the same shift, unless approved by the Engineer.

Unless otherwise shown in the Plans or determined by the Engineer, excavate to a depth of 1.0 feet. The Engineer will make the final determination of the excavation depth required. The minimum width of any pavement repair area shall be 40 inches unless shown otherwise in the Plans. Before any excavation, the existing pavement shall be sawcut or shall be removed by a pavement grinder. Excavated materials will become the property of the Contractor and shall be disposed of in a Contractor-provided site off the Right of Way or used in accordance with Sections 2-02.3(3) or 9-03.21.

Asphalt for tack coat shall be required as specified in Section 5-04.3(4). A heavy application of tack coat shall be applied to all surfaces of existing pavement in the pavement repair area.

Placement of the HMA backfill shall be accomplished in lifts not to exceed 0.35-foot compacted depth. Lifts that exceed 0.35-foot of compacted depth may be accomplished with the approval of the Engineer. Each lift shall be thoroughly compacted by a mechanical tamper or a roller.

5-04.3(5) Producing/Stockpiling Aggregates and RAP

Aggregates and RAP shall be stockpiled according to the requirements of Section 3-02. Sufficient storage space shall be provided for each size of aggregate and RAP. Materials shall be removed from stockpile(s) in a manner to ensure minimal segregation when being moved to the HMA plant for processing into the final mixture. Different aggregate sizes shall be kept separated until they have been delivered to the HMA plant.

5-04.3(5)A Vacant

5-04.3(6) Mixing

After the required amount of mineral materials, asphalt binder, recycling agent and anti-stripping additives have been introduced into the mixer the HMA shall be mixed until complete and uniform coating of the particles and thorough distribution of the asphalt binder throughout the mineral materials is ensured.

When discharged, the temperature of the HMA shall not exceed the optimum mixing temperature by more than 25°F as shown on the reference mix design report or as approved by the Engineer. Also, when a WMA additive is included in the manufacture of HMA, the discharge temperature of the HMA shall not exceed the maximum recommended by the manufacturer of the WMA additive. A maximum water content of 2

percent in the mix, at discharge, will be allowed providing the water causes no problems with handling, stripping, or flushing. If the water in the HMA causes any of these problems, the moisture content shall be reduced as directed by the Engineer.

Storing or holding of the HMA in approved storage facilities will be permitted with approval of the Engineer, but in no event shall the HMA be held for more than 24 hours. HMA held for more than 24 hours after mixing shall be rejected. Rejected HMA shall be disposed of by the Contractor at no expense to the Contracting Agency. The storage facility shall have an accessible device located at the top of the cone or about the third point. The device shall indicate the amount of material in storage. No HMA shall be accepted from the storage facility when the HMA in storage is below the top of the cone of the storage facility, except as the storage facility is being emptied at the end of the working shift.

Recycled asphalt pavement (RAP) utilized in the production of HMA shall be sized prior to entering the mixer so that a uniform and thoroughly mixed HMA is produced. If there is evidence of the recycled asphalt pavement not breaking down during the heating and mixing of the HMA, the Contractor shall immediately suspend the use of the RAP until changes have been approved by the Engineer. After the required amount of mineral materials, RAP, new asphalt binder and asphalt rejuvenator have been introduced into the mixer the HMA shall be mixed until complete and uniform coating of the particles and thorough distribution of the asphalt binder throughout the mineral materials, and RAP is ensured.

5-04.3(7) Spreading and Finishing

The mixture shall be laid upon an approved surface, spread, and struck off to the grade and elevation established. HMA pavers complying with Section 5-04.3(3) shall be used to distribute the mixture. Unless otherwise directed by the Engineer, the nominal compacted depth of any layer of any course shall not exceed the following:

HMA Class 1”		0.35 feet
HMA Class ¾” and HMA Class ½”		
	wearing course	0.30 feet
	other courses	0.35 feet
HMA Class ⅜”		0.15 feet

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the paving may be done with other equipment or by hand.

When more than one JMF is being utilized to produce HMA, the material produced for each JMF shall be placed by separate spreading and compacting equipment. The intermingling of HMA produced from more than one JMF is prohibited. Each strip of HMA placed during a work shift shall conform to a single JMF established for the class of HMA specified unless there is a need to make an adjustment in the JMF.

5-04.3(8) Aggregate Acceptance Prior to Incorporation in HMA

For HMA accepted by nonstatistical evaluation the aggregate properties of sand equivalent, uncompacted void content and fracture will be evaluated in accordance with Section 3-04. Sampling and testing of aggregates for HMA accepted by commercial evaluation will be at the option of the Engineer.

5-04.3(9) HMA Mixture Acceptance

Acceptance of HMA shall be as provided under nonstatistical, or commercial evaluation.

Nonstatistical evaluation will be used for the acceptance of HMA unless Commercial Evaluation is specified.

Commercial evaluation will be used for Commercial HMA and for other classes of HMA in the following applications: sidewalks, road approaches, ditches, slopes, paths, trails, gores, prelevel, temporary pavement, and pavement repair. Other nonstructural applications of HMA accepted by commercial evaluation shall be as approved by the Engineer. Sampling and testing of HMA accepted by commercial evaluation will be at the option of the Engineer.

The mix design will be the initial JMF for the class of HMA. The Contractor may request a change in the JMF. Any adjustments to the JMF will require the approval of the Engineer and may be made in accordance with this section.

HMA Tolerances and Adjustments

1. **Job Mix Formula Tolerances** – The constituents of the mixture at the time of acceptance shall be within tolerance. The tolerance limits will be established as follows:

   For Asphalt Binder and Air Voids (Va), the acceptance limits are determined by adding the tolerances below to the approved JMF values. These values will also be the Upper Specification Limit (USL) and Lower Specification Limit (LSL) required in Section 1-06.2(2)D2

Property	Non-Statistical Evaluation	Commercial Evaluation
Asphalt Binder	+/- 0.5%	+/- 0.7%
Air Voids, Va	2.5% min. and 5.5% max	N/A

   For Aggregates in the mixture:

   a. First, determine preliminary upper and lower acceptance limits by applying the following tolerances to the approved JMF.

Aggregate Percent Passing	Non-Statistical Evaluation	Commercial Evaluation
1", ¾", ½", and 3/8" sieves	+/- 6%	+/- 8%
No. 4 sieve	+/-6%	+/- 8%
No. 8 Sieve	+/- 6%	+/-8%
No. 200 sieve	+/- 2.0%	+/- 3.0%

   b. Second, adjust the preliminary upper and lower acceptance limits determined from step (a) the minimum amount necessary so that none of the aggregate properties are outside the control points in Section 9-03.8(6). The resulting values will be the upper and lower acceptance limits for aggregates, as well as the USL and LSL required in Section 1-06.2(2)D2.

2. Job Mix Formula Adjustments – An adjustment to the aggregate gradation or asphalt binder content of the JMF requires approval of the Engineer. Adjustments to the JMF will only be considered if the change produces material of equal or

better quality and may require the development of a new mix design if the adjustment exceeds the amounts listed below.

a. **Aggregates** –2 percent for the aggregate passing the 1½″, 1″, ¾″, ½″, ⅜″, and the No. 4 sieves, 1 percent for aggregate passing the No. 8 sieve, and 0.5 percent for the aggregate passing the No. 200 sieve. The adjusted JMF shall be within the range of the control points in Section 9-03.8(6).

b. **Asphalt Binder Con**tent – The Engineer may order or approve changes to asphalt binder content. The maximum adjustment from the approved mix design for the asphalt binder content shall be 0.3 percent

5-04.3(9)A Vacant

5-04.3(9)B Vacant

5-04.3(9)C Mixture Acceptance – Nonstatistical Evaluation

HMA mixture which is accepted by Nonstatistical Evaluation will be evaluated by the Contracting Agency by dividing the HMA tonnage into lots.

5-04.3(9)C1 Mixture Nonstatistical Evaluation – Lots and Sublots

A lot is represented by randomly selected samples of the same mix design that will be tested for acceptance. A lot is defined as the total quantity of material or work produced for each Job Mix Formula placed. Only one lot per JMF is expected. A sublot shall be equal to one day's production or 800 tons, whichever is less except that the final sublot will be a minimum of 400 tons and may be increased to 1200 tons.

All of the test results obtained from the acceptance samples from a given lot shall be evaluated collectively. If the Contractor requests a change to the JMF that is approved, the material produced after the change will be evaluated on the basis of the new JMF for the remaining sublots in the current lot and for acceptance of subsequent lots. For a lot in progress with a CPF less than 0.75, a new lot will begin at the Contractor's request after the Engineer is satisfied that material conforming to the Specifications can be produced.

Sampling and testing for evaluation shall be performed on the frequency of one sample per sublot.

5-04.3(9)C2 Mixture Nonstatistical Evaluation Sampling

Samples for acceptance testing shall be obtained by the Contractor when ordered by the Engineer. The Contractor shall sample the HMA mixture in the presence of the Engineer and in accordance with AASH-TO T 168. A minimum of three samples should be taken for each class of HMA placed on a project. If used in a structural application, at least one of the three samples shall to be tested.

Sampling and testing HMA in a Structural application where quantities are less than 400 tons is at the discretion of the Engineer.

For HMA used in a structural application and with a total project quantity less than 800 tons but more than 400 tons, a minimum of one acceptance test shall be performed. In all cases, a minimum of 3 samples will be obtained at the point of acceptance, a minimum of one of the three samples will be tested for conformance to the JMF:

- If the test results are found to be within specification requirements, additional testing will be at the Engineer's discretion.
- If test results are found not to be within specification requirements, additional testing of the remaining samples to determine a Composite Pay Factor (CPF) shall be performed.

5-04.3(9)C3 Mixture Nonstatistical Evaluation – Acceptance Testing

Testing of HMA for compliance of V_a will at the option of the Contracting Agency. If tested, compliance of V_a will use WSDOT SOP 731.

Testing for compliance of asphalt binder content will be by WSDOT FOP for AASHTO T 308.

Testing for compliance of gradation will be by FOP for WAQTC T 27/T 11.

5-04.3(9)C4 Mixture Nonstatistical Evaluation – Pay Factors

For each lot of material falling outside the tolerance limits in 5-04.3(9), the Contracting Agency will determine a Composite Pay Factor (CPF) using the following price adjustment factors:

Table of Price Adjustment Factors	
Constituent	**Factor "f"**
All aggregate passing: 1½″, 1″, ¾″, ½″, ⅜″ and No.4 sieves	2
All aggregate passing No. 8 sieve	15
All aggregate passing No. 200 sieve	20
Asphalt binder	40
Air Voids (Va) (where applicable)	20

Each lot of HMA produced under Nonstatistical Evaluation and having all constituents falling within the tolerance limits of the job mix formula shall be accepted at the unit Contract price with no further evaluation. When one or more constituents fall outside the nonstatistical tolerance limits in the Job Mix Formula shown in Table of Price Adjustment Factors, the lot shall be evaluated in accordance with Section 1-06.2 to determine the appropriate CPF. The nonstatistical tolerance limits will be used in the calculation of the CPF and the maximum CPF shall be 1.00. When less than three sublots exist, backup samples of the existing sublots or samples from the Roadway shall be tested to provide a minimum of three sets of results for evaluation.

5-04.3(9)C5 Vacant

5-04.3(9)C6 Mixture Nonstatistical Evaluation – Price Adjustments

For each lot of HMA mix produced under Nonstatistical Evaluation when the calculated CPF is less than 1.00, a Nonconforming Mix Factor (NCMF) will be determined. The NCMF equals the algebraic difference of CPF minus 1.00 multiplied by 60 percent. The total job mix compliance price adjustment will be calculated as the product of the NCMF, the quantity of HMA in the lot in tons, and the unit Contract price per ton of mix.

If a constituent is not measured in accordance with these Specifications, its individual pay factor will be considered 1.00 in calculating the Composite Pay Factor (CPF).

5-04.3(9)C7 Mixture Nonstatistical Evaluation - Retests

The Contractor may request a sublot be retested. To request a retest, the Contractor shall submit a written request within 7 calendar days after the specific test results have been received. A split of the original acceptance sample will be retested. The split of the sample will not be tested with the same tester that ran the original acceptance test. The sample will be tested for a complete gradation analysis, asphalt binder content, and, at the option of the agency, V_a. The results of the retest will be used for the acceptance of the HMA in place of the original sublot sample test results. The cost of testing will be deducted from any monies due or that may come due the Contractor under the Contract at the rate of $500 per sample.

5-04.3 (9)D Mixture Acceptance – Commercial Evaluation

If sampled and tested, HMA produced under Commercial Evaluation and having all constituents falling within the tolerance limits of the job mix formula shall be accepted at the unit Contract price with no further evaluation. When one or more constituents fall outside the commercial tolerance limits in the Job Mix Formula shown in 5-04.3(9), the lot shall be evaluated in accordance with Section 1-06.2 to determine the appropriate CPF. The commercial tolerance limits will be used in the calculation of the CPF and the maximum CPF shall be 1.00. When less than three sublots exist, backup samples of the existing sublots or samples from the street shall be tested to provide a minimum of three sets of results for evaluation.

For each lot of HMA mix produced and tested under Commercial Evaluation when the calculated CPF is less than 1.00, a Nonconforming Mix Factor (NCMF) will be determined. The NCMF equals the algebraic difference of CPF minus 1.00 multiplied by 60 percent. The Job Mix Compliance Price Adjustment will be calculated as the product of the NCMF, the quantity of HMA in the lot in tons, and the unit Contract price per ton of mix.

If a constituent is not measured in accordance with these Specifications, its individual pay factor will be considered 1.00 in calculating the Composite Pay Factor (CPF).

5-04.3(10) HMA Compaction Acceptance

HMA mixture accepted by nonstatistical evaluation that is used in traffic lanes, including lanes for intersections, ramps, truck climbing, weaving, and speed change, and having a specified compacted course thickness greater than 0.10-foot, shall be compacted to a

specified level of relative density. The specified level of relative density shall be a Composite Pay Factor (CPF) of not less than 0.75 when evaluated in accordance with Section 1-06.2, using a LSL of 92.0 (minimum of 92 percent of the maximum density). The maximum density shall be determined by WSDOT FOP for AASHTO T 729. The specified level of density attained will be determined by the evaluation of the density of the pavement. The density of the pavement shall be determined in accordance with WSDOT FOP for WAQTC TM 8, except that gauge correlation will be at the discretion of the Engineer, when using the nuclear density gauge and WSDOT SOP 736 when using cores to determine density.

Tests for the determination of the pavement density will be taken in accordance with the required procedures for measurement by a nuclear density gauge or roadway cores after completion of the finish rolling.

If the Contracting Agency uses a nuclear density gauge to determine density the test procedures FOP for WAQTC TM 8 and WSDOT SOP T 729 will be used on the day the mix is placed and prior to opening to traffic.

Roadway cores for density may be obtained by either the Contracting Agency or the Contractor in accordance with WSDOT SOP 734. The core diameter shall be 4-inches minimum, unless otherwise approved by the Engineer. Roadway cores will be tested by the Contracting Agency in accordance with WSDOT FOP for AASHTO T 166.

If the Contract includes the Bid item “Roadway Core” the cores shall be obtained by the Contractor in the presence of the Engineer on the same day the mix is placed and at locations designated by the Engineer. If the Contract does not include the Bid item “Roadway Core” the Contracting Agency will obtain the cores.

For a lot in progress with a CPF less than 0.75, a new lot will begin at the Contractor’s request after the Engineer is satisfied that material conforming to the Specifications can be produced.

HMA mixture accepted by commercial evaluation and HMA constructed under conditions other than those listed above shall be compacted on the basis of a test point evaluation of the compaction train. The test point evaluation shall be performed in accordance with instructions from the Engineer. The number of passes with an approved compaction train, required to attain the maximum test point density, shall be used on all subsequent paving.

HMA for preleveling shall be thoroughly compacted. HMA that is used for preleveling wheel rutting shall be compacted with a pneumatic tire roller unless otherwise approved by the Engineer.

Test Results

For a sublot that has been tested with a nuclear density gauge that did not meet the minimum of 92 percent of the reference maximum density in a compaction lot with a CPF below 1.00 and thus subject to a price reduction or rejection, the Contractor may request that a core be used for determination of the relative density of the sublot. The relative

density of the core will replace the relative density determined by the nuclear density gauge for the sublot and will be used for calculation of the CPF and acceptance of HMA compaction lot.

When cores are taken by the Contracting Agency at the request of the Contractor, they shall be requested by noon of the next workday after the test results for the sublot have been provided or made available to the Contractor. Core locations shall be outside of wheel paths and as determined by the Engineer. Traffic control shall be provided by the Contractor as requested by the Engineer. Failure by the Contractor to provide the requested traffic control will result in forfeiture of the request for cores. When the CPF for the lot based on the results of the HMA cores is less than 1.00, the cost for the coring will be deducted from any monies due or that may become due the Contractor under the Contract at the rate of $200 per core and the Contractor shall pay for the cost of the traffic control.

5-04.3(10)A HMA Compaction – General Compaction Requirements

Compaction shall take place when the mixture is in the proper condition so that no undue displacement, cracking, or shoving occurs. Areas inaccessible to large compaction equipment shall be compacted by other mechanical means. Any HMA that becomes loose, broken, contaminated, shows an excess or deficiency of asphalt, or is in any way defective, shall be removed and replaced with new hot mix that shall be immediately compacted to conform to the surrounding area.

The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option, provided the specified densities are attained. Unless the Engineer has approved otherwise, rollers shall only be operated in the static mode when the internal temperature of the mix is less than 175°F. Regardless of mix temperature, a roller shall not be operated in a mode that results in checking or cracking of the mat. Rollers shall only be operated in static mode on bridge decks.

5-04.3(10)B HMA Compaction – Cyclic Density

Low cyclic density areas are defined as spots or streaks in the pavement that are less than 90 percent of the theoretical maximum density. At the Engineer's discretion, the Engineer may evaluate the HMA pavement for low cyclic density, and when doing so will follow WSDOT SOP 733. A $500 Cyclic Density Price Adjustment will be assessed for any 500-foot section with two or more density readings below 90 percent of the theoretical maximum density.

5-04.3(10)C Vacant

5-04.3(10)D HMA Nonstatistical Compaction

5-04.3(10)D1 HMA Nonstatistical Compaction – Lots and Sublots

HMA compaction which is accepted by nonstatistical evaluation will be based on acceptance testing performed by the Contracting Agency dividing the project into compaction lots.

A lot is represented by randomly selected samples of the same mix design that will be tested for acceptance. A lot is defined as the total quantity of material or work produced for each Job Mix Formula placed. Only one lot per JMF is expected. A sublot shall be equal to one day's production or 400 tons, whichever is less except that the final sublot will be a minimum of 200 tons and may be increased to 800 tons. Testing for compaction will be at the rate of 5 tests per sublot per WSDOT T 738.

The sublot locations within each density lot will be determined by the Engineer. For a lot in progress with a CPF less than 0.75, a new lot will begin at the Contractor's request after the Engineer is satisfied that material conforming to the Specifications can be produced.

HMA mixture accepted by commercial evaluation and HMA constructed under conditions other than those listed above shall be compacted on the basis of a test point evaluation of the compaction train. The test point evaluation shall be performed in accordance with instructions from the Engineer. The number of passes with an approved compaction train, required to attain the maximum test point density, shall be used on all subsequent paving.

HMA for preleveling shall be thoroughly compacted. HMA that is used to prelevel wheel ruts shall be compacted with a pneumatic tire roller unless otherwise approved by the Engineer.

5-04.3(10)D2 HMA Compaction Nonstatistical Evaluation – Acceptance Testing

The location of the HMA compaction acceptance tests will be randomly selected by the Engineer from within each sublot, with one test per sublot.

5-04.3(10)D3 HMA Nonstatistical Compaction – Price Adjustments

For each compaction lot with one or two sublots, having all sublots attain a relative density that is 92 percent of the reference maximum density the HMA shall be accepted at the unit Contract price with no further evaluation. When a sublot does not attain a relative density that is 92 percent of the reference maximum density, the lot shall be evaluated in accordance with Section 1-06.2 to determine the appropriate CPF. The maximum CPF shall be 1.00, however, lots with a calculated CPF in excess of 1.00 will be used to offset lots with CPF values below 1.00 but greater than 0.90. Lots with CPF lower than 0.90 will be evaluated for compliance per 5-04.3(11). Additional testing by either a nuclear moisture-density gauge or cores will be completed as required to provide a minimum of three tests for evaluation.

For compaction below the required 92% a Non-Conforming Compaction Factor (NCCF) will be determined. The NCCF equals the algebraic difference of CPF minus 1.00 multiplied by 40 percent. The Compaction Price Adjustment will be calculated as the product of CPF, the quantity of HMA in the compaction control lot in tons, and the unit Contract price per ton of mix.

5-04.3(11) Reject Work

5-04.3(11)A Reject Work General

Work that is defective or does not conform to Contract requirements shall be rejected. The Contractor may propose, in writing, alternatives to removal and replacement of rejected material. Acceptability of such alternative proposals will be determined at the sole discretion of the Engineer. HMA that has been rejected is subject to the requirements in Section 1-06.2(2) and this specification, and the Contractor shall submit a corrective action proposal to the Engineer for approval.

5-04.3(11)B Rejection by Contractor

The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material. Any such new material will be sampled, tested, and evaluated for acceptance.

5-04.3(11)C Rejection Without Testing (Mixture or Compaction)

The Engineer may, without sampling, reject any batch, load, or section of Roadway that appears defective. Material rejected before placement shall not be incorporated into the pavement. Any rejected section of Roadway shall be removed.

No payment will be made for the rejected materials or the removal of the materials unless the Contractor requests that the rejected material be tested. If the Contractor elects to have the rejected material tested, a minimum of three representative samples will be obtained and tested. Acceptance of rejected material will be based on conformance with the nonstatistical acceptance Specification. If the CPF for the rejected material is less than 0.75, no payment will be made for the rejected material; in addition, the cost of sampling and testing shall be borne by the Contractor. If the CPF is greater than or equal to 0.75, the cost of sampling and testing will be borne by the Contracting Agency. If the material is rejected before placement and the CPF is greater than or equal to 0.75, compensation for the rejected material will be at a CPF of 0.75. If rejection occurs after placement and the CPF is greater than or equal to 0.75, compensation for the rejected material will be at the calculated CPF with an addition of 25 percent of the unit Contract price added for the cost of removal and disposal.

5-04.3(11)D Rejection - A Partial Sublot

In addition to the random acceptance sampling and testing, the Engineer may also isolate from a normal sublot any material that is suspected of being defective in relative density, gradation or asphalt binder content. Such isolated material will not include an original sample location. A minimum of three random samples of the suspect material will be obtained and tested. The material will then be statistically evaluated as an independent lot in accordance with Section 1-06.2(2).

5-04.3(11)E Rejection - An Entire Sublot

An entire sublot that is suspected of being defective may be rejected. When a sublot is rejected a minimum of two additional random samples from this sublot will be obtained. These additional samples and the original sublot will be evaluated as an independent lot in accordance with Section 1-06.2(2).

5-04.3(11)F Rejection - A Lot in Progress

The Contractor shall shut down operations and shall not resume HMA placement until such time as the Engineer is satisfied that material conforming to the Specifications can be produced:

1. When the Composite Pay Factor (CPF) of a lot in progress drops below 1.00 and the Contractor is taking no corrective action, or
2. When the Pay Factor (PF) for any constituent of a lot in progress drops below 0.95 and the Contractor is taking no corrective action, or
3. When either the PFi for any constituent or the CPF of a lot in progress is less than 0.75.

5-04.3(11)G Rejection - An Entire Lot (Mixture or Compaction)

An entire lot with a CPF of less than 0.75 will be rejected.

5-04.3(12) Joints

5-04.3(12)A HMA Joints

5-04.3(12)A1 Transverse Joints

The Contractor shall conduct operations such that the placing of the top or wearing course is a continuous operation or as close to continuous as possible. Unscheduled transverse joints will be allowed and the roller may pass over the unprotected end of the freshly laid mixture only when the placement of the course must be discontinued for such a length of time that the mixture will cool below compaction temperature. When the Work is resumed, the previously compacted mixture shall be cut back to produce a slightly beveled edge for the full thickness of the course.

A temporary wedge of HMA constructed on a 20H:1V shall be constructed where a transverse joint as a result of paving or planing is open to traffic. The HMA in the temporary wedge shall be separated from the permanent HMA by strips of heavy wrapping paper or other methods approved by the Engineer. The wrapping paper shall be removed and the joint trimmed to a slightly beveled edge for the full thickness of the course prior to resumption of paving.

The material that is cut away shall be wasted and new mix shall be laid against the cut. Rollers or tamping irons shall be used to seal the joint.

5-04.3(12)A2 Longitudinal Joints

The longitudinal joint in any one course shall be offset from the course immediately below by not more than 6 inches nor less than 2 inches. All longitudinal joints constructed in the wearing course shall be located at a lane line or an edge line of the Traveled Way. A notched wedge joint shall be constructed along all longitudinal joints in the wearing surface of new HMA unless otherwise approved by the Engineer. The notched wedge joint shall have a vertical edge of not less than the maximum aggregate size or more than ½ of the compacted lift thickness and then taper down on a slope not steeper than 4H:1V. The sloped portion of the HMA notched wedge joint shall be uniformly compacted.

5-04.3(12)B Bridge Paving Joint Seals

5-04.3(12)B1 HMA Sawcut and Seal

Prior to placing HMA on the bridge deck, establish sawcut alignment points at both ends of the bridge paving joint seals to be placed at the bridge ends, and at interior joints within the bridge deck when and where shown in the Plans. Establish the sawcut alignment points in a manner that they remain functional for use in aligning the sawcut after placing the overlay.

Submit a Type 1 Working Drawing consisting of the sealant manufacturer's application procedure.

Construct the bridge paving joint seal as specified ion the Plans and in accordance with the detail shown in the Standard Plans. Construct the sawcut in accordance with the detail shown in the Standard Plan. Construct the sawcut in accordance with Section 5-05.3(8)B and the manufacturer's application procedure.

5-04.3(12)B2 Paved Panel Joint Seal

Construct the paved panel joint seal in accordance with the requirements specified in section 5-04.3(12)B1 and the following requirement:

1. Clean and seal the existing joint between concrete panels in accordance with Section 5-01.3(8) and the details shown in the Standard Plans.

5-04.3(13) Surface Smoothness

The completed surface of all courses shall be of uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds. The completed surface of the wearing course shall not vary more than ⅛ inch from the lower edge of a 10-foot straightedge placed on the surface parallel to the centerline. The transverse slope of the completed surface of the wearing course shall vary not more than ¼ inch in 10 feet from the rate of transverse slope shown in the Plans.

When deviations in excess of the above tolerances are found that result from a high place in the HMA, the pavement surface shall be corrected by one of the following methods:

1. Removal of material from high places by grinding with an approved grinding machine, or
2. Removal and replacement of the wearing course of HMA, or
3. By other method approved by the Engineer.

Correction of defects shall be carried out until there are no deviations anywhere greater than the allowable tolerances.

Deviations in excess of the above tolerances that result from a low place in the HMA and deviations resulting from a high place where corrective action, in the opinion of the Engineer, will not produce satisfactory results will be accepted with a price adjustment. The Engineer shall deduct from monies due or that may become due to the Contractor the sum of $500.00 for each and every section of single traffic lane 100 feet in length in which any excessive deviations described above are found.

When utility appurtenances such as manhole covers and valve boxes are located in the traveled way, the utility appurtenances shall be adjusted to the finished grade prior to paving. This requirement may be waived when requested by the Contractor, at the discretion of the Engineer or when the adjustment details provided in the project plan or specifications call for utility appurtenance adjustments after the completion of paving.

Utility appurtenance adjustment discussions will be included in the Pre-Paving planning (5-04.3(14)B3). Submit a written request to waive this requirement to the Engineer prior to the start of paving.

5-04.3(14) Planing (Milling) Bituminous Pavement

The planning plan must be approved by the Engineer and a pre planning meeting must be held prior to the start of any planing. See Section 5-04.3(14)B2 for information on planning submittals.

Locations of existing surfacing to be planed are as shown in the Drawings.

Where planing an existing pavement is specified in the Contract, the Contractor must remove existing surfacing material and to reshape the surface to remove irregularities. The finished product must be a prepared surface acceptable for receiving an HMA overlay.

Use the cold milling method for planing unless otherwise specified in the Contract. Do not use the planer on the final wearing course of new HMA.

Conduct planing operations in a manner that does not tear, break, burn, or otherwise damage the surface which is to remain. The finished planed surface must be slightly grooved or roughened and must be free from gouges, deep grooves, ridges, or other imperfections. The Contractor must repair any damage to the surface by the Contractor’s planing equipment, using an Engineer approved method.

Repair or replace any metal castings and other surface improvements damaged by planing, as determined by the Engineer.

A tapered wedge cut must be planed longitudinally along curb lines sufficient to provide a minimum of 4 inches of curb reveal after placement and compaction of the final wearing course. The dimensions of the wedge must be as shown on the Drawings or as specified by the Engineer.

A tapered wedge cut must also be made at transitions to adjoining pavement surfaces (meet lines) where butt joints are shown on the Drawings. Cut butt joints in a straight line with vertical faces 2 inches or more in height, producing a smooth transition to the existing adjoining pavement.

After planing is complete, planed surfaces must be swept, cleaned, and if required by the Contract, patched and preleveled.

The Engineer may direct additional depth planing. Before performing this additional depth planing, the Contractor must conduct a hidden metal in pavement detection survey as specified in Section 5-04.3(14)A.

5-04.3(14)A Pre-Planing Metal Detection Check

Before starting planing of pavements, and before any additional depth planing required by the Engineer, the Contractor must conduct a physical survey of existing pavement to be planed with equipment that can identify hidden metal objects.

Should such metal be identified, promptly notify the Engineer.

See Section 1-07.16(1) regarding the protection of survey monumentation that may be hidden in pavement.

The Contractor is solely responsible for any damage to equipment resulting from the Contractor's failure to conduct a pre-planing metal detection survey, or from the Contractor's failure to notify the Engineer of any hidden metal that is detected.

5-04.3(14)B Paving and Planing Under Traffic

5-04.3(14)B1 General

In addition the requirements of Section 1-07.23 and the traffic controls required in Section 1-10, and unless the Contract specifies otherwise or the Engineer approves, the Contractor must comply with the following:

1. Intersections:

   a. Keep intersections open to traffic at all times, except when paving or planing operations through an intersection requires closure. Such closure must be kept to the minimum time required to place and compact the HMA mixture, or plane as appropriate. For paving, schedule such closure to individual lanes or portions thereof that allows the traffic volumes and schedule of traffic volumes required in the approved traffic control plan. Schedule work so that adjacent intersections are not impacted at the same time and comply with the traffic control restrictions required by the Traffic Engineer. Each individual intersection closure or partial closure, must be addressed in the traffic control plan, which must be submitted to and accepted by the Engineer, see Section 1-10.2(2).

   b. When planing or paving and related construction must occur in an intersection, consider scheduling and sequencing such work into quarters of the

intersection, or half or more of an intersection with side street detours. Be prepared to sequence the work to individual lanes or portions thereof.

c. Should closure of the intersection in its entirety be necessary, and no trolley service is impacted, keep such closure to the minimum time required to place and compact the HMA mixture, plane, remove asphalt, tack coat, and as needed.

d. Any work in an intersection requires advance warning in both signage and a number of Working Days advance notice as determined by the Engineer, to alert traffic and emergency services of the intersection closure or partial closure.

e. Allow new compacted HMA asphalt to cool to ambient temperature before any traffic is allowed on it. Traffic is not allowed on newly placed asphalt until approval has been obtained from the Engineer.

2. Temporary centerline marking, post-paving temporary marking, temporary stop bars, and maintaining temporary pavement marking must comply with Section 8-23.
3. Permanent pavement marking must comply with Section 8-22.

5-04.3(14)B2 Submittals – Planing Plan and HMA Paving Plan

The Contractor must submit a separate planing plan and a separate paving plan to the Engineer at least 5 Working Days in advance of each operation's activity start date. These plans must show how the moving operation and traffic control are coordinated, as they will be discussed at the pre-planing briefing and pre-paving briefing. When requested by the Engineer, the Contractor must provide each operation's traffic control plan on 24 x 36 inch or larger size Shop Drawings with a scale showing both the area of operation and sufficient detail of traffic beyond the area of operation where detour traffic may be required. The scale on the Shop Drawings is 1 inch = 20 feet, which may be changed if the Engineer agrees sufficient detail is shown.

The planing operation and the paving operation include, but are not limited to, metal detection, removal of asphalt and temporary asphalt of any kind, tack coat and drying, staging of supply trucks, paving trains, rolling, scheduling, and as may be discussed at the briefing.

When intersections will be partially or totally blocked, provide adequately sized and noticeable signage alerting traffic of closures to come, a minimum 2 Working Days in advance. The traffic control plan must show where police officers will be stationed when signalization is or may be, countermanded, and show areas where flaggers are proposed.

At a minimum, the planing and the paving plan must include:

1. A copy of the accepted traffic control plan, see Section 1-10.2(2), detailing each day's traffic control as it relates to the specific requirements of that day's planing and paving. Briefly describe the sequencing of traffic control consistent with the proposed planing and paving sequence, and scheduling of placement of temporary pavement markings and channelizing devices after each day's planing, and paving.
2. A copy of each intersection's traffic control plan.

3. Haul routes from Supplier facilities, and locations of temporary parking and staging areas, including return routes. Describe the complete round trip as it relates to the sequencing of paving operations.
4. Names and locations of HMA Supplier facilities to be used.
5. List of all equipment to be used for paving.
6. List of personnel and associated job classification assigned to each piece of paving equipment.
7. Description (geometric or narrative) of the scheduled sequence of planing and of paving, and intended area of planing and of paving for each day's work, must include the directions of proposed planing and of proposed paving, sequence of adjacent lane paving, sequence of skipped lane paving, intersection planing and paving scheduling and sequencing, and proposed notifications and coordinations to be timely made. The plan must show HMA joints relative to the final pavement marking lane lines.
8. Names, job titles, and contact information for field, office, and plant supervisory personnel.
9. A copy of the approved Mix Designs.
10. Tonnage of HMA to be placed each day.
11. Approximate times and days for starting and ending daily operations.

5-04.3(14)B3 Pre-Paving and Pre-Planing Briefing

At least 2 Working Days before the first paving operation and the first planing operation, or as scheduled by the Engineer for future paving and planing operations to ensure the Contractor has adequately prepared for notifying and coordinating as required in the Contract, the Contractor must be prepared to discuss that day's operations as they relate to other entities and to public safety and convenience, including driveway and business access, garbage truck operations, Metro transit operations and working around energized overhead wires, school and nursing home and hospital and other accesses, other contractors who may be operating in the area, pedestrian and bicycle traffic, and emergency services. The Contractor, and Subcontractors that may be part of that day's operations, must meet with the Engineer and discuss the proposed operation as it relates to the submitted planing plan and paving plan, approved traffic control plan, and public convenience and safety. Such discussion includes, but is not limited to:

1. General for both Paving Plan and for Planing Plan:
   a. The actual times of starting and ending daily operations.
   b. In intersections, how to break up the intersection, and address traffic control and signalization for that operation, including use of peace officers.
   c. The sequencing and scheduling of paving operations and of planing operations, as applicable, as it relates to traffic control, to public convenience and safety, and to other con-tractors who may operate in the Project Site.
   d. Notifications required of Contractor activities, and coordinating with other entities and the public as necessary.
   e. Description of the sequencing of installation and types of temporary pavement markings as it relates to planning and to paving.
   f. Description of the sequencing of installation of, and the removal of, temporary pavement patch material around exposed castings and as may be needed

g. Description of procedures and equipment to identify hidden metal in the pavement, such as survey monumentation, monitoring wells, street car rail, and castings, before planning, see Section 5-04.3(14)B2.

h. Description of how flaggers will be coordinated with the planing, paving, and related operations.

i. Description of sequencing of traffic controls for the process of rigid pavement base repairs.

j. Other items the Engineer deems necessary to address.

2. Paving – additional topics:

a. When to start applying tack and coordinating with paving.

b. Types of equipment and numbers of each type equipment to be used. If more pieces of equipment than personnel are proposed, describe the sequencing of the personnel operating the types of equipment. Discuss the continuance of operator personnel for each type equipment as it relates to meeting Specification requirements.

c. Number of JMFs to be placed, and if more than one JMF how the Contractor will ensure different JMFs are distinguished, how pavers and MTVs are distinguished if more than one JMF is being placed at the time, and how pavers and MTVs are cleaned so that one JMF does not adversely influence the other JMF.

d. Description of contingency plans for that day's operations such as equipment breakdown, rain out, and Supplier shutdown of operations.

e. Number of sublots to be placed, sequencing of density testing, and other sampling and testing.

5-04.3(15) Sealing Pavement Surfaces

Apply a fog seal where shown in the plans. Construct the fog seal in accordance with Section 5-02.3. Unless otherwise approved by the Engineer, apply the fog seal prior to opening to traffic.

5-04.3(16) HMA Road Approaches

HMA approaches shall be constructed at the locations shown in the Plans or where staked by the Engineer. The Work shall be performed in accordance with Section 5-04.

5-04.4 Measurement

HMA Cl. ___ PG ___, HMA for ___ Cl. ___ PG ___, and Commercial HMA will be measured by the ton in accordance with Section 1-09.2, with no deduction being made for the weight of asphalt binder, mineral filler, or any other component of the mixture. If the Contractor elects to remove and replace mix as allowed by Section 5-04.3(11), the material removed will not be measured.

Roadway cores will be measured per each for the number of cores taken.

Preparation of untreated roadway will be measured by the mile once along the centerline of the main line Roadway. No additional measurement will be made for ramps, Auxiliary Lanes, service roads, Frontage Roads, or Shoulders. Measurement will be to the nearest 0.01 mile.

Soil residual herbicide will be measured by the mile for the stated width to the nearest 0.01 mile or by the square yard, whichever is designated in the Proposal.

Pavement repair excavation will be measured by the square yard of surface marked prior to excavation.

Asphalt for prime coat will be measured by the ton in accordance with Section 1-09.2.

Prime coat aggregate will be measured by the cubic yard, truck measure, or by the ton, whichever is designated in the Proposal.

Asphalt for fog seal will be measured by the ton, as provided in Section 5-02.4.

Longitudinal joint seals between the HMA and cement concrete pavement will be measured by the linear foot along the line and slope of the completed joint seal.

Planing bituminous pavement will be measured by the square yard.

Temporary pavement marking will be measured by the linear foot as provided in Section 8-23.4.

Water will be measured by the M gallon as provided in Section 2-07.4.

5-04.5 Payment

Payment will be made for each of the following Bid items that are included in the Proposal:

"HMA Cl. ___ PG ___", per ton.

"HMA for Approach Cl. ___ PG ___", per ton.

"HMA for Preleveling Cl. ___ PG ___", per ton.

"HMA for Pavement Repair Cl. ___ PG ___", per ton.

"Commercial HMA", per ton.

The unit Contract price per ton for "HMA Cl. ___ PG ___", "HMA for Approach Cl. ___ PG ___", "HMA for Preleveling Cl. ___ PG ___", "HMA for Pavement Repair Cl. ___ PG ___", and "Commercial HMA" shall be full compensation for all costs, including anti-stripping additive, incurred to carry out the requirements of Section 5-04 except for those costs included in other items which are included in this Subsection and which are included in the Proposal.

"Preparation of Untreated Roadway", per mile.

The unit Contract price per mile for "Preparation of Untreated Roadway" shall be full pay for all Work described under 5-04.3(4) , with the exception, however, that all costs involved in patching the Roadway prior to placement of HMA shall be included in the unit Contract price per ton for "HMA Cl. ___ PG ___" which was used for patching. If the Proposal does not include a Bid item for "Preparation of Untreated Roadway", the Roadway shall be prepared as specified, but the Work shall be included in the Contract prices of the other items of Work.

"Preparation of Existing Paved Surfaces", per mile.

The unit Contract Price for "Preparation of Existing Paved Surfaces" shall be full pay for all Work described under Section 5-04.3(4) with the exception, however, that all costs involved in patching the Roadway prior to placement of HMA shall be included in the unit Contract price per ton for "HMA Cl. ___ PG ___" which was used for patching. If the Proposal does not include a Bid item for "Preparation of Untreated Roadway", the Roadway shall be prepared as specified, but the Work shall be included in the Contract prices of the other items of Work.

"Crack Sealing", by force account.

"Crack Sealing" will be paid for by force account as specified in Section 1-09.6. For the purpose of providing a common Proposal for all Bidders, the Contracting Agency has entered an amount in the Proposal to become a part of the total Bid by the Contractor.

"Pavement Repair Excavation Incl. Haul", per square yard.

The unit Contract price per square yard for "Pavement Repair Excavation Incl. Haul" shall be full payment for all costs incurred to perform the Work described in Section 5-04.3(4) with the exception, however, that all costs involved in the placement of HMA shall be included in the unit Contract price per ton for "HMA for Pavement Repair Cl. ___ PG ___", per ton.

"Asphalt for Prime Coat", per ton.

The unit Contract price per ton for "Asphalt for Prime Coat" shall be full payment for all costs incurred to obtain, provide and install the material in accordance with Section 5-04.3(4).

"Prime Coat Agg.", per cubic yard, or per ton.

The unit Contract price per cubic yard or per ton for "Prime Coat Agg." shall be full pay for furnishing, loading, and hauling aggregate to the place of deposit and spreading the aggregate in the quantities required by the Engineer.

"Asphalt for Fog Seal", per ton.

Payment for "Asphalt for Fog Seal" is described in Section 5-02.5.

"Longitudinal Joint Seal", per linear foot.

The unit Contract price per linear foot for "Longitudinal Joint Seal" shall be full payment for all costs incurred to perform the Work described in Section 5-04.3(12).

"Planing Bituminous Pavement", per square yard.

The unit Contract price per square yard for "Planing Bituminous Pavement" shall be full payment for all costs incurred to perform the Work described in Section 5-04.3(14).

"Temporary Pavement Marking", per linear foot.

Payment for "Temporary Pavement Marking" is described in Section 8-23.5.

"Water", per M gallon.

Payment for "Water" is described in Section 2-07.5.

"Job Mix Compliance Price Adjustment", by calculation.

"Job Mix Compliance Price Adjustment" will be calculated and paid for as described in Section 5-04.3(9)C6.

"Compaction Price Adjustment", by calculation.

"Compaction Price Adjustment" will be calculated and paid for as described in Section 5-04..3(10)D3.

"Roadway Core", per each.

The Contractor's costs for all other Work associated with the coring (e.g., traffic control) shall be incidental and included within the unit Bid price per each and no additional payments will be made.

"Cyclic Density Price Adjustment", by calculation.

"Cyclic Density Price Adjustment" will be calculated and paid for as described in Section 5-04.3(10)B.

Division 6
Structures

CONCRETE STRUCTURES

Construction Requirements

Proportioning Materials

Contractor Mix Design
Section 6-02.3(2)A is supplemented with the following:

(******)
All concrete mixes, including all required submittal items, shall be submitted to the Engineer for review and approval a minimum of 48 hours prior to the concrete pour.

Ready-Mix Concrete

Temperature and Time For Placement
Section 6-02.3(4)D is supplemented with the following:

(******)
If a longer duration is required for time to discharge, longer durations may be approved by the Engineer. This time extension will be considered on a case by case basis and requires the use of specific retardation admixtures and the concurrence of the Engineer.

Placing Concrete
The following sentence shall be added to the end of the second paragraph of Section 6-02.3(6):

(******)
All costs associated with dewatering for the Concrete piers or wing walls shall be incidental to the unit cost for Conc. Class 4000.

PILING

Construction Requirements

Pile Tips and Shoes
Section 6-05.3(8) is supplemented with the following:

(******)
Timber pile tips may be pointed for driving. Driving caps, collars, and steel tips (driving shoes) are not anticipated to be needed but may be added to the timber pile by the contractor as needed to ensure penetration of the pile to design depth.

Pile Driving Equipment

Pile Driving Equipment Minimum Requirements

Section 6-05.3(9)B is supplemented with the following:

(******)

Timber pile installation methods shall be at the Contractor's discretion provided that the required embedment depths are met. Potential methods of installation include, drop hammer or vibratory hammer. Installation by blasting, mudding, or jetting shall not be allowed.

Timber piles driven by vibratory hammers for the installation of "Type 1 Engineered log jam (ELJ)" are not required to be driven an additional 2 feet using an impact hammer.

If difficulties are encountered in timber pile installation and target depths cannot be achieved through other methods, the Engineer may require the Contractor to employ an excavator-mounted vibratory hammer with side grip capabilities. When required, or selected as the preferred method for timber pile installation, the vibratory hammer shall have a minimum centrifugal force of 80 tons and shall be capable of being fitted with a pile driving cap on the underside of the main driving body. The pile driving cap shall be capable of being held in line with the main body of the driver to maximize transfer of energy from the driver to the pile. The pile driving cap shall include a tubular section of steel with a minimum internal diameter of 20 inches.

Driving Piles

Tolerances

Section 6-05.3(11)A is supplemented with the following:

(******)

Timber piles shall be accurately located and installed to the prescribed batter as indicated, unless otherwise approved by the Engineer.

Timber piles, after installation, shall not be out of position by more than 1 foot horizontally. Timber piles installed outside of one foot of the plan location shall be marked and the Engineer shall be notified immediately to assess function and determine if remaining timber piles within the structure require adjustment to allow placement of woody materials. Misaligned timber piles may be pushed or pulled laterally as directed by the Engineer to achieve the specified alignment.

The vertical tolerance for each timber pile after installation shall be within 6 inches of the minimum embedment specified on the Contract Plans.

Timber piles with greater variation and those seriously damaged in installation shall be removed or cut off, as directed by the Engineer and replaced with new piles. All correction costs shall be paid by the Contractor.

Any timber pile heaved or displaced by the subsequent installation of adjacent timber piles shall be re-driven at the Contractor's expense.

Preparation for Driving

Section 6-05.3(11)C is supplemented with the following:

(******)

When planning for timber pile installation, the Contractor should consider potential subsurface conditions. A formal geotechnical analysis has not been performed for the location of the proposed Type 1 ELJ locations, and subsurface mapping will not be provided for this location.

Prior to timber pile installation, the Contractor shall clearly mark the target embedded depth as measured from the tip end of the timber pile; marking shall occur after any trimming of the timber pile has occurred. Shortening of timber piles shall be minimized; timber piles shall be shortened a maximum of one foot during squaring, trimming, and/or chamfering.

Achieving Minimum Tip Elevation and Bearing

Section 6-05.3(11)D is supplemented with the following:

(******)

The Contractor shall use all “normal means” necessary to ensure that the specified timber pile embedment is achieved, and the timber pile is not damaged. “Normal means” for timber pile installation include drop hammer or vibratory hammer.

Timber piles shall be installed with the tip (narrow end of timber pile) end down. Contractor shall attain Engineer’s approval prior to shifting timber piles.

Timber piles shall be driven continuously until the required tip elevation is met. Timber piles shall not be spliced.

Pile Damage

Section 6-05.3(11)F is supplemented with the following:

(******)

The Contractor shall remove and replace any timber pile which is damaged or broken due to Contractor actions at no additional cost to the Contracting Agency. The method used in installing timber piles shall not subject the timber piles to excessive or undue abuse that results in brooming, splitting, or splintering of wood. Any timber pile damaged during installation by reason of improper driving, or installed out of its proper location, or installed below the designated top elevation, shall be corrected by the Contractor, without compensation, by a method approved by the Engineer.

Treatment of Timber Pile Heads

Section 6-05.3(13) is deleted in its entirety and replaced with the following:

(******)

No preservatives shall be applied to timber pile heads.

Measurement

Section 6-05.4 is supplemented with the following:

(******)
Installing timber piles will not be measured.

Payment

Section 6-05.5 is supplemented with the following:

(******)
Payment for timber piles and timber pile installation shall be incidental to Work associated with "Type 1 ELJ" and will be included with the payment of each "Type 1 ELJ" (Section 8-30). All costs in connection with field fitting, installing steel tips, bands and shoes, all costs for any maintenance, labor, and installation of timber piles.

BRIDGE RAILINGS

Payment

Section 6-06.5 is supplemented with the following:

(******)
"Pedestrian Railing", per linear foot.
The unit Contract price per linear foot for "Pedestrian Railing" shall be full pay for constructing the railing on top of the bridge girders, and associated bridge approach slabs, curtain walls, wingwalls and concrete pads, excluding the steel reinforcing bars that extend from the bridge deck, bridge approach slab, curtain walls, wingwalls and concrete pads.

Division 7
DRAINAGE STRUCTURES, STORM SEWERS, SANITARY SEWERS, WATER MAINS, AND CONDUITS

GENERAL PIPE INSTALLATION REQUIREMENTS

Construction Requirements

Plugging Existing Pipe

Section 7-08.3(4) is supplemented with the following

(******)
All costs associated with dewatering for the pipe plugging shall be incidental to the unit cost for Plugging Existing Pipe.

Division 8
Miscellaneous Construction

EROSION CONTROL AND WATER POLLUTION CONTROL

Description

Definitions

Item 1C of Section 8-01.1(1) is revised to read:

(February 25, 2021)
May be neutralized and discharged to surface waters or neutralized and infiltrated.

Item 2E of Section 8-01.1(1) is revised to read:

(February 25, 2021)
May be neutralized, treated, and discharged to surface waters or neutralized and infiltrated in accordance with the CSWGP, with the exception of water-only shaft drilling slurry. Water-only shaft drilling slurry may be treated, neutralized, and infiltrated but not discharged to surface waters (Refer to Special Conditions S1.C. Authorized Discharges and S1.d Prohibited Discharges of the CSWGP).

Construction Requirements

General

Erosion and Sediment Control (ESC) Lead

The second sentence of the first paragraph of Section 8-01.3(1)B is revised to read:

(February 25, 2021)
The ESC Lead shall have, for the life of the Contract, a current Certificate of Training in Construction Site Erosion and Sediment Control from a course approved by the Washington State Department of Ecology.

The second sentence of the second paragraph of Section 8-01.3(1)B (excluding the numbered list) is revised to read:

(February 25, 2021)
Implementation shall include, but is not limited to:

Payment

Lump Sum Bid for Project (No Unit Items

Section 8-01.5(1) shall be supplemented with the following:

(******)
All costs associated with Seeding and Mulching shall be incidental to the lump sum cost for “Erosion Control and Water Pollution Prevention”.

ROADSIDE RESTORATION

Construction Requirements

Bioengineering

Section 8-02.3(15) is supplemented with the following:

(******)

Live siltation shall be construction in accordance with the Project Plans, or as directed in the field, by the Engineer. Live branch cuttings for the live siltation shall consist of the species shown on the Project Plans.

Measurement

Section 8-02.4 is supplemented with the following:

(******)

“Live siltation” will be paid for as a lump sum, as specified in the Project Plans and approved by the Engineer.

Payment

Section 8-02.5 is supplemented with the following:

(******)

The lump sum Contract price for "Live Siltation" shall be full pay for all labor, materials, tools, equipment, and incidentals required to install the live siltation as specified in the Project Plans. Live siltation shall be approved by Engineer. Costs shall include all costs, materials, and labor associated with harvesting, transport, and storage of live branch cuttings. Included in the bid price is furnishing any other materials required for live siltation and not included in other bid tab items.

PRECAST TRAFFIC CURB

Description

Section 8-07.1 is supplemented with the following:

(******)

This work consists of installing furnishing and installing precast wheel stop specified in the Plans in accordance with these Specifications in the locations indicated in the Plans or as staked by the Engineer.

Construction Requirements

Installing Curbs

Section 8-07.3(1) is supplemented with the following:

(******)

Wheel stops shall be installed using a single section of curb and anchored at each end of the curb per manufacturer recommendations.

Measurement

Section 8-07.4 is supplemented with the following:

(******)
Wheel Stops are paid per each wheel stop installed.

Payment

Section 8-07.5 is supplemented with the following:

(******)
"Wheel Stop", per each.
The unit Contract price for "Wheel Stop" shall include furnishing, and installing in place the complete wheel stop including any preparation of the surface and cleanup after installation is completed.

Add the following new sections:

(******)

8-30 ELJ Construction

Description

This work shall consist of installing toe protection ELJs as indicated in the Project Plans. This work includes installation of all timber piles, framing logs, racking, and slash used in the construction of the structures, any required excavation and placement of native soils related to the construction of the structures, and any additional minor grading work associated with structure construction, as directed by the Engineer. The placement and dimensions of ELJs may be adjusted in the field by the Engineer to accommodate changes in the final positioning of the structure.

Materials

All materials shall meet the criteria presented in the following sections:

Timber Piling	9-10.1
Framing logs	9-37.1
Slash	9-37.2
Racking	9-37.3

Construction Requirements

8-30.3(1) Delivery, Transport, and Storage

Woody material shall be stored in a neat, orderly arrangement in a manner that will prevent physical damage to the materials and to allow access for other Work. Material with branches shall be handled in a manner that minimizes damage to branches. The Contractor shall take care identifying proper locations for grasping woody material with branches and/or rootwads, using tow straps or chains secured to an excavator bucket when necessary to avoid damaging branches. Trucks shall not be overloaded such that materials become compressed.

8-30.3(2) Installation of ELJ

Locations and installation details of each project element may be field modified by the Engineer to suit site conditions that are encountered such as subgrade conditions, woody materials dimensions and quality, the Contractor's proposed installation methods, river and floodplain conditions such as presence/absence of surface or groundwater, channel and embankment shape, vegetation, trees, or sensitive areas. The Contractor shall place woody material, as shown in the Plans, such that the final arrangement of logs, racking material, and slash meets the dimensions and positions shown on the Plans. Piles shall be installed such that they cross key members at the locations indicated on the Plans.

The area available for heavy equipment to operate is limited. The Contractor shall consider this and other site conditions when determining appropriate means and methods. Difficult construction conditions shall not be grounds for additional compensation as part of this Contract.

Measurement

"Type 1 ELJ" will be measured on a per each unit basis for each structure installed and approved by the Engineer.

Payment

The unit Contract prices for "Type 1 ELJ" shall include all costs for labor, materials, tools, equipment, and incidentals required to install the ELJ. ELJs shall be approved by Engineer prior to payment. Unit costs shall include all costs, materials, and labor associated with driving timber piles. Included in the per each unit price is furnishing any other materials referenced in the Plans and not included in other bid tab items.

(January 2, 2018)

BOLLARDS

Description

This work shall consist of furnishing and installing steel bollards in accordance with the Plans, Standard Plans, and these Specifications, at the locations shown in the Plans or as staked by the Engineer.

Materials

Posts and Hardware

Type 1 and Type 2 bollard posts shall be ASTM A 53, NPS 3 (3" Nom.) schedule 80 steel pipe. Post sleeves shall be ASTM A 53, NPS 4 (4"Nom.) schedule 40 steel pipe.

Type 3 bollard posts shall be steel structural tubing per ASTM A 500 Gr B. Steel plate shall be per ASTM A 36.

All steel parts shall be hot-dip galvanized after fabrication in accordance with AASHTO M 111.

Reflective Tape

Reflective tape shall be one of the following or an approved equal:

Scotchlite High Intensity Grade Series 2870 Reflexite AP-1000

Scotchlite Diamond Grade LDP Series 3970 T-6500 High Intensity (Type IV)

Concrete

Footings shall be constructed using concrete Class 3000.

Construction Requirements

Bollards shall be constructed in accordance with the Standard Plans. Bollards shall not vary more than 1/2 inch in 30 inches from a vertical plane.

Bollard posts and the exposed parts of the base assembly shall be painted in accordance with Section 6-07.3(11) for galvanized surfaces. The top coat shall match SAE AMS Standard 595, Color No. 33538 Traffic Signal Yellow.

Measurement

Measurement for bollards will be by the unit for each type of bollard furnished and installed.

Payment

Payment will be made for the following bid items when included in the proposal: "Bollard Type _____", per each.

Division 9
Materials

PILING

Timber Piling

Section 9-10.1 is deleted in its entirety and replaced with the following:

(******)

Timber piles shall be Douglas fir logs. Timber Piles shall comply with ASTM D25 “Standard Specification for Round Timber Piles”, be unused, clean peeled, uniformly tapered, one piece from butt to tip. Timber piles dimensions shall meet the requirements shown on the Project Plans.

Piles shall have design bending stress capacity, Fb, equal to or greater than 2,050 pounds per square inch (psi) as graded per ASTM D3200.

Holes may be allowed less than ½ inch in average diameter, provided the sum of the average diameter of all holes in any square foot do not exceed 1 ½ inches. Splits shall be no longer than the pile's butt diameter. All of the outer bark and at least 80% of the inner bark shall be removed by peeling. The pile shall be sufficiently straight such that a straight line drawn from the center of the butt to the center of the tip shall lie entirely within the body of the pile.

Add the following new section:

(******)

9-37 ELJ CONSTRUCTION MATERIALS

9-37.1 Framing logs

All logs with rootwads shall come from Douglas Fir or Western Red-Cedar which have been harvested within the past 24 months. Logs with rootwads shall have a diameter as shown on the Plans, measured at diameter-at-breast height (DBH), and defined as 4.5 feet above ground when the tree was standing. Diameter measurements shall not include bark. All woody material shall be free of disease, insect infestation, and rot. Logs shall be No. 4 sawmill grade or better in accordance with the Official Rules of the Pacific Rim Log Scaling and Grading Bureau, Inc, Lacey WA. Certification of log grades will not be required but may be done if poor quality logs are encountered. Split trunks are not allowed. Waterlogged logs will not be accepted. All logs shall generally be straight and free of obvious bends, sweeps or curves; logs may have a maximum curvature of up to 0.2 feet per ten feet of length measured as the departure from the prevailing longitudinal axis of bole to the actual centerline of the bole.

Rootwads shall have a diameter that is at least three times the DBH measured from the outer tips of the primary root system, determined as measuring from tip-to-tip through the centerline of the bole from roots which are large enough to support the weight of the log while resting on the ground. The length for logs with rootwads shall be measured from the cut end to the point where the primary root system stops.

9-37.2 Slash

Slash shall consist of dense vegetative debris from conifer tree species including, but not limited to, small trees, blasted or pushed-out stumps, chunks, broken tops, limbs, branches, brush or saplings. Slash shall be any native conifer species. Length of individual pieces of slash may vary between 2-10 ft, with 50% of the material at a length of 6 ft or longer. Thickness of slash pieces as measured at the butt (larger) end may vary from 3/4" – 4" diameter, with 55% of the pieces between 2" – 3" diameter as noted in the table below. Slash shall be compacted during installation to ensure that voids no larger than 3" exist within the compacted slash layer. A compacted cubic yard of slash should weigh approximately 570 lb per CY. Slash materials may be generated from on-site clearing within the approved clearing limits.

Slash composition

Distribution	Diameter
30%	¾" – 2"
55%	2" – 3"
15%	3" – 6"

9-37.3 Racking

Racking logs shall be untreated, sound, not rotten, completely free of soil and noxious vegetation, and shall not be infested with wood boring insects. Rot shall not be more than 5% of volume for any log. Split trunks are not allowed. Waterlogged logs will not be accepted.

Racking logs shall be Western Red Cedar, Douglas fir, or Western Hemlock - listed in the order of species preference. Racking logs shall be between 6 and 12 inch in diameter, with 70% of the pieces being greater than 8". Length of individual pieces of racking may vary between 10-20 ft. At least 50 percent of the racking logs shall have rootwads attached. Trees generated on site during construction may be used as Racking as approved by the Engineer.

Racking composition

Distribution	Diameter
30%	6-8"
50%	8-10"
20%	10-12"

Appendices
(January 2, 2012)

The following appendices are attached and made a part of this contract:

*** APPENDIX A:
Standard Plans

APPENDIX B:
Washington State Prevailing Wage Rates

APPENDIX C:
Construction Contract and Contract Bond – For Information Only

APPENDIX D:
Proposal Forms – For Information Only

APPENDIX E:
Project Geotechnical Report

APPENDIX F:
Project Hydraulic Report

APPENDIX G:
Environmental Permits

APPENDIX H:
Vicinity Maps and Plans ***

(January 13, 2021)
Standard Plans

The State of Washington Standard Plans for Road, Bridge and Municipal Construction M21-01, effective September 30, 2020, is made a part of this contract.

The Standard Plans are revised as follows:

A-50.10
DELETED

A-50.20
DELETED

A-50.30
DELETED

A-50.40
DELETED

B-90.40
Valve Detail – DELETED

C-1a
DELETED

C-8
Add new Note 5, "5. Type 2 Barrier and Barrier Terminals are allowed in temporary installations only. New Type 2 Barrier and Barrier Terminals are not allowed to be fabricated after December 31, 2019. The plan is provided as a means to verify that any Type 2 barrier and Barrier Terminals fabricated prior to December 31, 2019 meets the plan requirements and cross-sectional dimensions as specified in Standard Specifications 6-10.3(5)."

C-8a
Add new Note 2, "2. Type 4 Barrier and Barrier Transition are allowed in temporary installations only. New Type 4 Barrier and Barrier Transition are not allowed to be fabricated after December 31, 2019. The plan is provided as a means to verify that any Type 4 barrier and Barrier Transition fabricated prior to December 31, 2019 meets the plan requirements and cross-sectional dimensions as specified in Standard Specifications 6-10.3(5)."

C-8b
DELETED

C-8e
DELETED

C-8f
DELETED

C-16a

DELETED

C-20.10

The following table is added:

SLOPE \ EMBANKMENT TABLE (FOR 8', 9', 11' LONG POSTS)		
POST LENGTH	SLOPE	W (FT)
8-FOOT	1H : 1V OR FLATTER	2.5 MIN.
8-FOOT	2H : 1V OR FLATTER	0 (FACE OF BARRIER AT SLOPE BREAK POINT)
9-FOOT	1.5H : 1V OR FLATTER	0 (FACE OF BARRIER AT SLOPE BREAK POINT)
11-FOOT	1H : 1V OR FLATTER	0 (FACE OF BARRIER AT SLOPE BREAK POINT)

C-20.11

DELETED

C-20.19

DELETED

C-40.16

DELETED

C-40.18

DELETED

C-80.50

DELETED

C-85.14

DELETED

C-85.15

SECTION B detail, the callout reading "ANCHOR BOLT (TYP.) ~ SEE DETAIL, STANDARD PLAN C-8b", is revised to read "ANCHOR BOLT (TYP.) ~ SEE DETAIL IN PLANS".

SECTION B detail, the callout reading "ANCHOR PLATE (TYP.) ~ SEE STANDARD PLAN J-8b", is revised to read "ANCHOR PLATE (TYP.) ~ SEE DETAIL IN PLANS".

D-2.14

DELETED

D-2.16

DELETED

D-2.18
DELETED

D-2.20
DELETED

D-2.42
DELETED

D-2.44
DELETED

D-2.46
DELETED

D-2.48
DELETED

D-2.82
DELETED

D-2.86
DELETED

D-10.10
Wall Type 1 may be used if no traffic barrier is attached on top of the wall. Walls with traffic barriers attached on top of the wall are considered non-standard and shall be designed in accordance with the current WSDOT Bridge Design Manual (BDM) and the revisions stated in the 11/3/15 Bridge Design memorandum.

D-10.15
Wall Type 2 may be used if no traffic barrier is attached on top of the wall. Walls with traffic barriers attached on top of the wall are considered non-standard and shall be designed in accordance with the current WSDOT BDM and the revisions stated in the 11/3/15 Bridge Design memorandum.

D-10.30
Wall Type 5 may be used in all cases.

D-10.35
Wall Type 6 may be used in all cases.

D-10.40
Wall Type 7 may be used if no traffic barrier is attached on top of the wall. Walls with traffic barriers attached on top of the wall are considered non-standard and shall be designed in accordance with the current WSDOT BDM and the revisions stated in the 11/3/15 Bridge Design memorandum.

D-10.45
Wall Type 8 may be used if no traffic barrier is attached on top of the wall. Walls with traffic barriers attached on top of the wall are considered non-standard and shall be designed

in accordance with the current WSDOT BDM and the revisions stated in the revisions stated in the 11/3/15 Bridge Design memorandum.

D-15.10
STD Plans D-15 series “Traffic Barrier Details for Reinforced Concrete Retaining Walls” are withdrawn. Special designs in accordance with the current WSDOT BDM are required in place of these STD Plans.

D-15.20
STD Plans D-15 series “Traffic Barrier Details for Reinforced Concrete Retaining Walls” are withdrawn. Special designs in accordance with the current WSDOT BDM are required in place of these STD Plans.

D-15.30
STD Plans D-15 series “Traffic Barrier Details for Reinforced Concrete Retaining Walls” are withdrawn. Special designs in accordance with the current WSDOT BDM are required in place of these STD Plans.

G-20.10
SIGN INSTALLATION BEHIND TRAFFIC BARRIER detail, dimension callout “3’ MIN.”, is revised to read “5’ MIN.”.

H-70.20
Sheet 2, Spacing Detail, Mailbox Support Type 1, reference to Standard Plan I-70.10 is revised to H-70.10

H-70.30
DELETED

J-10.16
Key Note 14, reads:”Mounting Hole ~ See Standard Plan J-10.30 for mounting Details.” Is revised to read:”Mounting Hole ~ See Standard Plan J-10.14 for mounting Details.”
General Note 12, reads: “See Standard Plan J-10.30 for pole installation details.” Is revised to read: “See Standard Plan J-10.14 for pole installation details.”

J-10.17
Key Note 16, reads:”Mounting Hole ~ See Standard Plan J-10.?? for mounting Details.” Is revised to read:”Mounting Hole ~ See Standard Plan J-10.14 for mounting Details.”
General Note 12, reads: “See Standard Plan J-10.30 for pole installation details.” Is revised to read: “See Standard Plan J-10.14 for pole installation details.”

J-10.18
Key Note 12, reads:”Mounting Hole ~ See Standard Plan J-10.20 for mounting Details.” Is revised to read:”Mounting Hole ~ See Standard Plan J-10.14 for mounting Details.”
General Note 12, reads: “See Standard Plan J-10.30 for pole installation details.” Is revised to read: “See Standard Plan J-10.14 for pole installation details.”

J-20.26
Add Note 1, “1. One accessible pedestrian pushbutton station per pedestrian pushbutton post.”

J-20.16

View A, callout, was – LOCK NIPPLE, is revised to read; CHASE NIPPLE

J-21.10

Sheet 1, Elevation View, Round Concrete Foundation Detail, callout – "ANCHOR BOLTS ~ ¾" (IN) x 30" (IN) FULL THREAD ~ THREE REQ'D. PER ASSEMBLY" IS REVISED TO READ: "ANCHOR BOLTS ~ ¾" (IN) x 30" (IN) FULL THREAD ~ FOUR REQ'D. PER ASSEMBLY"

Sheet 1 of 2, Elevation view (Round), add dimension depicting the distance from the top of the foundation to find 2 #4 reinforcing bar shown, to read; 3" CLR.. Delete "(TYP.)" from the 2 ½" CLR. dimension, depicting the distance from the bottom of the foundation to find 2 # 4 reinf. Bar.

Sheet 1 of 2, Elevation view (Square), add dimension depicting the distance from the top of the foundation to find 1 #4 reinforcing bar shown, to read; 3" CLR. Delete "(TYP.)" from the 2 ½" CLR. dimension, depicting the distance from the bottom of the foundation to find 1 # 4 reinf. Bar.

Sheet 2 of 2, Elevation view (Round), add dimension depicting the distance from the top of the foundation to find 2 #4 reinforcing bar shown, to read; 3" CLR. Delete "(TYP.)" from the 2 ½" CLR. dimension, depicting the distance from the bottom of the foundation to find 2 # 4 reinf. Bar.

Sheet 2 of 2, Elevation view (Square), add dimension depicting the distance from the top of the foundation to find 1 #4 reinforcing bar shown, to read; 3" CLR. Delete "(TYP.)" from the 2 ½" CLR. dimension, depicting the distance from the bottom of the foundation to find 1 # 4 reinf. Bar.

Detail F, callout, "Heavy Hex Clamping Bolt (TYP.) ~ 3/4" (IN) Diam. Torque Clamping Bolts (see Note 3)" is revised to read; "Heavy Hex Clamping Bolt (TYP.) ~ 3/4" (IN) Diam. Torque Clamping Bolts (see Note 1)"

Detail F, callout, "3/4" (IN) x 2' – 6" Anchor Bolt (TYP.) ~ Four Required (See Note 4)" is revised to read; "3/4" (IN) x 2' – 6" Anchor Bolt (TYP.) ~ Three Required (See Note 2)"

J-21.15

Partial View, callout, was – LOCK NIPPLE ~ 1 ½" DIAM., is revised to read; CHASE NIPPLE ~ 1 ½" (IN) DIAM.

J-21.16

Detail A, callout, was – LOCKNIPPLE, is revised to read; CHASE NIPPLE

J-22.15

Ramp Meter Signal Standard, elevation, dimension 4' - 6" is revised to read; 6'-0"

(2x) Detail A, callout, was – LOCK NIPPLE ~ 1 ½" DIAM. is revised to read; CHASE NIPPLE ~ 1 ½" (IN) DIAM.

J-28.60

Note 1 "See Standard Plans C-8b and C-85.14 for foundation and anchor bolt details." is revised to read "See contract for anchor bolt details. See Standard Plan C-85.15 for foundation details."

J-40.10

Sheet 2 of 2, Detail F, callout, "12 – 13 x 1 ½" S.S. PENTA HEAD BOLT AND 12" S. S. FLAT WASHER" is revised to read; "12 – 13 x 1 ½" S.S. PENTA HEAD BOLT AND 1/2" (IN) S. S. FLAT WASHER"

J-40.36

Note 1, second sentence; ”Finish shall be # 2B for backbox and # 4 for the cover.” Is revised to read; ”Finish shall be # 2B for barrier box and HRAP (Hot Rolled Annealed and Pickled) for the cover.

J-40.37

Note 1, second sentence; ”Finish shall be # 2B for backbox and # 4 for the cover.” Is revised to read; ”Finish shall be # 2B for barrier box and HRAP (Hot Rolled Annealed and Pickled) for the cover.

J-75.20

Key Notes, note 16, second bullet point, was: “1/2” (IN) x 0.45” (IN) Stainless Steel Bands”, add the following to the end of the note: “Alternate: Stainless steel cable with stainless steel ends, nuts, bolts, and washers may be used in place of stainless steel bands and associated hardware.”

J-81.10

All references to “Type 170 Controller” are replaced with “Controller”.

L-40.10

DELETED

The following are the Standard Plan numbers applicable at the time this project was advertised. The date shown with each plan number is the publication approval date shown in the lower right-hand corner of that plan. Standard Plans showing different dates shall not be used in this contract.

A-10.10-00.....8/7/07
A-10.20-00.....10/5/07
A-10.30-00.....10/5/07
A-20.10-00.....8/31/07
A-30.10-00.....11/8/07
A-30.30-01.....6/16/11
A-30.35-00.....10/12/07
A-40.00-00.....8/11/09
A-40.10-04.....7/31/19
A-40.15-00.....8/11/09
A-40.20-04.....1/18/17
A-40.50-02.....12/23/14
A-60.10-03.....12/23/14
A-60.20-03.....12/23/14
A-60.30-01.....6/28/18
A-60.40-00.....8/31/07

B-5.20-03.....9/9/20
B-5.40-02.....1/26/17
B-5.60-02.....1/26/17
B-10.20-02.....3/2/18
B-10.40-01.....1/26/17
B-10.70-01……9/9/20
B-15.20-01.....2/7/12
B-15.40-01.....2/7/12
B-15.60-02.....1/26/17
B-20.20-02.....3/16/12
B-20.40-04.....2/27/18
B-20.60-03.....3/15/12
B-25.20-02.....2/27/18
B-25.60-02.....2/27/18
B-30.05-00……..9/9/20
B-30.10-03.....2/27/18
B-30.15-00……..2/27/18
B-30.20-04.....2/27/18
B-30.30-03.....2/27/18
B-30.50-03.....2/27/18
B-30.60-00……..9/9/20
B-30.70-04.....2/27/18
B-30.80-01.....2/27/18
B-30.90-02.....1/26/17
B-35.20-00.....6/8/06
B-35.40-00.....6/8/06
B-40.20-00.....6/1/06
B-40.40-02.....1/26/17
B-45.20-01.....7/11/17
B-45.40-01.....7/21/17
B-50.20-00.....6/1/06
B-55.20-02.....2/27/18
B-60.20-02.....9/9/20
B-60.40-01.....2/27/18
B-65.20-01.....4/26/12
B-65.40-00.....6/1/06
B-70.20-00.....6/1/06
B-70.60-01.....1/26/17
B-75.20-02.....2/27/18
B-75.50-01.....6/10/08
B-75.60-00.....6/8/06
B-80.20-00.....6/8/06
B-80.40-00.....6/1/06
B-85.10-01.....6/10/08
B-85.20-00.....6/1/06
B-85.30-00.....6/1/06
B-85.40-00.....6/8/06
B-85.50-01.....6/10/08
B-90.10-00…....6/8/06
B-90.20-00.....6/8/06
B-90.30-00.....6/8/06
B-90.40-01.....1/26/17
B-90.50-00.....6/8/06
B-95.20-01.....2/3/09
B-95.40-01.....6/28/18

B-30.40-03.....2/27/18

1

C-1.....9/9/20
C-1b.....9/9/20
C-1d.....10/31/03
C-2c.....8/12/19
C-4f.....8/12/19
C-6a.....10/14/09
C-7.....6/16/11
C-7a.....6/16/11
C-8.....2/10/09
C-8a.....7/25/97
C-20.10-06.....9/16/20
C-20.14-04.....8/12/19
C-20.15-02.....6/11/14
C-20.18-03.....8/12/19
C-20.40-07.....8/12/19
C-20.41-02.....8/12/19
C-20.42-05.....7/14/15
C-20.45.02.....8/12/19
C-22.16-07.....9/16/20
C-22.40-08.....9/16/20
C-22.45-05.....9/16/20
C-23.60-04.....7/21/17
C.24.10-02.....8/12/19
C-25.20-06.....7/14/15
C-25.22-05.....7/14/15
C-25.26-04.....8/12/19
C-25.30-00…….6/28/18
C-25.80-05.....8/12/19
C-60.10-01…….9/24/20
C-60.20-00……9/24/20
C-60.30-00……9/24/20
C-60.70-00……9/24/20
C-70.10-02.....9/16/20
C-75.10-02.....9/16/20
C-75.20-02.....9/16/20
C-75.30-02.....9/16/20
C-80.10-02.....9/16/20
C-80.20-01.....6/11/14
C-80.30-01.....6/11/14
C-80.40-01.....6/11/14
C-85.10-00.....4/8/12
C-85.11-01.....9/16/20
C-85.15-01.....6/30/14
C-85.16-01.....6/17/14
C-85-18-01.....6/11/14
C-85.20-01.....6/11/14

2

D-2.04-00.....11/10/05
D-2.06-01.....1/6/09
D-2.08-00.....11/10/05
D-2.32-00.....11/10/05
D-2.34-01.....1/6/09
D-2.36-03.....6/11/14
D-2.60-00.....11/10/05
D-2.62-00.....11/10/05
D-2.64-01.....1/6/09
D-2.66-00.....11/10/05
D-2.68-00.....11/10/05
D-2.80-00.....11/10/05
D-2.84-00.....11/10/05
D-2.88-00.....11/10/05
D-2.92-00.....11/10/05
D-3.09-00.....5/17/12
D-3.10-01……5/29/13
D-3.11-03……6/11/14
D-3.15-02……6/10/13
D-3.16-02……5/29/13
D-3.17-02……5/9/16
D-4.....12/11/98
D-6.....6/19/98
D-10.10-01.....12/2/08
D-10.15-01.....12/2/08
D-10.20-01.....8/7/19
D-10.25-01.....8/7/19
D-10.30-00.....7/8/08
D-10.35-00.....7/8/08
D-10.40-01.....12/2/08
D-10.45-01.....12/2/08

3

E-1.....2/21/07
E-2.....5/29/98
E-4.....8/27/03
E-4a.....8/27/03

4

F-10.12-04.....9/24/20
F-10.16-00.....12/20/06
F-10.18-02.....9/24/20
F-10.40-04.....9/24/20
F-10.42-00.....1/23/07
F-10.62-02.....4/22/14
F-10.64-03.....4/22/14
F-30.10-04.....9/25/20
F-40.12-03.....6/29/16
F-40.14-03.....6/29/16
F-40.15-04.....9/25/20
F-40.16-03.....6/29/16
F-45.10-02.....7/15/16
F-80.10-04.....7/15/16

5

G-10.10-00.....9/20/07
G-20.10-02.....6/23/15
G-22.10-04.....6/28/18
G-24.10-00.....11/8/07
G-24.20-01.....2/7/12
G-24.30-02.....6/28/18
G-24.40-07.....6/28/18
G-24.50-05.....8/7/19
G-24.60-05.....6/28/18
G-25.10-05.....9/16/20
G-26.10-00……7/31/19
G-30.10-04.....6/23/15
G-50.10-03.....6/28/18
G-90.10-03……7/11/17
G-90.11-00……4/28/16
G-90.20-05……7/11/17
G-90.30-04……7/11/17
G-90.40-02……4/28/16
G-95.10-02.....6/28/18
G-95.20-03.....6/28/18
G-95.30-03.....6/28/18

6

H-10.10-00.....7/3/08
H-32.10-00.....9/20/07
H-70.10-01.....2/7/12

H-10.15-00.....7/3/08
H-30.10-00.....10/12/07
H-60.10-01.....7/3/08
H-60.20-01.....7/3/08
H-70.20-01.....2/16/12

1

I-10.10-01.....8/11/09
I-30.10-02.....3/22/13
I-30.15-02.....3/22/13
I-30.16-01.....7/11/19
I-30.17-01.....6/12/19
I-30.20-00.....9/20/07
I-30.30-02.....6/12/19
I-30.40-02.....6/12/19
I-30.60-02.....6/12/19
I-40.10-00.....9/20/07
I-40.20-00.....9/20/07
I-50.20-01.....6/10/13
I-60.10-01.....6/10/13
I-60.20-01.....6/10/13
I-80.10-02.....7/15/16

2

J-10.....7/18/97
J-10.10-04……9/16/20
J-10.12-00……9/16/20
J-10.14-00……9/16/20
J-10.15-01.....6/11/14
J-10.16-01……9/16/20
J-10.17-01……9/16/20
J-10.18-01……9/16/20
J-10.20-03……9/16/20
J-10.21-01……9/16/20
J-10.22-01.....9/16/20
J-10.25-00……7/11/17
J-12.15-00……6/28/18
J-12.16-00……6/28/18
J-15.10-01.....6/11/14
J-15.15-02……7/10/15
J-20.10-04.....7/31/19
J-20.11-03.....7/31/19
J-20.15-03.....6/30/14
J-20.16-02.....6/30/14
J-20.20-02.....5/20/13
J-20.26-01.....7/12/12
J-21.10-04.....6/30/14
J-21.15-01.....6/10/13
J-21.16-01.....6/10/13
J-21.17-01.....6/10/13
J-21.20-01.....6/10/13
J-22.15-02.....7/10/15
J-22.16-03.....7/10/15
J-26.10-03…..7/21/16
J-26.15-01…..5/17/12
J-26.20-01…..6/28/18
J-27.10-01…..7/21/16
J-27.15-00…..3/15/12
J-28.10-02.....8/7/19
J-28.22-00.....8/07/07
J-28.24-02.....9/16/20
J-28.26-01.....12/02/08
J-28.30-03.....6/11/14
J-28.40-02.....6/11/14
J-28.42-01.....6/11/14
J-28.43-01.....6/28/18
J-28.45-03.....7/21/16
J-28.50-03.....7/21/16
J-28.60-02.....7/21/16
J-28.70-03.....7/21/17
J-29.10-01.....7/21/16
J-29.15-01.....7/21/16
J-29.16-02.....7/21/16
J-30.10-00……6/18/15
J-40.05-00……7/21/16
J-40.10-04……4/28/16
J-40.20-03……4/28/16
J-40.30-04……4/28/16
J-40.35-01……5/29/13
J-40.36-02……7/21/17
J-40.37-02……7/21/17
J-40.38-01.....5/20/13
J-40.39-00……5/20/13
J-40.40-02……7/31/19
J-45.36-00……7/21/17
J-50.05-00……7/21/17
J-50.10-01…….7/31/19
J-50.11-02…….7/31/19
J-50.12-02…….8/7/19
J-50.13-00…….8/22/19
J-50.15-01…….7/21/17
J-50.16-01…….3/22/13
J-50.18-00…….8/7/19
J-50.19-00…….8/7/19
J-50.20-00…….6/3/11
J-50.25-00…….6/3/11
J-50.30-00…….6/3/11
J-60.05-01…….7/21/16
J-60.11-00……..5/20/13
J-60.12-00……..5/20/13
J-60.13-00……..6/16/10
J-60.14-01……7/31/19
J-75.10-02……7/10/15
J-75.20-01……7/10/15
J-75.30-02…….7/10/15
J-75.40-02……6/1/16
J-75.41-01……6/29/16
J-75.45-02……6/1/16
J-80.10-00……6/28/18
J-80.15-00……6/28/18
J-81.10-01……9/16/20
J-86.10-00……6/28/18
J-90.10-03…….6/28/18
J-90.20-03…….6/28/18
J-90.21-02……6/28/18
J-90.50-00……6/28/18

3

K-70.20-01.....6/1/16
K-80.10-02.....9/25/20
K-80.20-00.....12/20/06

K-80.35-01.....9/16/20
K-80.37-01.....9/16/20

L-10.10-02.....6/21/12
L-20.10-03.....7/14/15
L-30.10-02.....6/11/14
L-40.15-01.....6/16/11
L-40.20-02.....6/21/12
L-70.10-01.....5/21/08
L-70.20-01.....5/21/08

M-1.20-04.....9/25/20
M-1.40-03.....9/25/20
M-1.60-03.....9/25/20
M-1.80-03.....6/3/11
M-2.20-03.....7/10/15
M-2.21-00……7/10/15
M-3.10-04.....9/25/20
M-3.20-03.....9/25/20
M-3.30-04.....9/25/20
M-3.40-04.....9/25/20
M-3.50-03.....9/25/20
M-5.10-03.....9/25/20
M-7.50-01.....1/30/07
M-9.50-02.....6/24/14
M-9.60-00……..2/10/09
M-11.10-03.....8/7/19
M-12.10-02……9/25/20
M-15.10-01.....2/6/07
M-17.10-02.....7/3/08
M-20.10-03.....9/25/20
M-20.20-02.....4/20/15
M-20.30-04.....2/29/16
M-20.40-03.....6/24/14
M-20.50-02.....6/3/11
M-24.20-02.....4/20/15
M-24.40-02.....4/20/15
M-24.60-04.....6/24/14
M-24.65-00……7/11/17
M-24.66-00……7/11/17
M-40.10-03.....6/24/14
M-40.20-00...10/12/07
M-40.30-01.....7/11/17
M-40.40-00.....9/20/07
M-40.50-00.....9/20/07
M-40.60-00.....9/20/07
M-60.10-01.....6/3/11
M-60.20-02.....6/27/11
M-65.10-02.....5/11/11
M-80.10-01.....6/3/11
M-80.20-00.....6/10/08
M-80.30-00.....6/10/08

APPENDIX A

WSDOT Standard Plans

Link to WSDOT Standard Plans

https://wsdot.wa.gov/publications/fulltext/Standards/Standard-Plan-Manual-September2020.pdf

APPENDIX B

Federal Davis Bacon Wage Rates
Washington State Prevailing Wage Rates

State of Washington
Department of Labor & Industries
Prevailing Wage Section - Telephone 360-902-5335
PO Box 44540, Olympia, WA 98504-4540

Washington State Prevailing Wage

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, worker's wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements are provided on the Benefit Code Key.

Journey Level Prevailing Wage Rates for the Effective Date: 10/18/2021

County	Trade	Job Classification	Wage	Holiday	Overtime	Note	*Risk Class
Skagit	Asbestos Abatement Workers	Journey Level	$54.62	5D	1H		View
Skagit	Boilermakers	Journey Level	$70.79	5N	1C		View
Skagit	Brick Mason	Journey Level	$63.32	7E	1N		View
Skagit	Brick Mason	Pointer-Caulker-Cleaner	$63.32	7E	1N		View
Skagit	Building Service Employees	Janitor	$13.69		1		View
Skagit	Building Service Employees	Shampooer	$13.69		1		View
Skagit	Building Service Employees	Waxer	$13.69		1		View
Skagit	Building Service Employees	Window Cleaner	$13.69		1		View
Skagit	Cabinet Makers (In Shop)	Journey Level	$18.85		1		View
Skagit	Carpenters	Acoustical Worker	$64.94	7A	4C		View
Skagit	Carpenters	Bridge, Dock And Wharf Carpenters	$64.94	7A	4C		View
Skagit	Carpenters	Carpenter	$64.94	7A	4C		View
Skagit	Carpenters	Carpenters on Stationary Tools	$65.07	7A	4C		View
Skagit	Carpenters	Creosoted Material	$65.07	7A	4C		View
Skagit	Carpenters	Floor Finisher	$64.94	7A	4C		View
Skagit	Carpenters	Floor Layer	$64.94	7A	4C		View
Skagit	Carpenters	Scaffold Erector	$64.94	7A	4C		View
Skagit	Cement Masons	Application of all Composition Mastic	$67.41	7A	4U		View
Skagit	Cement Masons	Application of all Epoxy Material	$66.91	7A	4U		View
Skagit	Cement Masons	Application of all Plastic Material	$67.41	7A	4U		View
Skagit	Cement Masons	Application of Sealing Compound	$66.91	7A	4U		View
Skagit	Cement Masons	Application of Underlayment	$67.41	7A	4U		View
Skagit	Cement Masons	Building General	$66.91	7A	4U		View
Skagit	Cement Masons	Composition or Kalman Floors	$67.41	7A	4U		View
Skagit	Cement Masons	Concrete Paving	$66.91	7A	4U		View
Skagit	Cement Masons	Curb & Gutter Machine	$67.41	7A	4U		View

Skagit	Cement Masons	Curb & Gutter, Sidewalks	$66.91	7A	4U		View
Skagit	Cement Masons	Curing Concrete	$66.91	7A	4U		View
Skagit	Cement Masons	Finish Colored Concrete	$67.41	7A	4U		View
Skagit	Cement Masons	Floor Grinding	$67.41	7A	4U		View
Skagit	Cement Masons	Floor Grinding/Polisher	$66.91	7A	4U		View
Skagit	Cement Masons	Green Concrete Saw, self-powered	$67.41	7A	4U		View
Skagit	Cement Masons	Grouting of all Plates	$66.91	7A	4U		View
Skagit	Cement Masons	Grouting of all Tilt-up Panels	$66.91	7A	4U		View
Skagit	Cement Masons	Gunite Nozzleman	$67.41	7A	4U		View
Skagit	Cement Masons	Hand Powered Grinder	$67.41	7A	4U		View
Skagit	Cement Masons	Journey Level	$66.91	7A	4U		View
Skagit	Cement Masons	Patching Concrete	$66.91	7A	4U		View
Skagit	Cement Masons	Pneumatic Power Tools	$67.41	7A	4U		View
Skagit	Cement Masons	Power Chipping & Brushing	$67.41	7A	4U		View
Skagit	Cement Masons	Sand Blasting Architectural Finish	$67.41	7A	4U		View
Skagit	Cement Masons	Screed & Rodding Machine	$67.41	7A	4U		View
Skagit	Cement Masons	Spackling or Skim Coat Concrete	$66.91	7A	4U		View
Skagit	Cement Masons	Troweling Machine Operator	$67.41	7A	4U		View
Skagit	Cement Masons	Troweling Machine Operator on Colored Slabs	$67.41	7A	4U		View
Skagit	Cement Masons	Tunnel Workers	$67.41	7A	4U		View
Skagit	Divers & Tenders	Bell/Vehicle or Submersible Operator (Not Under Pressure)	$118.80	7A	4C		View
Skagit	Divers & Tenders	Dive Supervisor/Master	$81.98	7A	4C		View
Skagit	Divers & Tenders	Diver	$118.80	7A	4C	8V	View
Skagit	Divers & Tenders	Diver On Standby	$76.98	7A	4C		View
Skagit	Divers & Tenders	Diver Tender	$69.91	7A	4C		View
Skagit	Divers & Tenders	Manifold Operator	$69.91	7A	4C		View
Skagit	Divers & Tenders	Manifold Operator Mixed Gas	$74.91	7A	4C		View
Skagit	Divers & Tenders	Remote Operated Vehicle Operator/Technician	$69.91	7A	4C		View
Skagit	Divers & Tenders	Remote Operated Vehicle Tender	$65.19	7A	4C		View
Skagit	Dredge Workers	Assistant Engineer	$73.62	5D	3F		View
Skagit	Dredge Workers	Assistant Mate (Deckhand)	$73.05	5D	3F		View
Skagit	Dredge Workers	Boatmen	$73.62	5D	3F		View
Skagit	Dredge Workers	Engineer Welder	$75.03	5D	3F		View
Skagit	Dredge Workers	Leverman, Hydraulic	$76.53	5D	3F		View
Skagit	Dredge Workers	Mates	$73.62	5D	3F		View
Skagit	Dredge Workers	Oiler	$73.05	5D	3F		View
Skagit	Drywall Applicator	Journey Level	$67.54	5D	1H		View
Skagit	Drywall Tapers	Journey Level	$67.91	5P	1E		View
Skagit	Electrical Fixture Maintenance Workers	Journey Level	$21.48		1		View
Skagit	Electricians - Inside	Cable Splicer	$83.25	7H	1E		View

Skagit	Electricians - Inside	Construction Stock Person	$40.04	7H	1D		View
Skagit	Electricians - Inside	Journey Level	$77.98	7H	1E		View
Skagit	Electricians - Motor Shop	Craftsman	$15.37		1		View
Skagit	Electricians - Motor Shop	Journey Level	$14.69		1		View
Skagit	Electricians - Powerline Construction	Cable Splicer	$82.39	5A	4D		View
Skagit	Electricians - Powerline Construction	Certified Line Welder	$75.64	5A	4D		View
Skagit	Electricians - Powerline Construction	Groundperson	$49.17	5A	4D		View
Skagit	Electricians - Powerline Construction	Heavy Line Equipment Operator	$75.64	5A	4D		View
Skagit	Electricians - Powerline Construction	Journey Level Lineperson	$75.64	5A	4D		View
Skagit	Electricians - Powerline Construction	Line Equipment Operator	$64.54	5A	4D		View
Skagit	Electricians - Powerline Construction	Meter Installer	$49.17	5A	4D	8W	View
Skagit	Electricians - Powerline Construction	Pole Sprayer	$75.64	5A	4D		View
Skagit	Electricians - Powerline Construction	Powderperson	$56.49	5A	4D		View
Skagit	Electronic Technicians	Electronic Technicians Journey Level	$47.28	5B	1B		View
Skagit	Elevator Constructors	Mechanic	$100.51	7D	4A		View
Skagit	Elevator Constructors	Mechanic In Charge	$108.53	7D	4A		View
Skagit	Fabricated Precast Concrete Products	Journey Level	$13.69		1		View
Skagit	Fabricated Precast Concrete Products	Journey Level - In-Factory Work Only	$13.69		1		View
Skagit	Fence Erectors	Fence Erector	$46.29	7A	4V	8Y	View
Skagit	Fence Erectors	Fence Laborer	$46.29	7A	4V	8Y	View
Skagit	Flaggers	Journey Level	$46.29	7A	4V	8Y	View
Skagit	Glaziers	Journey Level	$72.41	7L	1Y		View
Skagit	Heat & Frost Insulators And Asbestos Workers	Journey Level	$82.02	15H	11C		View
Skagit	Heating Equipment Mechanics	Mechanic	$85.05	7F	1E		View
Skagit	Hod Carriers & Mason Tenders	Journey Level	$46.42	7A	4V	8Y	View
Skagit	Industrial Power Vacuum Cleaner	Journey Level	$13.69		1		View
Skagit	Inland Boatmen	Boat Operator	$61.41	5B	1K		View
Skagit	Inland Boatmen	Cook	$56.48	5B	1K		View
Skagit	Inland Boatmen	Deckhand	$57.48	5B	1K		View
Skagit	Inland Boatmen	Deckhand Engineer	$58.81	5B	1K		View
Skagit	Inland Boatmen	Launch Operator	$58.89	5B	1K		View
Skagit	Inland Boatmen	Mate	$57.31	5B	1K		View
Skagit	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Cleaner Operator, Foamer Operator	$13.69		1		View
Skagit	Inspection/Cleaning/Sealing Of	Grout Truck Operator	$13.69		1		View

	Sewer & Water Systems By Remote Control						
Skagit	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Head Operator	$13.69		1		View
Skagit	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Technician	$13.69		1		View
Skagit	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Tv Truck Operator	$13.69		1		View
Skagit	Insulation Applicators	Journey Level	$64.94	7A	4C		View
Skagit	Ironworkers	Journeyman	$78.53	7N	1O		View
Skagit	Laborers	Air, Gas Or Electric Vibrating Screed	$54.62	7A	4V	8Y	View
Skagit	Laborers	Airtrac Drill Operator	$56.31	7A	4V	8Y	View
Skagit	Laborers	Ballast Regular Machine	$54.62	7A	4V	8Y	View
Skagit	Laborers	Batch Weighman	$46.29	7A	4V	8Y	View
Skagit	Laborers	Brick Pavers	$54.62	7A	4V	8Y	View
Skagit	Laborers	Brush Cutter	$54.62	7A	4V	8Y	View
Skagit	Laborers	Brush Hog Feeder	$54.62	7A	4V	8Y	View
Skagit	Laborers	Burner	$54.62	7A	4V	8Y	View
Skagit	Laborers	Caisson Worker	$56.31	7A	4V	8Y	View
Skagit	Laborers	Carpenter Tender	$54.62	7A	4V	8Y	View
Skagit	Laborers	Cement Dumper-paving	$55.62	7A	4V	8Y	View
Skagit	Laborers	Cement Finisher Tender	$54.62	7A	4V	8Y	View
Skagit	Laborers	Change House Or Dry Shack	$54.62	7A	4V	8Y	View
Skagit	Laborers	Chipping Gun (30 Lbs. And Over)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Chipping Gun (Under 30 Lbs.)	$54.62	7A	4V	8Y	View
Skagit	Laborers	Choker Setter	$54.62	7A	4V	8Y	View
Skagit	Laborers	Chuck Tender	$54.62	7A	4V	8Y	View
Skagit	Laborers	Clary Power Spreader	$55.62	7A	4V	8Y	View
Skagit	Laborers	Clean-up Laborer	$54.62	7A	4V	8Y	View
Skagit	Laborers	Concrete Dumper/Chute Operator	$55.62	7A	4V	8Y	View
Skagit	Laborers	Concrete Form Stripper	$54.62	7A	4V	8Y	View
Skagit	Laborers	Concrete Placement Crew	$55.62	7A	4V	8Y	View
Skagit	Laborers	Concrete Saw Operator/Core Driller	$55.62	7A	4V	8Y	View
Skagit	Laborers	Crusher Feeder	$46.29	7A	4V	8Y	View
Skagit	Laborers	Curing Laborer	$54.62	7A	4V	8Y	View
Skagit	Laborers	Demolition: Wrecking & Moving (Incl. Charred Material)	$54.62	7A	4V	8Y	View
Skagit	Laborers	Ditch Digger	$54.62	7A	4V	8Y	View
Skagit	Laborers	Diver	$56.31	7A	4V	8Y	View
Skagit	Laborers	Drill Operator (Hydraulic, Diamond)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Dry Stack Walls	$54.62	7A	4V	8Y	View
Skagit	Laborers	Dump Person	$54.62	7A	4V	8Y	View

Skagit	Laborers	Epoxy Technician	$54.62	7A	4V	8Y	View
Skagit	Laborers	Erosion Control Worker	$54.62	7A	4V	8Y	View
Skagit	Laborers	Faller & Bucker Chain Saw	$55.62	7A	4V	8Y	View
Skagit	Laborers	Fine Graders	$54.62	7A	4V	8Y	View
Skagit	Laborers	Firewatch	$46.29	7A	4V	8Y	View
Skagit	Laborers	Form Setter	$54.62	7A	4V	8Y	View
Skagit	Laborers	Gabian Basket Builders	$54.62	7A	4V	8Y	View
Skagit	Laborers	General Laborer	$54.62	7A	4V	8Y	View
Skagit	Laborers	Grade Checker & Transit Person	$46.42	7A	4V	8Y	View
Skagit	Laborers	Grinders	$54.62	7A	4V	8Y	View
Skagit	Laborers	Grout Machine Tender	$54.62	7A	4V	8Y	View
Skagit	Laborers	Groutmen (Pressure) Including Post Tension Beams	$55.62	7A	4V	8Y	View
Skagit	Laborers	Guardrail Erector	$54.62	7A	4V	8Y	View
Skagit	Laborers	Hazardous Waste Worker (Level A)	$56.31	7A	4V	8Y	View
Skagit	Laborers	Hazardous Waste Worker (Level B)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Hazardous Waste Worker (Level C)	$54.62	7A	4V	8Y	View
Skagit	Laborers	High Scaler	$56.31	7A	4V	8Y	View
Skagit	Laborers	Jackhammer	$55.62	7A	4V	8Y	View
Skagit	Laborers	Laserbeam Operator	$55.62	7A	4V	8Y	View
Skagit	Laborers	Maintenance Person	$54.62	7A	4V	8Y	View
Skagit	Laborers	Manhole Builder-Mudman	$55.62	7A	4V	8Y	View
Skagit	Laborers	Material Yard Person	$54.62	7A	4V	8Y	View
Skagit	Laborers	Motorman-Dinky Locomotive	$55.62	7A	4V	8Y	View
Skagit	Laborers	nozzleman (concrete pump, green cutter when using combination of high pressure air & water on concrete & rock, sandblast, gunite, shotcrete, water blaster, vacuum blaster)	$46.42	7A	4V	8Y	View
Skagit	Laborers	Pavement Breaker	$55.62	7A	4V	8Y	View
Skagit	Laborers	Pilot Car	$46.29	7A	4V	8Y	View
Skagit	Laborers	Pipe Layer (Lead)	$46.42	7A	4V	8Y	View
Skagit	Laborers	Pipe Layer/Tailor	$55.62	7A	4V	8Y	View
Skagit	Laborers	Pipe Pot Tender	$55.62	7A	4V	8Y	View
Skagit	Laborers	Pipe Reliner	$55.62	7A	4V	8Y	View
Skagit	Laborers	Pipe Wrapper	$55.62	7A	4V	8Y	View
Skagit	Laborers	Pot Tender	$54.62	7A	4V	8Y	View
Skagit	Laborers	Powderman	$56.31	7A	4V	8Y	View
Skagit	Laborers	Powderman's Helper	$54.62	7A	4V	8Y	View
Skagit	Laborers	Power Jacks	$55.62	7A	4V	8Y	View
Skagit	Laborers	Railroad Spike Puller - Power	$55.62	7A	4V	8Y	View
Skagit	Laborers	Raker - Asphalt	$46.42	7A	4V	8Y	View
Skagit	Laborers	Re-timberman	$56.31	7A	4V	8Y	View
Skagit	Laborers	Remote Equipment Operator	$55.62	7A	4V	8Y	View

Skagit	Laborers	Rigger/Signal Person	$55.62	7A	4V	8Y	View
Skagit	Laborers	Rip Rap Person	$54.62	7A	4V	8Y	View
Skagit	Laborers	Rivet Buster	$55.62	7A	4V	8Y	View
Skagit	Laborers	Rodder	$55.62	7A	4V	8Y	View
Skagit	Laborers	Scaffold Erector	$54.62	7A	4V	8Y	View
Skagit	Laborers	Scale Person	$54.62	7A	4V	8Y	View
Skagit	Laborers	Sloper (Over 20")	$55.62	7A	4V	8Y	View
Skagit	Laborers	Sloper Sprayer	$54.62	7A	4V	8Y	View
Skagit	Laborers	Spreader (Concrete)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Stake Hopper	$54.62	7A	4V	8Y	View
Skagit	Laborers	Stock Piler	$54.62	7A	4V	8Y	View
Skagit	Laborers	Swinging Stage/Boatswain Chair	$46.29	7A	4V	8Y	View
Skagit	Laborers	Tamper & Similar Electric, Air & Gas Operated Tools	$55.62	7A	4V	8Y	View
Skagit	Laborers	Tamper (Multiple & Self-propelled)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Timber Person - Sewer (Lagger, Shorer & Cribber)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Toolroom Person (at Jobsite)	$54.62	7A	4V	8Y	View
Skagit	Laborers	Topper	$54.62	7A	4V	8Y	View
Skagit	Laborers	Track Laborer	$54.62	7A	4V	8Y	View
Skagit	Laborers	Track Liner (Power)	$55.62	7A	4V	8Y	View
Skagit	Laborers	Traffic Control Laborer	$49.50	7A	4V	9C	View
Skagit	Laborers	Traffic Control Supervisor	$52.45	7A	4V	9C	View
Skagit	Laborers	Truck Spotter	$54.62	7A	4V	8Y	View
Skagit	Laborers	Tugger Operator	$55.62	7A	4V	8Y	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 0-30 psi	$142.82	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 30.01-44.00 psi	$147.85	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 44.01-54.00 psi	$151.53	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 54.01-60.00 psi	$157.23	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 60.01-64.00 psi	$159.35	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 64.01-68.00 psi	$164.45	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 68.01-70.00 psi	$166.35	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 70.01-72.00 psi	$168.35	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Compressed Air Worker 72.01-74.00 psi	$170.35	7A	4V	9B	View
Skagit	Laborers	Tunnel Work-Guage and Lock Tender	$57.41	7A	4V	8Y	View
Skagit	Laborers	Tunnel Work-Miner	$57.41	7A	4V	8Y	View
Skagit	Laborers	Vibrator	$55.62	7A	4V	8Y	View
Skagit	Laborers	Vinyl Seamer	$54.62	7A	4V	8Y	View

Skagit	Laborers	Watchman	$42.08	7A	4V	8Y	View
Skagit	Laborers	Welder	$55.62	7A	4V	8Y	View
Skagit	Laborers	Well Point Laborer	$55.62	7A	4V	8Y	View
Skagit	Laborers	Window Washer/Cleaner	$42.08	7A	4V	8Y	View
Skagit	Laborers - Underground Sewer & Water	General Laborer & Topman	$54.62	7A	4V	8Y	View
Skagit	Laborers - Underground Sewer & Water	Pipe Layer	$55.62	7A	4V	8Y	View
Skagit	Landscape Construction	Landscape Construction/Landscaping Or Planting Laborers	$42.08	7A	4V	8Y	View
Skagit	Landscape Construction	Landscape Operator	$72.28	7A	3K	8X	View
Skagit	Landscape Maintenance	Groundskeeper	$14.18		1		View
Skagit	Lathers	Journey Level	$67.54	5D	1H		View
Skagit	Marble Setters	Journey Level	$63.32	7E	1N		View
Skagit	Metal Fabrication (In Shop)	Fitter	$15.16		1		View
Skagit	Metal Fabrication (In Shop)	Laborer	$13.69		1		View
Skagit	Metal Fabrication (In Shop)	Machine Operator	$13.69		1		View
Skagit	Metal Fabrication (In Shop)	Painter	$13.69		1		View
Skagit	Metal Fabrication (In Shop)	Welder	$15.16		1		View
Skagit	Millwright	Journey Level	$66.44	7A	4C		View
Skagit	Modular Buildings	Journey Level	$13.69		1		View
Skagit	Painters	Journey Level	$47.70	6Z	2B		View
Skagit	Pile Driver	Crew Tender	$69.91	7A	4C		View
Skagit	Pile Driver	Crew Tender/Technician	$69.91	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 0-30.00 PSI	$80.76	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 30.01 - 44.00 PSI	$85.76	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 44.01 - 54.00 PSI	$89.76	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 54.01 - 60.00 PSI	$94.76	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 60.01 - 64.00 PSI	$97.26	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 64.01 - 68.00 PSI	$102.26	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 68.01 - 70.00 PSI	$104.26	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 70.01 - 72.00 PSI	$106.26	7A	4C		View
Skagit	Pile Driver	Hyperbaric Worker - Compressed Air Worker 72.01 -	$108.26	7A	4C		View

		74.00 PSI					
Skagit	Pile Driver	Journey Level	$65.19	7A	4C		View
Skagit	Plasterers	Journey Level	$64.14	7Q	1R		View
Skagit	Plasterers	Nozzleman	$67.64	7Q	1R		View
Skagit	Playground & Park Equipment Installers	Journey Level	$13.69		1		View
Skagit	Plumbers & Pipefitters	Journey Level	$80.97	5A	1G		View
Skagit	Power Equipment Operators	Asphalt Plant Operators	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Assistant Engineer	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Barrier Machine (zipper)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Batch Plant Operator: concrete	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Bobcat	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Brokk - Remote Demolition Equipment	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Brooms	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Bump Cutter	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Cableways	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Chipper	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Compressor	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Concrete Finish Machine - Laser Screed	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Conveyors	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes friction: 200 tons and over	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: 100 tons through 199 tons, or 150' of boom (including jib with attachments)	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: 20 Tons Through 44 Tons With Attachments	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: 300 tons and over or 300' of boom including jib with attachments	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: A-frame - 10 Tons And Under	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Cranes: Friction cranes through	$74.99	7A	3K	8X	View

		199 tons					
Skagit	Power Equipment Operators	Cranes: through 19 tons with attachments, A-frame over 10 tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Crusher	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Deck Engineer/Deck Winches (power)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Derricks, On Building Work	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Dozers D-9 & Under	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Drill Oilers: Auger Type, Truck Or Crane Mount	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Drilling Machine	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Elevator And Man-lift: Permanent And Shaft Type	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Forklift: 3000 Lbs And Over With Attachments	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Forklifts: Under 3000 Lbs. With Attachments	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Gradechecker/Stakeman	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Guardrail Punch	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Horizontal/Directional Drill Locator	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Horizontal/Directional Drill Operator	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Hydralifts/Boom Trucks Over 10 Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Hydralifts/Boom Trucks, 10 Tons And Under	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Loader, Overhead 8 Yards. & Over	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Loaders, Overhead Under 6 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Loaders, Plant Feed	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Loaders: Elevating Type Belt	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Locomotives, All	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Material Transfer Device	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Motor Patrol Graders	$73.49	7A	3K	8X	View

Skagit	Power Equipment Operators	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Outside Hoists (Elevators And Manlifts), Air Tuggers, Strato	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Overhead, Bridge Type: 100 Tons And Over	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Overhead, Bridge Type: 45 Tons Through 99 Tons	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Pavement Breaker	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Pile Driver (other Than Crane Mount)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Plant Oiler - Asphalt, Crusher	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Posthole Digger, Mechanical	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Power Plant	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Pumps - Water	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Quad 9, Hd 41, D10 And Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Remote Control Operator On Rubber Tired Earth Moving Equipment	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Rigger and Bellman	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Rigger/Signal Person, Bellman (Certified)	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Rollagon	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Roller, Other Than Plant Mix	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Roller, Plant Mix Or Multi-lift Materials	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Roto-mill, Roto-grinder	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Saws - Concrete	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Scraper, Self Propelled Under 45 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Scrapers - Concrete & Carry All	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Scrapers, Self-propelled: 45 Yards And Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Service Engineers - Equipment	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Shotcrete/Gunite Equipment	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$72.84	7A	3K	8X	View

Skagit	Power Equipment Operators	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators	Slipform Pavers	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Spreader, Topsider & Screedman	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Subgrader Trimmer	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Tower Bucket Elevators	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Tower Crane Up To 175' In Height Base To Boom	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators	Tower Crane: over 175' through 250' in height, base to boom	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators	Tower Cranes: over 250' in height from base to boom	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators	Transporters, All Track Or Truck Type	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Trenching Machines	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Truck Crane Oiler/driver - 100 Tons And Over	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Truck Crane Oiler/Driver Under 100 Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators	Truck Mount Portable Conveyor	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators	Welder	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators	Wheel Tractors, Farmall Type	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators	Yo Yo Pay Dozer	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Asphalt Plant Operators	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Assistant Engineer	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Barrier Machine (zipper)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Batch Plant Operator, Concrete	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Bobcat	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Brokk - Remote Demolition Equipment	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Brooms	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Bump Cutter	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cableways	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Chipper	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Compressor	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Concrete Finish Machine - Laser Screed	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-	Concrete Pump - Mounted Or	$72.28	7A	3K	8X	View

	Underground Sewer & Water	Trailer High Pressure Line Pump, Pump High Pressure					
Skagit	Power Equipment Operators-Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Conveyors	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes friction: 200 tons and over	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: 100 tons through 199 tons, or 150' of boom (including jib with attachments)	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: 20 Tons Through 44 Tons With Attachments	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: 300 tons and over or 300' of boom including jib with attachments	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: A-frame - 10 Tons And Under	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: Friction cranes through 199 tons	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Cranes: through 19 tons with attachments, A-frame over 10 tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Crusher	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Deck Engineer/Deck Winches (power)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Derricks, On Building Work	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Dozers D-9 & Under	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Drill Oilers: Auger Type, Truck Or Crane Mount	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Drilling Machine	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Elevator And Man-lift: Permanent And Shaft Type	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Forklift: 3000 Lbs And Over With Attachments	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-	Forklifts: Under 3000 Lbs. With	$69.12	7A	3K	8X	View

	Underground Sewer & Water	Attachments					
Skagit	Power Equipment Operators-Underground Sewer & Water	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Gradechecker/Stakeman	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Guardrail Punch	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Horizontal/Directional Drill Locator	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Horizontal/Directional Drill Operator	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Hydralifts/Boom Trucks Over 10 Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Hydralifts/Boom Trucks, 10 Tons And Under	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Loader, Overhead 8 Yards. & Over	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Loaders, Overhead Under 6 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Loaders, Plant Feed	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Loaders: Elevating Type Belt	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Locomotives, All	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Material Transfer Device	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Motor Patrol Graders	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Outside Hoists (Elevators And Manlifts), Air Tuggers, Strato	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Overhead, Bridge Type: 100 Tons And Over	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Overhead, Bridge Type: 45 Tons Through 99 Tons	$73.49	7A	3K	8X	View

Skagit	Power Equipment Operators-Underground Sewer & Water	Pavement Breaker	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Pile Driver (other Than Crane Mount)	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Plant Oiler - Asphalt, Crusher	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Posthole Digger, Mechanical	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Power Plant	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Pumps - Water	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Quad 9, Hd 41, D10 And Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Remote Control Operator On Rubber Tired Earth Moving Equipment	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Rigger and Bellman	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Rigger/Signal Person, Bellman (Certified)	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Rollagon	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Roller, Other Than Plant Mix	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Roller, Plant Mix Or Multi-lift Materials	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Roto-mill, Roto-grinder	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Saws - Concrete	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Scraper, Self Propelled Under 45 Yards	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Scrapers - Concrete & Carry All	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Scrapers, Self-propelled: 45 Yards And Over	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Service Engineers - Equipment	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Shotcrete/Gunite Equipment	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90	$74.22	7A	3K	8X	View

		Metric Tons					
Skagit	Power Equipment Operators-Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Slipform Pavers	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Spreader, Topsider & Screedman	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Subgrader Trimmer	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Tower Bucket Elevators	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Tower Crane Up To 175' In Height Base To Boom	$74.22	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Tower Crane: over 175' through 250' in height, base to boom	$74.99	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Tower Cranes: over 250' in height from base to boom	$75.72	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Transporters, All Track Or Truck Type	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Trenching Machines	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Truck Crane Oiler/driver - 100 Tons And Over	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Truck Crane Oiler/Driver Under 100 Tons	$72.28	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Truck Mount Portable Conveyor	$72.84	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Welder	$73.49	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Wheel Tractors, Farmall Type	$69.12	7A	3K	8X	View
Skagit	Power Equipment Operators-Underground Sewer & Water	Yo Yo Pay Dozer	$72.84	7A	3K	8X	View
Skagit	Power Line Clearance Tree Trimmers	Journey Level In Charge	$55.03	5A	4A		View
Skagit	Power Line Clearance Tree Trimmers	Spray Person	$52.24	5A	4A		View
Skagit	Power Line Clearance Tree Trimmers	Tree Equipment Operator	$55.03	5A	4A		View
Skagit	Power Line Clearance Tree Trimmers	Tree Trimmer	$49.21	5A	4A		View
Skagit	Power Line Clearance Tree Trimmers	Tree Trimmer Groundperson	$37.47	5A	4A		View
Skagit	Refrigeration & Air Conditioning Mechanics	Journey Level	$80.96	5A	1G		View
Skagit	Residential Brick Mason	Journey Level	$32.30		1		View
Skagit	Residential Carpenters	Journey Level	$32.48		1		View
Skagit	Residential Cement Masons	Journey Level	$20.67		1		View
Skagit	Residential Drywall Applicators	Journey Level	$48.17	7A	4C		View
Skagit	Residential Drywall Tapers	Journey Level	$34.10		1		View
Skagit	Residential Electricians	Journey Level	$42.61	7F	1D		View
Skagit	Residential Glaziers	Journey Level	$47.80	7L	1H		View

Skagit	Residential Insulation Applicators	Journey Level	$23.91		1		View
Skagit	Residential Laborers	Journey Level	$23.64		1		View
Skagit	Residential Marble Setters	Journey Level	$32.30		1		View
Skagit	Residential Painters	Journey Level	$24.50		1		View
Skagit	Residential Plumbers & Pipefitters	Journey Level	$80.97	5A	1G		View
Skagit	Residential Refrigeration & Air Conditioning Mechanics	Journey Level	$46.96	5A	1G		View
Skagit	Residential Sheet Metal Workers	Journey Level	$24.60		1		View
Skagit	Residential Soft Floor Layers	Journey Level	$30.31		1		View
Skagit	Residential Sprinkler Fitters (Fire Protection)	Journey Level	$32.87		1		View
Skagit	Residential Stone Masons	Journey Level	$32.30		1		View
Skagit	Residential Terrazzo Workers	Journey Level	$32.30		1		View
Skagit	Residential Terrazzo/Tile Finishers	Journey Level	$35.85		1		View
Skagit	Residential Tile Setters	Journey Level	$32.30		1		View
Skagit	Roofers	Journey Level	$57.30	5A	3H		View
Skagit	Roofers	Using Irritable Bituminous Materials	$60.30	5A	3H		View
Skagit	Sheet Metal Workers	Journey Level (Field or Shop)	$85.05	7F	1E		View
Skagit	Shipbuilding & Ship Repair	New Construction Boilermaker	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Carpenter	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Crane Operator	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Electrician	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Heat & Frost Insulator	$82.02	15H	11C		View
Skagit	Shipbuilding & Ship Repair	New Construction Laborer	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Machinist	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Operating Engineer	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Painter	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Pipefitter	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Rigger	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Sheet Metal	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Shipfitter	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Warehouse/Teamster	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	New Construction Welder / Burner	$39.58	7V	1		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Boilermaker	$47.45	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Carpenter	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Crane Operator	$45.06	7Y	4K		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Electrician	$47.42	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Heat & Frost Insulator	$82.02	15H	11C		View

Skagit	Shipbuilding & Ship Repair	Ship Repair Laborer	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Machinist	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Operating Engineer	$45.06	7Y	4K		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Painter	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Pipefitter	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Rigger	$47.45	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Sheet Metal	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Shipwright	$47.35	7X	4J		View
Skagit	Shipbuilding & Ship Repair	Ship Repair Warehouse / Teamster	$45.06	7Y	4K		View
Skagit	Sign Makers & Installers (Electrical)	Journey Level	$16.03		1		View
Skagit	Sign Makers & Installers (Non-Electrical)	Journey Level	$13.69		1		View
Skagit	Soft Floor Layers	Journey Level	$51.91	5A	3J		View
Skagit	Solar Controls For Windows	Journey Level	$13.69		1		View
Skagit	Sprinkler Fitters (Fire Protection)	Journey Level	$87.99	5C	1X		View
Skagit	Stage Rigging Mechanics (Non Structural)	Journey Level	$13.69		1		View
Skagit	Stone Masons	Journey Level	$63.32	7E	1N		View
Skagit	Street And Parking Lot Sweeper Workers	Journey Level	$15.00		1		View
Skagit	Surveyors	Assistant Construction Site Surveyor	$72.28	7A	3K	8X	View
Skagit	Surveyors	Chainman	$69.12	7A	3K	8X	View
Skagit	Surveyors	Construction Site Surveyor	$73.49	7A	3K	8X	View
Skagit	Telecommunication Technicians	Telecom Technician Journey Level	$47.28	5B	1B		View
Skagit	Telephone Line Construction - Outside	Cable Splicer	$38.27	5A	2B		View
Skagit	Telephone Line Construction - Outside	Hole Digger/Ground Person	$25.66	5A	2B		View
Skagit	Telephone Line Construction - Outside	Telephone Equipment Operator (Light)	$31.96	5A	2B		View
Skagit	Telephone Line Construction - Outside	Telephone Lineperson	$36.17	5A	2B		View
Skagit	Terrazzo Workers	Journey Level	$57.71	7E	1N		View
Skagit	Tile Setters	Journey Level	$57.71	7E	1N		View
Skagit	Tile, Marble & Terrazzo Finishers	Finisher	$48.54	7E	1N		View
Skagit	Traffic Control Stripers	Journey Level	$50.51	7A	1K		View
Skagit	Truck Drivers	Asphalt Mix Over 16 Yards	$63.80	5D	4Y	8L	View
Skagit	Truck Drivers	Asphalt Mix To 16 Yards	$62.96	5D	4Y	8L	View
Skagit	Truck Drivers	Dump Truck	$62.96	5D	4Y	8L	View
Skagit	Truck Drivers	Dump Truck & Trailer	$63.80	5D	4Y	8L	View
Skagit	Truck Drivers	Other Trucks	$63.80	5D	4Y	8L	View
Skagit	Truck Drivers - Ready Mix	Transit Mix	$63.80	5D	4Y	8L	View
Skagit	Well Drillers & Irrigation Pump Installers	Irrigation Pump Installer	$13.69		1		View

Skagit	Well Drillers & Irrigation Pump Installers	Oiler	$13.69		1		View
Skagit	Well Drillers & Irrigation Pump Installers	Well Driller	$13.69		1		View

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Overtime Codes

Overtime calculations are based on the hourly rate actually paid to the worker. On public works projects, the hourly rate must be not less than the prevailing rate of wage minus the hourly rate of the cost of fringe benefits actually provided for the worker.

1. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

C. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

D. The first two (2) hours before or after a five-eight (8) hour workweek day or a four-ten (10) hour workweek day and the first eight (8) hours worked the next day after either workweek shall be paid at one and one-half times the hourly rate of wage. All additional hours worked and all worked on Sundays and holidays shall be paid at double the hourly rate of wage.

E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.

G. The first ten (10) hours worked on Saturdays and the first ten (10) hours worked on a fifth calendar weekday in a four-ten hour schedule, shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

H. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions or equipment breakdown) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

I. All hours worked on Sundays and holidays shall also be paid at double the hourly rate of wage.

J. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage.

K. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

M. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

N. All hours worked on Saturdays (except makeup days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

1. O. The first ten (10) hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays, holidays and after twelve (12) hours, Monday through Friday and after ten (10) hours on Saturday shall be paid at double the hourly rate of wage.

P. All hours worked on Saturdays (except makeup days if circumstances warrant) and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

Q. The first two (2) hours after eight (8) regular hours Monday through Friday and up to ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays (except Christmas day) shall be paid at double the hourly rate of wage. All hours worked on Christmas day shall be paid at two and one-half times the hourly rate of wage.

R. All hours worked on Sundays and holidays shall be paid at two times the hourly rate of wage.

U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays (except Labor Day) shall be paid at two times the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.

V. All hours worked on Sundays and holidays (except Thanksgiving Day and Christmas day) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Thanksgiving Day and Christmas day shall be paid at double the hourly rate of wage.

W. All hours worked on Saturdays and Sundays (except make-up days due to conditions beyond the control of the employer)) shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

X. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage. When holiday falls on Saturday or Sunday, the day before Saturday, Friday, and the day after Sunday, Monday, shall be considered the holiday and all work performed shall be paid at double the hourly rate of wage.

Y. All hours worked outside the hours of 5:00 am and 5:00 pm (or such other hours as may be agreed upon by any employer and the employee) and all hours worked in excess of eight (8) hours per day (10 hours per day for a 4 x 10 workweek) and on Saturdays and holidays (except labor day) shall be paid at one and one-half times the hourly rate of wage. (except for employees who are absent from work without prior approval on a scheduled workday during the workweek shall be paid at the straight-time rate until they have worked 8 hours in a day (10 in a 4 x 10 workweek) or 40 hours during that workweek.) All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and Labor Day shall be paid at double the hourly rate of wage.

Z. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid the straight time rate of pay in addition to holiday pay.

Overtime Codes Continued

2. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   B. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.

   F. The first eight (8) hours worked on holidays shall be paid at the straight hourly rate of wage in addition to the holiday pay. All hours worked in excess of eight (8) hours on holidays shall be paid at double the hourly rate of wage.

   M. This code appears to be missing. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.

   O. All hours worked on Sundays and holidays shall be paid at one and one-half times the hourly rate of wage.

   R. All hours worked on Sundays and holidays and all hours worked over sixty (60) in one week shall be paid at double the hourly rate of wage.

   U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked over 12 hours in a day or on Sundays and holidays shall be paid at double the hourly rate of wage.

3. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   F. All hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.

   H. All work performed on Sundays between March 16th and October 14th and all Holidays shall be compensated for at two (2) times the regular rate of pay. Work performed on Sundays between October 15th and March 15th shall be compensated at one and one half (1-1/2) times the regular rate of pay.

   J. All hours worked between the hours of 10:00 pm and 5:00 am, Monday through Friday, and all hours worked on Saturdays shall be paid at a one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

   K. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

   After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more. When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the eight (8) hours rest period.

4. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   A. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

4. C. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay. On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay. All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.

D. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturday, Sundays and holidays shall be paid at double the hourly rate of pay. Rates include all members of the assigned crew.

EXCEPTION:
On all multipole structures and steel transmission lines, switching stations, regulating, capacitor stations, generating plants, industrial plants, associated installations and substations, except those substations whose primary function is to feed a distribution system, will be paid overtime under the following rates:

The first two (2) hours after eight (8) regular hours Monday through Friday of overtime on a regular workday, shall be paid at one and one-half times the hourly rate of wage. All hours in excess of ten (10) hours will be at two (2) times the hourly rate of wage. The first eight (8) hours worked on Saturday will be paid at one and one-half (1-1/2) times the hourly rate of wage. All hours worked in excess of eight (8) hours on Saturday, and all hours worked on Sundays and holidays will be at the double the hourly rate of wage.

All overtime eligible hours performed on the above described work that is energized, shall be paid at the double the hourly rate of wage.

E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one and one half (1½) times the regular shift rate for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

G. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

I. The First eight (8) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) per day on Saturdays shall be paid at double the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

4. J. The first eight (8) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) hours on a Saturday shall be paid at double the hourly rate of wage. All hours worked over twelve (12) in a day, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.

K. All hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage, so long as Saturday is the sixth consecutive day worked. All hours worked over twelve (12) in a day Monday through Saturday, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.

L. The first twelve (12) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on a Saturday in excess of twelve (12) hours shall be paid at double the hourly rate of pay. All hours worked over twelve (12) in a day Monday through Friday, and all hours worked on Sundays shall be paid at double the hourly rate of wage. All hours worked on a holiday shall be paid at one and one-half times the hourly rate of wage, except that all hours worked on Labor Day shall be paid at double the hourly rate of pay.

U. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. (Except on makeup days if work is lost due to inclement weather, then the first eight (8) hours on Saturday may be paid the regular rate.) All hours worked over twelve (12) hours Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

V. Work performed in excess of ten (10) hours of straight time per day when four ten (10) hour shifts are established or outside the normal shift (5 am to 6pm), and all work on Saturdays, except for make-up days shall be paid at time and one-half (1 ½) the straight time rate.

In the event the job is down due to weather conditions, then Saturday may, be worked as a voluntary make-up day at the straight time rate. However, Saturday shall not be utilized as a make-up day when a holiday falls on Friday. All work performed on Sundays and holidays and work in excess of twelve (12) hours per day shall be paid at double (2x) the straight time rate of pay.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

When an employee returns to work without a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

W. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

Overtime Codes Continued

4. X. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage. Work performed outside the normal shift of 6 am to 6pm shall be paid at one and one-half the straight time rate, (except for special shifts or three shift operations). All work performed on Sundays and holidays shall be paid at double the hourly rate of wage. Shifts may be established when considered necessary by the Employer.

   The Employer may establish shifts consisting of eight (8) or ten (10) hours of work (subject to WAC 296-127-022), that shall constitute a normal forty (40) hour work week. The Employer can change from a 5-eight to a 4-ten hour schedule or back to the other. All hours of work on these shifts shall be paid for at the straight time hourly rate. Work performed in excess of eight hours (or ten hours per day (subject to WAC 296-127-022) shall be paid at one and one-half the straight time rate.

   When due to conditions beyond the control of the Employer, or when contract specifications require that work can only be performed outside the regular day shift, then by mutual agreement a special shift may be worked at the straight time rate, eight (8) hours work for eight (8) hours pay. The starting time shall be arranged to fit such conditions of work.

   When an employee returns to work without at a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

   Y. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at time and one-half the straight time rate. All work performed after 6:00 pm Saturday to 6:00 am Monday and holidays shall be paid at double the straight time rate of pay.

   Any shift starting between the hours of 6:00 pm and midnight shall receive an additional one dollar ($1.00) per hour for all hours worked that shift.

   After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

   Z. All hours worked between the hours of 6:00 pm and 6:00 am, Monday through Saturday, shall be paid at a premium rate of 20% over the hourly rate of wage. Work performed on Sundays may be paid at double time. All hours worked on holidays shall be paid at double the hourly rate of wage.

11. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   B After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

   C The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, and all hours on Sunday shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage. All non-overtime and non-holiday hours worked between 4:00 pm and 5:00 am, Monday through Friday, shall be paid at a premium rate of 15% over the hourly rate of wage.

D. All hours worked on Saturdays and holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

E. The first two (2) hours after eight (8) regular hours Monday through Friday, the first ten (10) hours on Saturday, and the first ten (10) hours worked on Holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, and Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

Holiday Codes

5. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, and Christmas Day (7).

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, the day before Christmas, and Christmas Day (8).

C. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

D. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8).

H. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Day after Thanksgiving Day, And Christmas (6).

I. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).

J. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, And Christmas Day (7).

K. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9).

L. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (8).

N. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, The Friday After Thanksgiving Day, And Christmas Day (9).

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday And Saturday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9). If A Holiday Falls On Sunday, The Following Monday Shall Be Considered As A Holiday.

Q. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).

Holiday Codes Continued

R. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day After Thanksgiving Day, One-Half Day Before Christmas Day, And Christmas Day. (7 1/2).

S. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, And Christmas Day (7).

Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

6. G. Paid Holidays: New Year's Day, Martin Luther King Jr. Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Christmas Eve Day (11).

H. Paid Holidays: New Year's Day, New Year's Eve Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, Christmas Day, The Day After Christmas, And A Floating Holiday (10).

T. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Last Working Day Before Christmas Day, And Christmas Day (9).

Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). If a holiday falls on Saturday, the preceding Friday shall be considered as the holiday. If a holiday falls on Sunday, the following Monday shall be considered as the holiday.

7. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any Holiday Which Falls On A Sunday Shall Be Observed As A Holiday On The Following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

C. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

D. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Unpaid Holidays: President's Day. Any paid holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any paid holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

E. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

Holiday Codes Continued

7. F. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas day and Christmas day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

G. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

V. Holidays: New Year's Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the day before or after Christmas, and the day before or after New Year's Day. If any of the above listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

Holiday Codes Continued

7. W. Holidays: New Year's Day, Day After New Year's, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day, Christmas Day, the day after Christmas, the day before New Year's Day, and a Floating Holiday.

X. Holidays: New Year's Day, Day before or after New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day before or after Christmas day. If a holiday falls on a Saturday or on a Friday that is the normal day off, then the holiday will be taken on the last normal workday. If the holiday falls on a Monday that is the normal day off or on a Sunday, then the holiday will be taken on the next normal workday.

Y. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. (8) If the holiday falls on a Sunday, then the day observed by the federal government shall be considered a holiday and compensated accordingly.

G. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, the last scheduled workday before Christmas, and Christmas Day (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Holiday Codes Continued

7. Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

V. Holidays: New Year's Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the day before or after Christmas, and the day before or after New Year's Day. If any of the above listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

W. Holidays: New Year's Day, Day After New Year's, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day, Christmas Day, the day after Christmas, the day before New Year's Day, and a Floating Holiday.

X. Holidays: New Year's Day, Day before or after New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day before or after Christmas day. If a holiday falls on a Saturday or on a Friday that is the normal day off, then the holiday will be taken on the last normal workday. If the holiday falls on a Monday that is the normal day off or on a Sunday, then the holiday will be taken on the next normal workday.

Y. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. (8) If the holiday falls on a Sunday, then the day observed by the federal government shall be considered a holiday and compensated accordingly.

15. G. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, the last scheduled workday before Christmas, and Christmas Day (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

H. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, and Christmas Day (8). When the following holidays fall on a Saturday (New Year's Day, Independence Day, and Christmas Day) the preceding Friday will be considered as the holiday; should they fall on a Sunday, the following Monday shall be considered as the holiday.

I. Holidays: New Year's Day, President's Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the last regular workday before Christmas (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Note Codes

8. D. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

L. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $0.75, Level B: $0.50, And Level C: $0.25.

M. Workers on hazmat projects receive additional hourly premiums as follows: Levels A & B: $1.00, Levels C & D: $0.50.

N. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $1.00, Level B: $0.75, Level C: $0.50, And Level D: $0.25.

S. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

T. Effective August 31, 2012 – A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

U. Workers on hazmat projects receive additional hourly premiums as follows – Class A Suit: $2.00, Class B Suit: $1.50, And Class C Suit: $1.00. Workers performing underground work receive an additional $0.40 per hour for any and all work performed underground, including operating, servicing and repairing of equipment. The premium for underground work shall be paid for the entire shift worked. Workers who work suspended by a rope or cable receive an additional $0.50 per hour. The premium for work suspended shall be paid for the entire shift worked. Workers who do “pioneer” work (break open a cut, build road, etc.) more than one hundred fifty (150) feet above grade elevation receive an additional $0.50 per hour.

V. In addition to the hourly wage and fringe benefits, the following depth and enclosure premiums shall be paid. The premiums are to be calculated for the maximum depth and distance into an enclosure that a diver reaches in a day. The premiums are to be paid one time for the day and are not used in calculating overtime pay.

Depth premiums apply to depths of fifty feet or more. Over 50' to 100' - $2.00 per foot for each foot over 50 feet. Over 101' to 150' - $3.00 per foot for each foot over 101 feet. Over 151' to 220' - $4.00 per foot for each foot over 220 feet. Over 221' - $5.00 per foot for each foot over 221 feet.

Enclosure premiums apply when divers enter enclosures (such as pipes or tunnels) where there is no vertical ascent and is measured by the distance travelled from the entrance. 25’ to 300’ - $1.00 per foot from entrance. 300’ to 600’ - $1.50 per foot beginning at 300’. Over 600’ - $2.00 per foot beginning at 600’.

W. Meter Installers work on single phase 120/240V self-contained residential meters. The Lineman/Groundmen rates would apply to meters not fitting this description.

Note Codes Continued

8. X. Workers on hazmat projects receive additional hourly premiums as follows - Class A Suit: $2.00, Class B Suit: $1.50, Class C Suit: $1.00, and Class D Suit: $0.50. Special Shift Premium: Basic hourly rate plus $2.00 per hour.

When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications requires that work can only be performed outside the normal 5 am to 6pm shift, then the special shift premium will be applied to the basic hourly rate. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in OT or Double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay.

Swinging Stage/Boatswains Chair: Employees working on a swinging state or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

Z. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

Special Shift Premium: Basic hourly rate plus $2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as a contractor), a government agency or the contract specifications require that more than (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they will be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

9. A. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

Special Shift Premium: Basic hourly rate plus $2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications require that more than four (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Certified Crane Operator Premium: Crane operators requiring certifications shall be paid $0.50 per hour above their classification rate.

Boom Pay Premium: All cranes including tower shall be paid as follows based on boom length:

(A) – 130’ to 199’ – $0.50 per hour over their classification rate.
(B) – 200’ to 299’ – $0.80 per hour over their classification rate.
(C) – 300’ and over – $1.00 per hour over their classification rate.

Note Codes Continued

9. B. The highest pressure registered on the gauge for an accumulated time of more than fifteen (15) minutes during the shift shall be used in determining the scale paid.

Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

C. Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. These classifications are only effective on or after August 31, 2012.

D. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, bridges, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.

E. Heavy Construction includes construction, repair, alteration or additions to the production, fabrication or manufacturing portions of industrial or manufacturing plants, hydroelectric or nuclear power plants and atomic reactor construction. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $1.00, Level B: $0.75, Level C: $0.50, And Level D: $0.25.

F. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.

Washington State Department of Labor and Industries
Policy Statement
(Regarding the Production of "Standard" or "Non-standard" Items)

Below is the department's (State L&I's) list of criteria to be used in determining whether a prefabricated item is "standard" or "non-standard". For items not appearing on WSDOT's predetermined list, these criteria shall be used by the Contractor (and the Contractor's subcontractors, agents to subcontractors, suppliers, manufacturers, and fabricators) to determine coverage under RCW 39.12. The production, in the State of Washington, of non-standard items is covered by RCW 39.12, and the production of standard items is not. The production of any item outside the State of Washington is not covered by RCW 39.12.

1. Is the item fabricated for a public works project? If not, it is not subject to RCW 39.12. If it is, go to question 2.

2. Is the item fabricated on the public works jobsite? If it is, the work is covered under RCW 39.12. If not, go to question 3.

3. Is the item fabricated in an assembly/fabrication plant set up for, and dedicated primarily to, the public works project? If it is, the work is covered by RCW 39.12. If not, go to question 4.

4. Does the item require any assembly, cutting, modification or other fabrication by the supplier? If not, the work is not covered by RCW 39.12. If yes, go to question 5.

5. Is the prefabricated item intended for the public works project typically an inventory item which could reasonably be sold on the general market? If not, the work is covered by RCW 39.12. If yes, go to question 6.

6. Does the specific prefabricated item, generally defined as standard, have any unusual characteristics such as shape, type of material, strength requirements, finish, etc? If yes, the work is covered under RCW 39.12.

Any firm with questions regarding the policy, WSDOT's Predetermined List, or for determinations of covered and non-covered workers shall be directed to State L&I at (360) 902-5330.

WSDOT's
Predetermined List for
Suppliers - Manufactures - Fabricator

Below is a list of potentially prefabricated items, originally furnished by WSDOT to Washington State Department of Labor and Industries, that may be considered non-standard and therefore covered by the prevailing wage law, RCW 39.12. Items marked with an X in the "YES" column should be considered to be non-standard and therefore covered by RCW 39.12. Items marked with an X in the "NO" column should be considered to be standard and therefore not covered. Of course, exceptions to this general list may occur, and in that case shall be evaluated according to the criteria described in State and L&I's policy statement.

	ITEM DESCRIPTION	YES	NO
1.	Metal rectangular frames, solid metal covers, herringbone grates, and bi-directional vaned grates for Catch Basin Types 1, 1L, 1P, and 2 and Concrete Inlets. See Std. Plans		X
2.	Metal circular frames (rings) and covers, circular grates, and prefabricated ladders for Manhole Types 1, 2, and 3, Drywell Types 1, 2, and 3 and Catch Basin Type 2. See Std. Plans		X
3.	Prefabricated steel grate supports and welded grates, metal frames and dual vaned grates, and Type 1, 2, and 3 structural tubing grates for Drop Inlets. See Std. Plans.		X
4.	Concrete Pipe - Plain Concrete pipe and reinforced concrete pipe Class 2 to 5 sizes smaller than 60 inch diameter.		X
5.	Concrete Pipe - Plain Concrete pipe and reinforced concrete pipe Class 2 to 5 sizes larger than 60 inch diameter.		X
6.	Corrugated Steel Pipe - Steel lock seam corrugated pipe for culverts and storm sewers, sizes 30 inch to 120 inches in diameter. May also be treated, 1 thru 5.		X
7.	Corrugated Aluminum Pipe - Aluminum lock seam corrugated pipe for culverts and storm sewers, sizes 30 inch to 120 inches in diameter. May also be treated, #5.		X

	ITEM DESCRIPTION	YES	NO
8.	Anchor Bolts & Nuts - Anchor Bolts and Nuts, for mounting sign structures, luminaries and other items, shall be made from commercial bolt stock. See Contract Plans and Std. Plans for size and material type.		X
9.	Aluminum Pedestrian Handrail - Pedestrian handrail conforming to the type and material specifications set forth in the contract plans. Welding of aluminum shall be in accordance with Section 9-28.14(3).	X	
10.	Major Structural Steel Fabrication - Fabrication of major steel items such as trusses, beams, girders, etc., for bridges.	X	
11.	Minor Structural Steel Fabrication - Fabrication of minor steel Items such as special hangers, brackets, access doors for structures, access ladders for irrigation boxes, bridge expansion joint systems, etc., involving welding, cutting, punching and/or boring of holes. See Contact Plans for item description and shop drawings.	X	
12.	Aluminum Bridge Railing Type BP - Metal bridge railing conforming to the type and material specifications set forth in the Contract Plans. Welding of aluminum shall be in accordance with Section 9-28.14(3).		X
13.	Concrete Piling--Precast-Prestressed concrete piling for use as 55 and 70 ton concrete piling. Concrete to conform to Section 9-19.1 of Std. Spec..	X	
14.	Precast Manhole Types 1, 2, and 3 with cones, adjustment sections and flat top slabs. See Std. Plans.		X
15.	Precast Drywell Types 1, 2, and with cones and adjustment Sections. See Std. Plans.		X
16.	Precast Catch Basin - Catch Basin type 1, 1L, 1P, and 2 With adjustment sections. See Std. Plans.		X

	ITEM DESCRIPTION	YES	NO
17.	Precast Concrete Inlet - with adjustment sections, See Std. Plans		X
18.	Precast Drop Inlet Type 1 and 2 with metal grate supports. See Std. Plans.		X
19.	Precast Grate Inlet Type 2 with extension and top units. See Std. Plans		X
20.	Metal frames, vaned grates, and hoods for Combination Inlets. See Std. Plans		X
21.	Precast Concrete Utility Vaults - Precast Concrete utility vaults of various sizes. Used for in ground storage of utility facilities and controls. See Contract Plans for size and construction requirements. Shop drawings are to be provided for approval prior to casting		X
22.	Vault Risers - For use with Valve Vaults and Utilities X Vaults.		X
23.	Valve Vault - For use with underground utilities. See Contract Plans for details.		X
24.	Precast Concrete Barrier - Precast Concrete Barrier for use as new barrier or may also be used as Temporary Concrete Barrier. Only new state approved barrier may be used as permanent barrier.		X
25.	Reinforced Earth Wall Panels – Reinforced Earth Wall Panels in size and shape as shown in the Plans. Fabrication plant has annual approval for methods and materials to be used. See Shop Drawing. Fabrication at other locations may be approved, after facilities inspection, contact HQ. Lab.	X	
26.	Precast Concrete Walls - Precast Concrete Walls - tilt-up wall panel in size and shape as shown in Plans. Fabrication plant has annual approval for methods and materials to be used	X	

	ITEM DESCRIPTION	YES	NO
27.	Precast Railroad Crossings - Concrete Crossing Structure Slabs.	X	
28.	12, 18 and 26 inch Standard Precast Prestressed Girder – Standard Precast Prestressed Girder for use in structures. Fabricator plant has annual approval of methods and materials to be used. Shop Drawing to be provided for approval prior to casting girders. See Std. Spec. Section 6-02.3(25)A	X	
29.	Prestressed Concrete Girder Series 4-14 - Prestressed Concrete Girders for use in structures. Fabricator plant has annual approval of methods and materials to be used. Shop Drawing to be provided for approval prior to casting girders. See Std. Spec. Section 6-02.3(25)A .	X	
30.	Prestressed Tri-Beam Girder - Prestressed Tri-Beam Girders for use in structures. Fabricator plant has annual approval of methods and materials to be used. Shop Drawing to be provided for approval prior to casting girders. See Std. Spec. Section 6-02.3(25)A	X	
31.	Prestressed Precast Hollow-Core Slab – Precast Prestressed Hollow-core slab for use in structures. Fabricator plant has annual approval of methods and materials to be used. Shop Drawing to be provided for approval prior to casting girders. See Std. Spec. Section 6-02.3(25)A.	X	
32.	Prestressed-Bulb Tee Girder - Bulb Tee Prestressed Girder for use in structures. Fabricator plant has annual approval of methods and materials to be used. Shop Drawing to be provided for approval prior to casting girders. See Std. Spec. Section 6-02.3(25)A	X	
33.	Monument Case and Cover See Std. Plan.		X

	ITEM DESCRIPTION	YES	NO
34.	Cantilever Sign Structure - Cantilever Sign Structure fabricated from steel tubing meeting AASHTO-M-183. See Std. Plans, and Contract Plans for details. The steel structure shall be galvanized after fabrication in accordance with AASHTO-M-111.	X	
35.	Mono-tube Sign Structures - Mono-tube Sign Bridge fabricated to details shown in the Plans. Shop drawings for approval are required prior to fabrication.	X	
36.	Steel Sign Bridges - Steel Sign Bridges fabricated from steel tubing meeting AASHTO-M-138 for Aluminum Alloys. See Std. Plans, and Contract Plans for details. The steel structure shall be galvanized after fabrication in accordance with AASHTO-M-111.	X	
37.	Steel Sign Post - Fabricated Steel Sign Posts as detailed in Std Plans. Shop drawings for approval are to be provided prior to fabrication		X
38.	Light Standard-Prestressed - Spun, prestressed, hollow concrete poles.	X	
39.	Light Standards - Lighting Standards for use on highway illumination systems, poles to be fabricated to conform with methods and materials as specified on Std. Plans. See Specia Provisions for pre-approved drawings.	X	
40.	Traffic Signal Standards - Traffic Signal Standards for use on highway and/or street signal systems. Standards to be fabricated to conform with methods and material as specified on Std. Plans. See Special Provisions for pre-approved drawings	X	
41.	Precast Concrete Sloped Mountable Curb (Single and DualFaced) See Std. Plans.		X

	ITEM DESCRIPTION	YES	NO
42.	Traffic Signs - Prior to approval of a Fabricator of Traffic Signs, the sources of the following materials must be submitted and approved for reflective sheeting, legend material, and aluminum sheeting. **NOTE:** *** Fabrication inspection required. Only signs tagged "Fabrication Approved" by WSDOT Sign Fabrication Inspector to be installed	X	X
		Custom Message	Std Signing Message
43.	Cutting & bending reinforcing steel		X
44.	Guardrail components	X	X
		Custom End Sec	Standard Sec
45.	Aggregates/Concrete mixes	Covered by WAC 296-127-018	
46.	Asphalt	Covered by WAC 296-127-018	
47.	Fiber fabrics		X
48.	Electrical wiring/components		X
49.	treated or untreated timber pile		X
50.	Girder pads (elastomeric bearing)	X	
51.	Standard Dimension lumber		X
52.	Irrigation components		X

ITEM DESCRIPTION	YES	NO
53. Fencing materials		X
54. Guide Posts		X
55. Traffic Buttons		X
56. Epoxy		X
57. Cribbing		X
58. Water distribution materials		X
59. Steel "H" piles		X
60. Steel pipe for concrete pile casings		X
61. Steel pile tips, standard		X
62. Steel pile tips, custom	X	

Prefabricated items specifically produced for public works projects that are prefabricated in a county other than the county wherein the public works project is to be completed, the wage for the offsite prefabrication shall be the applicable prevailing wage for the county in which the actual prefabrication takes place.

It is the manufacturer of the prefabricated product to verify that the correct county wage rates are applied to work they perform.

See RCW 39.12.010
(The definition of "locality" in RCW 39.12.010(2) contains the phrase "wherein the physical work is being performed." The department interprets this phrase to mean the actual work site.

WSDOT's List of State Occupations not applicable to Heavy and Highway Construction Projects

This project is subject to the state hourly minimum rates for wages and fringe benefits in the contract provisions, as provided by the state Department of Labor and Industries.
The following list of occupations, is comprised of those occupations that are not normally used in the construction of heavy and highway projects.
When considering job classifications for use and / or payment when bidding on, or building heavy and highway construction projects for, or administered by WSDOT, these Occupations will be excepted from the included "Washington State Prevailing Wage Rates For Public Work Contracts" documents.

- Building Service Employees
- Electrical Fixture Maintenance Workers
- Electricians - Motor Shop
- Heating Equipment Mechanics
- Industrial Engine and Machine Mechanics
- Industrial Power Vacuum Cleaners
- Inspection, Cleaning, Sealing of Water Systems by Remote Control
- Laborers - Underground Sewer & Water
- Machinists (Hydroelectric Site Work)
- Modular Buildings
- Playground & Park Equipment Installers
- Power Equipment Operators - Underground Sewer & Water
- Residential *** ALL ASSOCIATED RATES ***
- Sign Makers and Installers (Non-Electrical)
- Sign Makers and Installers (Electrical)
- Stage Rigging Mechanics (Non Structural)

The following occupations may be used only as outlined in the preceding text concerning "WSDOT's list for Suppliers - Manufacturers - Fabricators"

- Fabricated Precast Concrete Products
- Metal Fabrication (In Shop)

Definitions for the Scope of Work for prevailing wages may be found at the Washington State Department of Labor and Industries web site and in WAC Chapter 296-127.

Washington State Department of Labor and Industries
Policy Statements
(Regarding Production and Delivery of Gravel, Concrete, Asphalt, etc.)

WAC 296-127-018 Agency filings affecting this section

Coverage and exemptions of workers involved in the production and delivery of gravel, concrete, asphalt, or similar materials.

(1) The materials covered under this section include but are not limited to: Sand, gravel, crushed rock, concrete, asphalt, or other similar materials.

(2) All workers, regardless of by whom employed, are subject to the provisions of chapter 39.12 RCW when they perform any or all of the following functions:

(a) They deliver or discharge any of the above-listed materials to a public works project site:

(i) At one or more point(s) directly upon the location where the material will be incorporated into the project; or

(ii) At multiple points at the project; or

(iii) Adjacent to the location and coordinated with the incorporation of those materials.

(b) They wait at or near a public works project site to perform any tasks subject to this section of the rule.

(c) They remove any materials from a public works construction site pursuant to contract requirements or specifications (e.g., excavated materials, materials from demolished structures, clean-up materials, etc.).

(d) They work in a materials production facility (e.g., batch plant, borrow pit, rock quarry, etc.,) which is established for a public works project for the specific, but not necessarily exclusive, purpose of supplying materials for the project.

(e) They deliver concrete to a public works site regardless of the method of incorporation.

(f) They assist or participate in the incorporation of any materials into the public works project.

(3) All travel time that relates to the work covered under subsection (2) of this section requires the payment of prevailing wages. Travel time includes time spent waiting to load, loading, transporting, waiting to unload, and delivering materials. Travel time would include all time spent in travel in support of a public works project whether the vehicle is empty or full. For example, travel time spent returning to a supply source to obtain another load of material for use on a public works site or returning to the public works site to obtain another load of excavated material is time spent in travel that is subject to prevailing wage. Travel to a supply source, including travel from a public works site, to obtain materials for use on a private project would not be travel subject to the prevailing wage.

(4) Workers are not subject to the provisions of chapter 39.12 RCW when they deliver materials to a stockpile.

(a) A "stockpile" is defined as materials delivered to a pile located away from the site of incorporation such that the stockpiled materials must be physically moved from the stockpile and transported to another location on the project site in order to be incorporated into the project.

(b) A stockpile does not include any of the functions described in subsection (2)(a) through (f) of this section; nor does a stockpile include materials delivered or distributed to multiple locations upon the project site; nor does a stockpile include materials dumped at the place of incorporation, or adjacent to the location and coordinated with the incorporation.

(5) The applicable prevailing wage rate shall be determined by the locality in which the work is performed. Workers subject to subsection (2)(d) of this section, who produce such materials at an off-site facility shall be paid the applicable prevailing wage rates for the county in which the off-site facility is located. Workers subject to subsection (2) of this section, who deliver such materials to a public works project site shall be paid the applicable prevailing wage rates for the county in which the public works project is located.

[Statutory Authority: Chapter 39.12 RCW, RCW 43.22.051 and 43.22.270. 08-24-101, § 296-127-018, filed 12/2/08, effective 1/2/09. Statutory Authority: Chapters 39.04 and 39.12 RCW and RCW 43.22.270. 92-01-104 and 92-08-101, § 296-127-018, filed 12/18/91 and 4/1/92, effective 8/31/92.]

APPENDIX C

Construction Contract and Contract Bond-Informational Only

CONSTRUCTION CONTRACT AGREEMENT

THIS AGREEMENT, effective upon the date of mutual execution, is made and entered into between Skagit County, Washington, and _____, hereinafter called the Contractor.

WITNESSETH:
That in consideration of the terms and conditions contained herein and attached and made a part of this agreement, the parties hereto covenant and agree as follows:

I. The Contractor shall do all work and furnish all tools, materials, equipment, and transportation required for the construction of **Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229** in accordance with and as described in the attached plans and specifications and the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction M 41-10 2021 edition*, which are by this reference incorporated herein and made a part hereof, and shall perform any changes to the work in accord with the Contract Documents.

II. The Contractor shall provide and bear the expense of all equipment, work, and labor of any sort whatsoever that may be required for the transfer of materials and for constructing and completing the work provided for in this contract and every part thereof and shall guarantee said materials and work for a period of one year after substantial completion of this contract, except as may be modified by the plans, specifications and/or contract documents.

III. Skagit County, Washington, hereby promises and agrees with the Contractor to retain and does retain the Contractor to provide the materials and to do and cause to be done the above-described work and to complete and finish the same according to the attached plans and specifications and the terms and conditions herein contained, and hereby contracts to pay for the same according to the attached specifications and the schedule of prices bid and hereto attached, at the time and in the manner and upon the conditions provided for in this contract.

IV. The Contractor for himself/herself, and for his/her heirs, executors, administrators, successors, and assigns, does hereby agree to full performance of all covenants required of the Contractor in the contract.

V. It is further provided that no liability shall attach to Skagit County by reason of entering into this contract, except as provided herein.

IN WITNESS WHEREOF the Contractor has executed this instrument on the day and year first below written, and the Authorized Official has caused this instrument to be executed by and in the name of Skagit County the day and year first above written.

CONTRACTOR

Signature _____ Mailing Address:

Printed _____

Title _____

Date _____ Telephone No. (___) ____-____

DATED this _____ day of _____, 2021.

BOARD OF COUNTY COMMISSIONERS
SKAGIT COUNTY, WASHINGTON

_____
Lisa Janicki, Chair

_____
Peter Browning, Commissioner

_____
Ron Wesen, Commissioner

Attest:

_____
Clerk of the Board

For contracts under $5,000:
Authorization per Resolution R20030146

_____
County Administrator

Recommended:

_____
Department Head

Approved as to form:

_____
Civil Deputy Prosecuting Attorney

Approved as to indemnification:

_____
Risk Manager

Approved as to budget:

_____
Budget & Finance Director

CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS, that Skagit County, a Municipal Corporation of Washington, has awarded _____ of _____, as Principal, and _____as Surety, are jointly and severally held and bound unto the County of Skagit in the penal sum of _____ ($_____), dollars, for the payment of which we jointly and severely bind ourselves, our heirs, executors, administrators, and assigns, and successors and assigns, firmly by these presents.

THE CONDITION of this bond is such that whereas, on the _____ day of _____ A.D., 2021, the said Principal, herein, executed a certain contract with the County of Skagit by the items, conditions and provisions of which contract the said _____, Principal, herein agree to furnish all material and do certain work, to wit: That _____ will undertake and complete the construction of

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT #WA402229

according to the maps, plans and specifications made a part of said contract, which contract as so executed, is hereunto attached, is now referred to and by reference is incorporated herein and made a part hereof as fully for all purposes as if here set forth at length. The bond shall cover all approved change orders as if they were in the original contract.

NOW, THEREFORE, if the Principal herein shall faithfully and truly observe and comply with the terms, conditions and provisions of said contract in all respects and shall well and truly and fully do and perform all matters and things by _____ (principal) undertaken to be performed under said contract, upon the terms proposed therein, and within the time prescribed therein, and until the same is accepted, and shall pay all laborers, mechanics, subcontractors and material men, and all persons who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work, and shall in all respects faithfully

perform said contract according to law, then this obligation to be void, otherwise to remain in full force and effect.

WITNESS our hands this _____ day of _____, 2021.

_____

_____

_____
(Principal)

_____

_____

_____
Attorney-in-Fact, Surety

_____
Name and Address
Local Office of Agent

APPROVED AS TO FORM
RICH WEYRICH
Skagit County Prosecuting Attorney

APPROVED AS TO FORM
BONNIE HALEY
Skagit County Risk Manager

BY: _____
Approving Authority

DATE: _____, 2021

_____
SURETY BOND NUMBER

_____

_____
CONTRACT NUMBER

_____

APPENDIX D

Proposal Forms-Informational Only

Proposal for Bidding Purposes

For Construction of:

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT #WA402229 SRFB Project No. 18-1490R

SKAGIT COUNTY PUBLIC WORKS DEPARTMENT

SKAGIT COUNTY
Public Works Department
1800 Continental Place
Mount Vernon, WA 98273

PROPOSAL FOR BIDDING PURPOSES

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT

Skagit County Project #WA402229
SRFB Project No. 18-1490R

All bid envelopes must be plainly marked on the outside, **"Sealed Bid, Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229**

Sealed Bids will be received at the following location before the specified time:

Bids may be hand delivered to: The Reception Desk of Skagit County Commissioners Office, located at 1800 Continental Place, Mount Vernon, WA.

Bids may be mailed to: Skagit County Commissioners
1800 Continental Place, Suite 100
Mount Vernon, Washington, 98273

The bid opening date for this project will be **Monday, October 18, 2021.** The bids will be publicly opened and read after **2:45 p.m.** on this date.

Bid Advertisement:

Skagit Valley Herald and Daily Journal of Commerce–September 30 and October 7, 2021

ENTIRE PROPOSAL TO BE RETURNED AS YOUR BID PACKAGE

FAILURE TO SIGN OR COMPLETE ALL INFORMATION ON THE FORMS PROVIDED CAN RESULT IN REJECTION OF THE PROPOSAL AS NON-RESPONSIVE

PROPOSAL

BOARD OF SKAGIT COUNTY COMMISSIONERS
MOUNT VERNON, WASHINGTON 98273

Attention:

This certifies that the undersigned has examined the locations of:

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT #WA402229

and that the plans, specifications and contract governing the work embraced in this improvement, and the method by which payment will be made for said work is understood. The undersigned hereby proposes to undertake and complete the work embraced in this improvement, or as much thereof as can be completed with the money available in accordance with the said plans, specifications, and contract, and the following schedule of rates and prices:

Note: For work performed on this project the contractor should refer to Section 1-07.2(1) of the contract provisions and Department of Revenue Rule #171.

(Note: Unit prices for all items, all extensions, and total amount of bid shall be shown. All entries must be typed or entered in ink.)

OVENELL SLOUGH (CEDAR GROVE CULVERT) REPLACEMENT PROJECT #WA402229

Item No.	Description	Spec	QTY	Unit of Measure	Unit Price	Total Price
1	MOBILIZATION	1-09.7	1	L.S.	$_____ .___	$_____ .___
2	CONTRACTOR SURVEYING	1-05.4 SP	1	L.S.	$_____ .___	$_____ .___
3	RECORD DRAWINGS (Minimum Bid = $500)	1-05.18	1	L.S.	$_____ .___	$_____ .___
4	SPCC PLAN	1-07.15	1	L.S.	$_____ .___	$_____ .___
5	TYPE B PROGRESS SCHEDULE	1-08.3	1	L.S.	$_____ .___	$_____ .___
6	ROADSIDE CLEANUP	2-01	EST	FA	$_____**1.00**_	$____**20,000.00**_

Item No.	Description	Spec	QTY	Unit of Measure	Unit Price	Total Price
7	CLEARING AND GRUBBING	2-01	1	L.S.	$_____ .___	$_____ .___
8	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	2-02	1	L.S.	$_____ .___	$_____ .___
9	UNANTICIPATED MINOR STRUCTURE REVISIONS	1-09.7	EST	FA	$_____**1.00**	$_____**10,000.00**
10	UNANTICIPATED DEWATERING	1-09.7	EST	FA	$_____**1.00**	$_____**20,000.00**
11	UNANTICIPATED REPAIR/RESTORATION OF PUBLIC AND PRIVATE FACILITIES	1-09.7	EST	FA	$_____**1.00**	$_____**20,000.00**
12	CHANNEL EXCAVATION INC. HAUL	2-03	1,900	C.Y.	$_____ .___	$_____ .___
13	ROADWAY EXCAVATION INC. HAUL	2-03	93	C.Y.	$_____ .___	$_____ .___
14	GRAVEL BORROW INCL. HAUL	2-03	140	TON	$_____ .___	$_____ .___
15	EMBANKMENT COMPACTION	2-03	75	C.Y.	$_____ .___	$_____ .___
16	STRUCTURE EXCAVATION CLASS A INCL. HAUL	2-09	56	C.Y.	$_____ .___	$_____ .___
17	SHORING OR EXTRA EXCAVATION CL. A	2-09	1	L.S.	$_____ .___	$_____ .___
18	TEMPORARY ISOLATION WALLS	2-09 SP	1	L.S.	$_____ .___	$_____ .___
19	CRUSHED SURFACING BASE COURSE	4-04	32	TON	$_____ .___	$_____ .___

Item No.	Description	Spec	QTY	Unit of Measure	Unit Price	Total Price
20	COMMERCIAL HMA	5-04 SP	17	TON	$_____ .___	$_____ .___
21	GRAVEL BACKFILL FOR WALL	6-02	21	C.Y.	$_____ .___	$_____ .___
22	CONC. CLASS 4000	6-02	40	C.Y.	$_____ .___	$_____ .___
23	DEFICIENT STRENGTH CONC. PRICE ADJUSTMENT	6-02	1	CALC	$_____-1.00	$_____-1.00
24	ST. REINF. BAR	6-02	7,830	LB.	$_____ .___	$_____ .___
25	PRESTRESSED CONC. GIRDER – 30 INCH VOIDED DECK SLAB GIRDER	6-02	150	L.F.	$_____ .___	$_____ .___
26	PEDESTRIAN RAILING	6-06 SP	186	L.F.	$_____ .___	$_____ .___
27	UNDERDRAIN PIPE 6 IN. DIAM.	7-01	18	L.F.	$_____ .___	$_____ .___
28	GRAVEL BACKFILL FOR DRAINS	7-01	31	C.Y.	$_____ .___	$_____ .___
29	FURNISHING AND DRIVING (STEEL) TEST PILE	6-05	2	EA	$_____ .___	$_____ .___
30	FURNISHING ST. PILING	6-05	86	L.F.	$_____ .___	$_____ .___
31	FURNISHING STEEL PILE TIP OR SHOE	6-05	4	EA	$_____ .___	$_____ .___
32	DRIVING ST. PILE	6-05	4	EA	$_____ .___	$_____ .___

Item No.	Description	Spec	QTY	Unit of Measure	Unit Price	Total Price
33	EROSION/WATER POLLUTION CONTROL	8-01	1	L.S.	$_____ .___	$_____ .___
34	HIGH VISIBILITY FENCE	8-01	920	L.F.	$_____ .___	$_____ .___
35	PAINT LINE	8-22	150	L.F.	$_____ .___	$_____ .___
36	PAINTED ACCESS PARKING SPACE SYMBOL	8-22	1	EA	$_____ .___	$_____ .___
37	PERMANENT SIGNING	8-21	1	L.S.	$_____ .___	$_____ .___
38	CEMENT CONC. SIDEWALK	8-14	26	S.Y.	$_____ .___	$_____ .___
39	PLUGGING EXISTING PIPE	7-08	2	EA	$_____ .___	$_____ .___
40	CONTROLLED DENSITY FILL	2-09	9	C.Y.	$_____ .___	$_____ .___
41	BOLLARD TYPE 1	8-31	2	EA	$_____ .___	$_____ .___
42	WHEEL STOP	8-07 SP	2	EA	$_____ .___	$_____ .___
43	LIVE SILTATION	8-02 SP	1	L.S.	$_____ .___	$_____ .___
44	TYPE 1 EU	8-30 SP	2	EA		
					TOTAL BID AMOUNT	**$_____ .___**

FOR WORK PERFORMED ON THIS PROJECT THE CONTRACTOR SHOULD REFER TO SECTION 1-07.2(1) OF THE CONTRACT PROVISIONS AND DEPARTMENT OF REVENUE RULE #171.

PROPOSAL – Signature Page

The bidder is hereby advised that by signature of this proposal he/she is deemed to have acknowledged all requirements and signed all certificates contained herein.

The undersigned hereby agrees to pay labor not less than the prevailing rates of wages in accordance with the requirements of the special provisions for this project.

A proposal guaranty in an amount of five percent (5%) of the total bid based upon the approximate estimate of quantities at the above prices and in the form as indicated below is attached hereto:

☐ CASHIER'S CHECK In the amount of $_____Dollars

☐ CERTIFIED CHECK (Payable to Skagit County) In the amount of $_____Dollars

☐ PROPOSAL BOND In the amount five percent (5%) of the total bid.

Receipt is hereby acknowledged of Addendum(s) No. (s) _____, _____, & _____

Signature of Authorized Officials(s):

Proposal Must Be Signed → _____

_____
PRINT NAME

Firm Name: _____

Address: _____

_____

_____

Telephone No.: _____

State of Washington Contractor's License No._____

UBI No._____

Employment Security Department No._____

Note:

(1) This proposal form is not transferable and any alteration of the firm's name entered hereon without prior permission from the Skagit County will be cause for considering the proposal irregular and subsequent rejection of the bid.

(2) Please refer to Section 1-02.6 of the Standard Specifications, "Preparation of Proposal", or "Article 4" of the Instruction to Bidders for building construction jobs.

BID PROPOSAL MUST BE SIGNED.

FAILURE TO SIGN OR COMPLETE ALL INFORMATION CAN RESULT IN REJECTION OF THE PROPOSAL AS NON-RESPONSIVE.

SUBMIT THE ENCLOSED PROPOSAL BOND FORM WITH YOUR PROPOSAL

USE OF OTHER FORMS MAY SUBJECT YOUR BID TO REJECTION

PROPOSAL BOND

KNOW ALL MEN BY THESE PRESENTS, That we, _____

_____

of _____ as principal, and the

_____ a corporation duly

organized under the laws of the State of _____,
and authorized to do business in the State of Washington, as surety, are held and firmly bound unto Skagit County in the full and penal sum of five (5) percent of the total amount of the bid proposal of said principal for the work hereinafter described for the payment of which, well and truly to be made, we bind our heirs, executors, administrators and assigns, and successors and assigns, firmly by these presents.

The condition of this bond is such, that whereas the principal herein is herewith submitting his or its sealed proposal for the following highway construction, to wit:

Ovenell Slough (Cedar Grove Culvert) Replacement Project #WA402229
SRFB Project No. 18-1490R

said bid and proposal, by reference thereto, being made a part hereof.

NOW THEREFORE, If the said proposal bid by said principal be accepted, and the contract be awarded to said principal, and if said principal shall duly make and enter into and execute said contract and shall furnish bond as required by Skagit County within a period of twenty (20) days from and after said award, exclusive of the day of such award, then this obligation shall be null and void, otherwise it shall remain and be in full force and effect.

IN TESTIMONY WHEREOF, The principal and surety have caused these presents to be signed and sealed this _____ day of _____, 2021.

_____

_____
(Principal)

_____ _____
(Surety) (Attorney-in-fact)

Failure to return this Declaration as part of the bid proposal package will make the bid nonresponsive and ineligible for award.

NON-COLLUSION DECLARATION

I, by signing the proposal, hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. That the undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this proposal is submitted.
2. **That by signing the signature page of this proposal, I am deemed to have signed and to have agreed to the provisions of this declaration.**

NOTICE TO ALL BIDDERS

To report rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Proposal for Incorporating Recycled Materials into the Project

In compliance with a new law that went into effect January 1, 2016 (SHB1695), the Bidder shall propose below, the total percent of construction aggregate and concrete materials to be incorporated into the Project that are recycled materials. Calculated percentages must be within the amounts allowed in Section 9-03.21(1)E, Table on Maximum Allowable Percent (By Weight) of Recycled Material, of the Standard Specifications.

Proposed total percentage: _____ percent.

Note: Use of recycled materials is highly encouraged within the limits shown above, but does not constitute a Bidder Preference, and will not affect the determination of award, unless two or more lowest responsive Bid totals are exactly equal, in which case proposed recycling percentages will be used as a tie-breaker, per the APWA GSP in Section 1-03.1 of the Special Provisions. Regardless, the Bidder's stated proposed percentages will become a goal the Contractor should do its best to accomplish. Bidders will be required to report on recycled materials actually incorporated into the Project, in accordance with the APWA GSP in Section 1-06.6 of the Special Provisions.

Bidder: _____

Signature of Authorized Official: _____

Date: _____

Washington State Department of Transportation

Recycled Materials Reporting

Contract Number		Contract Title					
Contractor			Engineer				
		Reclaimed Hot Mix Asphalt	Recycled Concrete Aggregate	Recycled Glass	Steel Furnace Slag	Other Recycled Aggregates	Contract Total Quantity
Fine Aggregate for Portland Cement Concrete	9-03.1(2)						
Coarse Aggregate for Portland Cement Concrete	9-03.1(4)						
Coarse Aggregate for Commercial Concrete	9-03.1(4)						
Aggregates for Hot Mix Asphalt	9-03.8	see below					
Ballast	9-03.9(1)						
Permeable Ballast	9-03.9(2)						
Crushed Surfacing	9-03.9(3)						
Aggregate for Gravel Base	9-03.10						
Gravel Backfill for Foundations	9-03.12(1)						
Gravel Backfill for Walls	9-03.12(2)						
Gravel Backfill for Pipe Zone Bedding	9-03.12(3)						
Gravel Backfill for Drains	9-03.12(4)						
Gravel Backfill for Drywells	9-03.12(5)						
Backfill for Sand Drains	9-03.13						
Sand Drainage Blanket	9-03.13(1)						
Gravel Borrow	9-03.14(1)						
Select Borrow	9-03.14(2)						
Common Borrow	9-03.14(3)						
Foundation Material Class A and Class B	9-03.17						
Foundation Material Class C	9-03.18						
Bank Run Gravel for Trench Backfill	9-03.19						
Other Aggregate Materials (total quantity not required)	9-03						
TOTAL (recycled materials and contract total quantity)		0	0	0	0	0	0
		Reclaimed Hot Mix Asphalt	Reclaimed Asphalt Shingles		Steel Furnace Slag	Other Recycled Materials	Total Quantity
Hot Mix Asphalt	5-04.2						

I declare that the statements made in this document, including attachments, are complete, true and accurate.
Signed by an authorized representative of the Contractor

Contractor Representative Name	Signature	Title	Date

INSTRUCTIONS:

The Contractor shall report the quantity in ***tons*** for each type of recycled material that was used for each of the listed materials. If the Contract did not include the listed material or recycled materials were not used for this material a "0" shall be entered in the box. The Standard Specifications in Section 9-03.21 do not allow the use of recycled materials in the boxes that are shaded. If the Contract Provisions allowed and the Contractor utilized recycled materials for any of these items the amount of recycled material shall be entered in the box. The contract total quantity for each aggregate material (e.g., Fine Aggregate for Portland Cement Concrete) is the total weight in tons and includes both recycled and natural occurring materials. The total quantity for hot mix asphalt (HMA) is the total HMA weight in tons and includes recycled asphalt pavement (RAP) and new HMA materials.

Other recycled aggregates include other material sources that are utilized on a project. These sources include on-site recycling and aggregates from returned (uncured) concrete. Roadway excavation and embankment are not allowed in the quantity for other aggregate materials or other recycled aggregates.

Attach cost estimates as required in Section 1-06.6 of the Standard Specifications when the total percentage of recycled aggregate and concrete is less than 25 percent of the required amount for the entire Contract.

DOT Form 350-075
Revised 06/2016

Certification of Compliance with Wage Payment Statutes

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date (September 30, 2021), the bidder is not a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

_____
Bidder's Business Name

_____
Signature of Authorized Official*

_____
Printed Name

_____
Title

_____ _____ _____
Date City State

Check One:
Sole Proprietorship ☐ Partnership ☐ Joint Venture ☐ Corporation ☐

State of Incorporation, or if not a corporation, State where business entity was formed:

_____

If a co-partnership, give firm name under which business is transacted:

_____

** If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*

APPENDIX E

Geotechnical Report

GEOTECHNICAL ENGINEERING REPORT

Cedar Grove Ovenell Culvert Removal and Pedestrian Bridge Replacement
Skagit County, Washington

Prepared for: KPFF

Project No. 150306 • August 24, 2021 FINAL

Aspect CONSULTING

earth + water

GEOTECHNICAL ENGINEERING REPORT

Cedar Grove Ovenell Culvert Removal and Pedestrian Bridge Replacement
Skagit County, Washington

Prepared for: KPFF

Project No. 150306 • August 24, 2021

Aspect Consulting, LLC

8/24/2021

Erik O. Andersen, PE
Principal Geotechnical Engineer
eandersen@aspectconsulting.com

V:\150306 Cedar Grove Culvert Project\Deliverables\Cedar Grove Culvert Geotech Report\Final\Cedar Grove Ovenell Culvert Final Revised Geotechnical Eng Design_08242021.docx

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1 Introduction and Project Description

This report presents the results of geotechnical engineering studies performed by Aspect Consulting, LLC (Aspect) for the Cedar Grove Ovenell Culvert Removal and Pedestrian Bridge Replacement (Project). The Project area (Site) is located near the south bank of the Skagit River about 1 mile south of Concrete, Washington, about 300 feet past the north end of Cedar Grove Avenue (Figure 1).

The existing culvert consists of an approximately 2-foot-diameter corrugated metal pipe (CMP) carrying Ovenell Spring beneath the Cedar Grove Avenue (roadway) fill embankment. The project would involve removal of this culvert and replacement with an approximately 77-foot-long and 8.67-foot-wide, pedestrian bridge. We understand the proposed replacement bridge will use plumb piles with integral abutment, allowing the bridge itself to be utilized as a strut to resist lateral loads. The culvert removal would include re-grading the bridge end-slopes down to the side channel. Figure 2 depicts the existing site features/topography and location of the proposed pedestrian bridge.

Design of the pedestrian bridge will follow current American Association of State Highway and Transportation Officials *Load and Resistance Factor Design (LRFD) Guide Specifications for the Design of Pedestrian Bridges* (AASHTO, 2015).

In 2016, Aspect provided a preliminary geotechnical engineering study for the Site and Project. This geotechnical engineering report summarizes the results of those previously completed field exploration and presents Aspect's geotechnical engineering conclusions and recommendations for detailed design of the Project.

2 Site Conditions

2.1 Surface Conditions

Surface conditions at the proposed Project Site consist of a 35-foot-wide embankment with an 18-foot-wide paved roadway (Cedar Grove Avenue) about 25 feet wide and sloping down to the northwest at 9.5 percent. The roadway is oriented southeast-to-northwest.

The fill embankment is about 20 feet high at the southeast end, and about 6 feet high at the northwest end. Existing embankment sideslope declinations are in the range of 1.6 to1.8H:1V (horizontal:vertical). The existing 2-foot-diameter CMP culvert is oriented roughly perpendicular to the roadway to provide hydraulic connectivity for Ovenell Slough. Standing (very slowly moving) water exists on both sides of the culvert.

2.2 Tectonics and Regional Geology

Basement rocks underlying the Quaternary sediments at the Site are the result of ocean crust being thrust under and onto the North American Continent between the Devonian and Cretaceous periods (approximately 450 to 65 million years ago). During this time, as many as four different rock groups were thrust onto the continent; these groups are separated by inactive high angle normal faults.

Sediments overlying the basements rocks in the present Skagit River valley were deposited by multiple continental glaciations and intervening interglacial periods beginning about 2 million years ago. Between periods of glaciation, depositional processes were similar to those of the present Skagit River valley with a high energy river traversing the valley depositing river channel and floodplain deposits. During this time, pyroclastic flows, lahars, and mudflows from Mount Baker and Glacier Peak deposited and eroded sediments in the Skagit River valley.

Deposits in the Site area are associated with recent Skagit River processes, glacial, and interglacial cycles. They include nonglacially consolidated sandy to gravelly river channel-bed deposits and glacially consolidated gravel, sand, silt, organic-rich deposits.

Geologic mapping from the *Geologic map of the Mount Baker 30 x 60 quadrangle, Washington* (Tabor et. al., 2003) indicates the near-surface “native” soils consist of Holocene alluvium (Qal) described as cobbly gravel to pebbly sand. Glacial advanced outwash deposits and undifferentiated sediments consolidated by the Fraser glaciation are mapped on edges of the present Skagit River valley about half a mile to the north and south of the Site. Artificial fill is not mapped at the Site, but is present from roadway embankment and culvert construction. Soil units encountered in soil boring explorations completed at the Site are described in more detail in Section 3.2.

2.3 Seismic Hazards

The Site is within an area of active tectonic forces associated with the interaction of the offshore Juan de Fuca plate, the Pacific plate, and the onshore North American plate.

These plate interactions result in seismic hazards to the Project. Significant hazards include regional ground shaking from subduction zone earthquakes, deep earthquakes, and shallow crustal earthquakes potentially causing liquefaction of soft ground or landslides of unstable slopes.

The closest known Quaternary active fault is the Devils Mountain Fault (DMF), about 18 miles south of the Site. Analysis of well logs (by Johnson et al., 2001) found that the most recent evidence for movement of the DMF offsets Quaternary period sediments dated between 80 and 125 thousand years old about 40 miles west of the Site.

The Site is within the Cascadia Subduction Zone (CSZ), an active seismic zone subject to earthquakes on shallow crustal faults in addition to those within the CSZ. Hazards associated with the CSZ include deep earthquakes and subduction zone earthquakes. Deep earthquakes, which occur from tensional rupture of the sinking oceanic plate, typically have magnitude 7.5 or less and occur approximately every 10 to 30 years. The Site is generally protected from strong shaking caused by these earthquakes by the great depth to the hypocenter.

Subduction zone earthquakes occur due to rupture between the subducting oceanic plate and the overlying continental plate. These earthquakes have magnitude up to 9 and an average recurrence interval on the order of 500 years. The last great subduction zone earthquake in Washington occurred about 300 years ago. Due to the lengthy recurrence intervals between large seismic events, the potential for strong ground shaking is considered low during the life of the proposed Project.

The loose, saturated, granular recent overbank deposits at the Site are susceptible to liquefaction during a design-level large earthquake, which could result in vertical settlement and lateral displacements of the roadway fill embankment and culvert buried structure.

3 Subsurface Conditions

3.1 Field Exploration Program

We completed a field exploration program consisting of two machine-drilled borings on October 4, 2016. The borings, designated B-1 and B-2, were completed on the northwest and southeast sides of the existing culvert and approximately where the proposed pedestrian bridge abutments would be located (Figure 2). The borings were drilled using a hollow stem auger by Environmental Drilling, Inc., under subcontract to Aspect.

An Aspect geologist was present throughout the field exploration program to observe the drilling, collect soil samples, and prepare descriptive logs of the explorations. Soils were classified in general accordance with ASTM International (ASTM) D 2488, *Standard Practice for Description and Identification of Soils* (Visual-Manual Procedure; ASTM, 2012).

Borings B-1 and B-2 were drilled and sampled every 2.5 feet or 5 feet depending on subsurface conditions. Soil samples were taken using Standard Penetration Test (SPT) methods for soil density and consistency correlation. Boring B-1 was completed at 54 feet below ground surface (bgs); boring B-2 was completed at 44 feet bgs. Descriptions of the soils encountered in the borings, as well as the depths where characteristics of the soils changed, are indicated on the exploration logs presented in Appendix A. Definitions of the terminology and symbols used on the logs are included in the Exploration Log Key (Figure A-1).

Selected soil samples were submitted to a soil testing laboratory to determine moisture content (ASTM D 2216) and grain size distribution (ASTM C 136). The results of these tests are included in Appendix B.

3.2 Stratigraphy

Below the asphalt, we encountered roadway embankment fill, overlying overbank deposits, followed by glacially overridden sediments. The fill was placed during the culvert and roadway embankment construction. Overbank deposits were deposited by the Skagit River during flooding. Glacially overridden deposits were deposited prior to the preceding glacial advance approximately 15,000 years ago and consolidated by glacial ice.

3.2.1 Artificial Fill

Artificial fill (fill) was observed beneath the asphalt and extending 5 feet bgs at the northwest end of the roadway and extending 13 feet bgs at the southeast end of the roadway. The fill generally consisted of slightly moist, brown, gravelly, slightly silty sand (SP-SM/SW-SM), or silty sand (SM). The sand and gravel fraction gradation varied from fine to coarse. SPT[1] sampling indicates the fill is generally medium dense and rarely dense.

[1] SPT blow count refers to standard penetration test (SPT) N-values, in accordance with ASTM D 1586.

4.1.1 Overbank Deposits

Overbank deposits were encountered below the fill to 20 feet bgs at the west end of the roadway. The overbank deposits consisted of a range of non-plastic SILT (ML), sand (SP); and sandy, slightly silty gravel (GP-GM). Overbank deposits were identified by thin fine sand, silt, and organic laminations. SPT sampling indicates these granular overbank deposits range in relative density from very loose to medium dense.

4.1.2 Glacially Overridden Deposits

Glacially overridden deposits were encountered below overbank deposits from 20 feet bgs at the northwest side of the culvert and below the fill from 13 feet bgs at the southeast side of the culvert. The soils within the glacially overridden deposits were variable and typically consisted of wet, gray, gravelly, sand (SP), slightly silty sand (SP/SM), silty sand (SM), and sandy silt (ML). Traces of slightly silty gravel (GP-GM) were encountered at the west end of the roadway. Glacially overridden deposits were distinguished from overlying overbank deposits based on soil density. SPT sampling indicates the glacially overridden granular deposits are very dense

3.3 Groundwater

Groundwater levels in the borings, indicated by wet soil samples, were encountered at 20 feet bgs in boring B-1 and at 10 feet bgs in boring B-2. The groundwater level observed in boring B-2 is similar in elevation to Ovenell Slough and in our opinion is more indicative of conditions that will be encountered during Project construction. For the purposes of analysis, we conservatively estimate groundwater levels are 10 feet bgs at the southeast side of the culvert and at the elevation of Ovenell Slough at the northwest side of the culvert. Groundwater levels are expected to vary due to seasonal variations such as changes in weather and snowmelt, and the water level in Ovenell Slough.

4 Conclusions and Recommendations

This section presents the results of our geotechnical engineering analyses, and conclusions and recommendations to inform the 90 percent design submittal for the Project

4.1 Earthquake Engineering

4.1.1 Ground Response

The AASHTO seismic design is based on an event with a return period of 1,000 years. The U.S. Geological Survey (USGS) has an online tool for obtaining key design parameters for the AASHTO event using the probabilistic ground motion studies and maps for Washington. Seismic design for the Project should be completed with the specific ground motion parameters listed in Table 1 below.

Table 1. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	D
Peak Ground Acceleration (PGA)	0.266g
Short Period Spectral Acceleration (S_s)	0.610g
1-Second Period Spectral Acceleration (S_1)	0.20g
Site Coefficient (F_{PGA})	1.269
Site Coefficient (F_a)	1.312
Site Coefficient (F_v)	2.0
Design Peak Ground Acceleration (A_s)	0.337g
Design Short Period Spectral Acceleration (S_{DS})	0.80g
Design 1-Second Period Spectral Acceleration (S_{D1})	0.40g

Notes:
1. g = gravitational force
2. Based on the latitude and longitude of the Site: 48.527649°N, 121.740279°W

4.1.2 Liquefaction

Liquefaction occurs when loose, saturated and relatively cohesionless soil deposits temporarily lose strength as a result of earthquake shaking. Potential effects of soil liquefaction include temporary loss of bearing capacity and lateral soil resistance, liquefaction-induced settlement, flow failure of end- or side-slopes, and lateral spreading—any of which could result in structural damage. Primary factors controlling

the development of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soil, *in-situ* stress conditions, and the depth to groundwater.

Liquefaction evaluations were conducted using WSliq, a liquefaction analysis software program (Kramer, 2008). Liquefaction evaluations were completed for both the northwest and southeast abutments.

The results of the analysis indicate that liquefaction settlement will not be induced at the southeast abutment under the 1,000-year design earthquake, but that 4 to 8 inches of liquefaction settlement may be induced at the northwest abutment within the overbank deposits. Outputs from our analysis are presented in Appendix C.

Impacts due liquefaction will be incorporated in the structural design of the foundation system.

4.2 Deep Foundations

We understand the bridge replacement will be a 77-foot-long precast concrete voided slab girder bridge. The design loading for the proposed structure is approximately 180 kips per abutment. Through collaborations with the Project team, a deep foundation system was selected to be used to support the proposed bridge replacement.

Based on the results of our geotechnical engineering analyses and our experience with similar projects, we recommend the pedestrian bridge be supported on closed-end, concrete-filled steel pipe piles. We recommend 12-inch nominal diameter, Schedule 40 steel pipe piles with a 1-inch-thick minimum steel flat plate welded to the tip (i.e., closed-end).

The pipe piles should be driven to fully penetrate all existing fill and overbank sediments and should extend at least 5 feet into the glacially overridden deposits. The piles should extend to minimum tip Elevation 155[2] at the northwest abutment, and minimum tip Elevation 170 at the southeast abutment. Lateral analyses could require somewhat deeper pile tip elevations.

Our analyses indicate that a 12-inch nominal diameter Schedule 40, ASTM A 252 Grade 3 pipe, driven to tip elevation and acceptable driving resistance, can develop ultimate axial compressive capacities as high as 400 kips per pile. These piles should be driven using a diesel impact hammer capable of delivering at least 29,000 foot-pounds of impact energy per blow.

The bridge live-plus-dead loads are relatively small compared to the available axial capacities of the pipe piles; liquefaction flow-failure induced lateral loading on the abutment wall/pile cap will control this design.

For LRFD strength limit state design, a resistance factor (φ) of 0.4 should be applied to the ultimate (or nominal) axial compressive capacity. For extreme and service limit state design, resistance factors of 1.0 should be used. For service limit state design, piles

[2] All elevations are determined using North American Vertical Datum of 1988 (NAVD88).

driven at least 5 feet into the glacially overridden soil deposits, will settle less than ½ inch under service limit state loading conditions.

4.2.1 Design of Piles for Lateral Loading

Lateral loading on the foundation system due to wind, seismic inertial loading, and/or liquefaction-induced flow-failure will be resisted by soil and structural resistance.

Tables 2 and 3 below present the recommended LPILE parameters for use in design of the deep foundations.

Table 2. LPILE Parameters for the Northwest Abutment

Soil Unit	γ [pcf]	Φ [°]	c [psf]	Approximate Elevations	Soil Model	k [pci]	ε_{50}
Fill	115	32	50	179.5 to 175.5	Sand (Reese)	90	-
Unsaturated Alluvium	115	30	50	175.4 to 174.2	Sand (Reese)	25	-
Saturated Alluvium	115	30	50	174.2 to 162.5	Sand (Reese)	20	-
Liquefied Alluvium(1)	115	0	115	174.2 to 162.5	Liquefied Sand Hybrid	-	0.05
Glacially Overridden Deposits	125	38	0	162.5 to termination	Sand (Reese)	125	-

Notes: (1)The 'Liquefied Alluvium' case should be used for the post-seismic condition in place of the 'Saturated Alluvium' layer

pcf = pounds per cubic feet; psf = pounds per square foot; pci = pounds per cubic inch

Table 3. LPILE Parameters for the Southeast Abutment

Soil Unit	γ [pcf]	Φ [°]	c [psf]	Approximate Elevations	Soil Model	k [pci]
Fill	115	32	50	191.9 to 178.9	Sand (Reese)	90
Glacially Overridden Deposits	125	38	0	178.0 to termination	Sand (Reese)	125

Notes: pcf = pounds per cubic feet; psf = pounds per square foot; pci = pounds per cubic inch

4.2.2 Abutment Pile Cap and Wall Design

The pile-supported abutment walls will retain a few feet of approach fill. If a reinforced concrete "L-shaped" abutment/pile cap is designed, the abutment walls will behave as restrained walls. In this case, the abutment walls should be designed for at-rest equivalent fluid pressure of 55 pounds per cubic foot (pcf). To account for pedestrian and/or small motorized vehicle traffic, a 50 pounds per square foot (psf) uniform rectangular pedestrian surcharge should be added to this for non-seismic loading conditions. For seismic inertial loading conditions, the traffic surcharge can be replaced with a uniform rectangular seismic surcharge of 12H psf, where H is the retained height of fill measured from final roadway grade down to the bottom of the pile cap.

In the post-earthquake, fully liquefied, flow failure scenario, the backfill against the northwest abutment wall will develop relatively high earth pressures approaching the

ultimate passive resistance value. For design purposes, the reinforced concrete abutment wall and pile cap should be capable of resisting passive earth pressure equivalent to 500 pcf. Live loading need not be considered in this extreme loading scenario. As an example, if the abutment wall were 8 feet wide (transverse to the bridge) and retaining 4 feet of approach fill, this resultant force will amount to: (½)*(500pcf)*$(4ft)^2$*(8ft) = 32,000 pounds (32 kips).

The abutment walls should be backfilled with relatively clean and freely-draining sand and gravel, such as Gravel Backfill for Walls, specified in Section 9-03.12(2) of the Washington State Department of Transportation (WSDOT) *Standard Specifications* (WSDOT, 2021).

The contract documents should require the abutment pile cap and stem walls be detailed by a structural engineer that is retained by the design-builder. Aspect is available to review these plans for conformance with these recommendations. During construction, Aspect should be on site to observe and evaluate pile driving.

4.3 Seismic Bridge Abutment/Slope Stability

At the onset of an earthquake, the soil mass is subjected to inertial shaking. During a strong ground motion event (such as the 1,000-year design event), cycles of shaking incrementally increase the pore water pressures in liquefiable soils up to the point that they are fully liquefied.

Conventional AASHTO and WSDOT bridge design practice allows designers to "de-couple" the seismic inertial loads at the beginning of the earthquake, from the fully liquefied conditions which tend to exist immediately after the shaking has stopped. Two seismic design cases are then considered:

1. Peak ground accelerations combined with non-liquefied soil conditions; and
2. Fully liquefied soil conditions and no seismic shaking.

We used the computer program SLIDE to evaluate potential global flow failure of the abutment and end slope with the proposed structure and foundation system. The residual shear strength of the fully liquefied overbank deposits was estimated using current empirical methods (Kramer, 2008), which relate residual shear strength to relative density and initial overburden stress conditions.

We also utilized the Bray, Macedo, and Travasarou (2018) method to evaluate the potential permanent displacement of the slope after the design seismic event. Based on this analysis, we would expect on the order of 4 to 6 inches of deformation. However, the integral abutment design is an effective way to mitigate the structure from this hazard.

Our analyses indicate the abutments will be susceptible to global flow-failure during the post-earthquake fully liquefied condition. The potential flow-failure mass would involve the upper unsaturated nonliquefied soil behind and below the bridge abutment as well as the underlying liquefied overbank deposits. As flow failures are initiated, lateral loads will develop on the integral bridge abutments, and will be resisted by the inherent

compressive strength of the bridge girders. The magnitude of these loads can be approximated using the ultimate passive earth pressures described in Section 4.2.2.

4.4 Earthwork

4.4.1 Groundwater at Abutment Excavations

Excavations will be required at each abutment to facilitate pile cap and integral abutment construction. The contractor should expect groundwater seepage at or near the water level in Ovenell Slough at the time of construction. If the groundwater level is above the required excavation bottom depth, the contractor should be required to dewater the excavations. We anticipate this can be accomplished using sumps and submersible pumps.

4.4.2 Temporary Excavation Slopes

Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. All temporary cuts in excess of 4 feet in height that are not protected by trench boxes or otherwise shored, should be sloped in accordance with Part N of Washington Administrative Code (WAC) 296-155 (WAC, 2009) for worker safety. Based on the Site soils, it is our opinion that unsaturated temporary slopes should have a maximum slope of 1.5H:1V. Shallow slopes may need to be considered in accordance with Part N WAC 296-155.

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. Therefore, all temporary slopes should be protected from erosion by installing a surface water diversion ditch or berm at the top of the slope if precipitation is expected.

In addition, the contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly. Vibrations created by traffic and construction equipment may cause caving and raveling of the temporary slopes. In such an event, lateral support for the temporary slopes should be provided by the contractor.

4.4.3 Permanent Slopes

The existing embankment side slopes have declinations of about 1.6-1.8H:1V; therefore, we recommend the excavated channel slopes be re-graded no steeper than 2H:1V around the northwest abutment, and no steeper than 1.75H:1V around the southeasts abutment. This is to provide for long-term stability for the re-graded channel slopes. However, in the short term, the re-graded slopes will be susceptible to shallow sloughing and erosion. To guard against this, the re-graded slope surfaces should be planted with appropriate native vegetation, and erosion control features such as coir logs and jute matting should be placed.

4.5 Structural Fill Materials

4.5.1 Beneath Foundations

We recommend the abutment pile caps be subexcavated and replaced with a working surface of nominally 6 inches of compacted crushed surfacing base course. This will provide a smooth uniform surface upon which the pile cap concrete can be placed.

4.5.2 Behind Abutment Walls and Wingwalls

We recommend abutment walls and any wingwalls (if needed) consist of freely draining sand and gravel such as Gravel Backfill for Walls (WSDOT Standard Specification 9-03.12(2), 2021). Care should be taken when compacting fill against subsurface walls to avoid overstressing the walls by limiting compaction equipment size next to the wall.

4.5.3 Approach Embankments

The approach embankment may consist of compacted structural fill meeting the requirements of either the Gravel Borrow (Section 9-03.14(1)), or Gravel Backfill for Walls ((Section 9-03.12(2)) sections of the WSDOT Standard Specification (WSDOT, 2021). Deleterious materials such as wood, organic waste, coal, and other compressible materials should be removed from the material prior to placement.

Structural fill for approach embankments should be compacted to at least 95 percent of the maximum dry density of the material as determined by ASTM D1557 (modified Proctor).

4.5.4 Use of On-Site Soils

Minor grading may be required to align the new bridge with the existing sloping roadway embankment. It is anticipated that portions of the existing onsite embankment fill material is suitable for reuse as approach embankment fill. Any oversize particles, such as cobbles and boulders greater than 6 inches in diameter, should be screened out, and organic-laden soil should not be reused as fill. Excavated material should be visually inspected by the geotechnical engineer to verify its suitability for reuse.

References

American Association of State Highway and Transportation Officials (AASHTO), 2014, LRFD Bridge Design Specifications, Customary U.S. Units.

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ASTM International (ASTM), 2012, American Society of Testing Materials Annual Book of Standards, Vol. 4.08, West Conshohocken, Pennsylvania.

Bray, J. D., Macedo, J, and Travasarou, T., 2018, Simplified procedure for estimating seismic slope displacements for subduction zone earthquakes, J. Geotech. Geoenviron. Eng., 10.1061/(ASCE)GT.1943-5606.0001833.

Kramer, Steven, 2008, Evaluation of liquefaction hazards in Washington State, Washington State Department of Transportation. WA-RD 668.1, December 1, 2008.

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Rocscience, 2018, Slide 8.019 and 8.020 Analysis Program. Build date March 3, 2021.

Washington State Department of Transportation (WSDOT), 2021, Standard Specifications for Road, Bridge and Municipal Construction, Document M 41-10.

Washington State Legislature, 2009, Washington Administrative Code (WAC), April 1, 2009.

Limitations

Work for this project was performed for KPFF (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

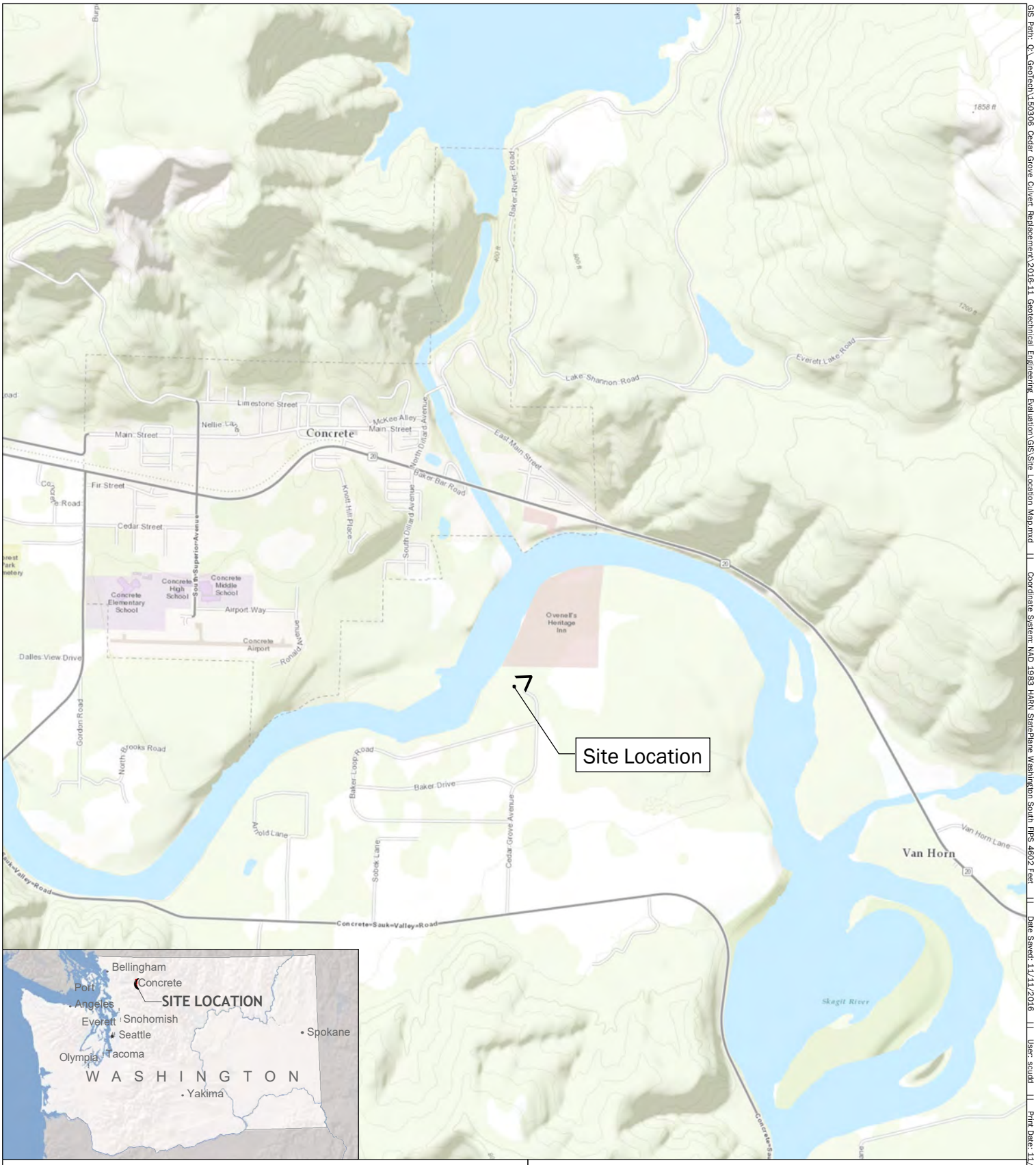
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix D titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Erik O. Andersen, PE, at (360) 746-8964.

FIGURES

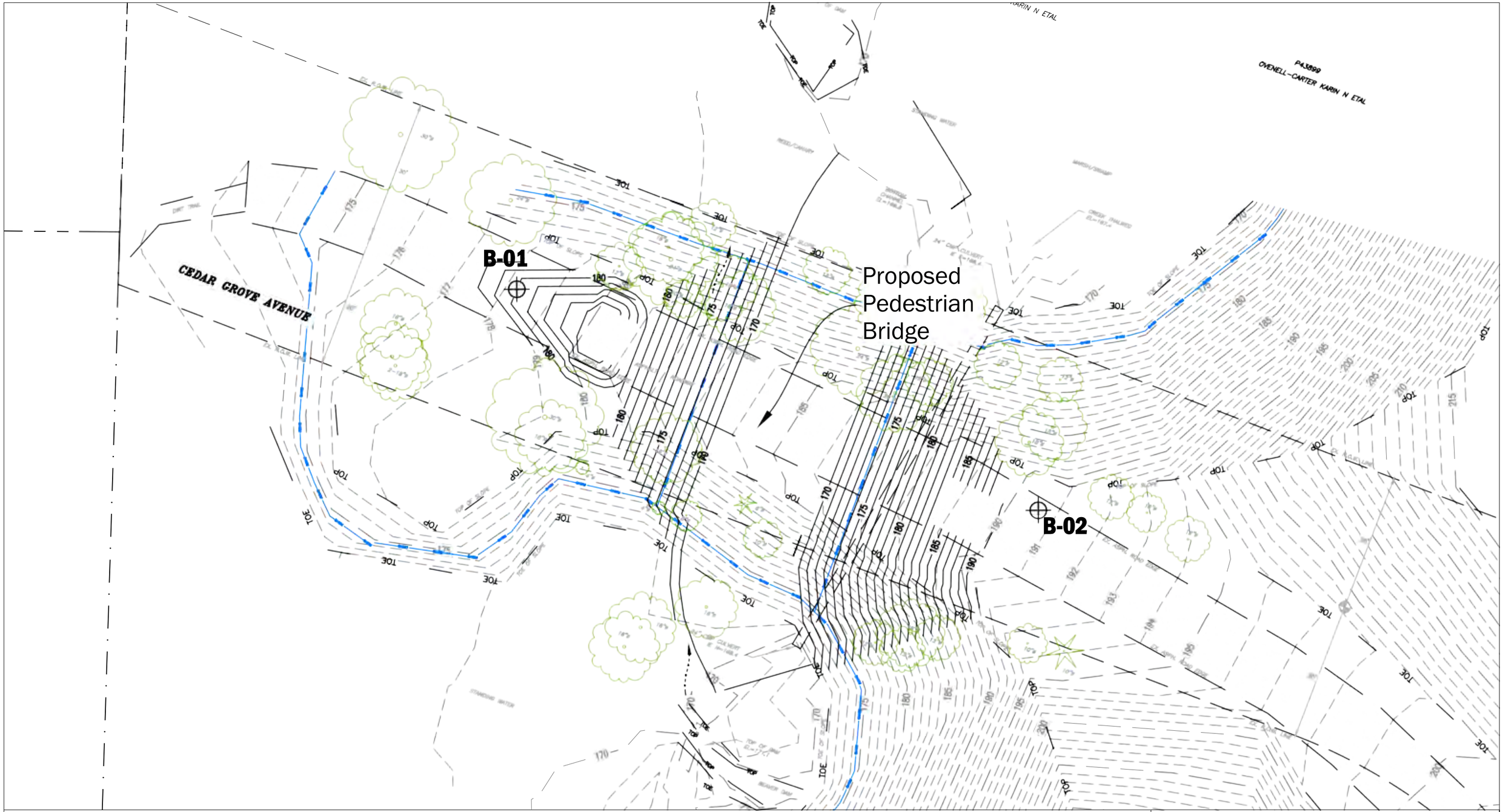


Site Location Map

Cedar Grove Ovenell Culvert Replacement
Cedar Grove Road
Skagit County, Washington

Aspect CONSULTING	NOV-2016	BY: JGF/SCC	FIGURE NO. 1
	PROJECT NO. 150306	REV BY: -	

GIS Path: Q:_GeoTech\150306 Cedar Grove Culvert Replacement\2016-11 Geotechnical Engineering Evaluation\GIS\Site Location Map.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet || Date Saved: 11/11/2016 || User: scuddi || Print Date: 11/11/2016



Source: Base map provided by KPFF Consulting Engineers.

Legend

Boring Location

0 20 40 Feet

Site and Exploration Map

Cedar Grove Ovenell Culvert Replacement
Cedar Grove Road
Skagit County, Washington

Aspect Consulting	Jul-2021	BY: EOA/CMV	FIGURE NO. 2
	PROJECT NO. 150306-A-002-2.2	REVISED BY: -	

CAD Path: Q:_GeoTech\150306 Cedar Grove Culvert Replacement\2021-07 Site Plan Update\150306-02.dwg:1.1x17 Landscape || Date Saved: Jul 29, 2021 11:16am || User: cvanslyke

APPENDIX A

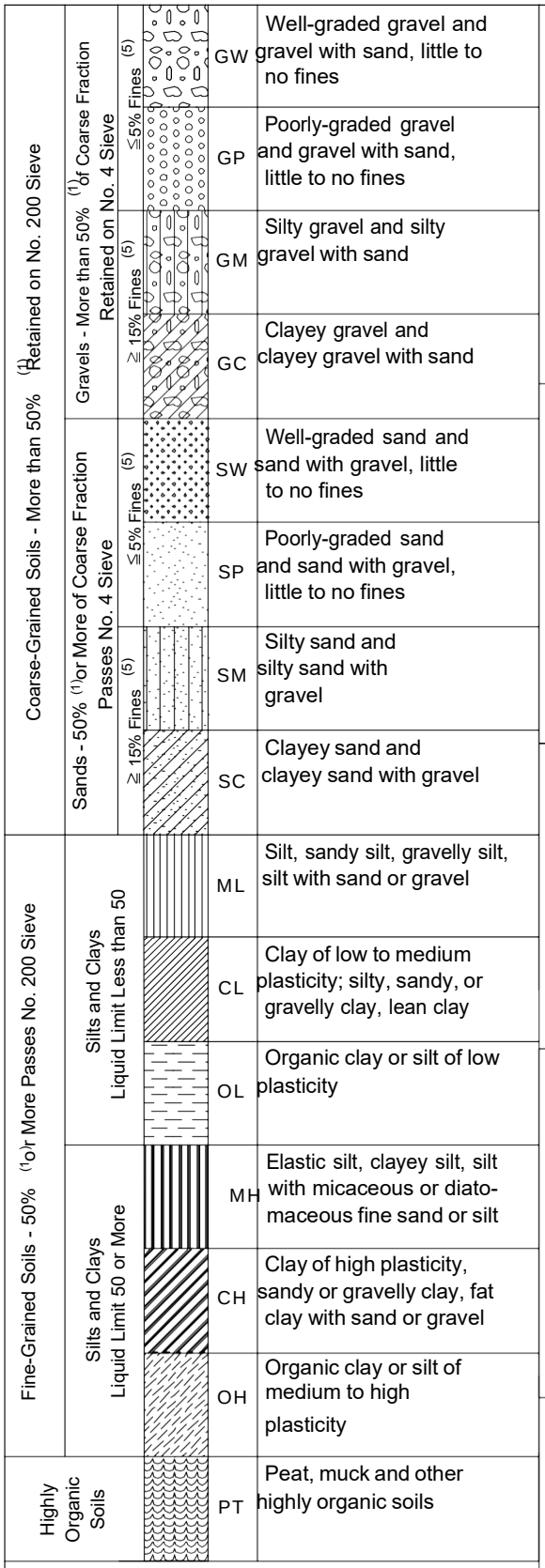
Subsurface Explorations

A.1 Field Exploration Program and Geotechnical Borings

On October 5, 2016, Aspect performed a site reconnaissance and completed two geotechnical soil borings, B-1 and B-2, to a depth of 54 feet and 44 feet below the existing ground surface (bgs) respectively. The borings were advanced by Environmental Drilling, Inc., under subcontract to Aspect, using a truck-mounted Mobile Drilling B-61 rotary drill rig with a 6.5-inch-outer-diameter hollow-stem auger. The locations of the borings are shown on Figure 2.

The borings were sampled at selected depth intervals using the Standard Penetration Test (SPT) in general accordance with ASTM method D1586. This involves driving a 2-inch-outside-diameter split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling from a distance of 30 inches (the drill rig employed on this project used an automatic-trip hammer). 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") or blow count. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils.

A representative from Aspect was present throughout the field exploration program to observe the drilling procedure, assist in sampling, and prepare descriptive logs of the exploration. Soils were classified in general accordance with ASTM D-2488 *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. The summary exploration log represents our interpretation of the contents of the field logs. The stratigraphic contacts shown on the individual summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times.



Terms Describing Relative Density and Consistency

Coarse-Grained Soils	Density	SPT (2) blows/foot
	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

Fine-Grained Soils	Consistency	SPT (2) blows/foot
	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

FC = Fines Content
G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Consolidation
DD = Dry Density
K = Permeability
Str = Shear Strength
Env = Environmental
PiD = Photoionization Detector

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)

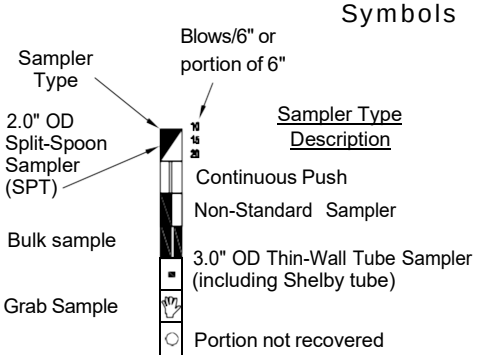
(3) Estimated Percentage

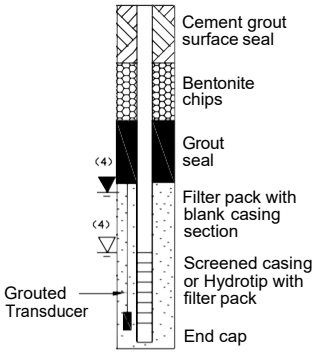
Percentage by Weight	Modifier
<5	Trace
5 to 15	Slightly (sandy, silty, clayey, gravelly)
15 to 30	Sandy, silty, clayey, gravelly)
30 to 49	Very (sandy, silty, clayey, gravelly)

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 groundwater
(5) Combined USCS symbols used for fines between 5% and 15% as estimated in General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

▽ ATD = At time of drilling
▼ Static water level (date)
BGS = below ground surface

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.

Aspect Consulting
Earth + Water
www.aspectconsulting.com

Exploration Log Key

DATE:
DESIGNED BY:
DRAWN BY:
REVISED BY:

PROJECT NO.

FIGURE NO.
A-1

Q:_ACAD Standards\Standard Details\Exploration Log Key B1.dwg

Cedar Grove Ovenell Culvert - 150306

Geotechnical Exploration Log

Project Address & Site Specific Location: Cedar Grove Road, Skagit County, Washington, West-end of culvert embankment.			Coordinates (Lat,Lon WGS84): 48.528, -121.739	Exploration Number: **B-1**
Contractor: Environmental Drilling Inc.	Equipment: Mobile Drilling B-61 rotary drill rig	Sampling Method: Autohammer; 140 lb hammer; 30" drop	Ground Surface (GS) Elev. (NAVD29): 178.1'	
Operator: Tom	Exploration Method(s): Hollow-stem Auger	Work Start/Completion Dates: 10/5/2016	Top of Casing Elev. (NAVD29): NA	Depth to Water (Below GS): 20' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								ARTIFICIAL FILL Medium dense, moist, brown, gravelly, slightly silty SAND (SP-SM); fine to coarse sand, well-graded fine and coarse gravel.	
	175	Exploration backfilled with bentonite grout and bentonite chips, capped with cold-patch asphalt.	S1	▲	7 10 11				
5								**OVERBANK DEPOSITS** Loose, moist, brown, SILT (ML) interbedded with SAND (SP); non-plastic, predominantly fine to medium sand.	5
	170	Broken gravel in sample shoe.	S2	▲	5 3 3				
10								Very loose, moist, gray, slightly gravelly, SAND (SP); trace silt, predominantly fine to medium sand, subrounded to subangular gravel, scattered organic thin laminations.	10
	165		S3	▲ ●	1 1 2	GS			
15									15
	160		S4	● ▲	2 10 10	GS		Medium dense, wet, gray, sandy slightly silty GRAVEL (GP-GM); fine to coarse sand, predominantly fine rounded to angular gravel.	
20		▽ 10/4/2016						**GLACIALLY OVERIDDEN DEPOSITS** Very dense, wet, gray, gravelly SAND (SP); trace silt, fine to coarse sand, fine and coarse gravel.	20
	155	Broken gravel in sample shoe.	S5	▲	12 21 31				
25								Very dense, wet, gray, very sandy GRAVEL (GP); fine to coarse sand, predominantly fine rounded to subangular gravel.	25
	150		S6	▲	11 50/6				

Legend

Sample Method
- ○ No Soil Sample Recovery
- ◪ Split Barrel 2" X 1.375" (SPT)
- ◧ Split Barrel 3" X 2.375" (Mod Cal)

Plastic Limit ⊢⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JGF
Approved by: EOA

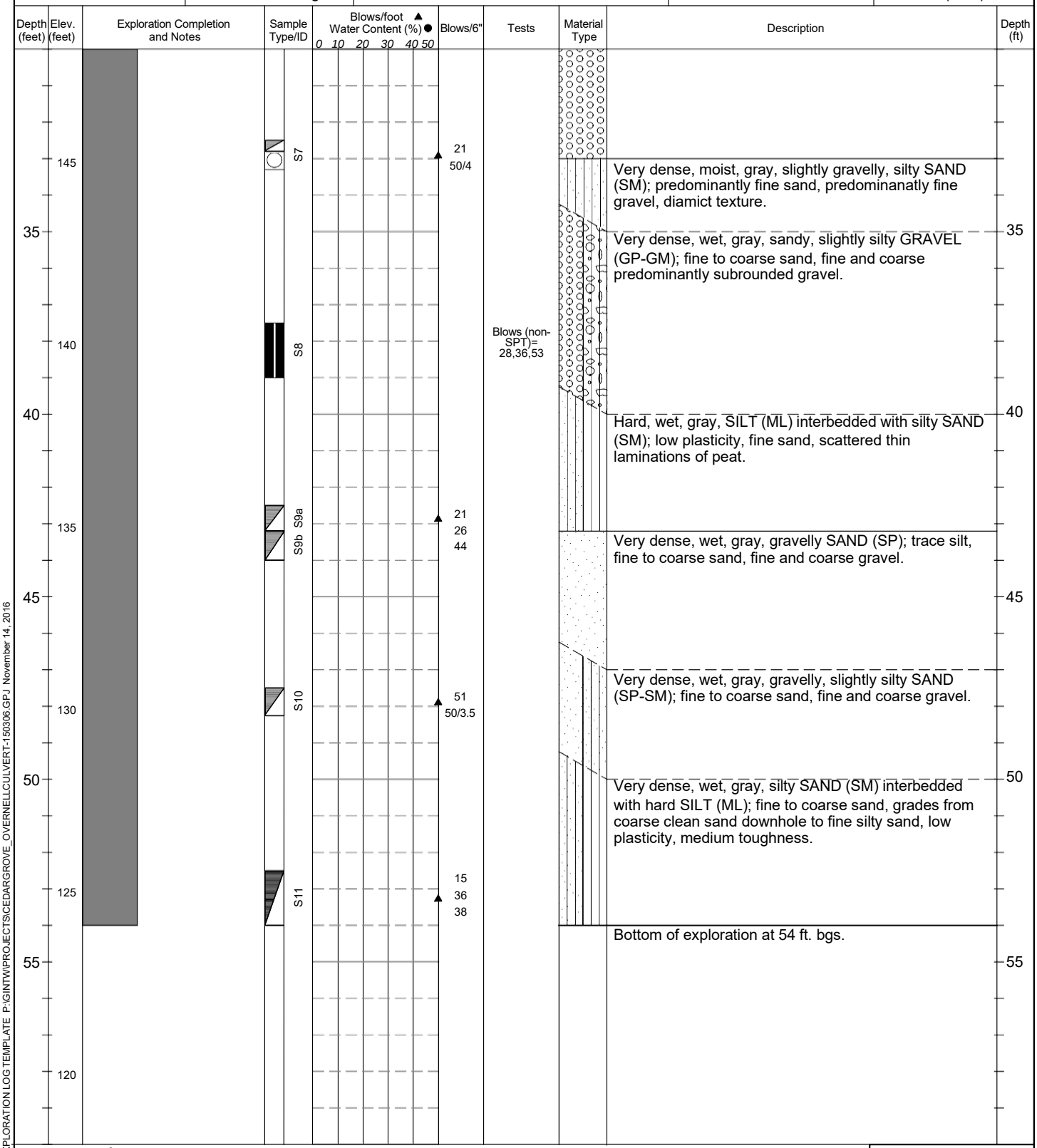
Exploration log B-1
Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\CEDARGROVE_OVERNELLCULVERT-150306.GPJ November 14, 2016

Cedar Grove Ovenell Culvert - 150306

Geotechnical Exploration Log

Project Address & Site Specific Location: Cedar Grove Road, Skagit County, Washington, West-end of culvert embankment.			Coordinates (Lat,Lon WGS84): 48.528, -121.739	Exploration Number: **B-1**
Contractor: Environmental Drilling Inc.	Equipment: Mobile Drilling B-61 rotary drill rig	Sampling Method: Autohammer; 140 lb hammer; 30" drop	Ground Surface (GS) Elev. (NAVD29): 178.1'	
Operator: Tom	Exploration Method(s): Hollow-stem Auger	Work Start/Completion Dates: 10/5/2016	Top of Casing Elev. (NAVD29): NA	Depth to Water (Below GS): 20' (ATD)



Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◪ Split Barrel 2" X 1.375" (SPT)
- ◧ Split Barrel 3" X 2.375" (Mod Cal)

Plastic Limit ⊢—⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JGF
Approved by: EOA

Exploration log B-1
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\CEDARGROVE_OVERNELLCULVERT-150306.GPJ November 14, 2016

Cedar Grove Ovenell Culvert - 150306

Geotechnical Exploration Log

Project Address & Site Specific Location: Cedar Grove Road, Skagit County, Washington, East-end of culvert embankment.			Coordinates (Lat,Lon WGS84): 48.528, -121.738	Exploration Number: **B-2**
Contractor: Environmental Drilling Inc.	Equipment: Mobile Drilling B-61 rotary drill rig	Sampling Method: Autohammer; 140 lb hammer; 30" drop	Ground Surface (GS) Elev. (NAVD29): 190.5'	
Operator: Tom	Exploration Method(s): Hollow-stem Auger	Work Start/Completion Dates: 10/5/2016	Top of Casing Elev. (NAVD29): NA	Depth to Water (Below GS): 11.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
0	190	Exploration backfilled with bentonite grout and bentonite chips, capped with cold-patch asphalt.	S1	▲	2 7 8			**ARTIFICIAL FILL** Medium dense, slightly moist, brown, slightly silty SAND (SW-SM).	
5	185		S2	▲	11 8 7			Medium dense, slightly moist, brown, gravelly, silty SAND (SM); fine to coarse sand, fine and coarse gravel.	5
		Broken gravel in sample shoe.	S3	▲	3 3 12			Dense, slightly moist, brown, gravelly, silty SAND (SM); fine to coarse sand, fine and coarse gravel.	
10	180	▽ 10/4/2016	S4	▲	18 21 10				10
			S5	● ▲	13 14 13	GS		**GLACIALLY OVERIDDEN DEPOSITS** Medium dense, wet, gray, slightly gravelly, slightly clayey SAND (SW-SC); moderate plasticity, fine to coarse sand, predominantly fine gravel.	
15	175							Very dense, wet, gray and brown mottled, gravelly, very silty SAND (SM); fine to coarse sand, fine and coarse gravel.	15
		Broken gravel in sample shoe.	S6	▲	26 35 30				
20	170		S7	▲	19 31 42			Very dense, wet, gray and brown mottled, gravelly, slightly silty SAND (SP-SM) interbedded with gray, SILT (ML); scattered thin beds, fine to coarse sand, fine and coarse gravel. Trace silt.	20
25	165		S8	▲	50/4			Very dense, wet, gray, gravelly, SAND (SP); trace silt, fine to coarse sand, fine and coarse predominantly subrounded gravel.	25

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◪ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢—⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JGF
Approved by: EOA

Exploration log B-2
Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\CEDARGROVE_OVERNELLCULVERT-150306.GPJ November 14, 2016

Cedar Grove Ovenell Culvert - 150306

Geotechnical Exploration Log

Project Address & Site Specific Location: Cedar Grove Road, Skagit County, Washington, East-end of culvert embankment.			Coordinates (Lat,Lon WGS84): 48.528, -121.738	Exploration Number: **B-2**
Contractor: Environmental Drilling Inc.	Equipment: Mobile Drilling B-61 rotary drill rig	Sampling Method: Autohammer; 140 lb hammer; 30" drop	Ground Surface (GS) Elev. (NAVD29): 190.5'	
Operator: Tom	Exploration Method(s): Hollow-stem Auger	Work Start/Completion Dates: 10/5/2016	Top of Casing Elev. (NAVD29): NA	Depth to Water (Below GS): 11.5' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
35	155		S9		50/5			Very dense, very moist, gray, silty SAND (SM) interbedded with SILT (ML); trace gravel, predominantly fine to medium sand, scattered peat thin laminations, numerous organics in silt interbeds.	35
			S10		21 25 50				
40	150								40
			S11		21 35 44				
45	145							Bottom of exploration at 44 ft. bgs.	45
50	140								50
55	135								55

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◪ Split Barrel 2" X 1.375" (SPT)

Plastic Limit ⊢—⊣ Liquid Limit

Water Level
- ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: JGF
Approved by: EOA

Exploration log B-2
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\CEDARGROVE_OVERNELLCULVERT-150306.GPJ November 14, 2016

APPENDIX B

Geotechnical Laboratory Test Results

B.1 Geotechnical Laboratory Testing

Geotechnical laboratory tests were conducted on selected soil samples collected during the field exploration program. Three samples were dispatched to Materials Testing and Consulting, Inc. of Burlington, Washington, for determination of moisture content and grain size distribution. Moisture content was determined by ASTM D2216 *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Grain size analysis was conducted in accordance with ASTM C 136 *Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.* USCS classifications were assigned in accordance with ASTM D-2487 *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*. The results of the tests are presented in Appendix B.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: Aspect Consultants
Address: Seattle, WA
Attn: Jesse Favia

Date: October 17, 2016
Project: Cedar Grove Ovenell Culvert
Project #: 16T023-04
Sample #: Several

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
x	Sieve Analysis	see attached	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count			
	Moisture Content			
	pH			
	Minimum Resistivity			
	Organic Content			
	Atterberg Limits			
	Asphalt Extraction/Gradation			
	Rice Density			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Cedar Grove Ovenell Culvert
Project #: 16T023-04
Client: Aspect Consultants
Source: B-1, S-3 at 12.5
Sample#: T16-1753

Date Received: 13-Oct-16
Sampled By: Client
Date Tested: 17-Oct-16
Tested By: KO, RB

ASTM D-2487 Unified Soils Classification System
SP, Poorly graded Sand
Sample Color:
Gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1166.04

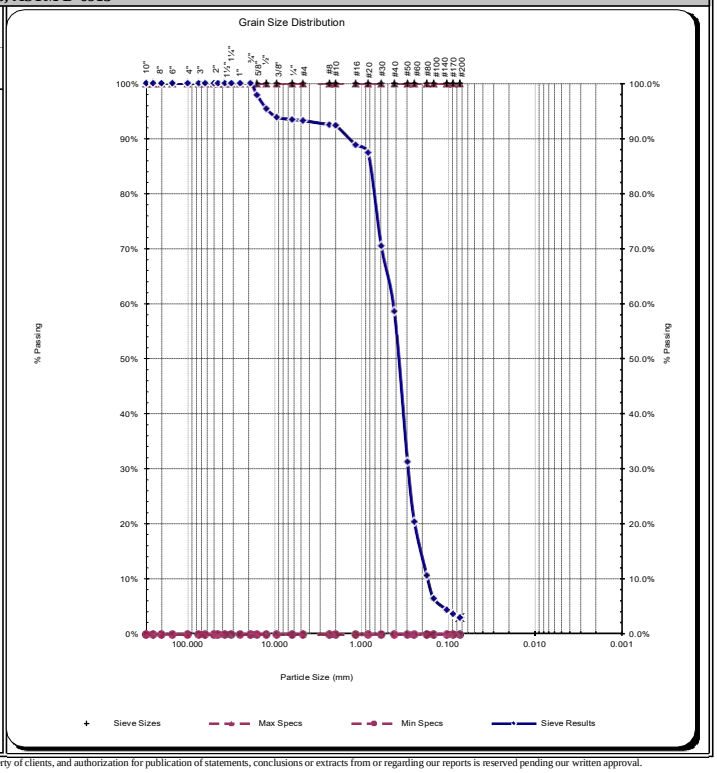
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.116	mm	% Gravel =	6.8%	Coeff. of Curvature, C_C = 1.11
$D_{(10)}$ =	0.175	mm	% Sand =	90.1%	Coeff. of Uniformity, C_U = 2.55
$D_{(15)}$ =	0.211	mm	% Silt & Clay =	3.1%	Fineness Modulus = 2.23
$D_{(30)}$ =	0.294	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.385	mm	Plasticity Index =	n/a	Moisture %, as sampled = 8.9%
$D_{(60)}$ =	0.445	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	1.450	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	1/19		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C-136, ASTM D-6913

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00		100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		98%	100.0%	0.0%
1/2"	12.50	95%	95%	100.0%	0.0%
3/8"	9.50	94%	94%	100.0%	0.0%
1/4"	6.30		93%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		92%	100.0%	0.0%
#10	2.00	92%	92%	100.0%	0.0%
#16	1.18		89%	100.0%	0.0%
#20	0.850	87%	87%	100.0%	0.0%
#30	0.600		70%	100.0%	0.0%
#40	0.425	59%	59%	100.0%	0.0%
#50	0.300		31%	100.0%	0.0%
#60	0.250	20%	20%	100.0%	0.0%
#80	0.180		11%	100.0%	0.0%
#100	0.150	7%	7%	100.0%	0.0%
#140	0.106		5%	100.0%	0.0%
#170	0.090		4%	100.0%	0.0%
#200	0.075	3.1%	3.1%	100.0%	0.0%



Comments: _____

Reviewed by: _____

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Cedar Grove Ovenell Culvert
Project #: 16T023-04
Client: Aspect Consultants
Source: B-1, S-4 at 17.5
Sample#: T16-1754

Date Received: 13-Oct-16
Sampled By: Client
Date Tested: 17-Oct-16
Tested By: KO, RB

ASTM D-2487 Unified Soils Classification System
GP-GM, Poorly graded Gravel with Silt and Sand
Sample Color:
Gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

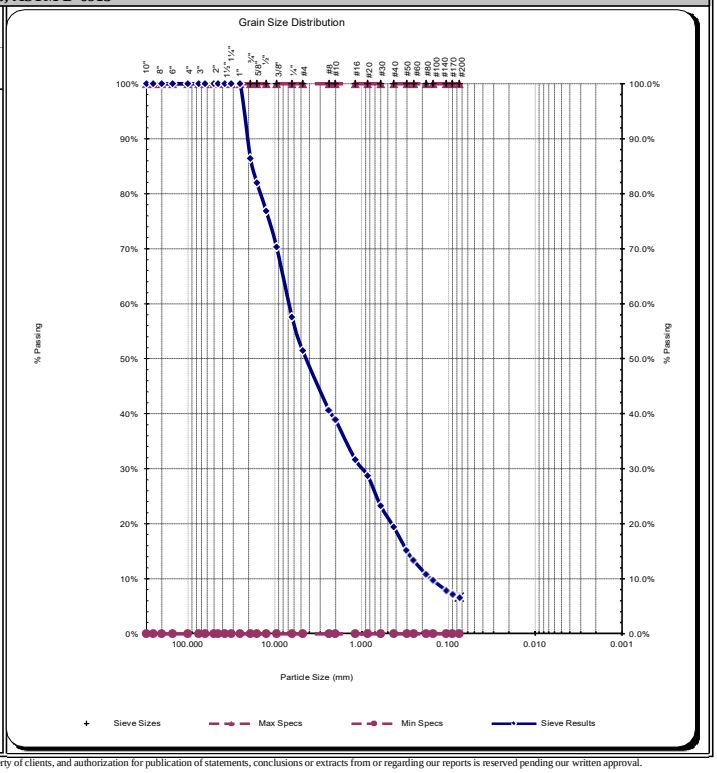
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.057	mm	% Gravel =	48.5%	Coeff. of Curvature, C_C = 0.90
$D_{(10)}$ =	0.158	mm	% Sand =	44.8%	Coeff. of Uniformity, C_U = 43.61
$D_{(15)}$ =	0.299	mm	% Silt & Clay =	6.6%	Fineness Modulus = 4.72
$D_{(30)}$ =	0.993	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	4.431	mm	Plasticity Index =	n/a	Moisture %, as sampled = 8.8%
$D_{(60)}$ =	6.903	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	20.574	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	27/79		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C-136, ASTM D-6913

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	86%	86%	100.0%	0.0%
5/8"	16.00		82%	100.0%	0.0%
1/2"	12.50	77%	77%	100.0%	0.0%
3/8"	9.50	70%	70%	100.0%	0.0%
1/4"	6.30		58%	100.0%	0.0%
#4	4.75	51%	51%	100.0%	0.0%
#8	2.36		41%	100.0%	0.0%
#10	2.00	39%	39%	100.0%	0.0%
#16	1.18		32%	100.0%	0.0%
#20	0.850	29%	29%	100.0%	0.0%
#30	0.600		23%	100.0%	0.0%
#40	0.425	19%	19%	100.0%	0.0%
#50	0.300		15%	100.0%	0.0%
#60	0.250	13%	13%	100.0%	0.0%
#80	0.180		11%	100.0%	0.0%
#100	0.150	10%	10%	100.0%	0.0%
#140	0.106		8%	100.0%	0.0%
#170	0.090		7%	100.0%	0.0%
#200	0.075	6.6%	6.6%	100.0%	0.0%



Comments: _____

Reviewed by: _____

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Cedar Grove Ovenell Culvert
Project #: 16T023-04
Client: Aspect Consultants
Source: B-2, S-5b at 13.2
Sample#: T16-1755

Date Received: 13-Oct-16
Sampled By: Client
Date Tested: 17-Oct-16
Tested By: KO, RB

ASTM D-2487 Unified Soils Classification System
SW-SC, Well-graded Sand with Silty Clay and Gravel
Sample Color:
Gray

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1166.04

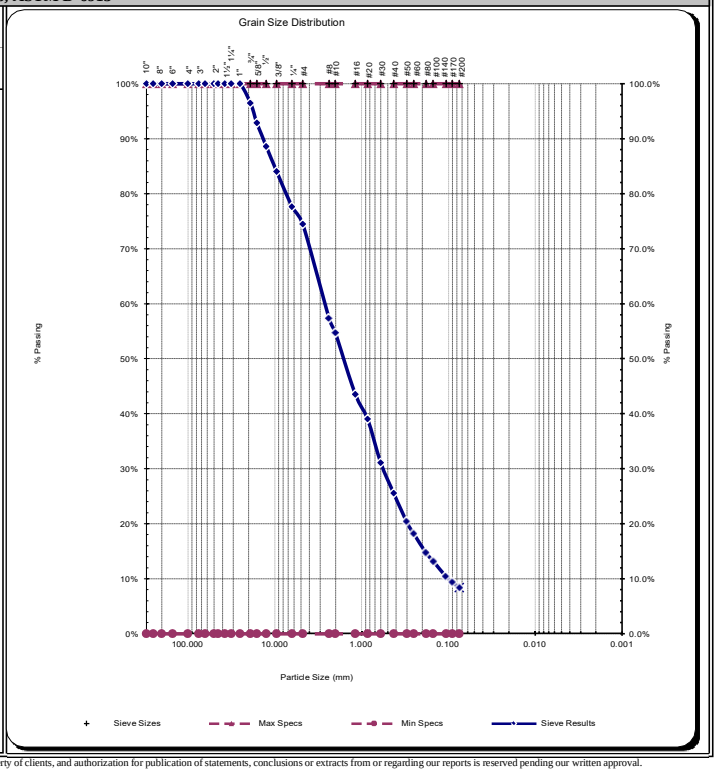
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.045	mm	% Gravel =	25.5%	Coeff. of Curvature, C_C = 1.17
$D_{(10)}$ =	0.100	mm	% Sand =	66.1%	Coeff. of Uniformity, C_U = 27.34
$D_{(15)}$ =	0.186	mm	% Silt & Clay =	8.4%	Fineness Modulus = 3.79
$D_{(30)}$ =	0.565	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	1.652	mm	Plasticity Index =	n/a	Moisture %, as sampled = 12.9%
$D_{(60)}$ =	2.732	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	13.632	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	25/76		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C-136, ASTM D-6913

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	96%	96%	100.0%	0.0%
5/8"	16.00		93%	100.0%	0.0%
1/2"	12.50	89%	89%	100.0%	0.0%
3/8"	9.50	84%	84%	100.0%	0.0%
1/4"	6.30		78%	100.0%	0.0%
#4	4.75	74%	74%	100.0%	0.0%
#8	2.36		57%	100.0%	0.0%
#10	2.00	55%	55%	100.0%	0.0%
#16	1.18		44%	100.0%	0.0%
#20	0.850	39%	39%	100.0%	0.0%
#30	0.600		31%	100.0%	0.0%
#40	0.425	26%	26%	100.0%	0.0%
#50	0.300		20%	100.0%	0.0%
#60	0.250	18%	18%	100.0%	0.0%
#80	0.180		15%	100.0%	0.0%
#100	0.150	13%	13%	100.0%	0.0%
#140	0.106		10%	100.0%	0.0%
#170	0.090		9%	100.0%	0.0%
#200	0.075	8.4%	8.4%	100.0%	0.0%



Comments: _____

Reviewed by: _____

`

APPENDIX C

Liquefaction Analysis Results

Liquefaction Hazard Evaluation Report
by WSLiq Program beta (May, 2009)

Site Name: Cedar Grove Ovenell Culvert, Northwest Abutment
Site Location (N,W) = 48.528 , 121.739
Job No: 150306
Analyst: CRS
Date: 1/17/2020 8:40:01 AM

=== Soil Profile ===
Unit: ft
The number of soil layers: 6
GWT at top of layer: 3
GWT depth: 10.00
SPT Energy Ratio (%): 80.00
Amplification Factors: a= -0.1500 b= -0.1300
Elevation: 0.00
Ground Surface: Level

Layer	Descpt.	Thickness (ft)	Unit Weight (lb/ft3)	Nm	N160	Vs ft/sec
1	Fill	5	120.00	21	47.6	867.3
2	Overbank_Deposits_ML	5	110.00	6	12.4	603.1
3	Overbank_Deposits_SP	7.5	115.00	3	5.0	493.3
4	Overbank_Deposits_GP-GM	2.5	120.00	20	30.5	855.2
5	Glacially_Overidden_SP	5	130.00	52	74.0	1128.2
6	Glacially_Overidden_GP	7.5	135.00	50	64.0	1115.4

Layer	FC (%)	PI	wc/LL	D50 (mm)	Ini. Eff. Stress (psf)	Ini. Total Stress (psf)
1	5	Unsat	Unsat	0.000	300.0	300.00
2	50	Unsat	Unsat	0.000	875.0	875.00
3	3.1	0	1	0.000	1347.3	1581.25
4	5	0	1	0.000	1616.5	2162.50
5	0	N.P.	N.P.	0.000	1857.5	2637.50
6	0	N.P.	N.P.	0.000	2298.8	3468.75

Soil Profile Plots

=== Susceptibility Evaluation ===

Threshold: 0.5
Weighting factors: B-I= 0.50 B-S= 0.50

Layer	PI	wc/LL	B-I	B-S	Suscep. Index	Potential
1	20.00	0.50	0.00	0.00	0.00	NO
2	20.00	0.50	0.00	0.00	0.00	NO
3	0.00	1.00	1.00	0.76	0.88	YES
4	0.00	1.00	1.00	0.76	0.88	YES
5	0.00	1.50	1.00	1.00	1.00	YES
6	0.00	1.50	1.00	1.00	1.00	YES

=== Initiation ===

Initiation - Single Scenario

Models Selected :
Use All Deterministic Models.

-----NCEER Model----------
--- PGA = 0.334 Mw = 5.50---------

Layer	(N1)60	CSR	CRR	FS	Nreq
3	5.0	0.096	0.072	0.75	7.9
4	30.5	0.106	3.000	28.20	9.2
5	74.0	0.110	3.000	27.20	9.7
6	64.0	0.112	3.000	26.87	9.8

---Boulanger and Idriss Model------------
--- PGA = 0.334 Mw = 5.50---------

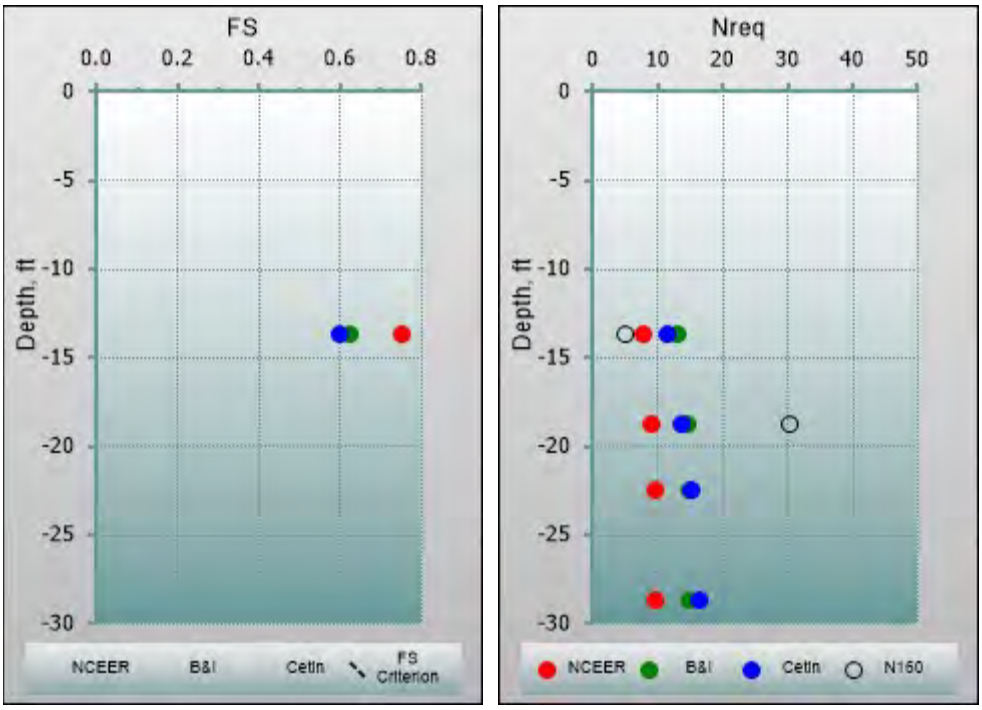
Layer	(N1)60	CSR	CRR	FS	Nreq
3	5.3	0.140	0.088	0.63	13.0
4	29.4	0.153	0.452	2.96	14.6
5	46.0	0.157	3.000	19.16	15.1
6	46.0	0.156	3.000	19.20	15.0

---Cetin et al. Model------------
--- PGA = 0.334 Mw = 5.50---------

Layer	(N1)60	CSR	CRR	FS	Nreq
3	5.0	0.244	0.147	0.60	11.7
4	30.5	0.274	0.996	3.63	13.7
5	74.0	0.287	3.000	10.44	15.3
6	64.0	0.299	3.000	10.03	16.7

Table of FS

#	Depth ft	NCEER	B&I	Cetin PL=0.60
3	-13.75	0.75	0.63	0.60
4	-18.75	28.20	2.96	3.63
5	-22.50	27.20	19.16	10.44
6	-28.75	26.87	19.20	10.03




```
=== Effects ===
--------------------------------------------------------------------------------


** Settlement **
-------------------------
>>>Single Scenario Results
Groud Surface Settlement SINGLE Scenario
Model Selected :
   Use all deterministic models.
----------------------------------------------------------------


Tokimatsu & Seed
================
Total ground surface settlement = 0.32 ft
--------------------------------------------------------------------------------
  #     Depth thickness    ev     Weight     dh
           ft        ft     %                 ft
--------------------------------------------------------------------------------
  3    13.75       7.5   4.226     1.00     0.32
  4    18.75       2.5   0.000     0.00     0.00
  5    22.50       5.0   0.001     0.00     0.00
  6    28.75       7.5   0.001     0.00     0.00
--------------------------------------------------------------------------------

Ishihara & Yoshimine
================
Total ground surface settlement = 0.38 ft
--------------------------------------------------------------------------------
```

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	13.75	7.5	5.087	1.00	0.38
4	18.75	2.5	0.001	0.00	0.00
5	22.50	5.0	0.001	0.00	0.00
6	28.75	7.5	0.001	0.00	0.00

Shamoto et al.

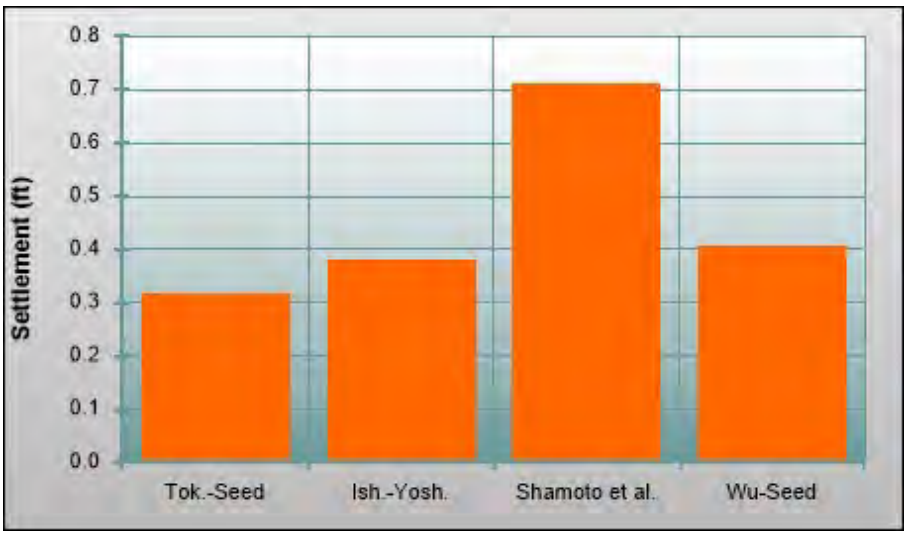
Total ground surface settlement = 0.71 ft

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	13.75	7.5	9.500	1.00	0.71
4	18.75	2.5	0.000	0.00	0.00
5	22.50	5.0	0.000	0.00	0.00
6	28.75	7.5	0.000	0.00	0.00

Wu & Seed

Total ground surface settlement = 0.41 ft

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	13.75	7.5	5.427	1.00	0.41
4	18.75	2.5	0.469	0.00	0.00
5	22.50	5.0	0.000	0.00	0.00
6	28.75	7.5	0.000	0.00	0.00



Liquefaction Hazard Evaluation Report
by WSLiq Program beta (May, 2009)

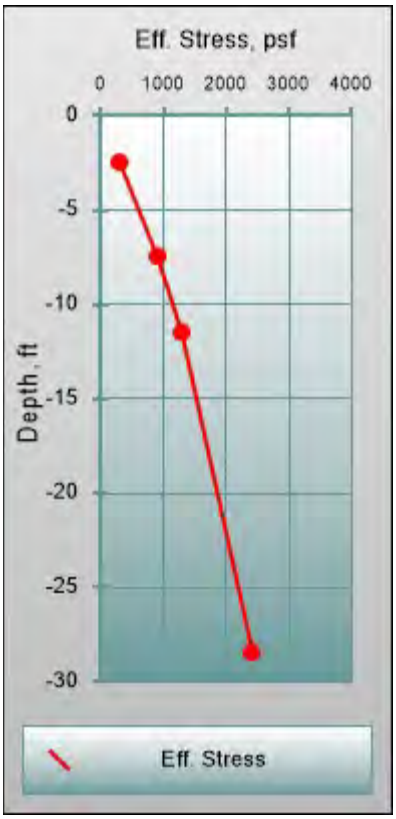
Site Name: Cedar Grove Ovenell Culvert, Southeast Abutment
Site Location (N,W) = 48.528 , 121.739
Job No: 150306
Analyst: CRS
Date: 9/17/2020 10:45:57 AM

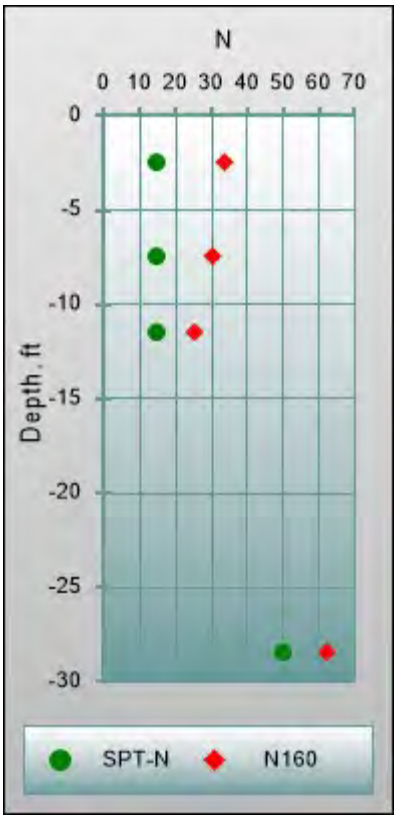
=== Soil Profile ===
Unit: ft
The number of soil layers: 4
GWT at top of layer: 3
GWT depth: 10.00
SPT Energy Ratio (%): 80.00
Amplification Factors: a= -0.1500 b= -0.1300
Elevation: 190.00
Ground Surface: Level

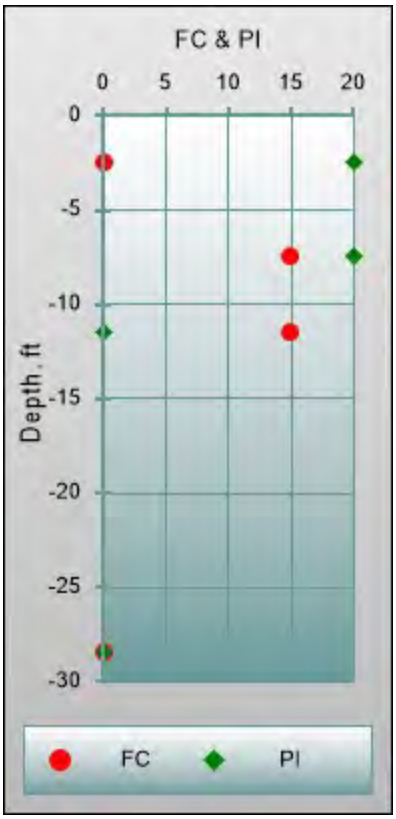
Layer	Descpt.	Thickness (ft)	Unit Weight (lb/ft3)	Nm	N160	Vs ft/sec
1	Fill_SW-SM	5	120.00	15	34.0	786.7
2	Fill_SM	5	120.00	15	30.7	786.7
3	Fill_SM_sat	3	120.00	15	25.7	786.7
4	glacially_overidden_deposits	31	130.00	50	62.3	1115.4

Layer	FC (%)	PI	wc/LL	D50 (mm)	Ini. Eff. Stress (psf)	Ini. Total Stress (psf)
1	0	Unsat	Unsat	0	300.0	300.00
2	15	Unsat	Unsat	0	900.0	900.00
3	15	0	0.01	0	1286.4	1380.00
4	0	N.P.	N.P.	0	2420.6	3575.00

Soil Profile Plots








```
=== Effects ===
--------------------------------------------------------------------------------


** Settlement **
-------------------------
>>>Single Scenario Results
Groud Surface Settlement SINGLE Scenario
Model Selected :
   Use all deterministic models.
----------------------------------------------------------------


Tokimatsu & Seed
================
Total ground surface settlement = 0.00 ft
--------------------------------------------------------------------------------
  #    Depth thickness     ev     Weight     dh
          ft        ft      %                ft
--------------------------------------------------------------------------------
  3    11.50       3.0    0.000     0.00     0.00
  4    28.50      31.0    0.001     0.00     0.00
--------------------------------------------------------------------------------

Ishihara & Yoshimine
================
Total ground surface settlement = 0.00 ft
--------------------------------------------------------------------------------
```

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	11.50	3.0	0.001	0.00	0.00
4	28.50	31.0	0.001	0.00	0.00

Shamoto et al.

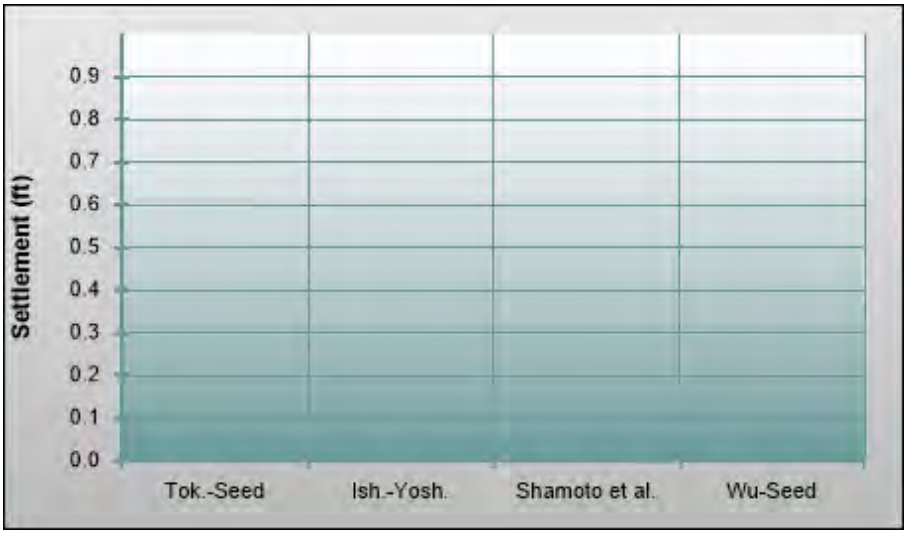
Total ground surface settlement = 0.00 ft

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	11.50	3.0	0.000	0.00	0.00
4	28.50	31.0	0.000	0.00	0.00

Wu & Seed

Total ground surface settlement = 0.00 ft

#	Depth ft	thickness ft	ev %	Weight	dh ft
3	11.50	3.0	0.335	0.00	0.00
4	28.50	31.0	0.000	0.00	0.00



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APPENDIX D

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

APPENDIX F

Hydraulic Report

Ovenell Slough Fish Passage Final Design
Final Design Technical Memorandum

Prepared by:
Aaron Lee, MS, EIT
Leif Embertson, MS, CFM, PE

Natural Systems Design, Inc.
1900 N. Northlake Way, Suite 211
Seattle, WA 98103

Prepared for:
Anne Streufert, PE

KPFF Consulting Engineers
1601 5th Avenue, Suite 1600
Seattle, WA 98101, Mount Vernon, WA 98273

INTRODUCTION

Project Overview

KPFF Consulting Engineers (KPFF) contracted Natural Systems Design, Inc. (NSD) to assist with hydraulic and scour evaluations for a new pedestrian bridge over Ovenell Slough in the Skagit River floodplain across from Concrete, WA. The project site is shown in the vicinity map, Figure 1. As part of this project, NSD evaluated the hydraulic parameters and scour potential for the proposed design of the pedestrian bridge. The existing crossing includes a 24-inch corrugated metal pipe culvert that acts a barrier to flow, sediment, and access to fish habitat in the upstream reaches of the Slough system. The intent of this project is to restore connectivity of Ovenell Slough to meet Washington Department of Fish and Wildlife (WDFW) Fish Passage Criteria, and to the natural flow and sediment transport regimes that sustain habitat forming processes. The proposed bridge span will be 77 feet long, 8 feet 7 inches wide, and set on pile-supported foundations. The proposed bridge structure will accommodate an open channel through the bridge opening with a 24-foot bottom width.

Scope of Work

The scope of services includes to evaluating hydraulic parameters and scour potential within Ovenell Slough and to assist KPFF Consulting Engineers (KPFF) and Skagit County Public Works Natural Resources Department (Skagit County) in developing final design plans for the replacement of the existing Cedar Grove Rd culvert. Natural Systems Design, Inc. (NSD) performed our services in general accordance with the scope of services attached in the sub-consultant agreement dated January 8, 2020 and authorized by KPFF. Our services performed are outlined below.

- Site Characterization
- Hydrology and Hydraulics
- Scour Analysis
- Technical memo

SITE CHARACTERISTICS

Ovenell Slough is an abandoned channel feature of the Skagit River located on the south side of the valley just downstream of the Baker River confluence near River Mile (RM) 56.8. The slough consists of a series of ponds, formed by channel spanning beaver dams that create a stepped longitudinal profile. Young to moderate-aged deciduous trees such as alder and cottonwood are present within the floodplain area surrounding Ovenell Slough. An existing roadway prism that connects Cedar Grove Avenue to a WDFW-owned parcel bisects the slough approximately 1,000 feet above the confluence with the Skagit River. The current crossing includes a 24-inch corrugated metal pipe (cmp) culvert that is approximately 84 feet long. Shown in Figure 1 is the project area map.

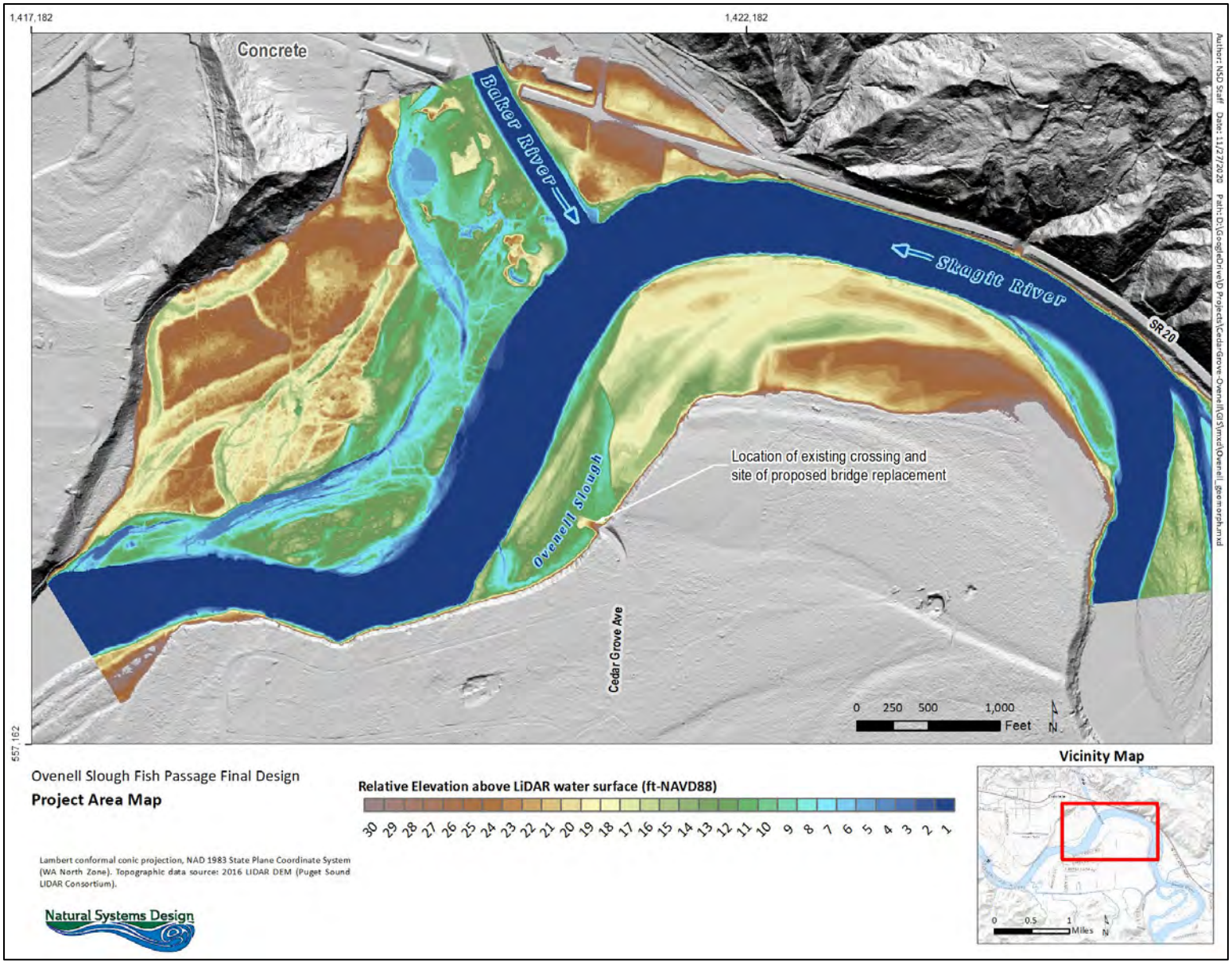

Figure 1. Project Area map for Ovenell Slough and the Skagit River. Current view is the general extent for the detailed analyses.

Geomorphic Reach Assessment

A desktop assessment was performed by NSD to define the reach setting for Ovenell Slough (NSD, 2020a). The 2019 alignment of the slough channel remains similar to conditions documented in 1937 by aerial photography, which indicates lateral stability of the system. Being situated on a floodplain terrace, Ovenell Slough is subject to inundation at high flow events but is not at immediate risk to avulsion or lateral migration from the Skagit River. The current crossing restricts the flow, sediment transport, and fish passage regimes within the slough. The reach above the existing crossing is typical of an impounded system, characterized by a broad channel with a relatively flat gradient. Downstream of the crossing exists a series of beaver dams that similarly impound sections of reach and provide local grade control. Historic field observations note the occurrence of beaver dams near their present locations (WDFW, 1994).

NSD staff conducted field investigations on January 23, 2020 and May 1, 2020 to support the geomorphic reach assessment and determination of minimum channel width for Ovenell Slough (NSD, 2020b). The proposed bridge will improve connectivity between the upstream and downstream segments of the slough for flow, sediment, and fish. It is expected that during the dry months when groundwater springs provide most of the flow, the system will be influenced by beaver dams even with the increased conveyance provided by the larger bridge opening. There is no anticipated change to downstream hydraulic or geomorphic controls and because Ovenell Slough is not a flow-through stream, there is not a significant risk of long-term channel bed adjustment. Given the relative stability of the channel there are no erosion hazards (i.e. hillslopes) or threats to infrastructure or private property. Refer to the detailed reach assessment and minimum channel width reports (NSD, 2020a; NSD, 2020b) for a complete discussion on geomorphic processes and reach setting of Ovenell Slough.

HYDROLOGY

The normal inflows to Ovenell Slough are groundwater seeps and springs that emerge from steep slopes along the valley margin that are underlain by unconsolidated glacial deposits. There are no surface water inflows to the slough; however, flow from the Skagit River backwaters into the site from the downstream end during periods of peak flow (approximately 2-year recurrence interval or greater). Large floods (approximately 10-year recurrence interval or greater) overtop the left bank of the Skagit River upstream of the culvert and inundate the entire floodplain surface. Since the Skagit River peak flow events drive hydraulic design and scour potential at the crossing site, a detailed hydrologic analysis specific to normal inflows to Ovenell Slough was not performed.

The hydrology used as input for the hydraulic model is based on the U.S. Army Corps of Engineers Water Management System Report for the Skagit and Baker Projects (USACE, 2017). This study is the basis for watershed planning particularly during flood events. Peak flows extracted from the existing hydraulic model at the inflow locations for the project site are listed in Table 1. Note that inflows have been calibrated to the observed November 2015 flood event and account for the effects of flow regulation in the upper basin.

Table 1. Peak flows provided by USACE CWMS model at hydraulic model inflow locations.

RECURRENCE INTERVAL (YEAR)	DISCHARGE (CFS) SKAGIT RIVER	DISCHARGE (CFS) BAKER RIVER
10	138,075	13,053
25	184,506	15,492
50	209,248	15,709
100	252,691	17,062
500	346,691	42,901

HYDRAULIC ANALYSIS

An existing hydraulic model (Corps model) developed by the USACE Seattle District in 2016 (USACE, 2017) was used as the base for the hydraulic analysis in this study. A combined one- and two-dimensional unsteady HEC-RAS model of the Skagit River Watershed model was previously calibrated for multiple flood events and includes the effects of flow regulation in the hydrologic input files. This is referred to as the Corps Water Management System (CWMS) HEC-RAS model in this report. NSD refined the existing hydraulic model using HEC-RAS version 5.0.7 to evaluate hydraulics and scour for the proposed conditions scenario. HEC-RAS computes depth-averaged hydraulic parameters such as depth, velocity, and shear stress at discrete cross-sections and considering the effects of structures such as bridges and weirs (USACE-HEC, 2016).

Hydraulic Model Geometry

The existing conditions model geometry in the project area is defined by a one-dimensional schematic with separate reaches defined for the Skagit River and Baker River. NSD truncated the Corps model geometry extents to reduce computation and processing time, leaving sufficient distance between the upstream and downstream boundaries relative to Ovenell Slough. An additional reach was added for Ovenell Slough, which begins in the floodplain and joins the Skagit River at river station (RS) 58.5652. Existing Skagit River cross-sections (RS 58.5652, RS 58.2105, RS 57.7136) were shortened to the left bank of the main channel, where the newly added Ovenell Slough cross-sections are joined by a lateral structure. The Ovenell Slough cross-section geometry was extracted from 2016 LiDAR data (QSI, 2017). Additional cross-sections were interpolated between existing Skagit River RS 58.5652and RS 57.2442.

When water surface elevations in the main channel of the Skagit River are sufficient to overtop the left bank, down-valley flow is conveyed through Ovenell Slough. The lateral structures that join left bank Skagit River with the Ovenell Slough channel are based on the 2016 LiDAR DEM, and assume a weir coefficient representative of overland flow, 0.5. Junctions were included to receive flow from the Baker River and Ovenell Slough, respectively. This setup allows flow exchange between the Skagit River mainstem and its floodplain, and quantification of hydraulic parameters within Ovenell Slough and the proposed crossing specifically. Additional cross-sections were interpolated at a distance of 150 feet and 40 feet in the immediate vicinity of the proposed bridge. Refer to Figure 2 and Figure 3 for the cross-section layout in the HEC-RAS hydraulic model. Manning's n-values in Ovenell Slough are consistent with previously calibrated values from the CWMS model.

Figure 2. HEC-RAS 1D model schematic for the Skagit River, Ovenell Slough, and Baker River. Flow direction is from right to left of figure. Aerial image provided by Google.

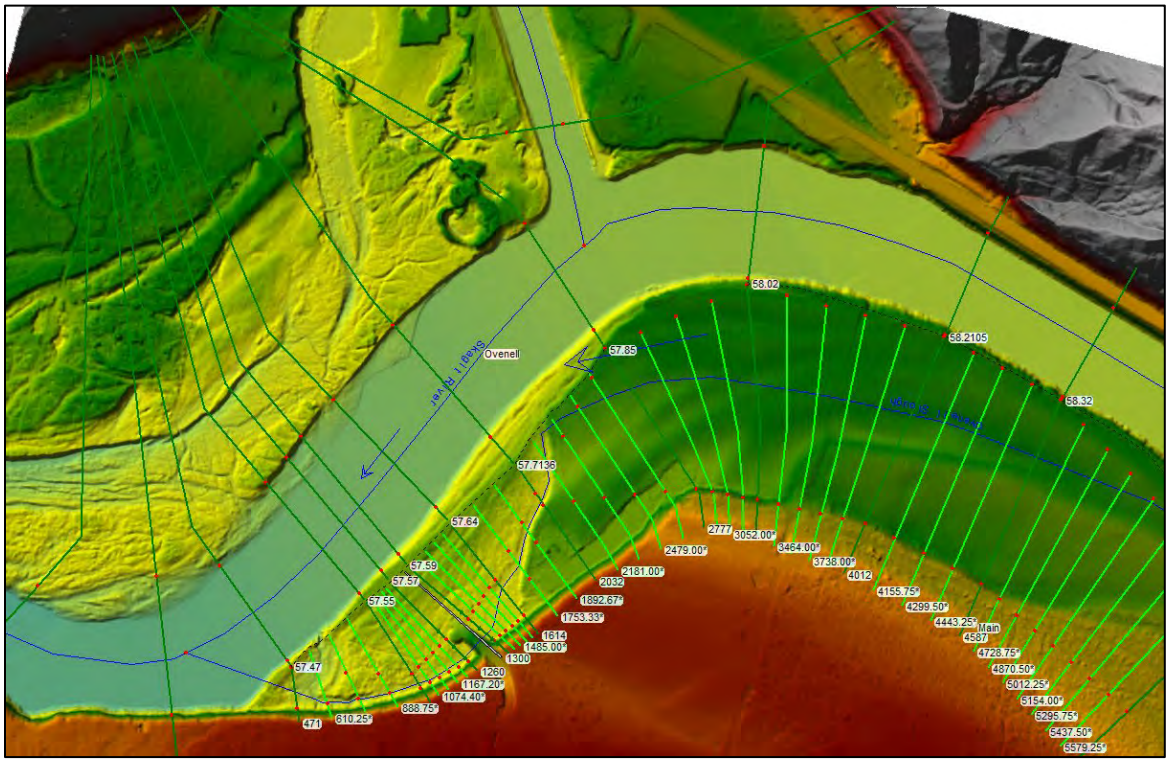

Figure 3. Zoomed view of the hydraulic model geometry. Ovenell Slough is in the bottom-center of figure with flow direction from right to left. The 2016 LiDAR DEM is shown in the background.

A proposed conditions model was developed for the final design of the pedestrian bridge crossing Ovenell Slough. The structure is modeled with the multiple opening analysis option since flow is conveyed through the entire Skagit River valley bottom in addition to the bridge opening. The top of deck elevation varies from approximately 198 feet to 173 feet at existing ground and has a span of 77 feet. The channel through the bridge opening has a bottom width of 24 feet with side slopes at 2:1 and 1:1.75 (H:V) for the left and right banks, respectively. Refer to Figure 4 for a schematic of the multiple opening in the hydraulic model. Ineffective areas were defined at the abutment fill slopes, and expansion and contraction coefficients at the structure openings were increased to account for energy losses through the bridge.

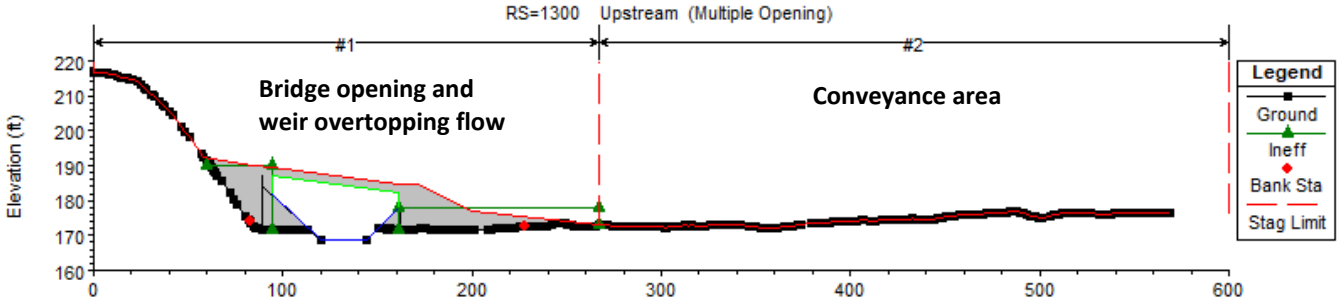

Figure 4. Proposed bridge represented in the hydraulic model geometry as a multiple opening type structure at Ovenell Slough RS 1300. Structure elevations and dimensions are based on the final design plans.

Hydraulic Model Inflows

There are three upstream inflow boundary conditions for the Skagit River at RS 64.1468, Baker River at 0.8301, and Ovenell Slough at RS 5721. Inflows for the Skagit River and Baker River were extracted from the CWMS HEC-RAS model (refer to Table 1) for the 10-, 25-, 50-, 100-, and 500-year peak discharges. The upstream boundary condition for Ovenell Slough is a constant flow of 200 cfs. Though there is no source of inflow at this location in reality, the pilot flow of 200 cfs provides a minimal amount of flow to stabilize the model since channels in one-dimensional HEC-RAS models are not allowed to run dry. This magnitude of flow, 200 cfs, does not influence results in the context of peak discharges of flood events. The downstream boundary condition at Skagit River RS 52.6944 uses the stage hydrograph extracted at the same location in the CWMS model output (Figure 5). Using output from the CWMS model for boundary conditions in the proposed conditions model ensures that results computed at the proposed bridge are consistent with the calibrated flood-scale model. The proposed conditions model was simulated as a full-unsteady analysis with a mixed flow regime (sub- and super-critical flows).

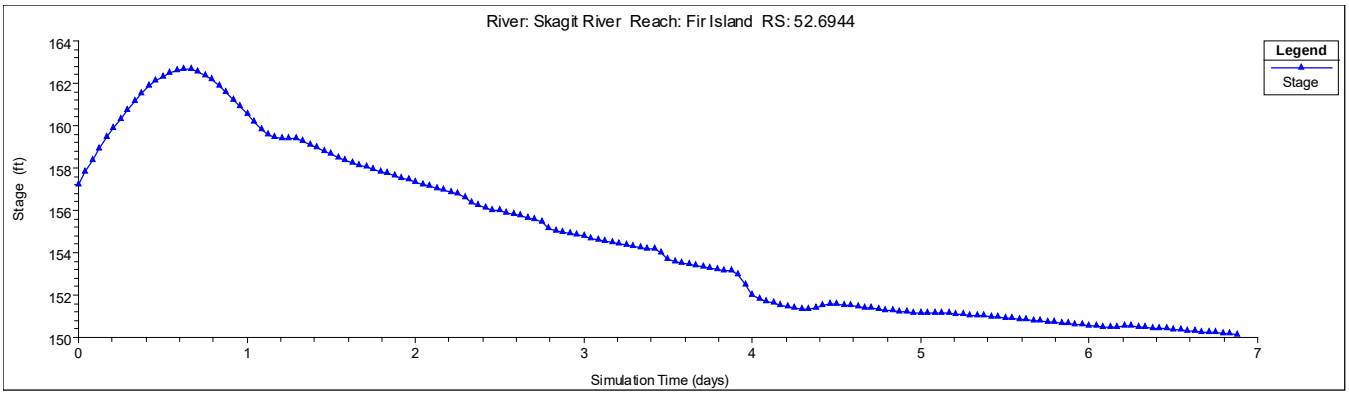

Figure 5. Downstream boundary condition at Skagit River RS 52.6944 as a stage hydrograph, for the 100-year event. This curve was extracted from the previously calibrated CWMS HEC-RAS model.

Hydraulic Model Results

A summary of the results from the proposed conditions hydraulic model is shown in Table 2. Detailed HEC-RAS output is included in Appendix A. At approximately 140,000 cfs, or the 10-year recurrence interval peak discharge, the Skagit River overtops its left bank and spills into Ovenell Slough where flow is conveyed in a down-valley direction. Below this threshold, connection with the Skagit River occurs at the outlet under backwater conditions (2-year to 10-year discharge) and fills the slough in an up-valley direction. When considering design criteria of the proposed bridge across Ovenell Slough, flood flows greater than the 10-year discharge will result in more severe hydraulic and scour conditions from the Skagit River at the proposed structure. Figure 6 plots the proposed bridge and water surface elevations at various peak discharges.

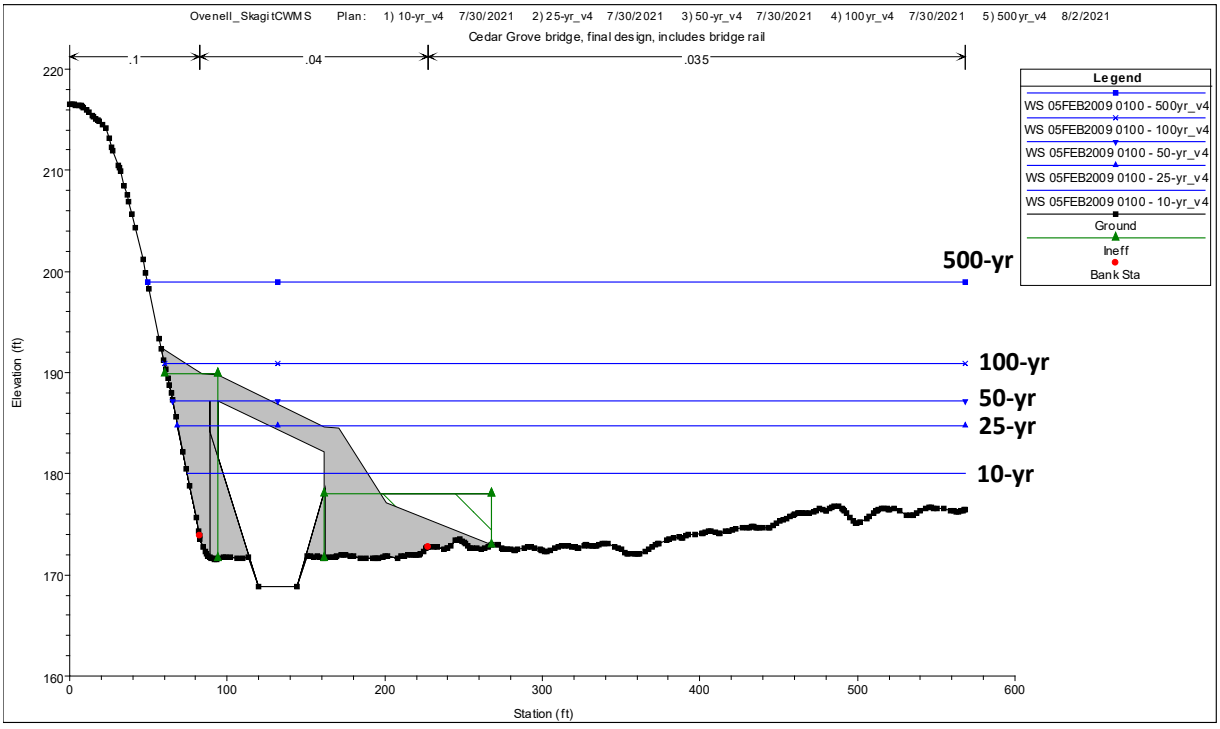

Figure 6. HEC-RAS cross-section plot of Ovenell Slough RS 1300, proposed bridge. Water surface elevations are shown for the 10-, 25-, 50-, 100-, and 500-year peak discharges.

At the 10-year peak discharge, the left bank of the Skagit River is overtopped near RS 58.32 and flows downstream through Ovenell Slough. The slough is inundated by 8-10 feet at the proposed bridge site. When Ovenell Slough receives overbank flow, water passes through the bridge opening in addition to conveyance in the floodplain around the structure. The proposed bridge is near fully overtopped at the 25-year peak discharge and begins to crest over the top of the right abutment. Velocity through the bridge is relatively low for the 10- and 25-year events, 0.6 and 1.1 feet/second (ft/s), respectively. Velocity in the floodplain is slightly higher, 0.8 ft/s at the 10-year and 1.7 ft/s at the 25-year event since the bridge acts as a local barrier to flow.

At the 50-year event, the bridge opening is nearly submerged which leads to pressure flow conditions through the channel and weir flow over the bridge deck. Most of the Skagit River valley bottom is inundated at the 50-year discharge, though down-valley flow through Ovenell Slough is not yet backwatered from the Skagit River.

The top of the bridge deck is near completely submerged during the 100-year event and above. For these larger magnitude flows, hydraulics at the bridge site are drowned out by the valley-wide conditions of the Skagit River. Within Ovenell Slough, conditions at the 100-year discharge are characterized by deep (~20 feet) and slow moving (0.2 ft/s) water at subcritical flow. Refer to Table 2 for a summary of hydraulic model output for the peak discharges analyzed at the proposed bridge.

Table 2. Summary of HEC-RAS output for Ovenell Slough RS 1300, 90% bridge design.

RECURRENCE INTERVAL (Years)	DISCHARGE AT BRIDGE* (cfs)	VELOCITY (ft/s)	FLOW AREA (ft^2)	SHEAR STRESS (lb/ft^2)	WATER SURFACE EL. (ft-NAVD88)
10	412	0.6	659	0.01	180.0
25	1,344	1.1	776	0.10	184.7
50	1,605	1.1	817	0.10	187.2
100	1,789	0.2	2,300	0.01	190.9
500	1,765	0.1	4,010	0.0	199.0

*Discharge at bridge includes flow through the opening and weir flow overtopping the bridge deck

Design and Regulatory Considerations

Design criteria for hydraulic loading was established by the Value Engineering (VE) workshop conducted on January 23, 2020 (KPFF, 2020). The results of the workshop led to a relaxation of the normal design events for hydraulic loading as follows:

- Proposed bridge is functional at the 10-year event,
- Minimal repair at the 25-year event, and
- Repairable at the 100-year event.

The project site, including the location of the proposed bridge is located within a reach of river with a FEMA Zone AE floodplain but is not located in a regulatory floodway according to the Federal Emergency Management Agency (FEMA) effective flood insurance study and insurance rate map (FEMA, 1985, FEMA, 1989). Accordingly, the project is not subject to a “no-rise” certification per Skagit County Code.

BRIDGE SCOUR ASSESSMENT

A scour analysis was performed to evaluate scour depths and elevations during the 25-, 50- and 100-year peak discharges such that the proposed bridge would be designed and constructed to withstand the expected amount of scour while meeting all appropriate standards and safety factors, including the design criteria established in the VE workshop (KPFF, 2020). The following sections provide detailed information on specific components of the scour analysis, data used, and results. The scour calculations assume an infinite depth of erodible material with a homogeneous particle size distribution. A median sediment particle size (D50) of 2

millimeter (mm) was used, based on field observations of channel substrate within Ovenell Slough – notably an absence of coarse-grained material (gravel, cobble).

Methods

A quantitative evaluation of the scour potential at the proposed bridge crossing was carried out following the procedures outlined in Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 18 (HEC-18), Fifth Edition (FHWA, 2012). Scour components considered in the calculations include abutment scour, and pier scour. Ovenell Slough is an inset channel within the left floodplain surface of the Skagit River, and the proposed bridge structure has a relatively small footprint on the Skagit River valley bottom when flows relevant to scour occur. Contraction scour is not considered a primary mechanism type because the low-velocity flow is spread throughout the floodplain and is not limited to the bridge opening.

During flood flows the left abutment will be exposed to local scour at the toe of the abutment fill slope. The corresponding equation in the HEC-18 manual is 8.1 (Froehlich's Abutment Scour Equation). The right abutment will act as a single wide pier where flow passes around both sides of the fill zone, which will expose the upstream toe of the abutment fill slope to scour similar to a typical wide bridge pier. The corresponding equation in the HEC-18 manual is 7.1. Long-term degradation is not considered in this analysis due to the stable geomorphic setting of the reach. Refer to the Geomorphic Reach Assessment section for a detailed explanation.

Results

A summary of the results of the scour calculations is presented in Table 3 below and detailed worksheets are included in Appendix B. The computed scour depths indicate significant channel scour is not expected at either the left (east) or right (west) abutment. The highest values of scour are computed for the 25- and 50-year peak events, where the combination of depth and velocity is most severe through the bridge opening. For the left and right abutments, the maximum scour is 5.4 feet and 5.0 feet, respectively. It is recommended that bridge foundations should be set at least as deep bottom elevation maximum scour elevation or abutment protection be installed to protect both abutments from scour. Given the low velocities during flood flows and design criteria for this project, we recommend environmentally sensitive scour protection be incorporated into the project design. Note that the following estimates of scour are considered conservative under the most severe conditions computed at the bridge opening by the hydraulic model.

Table 3. Summary of scour assessment results.

RECURRENCE INTERVAL (Years)	LEFT ABUTMENT SCOUR (ft)	RIGHT ABUTMENT SCOUR (ft)
25	5.3	5.0
50	5.4	5.0
100	2.6	1.1
Maximum Computed Scour (ft)	5.4	5.0
Channel Bed Elevation (ft, NAVD88)	168.8	168.8
Scour Elevation* (ft, NAVD88)	163.4	163.8

* Scour Elevation is the difference between the Channel Bed Elevation and Maximum Computed Scour.

SCOUR PROTECTION DESIGN

The proposed bridge design will increase conveyance through Ovenell Slough and significantly improve connectivity for flow, sediment, fish connectivity to off-channel areas compared to the existing culvert. The final design specifies the bridge abutments to be set on pile-supported foundations, set well below the computed scour elevations. To protect the abutment fill from erosion, and potential damage to the concrete wingwalls or landing pads, the placement of large wood at the upstream face of both abutment fill zones is proposed. The engineered log jams (ELJs) will dissipate flow energy, deflect flow away from the abutment fill, and promote sustained habitat forming features within Ovenell Slough. Live siltation is proposed along the toe of both streambanks to provide resistance to erosion along the proposed channel through the bridge opening. The ELJs are placed at the areas of highest susceptibility to scour, where contraction of flood flows from the Skagit River accelerate through the upstream face of the abutment fill corners through the bridge opening. The primary purpose of the ELJs is to displace scour upstream from the abutment fill, while also providing instream habitat.

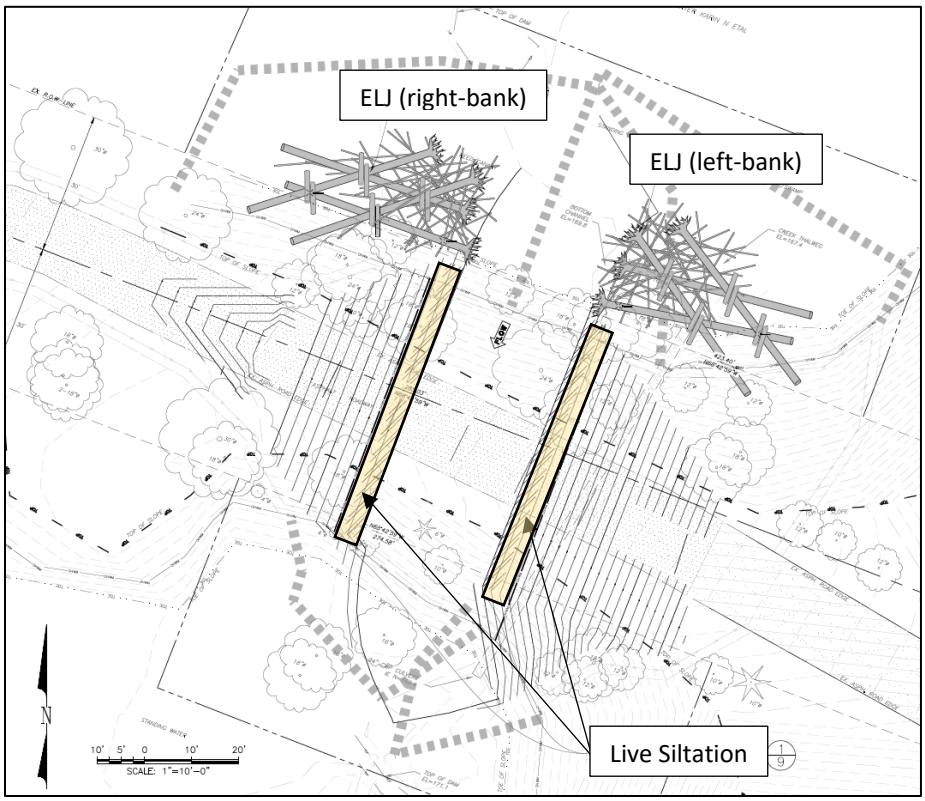

Figure 7. Proposed layout of ELJ design and live siltation extent (yellow).

Engineered Log Jams (ELJs)

Two ELJs are proposed, one structure on the left upstream abutment fill face and one on the right upstream abutment fill face. The proposed ELJs are composed of large rootwad pieces of conifer trees, such as Cedar or Douglas Fir, that cover approximately 40 feet along the toe of the fill slope and project 20 feet upstream from the toe of the fill slope. The rootwad pieces are overlapping in placement, such that a continuous line of protection is created. Stability and ballast are provided by timber piles installed at a batter angle and do not require metal cable connections or rock. Wood debris, such as branches and small cuttings, are placed throughout the structure to reduce porosity and to provide immediate protection to exposed bare soil or

channel bed. The rootwad pieces can be placed directly on existing ground and do not need to be excavated. If significant erosion occurs at the wood structure, the rootwad pieces will self-settle to provide protection at the new elevation upstream of the abutment fill toe.

ELJ Stability Analysis

The proposed logjams will be subjected to hydrodynamic forces once exposed to flow within the floodplain area of the Skagit River, thus in order to achieve long-term stability, these structures must be engineered and constructed to remain stable as guided by risk-based engineering analyses. The primary forces acting on the proposed ELJs include horizontal forces (acting in the downstream direction) of hydrostatic force from a water surface elevation difference between upstream and downstream and hydraulic drag imposed by moving water. Vertical forces acting upon the proposed ELJs include the upward force of buoyancy from the volume of wood used in structure construction and hydraulic lift. Horizontal forces are resisted by friction against the channel bed when a net downward force (normal force) exceeds the buoyant force, as well as by lateral resistance provided by buried vertical members. Vertical forces are resisted by buried vertical members that exceed the imposed buoyant forces through “skin” friction between subgrade particles. For this design, embedded timber piles (driven) serve as the primary mechanism for resisting both horizontal and vertical forces acted upon the ELJs.

The primary design considerations for a pile or post-based design are 1) the embedment depth beneath the channel bed and the anticipated depth of scour and 2) the diameter, species and condition of the pile or post relied upon for providing the lateral and vertical resistance. The design embedment depth is determined by achieving the depth necessary to provide the skin-friction required to resist buoyancy (skin-friction is proportional to the depth of embedment) while also achieving the necessary lateral resistance provided by passive earth pressure against the piles. A critical element in protecting the core of the ELJ structure and the piles/posts and key members within it is the retention of the smaller racking material at the face. Racking material distributes the hydraulic loading across multiple structural members, encourages scour towards the outward edge of the structure, and provides interstitial spaces for habitat. The primary design inputs specific to each structure type include the structure width, number of logs and rootwads, number of piles and relative embedment depths. Refer to Table 4 for a summary of the primary design inputs for the stability analysis and Table 5 for a summary of the stability analysis and resulting factors of safety for the design.

Table 4. Summary of primary ELJ design inputs into stability analysis

DESIGN PARAMETER	ELJ
ELJ Width/Active Channel Width, ft	40/510
Channel blockage ratio (Area of ELJ/Flow Area)	0.08
Design structure height, ft	4.5
Design flow depth, ft	21.9
Design flow velocity, ft/s	1.0
Design hydrostatic head, ft	0
Height of Load Application above channel bed, ft	4.5
Design submergence, %	100
Design subgrade, class[1]	Silt
# of piles	8
Pile diameter, in	16
Pile installation method and subgrade coefficient	Driven, K=1.25
Pile species (Design bending capacity)	Douglas-fir (2,050 psi)
Embedment, ft below channel bed	30
Design scour depth, ft	5
Design scour distribution	
100% Scour, # of piles/posts (resulting embedment)	4 (10)
33% Scour, # of piles/posts(resulting embedment	4 (13)

1. No geotechnical exploration was conducted. Based on field observations.

Using spreadsheet calculations which follow methods outlined in Knutson and Fealko (2014) Risk Based Design Guidelines, Load and Resistance Factor Design (LRFD) methodology for timber piles as outlined by the American Wood Council National Design Standards, and various other engineering texts and empirical studies in and around large wood design, the target factor of safety for horizontal and vertical loads, as outlined by Knutson and Fealko (2014) are 1.5 and 1.75, respectively for the 50-year flow event. This design meets or exceeds the 1.5 (horizontal) and 1.75 (vertical) recommended factors of safety at the 100-year event.

Table 5. Summary design results and resulting factors of safety

DESIGN PARAMETER	ELJ
Design Event, RI, year	100
Design Event, Q, cfs	11,600
Public Safety Risk	High
Property Damage Risk	Moderate
Buoyancy Factor of Safety, Required	1.75
Buoyancy Factor of Safety, Design, Driven Pile	6.6
Lateral Factor of Safety, Required	1.5
Lateral Factor of Safety, Design	1.9
Pile Capacity Factor of Safety, Required	1.5
Pile Capacity Factor of Safety, Design	173.6

Live Siltation and Planting

Behind the extents of the longitudinal scour protection and the abutment fill, native trees such Douglas fir, Cedar, spruce, and cottonwood should be planted to provide long-term scour protection. The toe of the abutment fill behind the ELJs and through the bridge opening is designed to be protected by one vertical row of live siltation. This protection extends up the abutment fill slope to approximately the Ordinary High Water elevation. Live siltation is a revegetation technique to secure the toe of a streambank with living branches of

willow and spirea (NCHRP, 2004). The live siltation design incorporates coir log that is secured by hemp rope and wooden stakes at the toe of the proposed abutment fill, with the hardwood cuttings placed in a narrow trench on the landward side of the coir log, and backfilled to proposed grade with native excavated soil. This method will provide immediate erosion resistance as well as cover and habitat for fish. Refer to Figure 8 for a typical detail of the live siltation design in section view.

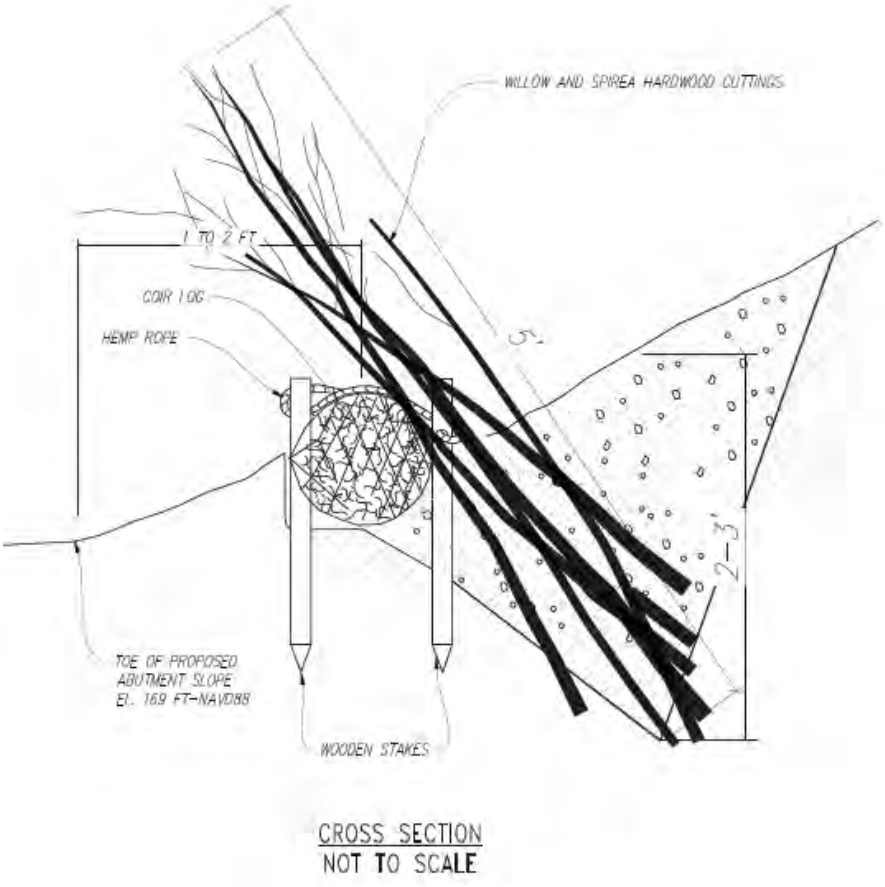

Figure 8. Typical live siltation detail in section view.

Engineers Estimate

The construction cost estimates presented for this project are largely based on our professional judgment, consultation with construction contractors and recent experience on similar projects (Appendix C). Construction quantities for each element were multiplied by their respective unit costs, and the resulting products totaled into a construction sub-total. Additional fees for taxes, contingencies, and incidentals were accounted for as a percentage of the construction sub-total. The construction sub-total was then increased by the percentages of the additional fees to estimate the total construction cost. The construction costs do not include field engineering and construction observation fees.

Risk

Anticipated channel response to the proposed bridge and scour protection design is low, considering Ovenell Slough is a floodplain channel primarily connected by backwater conditions induced by elevated Skagit River flows (NSD, 2020a). Proposed design will improve connectivity in the slough through the entire year and will

increase conveyance in the floodplain when the Skagit River is above the 5-year event. The proposed design will not increase risk of flooding at the 100-year flow, as the local increase in water surface elevation is computed at 0.02 ft, which is well below the allowable 1 ft increase in the special flood hazard area. The risk of erosion is low for the project area. Private residences and public infrastructure are located on an elevated terrace outside of the 100-year inundation area, and proposed design will not affect hydraulic conditions or susceptibility of the hillslope to erosion.

LIMITATIONS

NSD has prepared this report for KPFF, their authorized agents and regulatory agencies responsible for the Ovenell Slough Fish Passage Final Design project. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for river restoration and the engineered placement of wood in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment, and experience. No warranty or other conditions, expressed or implied, should be understood.

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APPENDIX A

HEC-RAS Model Results

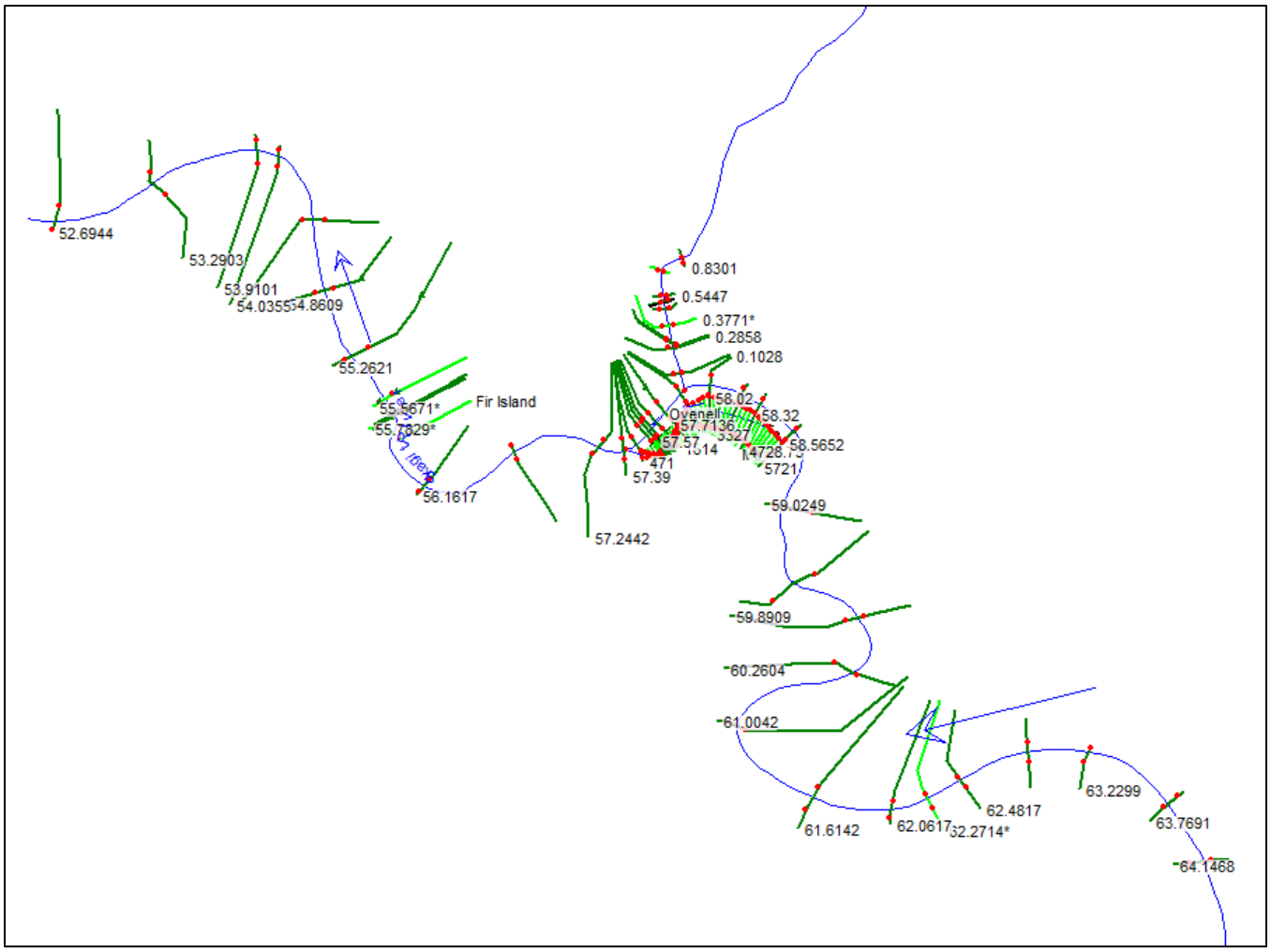

Figure 1. HEC-RAS model geometry

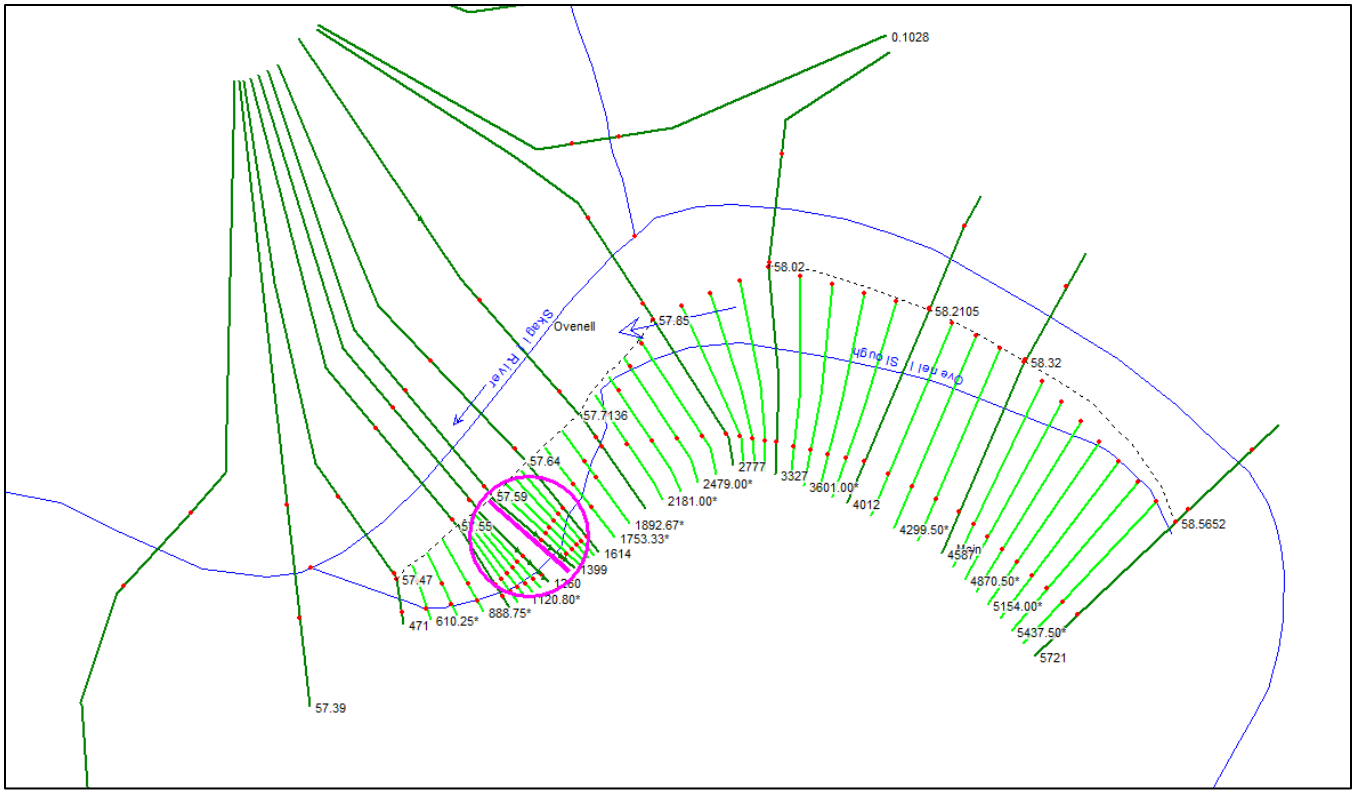

Figure 2. HEC-RAS model geometry, zoomed view centered at Ovenell Slough. The proposed bridge is highlighted in pink.

Table 1. Baker River, 10-yr output.

HEC-RAS Plan: 10-yr_v4 River: Baker River Reach: Baker-Skagit Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Baker-Skagit	0.8301	05FEB2009 0100	9460.00	175.16	184.26		185.54	0.003201	9.08	1041.36	137.15	0.58
Baker-Skagit	0.6883*	05FEB2009 0100	9463.81	169.45	183.14		183.82	0.001239	6.61	1430.77	148.45	0.38
Baker-Skagit	0.5447	05FEB2009 0100	9467.86	163.74	182.84		183.18	0.000424	4.68	2022.59	152.19	0.23
Baker-Skagit	0.5153	05FEB2009 0100	9468.83	163.74	182.97	170.75	183.12	0.000155	3.13	3028.54	194.67	0.14
Baker-Skagit	0.5082		Inl Struct									
Baker-Skagit	0.4685	05FEB2009 0100	9468.83	158.25	180.36		180.44	0.000077	2.30	4124.56	262.06	0.10
Baker-Skagit	0.3771*	05FEB2009 0100	9469.83	157.30	180.35		180.41	0.000054	1.96	4883.74	346.57	0.09
Baker-Skagit	0.2858	05FEB2009 0100	9471.08	156.35	180.35		180.39	0.000038	1.68	5965.07	451.94	0.07
Baker-Skagit	0.2778	05FEB2009 0100	9471.21	156.35	180.34		180.39	0.000036	1.73	5964.84	448.90	0.07
Baker-Skagit	0.2517	05FEB2009 0100	9472.03	156.35	180.35		180.38	0.000034	1.59	7556.61	900.75	0.07
Baker-Skagit	0.1028	05FEB2009 0100	9478.07	153.35	180.34		180.36	0.000022	1.27	13138.92	1389.57	0.05

Table 2. Baker River, 25-yr output.

HEC-RAS Plan: 25-yr_v4 River: Baker River Reach: Baker-Skagit Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Baker-Skagit	0.8301	05FEB2009 0100	11708.00	175.16	186.26		187.47	0.002393	8.84	1323.94	144.68	0.52
Baker-Skagit	0.6883*	05FEB2009 0100	11710.00	169.45	185.53		186.19	0.000970	6.52	1796.28	157.31	0.34
Baker-Skagit	0.5447	05FEB2009 0100	11711.76	163.74	185.30		185.67	0.000383	4.87	2403.29	157.11	0.22
Baker-Skagit	0.5153	05FEB2009 0100	11712.17	163.74	185.45	171.50	185.62	0.000156	3.33	3521.87	206.38	0.14
Baker-Skagit	0.5082		Inl Struct									
Baker-Skagit	0.4685	05FEB2009 0100	11712.17	158.25	184.91		184.98	0.000051	2.19	5385.88	295.97	0.09
Baker-Skagit	0.3771*	05FEB2009 0100	11713.11	157.30	184.91		184.96	0.000035	1.87	6572.47	386.91	0.07
Baker-Skagit	0.2858	05FEB2009 0100	11714.29	156.35	184.91		184.95	0.000025	1.61	8108.40	495.91	0.06
Baker-Skagit	0.2778	05FEB2009 0100	11714.41	156.35	184.90		184.95	0.000025	1.68	8065.13	471.19	0.06
Baker-Skagit	0.2517	05FEB2009 0100	11715.14	156.35	184.92		184.94	0.000015	1.24	11705.77	914.51	0.05
Baker-Skagit	0.1028	05FEB2009 0100	11720.59	153.35	184.92		184.93	0.000012	1.07	19550.85	1415.82	0.04

Table 3. Baker River, 50-yr output.

HEC-RAS Plan: 50-yr_v4 River: Baker River Reach: Baker-Skagit Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Baker-Skagit	0.8301	05FEB2009 0100	12218.00	175.16	188.04		188.96	0.001523	7.70	1587.37	150.89	0.42
Baker-Skagit	0.6883*	05FEB2009 0100	12221.04	169.45	187.64		188.15	0.000633	5.72	2134.81	163.91	0.28
Baker-Skagit	0.5447	05FEB2009 0100	12224.05	163.74	187.49		187.80	0.000277	4.44	2752.76	162.04	0.19
Baker-Skagit	0.5153	05FEB2009 0100	12224.79	163.74	187.62	171.66	187.76	0.000123	3.07	3988.32	221.54	0.13
Baker-Skagit	0.5082		Inl Struct									
Baker-Skagit	0.4685	05FEB2009 0100	12224.79	158.25	187.31		187.37	0.000038	2.03	6123.92	318.34	0.08
Baker-Skagit	0.3771*	05FEB2009 0100	12228.77	157.30	187.31		187.36	0.000026	1.73	7545.74	427.08	0.06
Baker-Skagit	0.2858	05FEB2009 0100	12233.73	156.35	187.31		187.35	0.000019	1.50	9336.67	527.34	0.05
Baker-Skagit	0.2778	05FEB2009 0100	12234.20	156.35	187.31		187.35	0.000019	1.57	9245.20	513.39	0.06
Baker-Skagit	0.2517	05FEB2009 0100	12237.17	156.35	187.33		187.34	0.000010	1.07	13941.51	962.68	0.04
Baker-Skagit	0.1028	05FEB2009 0100	12263.16	153.35	187.33		187.33	0.000008	0.95	23589.19	1994.60	0.03

Table 4. Baker River, 100-yr output.

HEC-RAS Plan: 100yr_v4 River: Baker River Reach: Baker-Skagit Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Baker-Skagit	0.8301	05FEB2009 0100	14296.00	175.16	191.35		192.07	0.000915	6.79	2105.81	162.54	0.33
Baker-Skagit	0.6883*	05FEB2009 0100	14295.85	169.45	191.13		191.56	0.000422	5.24	2726.89	174.21	0.23
Baker-Skagit	0.5447	05FEB2009 0100	14295.86	163.74	191.04		191.32	0.000204	4.28	3385.78	188.77	0.17
Baker-Skagit	0.5153	05FEB2009 0100	14295.86	163.74	191.15	172.28	191.29	0.000095	2.99	4800.64	237.58	0.11
Baker-Skagit	0.5082		Inl Struct									
Baker-Skagit	0.4685	05FEB2009 0100	14295.86	158.25	190.95		191.01	0.000031	2.03	7345.04	352.68	0.07
Baker-Skagit	0.3771*	05FEB2009 0100	14296.04	157.30	190.95		191.00	0.000021	1.73	9235.68	501.43	0.06
Baker-Skagit	0.2858	05FEB2009 0100	14296.25	156.35	190.95		190.99	0.000015	1.49	11473.54	672.88	0.05
Baker-Skagit	0.2778	05FEB2009 0100	14296.27	156.35	190.95		190.99	0.000016	1.57	11415.48	676.66	0.05
Baker-Skagit	0.2517	05FEB2009 0100	14296.42	156.35	190.97		190.98	0.000007	0.99	17875.54	1196.93	0.03
Baker-Skagit	0.1028	05FEB2009 0100	14297.68	153.35	190.97		190.97	0.000006	0.88	31931.03	2500.22	0.03

Table 5. Baker River, 500-yr output.

HEC-RAS Plan: 500yr_v4 River: Baker River Reach: Baker-Skagit Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Baker-Skagit	0.8301	05FEB2009 0100	40545.00	175.16	199.60		201.61	0.001606	11.37	3566.40	189.22	0.46
Baker-Skagit	0.6883*	05FEB2009 0100	40538.67	169.45	199.30		200.70	0.000818	9.55	4386.79	227.06	0.35
Baker-Skagit	0.5447	05FEB2009 0100	40532.76	163.74	199.02		200.17	0.000532	8.64	4945.62	201.58	0.29
Baker-Skagit	0.5153	05FEB2009 0100	40531.33	163.74	199.50	178.29	200.06	0.000250	6.05	6940.86	278.09	0.20
Baker-Skagit	0.5082		Inl Struct									
Baker-Skagit	0.4685	05FEB2009 0100	40531.33	158.25	198.91		199.19	0.000096	4.27	10586.31	463.57	0.13
Baker-Skagit	0.3771*	05FEB2009 0100	40523.87	157.30	198.95		199.14	0.000065	3.59	13951.76	683.01	0.11
Baker-Skagit	0.2858	05FEB2009 0100	40513.22	156.35	198.97		199.10	0.000046	3.06	17928.04	1052.56	0.09
Baker-Skagit	0.2778	05FEB2009 0100	40512.13	156.35	198.96		199.10	0.000048	3.21	17847.34	1017.50	0.09
Baker-Skagit	0.2517	05FEB2009 0100	40504.95	156.35	199.03		199.07	0.000016	1.80	29269.93	1646.15	0.05
Baker-Skagit	0.1028	05FEB2009 0100	40452.45	153.35	199.03		199.06	0.000015	1.64	54271.64	3085.52	0.05

Table 6. Skagit River, 10-yr output.

HEC-RAS Plan: 10-yr_v4 Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sauk-Baker	64.1468	05FEB2009 0100	36464.60	179.66	212.75		213.84	0.000596	8.43	16818.22	926.02	0.31
Sauk-Baker	63.7691	05FEB2009 0100	36541.70	171.65	211.43		212.67	0.000576	9.02	15760.55	713.47	0.31
Sauk-Baker	63.2299	05FEB2009 0100	36617.90	162.15	208.97		210.73	0.000794	10.64	12904.61	494.98	0.36
Sauk-Baker	62.8921	05FEB2009 0100	36663.90	177.64	207.58		209.23	0.000889	10.32	13463.21	752.03	0.37
Sauk-Baker	62.4817	05FEB2009 0100	36714.10	172.63	202.19		206.19	0.002412	16.07	8739.13	465.10	0.61
Sauk-Baker	62.2714*	05FEB2009 0100	36734.00	164.52	200.98		203.73	0.001587	13.32	10471.20	695.54	0.49
Sauk-Baker	62.0617	05FEB2009 0100	36758.10	156.42	200.07		202.10	0.001185	11.48	12308.98	818.28	0.42
Sauk-Baker	61.6142	05FEB2009 0100	36819.80	173.33	197.60		199.19	0.001264	10.12	14135.64	1156.35	0.43
Sauk-Baker	61.0042	05FEB2009 0100	36906.90	139.04	194.28		195.87	0.000862	10.25	15331.19	1705.74	0.36
Sauk-Baker	60.2604	05FEB2009 0100	37001.80	165.65	192.16		192.97	0.000862	8.09	22321.14	2837.37	0.35
Sauk-Baker	59.8909	05FEB2009 0100	37100.30	163.55	190.95		191.49	0.000645	7.38	28841.79	3421.87	0.30
Sauk-Baker	59.4724	05FEB2009 0100	37176.40	158.55	190.17		190.55	0.000279	5.00	29121.61	2432.29	0.21
Sauk-Baker	59.0249	05FEB2009 0100	37256.60	152.05	188.48		189.40	0.000740	7.75	18735.94	1738.43	0.35
Sauk-Baker	58.5652	05FEB2009 0100	37298.00	151.06	185.40		187.42	0.000968	11.39	12103.78	508.67	0.39
Sauk-Baker	58.5		Lat Struct									
Sauk-Baker	58.32	05FEB2009 0100	37502.20	150.51	181.21		185.38	0.003016	16.39	8388.90	435.81	0.66
Sauk-Baker	58.2105	05FEB2009 0100	37505.20	151.06	180.61		183.63	0.001888	13.95	9856.29	460.05	0.53
Sauk-Baker	58.02	05FEB2009 0100	37508.80	150.12	180.34		182.13	0.001042	10.75	12938.23	609.28	0.40
Ovenell	57.85	05FEB2009 0100	46986.90	129.52	180.34		181.48	0.000518	8.86	23343.71	1645.74	0.29
Ovenell	57.8		Lat Struct									
Ovenell	57.7136	05FEB2009 0100	46395.60	128.55	180.42		181.31	0.000421	7.81	25044.87	1629.73	0.26
Ovenell	57.64	05FEB2009 0100	45689.70	127.68	180.29		181.14	0.000384	7.60	25289.81	1647.05	0.25
Ovenell	57.59	05FEB2009 0100	45242.10	127.15	180.27		181.04	0.000347	7.28	26359.46	1621.01	0.24
Ovenell	57.57	05FEB2009 0100	45230.40	126.92	180.20		181.01	0.000357	7.43	25846.21	1618.83	0.24
Ovenell	57.55	05FEB2009 0100	44980.90	126.62	180.14		180.97	0.000362	7.49	25612.95	1644.49	0.25
Ovenell	57.47	05FEB2009 0100	43987.80	125.72	179.95		180.87	0.000342	7.99	25534.05	1550.87	0.24
Fir Island	57.39	05FEB2009 0100	47013.00	130.56	179.95		180.98	0.000540	8.52	24359.98	1596.37	0.29
Fir Island	57.2442	05FEB2009 0100	47020.50	131.55	179.08		180.63	0.000691	10.40	20168.26	1402.74	0.36
Fir Island	56.7429	05FEB2009 0100	47034.80	137.85	176.10		178.43	0.000923	12.24	12123.27	520.97	0.42
Fir Island	56.1617	05FEB2009 0100	47039.90	134.57	173.68		175.73	0.000783	11.49	12801.62	480.30	0.39
Fir Island	55.7829*	05FEB2009 0100	47042.20	110.39	173.30		174.24	0.000332	7.78	18911.00	646.04	0.25
Fir Island	55.6743	05FEB2009 0100	47042.50	103.47	170.63		173.86	0.000952	14.42	10200.58	282.84	0.41
Fir Island	55.6618	05FEB2009 0100	47042.50	103.47	170.14		173.76	0.001114	15.25	9645.76	260.46	0.44
Fir Island	55.5671*	05FEB2009 0100	47042.50	111.24	171.03		172.66	0.000506	10.25	14340.08	462.40	0.32
Fir Island	55.2621	05FEB2009 0100	47042.50	136.27	170.28		171.57	0.000720	9.10	16215.14	829.67	0.36
Fir Island	54.8609	05FEB2009 0100	47041.20	135.07	167.24		169.55	0.001124	12.20	12090.65	574.68	0.45
Fir Island	54.4591	05FEB2009 0100	47037.40	142.67	164.82		166.97	0.001257	11.77	12676.69	716.41	0.47
Fir Island	54.0355	05FEB2009 0100	47030.00	124.77	161.87		164.31	0.001116	12.56	12080.06	724.25	0.46
Fir Island	53.9101	05FEB2009 0100	47027.00	124.17	161.88		163.38	0.000756	9.83	15003.00	808.41	0.37
Fir Island	53.2903	05FEB2009 0100	46983.40	134.57	159.37		160.55	0.000853	9.02	21987.08	2185.51	0.38
Fir Island	52.6944	05FEB2009 0100	46840.60	129.77	156.75	149.47	157.69	0.000894	8.90	28449.76	3040.54	0.39

Table 7. Skagit River, 25-yr output.

HEC-RAS Plan: 25-yr_v4 Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sauk-Baker	64.1468	05FEB2009 0100	80754.70	179.66	216.51		217.86	0.000614	9.44	20467.51	985.73	0.32
Sauk-Baker	63.7691	05FEB2009 0100	80913.20	171.65	214.96		216.61	0.000653	10.43	18322.14	734.16	0.33
Sauk-Baker	63.2299	05FEB2009 0100	81074.70	162.15	211.72		214.27	0.001015	12.82	14422.60	579.63	0.41
Sauk-Baker	62.8921	05FEB2009 0100	81183.70	177.64	210.07		212.38	0.001101	12.28	15647.41	1005.36	0.42
Sauk-Baker	62.4817	05FEB2009 0100	81334.90	172.63	206.36		211.13	0.002325	17.65	11343.35	919.00	0.61
Sauk-Baker	62.2714*	05FEB2009 0100	81403.80	164.52	204.13		207.59	0.001714	15.11	13361.33	1085.89	0.53
Sauk-Baker	62.0617	05FEB2009 0100	81476.50	156.42	202.99		205.63	0.001338	13.21	15344.80	1275.08	0.46
Sauk-Baker	61.6142	05FEB2009 0100	81652.80	173.33	200.38		202.38	0.001330	11.45	18007.04	1738.92	0.45
Sauk-Baker	61.0042	05FEB2009 0100	81896.00	139.04	197.16		198.98	0.000924	11.35	21649.53	2636.01	0.38
Sauk-Baker	60.2604	05FEB2009 0100	82101.00	165.65	195.68		196.38	0.000643	7.94	33742.02	3561.70	0.31
Sauk-Baker	59.8909	05FEB2009 0100	82258.50	163.55	194.88		195.30	0.000424	6.81	43254.95	3814.01	0.26
Sauk-Baker	59.4724	05FEB2009 0100	82376.20	158.55	194.28		194.68	0.000234	5.20	40828.89	3163.81	0.19
Sauk-Baker	59.0249	05FEB2009 0100	82521.40	152.05	192.97		193.82	0.000541	7.60	27261.42	1928.87	0.30
Sauk-Baker	58.5652	05FEB2009 0100	82593.20	151.06	189.57		192.16	0.001029	12.97	14459.79	574.33	0.42
Sauk-Baker	58.5		Lat Struct									
Sauk-Baker	58.32	05FEB2009 0100	82012.10	150.51	185.31		190.26	0.002848	17.85	10196.03	445.27	0.66
Sauk-Baker	58.2105	05FEB2009 0100	82101.20	151.06	184.87		188.54	0.001878	15.37	11847.48	474.34	0.54
Sauk-Baker	58.02	05FEB2009 0100	81753.90	150.12	184.92		187.06	0.000970	11.75	15762.33	656.54	0.40
Ovenell	57.85	05FEB2009 0100	93474.50	129.52	184.92		186.19	0.000495	9.57	31187.28	1745.46	0.29
Ovenell	57.8		Lat Struct									
Ovenell	57.7136	05FEB2009 0100	91171.80	128.55	185.01		186.01	0.000400	8.44	32805.46	1811.37	0.26
Ovenell	57.64	05FEB2009 0100	89134.20	127.68	184.91		185.86	0.000363	8.18	33418.19	2097.08	0.25
Ovenell	57.59	05FEB2009 0100	87867.70	127.15	184.89		185.76	0.000327	7.82	34521.90	2096.33	0.24
Ovenell	57.57	05FEB2009 0100	87841.70	126.92	184.82		185.74	0.000341	8.02	34211.67	2148.03	0.24
Ovenell	57.55	05FEB2009 0100	87262.30	126.62	184.78		185.69	0.000340	8.02	34358.98	2176.42	0.24
Ovenell	57.47	05FEB2009 0100	86600.20	125.72	184.55		185.62	0.000346	8.77	34072.57	2185.26	0.25
Fir Island	57.39	05FEB2009 0100	94564.40	130.56	184.55		185.69	0.000502	9.14	33202.50	2284.16	0.29
Fir Island	57.2442	05FEB2009 0100	94573.60	131.55	183.75		185.44	0.000620	11.10	28040.49	2002.74	0.36
Fir Island	56.7429	05FEB2009 0100	94588.80	137.85	180.45		183.41	0.000947	13.85	14853.76	684.31	0.44
Fir Island	56.1617	05FEB2009 0100	94590.30	134.57	178.00		180.66	0.000812	13.10	15096.70	613.14	0.41
Fir Island	55.7829*	05FEB2009 0100	94589.10	110.39	177.75		178.96	0.000355	8.86	22793.68	929.33	0.27
Fir Island	55.6743	05FEB2009 0100	94588.50	103.47	173.85		178.65	0.001229	17.58	11079.89	289.32	0.48
Fir Island	55.6618	05FEB2009 0100	94588.50	103.47	173.08		178.52	0.001469	18.71	10413.57	264.84	0.52
Fir Island	55.5671*	05FEB2009 0100	94587.80	111.24	174.51		176.84	0.000609	12.24	15905.59	470.90	0.36
Fir Island	55.2621	05FEB2009 0100	94583.30	136.27	173.95		175.55	0.000698	10.18	19302.25	925.49	0.37
Fir Island	54.8609	05FEB2009 0100	94574.70	135.07	170.38		173.48	0.001233	14.14	14032.68	643.36	0.49
Fir Island	54.4591	05FEB2009 0100	94561.40	142.67	167.86		170.63	0.001327	13.40	15006.78	851.86	0.50
Fir Island	54.0355	05FEB2009 0100	94538.90	124.77	164.26		167.70	0.001349	14.96	13948.26	803.69	0.52
Fir Island	53.9101	05FEB2009 0100	94529.70	124.17	164.35		166.44	0.000895	11.62	17161.34	1022.07	0.42
Fir Island	53.2903	05FEB2009 0100	94411.60	134.57	161.72		163.18	0.000888	10.18	27146.23	2207.95	0.41
Fir Island	52.6944	05FEB2009 0100	94081.30	129.77	159.38	152.85	160.34	0.000776	9.30	36591.67	3155.33	0.38

Table 8. Skagit River, 50-yr output.

HEC-RAS Plan: 50-yr_v4 Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sauk-Baker	64.1468	05FEB2009 0100	06536.40	179.66	218.64		220.10	0.000610	9.89	22572.65	1000.09	0.32
Sauk-Baker	63.7691	05FEB2009 0100	06633.00	171.65	216.98		218.83	0.000678	11.09	19818.81	759.38	0.34
Sauk-Baker	63.2299	05FEB2009 0100	06724.70	162.15	213.37		216.35	0.001105	13.86	15391.21	590.54	0.43
Sauk-Baker	62.8921	05FEB2009 0100	06790.60	177.64	211.76		214.34	0.001138	13.01	17507.99	1169.73	0.43
Sauk-Baker	62.4817	05FEB2009 0100	06895.70	172.63	207.92	200.98	213.21	0.002420	18.73	13044.36	1264.40	0.63
Sauk-Baker	62.2714*	05FEB2009 0100	06943.70	164.52	205.61		209.40	0.001780	15.98	15127.79	1260.83	0.54
Sauk-Baker	62.0617	05FEB2009 0100	06989.60	156.42	204.41		207.30	0.001392	13.97	17250.93	1387.04	0.47
Sauk-Baker	61.6142	05FEB2009 0100	07105.30	173.33	201.73		203.93	0.001362	12.09	20519.27	1975.41	0.46
Sauk-Baker	61.0042	05FEB2009 0100	07289.00	139.04	198.78		200.55	0.000881	11.50	26121.28	2915.12	0.38
Sauk-Baker	60.2604	05FEB2009 0100	07497.60	165.65	197.61		198.23	0.000526	7.63	40826.64	3756.37	0.29
Sauk-Baker	59.8909	05FEB2009 0100	07710.10	163.55	196.97		197.34	0.000347	6.55	51261.82	3863.09	0.23
Sauk-Baker	59.4724	05FEB2009 0100	07876.60	158.55	196.43		196.83	0.000213	5.26	47856.61	3330.56	0.19
Sauk-Baker	59.0249	05FEB2009 0100	08070.80	152.05	195.26		196.08	0.000473	7.56	31685.69	1940.92	0.28
Sauk-Baker	58.5652	05FEB2009 0100	08160.00	151.06	191.67		194.57	0.001057	13.74	15667.21	577.30	0.43
Sauk-Baker	58.5		Lat Struct									
Sauk-Baker	58.32	05FEB2009 0100	05164.10	150.51	187.54		192.77	0.002683	18.34	11198.37	452.84	0.65
Sauk-Baker	58.2105	05FEB2009 0100	05789.30	151.06	187.20		191.12	0.001800	15.88	12961.64	480.54	0.54
Sauk-Baker	58.02	05FEB2009 0100	06513.30	150.12	187.33		189.64	0.000937	12.23	17657.42	899.84	0.40
Ovenell	57.85	05FEB2009 0100	18776.50	129.52	187.33		188.65	0.000479	9.87	35858.67	2141.39	0.29
Ovenell	57.8		Lat Struct									
Ovenell	57.7136	05FEB2009 0100	15687.20	128.55	187.42		188.47	0.000384	8.68	37391.30	1985.59	0.26
Ovenell	57.64	05FEB2009 0100	13176.30	127.68	187.29		188.32	0.000360	8.53	38747.51	2425.32	0.25
Ovenell	57.59	05FEB2009 0100	11659.80	127.15	187.30		188.21	0.000319	8.08	39930.98	2491.76	0.24
Ovenell	57.57	05FEB2009 0100	11632.20	126.92	187.25		188.19	0.000326	8.22	39722.98	2453.63	0.24
Ovenell	57.55	05FEB2009 0100	10823.20	126.62	187.21		188.15	0.000327	8.24	39947.58	2493.05	0.24
Ovenell	57.47	05FEB2009 0100	10201.60	125.72	186.95		188.12	0.000352	9.21	39813.94	2676.78	0.26
Fir Island	57.39	05FEB2009 0100	20800.60	130.56	186.95		188.11	0.000477	9.37	39293.46	2744.44	0.29
Fir Island	57.2442	05FEB2009 0100	20841.20	131.55	186.20		187.90	0.000585	11.31	33385.47	2456.89	0.35
Fir Island	56.7429	05FEB2009 0100	20924.80	137.85	182.76		186.01	0.000950	14.55	16473.15	718.44	0.45
Fir Island	56.1617	05FEB2009 0100	20963.10	134.57	180.31		183.25	0.000820	13.80	16599.30	695.04	0.42
Fir Island	55.7829*	05FEB2009 0100	20991.50	110.39	180.13		181.46	0.000360	9.32	25021.64	937.42	0.28
Fir Island	55.6743	05FEB2009 0100	20997.50	103.47	175.57		181.27	0.001382	19.17	11551.90	292.83	0.52
Fir Island	55.6618	05FEB2009 0100	20997.70	103.47	174.64		181.14	0.001670	20.46	10818.88	267.15	0.56
Fir Island	55.5671*	05FEB2009 0100	20999.70	111.24	176.32		179.04	0.000665	13.23	16730.62	476.92	0.38
Fir Island	55.2621	05FEB2009 0100	21014.30	136.27	175.86		177.63	0.000695	10.69	20958.65	1042.18	0.37
Fir Island	54.8609	05FEB2009 0100	21033.60	135.07	172.01		175.53	0.001290	15.07	15091.20	654.69	0.51
Fir Island	54.4591	05FEB2009 0100	21046.90	142.67	169.49		172.55	0.001341	14.10	16449.38	934.63	0.51
Fir Island	54.0355	05FEB2009 0100	21057.00	124.77	165.55		169.51	0.001465	16.10	14997.48	817.58	0.55
Fir Island	53.9101	05FEB2009 0100	21058.40	124.17	165.66		168.06	0.000960	12.47	18583.52	1134.87	0.44
Fir Island	53.2903	05FEB2009 0100	21049.80	134.57	162.99		164.58	0.000902	10.70	29962.84	2215.21	0.41
Fir Island	52.6944	05FEB2009 0100	20980.60	129.77	160.75	153.63	161.73	0.000740	9.52	40960.61	3225.57	0.37

Table 9. Skagit River, 100-yr output.

HEC-RAS Plan: 100yr_v4 Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sauk-Baker	64.1468	05FEB2009 0100	49814.70	179.66	221.79		223.45	0.000613	10.62	25840.57	1084.46	0.33
Sauk-Baker	63.7691	05FEB2009 0100	49916.70	171.65	219.95		222.15	0.000724	12.14	22258.83	874.89	0.36
Sauk-Baker	63.2299	05FEB2009 0100	50009.80	162.15	215.65		219.41	0.001279	15.61	16750.20	605.34	0.47
Sauk-Baker	62.8921	05FEB2009 0100	50072.60	177.64	214.18		217.16	0.001203	14.15	20503.49	1274.40	0.45
Sauk-Baker	62.4817	05FEB2009 0100	50178.90	172.63	210.13	204.43	216.12	0.002555	20.27	16123.51	1486.67	0.66
Sauk-Baker	62.2714*	05FEB2009 0100	50225.90	164.52	207.70		211.99	0.001884	17.28	17778.54	1286.35	0.56
Sauk-Baker	62.0617	05FEB2009 0100	50267.00	156.42	206.61		209.80	0.001440	14.96	20345.73	1425.07	0.49
Sauk-Baker	61.6142	05FEB2009 0100	50378.60	173.33	203.96		206.38	0.001351	12.85	25585.26	2620.05	0.46
Sauk-Baker	61.0042	05FEB2009 0100	50549.10	139.04	201.55		203.12	0.000762	11.37	34764.84	3338.34	0.36
Sauk-Baker	60.2604	05FEB2009 0100	50710.30	165.65	200.72		201.24	0.000396	7.23	52710.59	3914.51	0.25
Sauk-Baker	59.8909	05FEB2009 0100	50864.90	163.55	200.23		200.56	0.000269	6.26	64199.51	4167.31	0.21
Sauk-Baker	59.4724	05FEB2009 0100	50982.10	158.55	199.77		200.17	0.000188	5.36	59320.64	3510.49	0.18
Sauk-Baker	59.0249	05FEB2009 0100	51111.40	152.05	198.72		199.53	0.000402	7.61	38435.05	1954.42	0.26
Sauk-Baker	58.5652	05FEB2009 0100	51163.40	151.06	194.78		198.20	0.001113	14.99	17468.63	583.02	0.44
Sauk-Baker	58.5		Lat Struct									
Sauk-Baker	58.32	05FEB2009 0100	41745.80	150.51	190.99		196.59	0.002423	18.99	12767.44	457.62	0.63
Sauk-Baker	58.2105	05FEB2009 0100	43988.30	151.06	190.75		195.05	0.001690	16.65	14672.89	485.11	0.53
Sauk-Baker	58.02	05FEB2009 0100	47817.00	150.12	190.97		193.54	0.000897	12.95	21000.18	935.82	0.40
Ovenell	57.85	05FEB2009 0100	62114.70	129.52	190.97		192.41	0.000470	10.44	43985.27	2255.52	0.29
Ovenell	57.8		Lat Struct									
Ovenell	57.7136	05FEB2009 0100	58793.60	128.55	191.04		192.21	0.000382	9.25	45548.14	2351.04	0.26
Ovenell	57.64	05FEB2009 0100	55369.10	127.68	190.98		192.05	0.000340	8.87	47805.39	2469.13	0.25
Ovenell	57.59	05FEB2009 0100	53108.90	127.15	190.96		191.95	0.000311	8.53	49180.02	2535.22	0.24
Ovenell	57.57	05FEB2009 0100	53063.30	126.92	190.91		191.93	0.000319	8.68	49017.35	2558.41	0.24
Ovenell	57.55	05FEB2009 0100	52168.80	126.62	190.88		191.90	0.000319	8.69	49385.46	2598.18	0.24
Ovenell	57.47	05FEB2009 0100	52265.50	125.72	190.65		191.86	0.000339	9.59	49938.95	2767.58	0.26
Fir Island	57.39	05FEB2009 0100	65674.90	130.56	190.65		191.91	0.000460	9.88	49745.13	2842.16	0.29
Fir Island	57.2442	05FEB2009 0100	65676.00	131.55	190.03		191.73	0.000533	11.55	43828.26	2838.32	0.34
Fir Island	56.7429	05FEB2009 0100	65674.50	137.85	186.45		190.15	0.000946	15.59	19540.42	917.66	0.45
Fir Island	56.1617	05FEB2009 0100	65665.90	134.57	184.01		187.33	0.000816	14.75	20015.95	1202.91	0.42
Fir Island	55.7829*	05FEB2009 0100	65657.50	110.39	183.90		185.42	0.000362	10.00	28580.37	1415.64	0.28
Fir Island	55.6743	05FEB2009 0100	65655.70	103.47	178.28		185.57	0.001627	21.66	12304.61	298.75	0.57
Fir Island	55.6618	05FEB2009 0100	65655.60	103.47	177.10		185.48	0.001994	23.23	11461.15	270.54	0.62
Fir Island	55.5671*	05FEB2009 0100	65654.60	111.24	179.05		182.46	0.000759	14.81	17996.13	577.35	0.41
Fir Island	55.2621	05FEB2009 0100	65646.30	136.27	178.75		180.82	0.000701	11.53	23581.16	1443.52	0.38
Fir Island	54.8609	05FEB2009 0100	65632.70	135.07	174.45		178.69	0.001390	16.57	16722.11	869.81	0.54
Fir Island	54.4591	05FEB2009 0100	65619.20	142.67	172.00		175.48	0.001346	15.11	18889.79	991.46	0.52
Fir Island	54.0355	05FEB2009 0100	65602.60	124.77	167.51		172.35	0.001647	17.87	16614.76	834.42	0.59
Fir Island	53.9101	05FEB2009 0100	65595.80	124.17	167.61		170.53	0.001065	13.80	20980.14	1339.41	0.47
Fir Island	53.2903	05FEB2009 0100	65522.80	134.57	164.84		166.66	0.000941	11.57	34072.65	2223.96	0.43
Fir Island	52.6944	05FEB2009 0100	65354.50	129.77	162.68	155.33	163.71	0.000714	9.93	47256.10	3276.90	0.37

Table 10. Skagit River, 500-yr output.

HEC-RAS Plan: 500yr_v4 Profile: 05FEB2009 0100												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sauk-Baker	64.1468	05FEB2009 0100	43485.30	179.66	227.56		229.62	0.000629	11.99	32435.88	1180.46	0.34
Sauk-Baker	63.7691	05FEB2009 0100	43583.40	171.65	225.36		228.27	0.000810	14.12	27199.81	940.73	0.39
Sauk-Baker	63.2299	05FEB2009 0100	43679.10	162.15	219.91		225.43	0.001617	18.96	19467.57	819.71	0.54
Sauk-Baker	62.8921	05FEB2009 0100	43744.50	177.64	218.81		222.45	0.001274	16.00	26755.10	1466.01	0.48
Sauk-Baker	62.4817	05FEB2009 0100	43849.60	172.63	214.63	213.46	220.83	0.002418	21.66	24511.74	2453.59	0.65
Sauk-Baker	62.2714*	05FEB2009 0100	43896.50	164.52	212.47		217.11	0.001802	18.68	24922.18	2172.68	0.56
Sauk-Baker	62.0617	05FEB2009 0100	43933.30	156.42	211.36		214.73	0.001354	16.02	28654.58	2452.14	0.48
Sauk-Baker	61.6142	05FEB2009 0100	44001.00	173.33	209.33		211.58	0.001057	13.02	44213.86	4406.64	0.42
Sauk-Baker	61.0042	05FEB2009 0100	44050.20	139.04	207.97		209.03	0.000485	10.25	60472.30	5099.13	0.29
Sauk-Baker	60.2604	05FEB2009 0100	44063.30	165.65	207.53		207.91	0.000226	6.40	81899.03	4776.97	0.20
Sauk-Baker	59.8909	05FEB2009 0100	44066.00	163.55	207.24		207.51	0.000169	5.78	94173.59	4317.20	0.17
Sauk-Baker	59.4724	05FEB2009 0100	44062.70	158.55	206.89		207.27	0.000142	5.41	84849.16	3668.95	0.16
Sauk-Baker	59.0249	05FEB2009 0100	44051.00	152.05	206.02		206.81	0.000298	7.64	52798.45	1987.61	0.23
Sauk-Baker	58.5652	05FEB2009 0100	44033.30	151.06	201.61		205.90	0.001118	16.90	21515.72	601.66	0.46
Sauk-Baker	58.5		Lat Struct									
Sauk-Baker	58.32	05FEB2009 0100	19060.60	150.51	198.81		204.80	0.001877	19.65	16388.81	468.35	0.57
Sauk-Baker	58.2105	05FEB2009 0100	26801.80	151.06	198.59		203.46	0.001413	17.73	18534.35	502.26	0.50
Sauk-Baker	58.02	05FEB2009 0100	38386.40	150.12	199.03		201.96	0.000773	13.92	29428.23	1209.28	0.38
Ovenell	57.85	05FEB2009 0100	78838.90	129.52	199.03		200.63	0.000439	11.44	62233.25	2269.28	0.29
Ovenell	57.8		Lat Struct									
Ovenell	57.7136	05FEB2009 0100	74759.80	128.55	199.10		200.42	0.000359	10.20	64579.87	2370.26	0.27
Ovenell	57.64	05FEB2009 0100	69853.60	127.68	199.06		200.26	0.000322	9.79	67936.63	2503.75	0.25
Ovenell	57.59	05FEB2009 0100	66833.60	127.15	199.04		200.16	0.000297	9.44	69772.86	2565.45	0.24
Ovenell	57.57	05FEB2009 0100	66765.40	126.92	199.00		200.15	0.000303	9.58	69912.64	2603.83	0.24
Ovenell	57.55	05FEB2009 0100	65765.50	126.62	198.97		200.11	0.000302	9.57	70601.09	2632.15	0.24
Ovenell	57.47	05FEB2009 0100	66094.90	125.72	198.78		200.08	0.000323	10.50	72527.69	2786.80	0.26
Fir Island	57.39	05FEB2009 0100	84420.10	130.56	198.78		200.06	0.000397	10.49	72924.89	2861.83	0.28
Fir Island	57.2442	05FEB2009 0100	84354.80	131.55	198.27		199.92	0.000444	12.04	67314.59	2861.82	0.32
Fir Island	56.7429	05FEB2009 0100	84182.40	137.85	194.23		199.06	0.000983	18.06	28203.91	1278.77	0.48
Fir Island	56.1617	05FEB2009 0100	84006.60	134.57	192.67		195.94	0.000677	15.44	33552.18	1916.10	0.40
Fir Island	55.7829*	05FEB2009 0100	83866.20	110.39	192.49		194.45	0.000370	11.53	36888.28	1886.93	0.29
Fir Island	55.6743	05FEB2009 0100	83838.00	103.47	185.27		196.69	0.002106	27.11	14289.18	607.04	0.66
Fir Island	55.6618	05FEB2009 0100	83837.00	103.47	183.94		197.07	0.002579	29.06	13247.62	305.44	0.72
Fir Island	55.5671*	05FEB2009 0100	83824.10	111.24	184.99		190.35	0.000997	18.61	20917.23	1429.35	0.48
Fir Island	55.2621	05FEB2009 0100	83732.30	136.27	185.05		187.81	0.000731	13.45	31413.62	2413.28	0.40
Fir Island	54.8609	05FEB2009 0100	83608.50	135.07	180.04		186.14	0.001601	19.95	21067.75	1828.03	0.59
Fir Island	54.4591	05FEB2009 0100	83516.60	142.67	177.84		182.01	0.001292	16.94	26072.96	1444.48	0.53
Fir Island	54.0355	05FEB2009 0100	83444.40	124.77	172.12		179.15	0.002009	21.75	20555.46	877.30	0.66
Fir Island	53.9101	05FEB2009 0100	83420.10	124.17	171.98		176.09	0.001267	16.63	28926.29	2219.64	0.52
Fir Island	53.2903	05FEB2009 0100	83225.30	134.57	168.86		171.34	0.001063	13.71	43333.25	2387.46	0.47
Fir Island	52.6944	05FEB2009 0100	82920.90	129.77	166.75	157.94	167.97	0.000719	11.15	60672.95	3319.72	0.38

Table 11. Ovenell Slough, 10-yr output.

HEC-RAS Plan: 10-yr_v4 River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	5721	05FEB2009 0100	200.00	187.33	188.92		189.12	0.009337	3.57	55.96	54.76	0.62
Main	4587	05FEB2009 0100	2.58	182.48	182.66		182.67	0.004275	0.58	4.46	38.40	0.30
Main	4012	05FEB2009 0100	1.84	179.75	180.13		180.13	0.000640	0.34	5.41	24.89	0.13
Main	3327	05FEB2009 0100	2.15	178.73	180.06		180.06	0.000001	0.02	86.25	126.03	0.01
Main	2777	05FEB2009 0100	2.74	177.10	180.06		180.06	0.000000	0.01	363.78	281.46	0.00
Main	2032	05FEB2009 0100	601.03	170.65	180.06		180.06	0.000009	0.48	1806.07	480.84	0.03
Main	1614	05FEB2009 0100	1321.04	169.56	180.05		180.05	0.000008	0.43	3429.84	522.41	0.03
Main	1399	05FEB2009 0100	1774.49	168.80	180.04		180.04	0.000031	0.67	2550.08	494.17	0.05
Main	1300		Mult Open									
Main	1260	05FEB2009 0100	1774.49	168.80	180.03		180.04	0.000032	0.75	2480.50	477.87	0.05
Main	1028	05FEB2009 0100	2028.12	168.80	180.02		180.03	0.000023	0.82	2952.84	456.78	0.05
Main	471	05FEB2009 0100	3025.20	166.89	179.95		179.99	0.000093	1.64	1887.09	193.95	0.09

Table 12. Ovenell Slough, 25-yr output.

HEC-RAS Plan: 25-yr_v4 River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	5721	05FEB2009 0100	200.00	187.33	189.45		189.53	0.002588	2.33	85.97	60.83	0.35
Main	4587	05FEB2009 0100	793.72	182.48	185.44		185.53	0.002101	2.36	336.94	206.67	0.33
Main	4012	05FEB2009 0100	708.20	179.75	184.96		184.98	0.000384	1.07	659.95	368.60	0.14
Main	3327	05FEB2009 0100	1061.23	178.73	184.86		184.87	0.000056	0.51	2077.37	825.15	0.06
Main	2777	05FEB2009 0100	1063.81	177.10	184.85		184.85	0.000010	0.32	3317.70	728.35	0.03
Main	2032	05FEB2009 0100	3382.31	170.65	184.82		184.84	0.000036	1.25	4438.80	562.42	0.06
Main	1614	05FEB2009 0100	5443.57	169.56	184.79		184.81	0.000022	0.98	5930.65	531.13	0.05
Main	1399	05FEB2009 0100	6713.34	168.80	184.76		184.79	0.000055	1.32	4791.78	500.10	0.07
Main	1300		Mult Open									
Main	1260	05FEB2009 0100	6713.34	168.80	184.73		184.76	0.000059	1.44	4611.51	484.13	0.08
Main	1028	05FEB2009 0100	7299.98	168.80	184.72		184.75	0.000050	1.56	5115.30	465.37	0.07
Main	471	05FEB2009 0100	7964.16	166.89	184.55		184.68	0.000190	2.95	2792.68	199.34	0.14

Table 13. Ovenell Slough, 50-yr output.

HEC-RAS Plan: 50-yr_v4 River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	5721	05FEB2009 0100	200.00	187.33	191.00		191.02	0.000243	1.02	196.77	80.78	0.11
Main	4587	05FEB2009 0100	3217.29	182.48	187.73		187.89	0.002327	3.24	991.46	404.85	0.37
Main	4012	05FEB2009 0100	2605.03	179.75	187.33		187.36	0.000291	1.36	1915.86	606.95	0.13
Main	3327	05FEB2009 0100	1909.27	178.73	187.30		187.30	0.000019	0.44	4314.08	942.31	0.04
Main	2777	05FEB2009 0100	1919.76	177.10	187.29		187.30	0.000008	0.38	5101.77	732.20	0.03
Main	2032	05FEB2009 0100	5044.12	170.65	187.26		187.28	0.000038	1.43	5813.36	565.14	0.06
Main	1614	05FEB2009 0100	7597.08	169.56	187.23		187.25	0.000022	1.11	7227.53	534.35	0.05
Main	1399	05FEB2009 0100	9131.20	168.80	187.19		187.22	0.000050	1.45	5945.76	503.13	0.07
Main	1300		Mult Open									
Main	1260	05FEB2009 0100	9131.20	168.80	187.16		187.20	0.000054	1.56	5711.31	487.79	0.07
Main	1028	05FEB2009 0100	9957.14	168.80	187.14		187.18	0.000049	1.71	6250.80	470.74	0.07
Main	471	05FEB2009 0100	10599.03	166.89	186.95		187.12	0.000206	3.37	3272.63	201.51	0.14

Table 14. Ovenell Slough, 100-yr output.

HEC-RAS Plan: 100yr_v4 River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	5721	05FEB2009 0100	200.00	187.33	193.62		193.62	0.000029	0.41	487.02	160.94	0.04
Main	4587	05FEB2009 0100	9622.92	182.48	191.11		191.25	0.000984	3.03	3181.55	756.23	0.26
Main	4012	05FEB2009 0100	7382.84	179.75	190.96		191.00	0.000218	1.65	4483.83	854.83	0.13
Main	3327	05FEB2009 0100	3555.17	178.73	190.97		190.98	0.000009	0.46	7790.14	949.39	0.03
Main	2777	05FEB2009 0100	3555.58	177.10	190.97		190.97	0.000007	0.46	7803.12	737.50	0.02
Main	2032	05FEB2009 0100	6896.10	170.65	190.94		190.96	0.000029	1.45	7901.30	569.50	0.06
Main	1614	05FEB2009 0100	10353.55	169.56	190.91		190.93	0.000019	1.17	9202.30	538.82	0.05
Main	1399	05FEB2009 0100	12610.16	168.80	190.87		190.92	0.000042	1.48	7724.57	508.32	0.07
Main	1300		Mult Open									
Main	1260	05FEB2009 0100	12610.16	168.80	190.84		190.89	0.000046	1.56	7421.56	492.47	0.07
Main	1028	05FEB2009 0100	13511.62	168.80	190.83		190.88	0.000041	1.78	7996.65	474.93	0.07
Main	471	05FEB2009 0100	13409.38	166.89	190.65		190.84	0.000175	3.50	4026.27	205.46	0.14

Table 15. Ovenell Slough, 500-yr output.

HEC-RAS Plan: 500yr_v4 River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	5721	05FEB2009 0100	200.00	187.33	199.66		199.66	0.000001	0.10	2094.19	489.30	0.01
Main	4587	05FEB2009 0100	25130.55	182.48	198.95		199.05	0.000185	2.53	9991.17	890.17	0.13
Main	4012	05FEB2009 0100	17370.10	179.75	198.99		199.03	0.000054	1.50	11655.47	940.24	0.07
Main	3327	05FEB2009 0100	5741.26	178.73	199.04		199.04	0.000003	0.38	15516.54	982.76	0.02
Main	2777	05FEB2009 0100	5727.40	177.10	199.04		199.04	0.000003	0.42	13800.76	750.60	0.02
Main	2032	05FEB2009 0100	9806.14	170.65	199.02		199.04	0.000015	1.31	12538.52	578.84	0.04
Main	1614	05FEB2009 0100	14713.03	169.56	198.99		199.01	0.000011	1.12	13593.59	547.55	0.04
Main	1399	05FEB2009 0100	17707.03	168.80	198.96		199.01	0.000021	1.40	11881.38	519.04	0.05
Main	1300		Mult Open									
Main	1260	05FEB2009 0100	17707.03	168.80	198.94		198.98	0.000023	1.46	11449.20	502.21	0.05
Main	1028	05FEB2009 0100	18700.06	168.80	198.93		198.97	0.000022	1.64	11866.82	480.81	0.05
Main	471	05FEB2009 0100	18325.22	166.89	198.78		198.95	0.000114	3.42	5735.99	214.95	0.11

Table 16. Ovenell Slough Proposed Bridge output.

HEC-RAS River: Ovenell Slough Reach: Main Profile: 05FEB2009 0100

Reach	River Sta	Profile	Plan	Q Total	Flow Area	E.G. US.	W.S. US.	Top Wdth Act	Vel Total	Crit W.S.	Left Stagn	Right Stagn
				(cfs)	(sq ft)	(ft)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft)
Main	1300 Bridge #1	05FEB2009 0100	10-yr_v4	1774.49	864.37	180.04	180.03	173.45	0.48	170.76	74.41	267.45
Main	1300 Right Conv	05FEB2009 0100	10-yr_v4	1774.49	1681.17	180.04	180.03	301.13	0.81		267.45	568.58
Main	1300 Bridge #1	05FEB2009 0100	25-yr_v4	6713.34	1681.17	184.75	184.74	173.45	0.80	172.71	68.50	267.45
Main	1300 Right Conv	05FEB2009 0100	25-yr_v4	6713.34	3097.19	184.78	184.73	301.13	1.73		267.45	568.58
Main	1300 Bridge #1	05FEB2009 0100	50-yr_v4	9131.20	2107.55	187.21	187.20	173.45	0.76	173.02	65.43	267.45
Main	1300 Right Conv	05FEB2009 0100	50-yr_v4	9131.20	3827.99	187.22	187.16	301.13	1.97		267.45	568.58
Main	1300 Bridge #1	05FEB2009 0100	100yr_v4	12610.16	2782.56	190.90	190.89	207.23	0.64	173.21	60.22	267.45
Main	1300 Right Conv	05FEB2009 0100	100yr_v4	12610.16	4938.56	190.92	190.84	301.13	2.19		267.45	568.58
Main	1300 Bridge #1	05FEB2009 0100	500yr_v4	17707.03	4501.74	198.98	198.98	217.94	0.39	173.19	49.51	267.45
Main	1300 Right Conv	05FEB2009 0100	500yr_v4	17707.03	7376.47	199.01	198.94	301.13	2.16		267.45	568.58

Table 17. Ovenell Slough Proposed Bridge, detailed cross-section output for multiple openings-bridge, 50-yr event.

Plan: 50-yr_v4 Ovenell Slough Main RS: 1300 Open#1: Bridge Profile: 05FEB2009 0100				
E.G. US. (ft)	187.21	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	187.20	E.G. Elev (ft)	187.21	187.21
Q Total (cfs)	1604.76	W.S. Elev (ft)	187.19	187.19
Q Bridge (cfs)	897.37	Crit W.S. (ft)	173.35	173.36
Q Weir (cfs)	707.39	Max Chl Dpth (ft)	18.39	18.39
Weir Sta Lft (ft)	102.97	Vel Total (ft/s)	1.10	1.10
Weir Sta Rgt (ft)	234.13	Flow Area (sq ft)	817.47	817.47
Weir Submerg	1.00	Froude # Chl	0.05	0.05
Weir Max Depth (ft)	9.21	Specif Force (cu ft)	7501.42	7500.96
Min El Weir Flow (ft)	178.01	Hydr Depth (ft)		
Min El Prs (ft)	187.23	W.P. Total (ft)	148.56	148.56
Delta EG (ft)	0.01	Conv. Total (cfs)	94649.3	94652.6
Delta WS (ft)	0.01	Top Width (ft)	0.55	0.55
BR Open Area (sq ft)	817.48	Frctn Loss (ft)	0.00	0.01
BR Open Vel (ft/s)	1.10	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	0.10	0.10
BR Sel Method	Energy/Weir	Power Total (lb/ft s)	0.11	0.11

Table 18. Ovenell Slough Proposed Bridge, detailed cross-section output for multiple openings-conveyance, 50-yr event.

Plan: 50-yr_v4 Ovenell Slough Main RS: 1300 Open#2: Right Conv Profile: 05FEB2009 0100				
	Upstream	Inside US	Inside DS	Downstream
E.G. Elev (ft)	187.22	187.22	187.22	187.22
W.S. Elev (ft)	187.16	187.16	187.16	187.16
Q Total (cfs)	9131.20	9131.20	9131.20	9131.20
Crit W.S. (ft)				
Max Chl Dpth (ft)	15.09	15.09	14.53	14.90
Vel Total (ft/s)	1.97	1.97	2.07	2.07
Flow Area (sq ft)	3827.99	3827.99	3633.55	3639.52
Froude # XS	0.10	0.10	0.10	0.10
Specif Force (cu ft)	25167.11	25167.11	23747.10	23831.06
Hydr Depth (ft)	12.71	12.71	12.64	12.66
W.P. Total (ft)	312.45	312.45	298.12	297.92
Conv. Total (cfs)	863690.2	863683.8	816993.2	819592.6
Top Width (ft)	301.13	301.13	287.44	287.44

Table 19. Ovenell Slough Proposed Bridge, detailed cross-section output for multiple openings-bridge, 100-yr event.

Plan: 100yr_v4 Ovenell Slough Main RS: 1300 Open#1: Bridge Profile: 05FEB2009 0100				
E.G. US. (ft)	190.90	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	190.89	E.G. Elev (ft)	190.89	190.88
Q Total (cfs)	1788.79	W.S. Elev (ft)	190.89	190.88
Q Bridge (cfs)	537.60	Crit W.S. (ft)	173.66	173.66
Q Weir (cfs)		Max Chl Dpth (ft)	22.09	22.08
Weir Sta Lft (ft)		Vel Total (ft/s)	0.23	0.26
Weir Sta Rgt (ft)		Flow Area (sq ft)	2300.30	2100.65
Weir Submerg		Froude # Chl	0.01	0.01
Weir Max Depth (ft)		Specif Force (cu ft)	18324.86	16674.96
Min El Weir Flow (ft)	178.01	Hydr Depth (ft)	11.89	11.39
Min El Prs (ft)	187.23	W.P. Total (ft)	361.75	351.88
Delta EG (ft)	0.01	Conv. Total (cfs)	313054.2	281846.1
Delta WS (ft)	0.01	Top Width (ft)	193.43	184.46
BR Open Area (sq ft)	817.48	Frctn Loss (ft)	0.00	0.00
BR Open Vel (ft/s)	0.66	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	0.01	0.02
BR Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Table 20. Ovenell Slough Proposed Bridge, detailed cross-section output for multiple openings-conveyance, 100-yr event.

Plan: 100yr_v4 Ovenell Slough Main RS: 1300 Open#2: Right Conv Profile: 05FEB2009 0100				
	Upstream	Inside US	Inside DS	Downstream
E.G. Elev (ft)	190.92	190.92	190.93	190.89
W.S. Elev (ft)	190.84	190.84	190.84	190.81
Q Total (cfs)	12610.16	12610.16	12610.16	12610.16
Crit W.S. (ft)				
Max Chl Dpth (ft)	18.78	18.78	18.22	18.55
Vel Total (ft/s)	2.19	2.19	2.31	2.31
Flow Area (sq ft)	4938.56	4938.56	4693.67	4688.93
Froude # XS	0.10	0.10	0.10	0.10
Specif Force (cu ft)	41610.09	41610.09	39393.78	39326.48
Hydr Depth (ft)	16.40	16.40	16.33	16.31
W.P. Total (ft)	316.14	316.14	301.81	301.57
Conv. Total (cfs)	1310220.0	1310211.0	1241539.0	1240093.0
Top Width (ft)	301.13	301.13	287.44	287.44

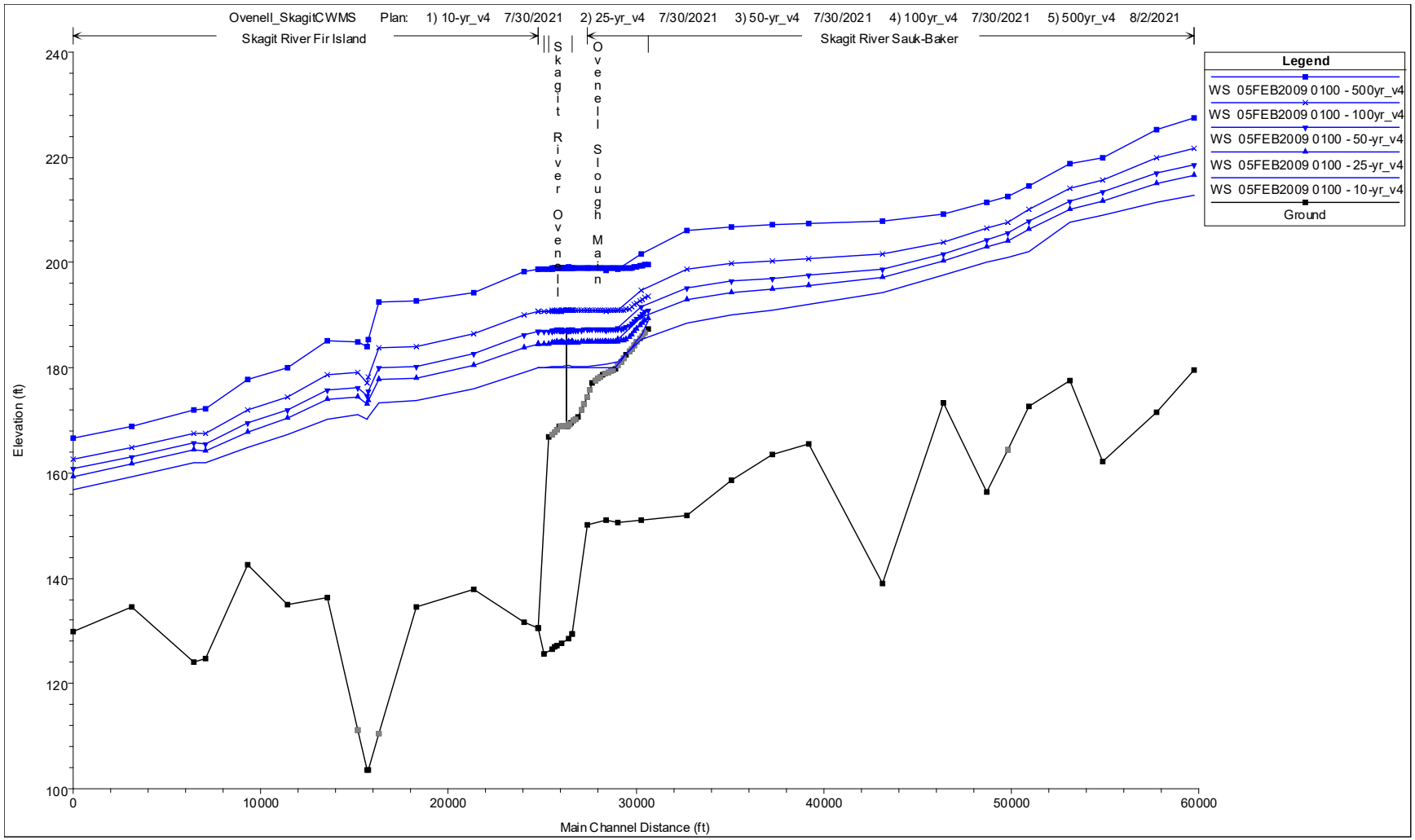

Figure 3. Water surface elevation profile for Skagit River and Ovenell Slough.

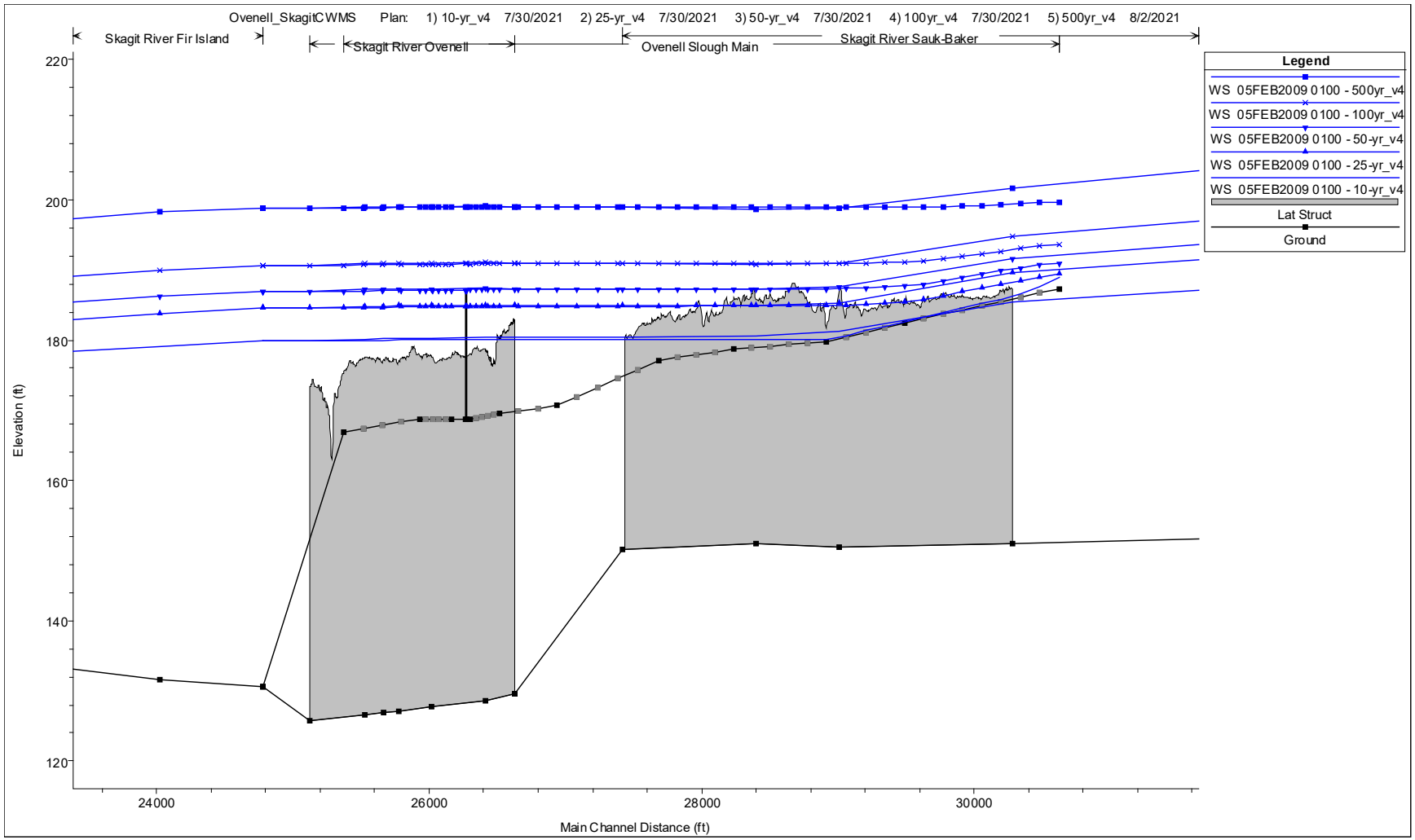

Figure 4. Water surface elevation profile for Skagit River and Ovenell Slough, zoomed view centered on Ovenell Slough. Note the lateral structure elevations shown in grey.

APPENDIX B

Scour Calculations

1: Introduction

Project Name:	Ovenell Slough Fish Passage Final Design	**Client:**	KPFF
Project Number:		**Owner:**	Skagit County Public Works
Calculations by:	Aaron Lee		
Date completed:	8/3/2021		
Review by:	Joey Smith		
Date completed:	8/11/2021		
Project Location:	Concrete, WA		
Watercourse:	Ovenell Slough (Skagit R.)		
Design Event :	100-year		
Design Location :	Ovenell Slough		

Workbook Explanation:

- The goal of this workbook is to

Instructions:
- Many values are automatically calculated and/or carried over to other sheets, so please check each cell for a formula before entering a new value.
- Cells highlighted blue require user input. Do not enter values in cells that are not highlighted blue.
- Hidden rows and columns should be unhidden prior to filling in each worksheet, then can be hidden again to facilitate viewing the final results.

Contents:

Hydraulic Data

Contracted Section

Plan: 100yr_v4 Ovenell Slough Main RS: 1300 Open#1: Bridge Profile: 05FEB2009 0100				
E.G. US. (ft)	190.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	190.89	E.G. Elev (ft)	190.89	190.88
Q Total (cfs)	1788.79	W.S. Elev (ft)	190.89	190.88
Q Bridge (cfs)	537.6	Crit W.S. (ft)	173.66	173.66
Q Weir (cfs)		Max Chl Dpth (ft)	22.09	22.08
Weir Sta Lft (ft)		Vel Total (ft/s)	0.23	0.26
Weir Sta Rgt (ft)		Flow Area (sq ft)	2,300.30	2,100.65
Weir Submerg		Froude # Chl	0.01	0.01
Weir Max Depth (ft)		Specif Force (cu ft)	18,324.86	16,674.96
Min El Weir Flow (ft)	178.01	Hydr Depth (ft)	11.89	11.39
Min El Prs (ft)	187.23	W.P. Total (ft)	361.75	351.88
Delta EG (ft)	0.01	Conv. Total (cfs)	313,054.20	281,846.10
Delta WS (ft)	0.01	Top Width (ft)	193.43	184.46
BR Open Area (sq ft)	817.48	Frctn Loss (ft)	0.00	0.00
BR Open Vel (ft/s)	0.66	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	0.01	0.02
BR Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Approach Section

Plan: 100yr_v4 Ovenell Slough Main RS: 1399 Profile: 05FEB2009 0100					
E.G. Elev (ft)	190.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.10	0.04	0.04
W.S. Elev (ft)	190.87	Reach Len. (ft)	139.40	139.40	139.40
Crit W.S. (ft)		Flow Area (sq ft)	22.12	2244.34	5458.11
E.G. Slope (ft/ft)	0.000042	Area (sq ft)	185.99	2857.03	5662.73
Q Total (cfs)	12610.16	Flow (cfs)	1.83	3327.52	9280.81
Top Width (ft)	508.32	Top Width (ft)	22.15	145.30	340.88
Vel Total (ft/s)	1.63	Avg. Vel. (ft/s)	0.08	1.48	1.7
Max Chl Dpth (ft)	22.07	Hydr. Depth (ft)	1	15.45	16.01
Conv. Total (cfs)	1942894	Conv. (cfs)	281.5	512683.8	1429929
Length Wtd. (ft)	139.4	Wetted Per. (ft)	27.91	147.18	356.06
Min Ch El (ft)	168.8	Shear (lb/sq ft)	0	0.04	0.04
Alpha	1.02	Stream Power (lb/ft s)	0	0.06	0.07
Frctn Loss (ft)		Cum Volume (acre-ft)	6.95	222.59	259.2
C & E Loss (ft)		Cum SA (acres)	0.57	2.62	5.33

Hydraulic Data for : Ovenell Slough

100-year

Hydraulic:	Y_o	=	0.08	ft.	= Main Channel contracted depth
	Q_1	=	3,328	cfs	= Main Channel flow in approach sectio
Channel	Q_2	=	0	cfs	= Main Channel flow in contracted secti
	A_1	=	2,857.0	$ft.^2$	= Main Channel approach area
	A_2	=	173.7	$ft.^2$	= Main Channel contracted area
	W_1	=	145.3	ft.	= Main channel approach top width
Channel	**W_2**	**=**	2,100.7	**ft.**	**= Main channel contracted TW, subtr**
	V_m	=	1.16	ft/s	
	Energy Slope	=	0.00	ft.	= Approach channel energy slope
	Gravity Acceleration	=	32.2	ft/s^2	
Channel Gradation:					
	D_{95}	=	0.00	ft.	= D_{95} of the main channel material
	D_{90}	=	0.00	ft.	= D_{90} of the main channel material
	D_{84}	=	0.00	ft.	= D_{84} of the main channel material
	D_{50}	=	0.01	ft.	= D_{50} of the main channel material
	D_{16}	=	0.00	ft.	= D_{16} of the main channel material
	Fall Vel., ω_{50}	=	2.22	ft/s	= Fall Velocity for D_{50}, ft/sec

100-YEAR FLOOD EVENT SCOUR SUMMARY
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

Return Period	Left Abutment Scour (ft)			Right Abutment Scour (ft)		
	Kuhnle Eqn. (Eqn. TS14B-65, NEH NRCS 2007)	**Richardson Eqn.** (Eqn. 4.2, HEC-23 Vol 1, FHWA 2009)	**Froehlich Eqn.** (Eqn. 8.1, HEC-18 , FHWA 2012)	**HEC-18 Wide Peir Scour** (Eqn. 7.1 & 7.20, HEC-18 , FHWA 2012)	**Simplified Chinese Eqn.** (Landers and Mueller, 1996)	**Froehlich Eqn.** (Froehlich, 1998)
10-yr						
25-yr	**7.2**	**9.9**	**5.3**	**5.0**	**1.9**	**8.5**
50-yr	**7.7**	**10.5**	**5.4**	**5.0**	**1.4**	**8.9**
100-yr	**8.4**	**7.0**	**2.6**	**1.1**	**0.0**	**7.2**
Design Scour Depth	**5.4**			**5.0**		

NOTES:
25-yr discharge does not overtop bridge, and is computed using energy equation. The 50-yr discharge fully submerges the bridge

SCOUR ANALYSIS SUMMARY

Location	Design Scour Depth (ft)	Channel Bed Elevation (ft, NAVD88)	Design Scour Elevation (ft, NAVD88)	Return Period	Equation
Left Abutment	**5.4**	168.8	**163.4**	50-yr	Froehlich
Right Abutment	**5.0**	168.8	**163.8**	50-yr	HEC-18 Wide Peir

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

SCOUR MODE COMPUTATION
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Laursen's Equation (Equation 15 in HEC-18):

$$V_c = Ku \times Y_1^{1/6} \times D_{50}^{1/3}$$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

APPROACH SECTION MAIN CHANNEL AREA (ft^2), A_1	=	2,857
APPROACH SECTION MAIN CHANNEL WIDTH (ft), W_1	=	145
APPROACH SECTION AVERAGE CHANNEL DEPTH (ft), $Y_1 = A_1/W_1$	=	19.66
MEDIAN GRAIN SIZE (ft), D_{50}	=	0.01
Ku	=	1.00
BED TRANSPORT CRITICAL VELOCITY (fps), V_c	=	0.31
DISCHARGE IN APPROACH CHANNEL (cfs), Q_1	=	3,328
MEAN VELOCITY IN APPROACH CHANNEL (fps), V_m	=	1.16
MAIN CHANNEL SCOUR MODE	=	**LIVE-BED**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Kuhnle
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Kuhnle Equation (Equation TS14B-65 in 210-V1-NEH):

$z_s/y = K_1 (L_c/y)^a$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

MEAN FLOW DEPTH (ft), y	=	22
LENGTH OF SPUR CREST PERPENDICULAR TO FLOW (ft), L_c	=	25
SPUR SUBMERGED (Y/N)?	=	N
SPUR ALIGNMENT PERPENDICULAR TO FLOW (Y/N)?	=	Y
K_1	=	2.00
K_2	=	17.11
a	=	0.50
b	=	-0.78
SHORT SPUR COEFFICIENT MODIFIER, K_1	=	0.36
ANGLE OF REPOSE OF BED SEDIMENT, ϕ	=	40
SIDE SLOPE OF SPUR STRUCTURE, θ	=	27

MAX SCOUR DEPTH OF LOCAL SCOUR ASSOCIATED WITH SPUR DIKE (ft), z_s	=	8.45
VOLUME OF SCOUR HOLE (yd^3)	=	1040.86

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	

100-YEAR FLOOD EVENT SCOUR SUMMARY
Abutment Scour - Richardson
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS

Reference for methodology: Richardson, et al., 1990

$$d_s = 1.1\left(\frac{L_a}{h_1}\right)^{0.4} Fr_1^{0.33} h_1$$

Scour Location		**ELJ 4**
V_1: APPROACH VELOCITY (fps)	=	0.26
Y_1: APPROACH DEPTH (ft)	=	22
g: gravitational constant (ft/sec^2)	=	32.22
F_{r1}: FROUDE NUMBER	=	0.01
Le: Length of obstruction (ft)	=	45.0
COMPUTED LOCAL SCOUR DEPTH (ft), d_s		**7.0**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	

Abutment Scour - Froliech
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

ABUTMENT SCOUR ANALYSIS
100-year

Reference for methodology: HEC-18 5th Edition, Froehlich's Abutment Scour Equation (8.1)

$$\frac{y_s}{y_a} = 2.27\, K_1\, K_2 \left(\frac{L'}{y_a}\right)^{0.43} Fr^{0.61} + 1$$

Scour Location		**L. ABUTMENT**
V_0: APPROACH VELOCITY (ft/s)	=	0.26
Y_a: AVG DEPTH OF FLOW ON FLOODPLAIN (ft)	=	22.4
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
EMBANKMENT ANGLE, Degrees	=	90
EMBANKMENT ANGLE, Radians	=	1.57
K1: COEFFICIENT FOR ABUTMENT SHAPE	=	0.55
K2: COEFFICIENT FOR ANGLE OF EMBANKMENT TO FLOW	=	1.0
L': LENGTH OF ACTIVE FLOW OBSTRUCTED BY EMBANKMENT (ft)	=	20.00
Ae: FLOW AREA OF APPROACH XS OBSTRUCTED (ft^2)	=	500.00
L: LENGTH OF EMBANKMENT PROJECTED NORMAL TO FLOW (ft)	=	25.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.01
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**2.6**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - HEC 18 Wide Pier
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCAL WIDE PIER SCOUR ANALYSIS

100-year

Reference for methodology: HEC-18 5th Edition Chapter 7

$$\frac{y_s}{y_1} = 2.0\ K_1\ K_2\ K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43}$$

$$K_w = 2.58\left(\frac{y}{a}\right)^{0.34} Fr_1^{0.65} \quad \text{for } V/V_c < 1$$

$$K_w = 1.0\left(\frac{y}{a}\right)^{0.13} Fr_1^{0.25} \quad \text{for } V/V_c \geq 1$$

Scour Location		**R. ABUTMENT**
D_{50} (mm)		2
K_u		1
u*c		0.13
a: PIER WIDTH (ft)		35
Vc_{50}: CRITICAL VELOCITY FOR D_{50} ft/s)		3.22
K_w: CORRECTION FACTOR FOR WIDE PIERS		0.11
V_1: MEAN VELOCITY (ft/s)	=	0.26
Y_1: DEPTH (ft)	=	22.4
ATTACK ANGLE, Degrees	=	0
a: PILE WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.00
PIER SHAPE	=	S
K_1: SHAPE COEFFICIENT	=	1.10
K_2: ANGLE COEFFICIENT	=	1.00
K_3: BED COND. COEFFICIENT	=	1.10
K_4: ARMORING COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.01
TOTAL SCOUR DEPTH (ft), Y_s	=	**1.1**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Chinese Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
100-year
Reference for methodology: Landers and Mueller, 1996

$CLEAR-WATER$ $LIVE-BED$

$$y_s = 1.141 K_s b^{0.6} y_0^{0.15} D_m^{-0.07} \left(\frac{V_0 - V_{ic}}{V_c - V_{ic}} \right) \quad y_s = 0.950 K_s b^{0.6} y_o^{0.15} D_m^{-0.07} \left(\frac{V_0 - V_{ic}}{V_c - V_{ic}} \right)^c$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	0.26
Y_0: APPROACH DEPTH (ft)	=	22.4
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.01
b: PIER WIDTH (ft)	=	35.00
PIER SHAPE, (C-cylinder, R, round nosed, S-sharp nose)	=	R
K_S: SHAPE COEFFICIENT	=	0.80
V_C: CRITICAL VELOCITY OF MEDIAN PARTICLE SIZE (ft/s)	=	2.48
V_{IC}: APROACH CRITICAL VELOCITY (ft/s)	=	1.01
c: LIVE BED SCOUR EXPONENT	=	1796.51
SCOUR MODE	=	CLEAR-WATER
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**-9.0**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Froehlich Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
100-year

Reference for methodology: Froehlich, 1998

$$y_s = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08}$$

$$y_{Ds} = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08} + b$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	0.26
Y_0: APPROACH DEPTH (ft)	=	22.4
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
ATTACK ANGLE, Degrees	=	0
ATTACK ANGLE, Radians	=	0.00
b: PIER WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.0
b_e: EFFECTIVE PIER WIDTH (ft)	=	35.00
PIER SHAPE, (Q-square, R, round nosed, S-sharp nose)	=	R
ϕ: SHAPE COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.01
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**7.2**
DESIGN LOCAL SCOUR DEPTH (ft), Y_{Ds}	**=**	**42.2**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

1: Introduction

Project Name:	Ovenell Slough Fish Passage Final Design	**Client:**	KPFF
Project Number:		**Owner:**	Skagit County Public Works
Calculations by:	Aaron Lee		
Date completed:	8/3/2021		
Review by:	Joey Smith		
Date completed:	8/11/2021		
Project Location:	Concrete, WA		
Watercourse:	Ovenell Slough (Skagit R.)		
Design Event :	50-year		
Design Location :	Ovenell Slough		

Workbook Explanation:

- The goal of this workbook is to

Instructions:
- Many values are automatically calculated and/or carried over to other sheets, so please check each cell for a formula before entering a new value.
- Cells highlighted blue require user input. Do not enter values in cells that are not highlighted blue.
- Hidden rows and columns should be unhidden prior to filling in each worksheet, then can be hidden again to facilitate viewing the final results.

Contents:

Hydraulic Data

Contracted Section

Plan: 50-yr_v4 Ovenell Slough Main RS: 1300 Open#1: Bridge Profile: 05FEB2009 0100				
E.G. US. (ft)	187.21	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	187.2	E.G. Elev (ft)	187.21	187.21
Q Total (cfs)	1604.76	W.S. Elev (ft)	187.19	187.19
Q Bridge (cfs)	897.37	Crit W.S. (ft)	173.35	173.36
Q Weir (cfs)	707.39	Max Chl Dpth (ft)	18.39	18.39
Weir Sta Lft (ft)	102.97	Vel Total (ft/s)	1.10	1.10
Weir Sta Rgt (ft)	234.13	Flow Area (sq ft)	817.47	817.47
Weir Submerg	1	Froude # Chl	0.05	0.05
Weir Max Depth (ft)	9.21	Specif Force (cu ft)	7,501.42	7,500.96
Min El Weir Flow (ft)	178.01	Hydr Depth (ft)		
Min El Prs (ft)	187.23	W.P. Total (ft)	148.56	148.56
Delta EG (ft)	0.01	Conv. Total (cfs)	94,649.30	94,652.60
Delta WS (ft)	0.01	Top Width (ft)	0.55	0.55
BR Open Area (sq ft)	817.48	Frctn Loss (ft)	0.00	0.01
BR Open Vel (ft/s)	1.1	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	0.10	0.10
BR Sel Method	Energy/Weir	Power Total (lb/ft s)	0.11	0.11

Approach Section

Plan: 50-yr_v4 Ovenell Slough Main RS: 1399 Profile: 05FEB2009 0100					
E.G. Elev (ft)	187.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.04	0.04
W.S. Elev (ft)	187.19	Reach Len. (ft)	139.40	139.40	139.40
Crit W.S. (ft)		Flow Area (sq ft)		1740.84	4204.92
E.G. Slope (ft/ft)	0.00005	Area (sq ft)	114.07	2322.85	4409.54
Q Total (cfs)	9131.2	Flow (cfs)		2520.25	6610.95
Top Width (ft)	503.13	Top Width (ft)	16.96	145.30	340.88
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		1.45	1.57
Max Chl Dpth (ft)	18.39	Hydr. Depth (ft)		13.02	12.34
Conv. Total (cfs)	1287582	Conv. (cfs)		355378.1	932204.3
Length Wtd. (ft)	139.4	Wetted Per. (ft)		135.13	352.39
Min Ch El (ft)	168.8	Shear (lb/sq ft)		0.04	0.04
Alpha	1	Stream Power (lb/ft s)		0.06	0.06
Frctn Loss (ft)		Cum Volume (acre-ft)	4.45	194.65	187.51
C & E Loss (ft)		Cum SA (acres)	0.48	2.62	5.33

Hydraulic Data for : Ovenell Slough

50-year

Hydraulic:	Y_o	=	0.21	ft.	= Main Channel contracted depth
	Q_1	=	2,520	cfs	= Main Channel flow in approach section
	Channel Q_2	=	1	cfs	= Main Channel flow in contracted section
	A_1	=	2,322.9	$ft.^2$	= Main Channel approach area
	A_2	=	173.4	$ft.^2$	= Main Channel contracted area
	W_1	=	145.3	ft.	= Main channel approach top width
	Channel W_2	**=**	817.5	**ft.**	**= Main channel contracted TW, subtract piers**
	V_m	=	1.08	ft/s	
	Energy Slope	=	0.00	ft.	= Approach channel energy slope
	Gravity Acceleration	=	32.2	ft/s^2	
Channel Gradation:					
	D_{95}	=	0.00	ft.	= D_{95} of the main channel material
	D_{90}	=	0.00	ft.	= D_{90} of the main channel material
	D_{84}	=	0.00	ft.	= D_{84} of the main channel material
	D_{50}	=	0.01	ft.	= D_{50} of the main channel material
	D_{16}	=	0.00	ft.	= D_{16} of the main channel material
	Fall Vel., ω_{50}	=	2.22	ft/s	= Fall Velocity for D_{50}, ft/sec

Fal

SCOUR MODE COMPUTATION
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Laursen's Equation (Equation 15 in HEC-18):

$$V_c = Ku \times Y_1^{1/6} \times D_{50}^{1/3}$$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

APPROACH SECTION MAIN CHANNEL AREA (ft^2), A_1	=	2,323
APPROACH SECTION MAIN CHANNEL WIDTH (ft), W_1	=	145
APPROACH SECTION AVERAGE CHANNEL DEPTH (ft), $Y_1 = A_1/W_1$	=	15.99
MEDIAN GRAIN SIZE (ft), D_{50}	=	0.01
Ku	=	1.00
BED TRANSPORT CRITICAL VELOCITY (fps), V_c	=	0.30
DISCHARGE IN APPROACH CHANNEL (cfs), Q_1	=	2,520
MEAN VELOCITY IN APPROACH CHANNEL (fps), V_m	=	1.08
MAIN CHANNEL SCOUR MODE	=	**LIVE-BED**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Kuhnle
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Kuhnle Equation (Equation TS14B-65 in 210-V1-NEH):

$z_s/y = K_1 (L_c/y)^a$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

MEAN FLOW DEPTH (ft), y	=	18
LENGTH OF SPUR CREST PERPENDICULAR TO FLOW (ft), L_c	=	25
SPUR SUBMERGED (Y/N)?	=	Y
SPUR ALIGNMENT PERPENDICULAR TO FLOW (Y/N)?	=	Y
K_1	=	1.41
K_2	=	17.11
a	=	0.50
b	=	-0.78
SHORT SPUR COEFFICIENT MODIFIER, K_1	=	0.36
ANGLE OF REPOSE OF BED SEDIMENT, ϕ	=	40
SIDE SLOPE OF SPUR STRUCTURE, θ	=	27

MAX SCOUR DEPTH OF LOCAL SCOUR ASSOCIATED WITH SPUR DIKE (ft), z_s	=	7.71
VOLUME OF SCOUR HOLE (yd^3)	=	686.01

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Froliech
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

ABUTMENT SCOUR ANALYSIS
50-year

Reference for methodology: HEC-18 5th Edition, Froehlich's Abutment Scour Equation (8.1)

$$\frac{y_s}{y_a} = 2.27\, K_1\, K_2 \left(\frac{L'}{y_a}\right)^{0.43} Fr^{0.61} + 1$$

Scour Location		L. ABUTMENT
V_0: APPROACH VELOCITY (ft/s)	=	1.10
Y_a: AVG DEPTH OF FLOW ON FLOODPLAIN (ft)	=	18
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
EMBANKMENT ANGLE, Degrees	=	90
EMBANKMENT ANGLE, Radians	=	1.57
K1: COEFFICIENT FOR ABUTMENT SHAPE	=	0.55
K2: COEFFICIENT FOR ANGLE OF EMBANKMENT TO FLOW	=	1.0
L': LENGTH OF ACTIVE FLOW OBSTRUCTED BY EMBANKMENT (ft)	=	32.70
Ae: FLOW AREA OF APPROACH XS OBSTRUCTED (ft^2)	=	817.47
L: LENGTH OF EMBANKMENT PROJECTED NORMAL TO FLOW (ft)	=	25.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**5.4**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Richardson
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS

Reference for methodology: Richardson, et al., 1990

$$d_s = 1.1\left(\frac{L_a}{h_1}\right)^{0.4} Fr_1^{0.33} h_1$$

Scour Location		**ELJ 4**
V_1: APPROACH VELOCITY (fps)	=	1.10
Y_1: APPROACH DEPTH (ft)	=	18.7
g: gravitational constant (ft/sec^2)	=	32.22
F_{r1}: FROUDE NUMBER	=	0.04
Le: Length of obstruction (ft)	=	45.0
COMPUTED LOCAL SCOUR DEPTH (ft), d_s		**10.5**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - HEC 18 Wide Pier
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCAL WIDE PIER SCOUR ANALYSIS

50-year

Reference for methodology: HEC-18 5th Edition Chapter 7

$$\frac{y_s}{y_1} = 2.0\ K_1\ K_2\ K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43}$$

$$K_w = 2.58\left(\frac{y}{a}\right)^{0.34} Fr_1^{0.65} \quad \text{for } V/V_c < 1$$

$$K_w = 1.0\left(\frac{y}{a}\right)^{0.13} Fr_1^{0.25} \quad \text{for } V/V_c \geq 1$$

Scour Location		**R. ABUTMENT**
D_{50} (mm)		2
K_u		1
u*c		0.13
a: PIER WIDTH (ft)		35
Vc_{50}: CRITICAL VELOCITY FOR D_{50} ft/s)		3.16
K_w: CORRECTION FACTOR FOR WIDE PIERS		0.27
V_1: MEAN VELOCITY (ft/s)	=	1.10
Y_1: DEPTH (ft)	=	18
ATTACK ANGLE, Degrees	=	0
a: PILE WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.00
PIER SHAPE	=	S
K_1: SHAPE COEFFICIENT	=	1.10
K_2: ANGLE COEFFICIENT	=	1.00
K_3: BED COND. COEFFICIENT	=	1.10
K_4: ARMORING COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
TOTAL SCOUR DEPTH (ft), Y_s	=	**5.0**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Chinese Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
50-year
Reference for methodology: Landers and Mueller, 1996

$CLEAR-WATER$ $LIVE-BED$

$$y_s = 1.141 K_s b^{0.6} y_0^{0.15} D_m^{-0.07} \left(\frac{V_0 - V_{ic}}{V_c - V_{ic}} \right) \quad y_s = 0.950 K_s b^{0.6} y_o^{0.15} D_m^{-0.07} \left(\frac{V_0 - V_{ic}}{V_c - V_{ic}} \right)^c$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	1.10
Y_0: APPROACH DEPTH (ft)	=	18.4
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.01
b: PIER WIDTH (ft)	=	35.00
PIER SHAPE, (C-cylinder, R, round nosed, S-sharp nose)	=	R
K_S: SHAPE COEFFICIENT	=	0.80
V_C: CRITICAL VELOCITY OF MEDIAN PARTICLE SIZE (ft/s)	=	2.41
V_{IC}: APROACH CRITICAL VELOCITY (ft/s)	=	0.99
c: LIVE BED SCOUR EXPONENT	=	13.56
SCOUR MODE	=	CLEAR-WATER
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**1.4**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Froehlich Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
50-year

Reference for methodology: Froehlich, 1998

$$y_s = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08}$$

$$y_{Ds} = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08} + b$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	1.10
Y_0: APPROACH DEPTH (ft)	=	18.4
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
ATTACK ANGLE, Degrees	=	0
ATTACK ANGLE, Radians	=	0.00
b: PIER WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.0
b_e: EFFECTIVE PIER WIDTH (ft)	=	35.00
PIER SHAPE, (Q-square, R, round nosed, S-sharp nose)	=	R
ϕ: SHAPE COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**8.9**
DESIGN LOCAL SCOUR DEPTH (ft), Y_{Ds}	**=**	**43.9**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

1: Introduction

Project Name:	Ovenell Slough Fish Passage Final Design	**Client:**	KPFF
Project Number:		**Owner:**	Skagit County Public Works
Calculations by:	Aaron Lee		
Date completed:	8/3/2021		
Review by:	Joey Smith		
Date completed:	8/11/2021		
Project Location:	Concrete, WA		
Watercourse:	Ovenell Slough (Skagit R.)		
Design Event :	25-year		
Design Location :	Ovenell Slough		

Workbook Explanation:

- The goal of this workbook is to

Instructions:
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Contents:

Hydraulic Data

Contracted Section

Plan: 25-yr_v3 Ovenell Slough Main RS: 1300 Open#1: Bridge Profile: 05FEB2009 0100				
E.G. US. (ft)	184.75	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	184.74	E.G. Elev (ft)	184.75	184.75
Q Total (cfs)	1344.42	W.S. Elev (ft)	184.73	184.73
Q Bridge (cfs)	878.91	Crit W.S. (ft)	172.90	172.90
Q Weir (cfs)	465.51	Max Chl Dpth (ft)	15.93	15.93
Weir Sta Lft (ft)	135.38	Vel Total (ft/s)	1.13	1.13
Weir Sta Rgt (ft)	234.13	Flow Area (sq ft)	776.28	776.26
Weir Submerg	1	Froude # Chl	0.05	0.05
Weir Max Depth (ft)	6.75	Specif Force (cu ft)	5,526.63	5,526.27
Min El Weir Flow (ft)	178.01	Hydr Depth (ft)	23.54	23.54
Min El Prs (ft)	187.23	W.P. Total (ft)	113.63	113.62
Delta EG (ft)	0.01	Conv. Total (cfs)	103,826.30	103,826.60
Delta WS (ft)	0.01	Top Width (ft)	32.97	32.98
BR Open Area (sq ft)	817.48	Frctn Loss (ft)	0.00	0.00
BR Open Vel (ft/s)	1.13	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	0.07	0.07
BR Sel Method	Energy/Weir	Power Total (lb/ft s)	0.08	0.08

Approach Section

Plan: 25-yr_v3 Ovenell Slough Main RS: 1399 Profile: 05FEB2009 0100					
E.G. Elev (ft)	184.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.04	0.04
W.S. Elev (ft)	184.76	Reach Len. (ft)	139.40	139.40	139.40
Crit W.S. (ft)		Flow Area (sq ft)		1415.74	3376.05
E.G. Slope (ft/ft)	0.000055	Area (sq ft)	76.56	1969.54	3580.67
Q Total (cfs)	6713.34	Flow (cfs)		1875.49	4837.85
Top Width (ft)	500.1	Top Width (ft)	13.92	145.30	340.88
Vel Total (ft/s)	1.4	Avg. Vel. (ft/s)		1.32	1.43
Max Chl Dpth (ft)	15.96	Hydr. Depth (ft)		10.59	9.9
Conv. Total (cfs)	901336.8	Conv. (cfs)		251804.1	649532.7
Length Wtd. (ft)	139.4	Wetted Per. (ft)		135.13	349.95
Min Ch El (ft)	168.8	Shear (lb/sq ft)		0.04	0.03
Alpha	1	Stream Power (lb/ft s)		0.05	0.05
Frctn Loss (ft)		Cum Volume (acre-ft)	3.11	176.53	145.51
C & E Loss (ft)		Cum SA (acres)	0.4	2.62	5.33

Hydraulic Data for : Ovenell Slough

25-year

Hydraulic:	Y_o	=	0.22	ft.	= Main Channel contracted depth
	Q_1	=	1,875	cfs	= Main Channel flow in approach section
	Channel Q_2	=	1	cfs	= Main Channel flow in contracted section
	A_1	=	1,969.5	$ft.^2$	= Main Channel approach area
	A_2	=	172.9	$ft.^2$	= Main Channel contracted area
	W_1	=	145.3	ft.	= Main channel approach top width
	Channel W_2	**=**	776.3	**ft.**	**= Main channel contracted TW, subtract piers**
	V_m	=	0.95	ft/s	
	Energy Slope	=	0.00	ft.	= Approach channel energy slope
	Gravity Acceleration	=	32.2	ft/s^2	
Channel Gradation:					
	D_{95}	=	0.00	ft.	= D_{95} of the main channel material
	D_{90}	=	0.00	ft.	= D_{90} of the main channel material
	D_{84}	=	0.00	ft.	= D_{84} of the main channel material
	D_{50}	=	0.01	ft.	= D_{50} of the main channel material
	D_{16}	=	0.00	ft.	= D_{16} of the main channel material
	Fall Vel., ω_{50}	=	2.22	ft/s	= Fall Velocity for D_{50}, ft/sec

Fal

SCOUR MODE COMPUTATION
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Laursen's Equation (Equation 15 in HEC-18):

$$V_c = Ku \times Y_1^{1/6} \times D_{50}^{1/3}$$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

APPROACH SECTION MAIN CHANNEL AREA (ft^2), A_1	=	1,970
APPROACH SECTION MAIN CHANNEL WIDTH (ft), W_1	=	145
APPROACH SECTION AVERAGE CHANNEL DEPTH (ft), $Y_1 = A_1/W_1$	=	13.55
MEDIAN GRAIN SIZE (ft), D_{50}	=	0.01
Ku	=	1.00
BED TRANSPORT CRITICAL VELOCITY (fps), V_c	=	0.29
DISCHARGE IN APPROACH CHANNEL (cfs), Q_1	=	1,875
MEAN VELOCITY IN APPROACH CHANNEL (fps), V_m	=	0.95
MAIN CHANNEL SCOUR MODE	=	**LIVE-BED**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Kuhnle
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

The following computations are made using Kuhnle Equation (Equation TS14B-65 in 210-V1-NEH):

$z_s/y = K_1 (L_c/y)^a$

INCIPIENT BRIDGE OVERTOPPING DISCHARGE
MAIN CHANNEL SCOUR MODE

MEAN FLOW DEPTH (ft), y	=	16
LENGTH OF SPUR CREST PERPENDICULAR TO FLOW (ft), L_c	=	25
SPUR SUBMERGED (Y/N)?	=	Y
SPUR ALIGNMENT PERPENDICULAR TO FLOW (Y/N)?	=	Y
K_1	=	1.41
K_2	=	17.11
a	=	0.50
b	=	-0.78
SHORT SPUR COEFFICIENT MODIFIER, K_1	=	0.36
ANGLE OF REPOSE OF BED SEDIMENT, ϕ	=	40
SIDE SLOPE OF SPUR STRUCTURE, θ	=	27

MAX SCOUR DEPTH OF LOCAL SCOUR ASSOCIATED WITH SPUR DIKE (ft), z_s	=	7.18
VOLUME OF SCOUR HOLE (yd^3)	=	495.91

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Richardson
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS

Reference for methodology: Richardson, et al., 1990

$$d_s = 1.1\left(\frac{L_a}{h_1}\right)^{0.4} Fr_1^{0.33} h_1$$

Scour Location		**ELJ 4**
V_1: APPROACH VELOCITY (fps)	=	1.13
Y_1: APPROACH DEPTH (ft)	=	15.96
g: gravitational constant (ft/sec^2)	=	32.22
F_{r1}: FROUDE NUMBER	=	0.05
Le: Length of obstruction (ft)	=	45.0
COMPUTED LOCAL SCOUR DEPTH (ft), d_s		**9.9**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

Abutment Scour - Froliech
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

ABUTMENT SCOUR ANALYSIS
25-year

Reference for methodology: HEC-18 5th Edition, Froehlich's Abutment Scour Equation (8.1)

$$\frac{y_s}{y_a} = 2.27\, K_1\, K_2 \left(\frac{L'}{y_a}\right)^{0.43} Fr^{0.61} + 1$$

Scour Location		**L. ABUTMENT**
V_0: APPROACH VELOCITY (ft/s)	=	1.13
Y_a: AVG DEPTH OF FLOW ON FLOODPLAIN (ft)	=	15.96
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
EMBANKMENT ANGLE, Degrees	=	90
EMBANKMENT ANGLE, Radians	=	1.57
K1: COEFFICIENT FOR ABUTMENT SHAPE	=	0.55
K2: COEFFICIENT FOR ANGLE OF EMBANKMENT TO FLOW	=	1.0
L': LENGTH OF ACTIVE FLOW OBSTRUCTED BY EMBANKMENT (ft)	=	31.05
Ae: FLOW AREA OF APPROACH XS OBSTRUCTED (ft^2)	=	776.28
L: LENGTH OF EMBANKMENT PROJECTED NORMAL TO FLOW (ft)	=	25.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**5.3**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - HEC 18 Wide Pier
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCAL WIDE PIER SCOUR ANALYSIS

25-year

Reference for methodology: HEC-18 5th Edition Chapter 7

$$\frac{y_s}{y_1} = 2.0\ K_1\ K_2\ K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43}$$

$$K_w = 2.58\left(\frac{y}{a}\right)^{0.34} Fr_1^{0.65} \quad \text{for } V/V_c < 1$$

$$K_w = 1.0\left(\frac{y}{a}\right)^{0.13} Fr_1^{0.25} \quad \text{for } V/V_c \geq 1$$

Scour Location		**R. ABUTMENT**
D_{50} (mm)	=	2
K_u	=	1
u*c	=	0.13
a: PIER WIDTH (ft)	=	35
Vc_{50}: CRITICAL VELOCITY FOR D_{50} ft/s)	=	3.11
K_w: CORRECTION FACTOR FOR WIDE PIERS		0.27
V_1: MEAN VELOCITY (ft/s)	=	1.13
Y_1: DEPTH (ft)	=	15.96
ATTACK ANGLE, Degrees	=	0
a: PILE WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.00
PIER SHAPE	=	S
K_1: SHAPE COEFFICIENT	=	1.10
K_2: ANGLE COEFFICIENT	=	1.00
K_3: BED COND. COEFFICIENT	=	1.10
K_4: ARMORING COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
TOTAL SCOUR DEPTH (ft), Y_s	=	**5.0**

Calc. By:	Aaron Lee	Date:	8/3/2021
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Chinese Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
25-year
Reference for methodology: Landers and Mueller, 1996

$CLEAR-WATER$ $LIVE-BED$

$$y_s = 1.141 K_s b^{0.6} y_0^{0.15} D_m^{-0.07} \left(\frac{V_0 - V}{V_c - V} \right) \qquad y_s = 0.950 K_s b^{0.6} y_o^{0.15} D_m^{-0.07} \left(\frac{V_0 - V_{ic}}{V_c - V_{ic}} \right)^c$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	1.13
Y_0: APPROACH DEPTH (ft)	=	15.96
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.01
b: PIER WIDTH (ft)	=	35.00
PIER SHAPE, (C-cylinder, R, round nosed, S-sharp nose)	=	R
K_S: SHAPE COEFFICIENT	=	0.80
V_C: CRITICAL VELOCITY OF MEDIAN PARTICLE SIZE (ft/s)	=	2.36
V_{IC}: APROACH CRITICAL VELOCITY (ft/s)	=	0.97
c: LIVE BED SCOUR EXPONENT	=	11.60
SCOUR MODE	=	CLEAR-WATER
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**1.9**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

Local Scour - Froehlich Method
Ovenell Slough
Ovenell Slough (Skagit R.)
Concrete, WA

August 2021

LOCALSCOUR ANALYSIS
25-year

Reference for methodology: Froehlich, 1998

$$y_s = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08}$$

$$y_{Ds} = 0.32 b \phi Fr_1^{0.2} \left(\frac{b_e}{b}\right)^{0.62} \left(\frac{y_0}{b}\right)^{0.46} \left(\frac{b}{D_{50}}\right)^{0.08} + b$$

Scour Location		**R. ABUTMENT**
V_0: APPROACH VELOCITY (fps)	=	1.13
Y_0: APPROACH DEPTH (ft)	=	15.96
D_{50}: MEDIAN PARTICLE SIZE (ft)	=	0.007
ATTACK ANGLE, Degrees	=	0
ATTACK ANGLE, Radians	=	0.00
b: PIER WIDTH (ft)	=	35.00
L: PILE LENGTH (ft)	=	40.0
b_e: EFFECTIVE PIER WIDTH (ft)	=	35.00
PIER SHAPE, (Q-square, R, round nosed, S-sharp nose)	=	R
ϕ: SHAPE COEFFICIENT	=	1.00
g: gravitational constant (ft/sec^2)	=	32.20
FROUDE NUMBER, Fr	=	0.05
COMPUTED LOCAL SCOUR DEPTH (ft), Y_s	**=**	**8.5**
DESIGN LOCAL SCOUR DEPTH (ft), Y_{Ds}	**=**	**43.5**

Calc. By:	Aaron Lee	Date:	08/03/21
Check By:	Joey Smith	Date:	8/11/2021

APPENDIX C

Construction Cost Estimate

COST ESTIMATE

Natural Systems Design

Project: Ovenell Slough Fish Passage Final Design
Project No: KPFF-002

Analyst: Aaron Lee
Checked: Nic Truscott, PE
Latest Revision: 2/19/2021
Allowance for Indeterminates Included in Bid Items: 0%
Inflation to 2021 $ Included in Bid Items: 0%

Stream

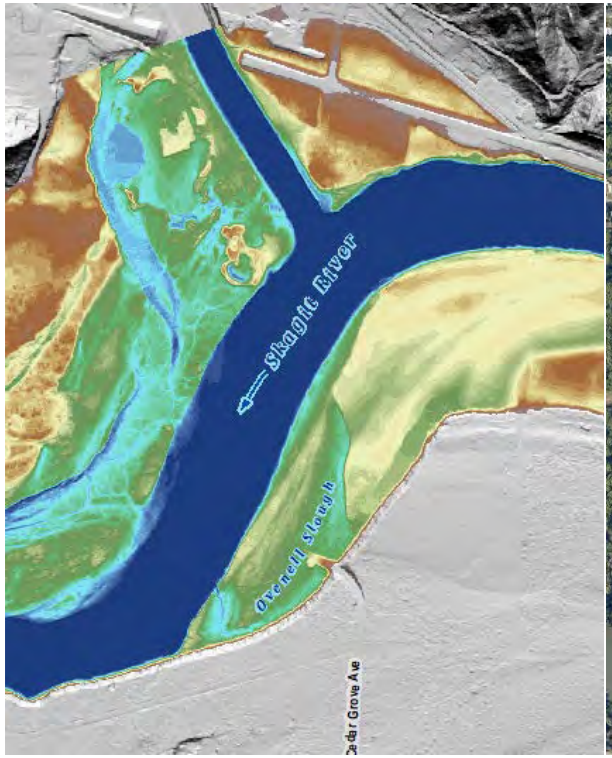
Item #	Item Description	WSDOT Ref	Quantity	Unit	Unit Price ($)	Amount ($)
1	SCOUR PROTECTION ELJ		2	EA	$12,177	$24,354
2	LIVE SILTATION		1	EA	$12,921	$12,921
	Subtotal					$37,275
	Taxes (as % of Construction Sub-Total)		8.7%			3,243
	Total (Large Wood Habitat and Erosion Protection)					**$40,518**

Grand Total **$40,518**

APPENDIX D

Geomorphic Reach Assessment

Geomorphic Reach Assessment
Ovenell Slough



Natural Systems Design

Overview

Goal: Determine a minimum channel size for Ovenell Slough that meets WDFW fish passage requirements

Approach:

- Hydrology (10% exceedance flow)
- Hydraulics (flood conveyance)
- Geomorphic reach assessment
- Synthesize findings

Findings:

- Ovenell Slough is a unique site, and does not fit standard design procedures
- Geomorphic processes are limited

Conclusions:

- Minimum width for fish passage is ~15 ft (range of 10-20 ft) based on topographical analysis
- Bridge opening is an improvement from 24” culvert
- Optimization of channel width (modeling) will not change fundamental dynamics of the system

Fish Passage

2013 Water Crossing Design Guidelines (WDFW):

"…the hydraulic design criteria must be satisfied 90 percent of the time during the passage season for the target species. The 10-percent exceedance flow for each target species is then considered the high fish-passage design flow."

"…it is prudent to look at the performance of the design at the 2-year recurrence interval flood flow."

"Transitions to and from supercritical flow or high inlet losses at these flows could block migrating fish at a critical time in their migration."

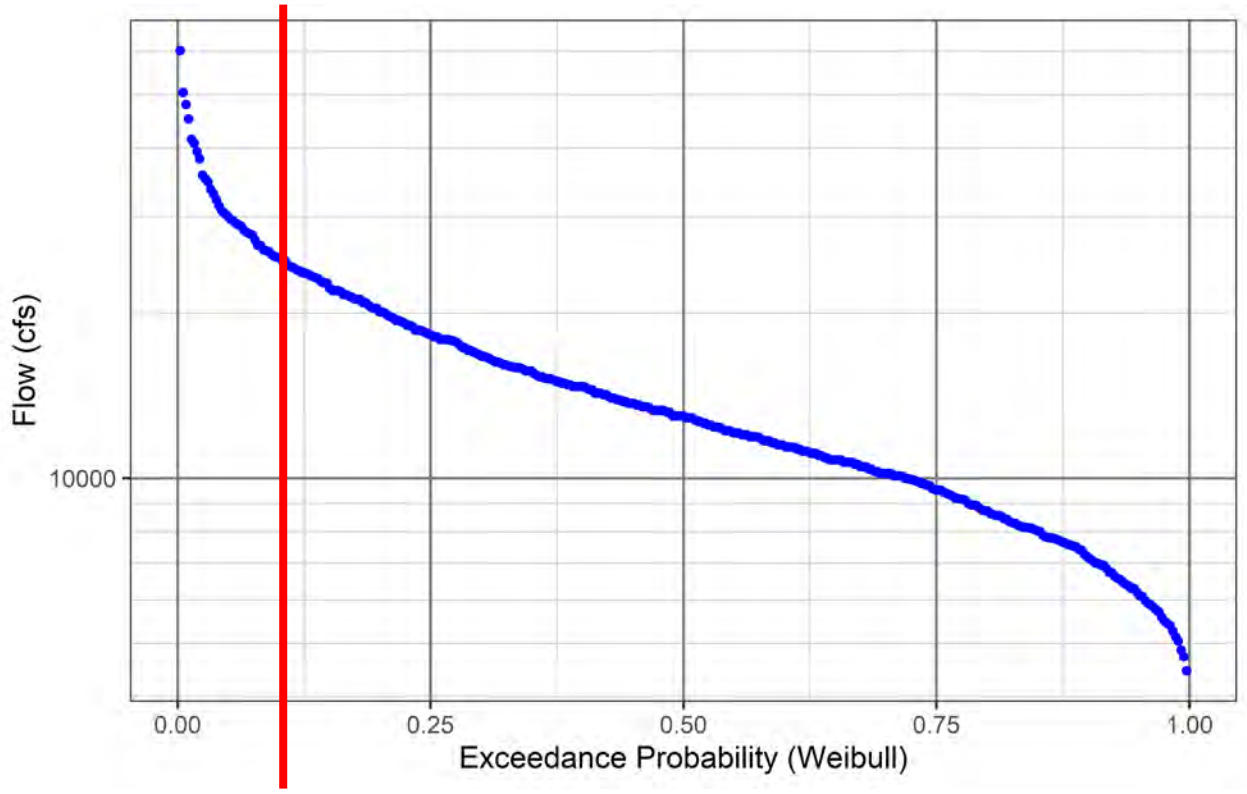
Design criteria, velocity: 4 ft/s, 1 ft/s
Design criteria, flow: ???


2019
Overflow from Skagit River
begins at ~100,000 cfs
Local drainage
Springs
SKAGIT RIVER
Cedar Grove Avenue
Baker Loop Road
Skagit County iMap
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Fish Passage - Hydrology

Flow duration = how often a certain discharge is exceeded throughout the year

Skagit R. near Concrete, WA



10%
(25,250 cfs)

Peak Flows (cfs) – Skagit R.

2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
91,317	148,783	197,113	224,435	269,409	388,199

Note that Ovenell Slough is connected through backwater until ~100,000 cfs.

Fish Passage - Hydrology

Photos taken on January 26, 2020 (NSD), Skagit River at ~24,000 cfs

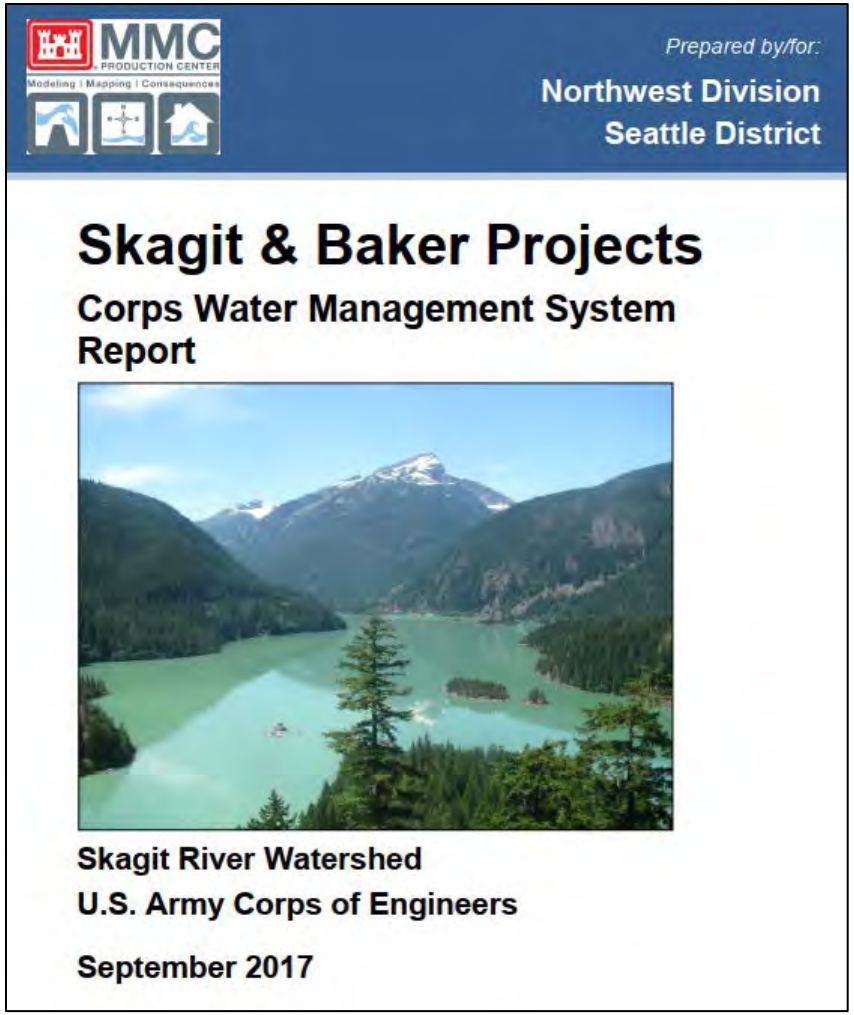
Outlet of Ovenell Slough, meeting the Skagit R.

Ovenell Slough looking downstream toward the outlet. The pictured channel contained the entirety of the flow from Ovenell Slough in wet conditions.

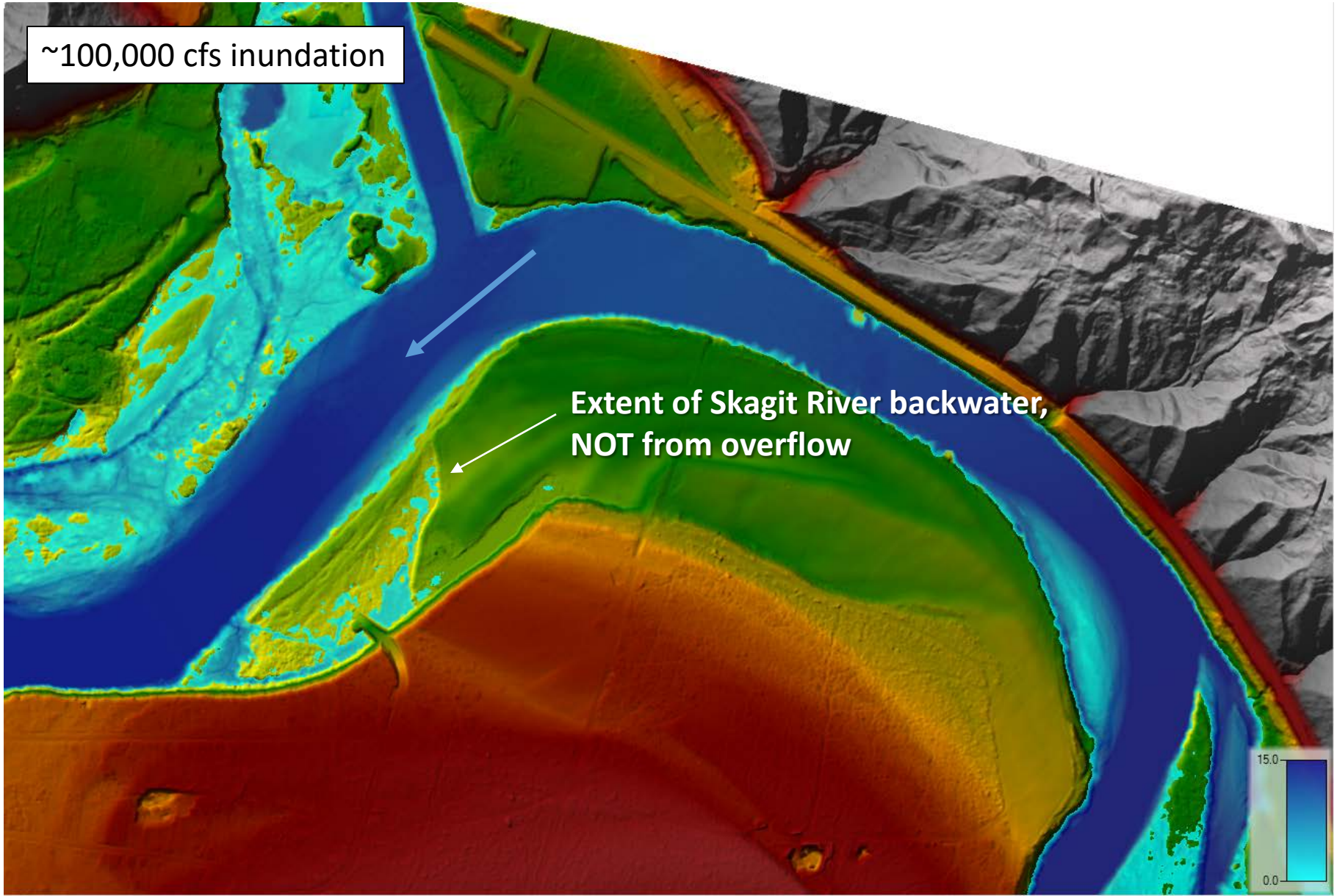
Fish Passage - Hydraulics

Background
- HEC-RAS model of Skagit River watershed
- Used by USACE Seattle District for flood management (CWMS, 2017)

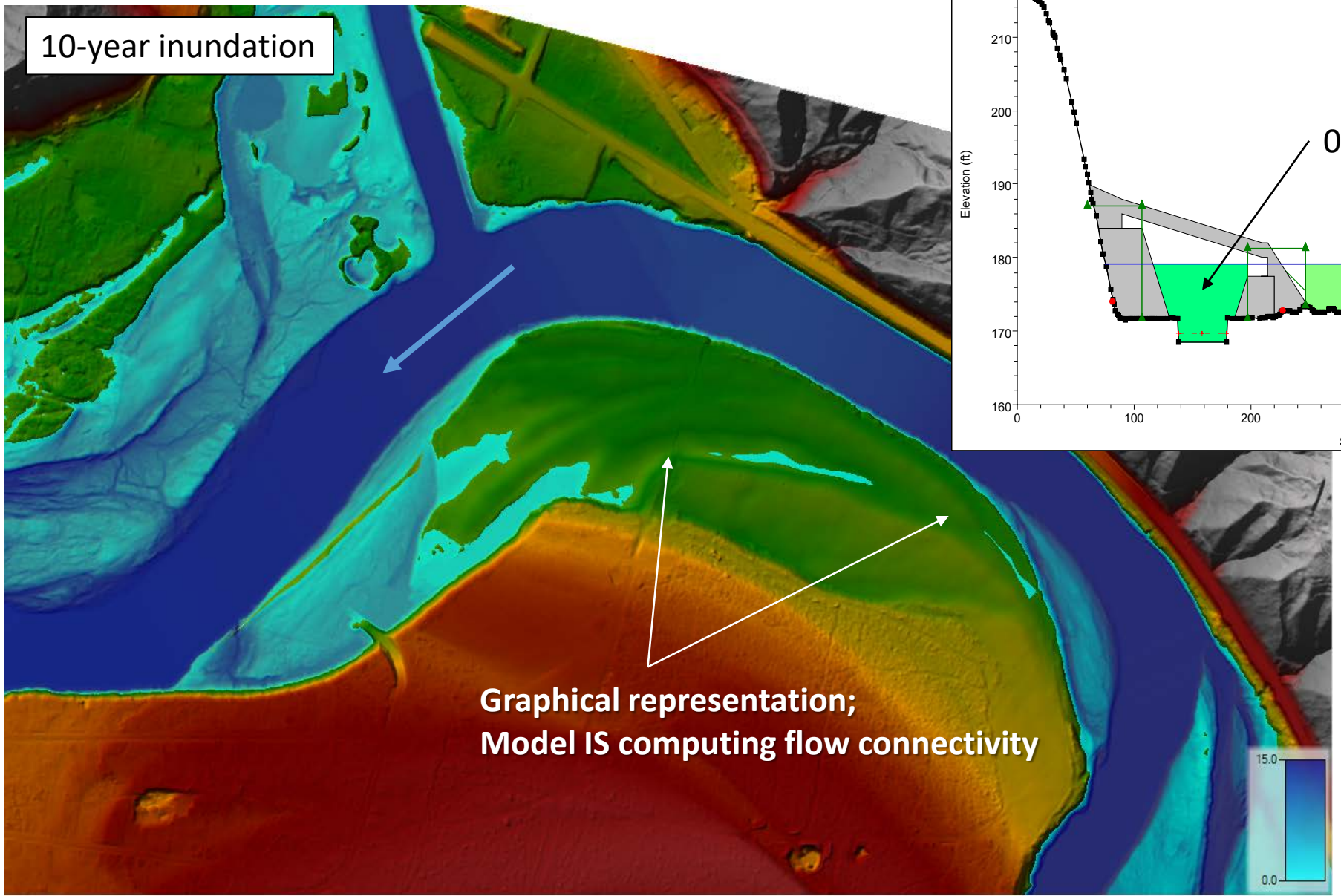
Approach
- Hydraulic model was refined in the project area
- Accounts for interaction between Ovenell Slough and the Skagit River, including the bridge
- Results are consistent with CWMS model

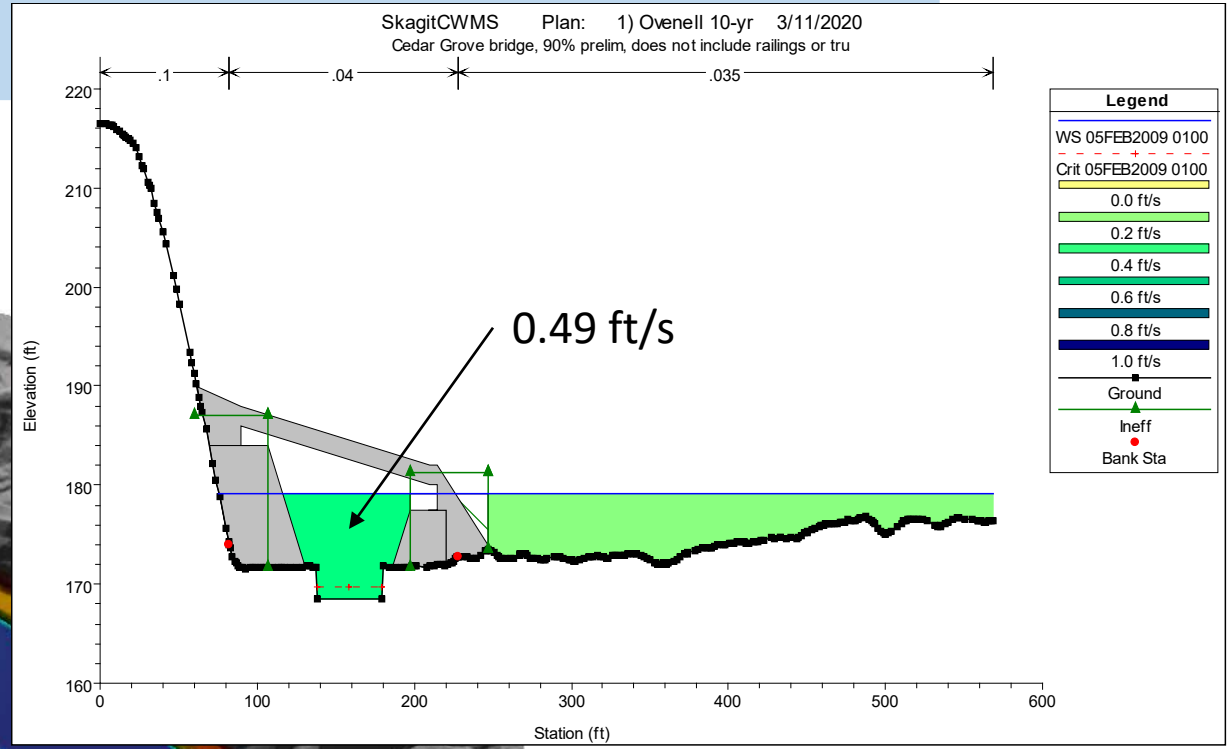


Fish Passage - Hydraulics

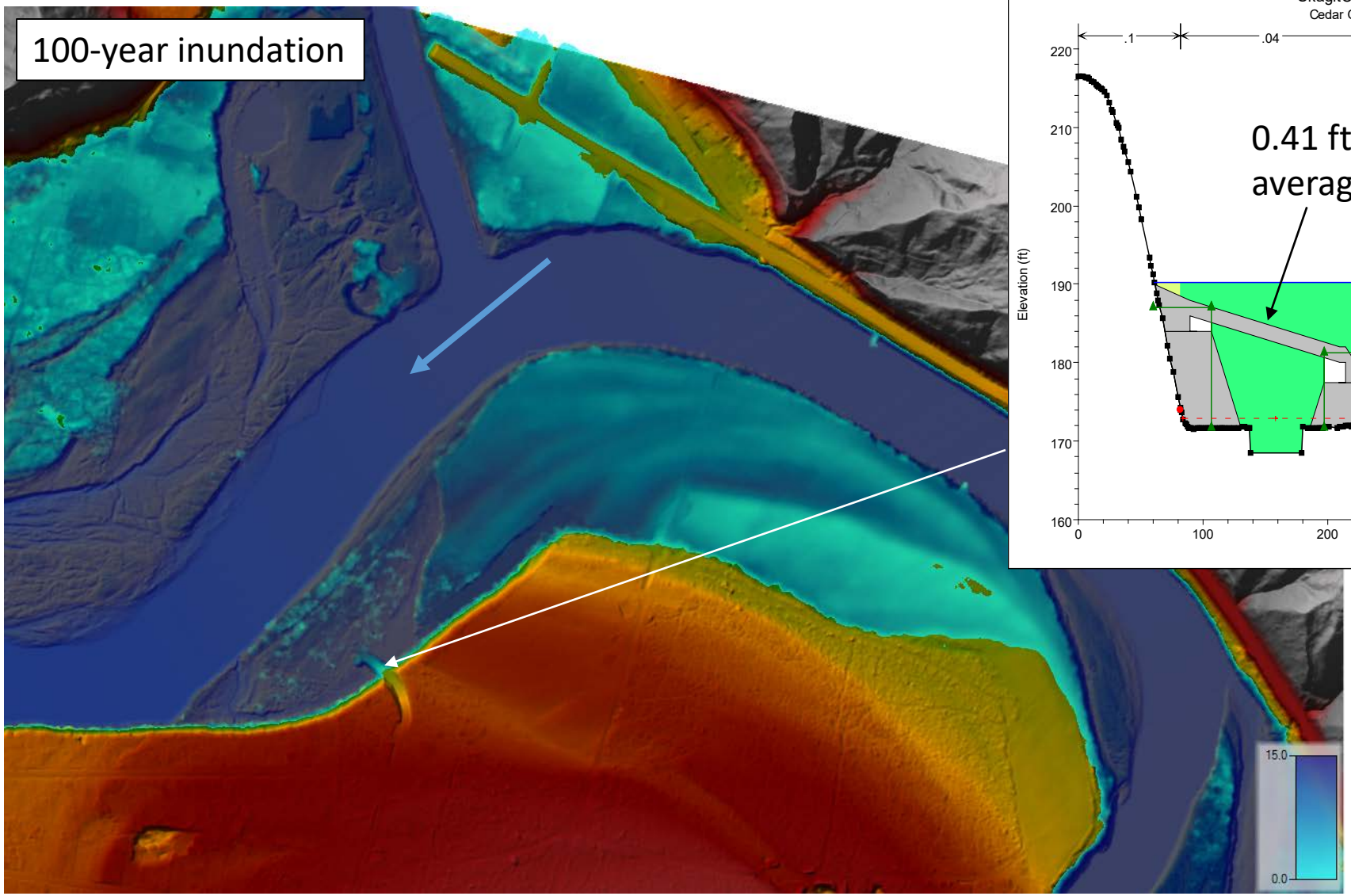


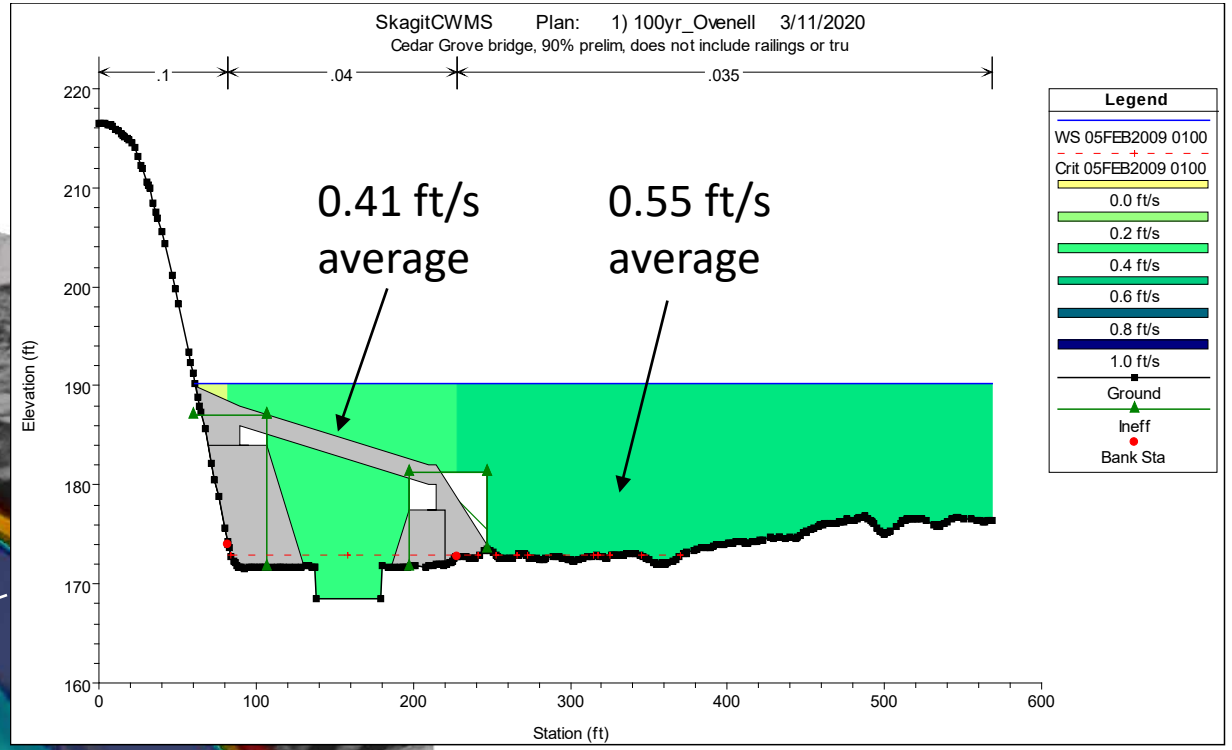
Fish Passage - Hydraulics





Fish Passage - Hydraulics

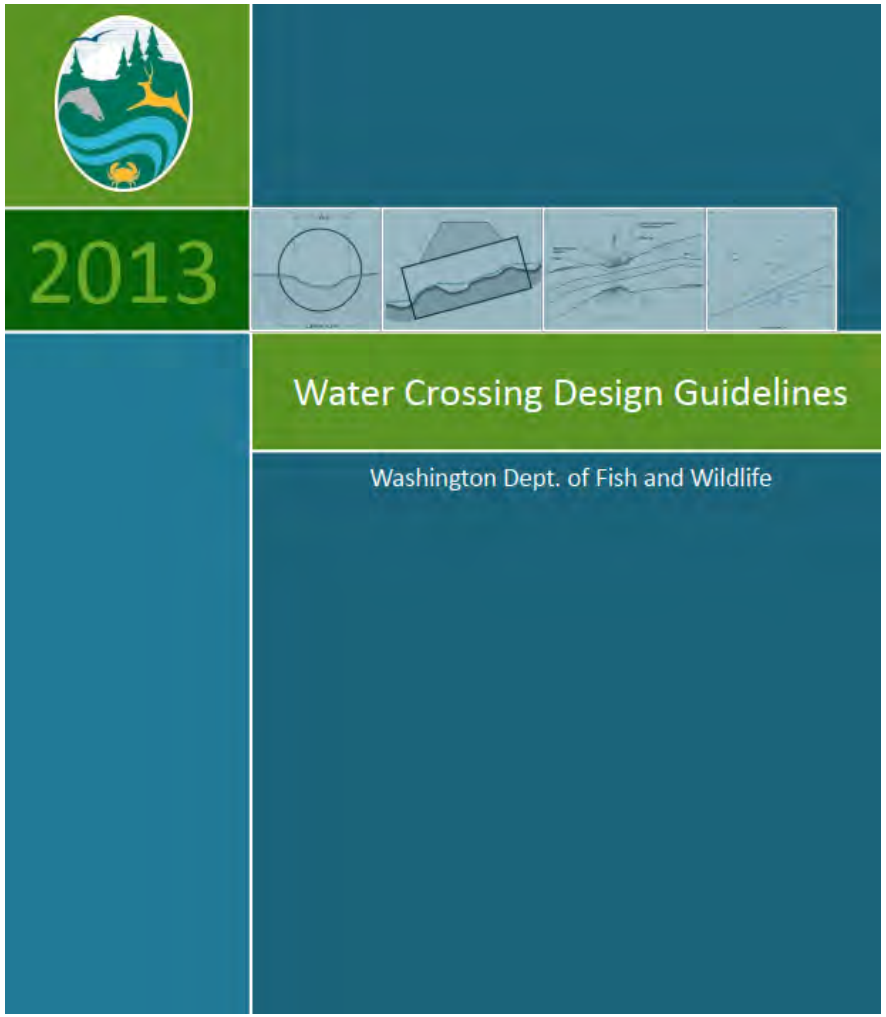


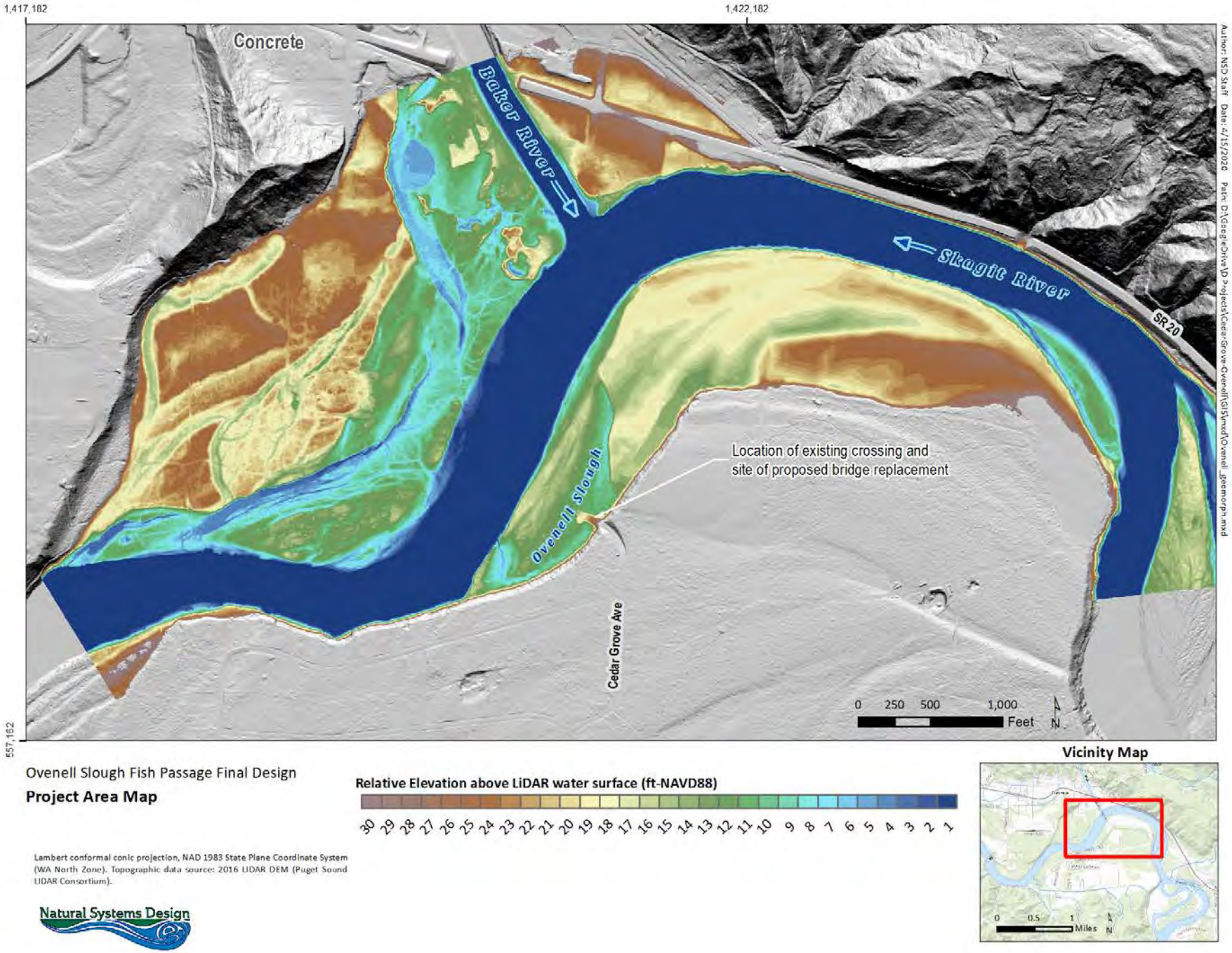


Geomorphic Reach Assessment

Overview of Approach:

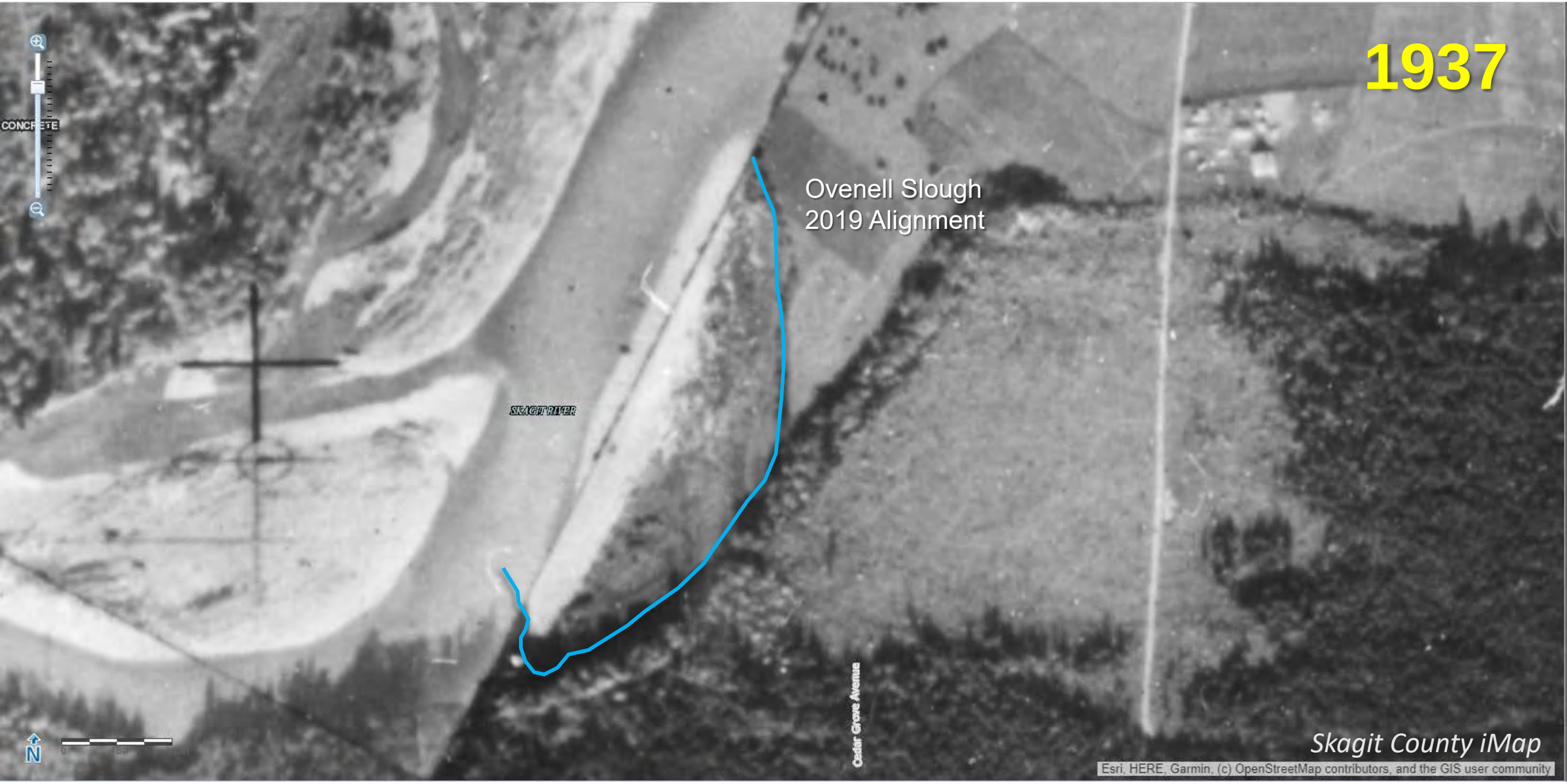
1. Channel features
2. Channel migration
3. Sediment supply and transport
4. Floodplain features

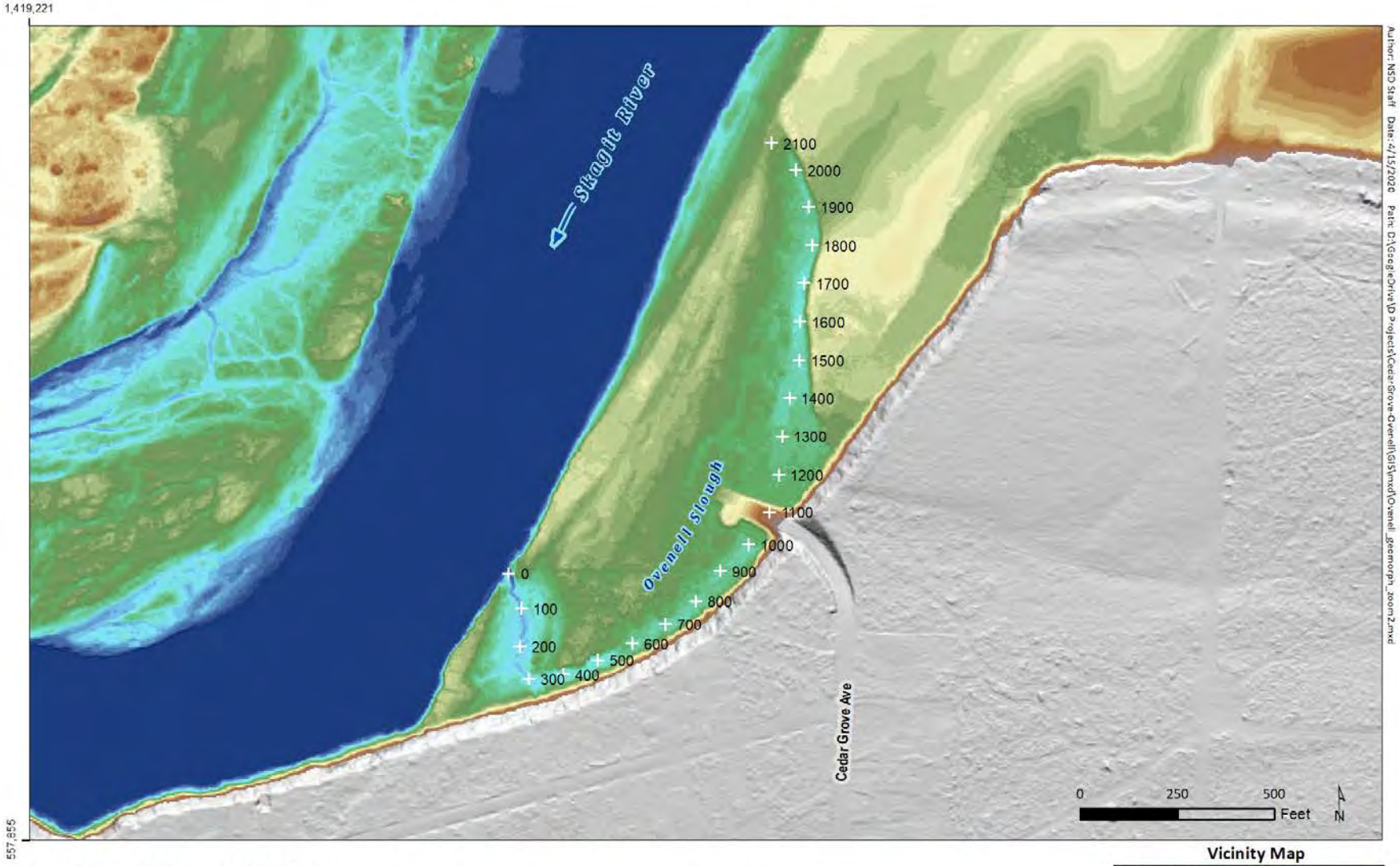




Ovenell Slough

- Inset floodplain channel within a relict feature of the Skagit River
- Broad wetland-type feature with nearly zero velocity
- Acts as an overflow pathway during high-flow events
- Relatively stable; no channel migration


1937
Ovenell Slough
2019 Alignment
SKAGIT RIVER
Cedar Grove Avenue
CONCRETE
N
Skagit County iMap
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



Ovenell Slough Fish Passage Final Design

Project Area Map

Relative Elevation above LiDAR water surface (ft-NAVD88)

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Lambert conformal conic projection, NAD 1983 State Plane Coordinate System (WA North Zone). Topographic data source: 2016 LIDAR DEM (Puget Sound LIDAR Consortium).

Natural Systems Design

Vicinity Map

Sediment supply derived from Skagit River flood deposits

- Fine material (sand, silt)
- No significant inputs from mass wasting, bank erosion

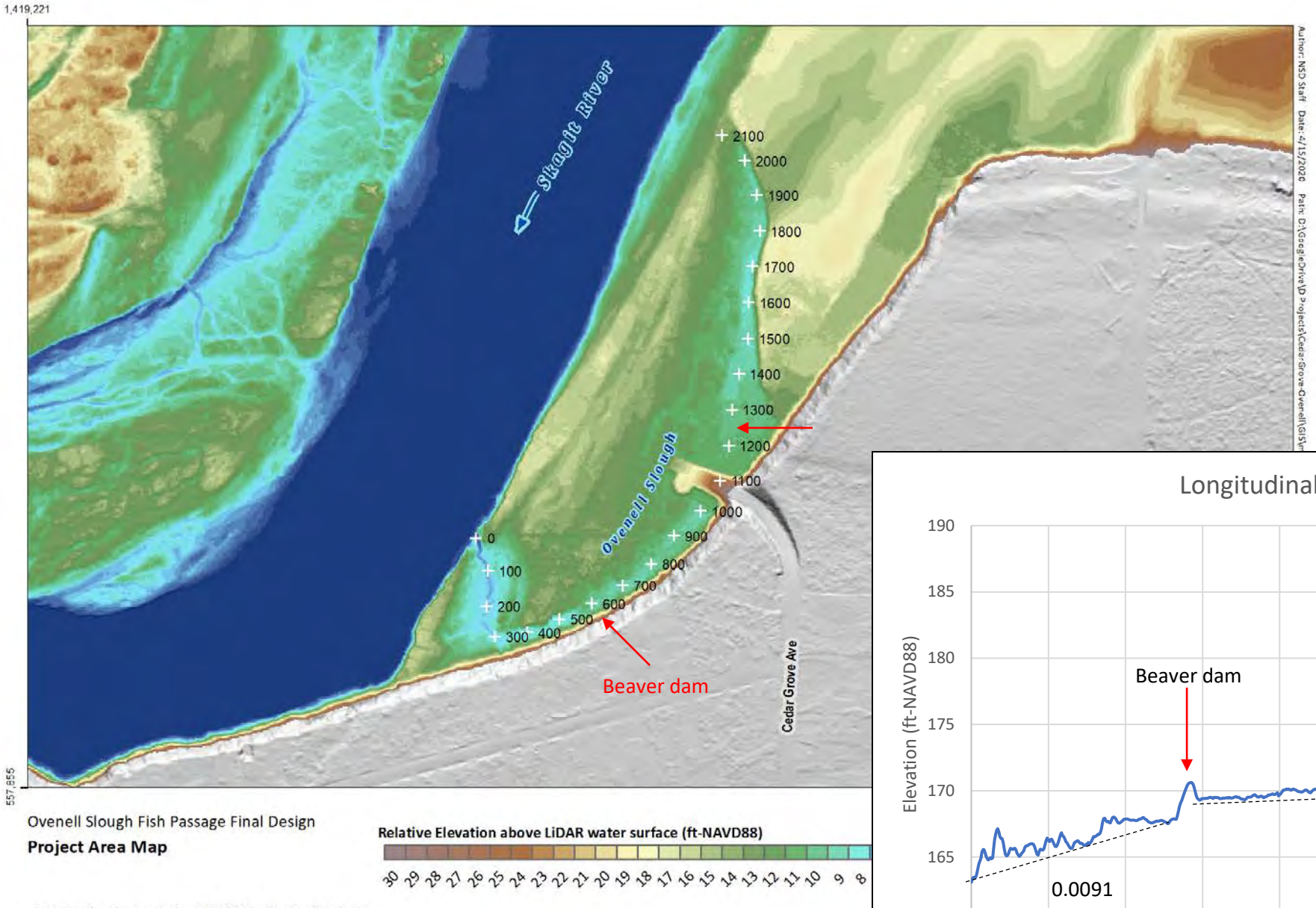
Prevailing flow regime is driven by groundwater-fed springs, with infrequent Skagit overflow

- Not a typical flow-through channel
- System lacks the necessary stream power to transport bedload or erode banks

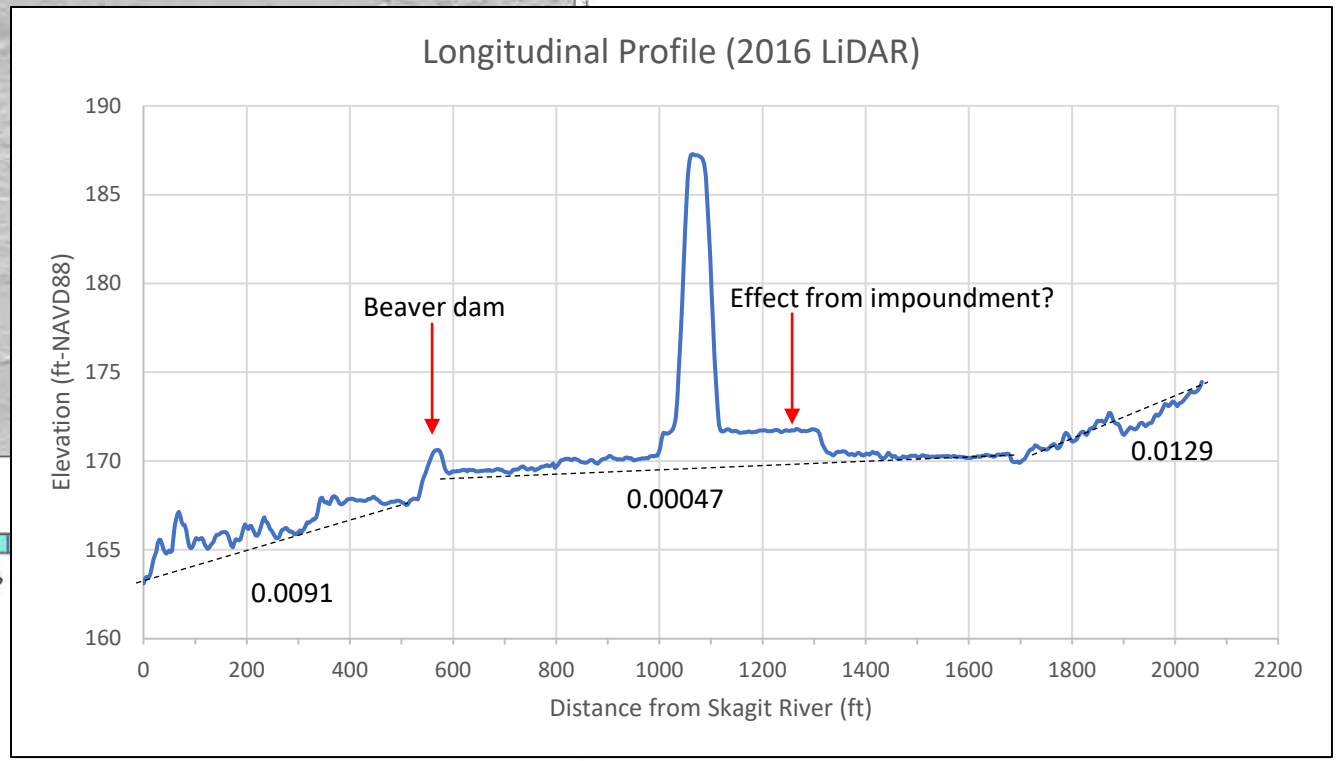
Geomorphic Reach Assessment

Broad channel from impounded flow.
Ovenell Slough looking upstream, view from existing crossing (January 2020, NSD).

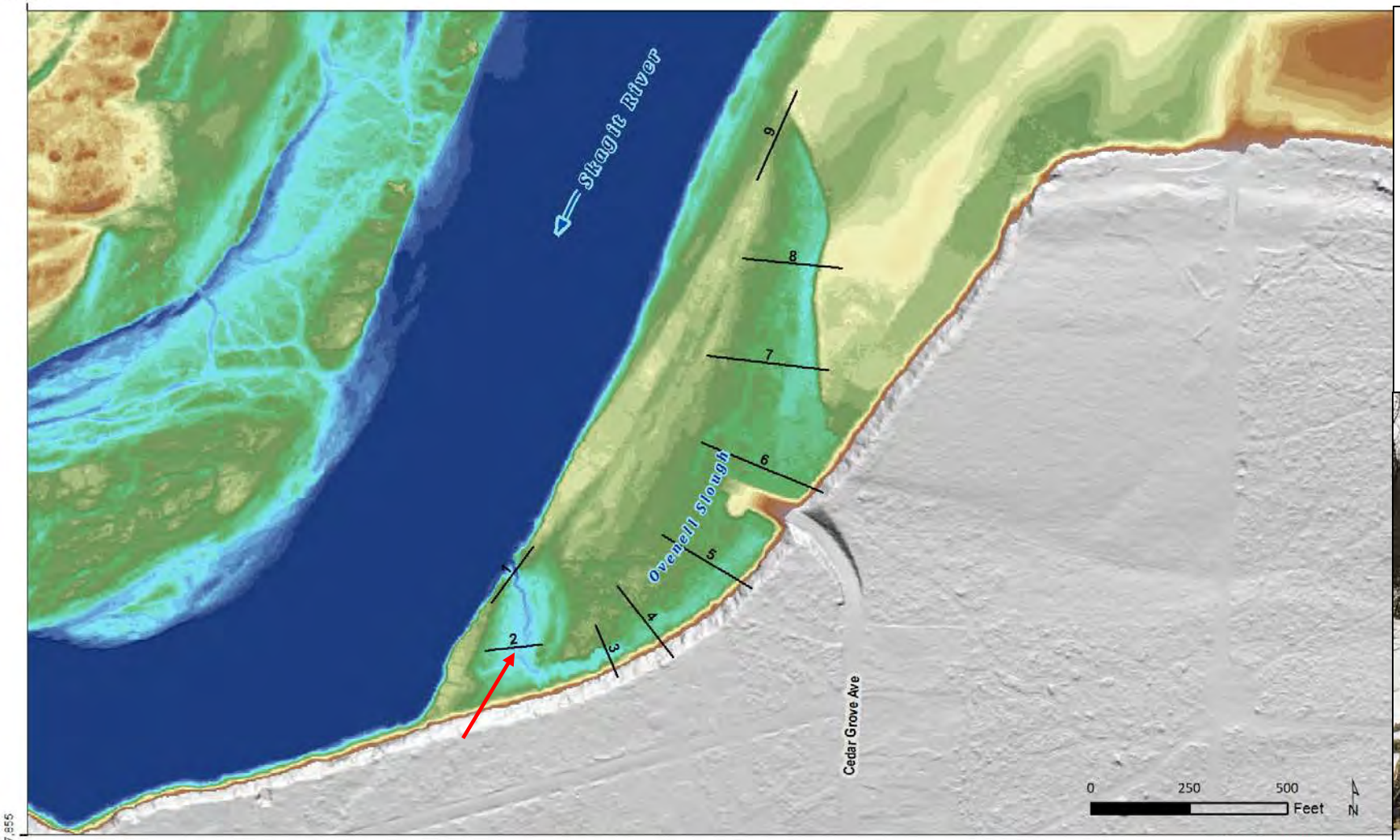
Channel bed composed of fine sediment.
Upstream end of Ovenell Slough looking towards Cedar Grove crossing.



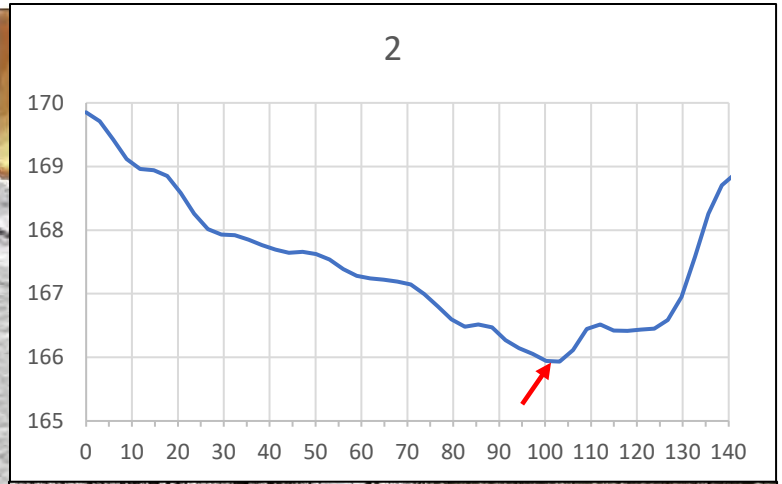
Channel geometry varies due to influence of fill prism, beaver dams



1,419,221



557,855



Ovenell Slough Fish Passage Final Design

Project Area Map

Relative Elevation above LiDAR water surface (ft-NAVD88)

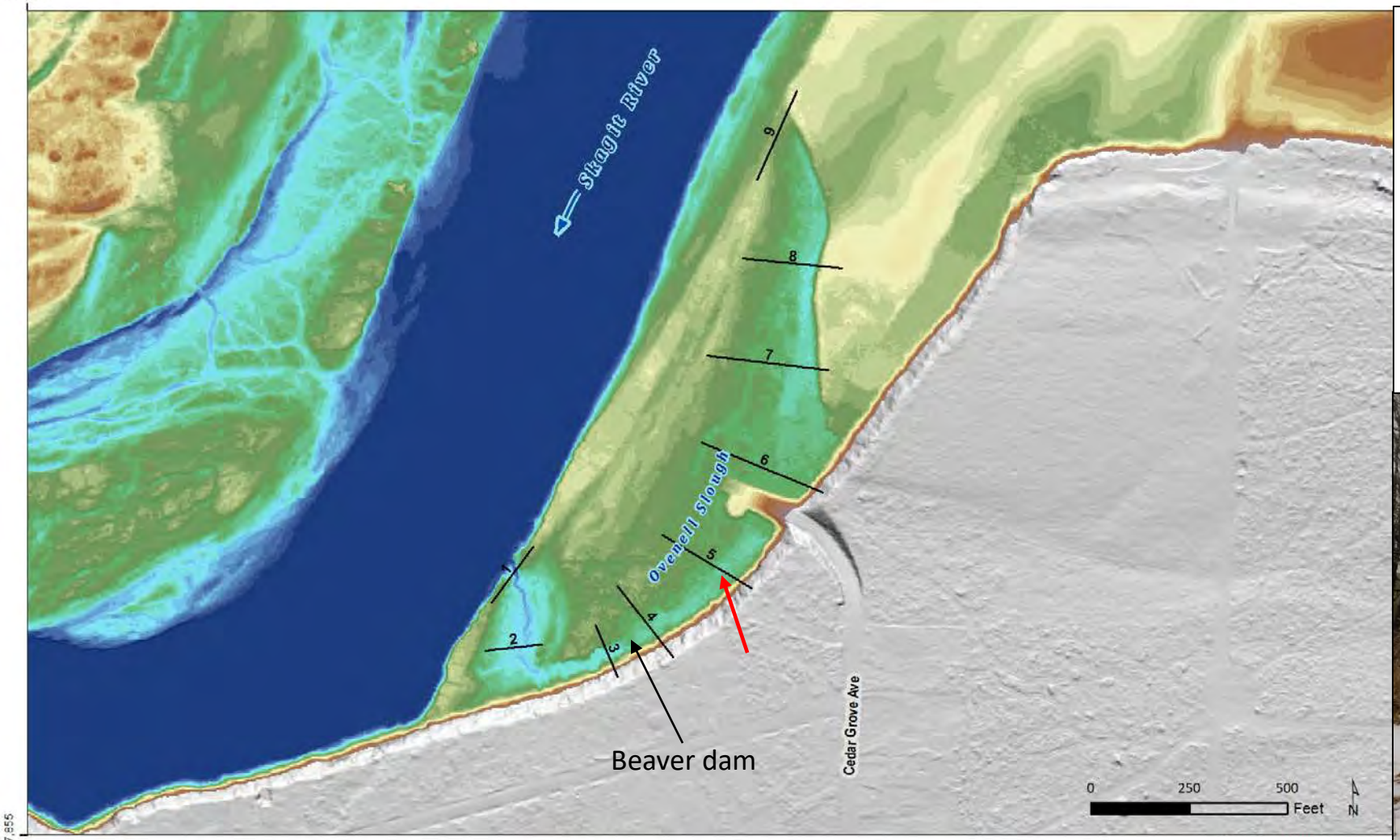
30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Lambert conformal conic projection, NAD 1983 State Plane Coordinate System (WA North Zone). Topographic data source: 2016 LIDAR DEM (Puget Sound LIDAR Consortium).

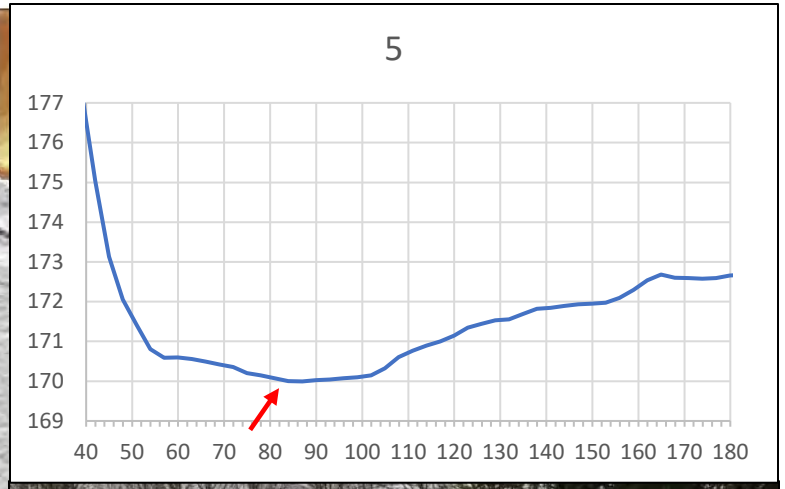
Natural Systems Design

Low-flow channel = 5-10 ft

1,419,221



557,855



Ovenell Slough Fish Passage Final Design

Project Area Map

Relative Elevation above LiDAR water surface (ft-NAVD88)

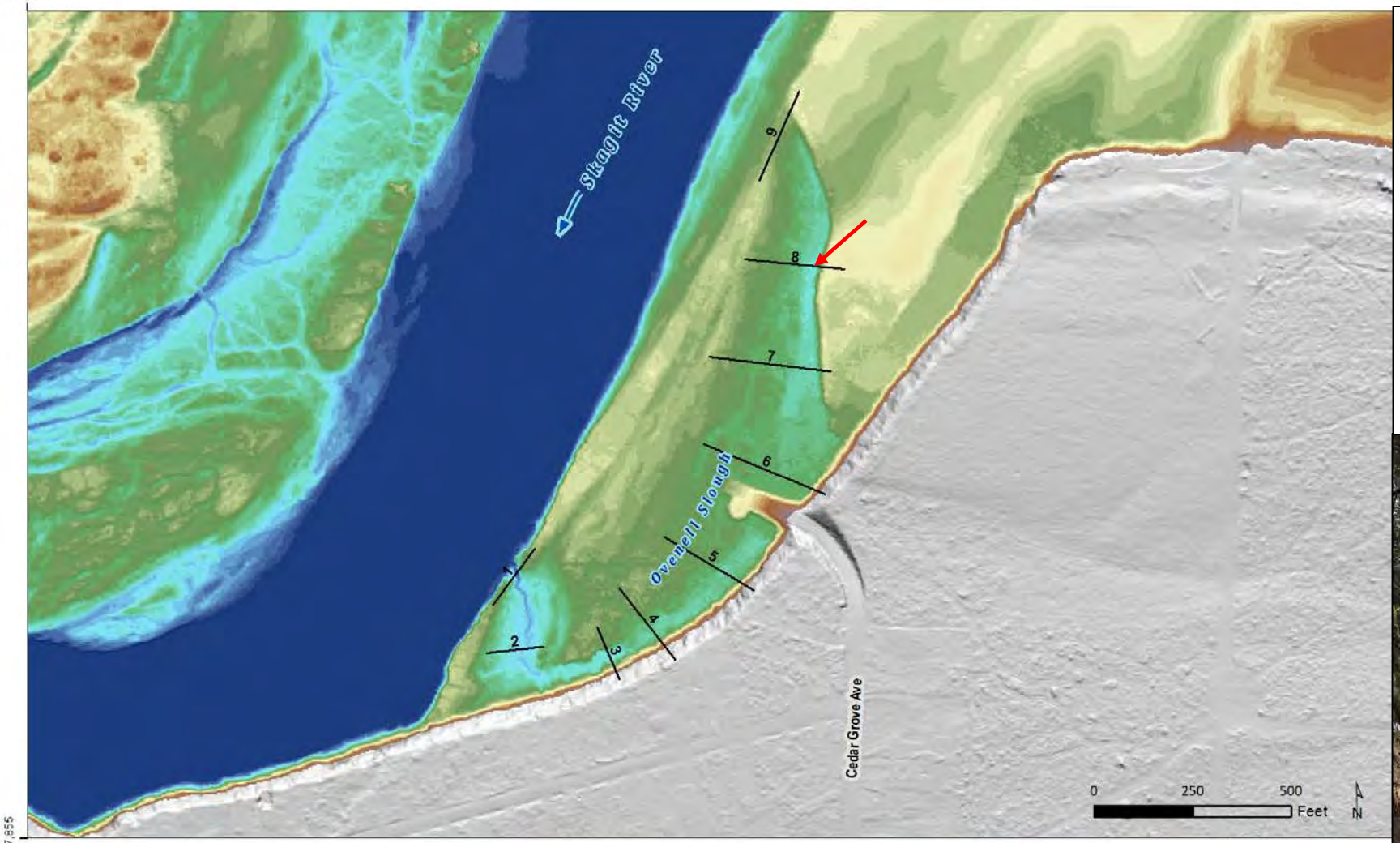
30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Lambert conformal conic projection, NAD 1983 State Plane Coordinate System (WA North Zone). Topographic data source: 2016 LIDAR DEM (Puget Sound LIDAR Consortium).

Natural Systems Design

Wetted width = 40-60 ft

1,419,221



557,855

Ovenell Slough Fish Passage Final Design

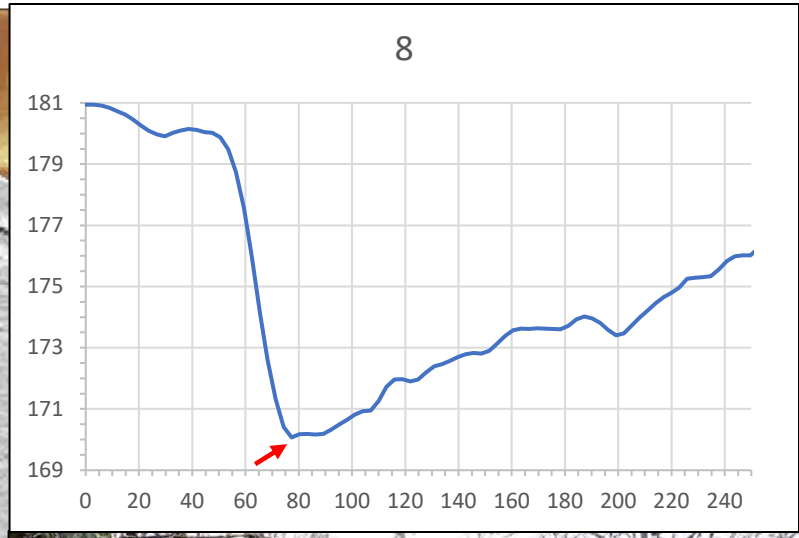
Project Area Map

Relative Elevation above LiDAR water surface (ft-NAVD88)

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Lambert conformal conic projection, NAD 1983 State Plane Coordinate System (WA North Zone). Topographic data source: 2016 LIDAR DEM (Puget Sound LIDAR Consortium).

Natural Systems Design



Wetted width = ~30 ft

Conclusions

1. A minimum channel width of 15 ft is recommended to meet fish passage requirements
   - Design flow is spring-fed low flow of Ovenell Slough
   - Based on interpretation of LiDAR DEM

2. Ovenell Slough is a backwater floodplain channel, characteristic of a low-energy system.

3. Providing adequate flow connectivity is needed to provide fish passage; velocity and geomorphic processes are not primary constraints of the system.

4. Detailed analysis, or optimization, of channel width past meeting the minimum sizing requirements will not substantially change the results of this rapid assessment.
   - An additional field-based effort can determine bankfull width in the lower Slough segment
   - Meet Stream Simulation criteria

APPENDIX E

Minimum Channel Width Determination

To: Jason Lee, Anne Streufert
KPFF Consulting Engineers

From: Aaron Lee, Shawn Higgins, and Leif Embertson
Natural Systems Design

Date: July 15, 2020

Re: Channel Width Determination for the Ovenell Slough Fish Passage Improvement Project

This memorandum presents field measurements and site observations to make a determination of channel width for use in developing design criteria for replacement of the Cedar Grove Avenue culvert crossing Ovenell Slough.

1.1 Project Location and Setting

Ovenell Slough provides off-channel habitat in the Skagit River floodplain near Concrete, WA. The slough channel is inset within an abandoned channel of the Skagit River on the south side of the valley just downstream of the Baker River confluence. The slough consists of a series of ponds, formed by channel spanning beaver dams that create a stepped longitudinal profile. The bed of Ovenell Slough is composed of fine-grained sediments (silt and mud) and accumulation of organic deposits.

The primary inflows to the slough are groundwater seeps and springs that emerge from steep slopes along the valley margin that are underlain by unconsolidated glacial deposits. There are no surface water inflows to the slough; however, flow from the Skagit River backwaters into the site from the downstream end during periods of peak flow (approximately 2-year recurrence interval or greater). Large floods (approximately 10-year recurrence interval or greater) overtop the left bank of the Skagit River upstream of the culvert and inundate the entire floodplain surface.

1.2 Field Data Collection

NSD collected field measurements at six cross-sections within the slough channel downstream of Cedar Grove Avenue on May 1, 2020. The slough upstream of Cedar Grove Avenue is a broad floodplain wetland lacking defined banks. As such, no width measurements were made upstream of the crossing. Site maps showing the location of channel cross-sections overlaid with recent imagery and LiDAR topography are attached to this memo. Ideally, channel width measurements should be located away from the influence of factors that tend increase channel width such as the backwater upstream of the existing culvert, beaver dams, or channel spanning logs. It was determined in the field that there are no locations in the project area that are free of these influences due widespread beaver activity throughout the site. Cross-section locations were identified in the field at an average spacing of approximately 150 ft with local adjustments up- or downstream where indicators of a well-defined bank were observed.

1.3 Results

Channel width measurements are summarized in Table 1. Site photos for each cross-section location are below in Figures 1-6.

Cross-sections #1 and #2 are located closest to the downstream junction with the Skagit River. The slough channel steepens as it approaches the outlet and is incised within floodplain deposits. The

hydraulic and geomorphic processes affecting channel geometry in this area are likely driven by the episodic periods of backwater inundation from the Skagit River during flood periods and subsequent incision into floodplain deposits on the falling limb of the flood hydrographs. As such, channel width measurements at cross-sections #1 and #2 are not used in determination of channel width for the culvert crossing upstream.

Cross-sections #3, #4, and #6 are located in portions of the slough channel upstream of beaver dams. The presence and location of beaver dams in the lower reach of Ovenell Slough corresponds with observations documented by WDFW in 1996. Well-defined banks marked by a distinct break in slope and lower limit of perennial vegetation were present in these sections despite the influence of beaver dams downstream. Slough channel width in these sections ranges between 22 and 26 feet.

Cross-section #5 was affected by deposition of sediment and encroachment of reed canary-grass that constricted channel width. The low flow channel was split into three anabranching channels that cut across the grass-covered wetland channel. The sum of the anabranching channel widths was used to define channel width for this section.

Table 1. Summary of channel width measurements in Ovenell Slough.

Cross-Section ID	Channel Width	Notes
#1	6 ft	Narrow, entrenched channel near outlet at Skagit River
#2	13 ft	Somewhat entranced, transitional channel segment
#3	**26 ft**	**Channel backwatered from beaver dam downstream**
#4	**24 ft**	**Channel backwatered from beaver dam downstream**
#5	13 ft	Anabranching channels through reed canarygrass floodplain
#6	**22 ft**	**Channel backwatered from beaver dam downstream**

*Sections #3, #4, and #6 highlighted in bold are most representative of typical conditions at the culvert crossing

1.4 Conclusion and Recommendations

Guidance from the Water Crossing Design Guidelines (WDFW 2013) note that roads that cross wetlands don't easily fit into the typical culvert design methods described for more confined channels. The 2013 guidelines state:

> *If the road is built over a natural wetland, then the road crossing should provide both fish passage and ecological continuity, minimizing impacts to the channel and adjacent wetlands.*

Based on field observations of Ovenell Slough and the surrounding floodplain, we conclude that the series of backwater ponds influenced by beaver activity are representative of the typical channel condition to be expected in the culvert vicinity. Therefore, we recommend that measurements from cross-sections #3, #4, and #6 be utilized in determining channel width for the culvert replacement design. The average of these three measurements yields an estimated channel width of 24 feet. The crossing design should consider this width as a minimium opening for the the crossing design at Cedar Grove Avenue.

Figure 1. Cross-section #1 has a narrow, entrenched channel geometry.

Figure 2. Cross-section #2 is influenced by beaver activity but in a transitional reach between the entrenched channel downstream and the unconfined channel condition upstream.

Figure 3. Cross-section #3 is backwatered by a beaver dam downstream.

Figure 4. Cross-section #3 is backwatered by a beaver dam downstream.

Figure 5. Cross-section #5 does not have a well-defined channel width but rather a network of anabranching channels that cut through the encroaching vegetation.

Figure 6. Cross-section #6 is backwatered by a beaver dam downstream.

APPENDIX G

Environmental Permits

HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: April 12, 2021
Project End Date: January 01, 2023

Permit Number: 2021-4-239+01
FPA/Public Notice Number: N/A
Application ID: 23729

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Skagit County Public Works	GeoEngineers, Inc
ATTENTION: Emily Derenne	ATTENTION: Mark Stamey
1800 Continental Pl	600 Dupont Street
Mount Vernon, WA 98273-5625	Bellingham, WA 98225

Project Name: Ovenell Slough/Cedar Grove Culvert Replacement

Project Description: The project will replace a failed culvert with a new bridge restoring fish passage to valuable upstream rearing habitat for threatened and endangered salmonids. The project consists of removing a portion of the existing Cedar Grove Avenue road prism and replacing it with a pedestrian bridge. A new stream channel will be constructed adjacent to the existing culvert and the old culvert will be plugged. The surrounding riparian area will be planted with native trees and shrub to restore habitat functions to Ovenell Slough.

PROVISIONS

1. TIMING LIMITATION: You may begin the project on June 1, 2021 and you must complete the project by January 1, 2023.

2. APPROVED PLANS: You must accomplish the work per plans and specifications submitted with the application and approved by the Washington Department of Fish and Wildlife, entitled Cedar Grove Culvert Replacement (Ovenell Slough) received on February 24, 2021, except as modified by this Hydraulic Project Approval. You must have a copy of these plans available on site during all phases of the project construction.

3. INVASIVE SPECIES CONTROL: Follow Method 1 for low risk locations (i.e. clean/drain/dry). Thoroughly remove visible dirt and debris from all equipment and gear (including drive mechanisms, wheels, tires, tracks, buckets, and undercarriage) before arriving and leaving the job site to prevent the transport and introduction of invasive species. For contaminated or high risk sites please refer to the Method 2 Decontamination protocol. Properly dispose of any water and chemicals used to clean gear and equipment. You can find this and additional information in the Washington Department of Fish and Wildlife's "Invasive Species Management Protocols", available online at https://wdfw.wa.gov/species-habitats/invasive/prevention.

4. RE-VEGETATION: You must complete re-vegetation by no later than September 30, 2022, and you must monitor the success of the re-vegetation through September 30, 2024.

5. Equipment used for this project may operate waterward of the ordinary high water line, provided the flow is diverted through the old culvert..

6. Isolate fish from the work area by using block nets.

7. Isolate fish from the work area by using either a total or partial bypass to reroute the stream through the old culvert.

8. Capture and safely move fish life from the work area to the nearest suitable free-flowing water.

9. During construction, isolate the new channel from the flowing watercourse and upon completion of new channel divert water into the new channel and cap and plug old culvert.

10. Completely remove any temporary fill before the end of the in-water timing window if the fill material could erode

and deliver sediment-laden water into waters of the state.

11. Replant the job site with the plant species composition and planting densities approved by the Washington Department of Fish and Wildlife.

LOCATION #1:	Site Name: Ovenell Slough , Concrete, WA 98237					
WORK START:	June 1, 2021			WORK END:	January 1, 2023	
WRIA		Waterbody:			Tributary to:	
04 - Skagit Upper		Unknown Stream Number			Unknown	
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
	14	35 N	08 E	48.528008	-121.738255	Skagit
Location #1 Driving Directions						
Take Concrete Sauk Valley to Cedar Grove Avenue. Drive north on Cedar Grove Avenue until the road dead ends, which is the project site.						

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW. Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person (s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in civil action against you, including, but not limited to, a stop work order or notice to comply, and/or a gross misdemeanor criminal charge, possibly punishable by fine and/or imprisonment.

HYDRAULIC PROJECT APPROVAL

Issued Date: April 12, 2021
Project End Date: January 01, 2023

Permit Number: 2021-4-239+01
FPA/Public Notice Number: N/A
Application ID: 23729

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

MINOR MODIFICATIONS TO THIS HPA: You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA unless this is a General HPA. If this is a General HPA you must use the Major Modification process described below. Any approved minor modification will require issuance of a letter documenting the approval. A minor modification to the required work timing means any change to the work start or end dates of the current work season to enable project or work phase completion. Minor modifications will be approved only if spawning or incubating fish are not present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a minor modification through APPS. A link to APPS is at http://wdfw.wa.gov/licensing/hpa/. If you did not use APPS you must submit a written request that clearly indicates you are seeking a minor modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

MAJOR MODIFICATIONS TO THIS HPA: You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a major modification through APPS. A link to APPS is at http://wdfw.wa.gov/licensing/hpa/. If you did not use APPS you must submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send your written request by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. You may email your request for a major modification to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

APPEALS INFORMATION

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

HYDRAULIC PROJECT APPROVAL

Washington Department of
Fish & Wildlife
PO Box 43234
Olympia, WA 98504-3234
(360) 902-2200

Issued Date: April 12, 2021
Project End Date: January 01, 2023

Permit Number: 2021-4-239+01
FPA/Public Notice Number: N/A
Application ID: 23729

A. INFORMAL APPEALS: WAC 220-660-460 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee may conduct an informal hearing or review and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-660-470 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

Habitat Biologist	Wayne.Watne@dfw.wa.gov		for Director
Wayne Watne	360-466-4345, Ext:231		WDFW

Emily Derenne

From: Padgett, Rebekah (ECY) <RPAD461@ECY.WA.GOV>
Sent: Monday, February 8, 2021 3:26 PM
To: Emily Derenne; ECY RE FED PERMITS (SEA)
Cc: Wilcox, Ronald J CIV USARMY CENWS (US); mstamey@geoengineers.com; Jason Lee
Subject: RE: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell (139732)

Hi Emily,

Thank you for providing this additional information.

The Department of Ecology received the 401 Request for the Skagit County Public Works Ovenell Slough/Cedar Grove Culvert Replacement project on February 8, 2021. Based on this submittal, Skagit County Public Works' 401 Request for this project is valid.

Thank you,
Rebekah

From: Emily Derenne <emilyjd@co.skagit.wa.us>
Sent: Monday, February 8, 2021 3:15 PM
To: ECY RE FED PERMITS (SEA) <ECYREFEDPERMITS@ECY.WA.GOV>
Cc: Wilcox, Ronald J CIV USARMY CENWS (US) <Ronald.J.Wilcox@usace.army.mil>; mstamey@geoengineers.com; Jason Lee <Jason.Lee@kpff.com>; Padgett, Rebekah (ECY) <RPAD461@ECY.WA.GOV>
Subject: RE: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell (139732)

Good morning-
Following a discussion with Rebekah I'd like to provide the attached follow-up information. Please let me know if I can provide anything else to assist with this review.

Thank you (and thanks Rebekah!),

Emily Derenne | 360-416-1449 | 360-708-5045 cell
Learn about the Natural Resource Stewardship Program here

From: Padgett, Rebekah (ECY) <RPAD461@ECY.WA.GOV>
Sent: Tuesday, January 19, 2021 11:50 AM
To: Emily Derenne <emilyjd@co.skagit.wa.us>
Cc: ECY RE FED PERMITS (SEA) <ECYREFEDPERMITS@ECY.WA.GOV>; Wilcox, Ronald J CIV USARMY CENWS (US) <Ronald.J.Wilcox@usace.army.mil>; mstamey@geoengineers.com
Subject: RE: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell

Hi Emily,

On December 31, 2020, the Department of Ecology received Skagit County Public Works' 401 Request for the Ovenell Slough/Cedar Grove Culvert Replacement project. However, it appears that you did not provide a Water Quality Monitoring and Protection Plan (WQMPP. Based on our initial review of the 401 Request, a WQMPP is necessary. Therefore, the 401 Request is not valid under the U.S. Environmental Protection Agency's new 401 Rule.

If you have any questions, feel free to contact me directly as I will be your point of contact.

Thank you,
Rebekah

Rebekah Padgett | 401/CZM Federal Permit Manager | Department of Ecology Northwest Regional Office | o: 425-649-7129 | e: rebekah.padgett@ecy.wa.gov

---

From: Padgett, Rebekah (ECY)
Sent: Friday, January 15, 2021 7:17 PM
To: 'emilyjd@co.skagit.wa.us' <emilyjd@co.skagit.wa.us>
Subject: RE: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell

Hi Emily,

I wanted to let you know that I am just reviewing your 401 Request for the Skagit County Ovenell Slough/Cedar Grove Culvert Replacement project now to determine whether it is a valid request. My contact information is below.

Thank you,
Rebekah
425-365-6571

Rebekah Padgett | 401/CZM Federal Permit Manager | Department of Ecology Northwest Regional Office | o: 425-649-7129 | e: rebekah.padgett@ecy.wa.gov

This communication is a public record and may be subject to disclosure as per the Washington State Public Records Act (RCW 42.56)

From: Emily Derenne <emilyjd@co.skagit.wa.us>
Sent: Tuesday, January 5, 2021 10:05 AM
To: ECY RE FED PERMITS (SEA) <ECYREFEDPERMITS@ECY.WA.GOV>
Subject: RE: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell

Thank you-
Is it possible to get Rebekah Padgett's contact information?

I am hoping to set up a time to go over the application and answer any questions ECY may have. I know you said you'd let us know if you have any, but since this is a new process for our team we thought it might be helpful for us both. Is this possible or would you prefer we wait to hear from you?

Thanks!

Emily Derenne | 360-416-1449 | 360-708-5045 cell
Learn about the Natural Resource Stewardship Program here

From: ECY RE FED PERMITS (SEA) <ECYREFEDPERMITS@ECY.WA.GOV>
Sent: Tuesday, January 5, 2021 9:48 AM
To: Emily Derenne <emilyjd@co.skagit.wa.us>
Cc: 'Lydia R. Baldwin' <lbaldwin@geoengineers.com>; 'Mark T. Stamey' <mstamey@geoengineers.com>
Subject: ECY Acknowledgment - RE: Section 401 Certification Request Form - Ovenell

The WA Department of Ecology (Ecology) has received your Section 401 Request package on **12/31/2020**. At this time Ecology is reviewing your request and associated documents to determine if this meets the EPA rule requirements. Ecology will notify you if additional information is needed in order to meet the rule requirements. For further inquiries regarding your project or process, please use the Aquatics tracking I.D. number below.

Aquatics tracking I.D. number: 139732
Project Name: Ovenell Slough / Cedar Grove Culvert Replacement
County: Skagit
Project Manager: Rebekah Padgett

For additional information regarding Ecology's Clean Water Act - Section 401 Water Quality Certifications, please visit Ecology's webpage.

If you have further questions, please email us at: ecyrefedpermits@ecy.wa.gov.

Thank you,

Sadie Hinklin
Federal Permit Unit
360-407-6067

From: Emily Derenne <emilyjd@co.skagit.wa.us>
Sent: Thursday, December 31, 2020 8:44 AM
To: ECY RE FED PERMITS (SEA) <ECYREFEDPERMITS@ECY.WA.GOV>
Cc: 'Lydia R. Baldwin' <lbaldwin@geoengineers.com>; 'Mark T. Stamey' <mstamey@geoengineers.com>
Subject: Section 401 Certification Request Form - Ovenell

Good morning-
Please find the completed application for Ecology's 401 certification attached. The pre-filling meeting request submittal is below with the forms reattached.
Thanks and happy new year!

Emily Derenne | 360-416-1449 | 360-708-5045 cell
Learn about the Natural Resource Stewardship Program here

From: Emily Derenne
Sent: Tuesday, November 17, 2020 10:01 AM
To: 'ecyrefedpermits@ecy.wa.gov' <ecyrefedpermits@ecy.wa.gov>
Cc: Lydia R. Baldwin <lbaldwin@geoengineers.com>; 'Mark T. Stamey' <mstamey@geoengineers.com>
Subject: Pre-Filing Request Form - Ovenell

Good morning-
Please find the pre-filing meeting attached.
Let me know if you have any questions.

Thank you,

Emily Derenne | Habitat Restoration Specialist
Skagit County Public Works | 1800 Continental Pl | Mount Vernon, WA 98273
emilyjd@co.skagit.wa.us | 360-416-1449 office | 360-708-5045 cell
Learn about the Natural Resource Stewardship Program here

SKAGIT COUNTY
PUBLIC WORKS
DEPARTMENT

1800 Continental Place, Mount Vernon, WA 98273-5625
(360) 416-1400 FAX (360) 416-1405

M E M O R A N D U M

DATE: February 8, 2021

TO: Ecology Federal Permit Unit
Rebekah Padgett

FROM: Emily Derenne, Habitat Restoration Specialist, Skagit County

SUBJECT: Ovenell Slough/ Cedar Grove Culvert Replacement
Project ID: 139732

On Tuesday, January 19, 2021 Rebekah Padgett emailed Emily Derenne to explain that the current 401 request was not valid under the US Environmental Protection Agency's new 401 rule. A follow-up phone call with Rebekah was completed to explain what was required. The below is a summary of how we intend to address turbidity concerns on site, including monitoring.

All work will be completed during the Washington Department of Fish and Wildlife's in-water work window. This period of time coincides with the Department of Ecology's exposed soil 7-day maximum period (May 1 through September 30). The clearing limits of the site will be clearly marked so that native soils and existing vegetation outside the project footprint are left in an undisturbed state. Black silt fence will be used in any locations where turbidity may discharge off-site. There is no area currently identified for silt fence but it will be required to be on site should grading result in locations it is needed.

Flows will be maintained through the existing culvert during construction of the new bridge opening. The existing culvert is 5-18 feet to the east of the new opening and will be outside of the work area isolation wall.

The work area will be isolated by installing an isolation wall. Sandbags will be filled with fine grained sand and rounded gravels, place end to end across the channel and tie into the Cedar Grove road prism (leaving the existing culvert outside of isolation wall). If other similar, low impact methods are requested by the Contractor they will be evaluated for consistency with this intent before approval by the Project Engineer. Sandbags are common, simple, inexpensive, and effective so we would expect them to be the isolation method of choice. The isolation wall shall be constructed and maintained to a height that prevents all potential stream flow that might occur during the bypass from entering the work area. The sediment within the work area is dominated by sands and fine sediment with occasional gravel. Although the potential for

turbidity to occur exists, we will control turbidity on the site by performing work in an isolated, dry work environment.

All Work within the channel, except for removal of the temporary erosion control items and installation of the large woody material structure on east bank shall be completed before the temporary stream diversion is removed. The LWM on the east side of the channel will be installed during phase 2 when the existing culvert is abandoned. Once all work below and immediately adjacent to the OHWM has been completed, the temporary stream bypass can be removed.

Flows shall be slowly reintroduced to the project site by removal of a few sandbags from the upstream isolation wall. The removed bags should be placed on the downstream side where the water spills to minimize erosion of streambed materials. The work area between upstream and downstream isolation walls should be allowed to slowly fill with water. A pump at the downstream end will pump turbid water, if any, into a well vegetated area a minimum of 100 feet beyond limits of streams or wetlands and allowed to infiltrate. The Contractor will have the option of installing a dewatering bag/silt sock. This will be sized to the maximum flow rate the pump can produce. The Contractor will continue to allow water to flow over new stream channel until turbidity levels meet or are below state water quality standards (WAC 173-201A). This will be visually inspected during release.

At the time water quality is being met, several bags can be removed from downstream isolation wall and water released into Ovenell Slough. Scour protection shall be provided at the outfall of the isolation wall or temporary dewatering system to prevent turbid water from entering the stream channel. Water levels in isolation area should be allowed to slowly lower by removing sandbags from both upstream and downstream. Rewatering should occur at a rate to avoid loss of surface water downstream and within the existing crossing. Increased levels of turbidity are not anticipated, however due to the fine grained sediment size within Ovenell slough, water quality will be visually inspected within a 100 foot mixing zone downstream of the project area in Ovenell Slough. This distance is determined by the given flow of Ovenell Slough. Typically, during the timing of construction, the slough will be flowing at less than 10cfs. If the slough is flowing between 10 cfs and 100 cfs the visual distance will increase to 200 feet downstream. This change will only be made after discussion and approval from the Project Engineer. If turbidity levels visually appear to be above background water quality, the Contractor shall immediately take all corrective actions necessary to prevent the water from exceeding the turbidity standards, including halting the release of water until settlement can occur again.

Following removal of the isolation wall, the existing culvert will be plugged with control density fill (CDF) and abandoned. Fish isolation and removal will be conducted around the inlet and outlet of the existing culvert and reasonable efforts will be made to herd fish out of the culvert. After fish removal and isolation, a temporary isolation wall will be constructed upstream and downstream of the culvert before it is plugged with control density fill. The isolation wall will be constructed in a similar fashion as described above but at a smaller scale. Isolation wall and fish block nets can be removed after fill has hardened and culvert is permanently plugged. Removal will follow the protocol outlined above.

Other Temporary Erosion Control BMPs shall remain installed and maintained until all worked soils within the project area have been permanently stabilized. Silt fence and straw wattles are examples of temporary erosion control BMPs that may be used to ensure erosion and sediment is controlled on the site.

Seeding and mulching disturbed areas will occur when construction is complete. The following fall or spring the disturbed areas will be replanted with native vegetation. Mulch will be left in place to ensure stabilization while the grass and native vegetation are establishing.

Summary of BMPs:

Type	Location	Duration
Protection outside work area	Clearing Limit Extent	Permanent
Silt Fence	Non-sensitive turbid-possible areas	During Construction
Sandbags Part 1	Upstream Bridge Isolation Wall Downstream Bridge Isolation Wall	Construction of Bridge
Bypass pump	Downstream Bridge Isolation Wall	If needed, while re-watering; likely one to two days.
Dewatering Bag/Silt Sock	Bypass pump outlet as secondary BMP to infiltration	As bypass pump is needed
Sandbags Part 2	Upstream culvert isolation wall Downstream culvert isolation wall	Few days while culvert is being filled with CDF
Seeding and mulching	Disturbed Areas	Permanent following completion of construction
Replanting	Disturbed Areas	Permanent following completion of construction

US Army Corps of Engineers
Seattle District

NATIONWIDE PERMIT 14
Terms and Conditions

Effective Date: March 19, 2017

In addition to any special condition that may be required on a case-by-case basis by the District Engineer, the following terms and conditions must be met, as applicable, for a Nationwide Permit (NWP) authorization to be valid in Washington State.

A. DESCRIPTION OF AUTHORIZED ACTIVITIES

Linear Transportation Projects. Activities required for crossings of waters of the United States associated with the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10-acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: For linear transportation projects crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Linear transportation projects must comply with 33 CFR 330.6(d). Note 2: Some discharges for the construction of farm roads or forest

roads, or temporary roads for moving mining equipment, may qualify for an exemption under section 404(f) of the Clean Water Act (see 33 CFR 323.4). Note 3: For NWP 14 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, "District Engineer's Decision." The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

B. CORPS NATIONAL GENERAL CONDITIONS FOR ALL NWPs

To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation. (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States. (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. (b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management

responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status. (c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur. (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs. (e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required. (g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. (b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer

determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. (d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment. (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal: (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum

extent practicable at the project site (i.e., on site). (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal. (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. (d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)). (e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses. (f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation. (2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)). (3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation. (4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). (5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs

to address the baseline conditions at the impact site and the number of credits to be provided. (6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs. (h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management. (i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a

road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include: (a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions; (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and (c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not

commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals. (d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal. (2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes. (3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame

concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5. (4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act. (5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

District Engineer's Decision: 1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2-acre. 2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns. 3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters (e.g., streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than

minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer. 4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

Further Information: 1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP. 2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law. 3. NWPs do not grant any property rights or exclusive privileges. 4. NWPs do not authorize any injury to the property or rights of others. 5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

C. CORPS SEATTLE DISTRICT REGIONAL GENERAL CONDITIONS: The following conditions apply to all NWPs for the Seattle District in Washington State, unless specified.

1. <u>Project Drawings</u>: Drawings must be submitted with pre-construction notification (PCN). Drawings must provide a clear understanding of the proposed project, and how waters of the U.S. will be affected. Drawings must be originals and not reduced copies of large-scale plans. Engineering drawings are not required. Existing and proposed site conditions (manmade and landscape features) must be drawn to scale.

2. <u>Aquatic Resources Requiring Special Protection</u>: Activities resulting in a loss of waters of the United States in mature forested wetlands, bogs and peatlands, aspen-dominated wetlands, alkali

wetlands, vernal pools, camas prairie wetlands, estuarine wetlands, wetlands in coastal lagoons, and wetlands in dunal systems along the Washington coast cannot be authorized by a NWP, except by the following NWPs:

NWP 3 – Maintenance
NWP 20 – Response Operations for Oil and Hazardous Substances
NWP 32 – Completed Enforcement Actions
NWP 38 – Cleanup of Hazardous and Toxic Waste

In order to use one of the above-referenced NWPs in any of the aquatic resources requiring special protection, prospective permittees must submit a PCN to the Corps of Engineers (see NWP general condition 32) and obtain written authorization before commencing work.

3. New Bank Stabilization in Tidal Waters of Puget Sound: Activities involving new bank stabilization in tidal waters in Water Resource Inventory Areas (WRIAs) 8, 9, 10, 11 and 12 (within the areas identified on Figures 1a through 1e on Corps website) cannot be authorized by NWP.

4. Commencement Bay: The following NWPs may not be used to authorize activities located in the Commencement Bay Study Area (see Figure 2 on Corps website):

NWP 12 – Utility Line Activities (substations)
NWP 13 – Bank Stabilization
NWP 14 – Linear Transportation Projects
NWP 23 – Approved Categorical Exclusions
NWP 29 – Residential Developments
NWP 39 – Commercial and Institutional Developments
NWP 40 – Agricultural Activities
NWP 41 – Reshaping Existing Drainage Ditches
NWP 42 – Recreational Facilities
NWP 43 – Stormwater and Wastewater Management Facilities

5. Bank Stabilization: All projects including new or maintenance bank stabilization activities require PCN to the Corps of Engineers (see NWP general condition 32). For new bank stabilization projects only, the following must be submitted to the Corps of Engineers:

a. The cause of the erosion and the distance of any existing structures from the area(s) being stabilized.
b. The type and length of existing bank stabilization within 300 feet of the proposed project.
c. A description of current conditions and expected post-project conditions in the waterbody.
d. A statement describing how the project incorporates elements avoiding and minimizing adverse environmental effects to the aquatic environment and nearshore riparian area, including vegetation impacts in the waterbody.

In addition to a. through d., the results from any relevant geotechnical investigations can be submitted with the PCN if it describes current or expected conditions in the waterbody.

6. Crossings of Waters of the United States: Any project including installing, replacing, or modifying crossings of waters of the United States, such as culverts or bridges, requires submittal of a PCN to the Corps of Engineers (see NWP general condition 32). If a culvert is proposed to cross waters of the U.S. where salmonid species are present or could be present, the project must apply the stream simulation design method from the Washington Department of Fish and Wildlife located in the *Water Crossing Design Guidelines* (2013), or a design method which provides passage at all life stages at all flows where the salmonid species would naturally seek passage. If the stream simulation design method is not applied for a culvert where salmonid species are present or could be present, the project proponent must provide a rationale in the PCN sufficient to establish one of the following:

a. The existence of extraordinary site conditions.

b. How the proposed design will provide equivalent or better fish passage and fisheries habitat benefits than the stream simulation design method.

If a culvert is proposed to cross waters of the U.S. where salmonid species are present or could be present, project proponents must provide a monitoring plan with the PCN that specifies how the proposed culvert will be assessed over a five-year period from the time of construction completion to ensure its effectiveness in providing passage at all life stages at all flows where the salmonid species would naturally seek passage. Culverts installed under emergency authorization that do not meet the above design criteria will be required to meet the above design criteria to receive an after-the-fact nationwide permit verification.

7. Stream Loss: A PCN is required for all activities that result in the loss of any linear feet of stream beds. No activity shall result in the loss of any linear feet of perennial stream beds or the loss of greater than 300 linear feet of intermittent and/or ephemeral stream beds. A stream may be rerouted if it is designed in a manner that maintains or restores hydrologic, ecologic, and geomorphic stream processes, provided there is not a reduction in the linear feet of stream bed. Streams include brooks, creeks, rivers, and historical waters of the U.S. that have been channelized into ditches. This condition does not apply to ditches constructed in uplands. Stream loss restrictions may be waived by the district engineer on a case-by-case basis provided the activities result in net increases of aquatic resource functions and services.

8. Mitigation: Pre-construction notification is required for any project that will result in permanent wetland losses that exceed 1,000 square feet. In addition to the requirements of General Condition 23 (Mitigation), compensatory mitigation at a minimum one-to-one ratio will be required for all permanent wetland losses that exceed 1,000 square feet. When a PCN is required for wetland losses less than 1,000 square feet, the Corps of Engineers may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation for impacts to marine waters, lakes, and streams will be determined on a case-by-case basis. If temporary impacts to waters of the U.S. exceed six months, the Corps of Engineers may require compensatory mitigation for temporal effects.

9. Magnuson-Stevens Fishery Conservation and Management Act – Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. If EFH may be adversely affected by a proposed activity, the prospective permittee must provide a written EFH assessment with an analysis of the effects of the proposed action on EFH. The assessment must identify the type(s) of essential fish habitat (i.e., Pacific salmon, groundfish, and/or coastal-pelagic species) that may be affected. If the Corps of Engineers determines the project will adversely affect EFH, consultation with NOAA Fisheries will be required. Federal agencies should follow their own procedures for complying with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. If PCN is required for the proposed activity, Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

10. Forage Fish: For projects in forage fish spawning habitat, in-water work must occur within designated forage fish work windows, or when forage fish are not spawning. If working outside of a designated work window, or if forage fish work windows are closed year round, work may occur if the work window restriction is released for a period of time after a forage fish spawning survey has been conducted by a biologist approved by the Washington State Department of Fish and Wildlife (WDFW). Forage fish species with designated in-water work windows include Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasi*), and surf smelt (*Hypomesus pretiosus*). This RGC does not apply to NWP 48, *Commercial Shellfish Aquaculture Activities*. Please see specific regional conditions for NWP 48.

11. Notification of Permit Requirements: The permittee must provide a copy of the nationwide permit authorization letter, conditions, and permit drawings to all contractors and any other parties performing the authorized work prior to the commencement of any work in waters of the U.S. The permittee must ensure all appropriate contractors and any other parties performing the authorized work at the project site have read and understand relevant NWP conditions as well as plans, approvals, and documents referenced in the NWP letter. A copy of these documents must be maintained onsite throughout the duration of construction.

12. Construction Boundaries: Permittees must clearly mark all construction area boundaries before beginning work on projects that involve grading or placement of fill. Boundary markers and/or construction fencing must be maintained and clearly visible for the duration of construction. Permittees should avoid and minimize removal of native vegetation (including submerged aquatic vegetation) to the maximum extent possible.

13. Temporary Impacts and Site Restoration

a. Temporary impacts to waters of the U.S. must not exceed six months unless the prospective permittee requests and receives a waiver by the district engineer. Temporary impacts to waters of the U.S. must be identified in the PCN.
b. No more than 1/2 acre of waters of the U.S. may be temporarily filled unless the prospective permittee requests and receives a waiver from the district engineer (temporary fills do not affect specified limits for loss of waters associated with specific nationwide permits).
c. Native soils removed from waters of the U.S. for project construction should be stockpiled and used for site restoration. Restoration of temporarily disturbed areas must include returning the area to pre-project ground surface contours. If native soil is not available from the project site for restoration, suitable clean soil of the same textural class may be used. Other soils may be used only if identified in the PCN.
d. The permittee must revegetate disturbed areas with native plant species sufficient in number, spacing, and diversity to restore affected functions. A maintenance and monitoring plan commensurate with the impacts, may be required. Revegetation must begin as soon as site conditions allow within the same growing season as the disturbance unless the schedule is approved by the Corps of Engineers. Native plants removed from waters of the U.S. for project construction should be stockpiled and used for revegetation when feasible. Temporary Erosion and Sediment Control measures must be removed as soon as the area has established vegetation sufficient to control erosion and sediment.
e. If the Corps determines the project will result in temporary impacts of submerged aquatic vegetation (SAV) that are more than minimal, a monitoring plan must be submitted. If recovery is not achieved by the end of the monitoring period, contingencies must be implemented, and additional monitoring will be required.

This RGC does not apply to NWP 48, *Commercial Shellfish Aquaculture Activities*. Please see specific regional conditions for NWP 48.

D. CORPS REGIONAL SPECIFIC CONDITIONS FOR THIS NWP:

1. Private residential driveways in waters of the U.S. with footprints wider than 22 feet or longer than 200 feet are not authorized by this NWP. For this requirement, “footprint” refers to the bottom width of the roadway fill prism.

2. A pre-construction notification must be submitted to the district engineer (see NWP general condition 32) for linear transportation project crossings in tidal waters.

E. ECOLOGY 401 CERTIFICATION: GENERAL CONDITIONS

In addition to all the Corps National and Seattle Districts' Regional permit conditions, the following State General Section 401 Water Quality Certification (Section 401) conditions apply to all Nationwide Permits whether **certified** or **partially certified** in the State of Washington.

1. **For in-water construction activities**. Ecology Section 401 review is required for projects or activities authorized under NWPs that will cause, or may be likely to cause or contribute to an exceedance of a State water quality standard (Chapter 173-201A WAC) or sediment management standard (Chapter 173-204 WAC). State water quality standards and sediment management standards are available on Ecology's website. Note: In-water activities include any activity within a wetland and/or activities below the ordinary high water mark (OHWM).

2. **Projects or Activities Discharging to Impaired Waters**. Ecology Section 401 review is required for projects or activities authorized under NWPs if the project or activity will occur in a 303(d) listed segment of a waterbody or upstream of a listed segment and may result in further exceedances of the specific listed parameter. To determine if your project or activity is in a 303(d) listed segment of a waterbody, visit Ecology's Water Quality Assessment webpage for maps and search tools.

3. **Application**. For projects or activities that will require Ecology Section 401 review, applicants must provide Ecology with a Joint Aquatic Resources Permit Application (JARPA) along with the documentation provided to the Corps, as described in National General Condition 32, Pre-Construction Notification, including, when applicable: (a) A description of the project, including site plans, project purpose, direct and indirect adverse environmental effects the project would cause, best management practices (BMPs), and any other Department of the Army or federal agency permits used or intended to be used to authorize any part of the proposed project or any related activity. (b) Drawings indicating the Ordinary High Water Mark (OHWM), delineation of special aquatic sites and other waters of the state. Wetland delineations must be prepared in accordance with the current method required by the Corps and shall include Ecology's Wetland Rating form. Wetland rating forms are subject to review and verification by Ecology staff. Guidance for determining the OHWM is available on Ecology's website. (c) A statement describing how the mitigation requirement will be satisfied. A conceptual or detailed mitigation or restoration plan may be submitted. See State General Condition 5 for details on mitigation requirements. (d) Other applicable requirements of Corps Nationwide Permit General Condition 32, Corps Regional Conditions, or notification conditions of the applicable NWP. (e) Within 180 calendar days from receipt of applicable documents noted above **and** a copy of the final authorization letter from the Corps providing coverage for a proposed project or activity under the NWP Program Ecology will provide the applicant notice of whether an individual Section 401 will be required for the project. If Ecology fails to act within a year after receipt of **both** of these documents, Section 401 is presumed waived.

4. **Aquatic resources requiring special protection**. Certain aquatic resources are unique, difficult-to-replace components of the aquatic environment in Washington State. Activities that would affect these resources must be avoided to the greatest extent possible. Compensating for adverse impacts to high value aquatic resources is typically difficult, prohibitively expensive, and may not be possible in some landscape settings. Ecology Section 401 review is required for activities in or affecting the following aquatic resources (and not prohibited by Seattle District Regional General Condition): (a) Wetlands with special characteristics (as defined in the Washington State Wetland Rating Systems for western and eastern Washington, Ecology Publications #14-06-029 and #14-06-030):

- Estuarine wetlands.
- Wetlands of High Conservation Value.
- Bogs.
- Old-growth and mature forested wetlands.
- Wetlands in coastal lagoons.
- Interdunal wetlands.

- Vernal pools.
- Alkali wetlands.

(b) Fens, aspen-dominated wetlands, camas prairie wetlands. (c) Marine water with eelgrass (*Zostera marina*) beds (except for NWP 48). (d) Category I wetlands. (e) Category II wetlands with a habitat score ≥ 8 points. This State General Condition does not apply to the following Nationwide Permits:
NWP 20 – *Response Operations for Oil and Hazardous Substances*, NWP 32 – *Completed Enforcement Actions*

5. Mitigation. Applicants are required to show that they have followed the mitigation sequence and have first avoided and minimized impacts to aquatic resources wherever practicable. For projects requiring Ecology Section 401 review with unavoidable impacts to aquatics resources, adequate compensatory mitigation must be provided.

(a) Wetland mitigation plans submitted for Ecology review and approval shall be based on the most current guidance provided in Wetland Mitigation in Washington State, Parts 1 and 2 (available on Ecology's website) and shall, at a minimum, include the following:

i. A description of the measures taken to avoid and minimize impacts to wetlands and other waters of the U.S.
ii. The nature of the proposed impacts (i.e., acreage of wetlands and functions lost or degraded).
iii. The rationale for the mitigation site that was selected.
iv. The goals and objectives of the compensatory mitigation project.
v. How the mitigation project will be accomplished, including construction sequencing, best management practices to protect water quality, proposed performance standards for measuring success and the proposed buffer widths.
vi. How it will be maintained and monitored to assess progress towards goals and objectives. Monitoring will generally be required for a minimum of five years. For forested and scrub-shrub wetlands, 10 years of monitoring will often be necessary.
vii. How the compensatory mitigation site will be legally protected for the long term.

Refer to Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Ecology Publication #06-06-011b) and Selecting Wetland Mitigation Sites Using a Watershed Approach (Ecology Publications #09-06-032 (Western Washington) and #10-06-007 (Eastern Washington)) for guidance on selecting suitable mitigation sites and developing mitigation plans. Ecology encourages the use of alternative mitigation approaches, including credit/debit methodology, advance mitigation, and other programmatic approach such as mitigation banks and in-lieu fee programs. If you are interested in proposing use of an alternative mitigation approach, consult with the appropriate Ecology regional staff person. Information on alternative mitigation approaches is available on Ecology's website.

(b) Mitigation for other aquatic resource impacts will be determined on a case-by-case basis.

6. Temporary Fills. Ecology Section 401 review is required for any project or activity with temporary fill in wetlands or other waters of the state for more than 90 days, unless the applicant has received written approval from Ecology. Note: This State General Condition does not apply to projects or activities authorized under NWP 33, *Temporary Construction, Access, and Dewatering*

7. Stormwater pollution prevention: All projects that involve land disturbance or impervious surfaces must implement stormwater pollution prevention or control measures to avoid discharge of pollutants in stormwater runoff to waters of the State.

(a) For land disturbances during construction, the applicant must obtain and implement permits (e.g., Construction Stormwater General Permit) where required and follow Ecology's current stormwater manual.

(b) Following construction, prevention or treatment of on-going stormwater runoff from impervious surfaces shall be provided.

Ecology's Stormwater Management and Design Manuals and stormwater permit information are available on Ecology's website.

8. State Section 401 Review for PCNs not receiving 45-day response from the Seattle District. In the event the Seattle District Corps does not issue a NWP authorization letter within 45 calendar days of receipt of a **complete** pre-construction notification, the applicant must contact Ecology for Section 401 review prior to commencing work.

F. ECOLOGY 401 CERTIFICATION: SPECIFIC CONDITIONS FOR THIS NWP:

Certified subject to conditions. Ecology Section 401 review is required for projects or activities authorized under this NWP if:

1. The project or activity impacts more than more than 1/3 acre of waters of the state.

2. The project includes fill related to a residential and/or commercial development.

3. The project or activity is in or adjoining a known contaminated or cleanup site.

G. COASTAL ZONE MANAGEMENT CONSISTENCY RESPONSE FOR THIS NWP:
(Note: This is only applies in the following counties: Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Thurston, Wahkiakum and Whatcom)

Response: Ecology concurs that this NWP is consistent with the CZMP, subject to the following condition: An individual Coastal Zone Management Consistency Determination is required for project or activities under this NWP if State Section 401 review is required.

General Conditions: For Non-Federal Permittees
1. Necessary Data and Information. A Coastal Zone Management Program "Certification of Consistency" form is required for projects located within a coastal county. "Certification of Consistency" forms are available on Ecology's website. The form shall include a description of the proposed project or activity and evidence of compliance with the applicable enforceable policies of the Washington Coastal Zone Management Program (CZMP). Also, a map of the site location is required.
2. Timing. Within 6 months from receipt of the necessary data and information, Ecology will provide a federal consistency determination for the proposed project or activity. If Ecology fails to act within the 6 month period, concurrence with the CZMP is presumed.

General Conditions: For Federal Permittees (Agencies)
1. Necessary Data and Information. Federal agencies shall submit the determination, information, and analysis required by 15 CFR 930.39 to obtain a federal consistency determination.
2. Timing. Within 60 days from receipt of the necessary data and information, Ecology will provide a federal consistency determination for the proposed project or activity. If Ecology fails to act within the 60 day period, concurrence with the CZMP is presumed.

APPENDIX H

Vicinity Map and Plans