

**Invitation for Bids  
and Construction Contract Documents for:**

**Carpenter and English Creeks  
Fish Passage Project**



**Project Manager**

Myrriah Crowley

Skagit Fisheries Enhancement Group

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Email [mcrowley@skagitfisheries.org](mailto:mcrowley@skagitfisheries.org)

**Design Engineer**

Bryan Tappel, PE

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**May 14, 2026**

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## Engineer's Certification

Contract documents for Skagit Fisheries Enhancement Group project:

*"Carpenter and English Creeks Fish Passage Project"*

The contract documents contained herein have been prepared by or under the direction of the following registered Professional Engineer:



5/13/2026

Bryan Tappel, PE

## Invitation to Bid and Bid Submittal Form

### Request for Bids

Project Title: Carpenter and English Creeks Fish Passage Project  
Project Sponsor: Skagit Fisheries Enhancement Group (SFEG)

### Location of the Project

21370 Little Mountain Road, Mountain Vernon, WA, 98274

### Description of Project

This project will (1) remove one 4ft-span x 21ft-long corrugated metal pipe (CMP) culvert and fill from a private driveway crossing of Carpenter Creek and replace it with a modular 30-foot long x 12-foot wide steel bridge, (2) constructing a 115ft-long roughened channel on Carpenter Creek to restore fish passage and create habitat features, and (3) remove a 2ft-span x 24ft-long corrugated plastic pipe (CPP) culvert and restore the channel habitat. This project will make 6.08 miles of upstream habitat accessible to salmon and other aquatic species. Additional work includes relocating buried utility lines and a gravity fed water line as detailed in the Drawings. The environmental permits required for this project allow for a construction work window from July 15 to September 30, 2026. This project is planned to take place mid-August - September 2026. SFEG will be responsible for obtaining all environmental permits and purchasing the bridge.

### Engineer's Cost Estimate

The engineer's cost estimate for the required work for the project completion is \$262,000 (without tax).

### Pre-Bid Meeting

A mandatory pre-bid meeting will be held on May 21, 2026, at 12:00 p.m. Contractors are required to notify SFEG if they plan to attend. This project is located at a private residence; please do not visit the project site without prior coordination with SFEG. SFEG will provide parking directions when contractors RSVP. Contractors must RSVP and attend the pre-bid meeting to be considered a responsible bidder.

**Staging Requirements and Landowner Access:** There are two staging areas for construction work available adjacent to the Project work site. It is anticipated that the driveway can be closed during construction, a temporary vehicle access will not be installed.

**Utilities:** Removal of the culvert crossing will necessitate relocation of power, and telecommunication ("telecom") lines, and water line. The water line will be buried beneath the creek bed. The Puget Sound Energy (PSE) power line and Zippy telecom line will be attached to the bridge. The construction tasks assigned

to the contractor are listed in the bid sheet and on the drawings. The PSE design is attached (Attachment D). SFEG is currently working with Zipty to determine the final design for their respective construction tasks, which are not included in the contractor’s scope of work.

**Tentative Construction Schedule**

SFEG anticipates the following schedule for contracting and construction. The actual schedule may vary depending on contingencies in permitting, weather, and other relevant considerations.

Pre-Bid Meeting (on site)	May 21, 2026 (12pm)
Bid Due	June 1, 2026 (12pm)
Expected Contract Award	June 11, 2026
Pre-Construction Plan Meeting (on site)	June 25, 2026
Expected Notice to Proceed*	July 1, 2026*
Expected Mobilization	August 24, 2026
Expected Project Construction	August 24 – September 21, 2026
Project Construction Complete	September 30, 2026
Project Demobilized	October 15, 2026

\*Notice to Proceed (NTP) is required for any work completed in association with this project. The NTP date will depend on SFEG obtaining environmental permits prior to July 1, 2026.

**Submission of Proposal**

The following items are required for a proposal to be considered **responsive**:

- A. Complete all parts of the attached BID PROPOSAL form including the SCHEDULE OF QUANTITIES (cost proposal). The bid will be considered responsive only if the Bid Submittal form is entirely completed.
- B. Bid submitted will verify that a representative of the contractor has reviewed the Plans and Specifications and demonstrates a working knowledge of the entire scope of work. Attending the on-site pre-bid meeting is mandatory.
- C. Three references are required with the proposal. These references should include past clients who; 1) are familiar with the contractor’s abilities to work in a stream with sensitive salmon resources, and 2) can respond to the contractor’s quality of work, timeliness, and reliability.
- D. Submit bid to SFEG no later than 12:00 p.m. on June 1, 2026. Bids must be delivered electronically, have “Carpenter and English Creeks Fish Passage Project BID RESPONSE” in subject line, and be sent as a single PDF document to [mcrowley@skagitfisheries.org](mailto:mcrowley@skagitfisheries.org). Bids will be opened and read on June 1, 2026, at 12:00 p.m. and all contractors submitting bids are invited to attend ([Carpenter and English Creeks Fish Passage Project Bid](#)

[Opening | Meeting-Join | Microsoft Teams](#)). Contract award shall be to the lowest responsive and responsible bidder. **Please do not CC engineer.**

**Bonds and Insurance Required:**

- A. Contract Bonds (Performance and Payment Bond)
- B. Standard Liability Insurance (as described in WSDOT Standards 1-07.18). General liability insurance coverage is reduced from \$3 million to \$2 million aggregate. Also, insurance coverage for products and complete operations is not required.

**Wage Requirements:**

This project is funded by a grant from the Washington State Recreation and Conservation Office Brian Abbott Fish Barrier Removal Board, US Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (NOAA); the requirements of Washington State’s Prevailing Wage Law (RCW 39.12) and the Davis Bacon Act apply. Because State and Federal wage laws both apply, the Contractor will need to: 1) Pay all workers the higher of the state or federal prevailing wage for each craft classification; and 2) Maintain proper records and comply with all reporting requirements for both the state and federal laws. WA wage requirements can be confirmed at <https://secure.lni.wa.gov/wagelookup/>. Davis Bacon Act wage requirements can be confirmed at <https://sam.gov/wage-determinations>.

**LIST OF REFERENCES**

List at least three references. These references should include past clients who are familiar with the bidder’s quality of work, timeliness, reliability, etc.

PROJECT NAME: Carpenter and English Creeks Fish Passage Project

Name of Reference Company / Contact and Phone Number	Project Name and General Location	Type of Work Performed



**BID PROPOSAL**

Bidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Contractor's State Registration No.: \_\_\_\_\_

State Industrial Insurance No.: \_\_\_\_\_

For the construction of:  
Carpenter and English Creeks Fish Passage Project, hereinafter referred to as  
the Project.

To:  
Myrriah Crowley  
Skagit Fisheries Enhancement Group  
P.O. Box 2497  
1202 South 2nd Street, Suite C  
Mount Vernon WA 98273  
360-899-6281  
mcrowley@skagitfisheries.org

We, the undersigned, having examined the Invitation for Bid and the Contract Documents for the construction of the Work, offer to construct and complete the Work in conformity with said documents, and to enter into an agreement according to the form hereto attached, in consideration of the sum arrived at by the proper extension of units of work shown in the following Schedule of Quantities, or such sum as may be ascertained in accordance with said documents. We acknowledge receipt, understanding and full consideration of Addenda Number(s): \_\_\_ issued prior to the date for receipt of bids (blank or "NA" if no addenda).

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**ATTACHMENT A:**

**Carpenter and English Creeks Fish Passage Project Construction Contract**

May 14, 2026

# Carpenter and English Creeks Fish Passage Project Construction Contract

May 14, 2026



**Skagit Fisheries Enhancement Group**  
1202 South 2<sup>nd</sup> Street, Suite C  
(P.O. Box 2497 for mail)  
Mount Vernon, WA 98273  
Myrriah Crowley, Project Manager  
360-336-0172 Office  
360-899-6281 Cell  
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509-899-7279 Cell  
btappel@comcast.net

**Carpenter and English Creeks  
Fish Passage Project  
Construction Contract**

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- 2 Overall Fish Passage Plan
- 3 Fish Passage Project Overview
- 4 Flow Rating Curves For Fish Passage
- 5 Carpenter Creek Fish Passage Plan
- 6 Carpenter Site Prep & Water Control
- 7 Project Sequence Notes
- 8 Roughened Channel Profile & Details
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- 18 Roughened Channel Basis-Of-Design
- 19 Fish Passage Basis-Of-Design
- 20 Construction Elements & Quantities

# **Carpenter & English Creek Fish Passage Project Construction Contract**

## **Contract Form**

This Contract is between the Skagit Fisheries Enhancement Group (SFEG) and \_\_\_\_\_ (Contractor), and is effective on the date signed by both parties.

The Contractor shall complete all work, pay all costs, and perform all construction requirements indicated on Drawings (Plans) titled “Carpenter & English Creek Fish Passage Project” (20 drawings), listed in specifications attached to this Contract Form, and as listed on the Proposal Form (Bid Form). SFEG advises to Contractor that cell phone service at the project site is “little to none” which will require Contractor to search for and use a different location for cell phone communication.

Contract work includes all construction to build a roughened channel for fish passage in Carpenter Creek and English Creek, construct a 30’-span bridge across Carpenter Creek, remove a culvert from English Creek, and restore the creek channel for fish passage and stream habitat improvement. SFEG has separately purchased the pre-fabricated modular weathering steel bridge superstructure (30’-span x 12’-wide deck). This purchase includes delivery of bridge modules to the project site, but requires that the on-site Contractor coordinate the delivery schedule with TrueNorth Steel. The on-site Contractor will need to unload the bridge module(s) from the delivery truck. Contractor shall complete all site work, pre-cast concrete footing and backwall fabrication and installation, bridge assembly, and all other work as shown on drawings or listed on the Bid Form.

The fish passage (construction) project will be subject to requirements of the State of Washington Prevailing Wage Law. Prevailing wage information and wage rate requirements for Skagit County are included in Appendix A. The construction project is also subject to requirements of the Davis-Bacon and Related Acts (Davis-Bacon). Since State and Federal wage laws both apply, the Contractor will need to: 1) Pay all workers the higher of the state or federal prevailing wage for each craft classification; and 2) Maintain proper records and comply with all reporting requirements for both the state and federal laws.

The environmental permits (e.g. Hydraulic Project Approval, National Environmental Protection Act, etc.) required for construction work will be obtained by SFEG. A copy of the environmental permits will be provided to the Contractor, and these permits shall be retained on-site start-to-finish. All work required by the permits is shown on project drawings (e.g. limited riparian clearing, separation of work from flowing water, etc.), or is considered common

sense construction by the engineer (isolate work from flowing water, no re-fueling adjacent to the creek channel, etc.).

In addition, Contractor is required to following the Project Design Criteria General Construction Measures as outlined in Appendix C. The Project Design Criteria are required by the federal funding agency, NOAA and US Fish and Wildlife Service, and must be complied with, as applicable, at all times during contract work.

A Bid Bond is not required for bid submittal.

A Contract Bond (Payment and Performance Bond) will be required.

The Contractor and SFEG agree that the engineer or a SFEG representative shall be on-site to observe all construction work start-to-finish. Project construction for the 30'-span bridge will be along a private driveway, which will be closed for the duration of construction; a vehicle detour is not required for private owners during bridge construction work.

SFEG shall pay the Contractor the amount listed for each pay item on the Bid Form submitted by Contractor, multiplied by the quantity of work completed for each pay item (Bid Form in Appendix B). At the time of contract signature, the total amount of SFEG payment to Contractor after completion of the project would be: \$ \_\_\_\_\_. This total is the sum of all unit prices multiplied by quantities on the Bid Form, plus sales tax.

For billing, please refer to "Carpenter and English Creeks Fish Passage Project" on all invoices. Address any questions to our Financial Manager, Melody Meyers at 360-336-0172 x303 or [accounting@skagitfisheries.org](mailto:accounting@skagitfisheries.org)

Increased or Decreased Quantities, or Changed Conditions, may alter the final payment to Contractor as outlined in Standard Specifications 1-04.6 or 1-04.7, respectively.

Signed by:

Skagit Fisheries Enhancement Group:

Contractor:

\_\_\_\_\_

\_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

# Specifications

## Division 0 - Introduction

Technical specifications for construction of the new bridge and habitat improvements (fish passage project) are based on the Washington State Department of Transportation's Standard Specifications for Road, Bridge, and Municipal Construction 2026 (WSDOT Standard Specifications). Payment to Contractor shall only be for payment items listed on the Bid Form. Work items shown on the Plans or described in the Specifications, but not listed on the Bid Form, are considered "incidental" to other work items. The Contractor shall include costs for "incidental items" in pay items listed on the Bid Form. Throughout the contract, substitute "Contracting Agency" for "State".

## Division 1 – General Requirements

### 1-01 Definitions and Terms

#### 1-01.1 General

Include as written in WSDOT Standard Specifications (abbreviated as "Include as written").

#### 1-01.2 Abbreviations

Include as written.

#### 1-01.3 Definitions

Include only the following definitions from the Standard Specifications: Addendum, Award, Bid, Bidder, Bid Documents, Call for Bids, Completion Date, Contract, Contract Bond, Contract Form, Contracting Agency (Skagit Fisheries Enhancement Group), Contractor, Contract Provisions, Engineer, Inspector, Plans, Proposal Form (= Bid Form), Special Provisions, Specifications, Subcontractor, Work.

### 1-02 Bid Procedures and Conditions

#### 1-02.1 Prequalification of Bidders

Delete this section.

## 1-02.2 Plans and Specifications

Delete the WSDOT Standard Specification and replace with the following:

SFEG shall provide one electronic copy (pdf file) of each contract document (Contract Book, Drawings) to Contractor for project bidding purposes. After contract award, SFEG shall supply Contractor with one Contract Book (includes Contract Form, General Requirements, Technical Specifications, Prevailing Wage Information, Bid Form) and one set of drawings electronically (pdf file). One print copy of the contract may be requested, if preferred. Contractor shall make all other copies of contract documents needed for bidding and/or completion of Contractor's work.

## 1-02.3 (Estimated Quantities) through 1-02.6 (Preparation of Proposal)

Include as written.

Add the following to Section 1-02.6 (Preparation of Proposal):

- Bid submittals shall include a completed Bid Form (Appendix B).
- Confirmation of addenda is required (if any are issued during bid period). To confirm receipt of addenda, list each addendum on Bid Form and initial.
- The Bid Form must be filled out completely, with extension of all Unit Costs to the Total Cost column, subtotal then sales tax applied for the Total Construction Cost (Bid). The Total Construction Cost and List of References provided within the Proposal will be used for determination of "lowest responsive bidder" and contract award. All math for bids will be verified by SFEG with Unit Costs considered accurate.
- Bidders must attend the pre-bid meeting detailed in the Invitation to Bid to be considered a "responsive" bidder.

## 1-02.6 Preparation of Proposal

Paragraph five; item #1 is revised to read: The Bidder shall list all Subcontractors, fabricators, or suppliers expected to perform more than five percent (5%) of the contracted work on the Bid Form.

## 1-02.7 Bid Deposit

Delete this WSDOT requirement; a bid bond is not required.

## 1-02.8 (Noncollusion Declaration) through 1-02.11 (Combination and Multiple Proposals)

Delete these sections.

#### 1-02.9 Delivery of Proposal

This section is revised to read: Bids shall be submitted to SFEG on the date and time specified in the bid advertisement. Bids may be submitted in paper format or in electronic .pdf file format provided that they contain all the relevant information in Section 1-02.9. Any part of the Bid Proposal not received prior to the time specified will not be considered and the bid will be returned to the bidder unopened.

#### 1-02.12 (Public Opening of Proposals) through 1-02.15 (Pre-Award Information)

Include these WSDOT contract clauses as written.

Add the following to Section 1-02.12:

- An optional Bid Opening meeting will be held online on the date and time specified within the Invitation to Bid and Bidders will be invited to attend. The bid opening will not be attended by the general public.

### **1-03 Award and Execution of Contract**

#### 1-03.1 Consideration of Bids

Include as written.

After receipt and checking of bids (for completeness and possible math errors), SFEG will verify the “Total Construction Cost” amounts submitted by each Contractor on the Bid Form. The Project award will be made to the lowest responsive and responsible bidder. Bidders will be notified of bid results from the Project Manager.

#### 1-03.2 Award of Contract

Include as written, except in the WSDOT Standard Specification, replace “45 calendar days” with “30 calendar days”.

#### 1-03.3 Execution of Contract

Delete the WSDOT Standard Specification and replace with the following:

Within 10 calendar days after the award date, the successful bidder shall return the signed Contracting Agency-prepared contract, a Contract Bond (1-03.4), and an insurance certification as required by Section 1-07.18.

#### 1-03.4 Contract Bond

Include this WSDOT Standard Specification. A Contract Bond (Performance and Payment Bond) for the full contract amount is required for this contract.

1-03.5 (Failure to Execute Contract) through 1-03.7 (Judicial Review)

Delete these sections.

#### **1-04 Scope of Work**

Include the WSDOT Standard Specifications (Year 2026) as written for these specification sections (Include as written).

Within this WSDOT section, 1-04.4(1) Minor Changes shall be modified as follows. The dollar threshold for consideration of "Minor Change" shall be reduced from \$25,000 (WSDOT) to \$5,000 for SFEG. Small changes to the work that add (or subtract) dollars shall be negotiated and tallied between SFEG and Contractor to \$5,000 maximum. Contract adjustments above this threshold will be considered "Change Order" with more formal protocol as outlined in WSDOT Standard Specification 1-04.4.

#### **1-05 Control of Work**

Include as written.

#### **1-06 Control of Material**

Delete this section.

#### **1-07 Legal Relations and Responsibilities to the Public**

1-07.1 Laws to be Observed

In the first paragraph, second sentence of Section 1-07.1, replace "State" with "Contracting Agency". Otherwise, include this section as written.

1-07.2 State Taxes

The entire construction cost (subtotal on Bid Form) is subject to Washington State Sales Tax, as shown on the Bid Form.

The total bid amounts shall include Washington State Sales Tax (WSST) as a line item. All other taxes imposed by law shall be included in the bid amount. SFEG will include WSST in progress payments according to the percent of completion. The Contractor shall pay the WSST to the Department of Revenue and shall furnish proof of payment to the SFEG if requested.

1-07.3 Forest Protection and Merchantable Timber Requirements

Include 1-07.3(1) (Forest Fire Prevention) as written in the WSDOT Standard Specifications.

Delete 1-07.3(2) (Merchantable Timber Requirements).

1-07.4 (Sanitation) through 1-07.5 (Environmental Regulations)

Include as written.

1-07.6 Permits and Licenses

Delete the text in the WSDOT Standard Specifications, and replace with the following:

The environmental permits required for the work will be obtained by SFEG. The engineer's opinion is that all work required by permits (e.g. water control) is shown on the drawings, or would be considered routine construction requirements near any fish-bearing stream (e.g. tracked equipment not allowed in creek). The Contractor shall comply with and maintain a copy of the environmental permits on-site (in weatherproof bag such as Ziploc) for the duration of the work.

SFEG assumes that all required permits will be obtained by July 1, 2026, and on-site construction work could be completed during July, August and September 2026. It is recognized that fabrication of pre-cast concrete items may need to be done prior to permit authorization; partial payments by SFEG would be paid to Contractor for these structural items.

1-07.7 Load Limits

Include as written.

1-07.8 High Visibility Apparel

Include as written.

1-07.9 Wages

Include this WSDOT Standard Specification as written. The fish passage project will be subject to Prevailing Wage requirements determined by the Washington Department of Labor & Industries. As previously noted (in Contract Form), Davis-Bacon wages will also apply due to federal funding.

Appendix A includes prevailing wage information and wage rates for the convenience of Contractors. The Contractor is solely responsible for complying with all laws and procedures relevant to prevailing wage requirements.

1-07.10 (Worker's Benefits) through 1-07.12 (Federal Agency Inspection)

Include these sections of the WSDOT Standard Specification as written, which includes 1-07.11 (Requirements for Nondiscrimination).

1-07.13 (Contractor's Responsibility for Work) through 1-07.17 (Utilities and Similar Facilities)

Include as written, except delete 1-07.15(1) – Spill Prevention, Control, and Countermeasures Plan. Waiver of the formal SPCC Plan does not remove the Contractor's responsibility to implement all practical measures to avoid spills, responsibility for spill response if any spill occurs, and following the spill prevention guidelines listed under 1-07.15 (1) (7); e.g. Contractor to supply spill response kits on-site, daily inspection of all equipment for external petroleum-based products or leaks.

1-07.18 Public Liability and Property Damage Insurance

Include this section as written, except replace "State of Washington" or "State" with Skagit Fisheries Enhancement Group to be named as additional insured's for general liability insurance policy for the duration of the contract. Insurance limits shall include: (a) Commercial or comprehensive general liability insurance covering bodily injury liability, property damage liability, contractual liability, and personal injury liability with limits of liability not less than \$1,000,000 each occurrence, with at least \$2,000,000 annual aggregate; and (b) Automobile liability coverage for all owned, hired, and non-owned vehicles with the same occurrence and annual aggregate policy limits as listed above for general liability insurance. Insurance coverage for Products and Completed Operations is not required.

1-07.19 Gratuities

Include as written (no gratuities allowed).

1-07.20 (Patented Devices) through 1-07.22 (Use of Explosives)

Delete these sections.

1-07.23 Public Convenience and Safety

Delete this section of the WSDOT Standard Specifications. The private road will be closed for the duration of bridge construction, and the Contractor is not required to build a vehicle detour.

1-07.24 (Rights of Way) through 1-07.27 (No Waiver of State's Legal Rights)

Delete these sections.

## **1-08 Prosecution and Progress**

### 1-08.1 (Subcontracting) through 1-08.4 (Prosecution of Work)

Include as written.

### 1-08.5 Time for Completion

Delete the WSDOT Standard Specification and replace with the following:

The project construction schedule is contingent on approval of several environmental permits; SFEG has responsibility for these permits and assumes they will be obtained by July 1, 2026. Contractor shall construct (or have constructed) the pre-cast concrete footings and backwalls in time for July, August and September 2026 on-site construction.

All work required for this project shall be completed by September 30, 2026. In addition, all project work shall be completed within 4 weeks of Contractor mobilization to the site.

### 1-08.6 (Suspension of Work) through 1-08.8 (Extensions of Time)

Include as written.

### 1-08.9 Liquidated Damages

Include this WSDOT Standard Specification. The variable T (time) will be 30 days, so liquidated damages will be 0.5% of total price per day. Liquidated damages will only apply if in-stream work extends beyond the permit deadline of September 30, 2026.

### 1-08.10 (Termination of Contract)

Include as written.

## **1-09 Measurement and Payment**

### 1-09.1 (Measurement of Quantities) through 1-09.8 (Payment for Material on Hand)

Include as written, and add the following. These WSDOT clauses include 1-09.7 (Mobilization) which is a pay item on the Bid Form.

- The Contractor is advised that all volume measurements listed on the Bid Form (CY = cubic yard) are based on “neat-line” AutoCAD estimates, and the Contractor (for bidding) needs to consider that some materials have a high in-place density (existing soils) or shall be compacted (backfill

around bridge footings). On-site excavation of soils will result in “swell” of the excavated materials, and the Contractor’s haul count (to on-site stockpiles and/or backfill) may exceed the Bid Form quantity by 10% to 40% volume. Similarly, the Contractor’s “haul” volume for materials to be compacted on-site may exceed the Bid Form amounts by 10% to 40% since the density of some hauled materials will be less than in-place compacted density. For all excavation and/or backfill of native soils, or supply of crushed rock if measured by the cubic yard (to be compacted), the Contractor shall assume that “haul” (loose materials) may exceed the listed quantity by up to 40% without additional payment.

#### 1-09.9 Payments

Delete the WSDOT Standard Specification and replace with the following:

The basis of payment will be the actual quantities of work performed according to the contract and as specified for payment, unless the specifications indicate that “estimated quantity” shall be used for payment as listed on the Bid Form. Payments will be made for work and labor performed and materials furnished under the contract according to the prices in the proposal (Bid Form) unless otherwise provided. Final payment shall not be made until written acceptance of all work by Skagit Fisheries Enhancement Group, and verification to SFEG that the Contractor has filed an Affidavit of Wages Paid with the Washington State Department of Labor & Industries, and comparable verification for Davis-Bacon wage compliance due to federal funds.

#### 1-09.10 (Payment for Surplus Processed Material) through 1-09.13 (Claims Resolution)

Delete these sections.

#### 1-50 Surveying

##### 1-50.1 Description

This section covers surveying for vertical and horizontal control of the fish passage project.

##### 1-50.2 Materials and Construction

Vertical control for construction will be referenced to a “reference elevation” at the project site (concrete pad at existing electric transformer) with an assumed elevation. The engineer will show the Contractor exactly where and what this reference elevation is at the project site. The Contractor is responsible for all vertical control for project construction (e.g. operate a laser level), with intermittent checks by the engineer (or representative).

Horizontal control for construction will be provided by the engineer, who will place wood stakes at multiple cross sections for roughened channel construction, and stakes required for location of the new English Creek channel.

The engineer will also set stakes at the four outside corners for bridge pre-cast concrete footings (as shown on drawings), as well as off-set stakes to preserve these locations during project excavation. The engineer will also flag clearing limits, and stake or flag sandbag dam locations and flow bypass pipe routes.

The engineer's experience with about 250 similar projects is that the services of a Professional Land Surveyor (PLS) will not be required. Tolerances for horizontal control for bridge placement shall be 0.2 feet. The bridge shall be installed within 0.1 feet vertical of the specified elevations.

### **1-50.3 Payment**

Payment for Surveying for shall be "Lump Sum" as listed on the Bid Form.

## **Division 2 – Earthwork**

### **2-01 Clearing and Grubbing**

Include only Section 201.1 (Description) as written in the WSDOT Standard Specifications. Areas to be cleared and grubbed prior to other work are shown on Drawing 6, and will be flagged on-site; the 13 trees to be removed (including rootwads except two trees upstream of the bridge location) will be flagged. Three trees, two rootwads with trunk attached, and a large cedar stump will be selected by SFEG to be set aside for later placement in-stream and/or over riparian areas. All other clearing debris will be disposed on private land within 200' of the bridge site. Debris shall be semi-neatly piled, mashed down, and left for natural decomposition. Payment for Clearing and Grubbing shall be Lump Sum as listed on the Bid Form.

#### **2-01.1 Knotweed Removal & Disposal**

Knotweed is a Class B designate noxious weed by the Skagit County Noxious Weed Control Board and control is required; knotweed fragments re-rooting from pieces of the live plant is one of the primary methods it spreads. Knotweed is prevalent at the project site and the Contractor will take care not to spread it off site. Throughout construction, Contractor will clean all equipment and machinery of knotweed fragments prior to leaving the site; including but not limited to heavy machinery tracks and excavation equipment. Knotweed removal and disposal at the English Creek fish passage location is shown and described on Drawing 16. Payment for Knotweed removal and disposal shall be per cubic yard as listed on the Bid Form.

### **2-02 Removal of Structures and Obstructions**

Include this section as written in the WSDOT Standard Specifications, except add the following to Section 2-02.1 (Description):

The existing 48"-diameter steel culvert shall be removed from the existing road crossing of Carpenter Creek, and an existing 24"-diameter culvert shall be removed from English Creek. These culverts shall be disposed by Contractor off-site. Payment for existing culvert removal and off-site disposal shall be Each as listed on the Bid Form.

## **2-09 Structure Excavation**

Include this section of the WSDOT Standard Specifications to cover general requirements for excavation, stockpile of suitable backfill material, backfill and compaction, and disposal of excess (and/or unsuitable) material. The following summaries shall over-ride comparable portions of the WSDOT Standard Specifications.

Approximate excavation contours were drawn in AutoCAD by the engineer and multiple project sections were evaluated to estimate excavation, backfill and excess soil quantities as listed on the Bid Form. All estimated quantities within this specification are based on "neat-line" AutoCAD measurements; see Specification 1-09 (Measurement and Payment) for interpretation of "swell" vs. payment for estimated quantities.

Excavation for all project construction shall proceed as summarized in a long project sequence on Drawing 7, unless the Contractor outlines a better approach with concurrence by SFEG. All excavated soils needed for backfill (see Bid Form quantities) shall be stockpiled in upland areas along the existing road and/or along the streams. SFEG and a private owner (Lang) will identify a location(s) for long-term storage (i.e. disposal) of soil materials surplus to project requirements; the soil disposal location(s) will be within 400' of the English Creek fish passage site.

Stockpiles of soils considered suitable for backfill and compaction (around footings and for approaches) shall be covered with plastic (visqueen) unless dry weather and/or light rain (no heavy rain) is predicted until the stockpile materials will be incorporated into the backfill. Backfill soils around the outside of bridge footings shall be placed in 12"-thick lifts (maximum) and compacted with vibratory compaction equipment (hoe-pack, jumping jack, or vibratory plate compactor).

Payment for all items under this Specification shall be based on "estimated quantity" shown on the Bid Form, unless the Contractor verifies a substantial discrepancy between estimated and actual quantities (see previous text in Specification 1-09 about possible "swell" up to 40% of estimated neat-line AutoCAD volumes).

"Excavation (stockpile)" on the Bid Form includes soil excavation and side-cast stockpile near multiple construction areas. A loader and/or dump truck will be required to shuttle soil to-and-from stockpile areas. For some materials,

“stockpile” will be to the soil disposal location(s) when the Contractor and engineer are confident these materials are surplus to project requirements.

“Backfill & Compact (footings, road fill)” includes haul from stockpiles, spreading and compacting as shown on drawings for backfill around the footings, and building the road approaches to both ends of the bridge. Backfill materials within the road prism shall be placed in 12”-thick lifts (maximum) and compacted with vibratory equipment to at least 90% of maximum density. The engineer will observe compaction effort and will informally test for adequate road fill compaction. Materials backfilled outside the road prism shall be lightly tamped with bucket but not otherwise compacted.

“Backfill for Streambanks (do not compact)” applies to native soils placed waterward of footing walls, to build the streambanks under and near to the bridge.

“Dispose Excess Soils (on Lang property)” includes placement and spreading of excess soils at the permanent stockpile location(s). When haul to disposal site(s) is completed, these soils shall be graded to match adjacent ground contours.

## **2-10 New Zealand Mud Snail**

This specification informs the Contractor that Carpenter Creek is known to be inhabited with invasive New Zealand Mud Snails, and several precautions (listed below) are required to minimize the chances of spreading these invasive snails to other aquatic habitats. These precautions are considered incidental to other construction work, and will not be separately paid.

- Prior to leaving the project site, all equipment parts (e.g. buckets, booms), tools (e.g. shovels), and machines (e.g. water pump) that come in contact with creek water need to be thoroughly cleaned with potable water from a water tank provided by Contractor at the staging area; wash water will be drained towards Carpenter Creek to infiltrate into riparian area soils.
- All boots, buckets, nets, etc. that enter Carpenter Creek shall be thoroughly washed (potable water from tank) prior to leaving the site, including visual inspection for mud snails.

## **2-14 Standby Generator 10 kw**

Bridge construction will require short-term suspension of PSE’s electrical service to one residence. As described on Drawing 7, the Contractor will supply a 10 kw portable generator to provide temporary power to this house. The Contractor will need to instruct the homeowner on start, stop, and other generator operations such as sequential switches to energize the house without overloading generator capacity. The Contractor shall supply enough fuel to the homeowner for 12 hours of generator operation; the homeowner will purchase

additional fuel as required. Payment for Contractor supply of the generator will be Lump Sum.

## **2-14 Extension Cords**

The Contractor shall supply extension cords to the homeowner for the duration of power outage, including cords for 120-volt and 240-volt power as determined between the Contractor and homeowner. These extension cords will be returned to the Contractor after bridge construction.

## **2-15 Water Control (sandbag dams, pump)**

Step-by-step water control requirements are shown on Drawing 6 and 16, further described in the project sequence (Drawing 7), and are integrated with multiple elements of project construction. All project water control will be done with minimal contact with creek water, and minimal generation of turbidity.

SFEG will be responsible for installation of fish block nets, and for recovery and relocation of fish (“fish rescue”) from the stream channel as “standing water” is pumped down by the Contractor (see notes and block nets on Drawings 6, 7 and 16). It is anticipated that fish rescue will take one (1) day and occur during mobilization.

Water control by Contractor will include pumping of “standing water” encountered within the work area, or from infiltration of water into footing excavations. Turbid water shall be discharged onto flat ground within 100’ of the work site, for infiltration into the ground before re-entering the creek. Water control also includes Contractor supply and placement of flow bypass pipes in Carpenter and English Creeks (Drawing 6 and 16).

Payment for Water Control will be Lump Sum as listed on the Bid Form.

## **2-20 Miscellaneous Work for Underground Utilities**

The Contractor is required to call 811 for underground utility locate prior to any on-site work. Underground utilities at the proposed bridge location include PSE electric service conductor to one house, and Zply telecommunications cable. Contractor coordination with utility companies and SFEG, temporary shut off of utilities, then re-construction of electric and telecommunication services are shown and described on Drawings 6, 7 and 12; this information is not repeated herein.

Multiple bid items are listed on the Bid Form for Specification 2-20, with varying quantities and units for payment. The details of PSE’s requirements to weld five short sections of steel Unistrut to a bridge beam, then semi-circular bolted clamps to secure the electrical conduit to the beam are not fully understood by the engineer. The Contractor, engineer, and PSE will work together to implement this small-scale detail acceptable to PSE.

## **2-30 Temporary Barricades for Driveway**

Barricades are required for the driveway north of the proposed bridge to inform drivers that the road is closed to vehicle passage. The barricades will be in place start-to-finish for bridge construction. Barricades with battery-powered yellow flashing lights, concrete barriers of the “Jersey Barrier” type (with lights), and other barrier types will be acceptable.

## **Division 6 - Structures**

### **6-02 Concrete Structures**

Include the WSDOT Standard Specification 6-02 as written. All pre-cast concrete shall be Class 4000A, which is an air-entrained mix with 28-day compressive strength at least 4,000 psi.

The quantity of concrete for payment shall be the “neat line AutoCAD” volumes (cubic yards) measured by the engineer on project drawings and listed on the Bid Form, for the following types: Pre-Cast Concrete Class 4000 for Footings, and Pre-Cast Concrete Class 4000 for Backwalls.

The mix design for proposed concrete, and previous test data showing compliance with this specification, shall be submitted to SFEG (SFEG will forward information to the engineer) for review and approval prior to concrete construction.

Include Sub-Sections 6-02.3(1) through 6-02.3(6).

Delete Sub-Sections 6-02.3(7), 6-02.3(8), and 6-02.3(10).

Include Sub-Section 6-02.3(9) (Vibration of Concrete).

Include Sub-Section 6-02.3(11) (Curing Concrete).

Delete Sub-Sections 6-02.3(12) and 6-02.3(13).

Include 6-02.3(14) (Finishing Concrete Surfaces). All surfaces shall be given a Class 2 finish (clean up edges and fill form tie holes with grout).

Delete Sub-Sections 6-02.3(15) through 6-02.3(23).

Include Sub-Section 6-02.3(24) (Reinforcement), except replace the text with the following: All reinforcement for all concrete structures shall be deformed steel bars Grade 60 complying with WSDOT 9-07. Rebar patterns are shown on drawings for all structures.

Delete Sub-Sections 6-02.3(25) and 6-02.3(26).

Delete Sub-Sections 6-02.3(27) (Concrete for Precast Units) and 6-02.3(28) (Precast Concrete Panels).

### **6-03 Steel Structures**

The steel bridge superstructure has been purchased by SFEG from TrueNorth Steel and will be supplied to the project site. Contractor will be responsible for all coordination of bridge delivery to the site (i.e. to coordinate with on-site construction schedule). Final coordination and scheduling of the bridge delivery typically includes real-time cell phone communication with the truck driver delivering the bridge module(s). The Contractor shall lift the bridge module(s) into place and perform necessary on-site assembly as listed on Drawing 12 and/or as required by bridge supplier. Bridge superstructure will be a 30'-span x 12'-wide modular weathering steel beam bridge as shown on Drawing 12.

The on-site Contractor shall complete all bridge placement and assembly. Modular steel bridges are shipped by flatbed truck, and require placement with two excavators (or a crane may be used). Assembly includes, but is not limited to, swinging bridge pieces together so bridge beams rest on bearing plates, welding beams to bearing plates, installing nuts on anchor bolts imbedded in top of footings, bolting bridge pieces together, installing guardrail posts supplied with bridge, and attaching the guardrails to posts.

### **6-30 Wood Rail and Bench Construction**

- Wood for rails and benches shall be pressure-treated Hem-Fir 4x12's (nominal dimension lumber) provided on-site by the Contractor. The engineer believes 16'-long stock lengths will work best with guardrail post spacing (Contractor to verify). All wood cutting, fitting and assembly shall be done by Contractor.
- All hardware shall be stainless steel.
- Hex head bolts to attach wood rails to steel posts shall be  $\frac{3}{8}$ "-dia. x 5"-long w/ hex head bolt, hex head nut and two flat washers (24 assemblies required). Drill wood rails  $\frac{1}{2}$ "-dia. for bolt installation, per hole pattern on steel posts. Bolt heads to be on inside rail surface, and do not need to be countersunk. Use four bolts per post at rail joints, and two bolts at posts without joint.
- Lag screws to attach top rail (bench) to vertical wood rail shall be hex-head  $\frac{3}{8}$ "-dia. x 8"-long with flat washer. Pre-drill for lag screws and drill top of bench surface to countersink hex-head flush with top surface within 12" each joint and at 6' on-center +/- (12 lag screw assemblies).

- All joints for rails and benches to be at posts. Pre-drill these joints, then hammer galvanized steel nails for secure joint connections.
- After bench attachment to vertical rail, use skillsaw (or similar) with blade set at 45° to saw 1"-wide bevel all outside top edges benches. Use skillsaw guide or temporary guide tacked to bench to maintain uniform 45° bevel cuts parallel with outside edges wood bench.

## **Division 7 – Waterline**

### **7-20 Waterline Re-construction under English Creek**

Drawing 17 shows and describes a small-scale waterline relocation and re-construction at the English Creek fish passage site. Waterline materials are itemized on the Bid Form. The Romac fittings need to be specifically ordered to fit around 2½"-diameter PVC Schedule 80 pipe as well as the existing 2½"-diameter galvanized steel pipe. Payment for all elements of waterline work shall be as listed on the Bid Form.

## **Division 8 – Miscellaneous Construction**

### **8-30 In-Stream Habitat Features & Erosion Control Materials**

The small-scale bank reinforcement for English Creek, to consist of one large cedar rootwad and a few large boulders (see Drawing 5) is included in this specification. Trees and tree sections to be placed within the Carpenter Creek roughened channel are also included in this specification (see Drawing 5). These in-stream habitat features will be paid as listed on the Bid Form.

Erosion-Control Seeds shall be a mix of native (western Washington) plants specifically intended for erosion-control, certified weed-free and commercially available. Excavation and fill areas are to be raked to create a rough surface prior to seed application. Seeds shall be spread by hand at an application rate 1 pound of seeds scattered over 500 to 1,000 ft<sup>2</sup> ground area. Payment will be per pound of seed mixture supplied and spread.

Weed-Free Straw shall be certified weed-free, dry and supplied in bales approximately 14"x14"x36"-long (conventional bales). After seeding, straw shall be spread over areas that were excavated or filled, including slopes near the bridge. Straw to be spread at an application rate about 1 bale per 500 ft<sup>2</sup> ground area. Payment will be per bale delivered to the site and spread.

## Division 9 - Materials

### 9-03 Aggregates

#### 9-03.1 Description

This section specifies Pea Gravel to be spread for subgrade leveling under pre-cast concrete footings and backwalls, Crushed Rock (crushed surfacing base course, 1¼"-minus) for the final road surfaces including complete coverage of the new bridge deck, Boulders for the roughened channel, Washed Sand to fill voids between boulders, and Streambed Materials.

#### 9-03.2 Materials

Pea Gravel shall be washed gravel with maximum size about ½".

Crushed Rock shall be WSDOT 9-03.9(3) Base Course (1¼"-minus).

Boulders shall be rounded native stones with nominal dimensions 12" to 24"-size. Boulders shall be randomly sized within this range (i.e. boulders shall not be in a subset range for example only 12" to 14"-size).

Washed Sand shall be pit-run sand from a commercial pit, washed to remove most silt and clay-sized particles.

Streambed Materials to be an 8"-minus combination of cobbles, gravel and washed sand as described on Drawing 15 for English Creek channel reconstruction. These same Streambed Materials shall be placed within the Carpenter Creek and English Creek roughened channels and they will also be spread over all roughened channel areas (see Drawings 5 and 15).

#### 9-03.3 Construction

Pea Gravel shall be supplied and placed as shown on drawings; compaction is not required.

Crushed Rock for final road surfacing (including the bridge deck) shall be spread in a 4"-thick layer and compacted using vibratory compaction equipment. Compaction on the bridge deck needs to be with a small plate compactor to avoid vibration of the bridge into a harmonic pattern.

Boulders to be placed a few at a time for roughened channel construction. The engineer has extensive experience with similar channel constructions and will be advising the Contractor step-by-step. For example, the engineer has fabricated tall steel stakes that will be set with elevated rope lines for layout of final roughened channel surfaces over the native subgrade materials.

Washed Sand will be sluiced by the Contractor to fill voids between boulders forming the low-flow sections of roughened channels; the engineer's experience and instructions for washed sand sluicing are listed on Drawing 8.

Streambed Materials shall be placed in bands within the roughened channel, and spread over the entire completed channel surface; these placements will be based on advice from the engineer to be spread lightly (sprinkle) over new channel areas under and near to the new bridge.

#### **9-03.4 Payment**

Payment for Pea Gravel, Crushed Rock, Boulders, Washed Sand and Streambed Materials shall be per ton, as estimated on the Bid Form (Contractor to provide truck tickets to SFEG for actual quantity payment). Payment includes supply, placement, spreading and compaction (only the crushed rock needs to be compacted).

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## Appendix A

# Prevailing Wage Information and Rates

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The Contractor shall submit certified payroll and comply with all other relevant requirements as described at:

<https://lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-rates/>

Washington state prevailing wage requirements can be confirmed at  
<https://secure.lni.wa.gov/wagelookup/>

Davis Bacon Act wage requirements can be confirmed at  
<https://sam.gov/wage-determinations>

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# Appendix B Bid Form

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**Bid Form  
Carpenter & English Creek Fish Passage Project (SFEG)**

**Contractor:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Item No.	Spec.	Item	Qty	Unit	Unit Cost	Total Cost
1	1-09	Mobilization	1	LS		
2	1-50	Surveying (most will be done by engineer)	1	LS		
3	2-01	Clearing and Grubbing (except knotweed)	1	LS		
4	2-01	Knotweed Removal & Disposal	30	CY		
5	2-02	Dispose (off-site) Existing Culverts	2	EA		
6	2-09	Excavation (stockpile on Lang property)	440	CY		
7	2-09	Backfill & Compact (footings, road fill)	80	CY		
8	2-09	Backfill for Streambanks (do not compact)	120	CY		
9	2-09	Dispose Excess Soils (on Lang property)	240	CY		
10	2-14	Standby Generator 10 kw (2 weeks)	1	LS		
11	2-14	Extension Cords (120 and 240-volt)	1	LS		
12	2-15	Water Control (sandbag dams, pump)	1	LS		
13	2-20	Daylight Utilities for Site Prep	1	LS		
14	2-20	Re-connect Electric Service w/ PSE	1	LS		
15	2-20	Re-connect Telecommunication Service	1	LS		
16	2-20	Re-connect 120-volt Wire	1	LS		
17	2-20	2"-dia. Conduit (Sch. 40) for Electric Service	80	LF		
18	2-20	2"-dia. PVC 45 Elbow	4	EA		
19	2-20	2"-dia. PVC 90 Elbow	1	EA		
20	2-20	Unistrut and Clamps for Electrical Conduit	1	LS		
21	2-20	1"-dia. Conduit for Telecom, 120-volt Wire	80	LF		
22	2-20	Flat Bars for Conduits on Bridge Beams	1	LS		
23	2-30	Temporary Barricades for Driveway	1	LS		
24	6-02	Pre-Cast Concrete Class 4000 for Footings	9.2	CY		
25	6-02	Pre-Cast Concrete Class 4000 for Backwalls	1.8	CY		
26	6-03	Steel Bridge Fabrication & Supply	1	LS	Supply by SFEG	
27	6-03	Steel Bridge Placement & Assembly	1	LS		

**Bid Form  
Carpenter & English Creek Fish Passage Project (SFEG)**

**Contractor:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Item No.	Spec.	Item	Qty	Unit	Unit Cost	Total Cost
28	6-30	Wood Rail & Bench Construction (4x12's)	1	LS		
29	7-20	2-1/2"-dia. PVC Schedule 80 Pipe	30	LF		
30	7-20	45° Elbow 2-1/2"-dia. PVC Schedule 80	4	EA		
31	7-20	2-1/2"-dia. PVC Ball Valve	1	EA		
32	7-20	Romac Style 501 Coupling 2"-dia. (nominal)	2	EA		
33	8-30	Small-scale Bank Reinforcement (English)	1	LS		
34	8-30	Tree Placement (similar to windthrow)	3	EA		
35	8-30	Rootwad with Trunk (from clearing)	2	EA		
36	8-30	Erosion-Control Seed	5	LB		
37	8-30	Weed-Free Straw	14	Bale		
38	9-03	Pea Gravel (footings, backwalls, waterline)	30	TN		
39	9-03	Crushed Surfacing Base Course (1-1/4"-minus)	45	TN		
40	9-03	Boulders (12" to 24"-size)	300	TN		
41	9-03	Washed Sand (sluice into voids)	170	TN		
42	9-03	Streambed Materials (cobble, gravel & sand)	80	TN		
<b>Construction Subtotal (without sales tax):</b>						
<b>Washington State Sales Tax (@ 8.2% Skagit County unincorporated):</b>						
<b>Total Construction Cost (Bid):</b>						

CY = cubic yard  
EA = each

LB = pound  
LF = lineal foot  
LS = lump sum

SF = square foot  
TN = ton

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# Appendix C

## Project Design Criteria

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Provided by NOAA Restoration Center

### 1.3.1.2 Project Design Criteria - General Construction Measures

Carpenter English Specific

#### 13. Project Design

- a. Use the best available scientific information regarding the likely effects of climate change on resources in the project area, including projections of local stream flow and water temperature, to ensure that the project will be adaptable to those changes.
- b. Obtain all applicable regulatory permits and official project authorizations before beginning construction.
- c. Minimize the extent and duration of earthwork, *e.g.*, compacting, dredging, drilling, excavation, and filling.
  - i. Avoid use of heavy equipment, vehicles or power tools below bankfull elevation unless project specialists determine such work is necessary, or will result in less risk of sedimentation or other ecological damage than work above that elevation.
  - ii. Complete earthwork in wetlands, riparian areas, and stream channels as quickly as possible.
- d. Cease project operations when high flows may inundate the project area, except for efforts to avoid or minimize resource damage.

#### 14. Site Contamination Assessment

- a. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. Assessments may include the following:
  - i. Review available records, such as former site use, building plans, and records of any prior contamination events.
  - ii. If the project site was used for industrial processes (*i.e.*, mining or manufacturing with chemicals), inspect to determine the environmental condition of the property.
  - iii. Interview people who are knowledgeable about the site, *e.g.*, site owners, operators, and occupants, neighbors, or local government officials.
- b. Retain contaminant survey information in the project file. Consult with NMFS if ground disturbance to accomplish the proposed project will potentially release contaminants to aquatic habitat that supports listed fish species.

#### 15. Site Layout and Flagging

- a. Before any significant ground disturbance or entry of mechanized equipment or vehicles into the construction area, clearly mark with flagging or survey marking paint the following areas:
  - i. Sensitive areas, *e.g.*, wetlands, water bodies, ordinary high water, spawning areas
  - ii. Equipment entry and exit points
  - iii. Road and stream crossing alignments
  - iv. Staging, storage, and stockpile areas

- b. Before the use of herbicides, clearly flag no-application buffer zones.

**16. Staging, Storage, and Stockpile Areas**

- a. Designate and use staging areas to store hazardous materials, or to store, fuel, or service heavy equipment, vehicles and other power equipment with tanks larger than 5 gallons, that are at least 150 feet from any natural water body or wetland, or on an established paved area, such that sediment and other contaminants from the staging area cannot be deposited in the floodplain or stream.
- b. Natural materials that are displaced by construction and reserved for restoration, e.g., LW, gravel, and boulders, may be stockpiled within the 100-year floodplain.
- c. Dispose of any material not used in restoration and not native to the floodplain outside of the functional floodplain.
- d. After construction is complete, obliterate all staging, storage, or stockpile areas, stabilize the soil, and revegetate the area.<sup>1</sup>

**17. Erosion Control**

- a. Use site planning and site erosion control measures commensurate with the scope of the project to prevent erosion and sediment discharge from the project site.
- b. Before significant earthwork begins, install appropriate, temporary erosion controls downslope to prevent sediment deposition in the riparian area, wetlands, or water body.
- c. During construction, if eroded sediment appears likely to be deposited in the stream during construction, install additional sediment barriers as necessary.
- d. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
- e. Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
- f. Remove sediment from erosion controls if it reaches 1/3 of the exposed height of the control.
- g. Whenever surface water is present, maintain a supply of sediment control materials and an oil-absorbing floating boom at the project site.
- h. Stabilize all disturbed soils following any break in work unless construction will resume within four days.
- i. Remove temporary erosion controls after construction is complete and the site is fully stabilized.

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<sup>1</sup> Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.

**18. Hazardous Material Spill Prevention and Control**

- a. At the project site:
  - i. Post written procedures for notifying environmental response agencies, including an inventory and description of all hazardous materials present, and the storage and handling procedures for their use.
  - ii. Maintain a spill containment kit, with supplies and instructions for cleanup and disposal, adequate for the types and quantity of hazardous materials present.
  - iii. Train workers in spill containment procedures, including the location and use of the spill containment kits.
- b. Temporarily contain any waste liquids generated under an impervious cover, such as a tarpaulin, in the staging area until the wastes can be properly transported to, and disposed of, at an approved receiving facility.

**19. Equipment, Vehicles, and Power Tools**

- a. Select, operate and maintain all heavy equipment, vehicles, and power tools to minimize adverse effects on the environment, *e.g.*, low pressure tires, minimal hard-turn paths for track vehicles, use of temporary mats or plates to protect wet soils.
- b. Before entering wetlands or working within 150 feet of a waterbody, replace all petroleum-based hydraulic fluids with biodegradable products.<sup>2</sup>
- c. Invasive species prevention and control.
  - i. Before entering the project site, power wash all heavy equipment, vehicles and power tools, allow them to fully dry, and inspect them to make certain no plants, soil, or other organic material is adhering to their surface.
  - ii. Before entering the water, inspect any watercraft, waders, boots, or other gear to be used in or near water and remove any plants, soil, or other organic material adhering to the surface.
- d. Inspect all equipment, vehicles, and power tools for fluid leaks before they leave the staging area.
- e. Before operation within 150 feet of any waterbody, and as often as necessary during operation, thoroughly clean all equipment, vehicles, and power tools to keep them free of external fluids and grease and to prevent leaks and spills from entering the water.

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<sup>2</sup> For additional information and suppliers of biodegradable hydraulic fluids, motor oil, lubricant, or grease, see Environmentally Acceptable Lubricants by the U.S. EPA (2011); *e.g.*, mineral oil, polyglycol, vegetable oil, synthetic ester; Mobil® biodegradable hydraulic oils, Total® hydraulic fluid, Terresolve Technologies Ltd.® bio-based biodegradable lubricants, Cougar Lubrication® 2XT Bio engine oil, Series 4300 Synthetic Bio-degradable Hydraulic Oil, 8060-2 Synthetic Bio-Degradable Grease No. 2, *etc.* The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of Commerce or NMFS of any product or service to the exclusion of others that may be suitable.

- f. Generators, cranes or other stationary heavy equipment operated within 150 feet of any waterbody will be maintained and protected as necessary to prevent leaks and spills from entering the water.

**20. Temporary Access Roads and Paths**

- a. Whenever reasonable, use existing access roads and paths preferentially.
- b. Minimize the number and length of temporary access roads and paths through riparian areas and floodplains.
- c. Minimize removal of riparian vegetation.
- d. When it is necessary to remove vegetation, cut at ground level (no grubbing).
- e. Do not build temporary access roads or paths where grade, soil, or other features suggest slope instability.
- f. Any road on a slope steeper than 30% will be designed by a civil engineer with experience in steep road design.
- g. After construction is complete, obliterate all temporary access roads and paths, stabilize the soil, and revegetate the area.
- h. Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window. Decomact road surfaces and drainage areas, pull fill material onto the running surface, and reshape to match the original contours.

**21. Dust Abatement**

- a. Employ dust abatement measures commensurate with soil type, equipment use, wind conditions, and the effects of other erosion control measures.
- b. Sequence and schedule work to reduce the exposure of bare soil to wind erosion.
- c. Maintain spill containment supplies on-site whenever dust abatement chemicals are applied.
- d. Do not use petroleum-based products.
- e. Do not apply dust-abatement chemicals, *e.g.*, magnesium chloride, calcium chloride salts, ligninsulfonate, within 25 feet of a water body, or in other areas where they may runoff into a wetland or water body.
- f. Do not apply ligninsulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of ligninsulfonate to water.

**22. Temporary Stream Crossings**

- a. No stream crossing may occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel.
- b. Do not place temporary crossings in areas that may increase the risk of channel re-routing or avulsion, or in potential spawning habitat, *e.g.*, pools and pool tailouts.
- c. Minimize the number of temporary stream crossings; use existing stream crossings whenever reasonable.

- d. Install temporary bridges and culverts to allow for equipment and vehicle crossing over perennial streams to access construction areas.
  - e. Wherever possible, vehicles and machinery will cross streams at right angles to the main channel.
  - f. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock where the streambed is naturally stable, or where mats or off-site logs are placed in the stream and used as a crossing.
  - g. Obliterate all temporary stream crossings as soon as they are no longer needed, and restore any damage to affected stream banks or channel.
- 23. Surface Water Withdrawal and Construction Discharge Water**
- a. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.
  - b. Diversions may not exceed 10% of the available flow and will have a juvenile fish exclusion device that is consistent with NMFS' criteria ([NMFS 2011a](#)).<sup>3</sup>
  - c. Treat all construction discharge water using best management practices to remove debris, sediment, petroleum products, and any other pollutants likely to be present (e.g., green concrete, contaminated water, silt, welding slag, sandblasting abrasive, grout cured less than 24 hours, drilling fluids), to ensure that no pollutants are discharged to any perennial or intermittent waterbody.
- 24. Fish Passage**
- a. Provide fish passage for any adult or juvenile ESA-listed fish likely to be present in the action area during construction, unless passage did not exist before construction, stream isolation and dewatering is required during project implementation, or the stream is naturally impassable at the time of construction.
  - b. After construction, provide fish passage that meets NMFS' fish passage criteria for any adult or juvenile ESA-listed fish ([NMFS 2011a](#)), for the life of the action.
- 25. Timing of In-Water Work**
- a. The in-water work window will be identified as the limit to inwater construction specified in the project notification form. The construction schedule will conform to the windows established in Oregon, Washington, and Idaho by the Oregon Department of Fish and Wildlife ([ODFW 2008](#)), Washington Department of Fish and Wildlife ([WDFW 2010](#)), and Idaho Department of Fish and Game, respectively. Any exceptions to in-water work windows recommended by ODFW, WDFW, or IDFG will be approved by NMFS. In the Willamette River below Willamette Falls, the winter

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<sup>3</sup> National Marine Fisheries Service. 2011. Anadromous salmonid passage facility design. Northwest Region.

work window (December 1 – January 31) is not approved for actions under this opinion.

- b. Hydraulic and topographic measurements and placement of LW, boulders, or gravel may be completed anytime, provided the affected area is not occupied by adult fish congregating for spawning, or in an area where redds are occupied by eggs or pre-emergent alevins.

26. **Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration** include assessments and monitoring projects that are associated with planning, implementation, and monitoring of aquatic restoration projects covered by this opinion. Such support projects may include surveys to document the following aquatic and riparian attributes: fish habitat, hydrology, channel geomorphology, water quality, fish spawning, fish presence<sup>4</sup>, macroinvertebrates, riparian vegetation, wildlife, and cultural resources (including excavating test pits less than 1 m<sup>2</sup> in size). This also includes effectiveness monitoring associated with projects implemented under this opinion, provided the effectiveness monitoring is limited to the same survey techniques described in this section.

- a. Train personnel in survey methods to prevent or minimize disturbance of fish. Contract specifications should include these methods where appropriate.
- b. Avoid impacts to fish redds. When possible, avoid sampling during spawning periods.
- c. Coordinate with other local agencies to prevent redundant surveys.
- d. Locate excavated material from cultural resource test pits away from stream channels. Replace all material in test pits when survey is completed and stabilize the surface.
- e. Does not include research projects that have or should obtain a permit pursuant to section 10(a) of the ESA.

27. **Work Area Isolation**

- a. Isolate any work area within the wetted channel from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300 feet upstream from known spawning habitats. However, work area isolation may not always be necessary or practical in certain settings; *i.e.*, dry streambeds and tidal zones, respectively.
- b. Engineering design plans for work area isolation will include all isolation elements.
- c. Dewater the shortest linear extent of work area practicable, unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species.<sup>5</sup>

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<sup>4</sup> Capture or enumeration by non-lethal techniques, *i.e.*, snorkel, minnow trapping; not hooking or electrofishing.

<sup>5</sup> For instructions on how to dewater areas occupied by lamprey, see *Best management practices to minimize adverse effects to Pacific lamprey (Entosphenus tridentatus)* ([USFWS 2010](#)).

- i. Use a coffer dam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch to divert flow around the dewatered area. Dissipate flow energy to prevent damage to riparian vegetation or stream channel and provide for safe downstream reentry for fish, preferably into pool habitat with cover.
  - ii. Where gravity feed is not possible, pump water from the work site to avoid rewatering. Maintain a fish screen on the pump intake to avoid juvenile fish entrainment ([NMFS 2011a](#)).
  - iii. Pump seepage water to a temporary storage and treatment site, or into upland areas, to allow water to percolate through soil or to filter through vegetation before reentering the stream channel with a treatment system comprised of either a hay bale basin or other sediment control device.
  - iv. Monitor below the construction site to prevent stranding of aquatic organisms.
  - v. When construction is complete, re-water the construction site slowly to prevent loss of surface flow downstream, and to prevent a release of suspended sediment.
- d. Whenever a pump is used to dewater the isolation area and ESA-listed fish may be present, a fish screen will be used that meets the most current version of NMFS' fish screen criteria ([NMFS 2011a](#)). NMFS approval is required for pumping that exceeds 3 cfs.

## **28. Fish Capture and Release**

- a. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, or trapping with minnow traps (or gee-minnow traps).
- b. Fish capture will be supervised by a qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of fish.
- c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.
- d. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.
- e. Electrofishing will be used during the coolest time of day, and only after other means of fish capture are determined to be not feasible or ineffective.
  - i. Follow the most recent version of NMFS (2000) electrofishing guidelines.
  - ii. Do not electrofish when the water appears turbid, *e.g.*, when objects are not visible at depth of 12 inches.
  - iii. Do not intentionally contact fish with the anode.

- iv. Use direct current (DC) or pulsed direct current within the following ranges:
  - 1. If conductivity is less than 100  $\mu\text{s}$ , use 900 to 1100 volts.
  - 2. If conductivity is between 100 and 300  $\mu\text{s}$ , use 500 to 800 volts.
  - 3. If conductivity greater than 300  $\mu\text{s}$ , use less than 400 volts.
- v. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.
- vi. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.
- f. If buckets are used to transport fish:
  - i. Minimize the time fish are in a transport bucket.
  - ii. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
  - iii. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
  - iv. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
  - v. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.
  - vi. Be careful to avoid mortality counting errors.
- g. Monitor and record fish presence, handling, and injury during all phases of fish capture and submit a fish salvage report (Appendix A) to NMFS within 60 days of capture that documents date, time of day, fish handling procedures, air and water temperatures, and total numbers of each salmon, steelhead and eulachon handled, and numbers of ESA-listed fish injured or killed.

## 29. Site Restoration

- a. Restore any significant disturbance of riparian vegetation, soils, stream banks or stream channel.
- b. Remove all project related waste; *e.g.*, pick up trash, sweep roadways in the project area to avoid runoff-containing sediment, *etc.*
- c. Obliterate all temporary access roads, crossings, and staging areas.
- d. Loosen soil in compacted areas when necessary for revegetation or infiltration.

- e. Although no single criterion is sufficient to measure restoration success, the intent is that the following features should be present in the upland parts of the project area, within reasonable limits of natural and management variation:
  - i. Human and livestock disturbance, if any, are confined to small areas necessary for access or other special management situations.
  - ii. Areas with signs of significant past erosion are completely stabilized and healed, bare soil spaces are small and well-dispersed.
  - iii. Soil movement, such as active rills and soil deposition around plants or in small basins, is absent or slight and local.
  - iv. Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site; invasive plants are minimal or absent.
  - v. Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.
  - vi. Plant litter is well distributed and effective in protecting the soil with little or no litter accumulated against vegetation as a result of active sheet erosion (“litter dams”).
  - vii. A continuous corridor of shrubs and trees appropriate to the site are present to provide shade and other habitat functions for the entire streambank/shoreline.

### **30. Piling Installation**

- a. Pilings may be placed with concrete, or steel round pile 24 inches in diameter or smaller, steel H-pile designated as HP24 or smaller, or untreated wood.<sup>6</sup>
- b. When possible, use a vibratory hammer for piling installation.
- c. When using an impact hammer to drive or proof steel piles, one of the following sound attenuation methods will be used to effectively dampen sound pressure waves in all areas to a single strike peak threshold of 206 decibels and, for cumulative strikes, a 187 decibel sound exposure level (SEL) in areas and times where fish are larger than 2 grams and a 183 decibel SEL in areas and times when fish are smaller than 2 grams:
  - i. Completely isolate the pile from flowing water by dewatering the area around the pile.

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<sup>6</sup> An individual consultation and site-specific risk assessment are required for actions that propose the use of pilings made of treated wood, including chromated copper arsenate (CCA), ammoniacal copper zinc arsenate (ACZA), alkaline copper quaternary (ACQ-B and ACQ-D), ammoniacal copper citrate (CC), copper azole (CBA-A), copper dimethyldithiocarbamate (CDDC), borate preservatives, and oil-type wood preservatives, such as creosote, pentachlorophenol, and copper naphthenate.

- ii. If water velocity is 1.6 feet per second or less, surround the piling being driven by a confined or unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column, as described in NMFS and USFWS (2006).<sup>7</sup>
- iii. If water velocity is greater than 1.6 feet per second, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or non-metallic sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
- iv. **NMFS fish passage review and approval.** Provide NMFS information regarding the timing of in-water work, the number of impact hammer strikes per pile and the estimated time required to drive piles, hours per day pile driving will occur, depth of water, and type of substrate, hydroacoustic assumptions, and the pile type, diameter, and spacing of the piles.

### 32. Revegetation

- a. Plant and seed disturbed areas before or at the beginning of the first growing season after construction.
- b. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, *etc.* When feasible, use vegetation salvaged from local areas scheduled for clearing due to development.
- c. Use species that will achieve shade and erosion control objectives, including forb, grass, shrub, or tree species that are appropriate for the site and native to the project area or region.
- d. Short-term stabilization measures may include use of non-native sterile seed mix if native seeds are not available, weed-free certified straw, jute matting, and similar methods.
- e. Do not apply surface fertilizer within 50 feet of any wetland or water body.
- f. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
- g. Do not use invasive or non-native species for site restoration.
- h. Conduct post-construction monitoring and treatment to remove or control invasive plants until native plant species are well-established.

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<sup>7</sup> See also Wursig *et al.* (2000) and Longmuir and Lively (2001) for additional information on how to deploy an effective, economical bubble curtain.

### 1.3.1.3 Project Design Criteria – Types of Restoration Actions

33. **Fish Passage Restoration** includes the following: total removal, replacement, or resetting of culverts or bridges; stabilizing headcuts and other channel instabilities; removing, relocating, constructing, repairing, or maintaining fish ladders; and replacing, relocating, or constructing fish screens and irrigation diversions. Such projects will take place where fish passage has been partially or completely eliminated.
- a. **Stream simulation culvert and bridge projects.** All road-stream crossing structures shall adhere to the most recent version of NMFS fish passage criteria ([NMFS 2011a](#)) located at: <http://www.nwr.noaa.gov/publications/hydropower/ferc/fish-passage-design.pdf> NMFS engineering review, if required, shall occur at the conceptual, post-modeling, and final design phases, which is approximated by 30%, 60%, and 90% designs.
  - b. All road-stream crossing structures shall simulate stream channel conditions per industry design standards found in any one of the following:
    - i. *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* ([USDA-Forest Service 2008](#)) or the most recent version, located at: [http://stream.fs.fed.us/fishxing/aop\\_pdfs.html](http://stream.fs.fed.us/fishxing/aop_pdfs.html)
    - ii. *Part XII Fish Passage Design and Implementation, Salmonid Stream Habitat Restoration Manual* ([California Department of Fish and Game 2009](#)) or the most recent version, located at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=12512>
    - iii. *Water Crossings Design Guidelines* (Barnard *et al.* 2013) or the most recent version), located at: <http://wdfw.wa.gov/publications/01501/>
  - c. **General road-stream crossing criteria**
    - i. **Span**
      1. Span is determined by the crossing width at the proposed streambed grade.
      2. Single span structures will maintain a clear, unobstructed opening above the general scour elevation that is at least as wide as 1.5 times the active channel width.
      3. Multi-span structures will maintain clear, unobstructed openings above the general scour elevation (except for piers or interior bents) that are at least as wide as 2.2 times the active channel width.
      4. Entrenched streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the crossing width will accommodate the floodprone width.

Floodprone width is the channel width measured at twice the maximum bankfull depth (Rosgen 1996).

5. Minimum structure span is 6ft.
- ii. Scour Prism
    1. Designs shall maintain the general scour prism, as a clear, unobstructed opening (*i.e.*, free of any fill, embankment, scour countermeasure, or structural material to include abutments, footings, and culvert inverts). No scour or stream stability countermeasure may be applied above the general scour elevation.
    2. When bridge abutments are set back beyond the applicable criteria span they may be located above the general scour elevation.
  - iii. Embedment
    1. All culvert footings and inverts shall be placed below the thalweg at a depth of 3 feet, or the Lower Vertical Adjustment Potential (LVAP) line, whichever is deeper.
      - a. LVAP, as calculated in *Stream Simulation: An ecological approach to providing passage for aquatic organisms at road crossings* (USDA-Forest Service 2008)
    2. In addition to embedment depth, embedment of closed bottom culverts shall be between 30% and 50% of the culvert rise.
  - iv. Bridges
    1. Primary bridge structural elements will be concrete, metal, fiberglass, or untreated timber. The use of treated wood for bridge construction or replacement is not allowed under this opinion. Old railroad cars, which are commonly used as bridges, may have treated wood decking. Sample for the presence of treatment chemicals and replace treated elements with untreated wood.
    2. All concrete will be poured in the dry, or within confined waters not connected to surface waters, and will be allowed to cure a minimum of 7 days before contact with surface water as recommended by Washington State Department of Transportation (2010).
    3. Riprap will not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. The amount and placement of riprap will not constrict the bankfull flow.

4. Temporary work bridges will also meet NMFS (2011a) (or the latest version).
- d. **Headcut and grade stabilization.** Headcuts (vertical off-sets in the streambed) often occur in meadow areas, where floodplain soils are fine textured. Headcuts may develop because of channel straightening, channel avulsion, or loss of riparian vegetation.
- i. Methods
    1. In streams with current or historical fish presence, provide fish passage over a stabilized headcut through use of morphologically appropriate grade control. This includes constructed riffles for riffle-pool morphologies, rough constructed riffles/ramps for plane bed morphologies, wood jams, rock bands, and boulder weirs for step-pool morphologies, and roughened channels for cascade morphologies as described in part ii below.
    2. Grade control materials can include both rock and LW. Material shall not in any part consist of gabion baskets, sheet piles, concrete, articulated concrete blocks, or cable anchors.
    3. Rock for structures shall be durable and of suitable quality to assure permanence in the climate in which it is to be used. Gravel sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
    4. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage will be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.
  - ii. Grade Stabilization to Promote Fish Passage
    1. **NMFS fish passage review and approval.** NMFS will review all projects containing grade control, stream stability, or headcut countermeasures that are proposed to promote fish passage.
    2. Provide fish passage over grade control structures through use of constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels. If LW and boulder placement is used for headcut stabilization, refer to Large Wood, Boulder, and Gravel Placement (PDC 34) below.
    3. Construct structures in a 'V' or 'U' shape, oriented with the apex upstream, lower in the center to direct flows to the middle of channel.

4. Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5 times their exposure height. The structures should also be keyed into both banks—if feasible greater than 8 feet.
5. If several structures will be used in series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate NMFS (2011a) fish passage criteria (jump height, pool depth, etc.) in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure in a stream with a two-percent gradient will have a minimum spacing of 50-feet  $[1/0.02]$ ).
6. Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient.
7. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

34. **Large Wood (LW), Boulder, and Gravel Placement** includes LW and boulder placement, ELJs, constructed riffles, porous boulder structures and vanes, gravel placement, and tree removal for LW projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (LW removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function.

a. **Large wood and boulder projects**

- i. Place LW and boulders in areas where they would naturally occur and in a manner that closely mimics natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams.
- ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, wind-throw, and tree breakage.
- iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.

- iv. Projects can include grade control and streambank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.
  - v. The partial burial of LW and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
  - vi. LW includes whole conifer and hardwood trees, logs, and rootwads. LW size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0 x bankfull widths.
  - vii. Structures may partially or completely span stream channels or be positioned along stream banks.
  - viii. Stabilizing or key pieces of LW will be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the LW increase stability.
  - ix. Anchoring LW – Anchoring alternatives may be used in preferential order:
    1. Use of adequate sized wood sufficient for stability
    2. Orient and place wood in such a way that movement is limited
    3. Ballast (gravel or rock) to increase the mass of the structure to resist movement
    4. Use of large boulders as anchor points for the LW
    5. Pin LW with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (less than 12) an additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.
    6. Anchoring LW by cable is not allowed under this opinion.
- b. **Engineered Logjams (ELJs)** are structures designed to redirect flow and change scour and deposition patterns.<sup>8</sup> While providing valuable fish and wildlife habitat, they are also designed to redirect flow and can provide stability to a streambank or downstream gravel bar. To the extent practical, ELJs are designed to simulate stable natural log jams and can be either naturally stable due to LW

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<sup>8</sup> ELJs are defined as structures composed of LW with at least three key members incorporating the use of an anchoring system as defined in PDC 33.a.ix.

size and/or stream width or anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). They are also designed to create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out and scour holes adjacent to the structure.

- i. **NMFS fish passage review and approval.** For ELJs that occupy greater than 25% of the bankfull area, NMFS will review the action for consistency with criteria in *Anadromous Salmonid Passage Facility Design (NMFS 2011a)*.
- ii. ELJs will be patterned, to the greatest degree possible, after stable natural log jams.
- iii. Grade control ELJs are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.
- iv. Stabilizing or key pieces of LW that will be relied on to provide streambank stability or redirect flows will be intact and solid (little decay). If possible, acquire LW with untrimmed rootwads to provide functional refugia habitat for fish.
- v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.
- vi. The partial burial of LW and boulders may constitute the dominant means of placement, and key boulders (footings) or LW can be buried into the streambank or channel.
- vii. Angle and offset – The LW portions of ELJ structures should be oriented such that the force of water upon the LW increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.
- viii. If LW anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, or the use of manila, sisal, or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, rebar pinning or bolted connections may be used. Rock may be used for ballast but is limited to that needed to anchor the LW.

**Section 2.8.1, Amount or Extent of Take: Harm due to habitat-related effects**

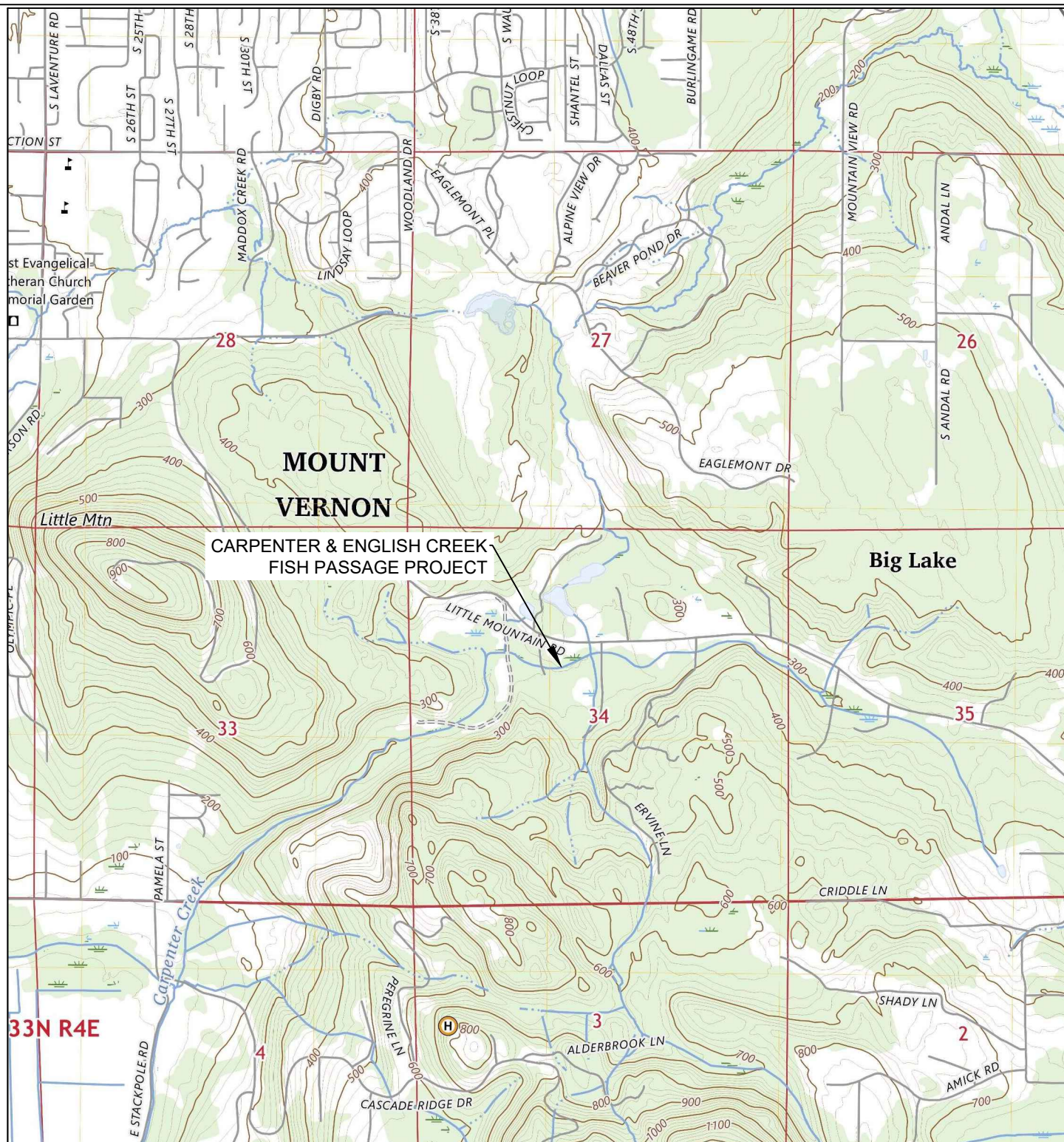
USFWS and NOAA RC will complete and record the following water quality observations to ensure that any increases in suspended sediment do not exceed background levels:

1. Take a turbidity sample using an appropriately and regularly calibrated turbidimeter, or a visual turbidity observation, every 4 hours when work is being completed, or more often as necessary to ensure that the in-water work area is not contributing visible sediment to water, at a relatively undisturbed area approximately 100 feet upstream from the project area, or 300 feet from the project area if it is subject to tidal or coastal scour. Record the observation, location, and time before monitoring at the downstream point.
2. Take a second visual observation, immediately after each upstream observation, approximately 50 feet downstream from the project area in streams that are 30 feet wide or less, 100 feet from the project area for streams between 30 and 100 feet wide, 200 feet from the discharge point or nonpoint source for streams greater than 100 feet wide, and 300 feet from the discharge point or nonpoint source for areas subject to tidal or coastal scour. Record the downstream observation, location, and time.
3. Compare the upstream and downstream observations. If more turbidity or pollutants is/are observed downstream than upstream, the activity will be modified to reduce pollution. Continue to monitor every 4 hours.
4. If the exceedance continues after the second monitoring interval (after 8 hours), the activity will stop until the levels returns to background.

**ATTACHMENT B:  
Carpenter and English Creeks Fish Passage Project Drawings**

Carpenter and English Creeks Fish Passage Project  
Fisheries Engineers, Inc.  
Bryan Tappel, PE

Dated: 5/1/2026



Location for Carpenter & English Creek Fish Passage Project about 3 miles southeast of Mount Vernon, Washington. In N½ Section 34, T34N, R4E. Latitude 48.3938°, Longitude 122.2843°. Address for project access is 21370 Little Mountain Road, Mount Vernon, Washington.

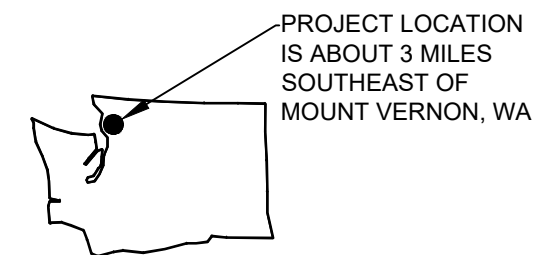
Map scale: 1" = 2,000'.

## Carpenter & English Creek Fish Passage Project

Skagit Fisheries Enhancement Group  
 P.O. Box 2497  
 Mount Vernon, WA 98273  
 Yuki Reiss, Project Manager  
 360-770-3177 cell  
 kyreiss@skagitfisheries.org

### Drawing List

- 1 Project Location & Drawing List
- 2 Overall Fish Passage Plan
- 3 Fish Passage Project Overview
- 4 Flow Rating Curves For Fish Passage
- 5 Carpenter Creek Fish Passage Plan
- 6 Carpenter Site Prep & Water Control
- 7 Project Sequence Notes
- 8 Roughened Channel Profile & Details
- 9 Roughened Channel Sections
- 10 Section at Middle of Bridge
- 11 Bridge Profile at Creek Center
- 12 Steel Bridge Requirements
- 13 Pre-Cast Concrete Footings
- 14 Pre-Cast Concrete Backwalls
- 15 English Creek Fish Passage Plan
- 16 English Creek Site Preparation
- 17 Waterline Details
- 18 Roughened Channel Basis-Of-Design
- 19 Fish Passage Basis-Of-Design
- 20 Construction Elements & Quantities

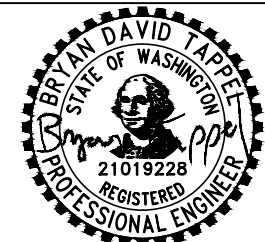


### FISHERIES ENGINEERS, INC.

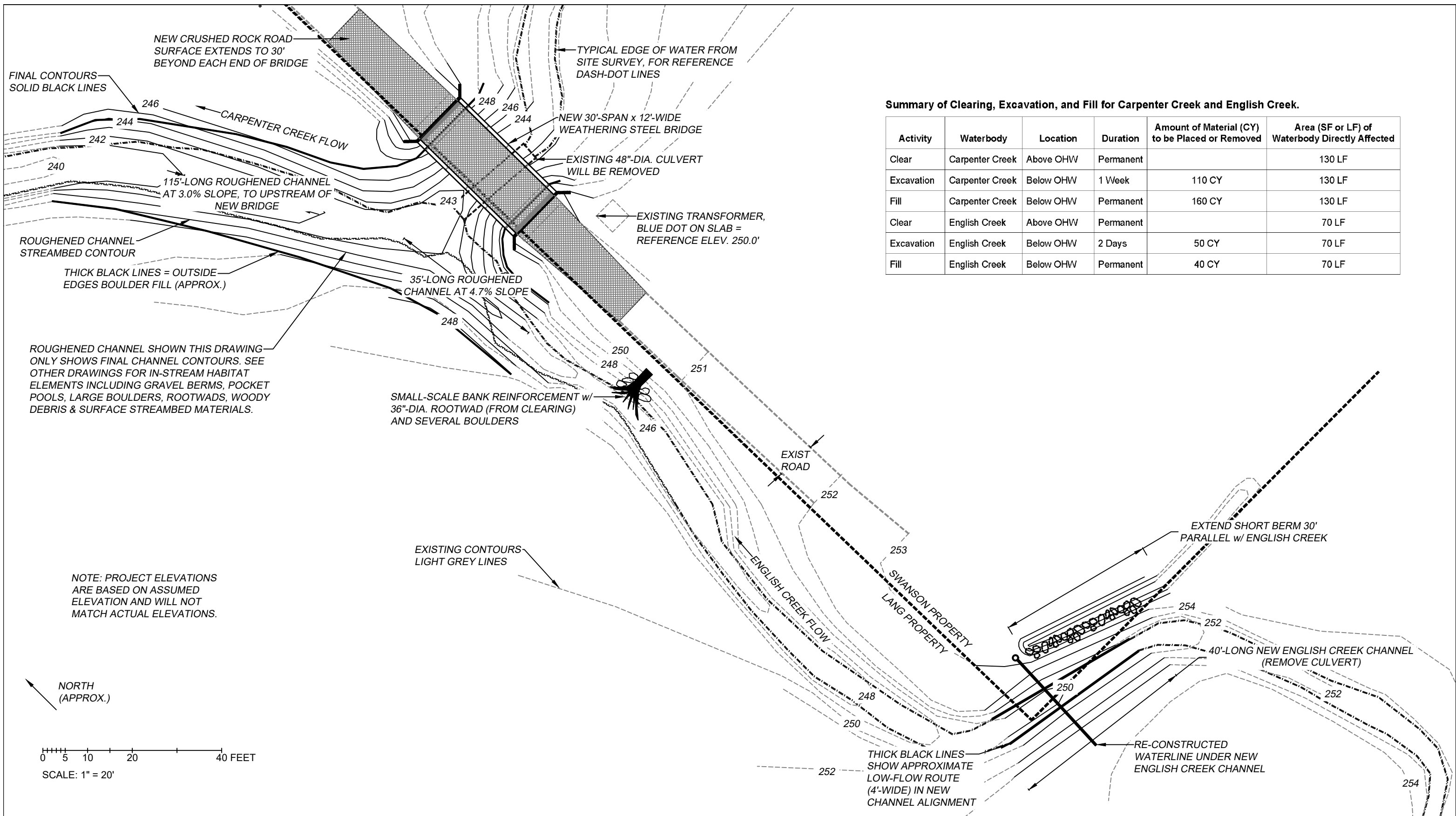
WESTERN WA  
 3100 243<sup>RD</sup> STREET SW  
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## CARPENTER & ENGLISH CREEK FISH PASSAGE PROJECT SKAGIT FISHERIES ENHANCEMENT GROUP PROJECT LOCATION & DRAWING LIST



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>1</b>



**Summary of Clearing, Excavation, and Fill for Carpenter Creek and English Creek.**

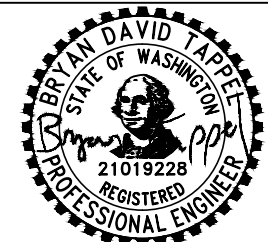
Activity	Waterbody	Location	Duration	Amount of Material (CY) to be Placed or Removed	Area (SF or LF) of Waterbody Directly Affected
Clear	Carpenter Creek	Above OHW	Permanent		130 LF
Excavation	Carpenter Creek	Below OHW	1 Week	110 CY	130 LF
Fill	Carpenter Creek	Below OHW	Permanent	160 CY	130 LF
Clear	English Creek	Above OHW	Permanent		70 LF
Excavation	English Creek	Below OHW	2 Days	50 CY	70 LF
Fill	English Creek	Below OHW	Permanent	40 CY	70 LF

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**CARPENTER & ENGLISH CREEK  
 FISH PASSAGE PROJECT  
 SKAGIT FISHERIES ENHANCEMENT GROUP  
 OVERALL FISH PASSAGE PLAN**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>2</b>



## Fish Passage Project Overview & Sequence of Construction

This comprehensive design includes fish passage elements for Carpenter Creek and English Creek, which are presented separately to simplify design organization. Although presented separately on multiple drawings, these two fish passage projects will function together for holistic restoration of fish passage into these two small salmon streams.

Major elements of the combined fish passage project include the following:

- A 115'-long roughened channel at 3.0% slope to restore Carpenter Creek's channel thalweg to the natural creek profile that existed prior to artificial channel incision caused by an under-sized culvert.
- In English Creek, a 35'-long roughened channel at 4.7% slope to restore this stream's profile at its junction with Carpenter Creek, compared with the existing artificially incised channel reach.
- A 30'-span x 12'-wide weathering steel bridge to replace an existing 48"-diameter fish barrier culvert in Carpenter Creek.
- Removal of an existing 24"-diameter fish barrier culvert in English Creek, and construction of a 40'-long new channel to return a short reach of this stream to a natural channel morphology.

The sequence of construction is an important consideration, due to site access and staging areas for construction, and to incorporate necessary interruptions for one owner (Swanson) into the overall project schedule. Project elements will be constructed in the order listed above, and the drawing set is organized for this same sequence of fish passage elements.

This fish passage design replaces a preliminary design completed in March 2025 by another engineer (Ayers 2025). Except for a few basis-of-design principles (e.g. replacement of 48"-diameter culvert with a 30'-span bridge), none of the details of this previous design are incorporated herein.

### Summary of Existing Fish Passage and Stream Conditions

This section summarizes several adverse conditions that exist along the Carpenter Creek and English Creek channels within the proposed fish passage project area. The listed problems are long-term, and detrimental to fisheries and aquatic resources for multiple interdisciplinary elements. Understanding the fish passage and aquatic habitat problems is essential for review of the basis-of-design for correction of the problems, as outlined here-in, explained within the design, and illustrated with multiple drawings.

Multiple decades ago, a 48"-diameter culvert was installed along Carpenter Creek for access to one residence. Per the conventional practice state-wide during previous decades of time, the culvert was under-sized for peak flow events. Excessive hydraulic energy and turbulence during high flow events and floods heavily scoured the channel bed and banks for approximately 100' downstream of the culvert, with scour depth approximately 3.5'-deep compared to the historic channel bottom. The existing channel has experienced extreme degradation and at the culvert outlet is a vertical water level drop about 3'-high that splashes onto large rocks, artificially installed concrete riprap, and/or hardpan glacial till with little to no fine sediment.

Although a few adult coho salmon may have been able to leap into this perched culvert to swim upstream and spawn in previous years, the existing culvert is classified as a complete barrier to upstream fish passage at all creek flows. Stream channel scour downstream of the culvert is considered artificial, since the channel incision was caused by the under-sized culvert. Due to the extent of degradation throughout the length of the channel bed and banks downstream of the culvert, a roughened channel was selected as the premier method for fish passage and habitat restoration (WDFW 2013). For the purposes of this project, the selected design approach is referred to as a roughened channel, and falls within criteria guidance per NOAA Project Design Criteria 2013.

In addition, the extent of channel degradation throughout Carpenter Creek necessitates a 115'-long section of channel reconstruction to protect against additional degradation of channel bed, banks, and restored habitat, and ensure gradient accessibility (3% slope) to ensure fish passage. The extent of channel re-construction and slope were chosen to avoid abrupt hydraulic transitions that could exacerbate existing bed instability that has been observed downstream of the culvert outlet scour pool. See Drawing 18 for further details on the design approach.

For English Creek and also multiple decades ago, the stream channel was "ditched" during property development, with two essentially 90° bends constructed just outside adjacent property lines. The original ditch confining English Creek to its connection with Carpenter Creek was under-sized, and there has been channel (i.e. ditch) erosion over decades of time. An under-sized culvert (24"-diameter) installed in English Creek causes a fish passage barrier between the two 90° constructed bends in this small salmon stream. This fish passage barrier will be removed and the crossing abandoned to allow fish unimpeded access to upstream habitat. Near English Creek's confluence with Carpenter Creek, anthropogenic effects exacerbated channel erosion resulting in collapse of a large cedar tree, which in turn created a 2.5'-high water level drop in the channel that is considered a complete fish passage barrier. This water level drop in English Creek is considered "artificial" and directly related to the adjacent stream channel incision in Carpenter Creek caused by the under-sized 48"-dia. culvert. Therefore, the roughened channel was extended up English Creek for 35' to protect against continued artificial erosion of the bank and incision of the channel.

### Hydrology & Hydraulic Design Summary

StreamStats was used to estimate peak flow events (e.g. 100-year floods) for Carpenter Creek upstream of the existing road crossing, English Creek at its junction with Carpenter Creek, and Carpenter Creek below the English Creek confluence. Watershed area and annual precipitation data reported by StreamStats were applied to equations based on regression analyses for gaged streams within similar hydrologic settings (Mastin et al. 2017), with a few minor adjustments made to watershed areas after detailed review of 1:24,000 USGS topographic maps.

An on-line tool developed by WDFW (2018) to estimate hydrologic changes to Year 2080 (+/-) due to climate change was used to adjust the estimated flood flows. The on-line tool estimated a 7% increase in the 100-year flood would be a reasonable assumption to Year 2080, so the 100-year flood estimates (per Mastin et al. 2017) were slightly increased for project designs. These adjustments to the estimated flood flows directly incorporate climate change science by Wilhere et al. (2017) into this fish passage project.

Estimated 2-year and 100-year floods used for project design are as follows (cfs = cubic feet per second):

Stream and Reach	2-year Flood	100-year Flood
Carpenter Creek Upstream of Existing Road	40 cfs	110 cfs
English Creek at Carpenter Creek	30 cfs	80 cfs
Carpenter Creek Downstream of English Creek Confluence	70 cfs	190 cfs

Survey data including multiple channel cross-sections, combined with Manning's equation (Chow 1959), were used to develop flow rating curves for each Carpenter Creek and English Creek reach listed above; these rating curves are shown on Drawing 4. For each project reach, Bankfull Width (BFW) was assumed to be equal to wetted channel width per the surveyed channel cross-sections combined with rating curve data for the respective 2-year flood. Bankfull Widths for each project reach:

- Carpenter Creek Upstream of Existing Road BFW = 12'
- English Creek at Carpenter Creek BFW = 10'
- Carpenter Creek Downstream of English Creek BFW = 14'

### References

- Ayres, J. 2025. Carpenter and English Creek Fish Passage Restoration Projects. Engineering Basis Of Design Report for Skagit Fisheries Enhancement Group, March 24, 2025.
- Chow, V.T. 1959. Open Channel Hydraulics. McGraw-Hill Book Company, New York, New York.
- Mastin, M.C., C.P. Konrad, A.G. Veilleux, and A.E. Tecca. 2017. Magnitude, Frequency, and Trends of Floods at Gaged and Ungaged Sites in Washington, Based on Data through Year 2014. Scientific Investigations Report 2016-5118 for U.S. Geological Survey, U.S. Department of the Interior, November 2017.
- NMFS (National Marine Fisheries Service). 2013. Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Programmatic Restoration Opinion for Joint Ecosystem Conservations by the Services (PROJECTS) by the U.S. Fish and Wildlife Service Using the Partners for Fish and Wildlife, Fisheries, Coastal, and Recovery Programs and NOAA Restoration Center Using the Damage Assessment, Remediation and Restoration Program (DARRP), and Community-Based Restoration Program (CRP) in the States of Oregon, Washington, and Idaho. NMFS No. NWR-2013-10221. WCR.
- Washington Department of Fish & Wildlife. 2018. On-line tool to estimate hydrologic changes for water crossing structures due to climate change. [geodataservices.wdfw.wa.gov/hp/culvert-app/](http://geodataservices.wdfw.wa.gov/hp/culvert-app/).
- WDFW (Washington Department of Fish and Wildlife). 2013. Water Crossing Design Guidelines. WDFW, Olympia, Washington.
- Wilhere, G., J. Atha, T. Quinn, L. Helbrecht, and I. Tohver. 2017. Incorporating Climate Change into the Design of Water Crossing Structures. WDFW Final Project Report, Olympia, Washington. November 2017.



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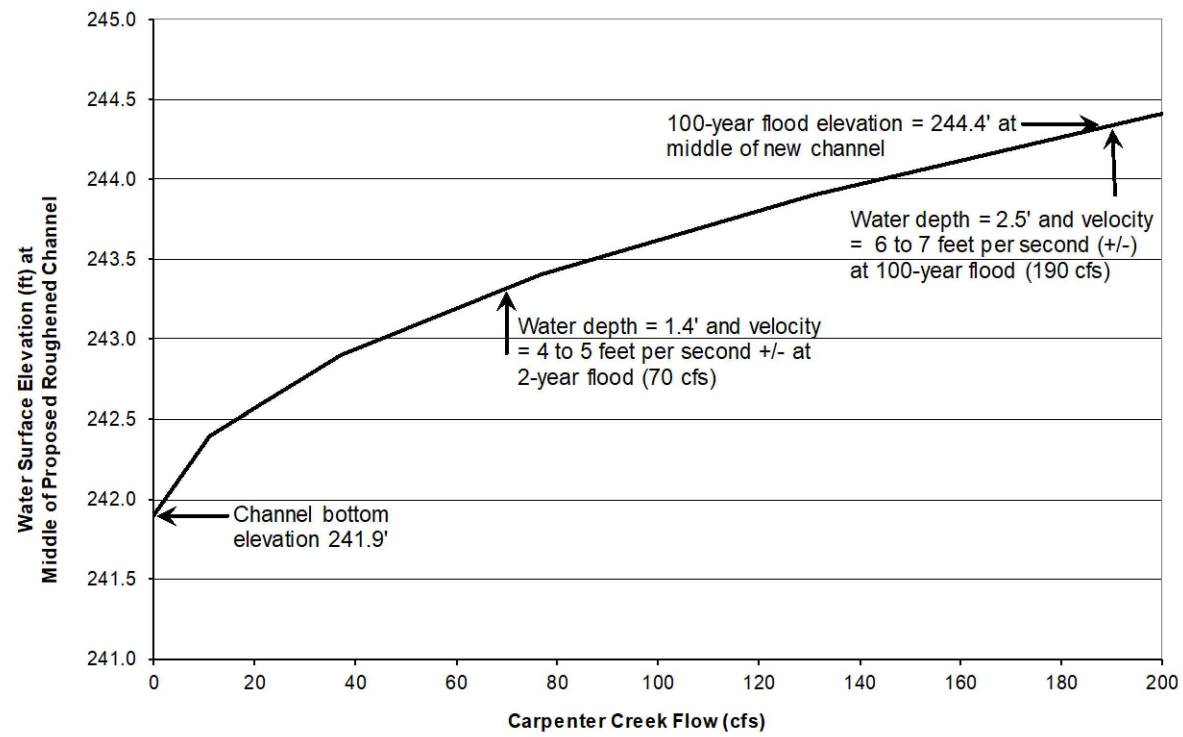
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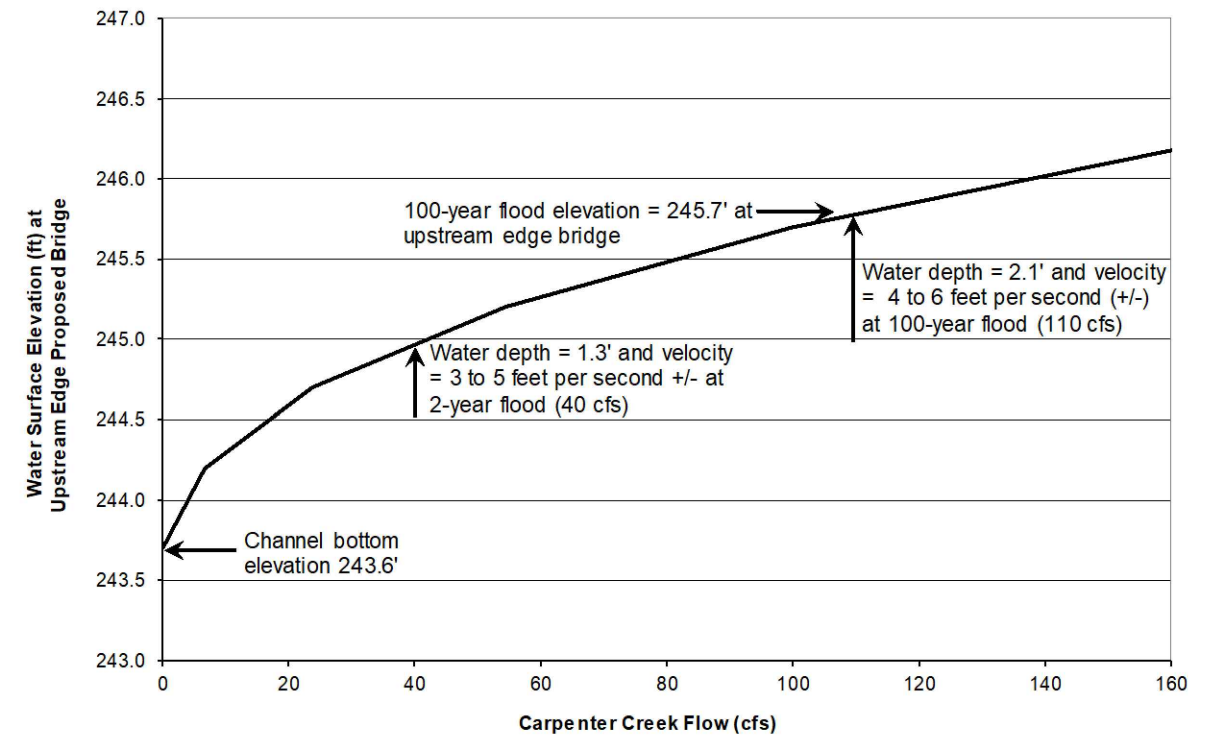
# CARPENTER & ENGLISH CREEK FISH PASSAGE PROJECT SKAGIT FISHERIES ENHANCEMENT GROUP FISH PASSAGE PROJECT OVERVIEW



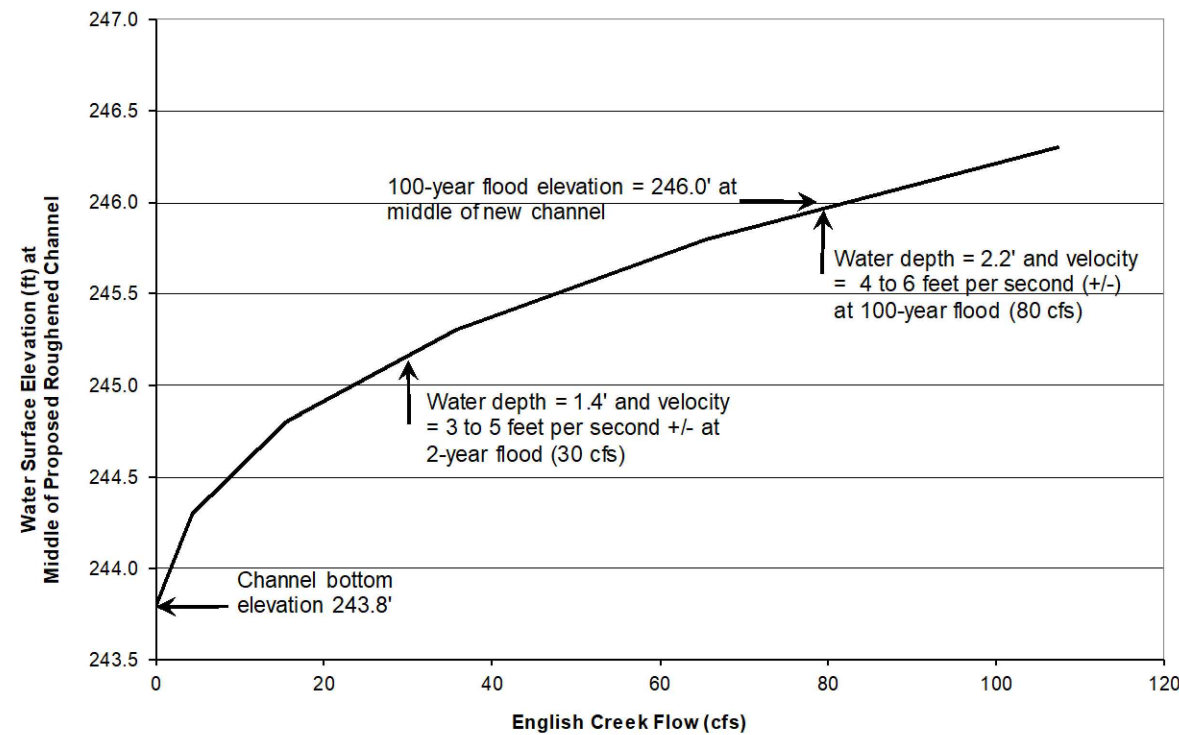
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DRAWING	<b>3</b>



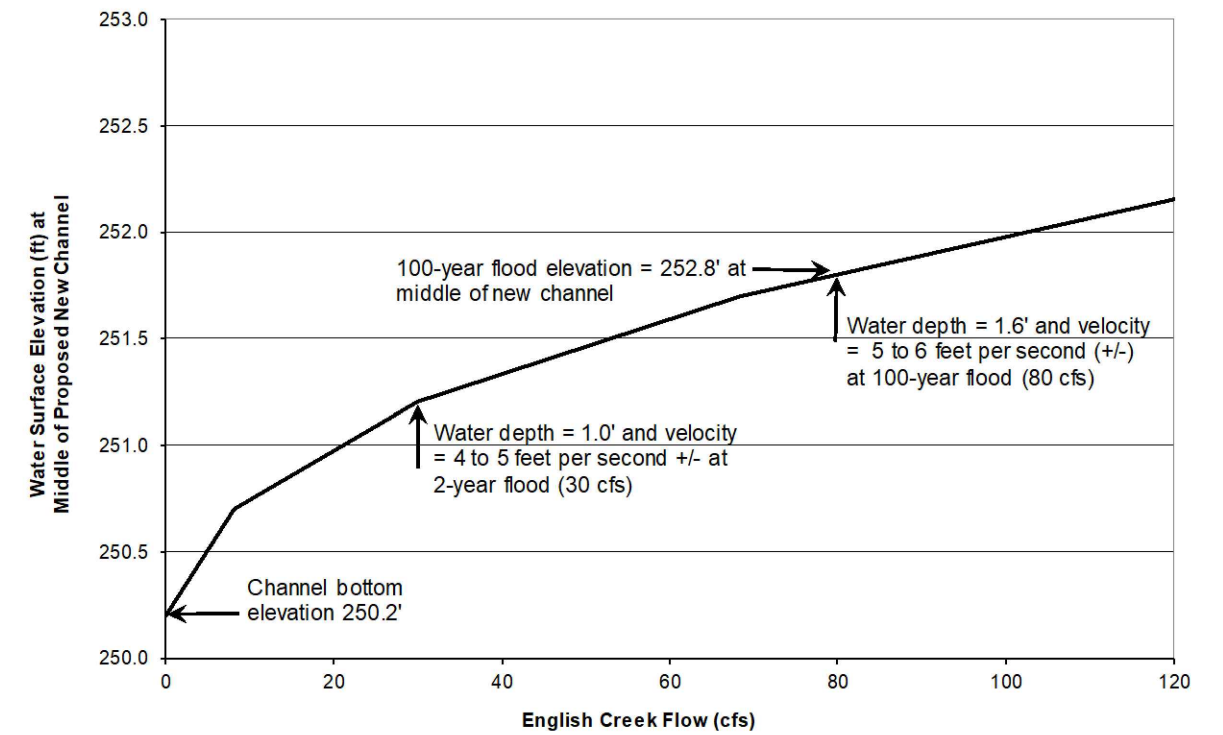
Rating curve for Carpenter Creek at middle of proposed roughened channel, which will be downstream of the confluence with English Creek. Typical channel section at 3.0% slope used for calculations.



Rating curve for Carpenter Creek upstream of existing road. Typical channel section at 1.4% slope (long profile) used for calculations.



Rating curve for English Creek at middle of proposed roughened channel. Channel section at 4.7% slope used for calculations.



Rating curve for English Creek near the existing culvert (to be removed), at middle of proposed new channel reach. Typical channel section at 2.2% slope (long profile) used for calculations.

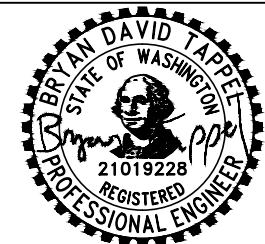


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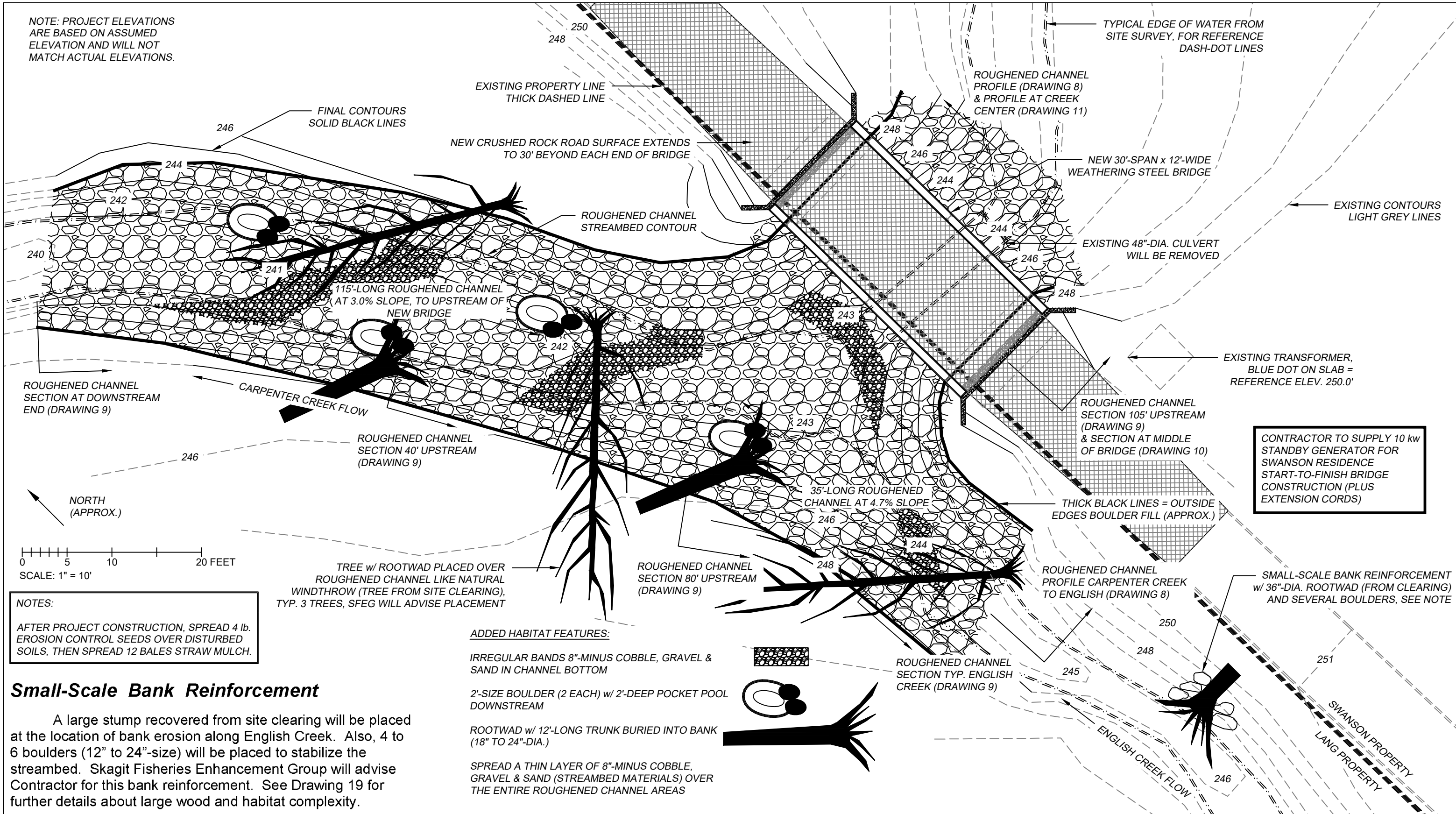
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
FLOW RATING CURVES FOR FISH PASSAGE**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>4</b>

NOTE: PROJECT ELEVATIONS ARE BASED ON ASSUMED ELEVATION AND WILL NOT MATCH ACTUAL ELEVATIONS.



NOTES:  
AFTER PROJECT CONSTRUCTION, SPREAD 4 lb. EROSION CONTROL SEEDS OVER DISTURBED SOILS, THEN SPREAD 12 BALES STRAW MULCH.

**Small-Scale Bank Reinforcement**

A large stump recovered from site clearing will be placed at the location of bank erosion along English Creek. Also, 4 to 6 boulders (12" to 24"-size) will be placed to stabilize the streambed. Skagit Fisheries Enhancement Group will advise Contractor for this bank reinforcement. See Drawing 19 for further details about large wood and habitat complexity.

**ADDED HABITAT FEATURES:**

- IRREGULAR BANDS 8"-MINUS COBBLE, GRAVEL & SAND IN CHANNEL BOTTOM
- 2'-SIZE BOULDER (2 EACH) w/ 2'-DEEP POCKET POOL DOWNSTREAM
- ROOTWAD w/ 12'-LONG TRUNK BURIED INTO BANK (18" TO 24"-DIA.)
- SPREAD A THIN LAYER OF 8"-MINUS COBBLE, GRAVEL & SAND (STREAMBED MATERIALS) OVER THE ENTIRE ROUGHENED CHANNEL AREAS

CONTRACTOR TO SUPPLY 10 kw STANDBY GENERATOR FOR SWANSON RESIDENCE START-TO-FINISH BRIDGE CONSTRUCTION (PLUS EXTENSION CORDS)

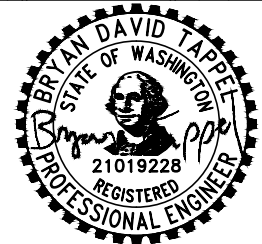


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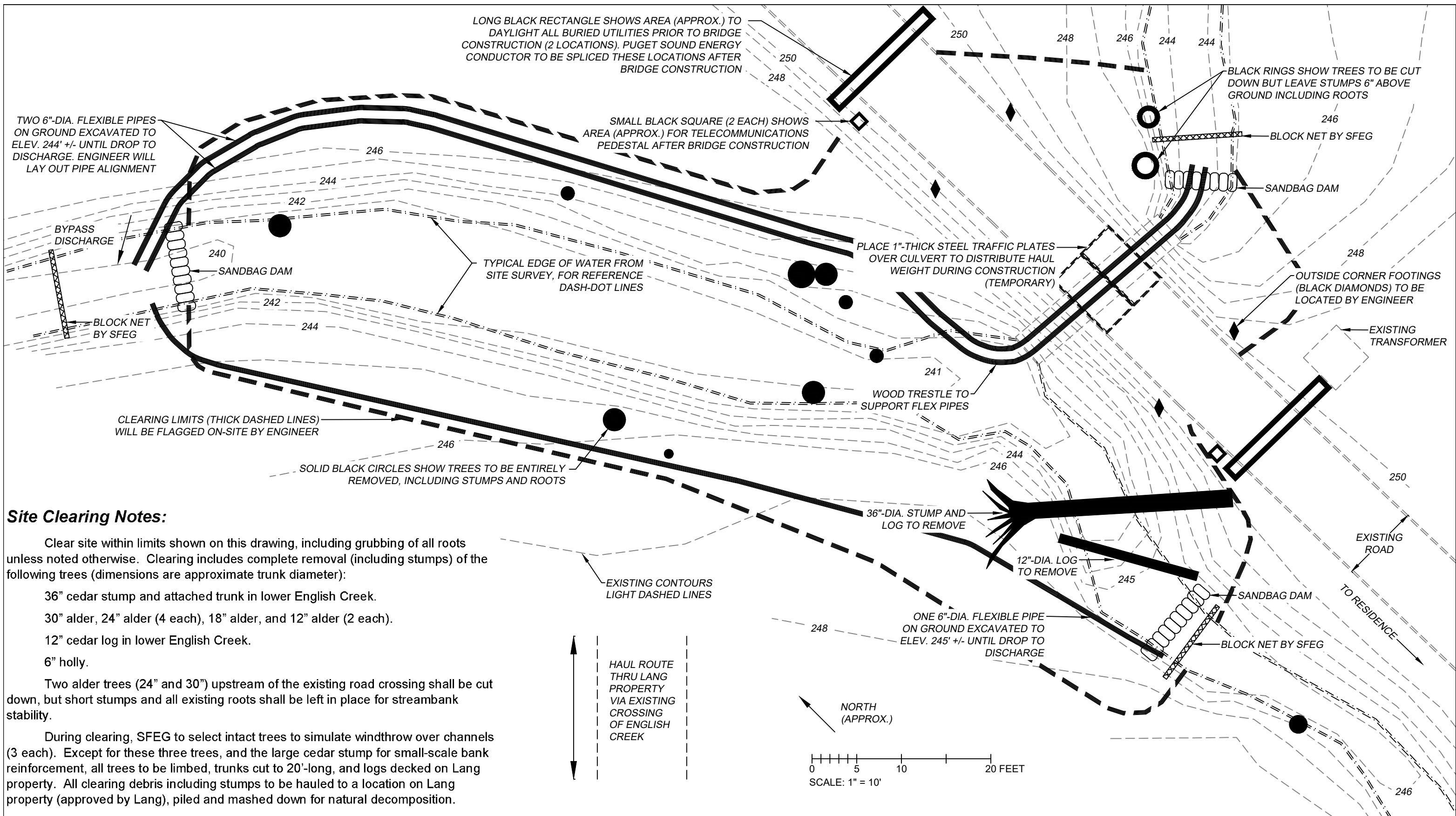
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
CARPENTER CREEK FISH PASSAGE PLAN**



DATE	5/1/2026
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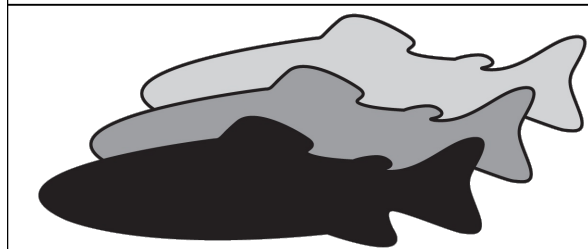
**Site Clearing Notes:**

Clear site within limits shown on this drawing, including grubbing of all roots unless noted otherwise. Clearing includes complete removal (including stumps) of the following trees (dimensions are approximate trunk diameter):

- 36" cedar stump and attached trunk in lower English Creek.
- 30" alder, 24" alder (4 each), 18" alder, and 12" alder (2 each).
- 12" cedar log in lower English Creek.
- 6" holly.

Two alder trees (24" and 30") upstream of the existing road crossing shall be cut down, but short stumps and all existing roots shall be left in place for streambank stability.

During clearing, SFEG to select intact trees to simulate windthrow over channels (3 each). Except for these three trees, and the large cedar stump for small-scale bank reinforcement, all trees to be limbed, trunks cut to 20'-long, and logs decked on Lang property. All clearing debris including stumps to be hauled to a location on Lang property (approved by Lang), piled and mashed down for natural decomposition.



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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
CARPENTER SITE PREP & WATER CONTROL**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>6</b>

## Project Sequence Notes:

Multiple project logistics, access elements, flow bypass, buried utility and landowner considerations encouraged the engineer to develop the following project sequence. This sequence to be considered by Contractor, and is subject to change in consultation between the Contractor, Skagit Fisheries Enhancement Group, two landowners (Lang and Swanson) and the engineer.

- ✓ Vertical control for all project construction is a blue dot on the top of the transformer concrete pad near the proposed bridge location (see Drawing 5). This reference elevation = 250.0', which is slightly different than NAVD 88.
- ✓ Contractor to schedule underground utility locate 811. SFEG will separately pay all fees from PSE and the telecommunications company.
- ✓ Schedule with SFEG for full day of fish rescue operations in Carpenter Creek, to be completed after clearing and flow bypass setup.
- ✓ Schedule with Puget Sound Energy to de-energize electrical service, and also to re-energize service after completion of bridge construction.
- ✓ Place steel traffic plates over existing culvert to distribute weight, prior to mobilization of heavy equipment to the site (see Drawing 6).
- ✓ All site clearing to be completed, including clearing and knotweed removal at the English Creek site.
- ✓ An excavator on Lang property will need to be able to lift the entire bridge superstructure, or two excavators will be required on Lang property. Another excavator will be needed on Swanson property north of the proposed bridge location.
- ✓ Excavate for flow bypass pipe alignments, place bypass pipes and stage sandbags for dam construction. In Carpenter Creek, short sections of bypass pipes will need to be supported with a small wood trestle downstream of the existing perched culvert.
- ✓ With SFEG on-site for fish rescue, divert all flow into bypass pipes. Contractor to supply and operate a 2"-diameter submersible electric pump to de-water the plunge pool below existing culvert for fish rescue. SFEG staff to recover fish in all stream reaches as water level drains.
- ✓ Excavate as much as practical for roughened channel construction up to the existing culvert outlet in Carpenter Creek, including the English Creek channel.
- ✓ Mobilize all boulders and washed sand needed for roughened channel construction to Lang property, except boulders and sand that will be placed through the existing road fill area (i.e. near to and under the new bridge).

- ✓ Start roughened channel construction, and complete as much of the low flow channel construction as possible.
- ✓ Finish roughened channel low flow construction, then continue with roughened channel slope construction.
- ✓ Introduce flow for both creeks into the roughened channel (thru low flow portions). Remove sandbag dam in English Creek, sandbag dam at downstream end roughened channel and shorten the Carpenter Creek bypass pipes to discharge into the new roughened channel. SFEG block nets to remain in place.
- ✓ Contractor to supply a 10 kw standby generator to Swanson residence for full duration of power outage (1-2 weeks), plus extension cords for 120 and 240-volt outlets and appliances. Swanson to stage vehicles north of bridge location, with walking access via existing footbridge.
- ✓ Contractor to stage steel bridge superstructure, one set of footings, two backwall pieces, and pea gravel (7 tons) to Lang property south of English Creek. Contractor also to stage one set of footings, two backwall pieces, and pea gravel (7 tons) to Swanson property north of bridge location.
- ✓ PSE to de-energize electric service. Swanson to cut power for 120-volt wire at house electric panel. Then Contractor to daylight all buried utilities outside bridge construction areas. The PSE conductor and 120-volt wire to be cut for splices after bridge construction. The telecommunication cable to be exposed sufficient lengths for later splices outside the road alignment.
- ✓ Excavate for north bridge footing and stockpile 40 cubic yards on existing road to north. Additional excavated materials to be hauled south, to soil stockpile area on Lang property. Some of these stockpiled soils will be hauled back for bridge approach construction, and some soils will be graded to match existing ground topography at the end of the project (see Bid Form estimate of surplus soils).
- ✓ Place north bridge footing, then backfill and compact north side to top of footing wall.
- ✓ Excavate from south side to roughened channel subgrade under bridge; all excavated materials to Lang property stockpiles. Excavate to north side of existing culvert, then build the roughened channel as close to the culvert as practical.
- ✓ Push the existing culvert, including 6"-diameter bypass pipes to the north then continue with roughened channel subgrade and footing excavation.
- ✓ Place south bridge footing, then complete roughened channel construction. Remove upstream sandbag dam, bypass pipes, and SFEG block nets.
- ✓ Place the bridge superstructure and complete bridge assembly. Then place the backwalls and install utility conduits.

- ✓ PSE has specific requirements to secure the 2"-diameter PVC conduit to one of the bridge beams. Small pieces of Unistrut need to be welded to bridge beams at 5" on-center (4 locations), then small U-shaped bolted couplings to securely hold the conduit on the bridge beam. Unistrut and small couplings may be supplied by PSE, and details of these small conduit connections have not yet been finalized.
- ✓ Puget Sound Energy to splice electric conductor and reconnect to existing transformer, then re-energize service to Swanson residence. Existing PSE conductor to remain direct-buried from new splice to Little Mountain Road.
- ✓ Telecommunications provider to splice cable at new pedestals on each side of the bridge. Contractor to provide new electric wire through conduit (120-volt), splice wire ends, then Swanson to verify electric power returned to north.
- ✓ Schedule with SFEG for half day of fish rescue operations in English Creek, to be completed prior to waterline reconstruction.
- ✓ Construction work at English Creek site will not begin until complete construction of the roughened channel and new steel bridge, because vehicle access will not be provided across the new channel alignment for English Creek.
- ✓ Contractor to excavate all knotweed areas along English Creek to 12"-deep soil, and haul these materials to a knotweed disposal site approved by Lang.
- ✓ Waterline reconstruction will be done before any other excavation required for English Creek restoration.
- ✓ SFEG to install block nets at English Creek site, Contractor to install sandbag dams and bypass pipe to divert all flow into 6"-diameter flexible pipe. SFEG to rescue fish as water level drops in bypass reach. See additional notes on Drawing 16.
- ✓ After waterline reconstruction is done, Contractor to build new 40'-long English Creek channel concurrent with removal of the existing fish barrier culvert.
- ✓ Contractor to place gravel & sand (8"-minus) for 40'-long new English Creek channel.

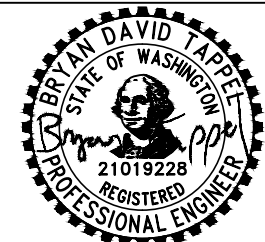


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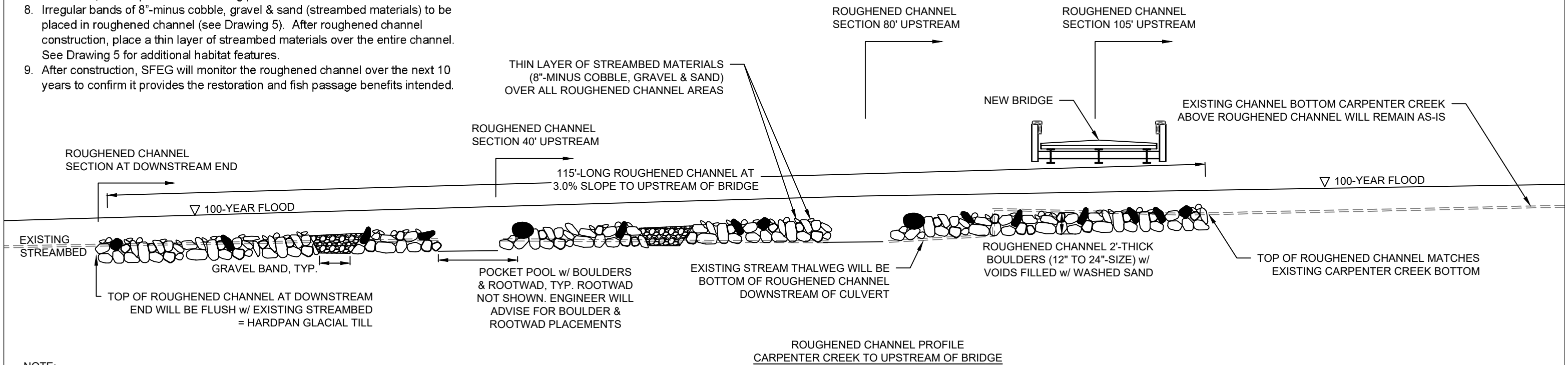
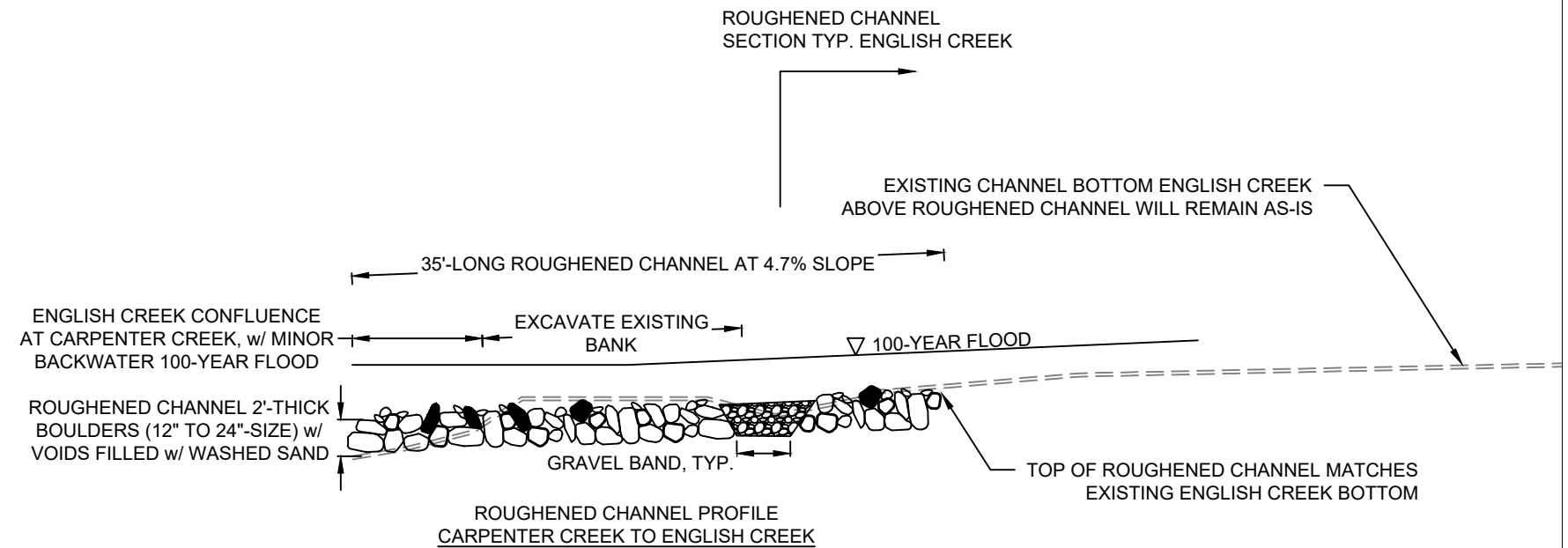
## CARPENTER & ENGLISH CREEK FISH PASSAGE PROJECT SKAGIT FISHERIES ENHANCEMENT GROUP PROJECT SEQUENCE NOTES



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>7</b>

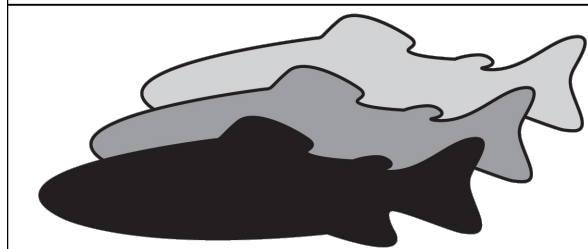
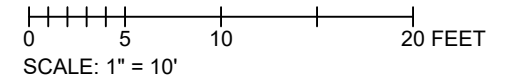
**Roughened Channel Notes:**

1. Excavate and/or fill to re-grade existing streambed materials for roughened channel subgrade, see channel sections. Subgrade to follow bottom of boulders, and will slope up from low point across each section. Engineer will set stakes for subgrade and final roughened channel surface and will be on site during installation of the roughened channel.
2. Place 2'-thick layer boulders, with random distribution of sizes within the specified size range. Engineer will place tall metal stakes and rope lines for visual guidance to operator for boulder placements. Tops of boulders shall be within +/- 6" of elevations indicated by on-site rope lines, with the top surfaces uneven across any section.
3. Every 4<sup>th</sup> boulder +/- shall extend up to 12" above rope lines set by engineer, for increased dissipation of turbulence during peak flow events. These boulders shown solid black this drawing.
4. Boulders along the channel bottom meander (low points) shall be within 6" of design elevation (3.0% slope) for a low flow channel of varying width (see sections).
5. Leave a 4'-diameter void in downstream end boulder layer to allow water to pond up, then use this water for recycle sluicing of sand into voids. This opening will be left after channel construction, and will quickly fill with native streambed materials.
6. Fill all voids between boulders with washed sand by sluicing and shoveling. Creek water will be recycled for the sluice operations. Sluice sand until water ponds up on the surface, over the entire low-flow channel bottom and to 1' above the listed channel elevations.
7. Voids in boulder slopes higher than 1' above channel bottom to be partially filled with sand as follows. Place a few boulders, then a small amount of sand, shovel and sluice, then repeat this alternating process.
8. Irregular bands of 8"-minus cobble, gravel & sand (streambed materials) to be placed in roughened channel (see Drawing 5). After roughened channel construction, place a thin layer of streambed materials over the entire channel. See Drawing 5 for additional habitat features.
9. After construction, SFEG will monitor the roughened channel over the next 10 years to confirm it provides the restoration and fish passage benefits intended.



**NOTE:**

HABITAT FEATURES INCLUDING GRAVEL BANDS, POCKET POOLS, AND ROOTWADS ARE SHOWN SCHEMATICALLY ON PROFILE SECTIONS. THE ENGINEER WILL LOCATE EACH HABITAT FEATURE ON SITE, SEE SITE PLAN.

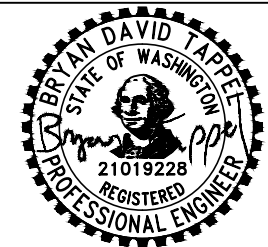


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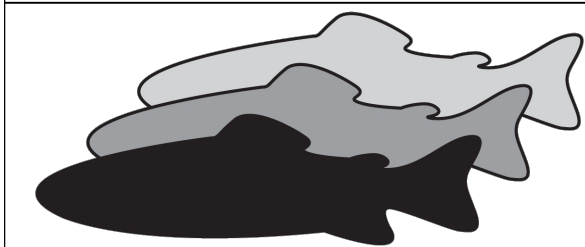
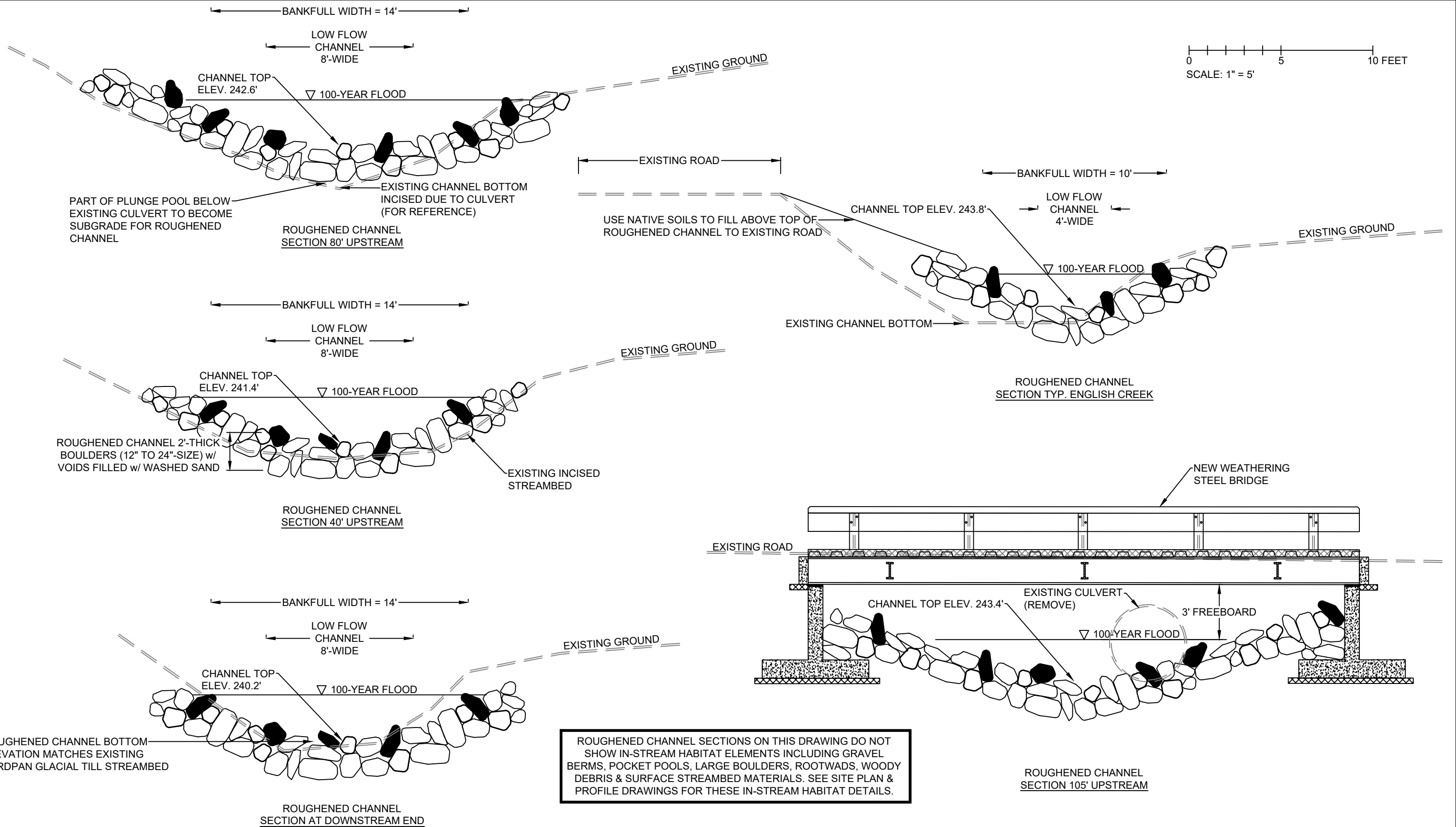
**WESTERN WA**  
3100 243<sup>RD</sup> STREET SW  
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425-482-6420  
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
ROUGHENED CHANNEL PROFILE & DETAILS**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>8</b>

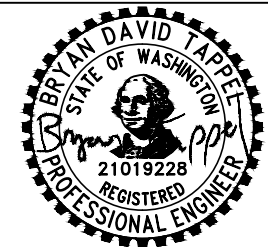


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**CARPENTER & ENGLISH CREEK  
 FISH PASSAGE PROJECT  
 SKAGIT FISHERIES ENHANCEMENT GROUP  
 ROUGHENED CHANNEL SECTIONS**



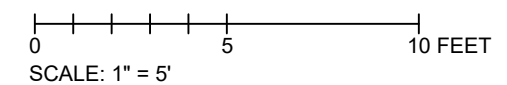
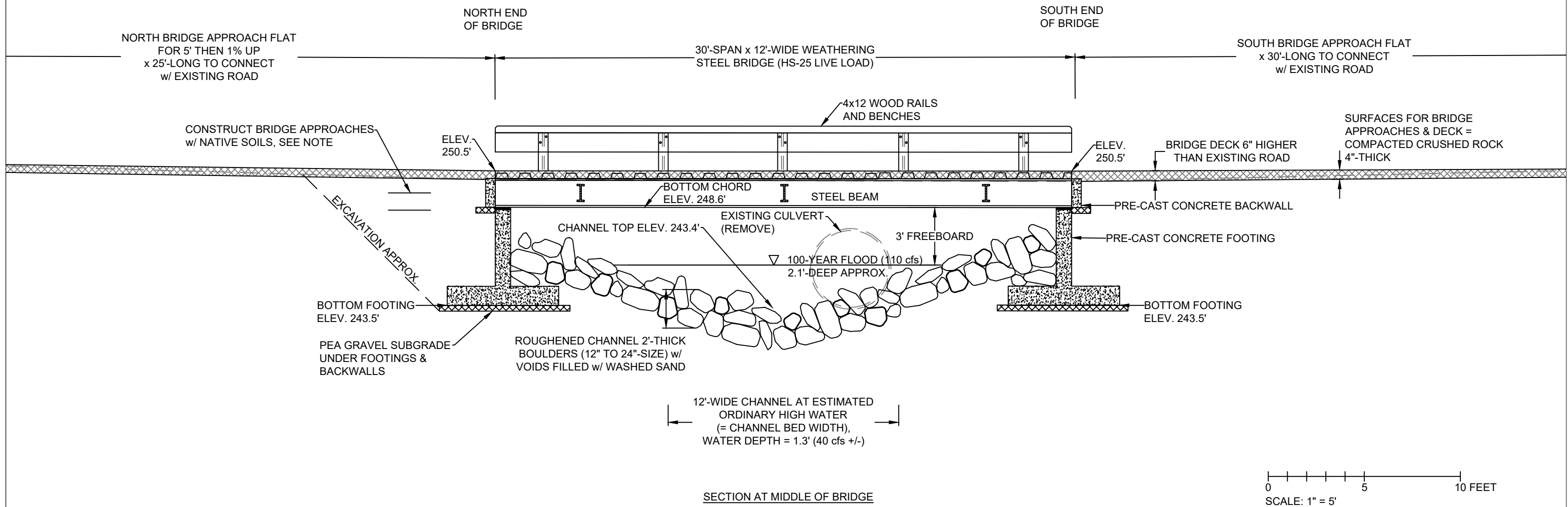
DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>9</b>

**Note for Footing Backfill & Bridge Approaches:**

Construct bridge approaches (road fill) with suitable native soil materials (side-cast from excavation). Place fill materials in 12"-thick (maximum) layers and compact with vibratory equipment to at least 90% maximum soil density.

**Notes for Channel Design:**

1. Bankfull Width (BFW) was assumed to be equal to wetted channel width per the surveyed channel cross-sections combined with rating curve data for the respective 2-year flood. BFW = 12'-wide at the bridge location.
2. Freeboard over the estimated 100-year flood will be 3'-high (minimum). The new bridge will increase open area for flood flow conveyance from 12.6 ft<sup>2</sup> (existing culvert) to 92 ft<sup>2</sup> under new bridge beams.

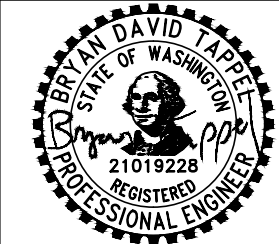


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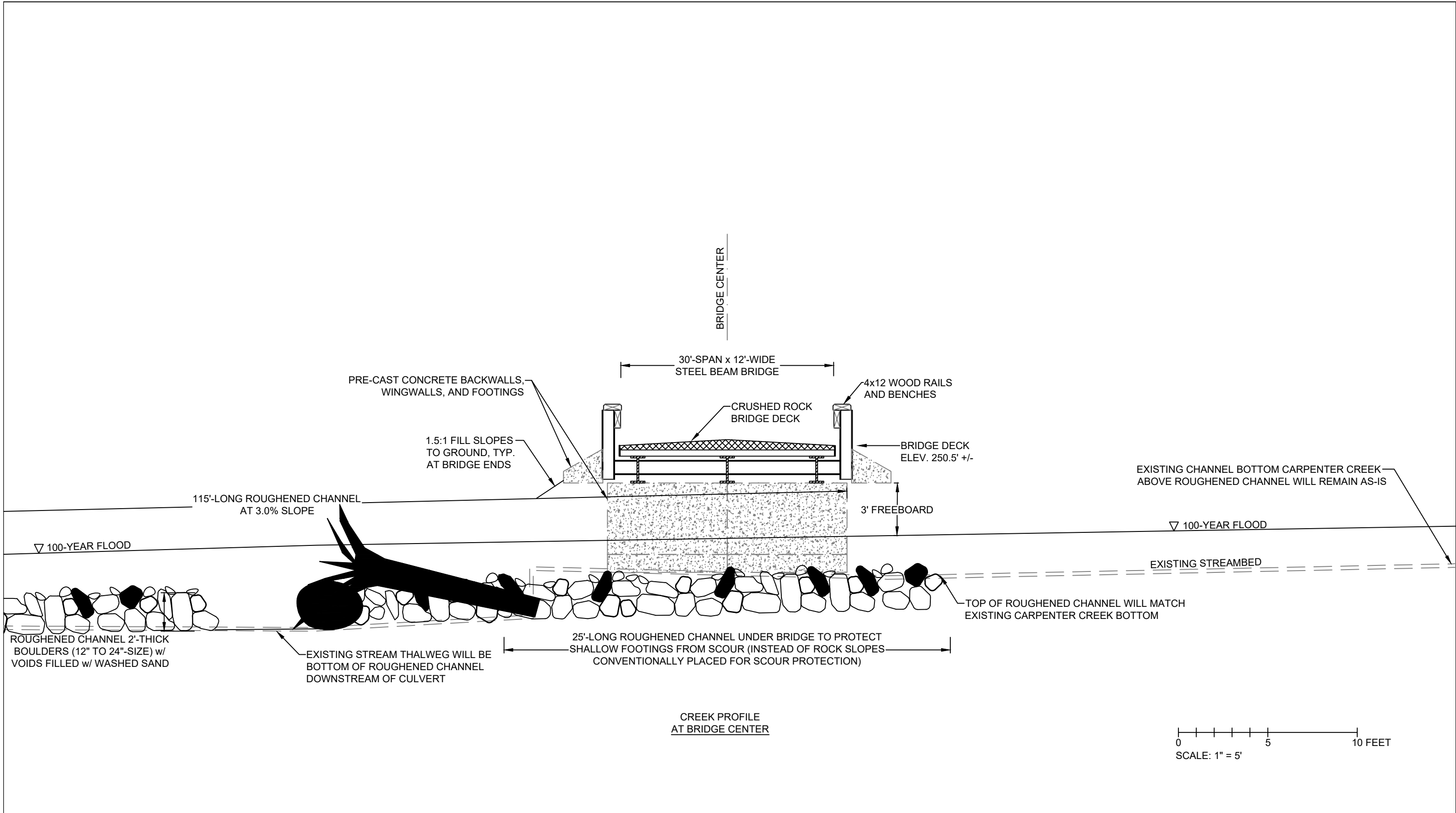
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**CARPENTER & ENGLISH CREEK  
 FISH PASSAGE PROJECT  
 SKAGIT FISHERIES ENHANCEMENT GROUP  
 SECTION AT MIDDLE OF BRIDGE**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>10</b>



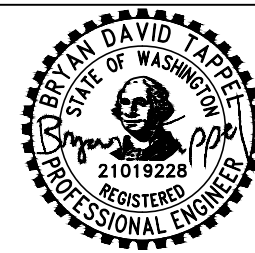


**FISHERIES ENGINEERS, INC.**

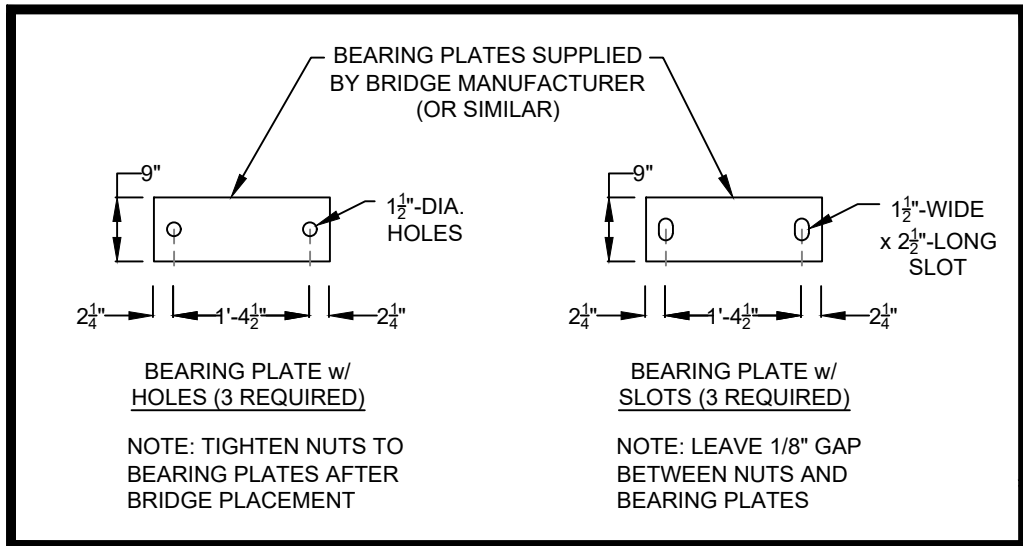
WESTERN WA  
3100 243<sup>RD</sup> STREET SW  
BRIER, WA 98036  
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
BRIDGE PROFILE AT CREEK CENTER**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>11</b>



**STEEL BRIDGE REQUIREMENTS:**

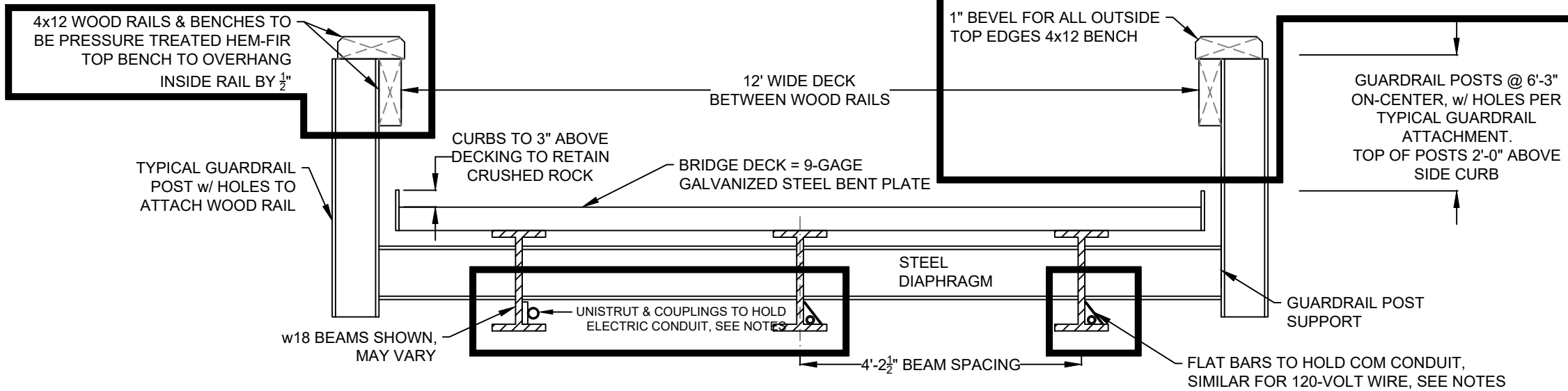
- 30'-SPAN (BEAM END-TO-END) BY 12'-WIDE (DECK WIDTH) MODULAR WEATHERING STEEL (A588) BEAM BRIDGE TO BE PRE-FABRICATED AND SHIPPED TO THE PROJECT SITE. SITE IS ABOUT 3 MILES SOUTHEAST OF MOUNT VERNON, WASHINGTON, ACCESSIBLE BY ROAD.
- AFTER CONSTRUCTION OF WEATHERING STEEL SUPERSTRUCTURE, BUT PRIOR TO INSTALLATION OF DECK PLATE, ALL SURFACES SHALL BE BLASTED SP-6 COMMERCIAL BLAST TO REMOVE ALL MILL SCALE, GREASE, DIRT, RUST AND OTHER FOREIGN MATERIAL. BLASTING SAND TO BE BLOWN OFF ALL SURFACES PRIOR TO TRANSPORT.
- BRIDGE SUPPLIER TO PROVIDE BRIDGE SUPERSTRUCTURE PRE-FABRICATED IN HALVES (OR ONE MODULE) WITH DECK MATERIAL ATTACHED, OR SEPARATE PRECAST REINFORCED CONCRETE DECK PANELS. BRIDGE SUPPLY INCLUDES BEARING PLATES, ELASTOMERIC (OR SIMILAR) BEARING PADS, AND ALL ASSEMBLY HARDWARE (ASTM A325 TYPE 3 WEATHERING STEEL).
- MAXIMUM BRIDGE BEAM DEPTH 18" (NOMINAL).

- ALL ON-SITE WORK INCLUDING LIFTING THE BRIDGE OFF TRANSPORT TRUCK, PLACING BRIDGE ON BEARING PLATES, WELDING BEAMS TO PLATES, BOLT INSTALLATION ALONG BRIDGE CENTERLINE, AT BEARING PLATES, AND GUARDRAIL POSTS WILL BE ACCOMPLISHED BY ON-SITE CONTRACTOR.
- ON-SITE WORKERS TO SUPPLY AND INSTALL 4x12 WOOD RAILS BOTH SIDES OF BRIDGE. W-BEAM OR THRIE BEAM STEEL GUARDRAILS NOT REQUIRED. EACH GUARDRAIL POST TO HAVE FOUR 5/8"-DIA. HOLES FOR ON-SITE WORKERS TO ATTACH 4x12s TO POSTS, AND TO ALLOW 4x12 JOINTS AT ANY RAIL POST.

**LOADS AND DEFLECTION:**

- LIVE LOAD = HS-25 (90,000 POUND VEHICLE).
- INCLUDE 80 psf DEAD LOAD OVER ENTIRE DECK FOR SURFACING.
- LIVE LOAD DEFLECTION < L/300.

THICK BORDERS SHOW WORK TO BE DONE BY ON-SITE CONTRACTOR

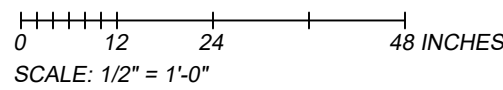


**Utility Conduit Notes:**

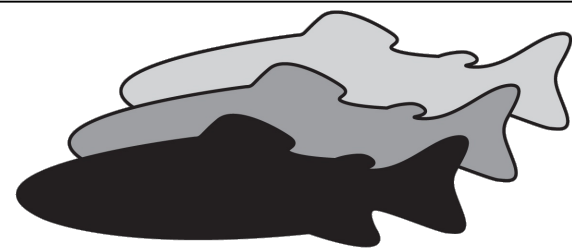
Contractor to provide 2"-diameter x 80'-long PVC conduit (Schedule 40) for PSE electric service, and 2"-diameter PVC fittings, see Bid Form. Contractor also to provide 1"-diameter x 80'-long PVC conduit for telecommunication and 120-volt electric wire. Conduit to be installed on downstream flanges of beams, with pull string extending outside each end of all conduits.

The electric conduit will be secured to a bridge beam at 5' on-center spacing using small Unistrut sections welded to the beam and U-shaped bolted couplings.

Contractor to provide flat bar 1/2" x 1" x 5" (4 each) to be welded to bridge beams, to secure 1"-diameter conduits for telecommunication and 120-volt electric wires.



STEEL BRIDGE SCHEMATIC CROSS-SECTION

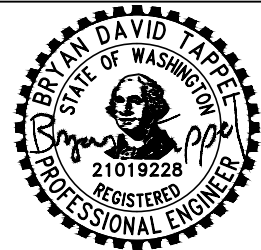


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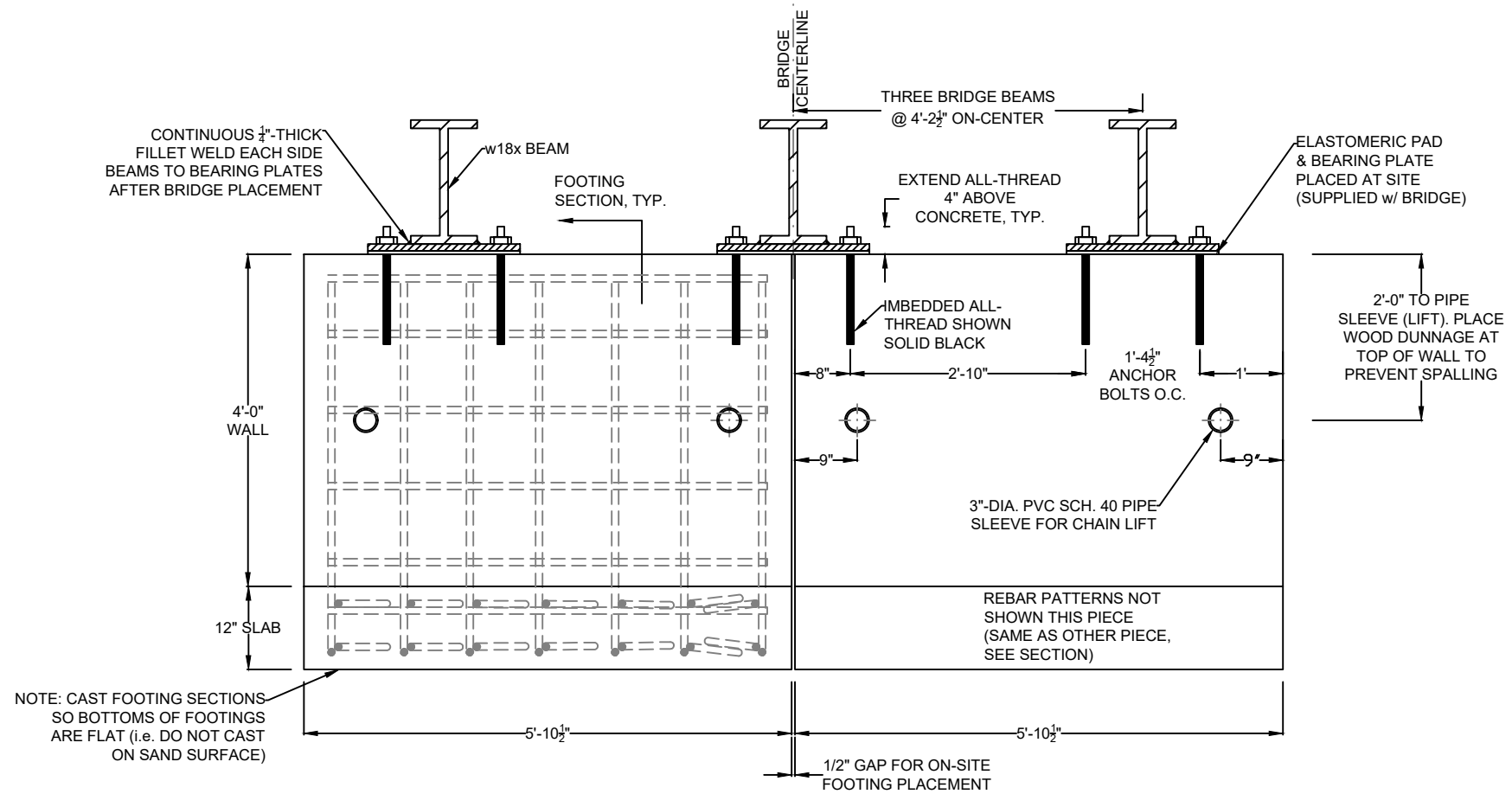
CENTRAL & EASTERN WA  
1749 DEER VALLEY DRIVE  
ELLENSBURG, WA 98926  
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
STEEL BRIDGE REQUIREMENTS**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>12</b>

NOTE: BRIDGE SUPERSTRUCTURE SHOP DRAWINGS HAVE BEEN REVIEWED BY THE DESIGN ENGINEER, AND MINOR CHANGES HAVE BEEN MADE TO THIS DRAWING. THIS DRAWING TO BE USED FOR PRE-CAST CONCRETE FOOTING CONSTRUCTION.

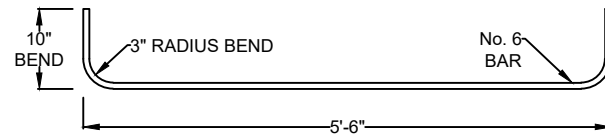


FOOTING FRONT VIEW

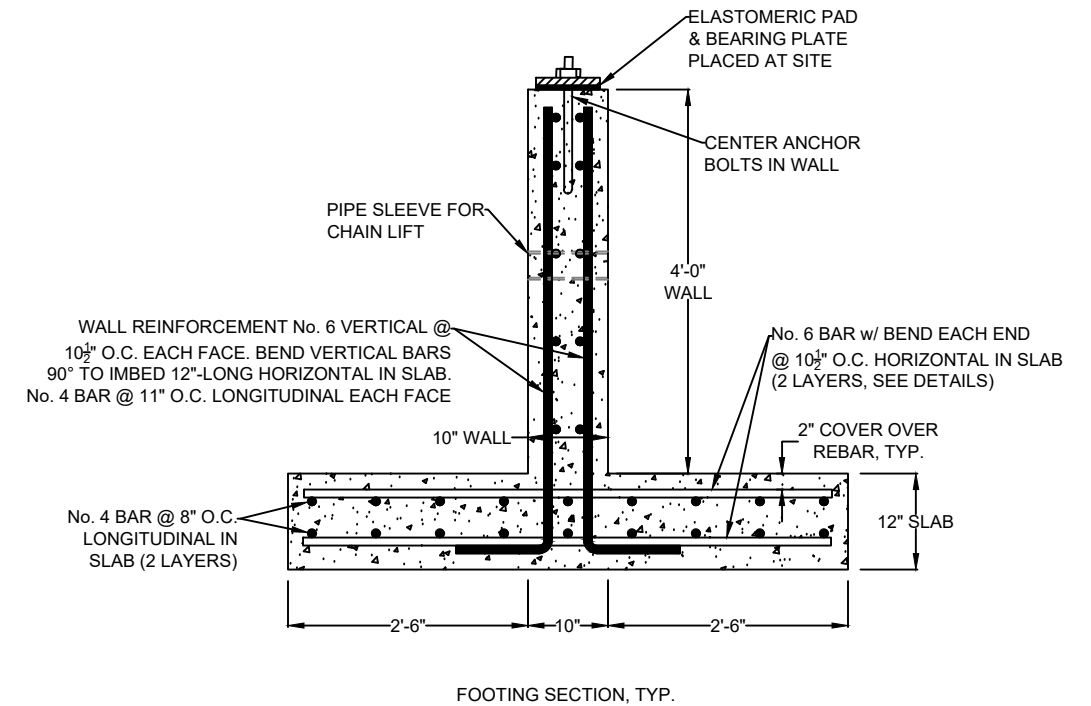
NOTE: FOUR PRE-CAST CONCRETE FOOTING PIECES REQUIRED (TWO SHOWN THIS VIEW)

**PRE-CAST CONCRETE NOTES & SPECIFICATIONS:**

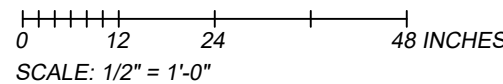
1. PRE-CAST CONCRETE SUPPLIER MAY DESIGN AND INSTALL ALTERNATE LIFT SYSTEM FOR FOOTING PIECES, INSTEAD OF 3"-DIA. HOLES THROUGH FOOTING WALLS. THESE POSSIBLE CHANGES SHALL BE COORDINATED WITH ENGINEER (APPROVAL REQUIRED), AND ALL LIFTING HARDWARE (e.g. CLUTCHES) SHALL BE LOANED TO GENERAL CONTRACTOR FOR THE ON-SITE WORK.
2. CONCRETE - CLASS 4000, WSDOT SPEC. 6-02. REINFORCEMENT - GRADE 60 DEFORMED STEEL BARS, WSDOT SPEC. 9-07. THESE CONCRETE REQUIREMENTS APPLY TO FOOTINGS AND BACKWALLS.
3. ANCHOR BOLTS = STAINLESS STEEL (ALLOY 316) ALL-THREAD 1.25"-DIA. x 16"-LONG w/ EXPOSED THREAD LENGTH 4", IMBED 12" IN CONCRETE. SUPPLY STAINLESS STEEL (316) NUT AND FLAT WASHER EACH BOLT (12 ANCHOR ASSEMBLIES REQ'D).
4. PRE-CAST CONCRETE SUPPLIER TO SUPPLY PRE-CAST CONCRETE FOOTING PIECES ON-SITE w/ ANCHOR BOLTS & HARDWARE. BRIDGE SUPPLIER TO SUPPLY BEARING PLATES AND ELASTOMERIC PADS. PRE-CAST CONCRETE SUPPLIER ALSO TO SUPPLY BACKWALL PIECES ON-SITE.
5. ON-SITE GENERAL CONTRACTOR TO LIFT PRE-CAST FOOTING PIECES OFF TRUCK AND PLACE ON PEA GRAVEL SUBGRADE. FIELD WELD STEEL BEAMS TO EACH BEARING PLATE. PRE-CAST CONCRETE BACKWALLS ALSO REST ON TOP OF PEA GRAVEL BEDDING (SEPARATE FROM FOOTINGS).
6. FOOTING PIECES = 10,200 LB. EACH (APPROX.).



SLAB REBAR w/ BENDS DETAIL (60 REQ'D)



FOOTING SECTION, TYP.



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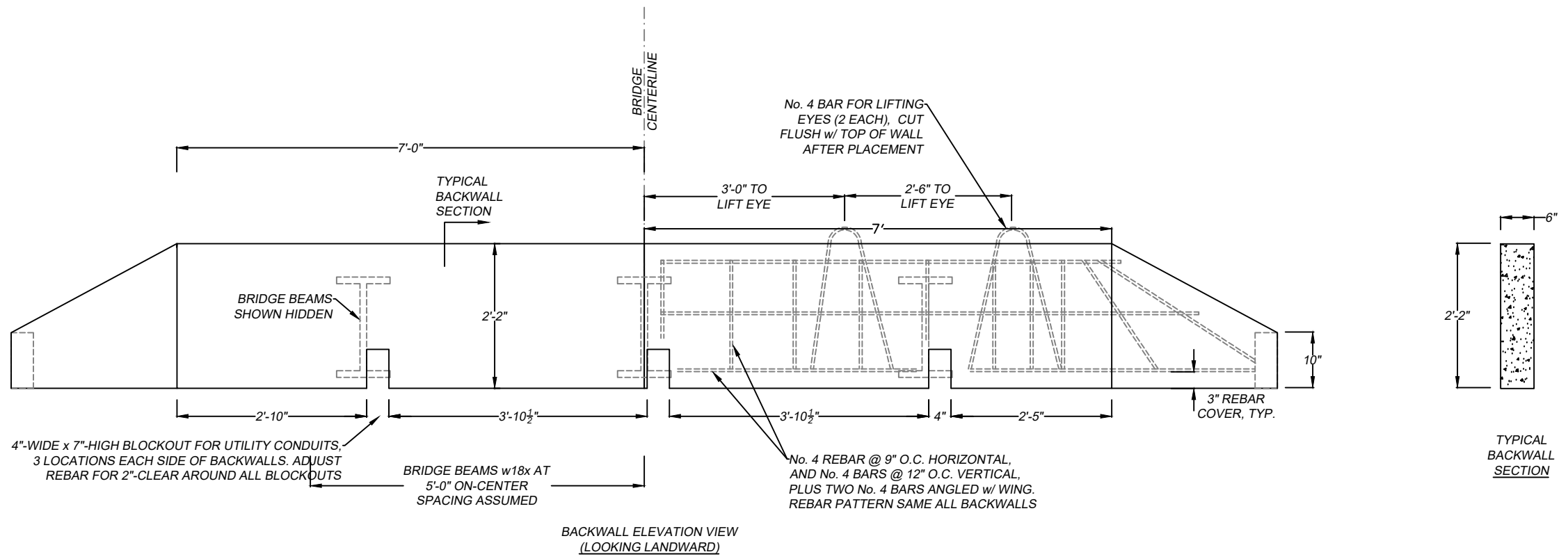
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
PRE-CAST CONCRETE FOOTINGS**



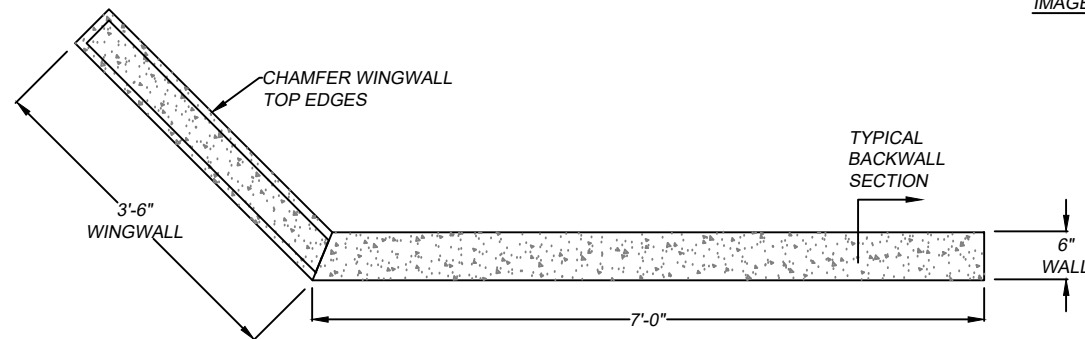
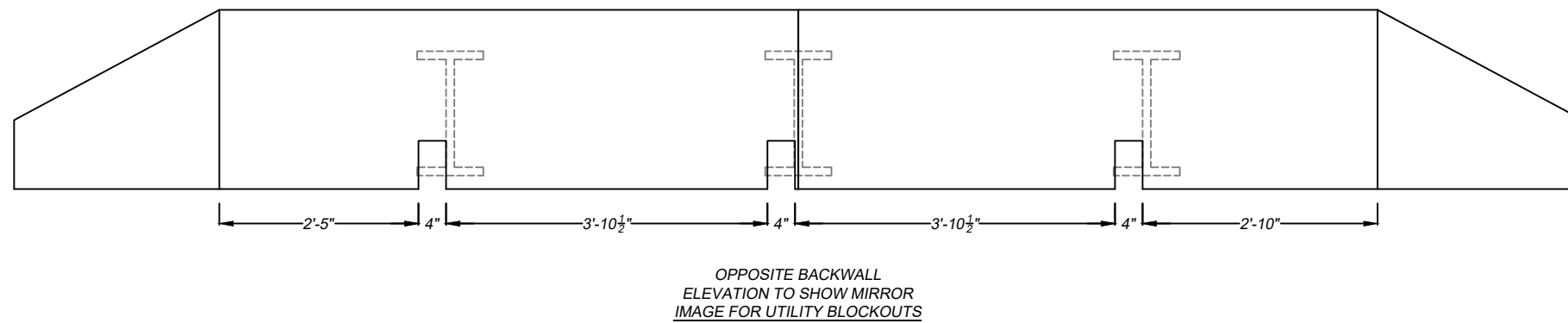
DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>13</b>

NOTE: BRIDGE SUPERSTRUCTURE SHOP DRAWINGS HAVE BEEN REVIEWED BY THE DESIGN ENGINEER, AND MINOR CHANGES HAVE BEEN MADE. USE THIS DRAWING FOR PRE-CAST CONCRETE BACKWALL CONSTRUCTION.

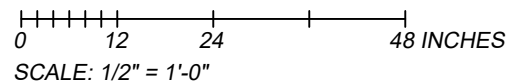
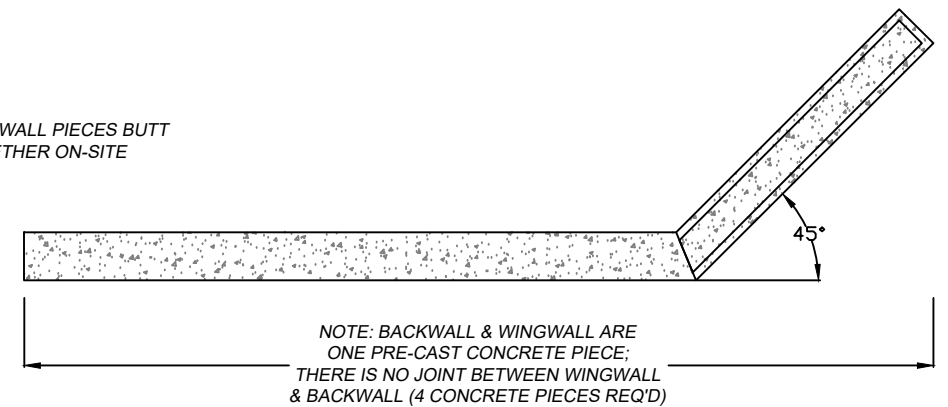


**PRE-CAST CONCRETE BACKWALL NOTES:**

1. TWO PAIRS REQ'D AS SHOWN. EACH OF TWO PIECES (FOR EACH PAIR) ARE OPPOSITE HAND.
2. CHAMFER TOP AND END EDGES 1" ON OUTSIDE LENGTHS EACH BACKWALL & WINGWALL SECTION.
3. CUT OFF REBAR LIFT LOOPS FLUSH w/ TOP OF BACKWALL AFTER PLACEMENT.
4. EACH BACKWALL & WINGWALL SIDE TO BE CAST AS ONE PIECE; THERE IS NO JOINT BETWEEN BACKWALL & WINGWALL.



BACKWALL TOP VIEW

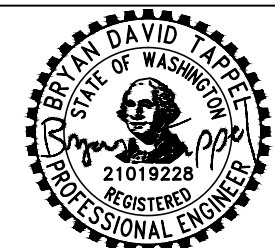


**FISHERIES ENGINEERS, INC.**

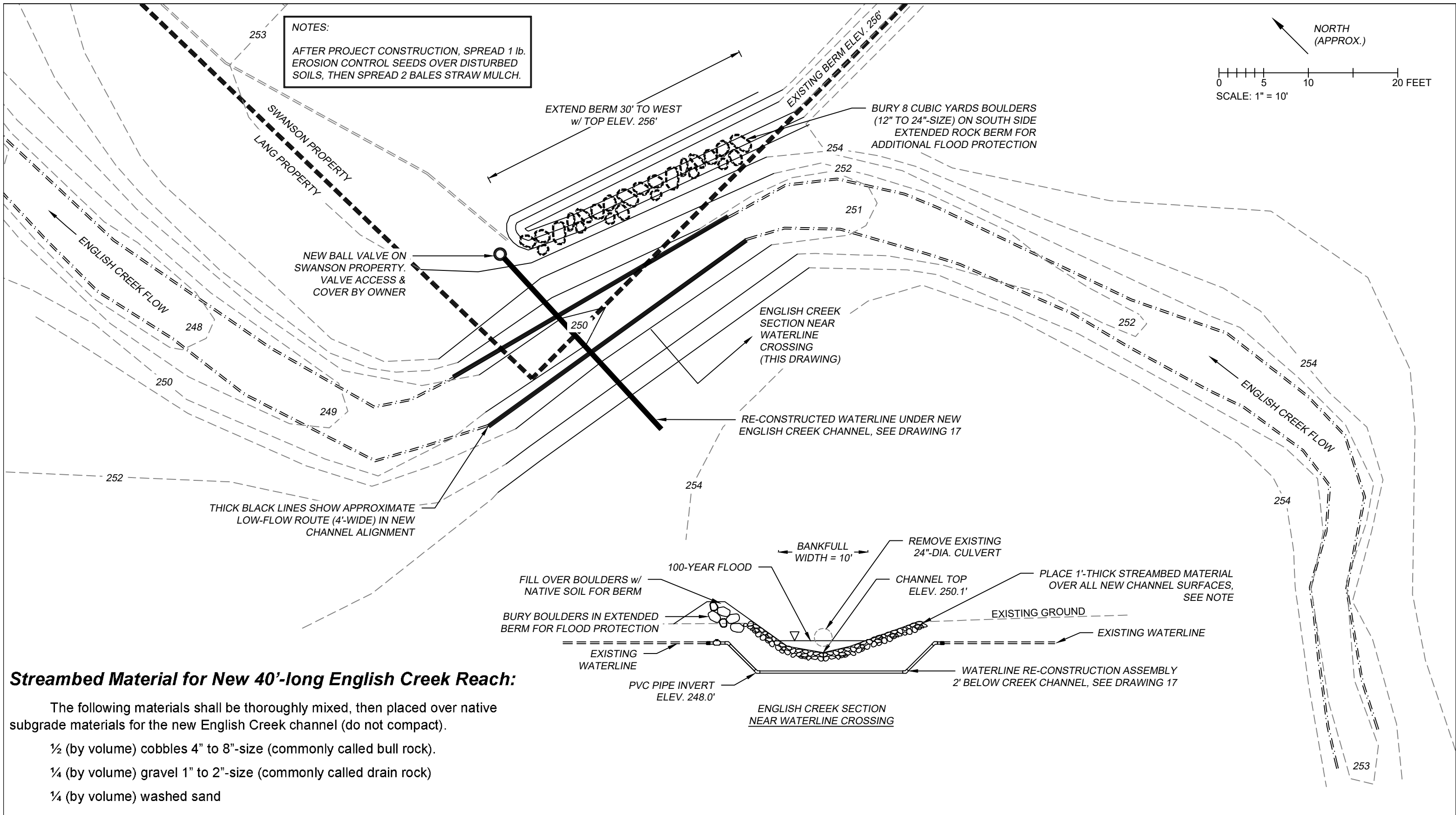
WESTERN WA  
3100 243<sup>RD</sup> STREET SW  
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FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
PRE-CAST CONCRETE BACKWALLS**



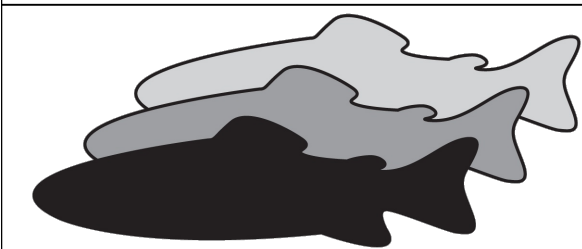
DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>14</b>



**Streambed Material for New 40'-long English Creek Reach:**

The following materials shall be thoroughly mixed, then placed over native subgrade materials for the new English Creek channel (do not compact).

- ½ (by volume) cobbles 4" to 8"-size (commonly called bull rock).
- ¼ (by volume) gravel 1" to 2"-size (commonly called drain rock)
- ¼ (by volume) washed sand

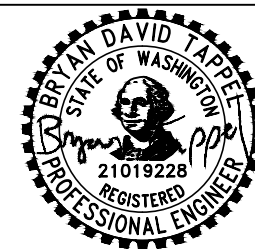


**FISHERIES ENGINEERS, INC.**

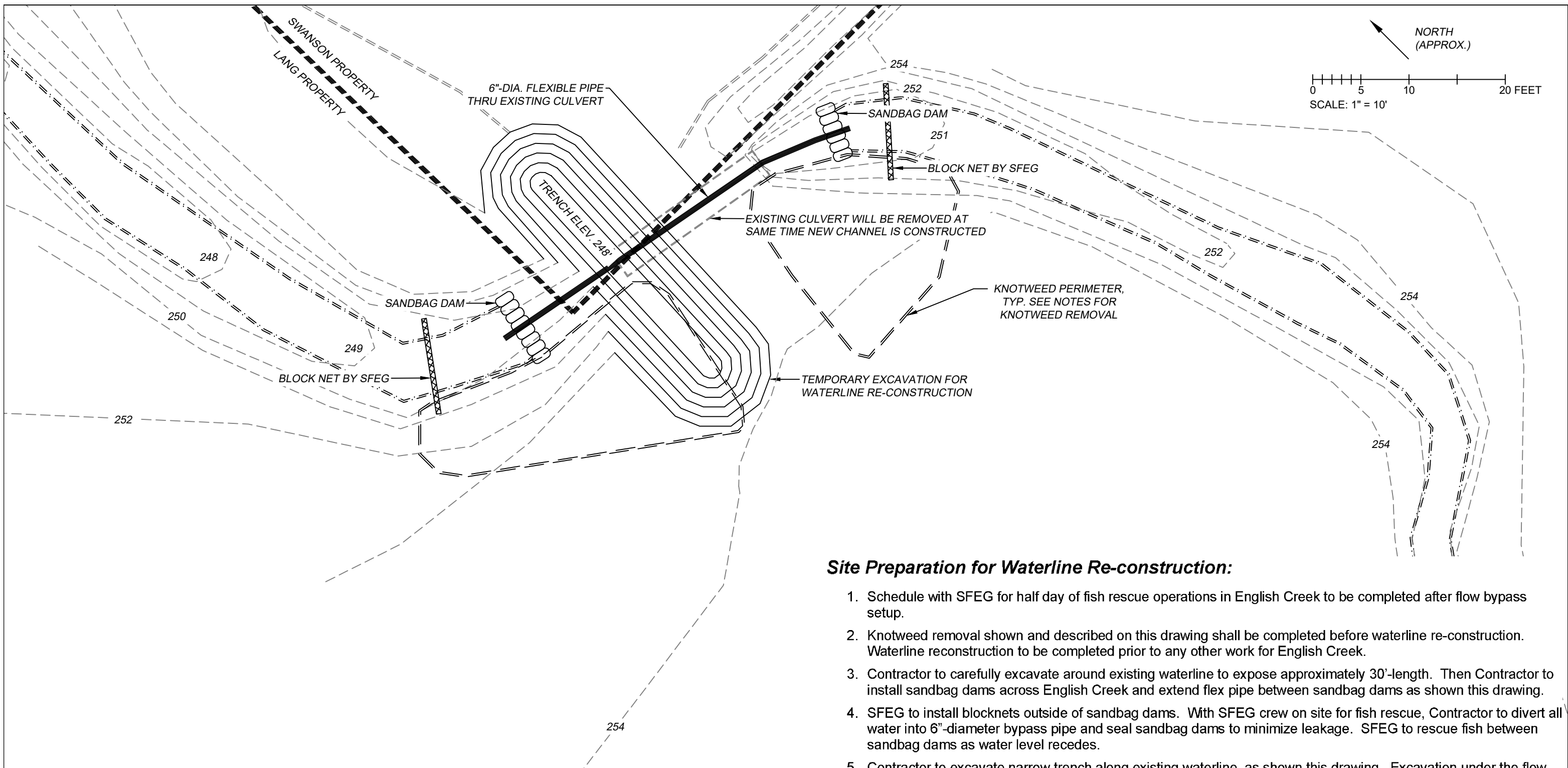
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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
ENGLISH CREEK FISH PASSAGE PLAN**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>15</b>

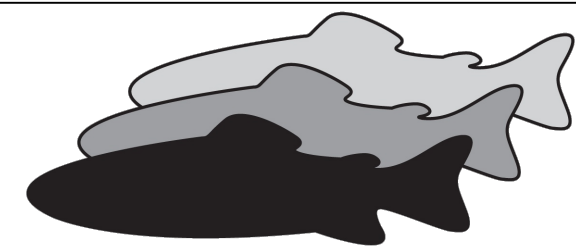


**Site Preparation for Waterline Re-construction:**

1. Schedule with SFEG for half day of fish rescue operations in English Creek to be completed after flow bypass setup.
2. Knotweed removal shown and described on this drawing shall be completed before waterline re-construction. Waterline reconstruction to be completed prior to any other work for English Creek.
3. Contractor to carefully excavate around existing waterline to expose approximately 30'-length. Then Contractor to install sandbag dams across English Creek and extend flex pipe between sandbag dams as shown this drawing.
4. SFEG to install blocknets outside of sandbag dams. With SFEG crew on site for fish rescue, Contractor to divert all water into 6"-diameter bypass pipe and seal sandbag dams to minimize leakage. SFEG to rescue fish between sandbag dams as water level recedes.
5. Contractor to excavate narrow trench along existing waterline, as shown this drawing. Excavation under the flow bypass pipe will probably need to be done by hand, and the flexible pipe will need to be temporarily supported with a wood trestle or similar.
6. Waterline re-construction is shown and described on Drawing 17.
7. After waterline re-construction, excavation of the new channel for English Creek to be done with all flow remaining in the short bypass pipe through the existing culvert.

**Site Clearing Notes:**

The main clearing effort along English Creek will be excavation of two large knotweed areas shown this drawing, with total area 700 square feet. The top 12" of soil within these knotweed areas shall be excavated, and hauled to a knotweed disposal site on Lang property. The disposal area will already be infested with knotweed, and will be identified by SFEG (approval by Lang required). Total volume of knotweed waste soils will be about 30 cubic yards.



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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
ENGLISH CREEK SITE PREPARATION**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>16</b>

**Waterline Materials List:**

The following materials shall be used to replace a short section of the existing galvanized steel pipe (2½" O.D.) with new PVC pipe, including a PVC ball valve on Swanson property.

2½"-dia. PVC Schedule 80 pipe (30'-long +/- required)

45° elbow 2½"-dia. PVC Schedule 80 (4 each)

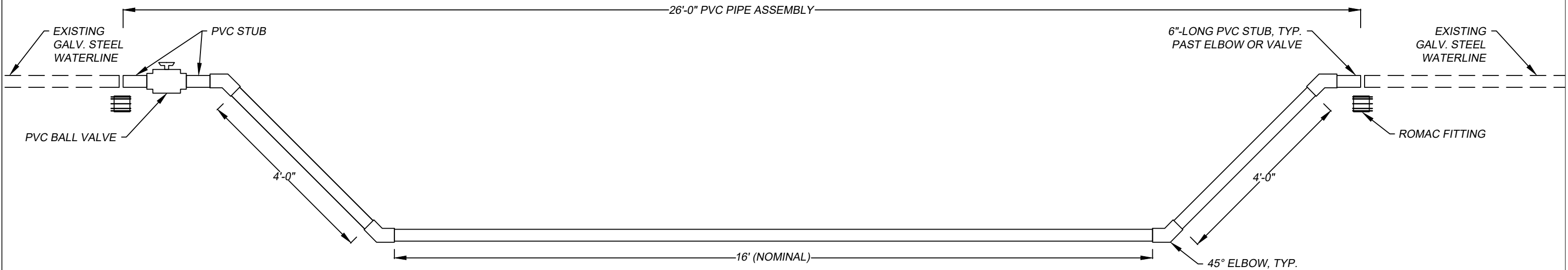
2½"-dia. PVC ball valve (1 each)

Romac Style 501 ductile iron coupling, 2"-dia. (nominal) with gaskets for 2½" to 3"-dia. PVC (2 each)

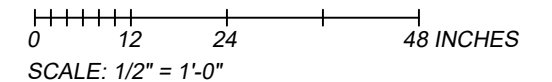
**Waterline Assembly & Installation:**

Waterline re-construction to be completed in the order listed below.

1. Install 6"-dia. bypass pipe to convey all English Creek flow over the proposed waterline alignment, see Drawing 16.
2. Excavate waterline trench as shown on Drawing 16. Hand excavation will be required under the 6"-dia. bypass pipe in English Creek channel. Place 2"-thick pea gravel bedding in bottom of trench. Engineer to confirm depth and length of waterline trench prior to pipe placement.
3. Contractor to build pipe assembly shown this drawing, connect all socket joints with PVC cement (after PVC primer).
4. The engineer has not yet resolved with owner water flow shutoff and/or pressure reduction that will need to be done prior to installation of new waterline assembly.
5. Place waterline assembly in trench; the assembly will need to pass underneath the 6"-dia. bypass pipe. Place Romac fittings on stub ends pipe assembly, then cut existing steel pipe 1" away from PVC stubs, then install Romac fittings across pipe joints.
6. Cover entire PVC pipe assembly with 2"-thick pea gravel bedding then backfill to bottom of streambed material for new English Creek alignment (engineer will advise).
7. Verify re-connection of water supply to Swanson residence.



WATERLINE RE-CONSTRUCTION SIDE VIEW

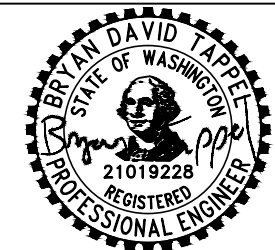


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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
WATERLINE DETAILS**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>17</b>

## Fish Passage and Stream Channel Basis-Of-Design

### Roughened Channel in Carpenter Creek and English Creek

The primary objectives for the roughened channel proposed as part of the Carpenter and English Creek Fish Passage Project are to: 1) Restore unrestricted fish passage upstream and downstream in Carpenter Creek and English Creek, for all native fish species and life-stages; 2) Reestablish the natural Carpenter Creek channel bottom that existed prior to the artificial channel incision caused by an under-sized culvert; and 3) Raise the elevation of the confluence of English Creek with Carpenter Creek to eliminate the existing water level drop related to Carpenter Creek channel incision. Additional explanation and analysis of the artificial channel incision caused by the undersized culvert along Carpenter Creek is included on Drawing 3.

The Basis-Of-Design for the proposed roughened channel in Carpenter Creek is inherently interdisciplinary and integrates guidelines and required criteria listed in NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2022a), Project Design Criteria (PDC) listed in NMFS' (2013) Endangered Species Act Programmatic Biological Opinion, and the State of Washington Water Crossing Design Guidelines (WDFW 2013).

The first Basis-Of-Design consideration was whether or not stream simulation design (NMFS 2022a) would be suitable at the subject road crossing of Carpenter Creek. NMFS (2022a) notes: *Stream simulation design was primarily developed for projects with a channel ... that can retain the average slope of the reference reach.* Stream simulation gradient at the reference reach slope (approximately 1%) would not address channel bank and bed degradation, or the water level drop, and would result in the same level of artificial channel incision (3.5'-high, see Drawing 3 narrative) after project completion. Further, future peak flow events in Carpenter Creek would extend the artificial channel incision upstream an estimated 200' to 300'. Carpenter Creek habitat upstream of the existing road crossing has been observed to be in excellent condition with no artificial bank erosion or channel incision and extension of artificial channel incision would be adverse to fisheries resources. The goal of incorporating a roughened channel (i.e. constructed riffle) into the project design is to ensure there are adequate fish passage conditions over a stabilized headcut by using morphologically appropriate grade control along with hydraulic and habitat complexity for long-term stability of hydraulic conditions (NMFS PDC 2013; NMFS 2022a; WDFW 2013). This project has selected "engineering methods that have a track record of success at the same scale—and within the same geomorphic conditions—as the proposed design" (NMFS 2022a, 4.2.1). Referenced guidelines listed above are supplemented by the engineer's extensive experience with roughened channel design over the last 30+ years (71 constructed roughened channels); channels built thru year 2012 are summarized in Tappel (2012).

An important consideration for Carpenter Creek is that adult chum salmon are expected to swim up the roughened channel for spawning, and that chum salmon have relatively low burst speeds and jumping abilities compared to other salmon species (e.g. coho salmon). On-site, it was observed that Carpenter Creek has (artificially) incised to hardpan glacial till to at least 100' downstream of the existing road crossing. To provide fish passage to all adult salmon and restore channel bed and bank stability, the original channel bottom profile (i.e. before artificial incision) will be reconstructed within a 115'-long roughened channel at a gradient of 3%. The extent (length) of channel reconstruction is necessary to provide low gradient fish passage to all adult salmon, increase bed stability where instabilities have been observed downstream of the existing crossing, and provide smooth hydraulic transitions that reduce scouring.

The roughened channel will increase channel bottom 3.5' in elevation on Carpenter Creek, compared to the existing incised condition, and will protect against continued channel bank and bed scour caused by artificial conditions. In combination with the proposed 30'-span bridge (described below) to replace the 48"-dia. culvert, the roughened channel will provide fish passage, flood flow conveyance, passage of all woody debris, and natural bedload transport. The Carpenter Creek roughened channel will also raise the confluence of English Creek with Carpenter Creek about 3' in elevation; this change in English Creek channel bottom will eliminate the existing 2.5'-high water level drop related to Carpenter and English Creek artificial channel incision and provide bed and bank stability.

NMFS (2022a) requires that Nature-Like Fishways (roughened channels) have beds and banks that will be stable at all flows. For Carpenter Creek and English Creek in the project vicinity, the streams transport bedload materials as large as 8"-size cobbles at existing channel gradients in the range of 1% to 2%. At the proposed 3% roughened channel slope, Carpenter Creek would be able to mobilize and transport bedload materials larger than 8"-size. Over decades, Tappel has developed a routine and straight-forward hydraulic design method using the Tractive Force Equation (Vanoni 1977) to determine the size range of boulders that will be stable in a very wide range of fluvial systems (state-wide Washington). The method directly integrates the peak design flow (100-year flood), channel slope, and other factors; for the Carpenter and English Creek site, it was determined that 12" to 24"-size boulders will remain stable in the channel regardless of flood flow rate. The proposed roughened channel armor layer materials (12" to 24"-size boulders), washed sand sluiced into the voids, and a well graded mix of materials sprinkled over the constructed channel will follow NMFS' requirement for an engineering method with a track record of success at the same scale (Tappel 2012). Natural bed load is anticipated to be recruited throughout the roughened channel immediately following the next high flow event.

For the Carpenter and English Creek roughened channels, recommendations from NMFS and WDFW have been incorporated to diversify habitat and hydraulic roughened channel elements. The addition of gravel berms, pocket pools, large boulders, rootwads, woody debris, and well-graded cobble, gravel & sand over the channel surfaces provide conditions similarly achieved through stream-simulation, while also achieving requirements for fish passage and stability due to the unique site specific constraints of this project (NMFS PDC 2013). The well-graded streambed materials will be an 8"-minus mix of cobbles, gravel and washed sand similar to native bed materials recorded by Ayres (2025) and will conform to stream-simulation criteria (NMFS PDC 2013; WDFW 2013). These added channel elements will diversify in-stream hydraulic patterns at all creek flows, and the mosaic of habitat features will be better than a relatively uniform armored channel riffle.

NMFS (2022a) specifies that maximum average channel velocity should not exceed 5 feet per second (fps) at the 5% exceedance flow. Rating curves (Drawing 4) show water velocities will average 3 to 5 feet per second in Carpenter Creek or English Creek at the estimated 2-year floods for these streams. Water velocities along stream and roughened channel margins are always substantially lower than average water velocities during high flow events. NMFS (2022a) mentions that velocity conditions are most often passable when 20% to 40% of the project surface area is occupied by roughness elements extending significantly into the water column at the bankfull discharge. This is accomplished in the proposed roughened channel by extending every 4<sup>th</sup> boulder +/- 12" above the roughened channel bed.

In order to evaluate water turbulence, the roughened channel was checked using the energy-dissipation factor (EDF) Equation 6.3 per WDFW (2013). Per Table 6.4 (WDFW 2013), the EDF should not exceed 7.5 ft-lb/ft<sup>3</sup>/s for a channel at 3.0% slope, at the estimated high fish passage flow. Calculation of EDF at the estimated 2-year flood for Carpenter Creek roughened channel was 8.7 ft-lb/ft<sup>3</sup>/s. An energy-dissipation factor slightly higher than WDFW (2013) guidelines is probably because the calculation was done for the estimated 2-year flood, which is presumably a higher flow rate than what the high fish passage flow would be.

Per NMFS PDC (2013) a well-graded mix and fish passage criteria must be achieved by the design, as well as stream-crossing guidelines as stated in NMFS (2022a). This design incorporates a mix of materials that will provide fish passage, channel stability, and sealing of the channel bed. Per NMFS, sealing bed and bank material is critical for maintaining low-flow fish passage conditions. The roughened channel bed will be sealed by sluicing washed sand into the voids between boulders until water ponds up on the surface. The engineer has found using larger materials (i.e. well-graded mix) results in gravel bridging across gaps between boulders, which effectively stops void filling by sluicing operations. Prior to construction demobilization, the engineer and/or the project manager will ensure that the structure is adequately sealed to ensure minimal loss of surface flow within the roughened channel (NMFS PDC 2013). In addition, a roughened channel is considered an alternative design approach (WDFW 2013) and hydraulic project approval regulations require that this project be monitored over the next 10 years with a Stewardship Plan (created by SFEG) to ensure that the structure is providing all restoration benefits and fish passage intended by this design and appropriate corrective actions are taken if not.

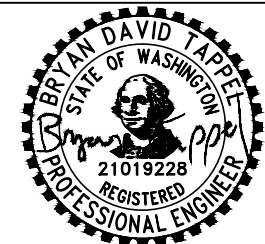


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# CARPENTER & ENGLISH CREEK FISH PASSAGE PROJECT SKAGIT FISHERIES ENHANCEMENT GROUP ROUGHENED CHANNEL BASIS-OF-DESIGN



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>18</b>

## Fish Passage and Stream Channel Basis-Of-Design

### Weathering Steel Bridge for Carpenter Creek

Design for a bridge to replace the under-sized culvert began with flood flow routing to approximate Carpenter Creek's Bankfull Width (BFW) as a 2-year flood; BFW was estimated to be 12' at the bridge location upstream of the confluence with English Creek. The engineer conventionally applies NMFS' (2022a) 3.8.2.1 Stream Simulation formula  $1.5 * BFW$  for determination of water crossing structure spans (bridges or culverts). For Carpenter Creek, a Stream Simulation channel width = 18' is included in the channel design. Combined with on-site survey of road elevations, survey of nearby channel dimensions and elevations, flood flow routing, and consideration of 3' freeboard required over the estimated 100-year flood, it was concluded that a 30'-span bridge will be an excellent water crossing structure for the subject site.

### English Creek Channel Improvements Near Carpenter Creek

Design objectives for English Creek near its junction with Carpenter Creek are to reduce several habitat limitations related to the originally constructed ditch, which was somewhat under-sized for English Creek. The west bank of English Creek will be excavated over a 35'-long creek reach, to provide additional room for natural (vs. confined) conveyance of peak flow events, fish passage, floating wood, and bedload transport. Channel bed and banks will be a 35'-long roughened channel extending upstream from Carpenter Creek, to recover English Creek's profile from the existing incised condition (caused by under-sized culvert in Carpenter Creek) and restore fish passage at the 2.5' water level drop caused by artificial incision and bank erosion in the historically ditched English Creek channel. The proposed minor changes to this lowermost reach of English Creek will reduce fluvial erosion occurring along the adjacent driveway fill, and will also provide sufficient out-of-channel space for support of the proposed bridge's (west) reinforced concrete footing and backwall.

### Removal of English Creek Culvert & Channel Re-Construction

The existing under-sized (24"-dia.) culvert in English Creek will be removed and abandoned to eliminate this existing fish passage barrier. A new stream channel 40'-long will be constructed to replace the existing culvert crossing. English Creek BFW = 10', based on flood flow routing of the estimated 2-year flood within the existing stream channel. Streambed materials for the new channel will be an 8"-minus mix of cobbles, gravel and washed sand similar to native bed materials recorded by Ayres (2025) and will conform to stream-simulation criteria (NMFS PDC 2013; WDFW 2013).

The existing buried waterline to Swanson residence (2½"-dia. galvanized steel pipe) currently spans across the English Creek channel 1.5' above channel thalweg (i.e. within flood flow depth). This waterline will be re-constructed as a "sag pipe" underneath the new alignment for English Creek. Scour calculations from the HEC-RAS quantitative hydraulic model (U.S. Army 2021) were used to determine a reasonable depth for the re-constructed waterline, to be below the depth of estimated channel scour. Maximum estimated scour using 3 equations (Blench, Lacey, USBR mean velocity) was 1.1'-deep. Based on this estimated scour depth, it was decided the new waterline would be placed 2' below the English Creek thalweg.

### Large Wood and Habitat Complexity:

Per NMFS (2022a), Nature-Like Fishways are meant to mimic hydraulic conditions of natural channels. The proposed roughened channel will "simulate the form and roughness of a reference reach" and has incorporated shadow habitat features in the form of large wood and small boulders where practical given the need for channel stability (NMFS 2013; NMFS 2022a, WDFW 2013). Per NMFS (2022a) 4.3.1, fish passage at grade control structures is partially a function of hydraulic diversity, and large roughness elements (i.e. boulders) can provide energy dissipation and velocity reduction necessary for fish passage at high flows.

The roughened channel, large wood, and small boulders are incorporated into the design plans as habitat features on Carpenter and English Creeks to address bank instability issues on both creeks. Large wood will be placed in areas where they would naturally occur as windthrow. Based on availability of wood sourced on-site, trees will be a minimum of 21' with rootwads and 28ft without rootwads (NMFS PDC 34a).

Large wood, boulders with habitat shadows, and irregular bands of 8"-minus cobble, gravel, and sand were incorporated as habitat features at the confluence of Carpenter and English Creek to deter continued channel incision and match the elevation of the creeks. Additionally, habitat shadows will allow migrating fish holding and resting areas. The addition of large wood and boulders with habitat shadows is to provide habitat complexity and mimic natural processes, while providing immediate fish passage and quality habitat to salmon. Immediately upstream of the Carpenter-English confluence, English Creek has a roughly 2.5' water level drop due to channel scour and a small rootwad. Installation of large wood and extension of the roughened channel up English Creek is necessary to ensure fish passage. These features are to comply with the NMFS PDC (2013) and WDFW (2013).

### References

- Ayres, J. 2025. Carpenter and English Creek Fish Passage Restoration Projects. Engineering Basis Of Design Report for Skagit Fisheries Enhancement Group, March 24, 2025.
- NMFS (National Marine Fisheries Service). 2013. Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Programmatic Restoration Opinion for Joint Ecosystem Conservations by the Services (PROJECTS} by the U.S. Fish and Wildlife Service Using the Partners for Fish and Wildlife, Fisheries, Coastal, and Recovery Programs and NOAA Restoration Center Using the Damage Assessment, Remediation and Restoration Program (DARRP), and Community-Based Restoration Program (CRP) in the States of Oregon, Washington, and Idaho. NMFS No. NWR-2013-10221. WCR.
- NMFS 2022a. Guidelines for Salmonid Passage at Stream Crossings in Oregon, Washington, and Idaho. NMFS, West Coast Region (WCR), Portland, Oregon.
- Tappel, P. 2012. Design and Construction of Roughened Channels for Fish Passage in Washington State. Unpublished report by Fisheries Engineers Inc., Brier, Washington.
- U.S. Army Corps of Engineers. 2021. Approaches for Assessing Riverine Scour. Coastal and Hydraulics Laboratory TR-21-7, Engineer Research & Development Center, U.S. Army Corps of Engineers.
- Vanoni, V. A. 1977. Sedimentation Engineering. American Society of Civil Engineers, New York, New York.
- WDFW (Washington Department of Fish and Wildlife). 2013. Water Crossing Design Guidelines. WDFW, Olympia, Washington.

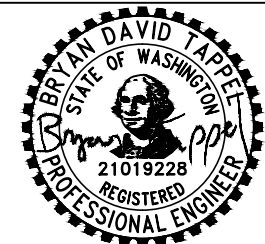


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# CARPENTER & ENGLISH CREEK FISH PASSAGE PROJECT SKAGIT FISHERIES ENHANCEMENT GROUP FISH PASSAGE BASIS-OF-DESIGN



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>19</b>

**Bid Form  
Carpenter & English Creek Fish Passage Project (SFEG)**

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

Item No.	Spec.	Item	Qty	Unit	Unit Cost	Total Cost
1	1-09	Mobilization	1	LS		
2	1-50	Surveying (most will be done by engineer)	1	LS		
3	2-01	Clearing and Grubbing (except knotweed)	1	LS		
4	2-01	Knotweed Removal & Disposal	30	CY		
5	2-02	Dispose (off-site) Existing Culverts	2	EA		
6	2-09	Excavation (stockpile on Lang property)	440	CY		
7	2-09	Backfill & Compact (footings, road fill)	80	CY		
8	2-09	Backfill for Streambanks (do not compact)	120	CY		
9	2-09	Dispose Excess Soils (on Lang property)	240	CY		
10	2-14	Standby Generator 10 kw (2 weeks)	1	LS		
11	2-14	Extension Cords (120 and 240-volt)	1	LS		
12	2-15	Water Control (sandbag dams, pump)	1	LS		
13	2-20	Daylight Utilities for Site Prep	1	LS		
14	2-20	Re-connect Electric Service w/ PSE	1	LS		
15	2-20	Re-connect Telecommunication Service	1	LS		
16	2-20	Re-connect 120-volt Wire	1	LS		
17	2-20	2"-dia. Conduit (Sch. 40) for Electric Service	80	LF		
18	2-20	2"-dia. PVC 45 Elbow	4	EA		
19	2-20	2"-dia. PVC 90 Elbow	1	EA		
20	2-20	Unistrut and Clamps for Electrical Conduit	1	LS		
21	2-20	1"-dia. Conduit for Telecom, 120-volt Wire	80	LF		
22	2-20	Flat Bars for Conduits on Bridge Beams	1	LS		
23	2-30	Temporary Barricades for Driveway	1	LS		
24	6-02	Pre-Cast Concrete Class 4000 for Footings	9.2	CY		
25	6-02	Pre-Cast Concrete Class 4000 for Backwalls	1.8	CY		
26	6-03	Steel Bridge Fabrication & Supply	1	LS	Supply by SFEG	
27	6-03	Steel Bridge Placement & Assembly	1	LS		

**Bid Form  
Carpenter & English Creek Fish Passage Project (SFEG)**

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

Item No.	Spec.	Item	Qty	Unit	Unit Cost	Total Cost
28	6-30	Wood Rail & Bench Construction (4x12's)	1	LS		
29	7-20	2-1/2"-dia. PVC Schedule 80 Pipe	30	LF		
30	7-20	45° Elbow 2-1/2"-dia. PVC Schedule 80	4	EA		
31	7-20	2-1/2"-dia. PVC Ball Valve	1	EA		
32	7-20	Romac Style 501 Coupling 2"-dia. (nominal)	2	EA		
33	8-30	Small-scale Bank Reinforcement (English)	1	LS		
34	8-30	Tree Placement (similar to windthrow)	3	EA		
35	8-30	Rootwad with Trunk (from clearing)	2	EA		
36	8-30	Erosion-Control Seed	5	LB		
37	8-30	Weed-Free Straw	14	Bale		
38	9-03	Pea Gravel (footings, backwalls, waterline)	30	TN		
39	9-03	Crushed Surfacing Base Course (1-1/4"-minus)	45	TN		
40	9-03	Boulders (12" to 24"-size)	300	TN		
41	9-03	Washed Sand (sluice into voids)	170	TN		
42	9-03	Streambed Materials (cobble, gravel & sand)	80	TN		

**Construction Subtotal (without sales tax):**

**Washington State Sales Tax (@ 8.2% Skagit County unincorporated):**

**Total Construction Cost (Bid):**

CY = cubic yard  
EA = each

LB = pound  
LF = lineal foot  
LS = lump sum

SF = square foot  
TN = ton

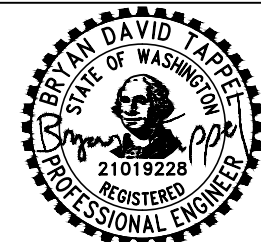


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**CARPENTER & ENGLISH CREEK  
FISH PASSAGE PROJECT  
SKAGIT FISHERIES ENHANCEMENT GROUP  
CONSTRUCTION ELEMENTS & QUANTITIES**



DATE	5/1/2026
DESIGNED	BT
DRAFTED	BT
DRAWING	<b>20</b>

**ATTACHMENT C:  
Environmental Permits**

(Provided upon approval)

Hydraulic Project Approval  
Endangered Species Act  
National Environmental Policy Act  
US Army Corps of Engineers Nationwide  
National Historical Preservation Act (Section 106)

(Other as applicable)

**ATTACHMENT D:  
Utility Relocation Designs**

Puget Sound Energy (Replacement & Splice Underground Primary for New Bridge) pages)	(3
Ziplay Relocation Design	TBD
Waterline (bound within Drawings; Attachment B)	



# 101187571

## 21370 LITTLE MOUNTAIN RD

### BRIDGE INSTALLATION

#### GENERAL SPECIFICATIONS

**Scope of Work**  
 PSE to Replace Underground Primary Cable for New Bridge Installation

**General**

- All work is to be completed per PSE Standards & Practices. Copies of all PSE Standards are available upon request.
- Work sites shall be kept clear of debris and all construction materials; equipment and packing shall be removed daily.
- Return all unused and removed poles, transformers and hardware to PSE, storeroom. All copper shall be coiled and returned the day it is removed from the poles. Remove all unused pins and insulators.

**Preconstruction**

- Notify appropriate city, County or DOT authorities 48 to 72 hours, or as required by permitting agency, in advance of starting work in Right-of-way involving a Permit.
- All system switching shall be approved by **System Operations (425-882-4652)** a minimum of 48 hours in advance.
- Notify customers of all outages 48 hours in advance.

**Work Drawings & Documents**

- Field design changes shall be approved by PSE Project Manager or Engineer.
- Mark all field changes, equipment ID numbers and Underground cable information in red on Foreman's copy of worksketch.
- Return one Foreman's copy of worksketch to Project Manager at completion of job.
- When permits are required, a copy shall be available on work site at all times.

**Safety**

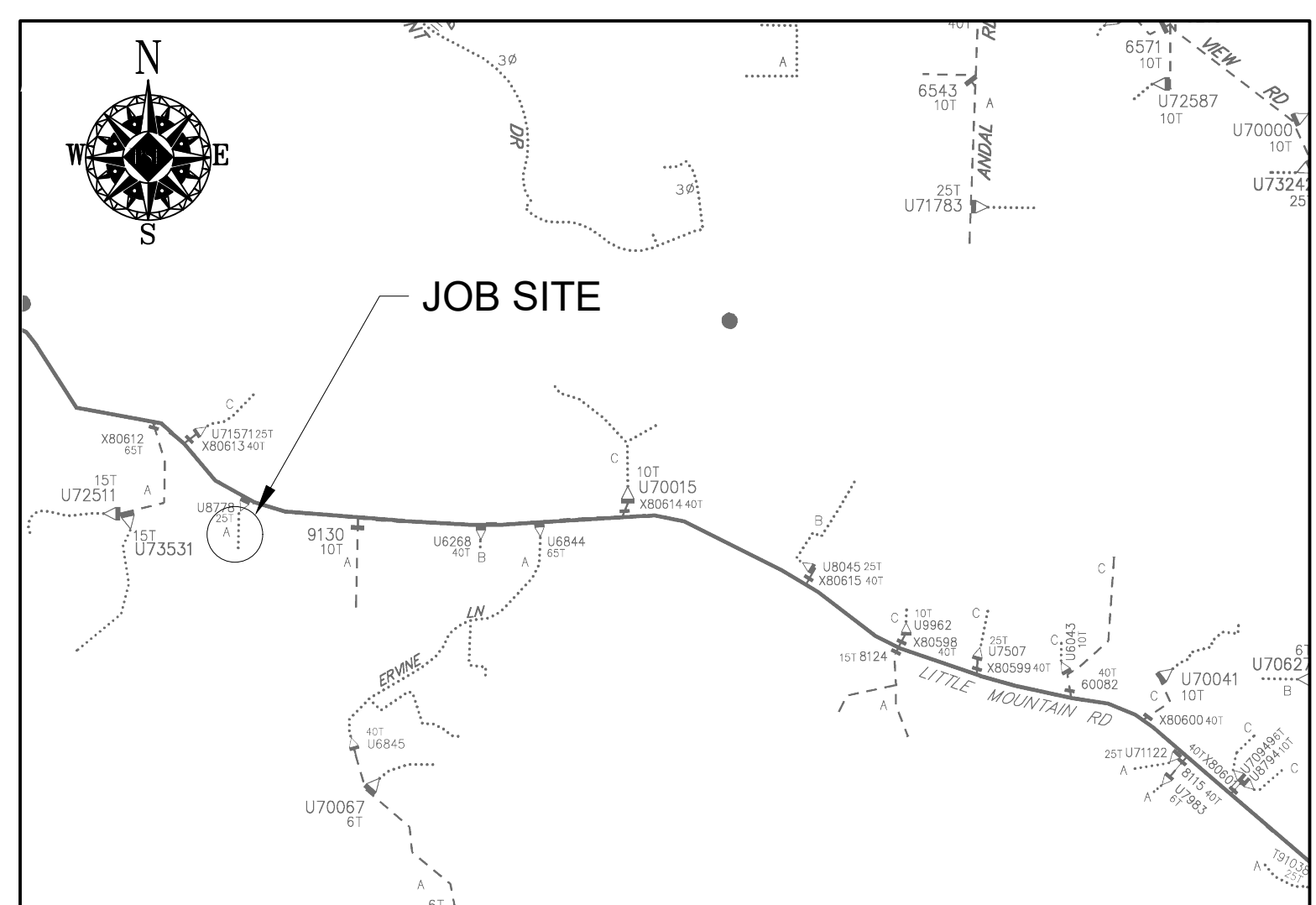
- Refer to PSE standards 6275.3000 and 6275.6000 for system ground requirements.
- Refer to PSE standards 6275.9050 for personal protective grounding requirements.
- Refer to PSE standards 6275.9150 for vehicle grounding and barricading requirements.
- Proper line clearances shall be taken at the beginning, and released at the end, of each work day, or as otherwise instructed by the System Operator.
- Provide signs, barricades, and traffic control in conformance with permit regulations.
- Utilize flagging and other vehicle traffic control as necessary and in conformance with local traffic regulations.
- Maintain traffic flow as required by permitting agency.

**Erosion & Sediment Control**

- Refer to PSE standards 0150.3200 for minimum requirements.
- Comply with all requirements of permitting agency.
- Installed erosion & sediment devices shall be maintained until vegetation has been re-established or disturbed soil has been otherwise permanently stabilized.

**Joint Facilities**

- Coordinate with Communication Companies for transfers.



**OVERHEAD CIRCUIT MAP**  
 SCALE: Not to Scale

#### UNDERGROUND CONSTRUCTION

**Excavation**

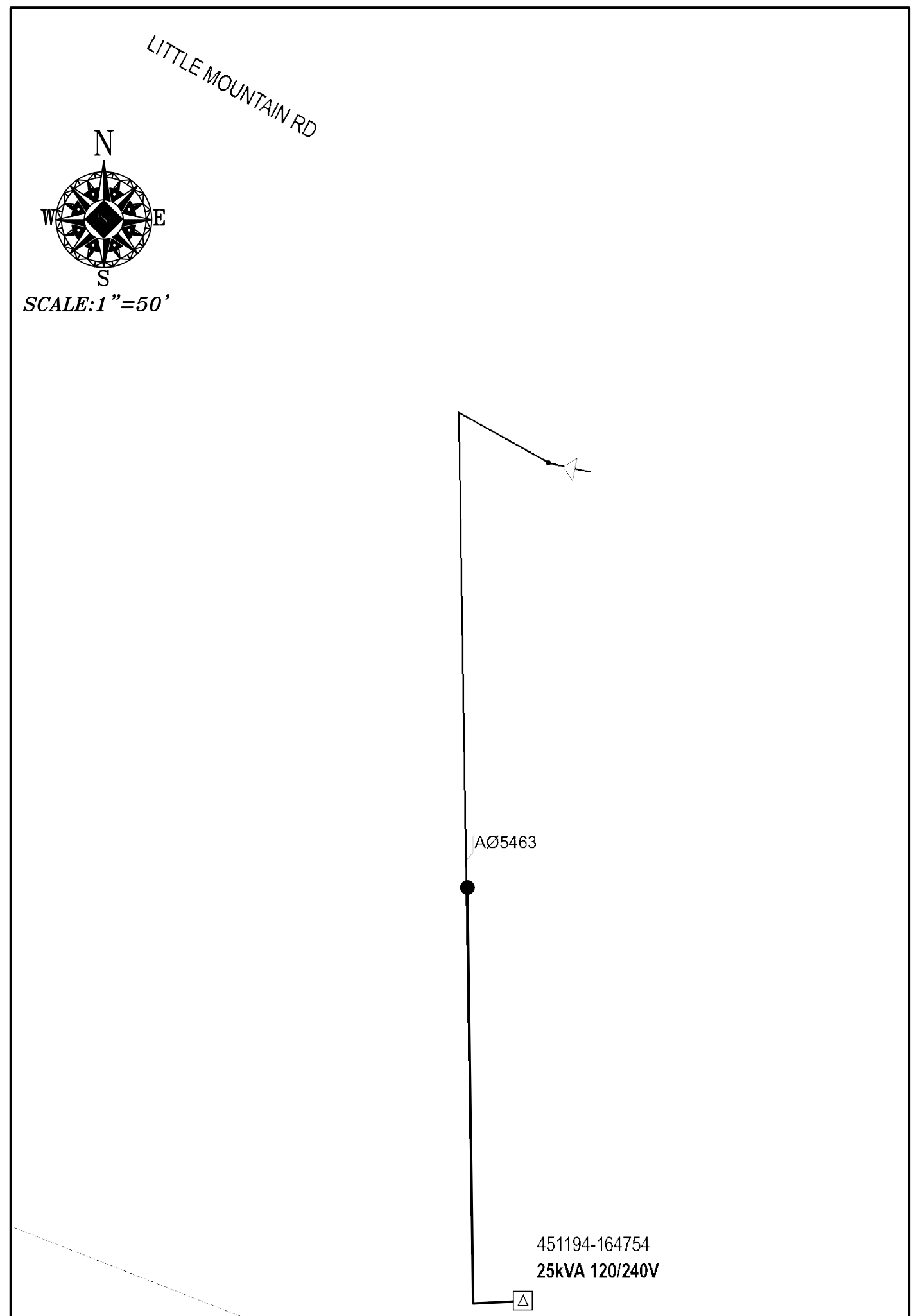
- Trenching outside of the Right-of-way shall be of sufficient depth to provide a minimum of 36" of cover for primary conductors and 24" of cover for secondary conductors.
- Road crossings and all trenches within the Right-of-way shall be of sufficient depth to provide a minimum of 36" of cover for all conductors or as required by the permitting Agency.
- All conductors/conduits shall have a minimum of 3" of bed and 3" of clean sand cover.
- No rocks larger than 6" shall be included in backfill.
- Backfill in road crossings and within the Right-of-way shall be compacted to 95% density or as required by the permitting Agency.
- Restore all excavated areas to original condition.

**Vaults & Handholes**

- Refer to PSE standard 6775.0040 "Vault and Handhole Installation"
- Vaults shall be placed level and 2" above final grade in landscaped areas and flush with final grade when placed in hard surface areas.
- A minimum 6" bed of 5/8" crushed rock shall be placed under all vaults.
- All conduit entrances shall be grouted.

**Conductors & Conduit**

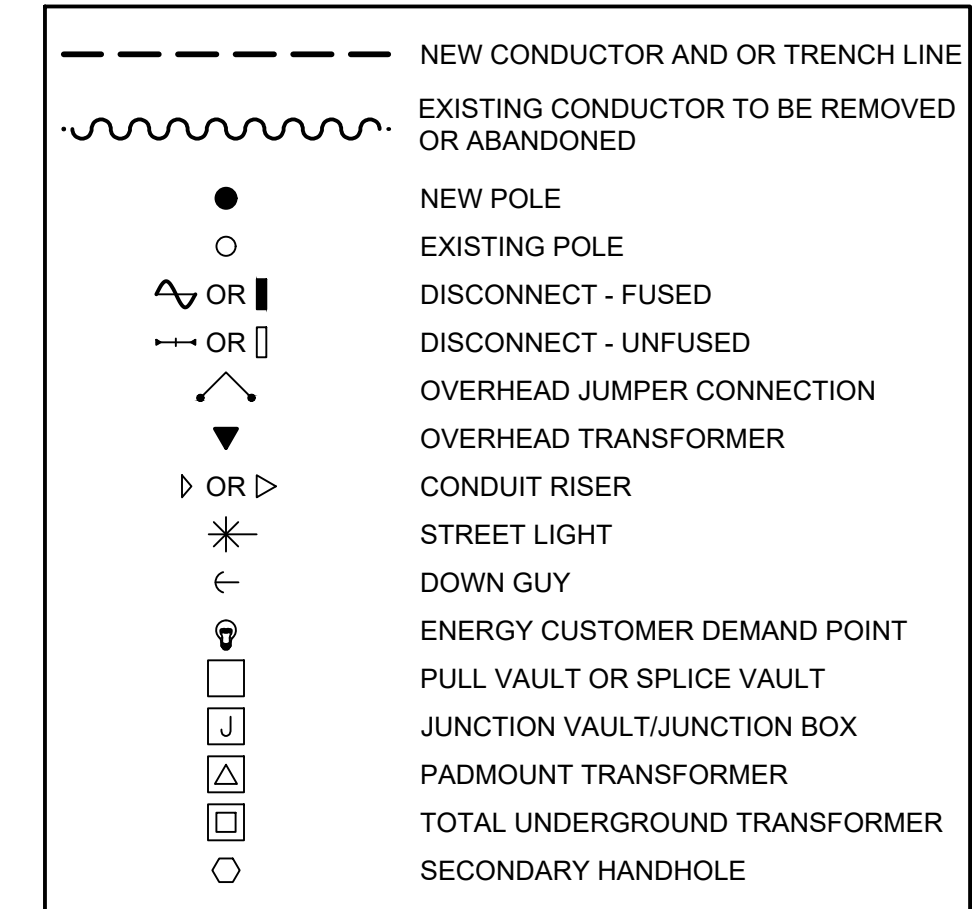
- Refer to PSE standard 6800.6000 "PVC Conduit Installation".
- Unless splices are called for, or otherwise noted or approved, conduit risers shall be plumbed directly to road crossing conduits.
- Install insulating caps on all unused primary bushings.
- All "spare" conduits shall be capped at each end.



**UNDERGROUND CIRCUIT MAP: POST CONSTRUCTION**  
 SCALE: 1" = 50'

#### POWER GENERAL NOTES PROJECT

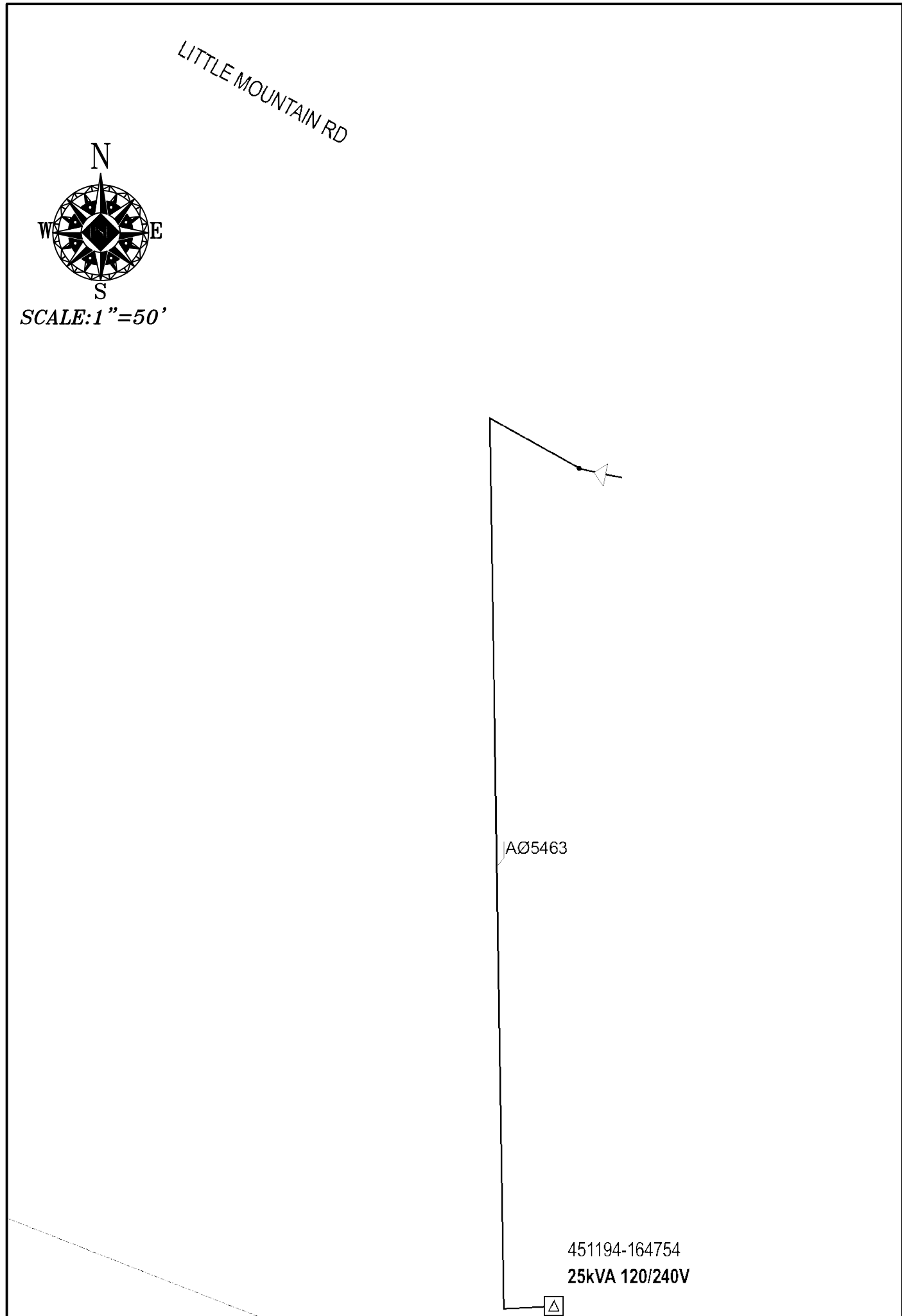
- All materials to be installed in accordance with Puget Sound Energy's (PSE) standards. Any deviation from this work sketch must be AUTHORIZED by PSE's Project Manager and NOTED on the Foreman's Copy.
- All switching arrangements and/or outage arrangements are to be made with the Project Manager at least three (3) working days in advance.
- Contact the Utilities Underground Location Center (1-800-424-5555) at least 48 hours prior to commencing work to get the underground facilities located.
- SITE PREPARATION:** The work area will be at or near finished grade, clear of trench spoils or construction materials which would restrict construction and/or equipment access, before work can begin.
- Roads shall be paved or have a compacted, crushed rock base in place.
- CLEARANCES:** Transformers require a minimum of 6 feet from fire fighting equipment, 10 feet from combustible walls, overhangs, doors, and windows, and a minimum of 5 feet from the back of curb (or guard posts will be required per PSE standards). All conduits and vaults are to be at least 5 feet away from water, storm and sewer lines when paralleling them in the right of way, and at least 1 foot when crossing them.
- All work is to be done in accordance with local municipal and county permit requirements as applicable.
- Inclement weather conditions may cause delays in construction times and dates.



**LEGEND**

#### EROSION & SEDIMENT CONTROL REQUIREMENTS

EROSION & SEDIMENT CONTROL SHALL BE PER PSE STANDARD PRACTICE 0150.3200 TECHNIQUES FOR TEMPORARY EROSION & SEDIMENT CONTROL & ANY ADDITIONAL LOCAL JURISDICTION REQUIREMENTS. (LOCAL JURISDICTIONS MAY HAVE ADDITIONAL REQUIREMENTS INCLUDING NOTES DETAILING WHERE EROSION OR SEDIMENT CONTROL STRUCTURES ARE TO BE INSTALLED, CROSS SECTION DETAILS OF THE TYPICAL EROSION STRUCTURES, & SPECIAL REQUIREMENTS FOR WORK IN SENSITIVE AREAS.)



**UNDERGROUND CIRCUIT MAP: PRE-CONSTRUCTION**  
 SCALE: 1" = 50'

**FOREMAN (CHECK BOX WHEN COMPLETED)**

PSE Equipment LOCKED/SECURED & Work Area left in CLEAN/SAFE Condition.

Grid, Cable and Switch numbers INSTALLED & VERIFIED.

Field Changes RED-LINED on As-built.

Material VERIFIED and CHANGES noted on Paperwork.

Total PRIMARY Cable noted on As-built.

Company ID#s RECORDED in correct location on As-built.

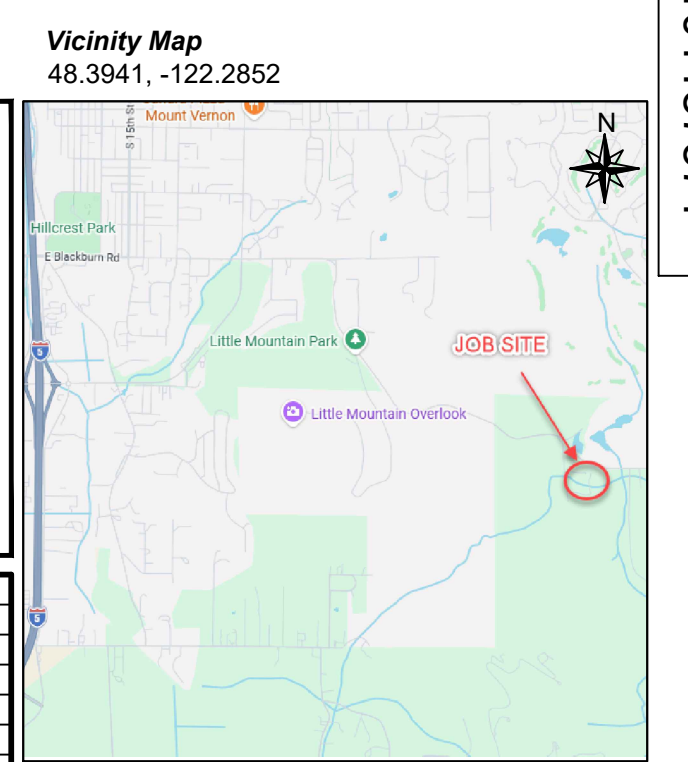
Indicate correct FUSE SIZE on As-built & VERIFY proper PHASE.

Deviations noted on the As-built and their reason.

I certify that the work performed meets PSE's standards and procedures and that all quality requirements are met.

Foreman's Signature \_\_\_\_\_  
 Print Name \_\_\_\_\_ Date \_\_\_\_\_

PROJECT PHASE	NOTIF#	ORDER#
PWR Superior	515765636	101187571
UG Pri Cable Retire		108165465



**Owner / Developer Contact Info**  
 Skagit Fisheries Enhancement Group  
 PO Box 2497  
 Mount Vernon, WA 98273  
 ATTN: Myrriah Crowley 360-899-6281 office

**Project Manager Contact Information:**  
 Manager: JOE ARTHURS  
 Cell Phone: 360-395-8016  
 E-Mail: Joe.Arthurs@pse.com  
 \*PSE Locates Required\* No  
 \*Locates Required\* Yes  
 \*Outages Required\* Yes  
 \*Flagging Required\* Yes

For contacts below dial 1-888-CALL PSE (225-5773)  
**CALL 811 TWO BUSINESS DAYS BEFORE YOU DIG**

THIS SKETCH NOT TO BE RELIED UPON FOR EXACT LOCATION OF EXISTING FACILITIES

REAL ESTATE/EASEMENT	PERMIT	SKAGIT CO.
RW-131559		
3	FUNCTION	CONTACT
2	PROJECT MGR	Joe Arthurs
1	ENGR - POWER	Britton Brooks
	ENGR - GAS	
	POWER WK CTR	Britton Brooks
	CSPSEPM	Heather Cottom
	PLAT MAP	Myrriah Crowley
	FOREMAN #1	
	FOREMAN #2	
	MAPPING	

UTILITIES CONTACT	PHONE#	PSE ROW	JOSEPH STEELE	PHONE#

**PSE PUGET SOUND ENERGY**

**Fish Passage Barrier Improvement Project**  
 Replacement & Splice Underground Primary for New Bridge  
 21370 Little Mountain Rd, Mt. Vernon, WA 98273

INCIDENT N/A	MAOP N/A
Gas Order N/A	Elect Order 101187571
SCALE As Noted	PAGE 1 OF 3

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