

# Fish Barrier Removal Board Grant Program

## Match Certification Credit Form

The preference of the Fish Barrier Removal Board is for the project sponsor to provide a 15% match of the grant award. However, the board recognizes that under certain circumstances a project match may be a hardship for the project sponsor. A match certification credit may be used to meet the spirit of providing matching resources and help increase coordination within a watershed (at a HUC 10 scale).

### 1. Project Information:

Sponsor Name: Lewis County Public Works

Email & Phone: Ann.Weckback@lewiscountywa.gov - (360) 740-1440

Recovery Region: Washington Coast, Chehalis Basin Lead Entity

Stream Name: Middle Fork Newaukum River

WDFW Site ID: Site ID 021(45011)(07070)

Total Project Cost: \$525,000

### 2. Select which Match Certification Credit you are applying for:

**Another fish passage barrier removal within the same watershed** – Another fish passage barrier removal within the same watershed (HUC 10 Scale) may be used as match for Fish Barrier Removal Board funding if all of the following criteria are met:

- a. The matching project was not funded by the Fish Barrier Removal Board or previously used as match.
- b. The matching project must be congruently under contract (construction or grant) with the FBRB contract or have been constructed within the previous four years from the time FBRB funds become available.
- c. If already constructed, the matching project must be 100% passable per WDFW barrier assessment guidelines.
- d. Eligible matching projects include design work, feasibility studies, and other activities that are specific to a particular barrier removal. Watershed inventory, assessment, and prioritization efforts are not eligible to use as match.

**Project Sponsor Hardship**– The project sponsor is not able to meet the minimum 15% match and there are no other fish passage barrier removal projects within the watershed that can be used as match.

3. The project sponsor must provide the following materials based on the type of Match Certification Credit being applied for:

a) ***Another fish passage barrier removal within the same watershed***

- i. Completed Match Certification Credit Form (plus attachments listed below)
- ii. A letter from the sponsor or owner removing the barrier (e.g., state, county, city, forest landowner, RFEG or CD) certifying the matching project is either under contract (construction or grant), included on a public works list and in the design or permitting phase, or a grant application is in the process of being awarded to remove the barrier. The letter must be signed by someone with signature authority within the organization.
- iii. Submit a map and description of the project.
- iv. Provide photos of the site.
- v. Provide barrier assessment information, when and who conducted the survey.
- vi. Provide a preliminary design, final design, or as-built drawings.
- vii. Estimated or final cost of the project and completion date with supporting documentation.
- viii. Must certify that the match is not being used or will be used for any other project.

a) ***Project Sponsor Hardship***

- ix. Completed Match Certification Form (plus attachments listed below)
- x. Provide a statement describing the match amount (or percentage) your organization can commit. Please detail the type of match and dollar or in-kind value.
- xi. Explain the resources that have been investigated for potential match
- xii. Explain the organizational hardship

4. Please submit the completed Match Certification Credit materials to:

Fish Barrier Removal Board  
c/o Tom Jameson, WDFW Fish Passage Division Manager  
PO Box 43200  
Olympia, WA 98504-3200  
[Thomas.Jameson@dfw.wa.gov](mailto:Thomas.Jameson@dfw.wa.gov)

The Fish Barrier Removal Board will review match eligibility for all proposed projects and may approve or deny match eligibility on a case-by-case basis. The Fish Barrier Removal Board will track match sources to avoid double matching.



## *Lewis County Department of Public Works*

Erik P. Martin, PE, Director

Tim D. Fife, PE, County Engineer

March 7, 2018

Fish Barrier Removal Board  
c/o Tom Jameson, WDFW Fish Passage Division Manager  
PO Box 43200  
Olympia, WA 98504-3200

RE: Match Certification Credit for the Middle Fork Newaukum Fish Passage\_  
Site ID 021(45011)(07070)

Mr. Jameson,

Lewis County is submitting this letter to serve as both a request of match certification as well as a statement of intent to amend the Grant amount in the near future. The Middle Fork Newaukum Fish Passage Site ID 021(45011)(07070) Project is slated to receive approximately \$525,000 funds from the Brian Abbott Fish Passage Barrier Removal Board's Watershed Pathway's Grant for the 2017-2019 biennium under the 2018 Supplemental Capital Budget. Original estimates showed project costs at approximately \$525,000. However, recent estimates completed by Washington State Department of Fish and Wildlife and Lewis County Public Works staff show project costs to be more likely in the range of \$880,000 to \$1,110,000.

Lewis County intends to provide match for the design and construction of the Middle Fork Newaukum Fish Passage Site ID 021(45011)(07070) project through the construction of another fish passage barrier removal project within the same watershed.

Lewis County is proposing the use the of the *Frase Creek Removal and Channel Realignment Project* [Culvert Site ID 021(64002)(00529)] as match for the Middle Fork Newaukum Fish Passage Site ID 021(45011)(07070) Project. Design for The *Frase Creek Removal and Channel Realignment Project* Frase Creek Barrier has been completed and is undergoing permitting scheduled for 2019 construction.

### *Road Maintenance &*

#### *Fleet Services*

476 West Main St.  
Chehalis, WA 98532

☎ 360.740.3380

F 360.740.2741

### *Administration, Engineering, Utilities,*

#### *Real Estate Services & Traffic*

2025 NE Kresky Ave.  
Chehalis, WA 98532

☎ 360.740.1123

F 360.740.1479

### *Solid Waste Services*

Post Office Box 180  
Centralia, WA 98531

☎ 360.740.1451

F 360.330.7805

The Frase Creek project is estimated to cost \$1,000,000.

Grant funds have been applied for the *Frase Creek Barrier Removal and Channel Realignment Project* in the amount of \$147,500 from the US Fish and Wildlife Service's National Fish Passage Program Grant and \$594,591 from the Chehalis Basin Strategy's Aquatic Species Restoration Plan Grant and will be submitted for Salmon Recovery Funding Board Grant as well.

The County is planning on utilizing up to \$170,000 of construction costs of the Frase Creek Removal and Channel Realignment Project (including grant funding) as match for the Match Certification Credit, at the prescribed 15% for the Middle Fork Newaukum Fish Passage Site ID 021(45011)(07070). While it is not anticipated at this time that the additional construction funds will be used for any other project the County would also like to reserve the right to utilize any remaining funds as match for any other projects which may allow the utilization of such funds as match.

As a result of more recent Newaukum project cost estimates mentioned earlier in this letter, it will be necessary for Lewis County to formally request an amendment to the project agreement immediately after execution for an amount somewhere between \$360,000 and \$500,000. Should it be determined that there are no funds available to satisfy the cost increase the County will submit a scope change to move forward with a design only project at that time.

I, Erik Martin, certify the information provided above to be true and accurate.

Regards,



Erik Martin P.E.

Director

Lewis County Public Works

## **Frase Creek Culvert Barrier Removal**

*The primary objective of the Frase Creek Barrier Removal is to replace an existing fish passage barrier with a fish passable structure and realign 300ft of the streambed channel. The project will restore salmon access to 2.74 linear miles of potential habitat; approximately 388 square meters (0.10 acres) of spawning habitat and 8,442 square meters (2.89 acres) of rearing habitat for the Southwest Washington ESU (evolutionary significant unit) of coho salmon, and the Southwest Washington DPS (distinct population segment) of winter steelhead, as well as searun cutthroat and resident cutthroat trout.*

*The culvert proposed for replacement is ranked 18<sup>th</sup> on a list of priority culverts for replacement within the Chehalis Basin and 11<sup>th</sup> on a list of priority culverts to be replaced that are owned by Lewis County. A stream survey on Frase Creek was performed by Parametrix, Inc. Canopy cover upstream of the culvert proposed for replacement averages 97 percent.*

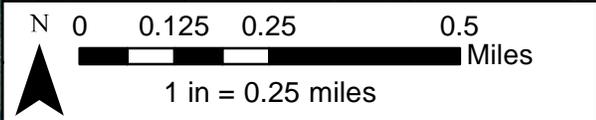
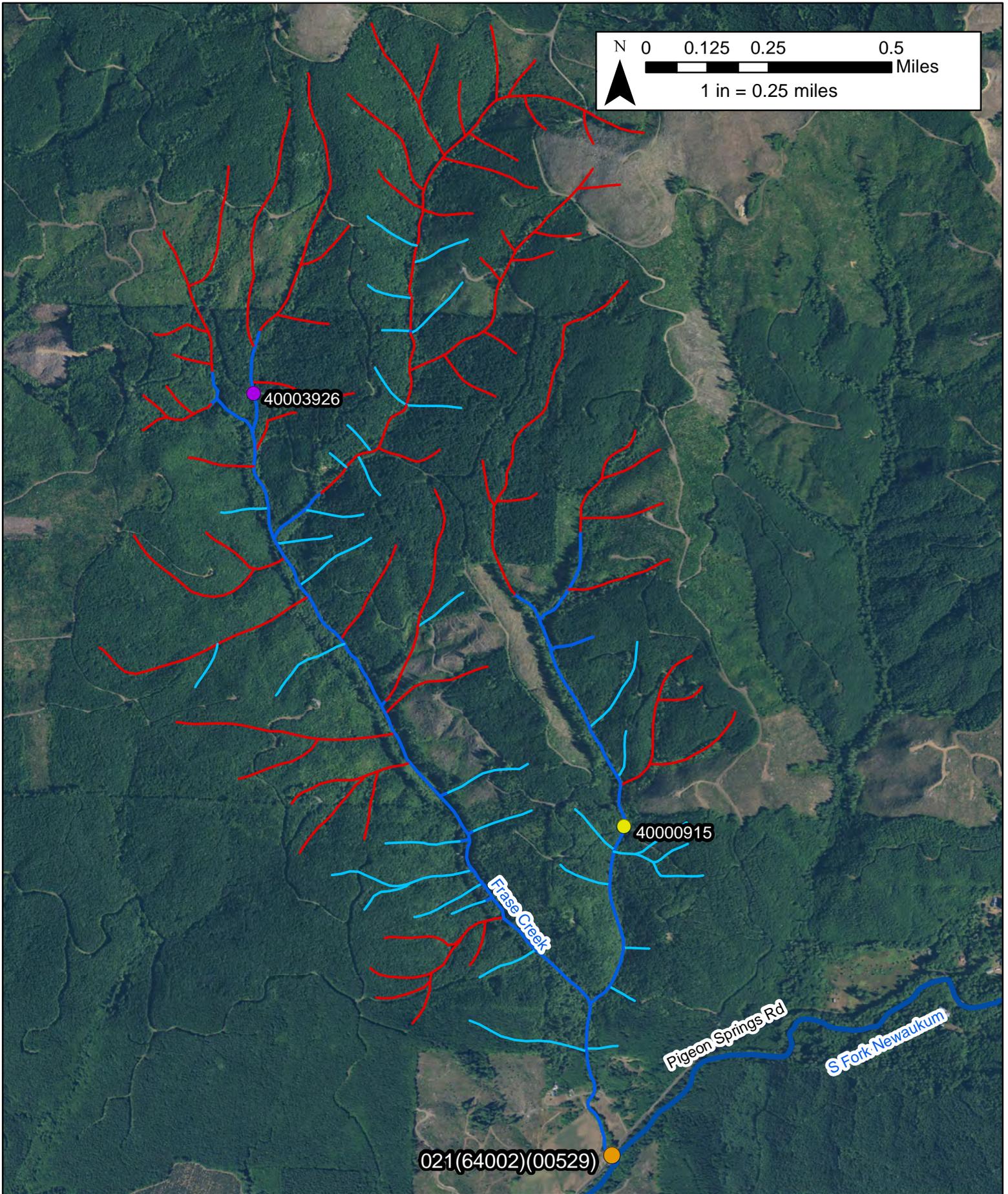
*The existing fish passage barrier is a 2.13 x 1.52 meter (7 x 5 ft) corrugated metal squash pipe. The culvert is 0 percent passable due to a 1.16 meter (3.8 ft) outfall drop, a slope of two percent, and lack of substrate within the culvert. The culvert is also a constriction point as the bankfull width of the channel is 4 meters (13.17 ft).*

*The proposed fish passable structure to replace the culvert barrier will be a precast concrete box culvert 6.10 meters (20 ft) in width, 3.50 Meters (11.5 ft) in height, and 18.28 meters (60 ft) in length. The proposed width meets the minimum width of 5.79 meters (19 ft) as is required by the stream simulation design method (using an 8 percent increasing bankfull width to incorporate 2099 climate change data).*

*Currently there is a natural bedrock ledge outcrop near the culvert outlet which may function as a partial barrier during low flows. The project proposed to relocate the culvert outlet as well as realign/regrade approximately 300 ft of the channel to provide a 3.78 percent slope for passability. The realigned channel will include a meandering low flow notch, 12 pieces of LWD, and two 1 ft pools. An approximate 35 ft riparian buffer strip will be planted on either side of the channel with western red cedar, big leaf maple, Geyer willow, Nookta rose, common snowberry, Oregon grape, and oceanspray..*

*Removing the current culvert barrier and replacing it with properly designed fish passable structure will not only allow for fish passage of all life stages it will also minimize bank erosion. The incorporation of large woody debris into the final design is anticipated to retain bedloads and elevate streambed levels to allow for better floodplain connectivity, increase habitat complexity and increase organic inputs. Increasing the hydraulic opening is anticipated to reduce sedimentation, improve floodplain connectivity, and improve water quality.*





**Figure 2: Watershed Information**  
 Frase Creek Barrier Removal and Channel Realignment  
 Section 12, Township 13 North, Range 1 East

**Legend**

Culvert Proposed for Replacement by Lewis County	Fishbearing Stream
Culvert Scheduled for Replacement in 2017 or 2018	Non-fishbearing Stream
Culvert Scheduled for Removal in 2017 or 2018	Stream of Unknown Fish Presence
South Fork Newaukum River	Road

November 21, 2017



Frase Creek Barrier Removal and Channel Realignment  
Photo Log



Photo 1: View of Frase Creek upstream from culvert



Photo 2: View of culvert inlet



Photo 3: View of South Fork Newaukum River downstream from culvert



Photo 4: View of culvert outlet



Photo 5: View of Frase Creek downstream from private bridge



Photo 6: Southwest facing view of area of propose new alignment



# Barrier Evaluation Form – Single Culvert at Crossing

## Location Information

Project Name: Frase Creek – 021(64022)(00529)		SRFB Project #: 16-1709	County: <b>Lewis County</b>
HPA #:		Parcel #: <b>032429002002</b>	
GPS Location: Datum - WGS84 -decimal degrees		Latitude: <b>46.62334</b>	Longitude: <b>-122.6324</b>
¼ Section:	Section: <b>12</b>	Township: <b>13N</b>	Range: <b>01</b> <input checked="" type="checkbox"/> East <input type="checkbox"/> West
Stream Name: <b>Frase Creek</b>		Tributary To: <b>Middle South Fork Newaukum River</b>	WRIA #: <b>22-23</b>
Driving Directions: <b>From I-5 take the WA-508 E exit, Exit 71. Turn east onto WA-508. Travel on WA-508 for 13.45 miles, turn left on to Centralia Alpha Rd. Follow Centralia Alpha Rd for 0.55 miles then stay straight onto Pigeon Springs Rd. The project site will be 0.63 miles on Pigeon Springs Rd.</b>			

## Landowner Information

Landowner: <b>Frase Incorporated</b>		Mailing Address: <b>181 PIGEON SPRINGS RD</b>	
City: <b>ONALASKA</b>	State: <b>WA</b>	Zip: <b>98570</b>	Telephone: ( )
Cell: ( )	Fax: ( )	E-mail:	

## Evaluator Information

Evaluator Name: <b>Nicholas Noble</b>		Affiliation: <b>Lewis County Public Works</b>	
Mailing Address: <b>2025 NE Kresky Ave</b>		City: <b>Chehalis</b>	State: <b>WA</b> Zip: <b>98532</b>
Telephone: 360-496-8432	Fax:	Cell:	E-mail: <b>Nicholas.Noble@Lewiscountywa.gov</b>

## Barrier Information (measurements in meters)

Is the Stream Fish-bearing? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown		Species: <b>Coho (Spawning), Winter Steelhead (Spawning), Cutthroat</b>	Date of Visit: <b>11/09/15</b>
Fish-bearing Criteria: <input type="checkbox"/> Fish Observation <input checked="" type="checkbox"/> Stream Type <input type="checkbox"/> SASSI/Stream Catalog <input type="checkbox"/> Physical Criteria <input type="checkbox"/> Other:			
Stream Flow: <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Unknown Source of Information:			
Will this Culvert be Entered into the WDFW-FPDSI (formerly SSHEAR) Database? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, Site ID #: <b>021(64022)(00529)</b>			
Shape: <b>SQSH</b>	Material: <b>CST</b>	Apron: <input checked="" type="checkbox"/> None <input type="checkbox"/> Upstream <input type="checkbox"/> Downstream <input type="checkbox"/> Both	Span: <b>2.13</b>
Rise: <b>1.54</b>	Length: <b>10.36</b>	Water Depth in Culvert: <b>0.12</b>	Water Surface Drop: <b>1.16</b>
Drop Location: <input checked="" type="checkbox"/> Outlet <input type="checkbox"/> Inlet <input type="checkbox"/> Inside	Countersunk: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown		Culvert Slope(%): <b>3.53%</b>
Bankfull Width (outside influence of culvert): <b>3.96</b>		Culvert Span/Bankfull Width Ratio: <b>0.54</b>	
Plunge Pool: Length (culvert to tail-out):	OHW width:	Max depth:	Road Fill DS: <b>1.15</b> Road Width: <b>5.9</b>
Fishway Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (if yes, describe in Comments)			Tide Gate Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown
Is this Culvert a Fish Passage Barrier? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Level B needed			
Problem with Culvert: <input checked="" type="checkbox"/> WS drop <input type="checkbox"/> Slope <input type="checkbox"/> Velocity <input type="checkbox"/> Depth		Percent Passability: <input checked="" type="checkbox"/> 0% <input type="checkbox"/> 33% <input type="checkbox"/> 67% <input type="checkbox"/> 100%	
Habitat Quality: <input type="checkbox"/> Excellent <input checked="" type="checkbox"/> Good <input type="checkbox"/> Poor <input type="checkbox"/> Unknown			

Comments (describe crossing condition, fish observations, habitat quality etc): Coho and Winter steelhead have been seen utilizing the stream. 4,221 m of rearing habitat and 194 m of spawning habitat



# Expanded Barrier Evaluation Form

## Project Information

Project Name: Frase Creek- 021(64022)(00529)

SRFB Project #: 16-1709

Date: 4-14-16

## Evaluator Information

Evaluator Name: **Nicholas Noble**

Affiliation: **Lewis County Public Works**

Mailing Address: **2025 NE Kresky Ave**

City: **Chehalis**

State: **WA**

Zip: **98532**

Telephone: **360-496-8432** FAX:

Cell:

E-mail: **Nicholas.Noble@lewiscountywa.gov**

## Watershed Information

Amount of Habitat Upstream: **3926(m)**  Map Measure  Hip Chain Basin Area (square miles above culvert): 2.1

Stream Flow:  Perennial  Intermittent  Unknown Source of Information:

Has a Barrier Inventory Been Conducted in the Watershed?  Yes (road)  Yes (stream survey)  No  Unknown

If Yes, List Source and Date Completed: Parametrix, Inc. 2001. Frase Creek Stream Habitat and Barrier Assessment Survey, December.

Distance Walked DS: - (m) Walked to:  Known Anadromous  Natural Barrier  Human-made Barrier   
Other: South Fork Newaukum

List Downstream Culverts, Dams, Bridges, and Natural Barriers. Include Passable Features. Attach Additional Pages if Needed.

Distance DS: % Passable: Site ID#: Location:

Distance DS: % Passable: Site ID#: Location:

Distance walked US: 2,992 (m) Walked to:  Physical End of Fish Use  Natural Barrier  Human-made Barrier   
Other:

List Upstream Culverts, Dams, Bridges and Natural Barriers. Include Passable Features. Attach Additional Pages if Needed.

Distance US: 2,942m % Passable: <66 Site ID#: 40000915 Location: 46.633231, -122.632117

Distance US: 1,194m % Passable: <66 Site ID#: 40003926 Location: 46.645706, -122.648461

## Fish Species/Habitat Quality

What Species are Currently Blocked, at Least Partially, by this Barrier? Include Juvenile Life Stages.

Sockeye  Chum  Pink  Coho  Chinook  Steelhead  Searun Cutthroat  Resident Cutthroat

Anadromous Bull  Resident Bull  Rainbow Trout  Brook Trout  Brown Trout  Resident Trout

Information Source (including on-site observations): SalmonScape

Range of Gradient Downstream: Range of Gradient Upstream: >3% Size of any US Lake/Wetlands: 63,575 (sq. m)

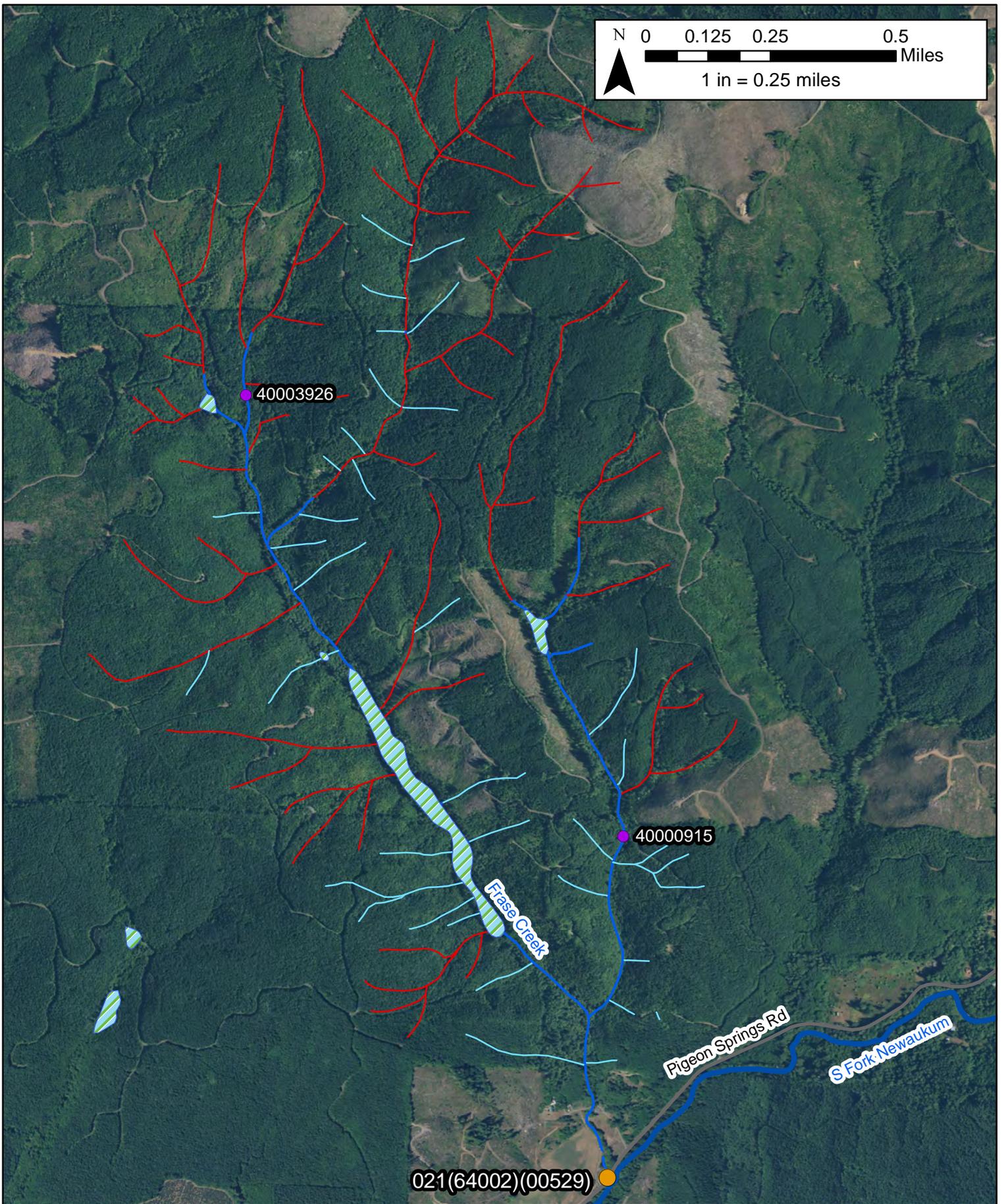
Predominant Land Use:  Forest  Agriculture  Rural residential  Urban % Canopy Cover: 97%

In-stream Cover:  High  Medium  Low Channel Stability:  High  Medium  Low

Rearing Quality:  Excellent  Good  Poor Spawning Quality:  Excellent  Good  Poor

Describe Habitat Upstream from Barrier: Habitat upstream from barrier has 4,221 m of rearing habitat and 194 m of spawning habitat.





**Legend**

- Culvert Proposed for Replacement by Lewis County
- RMAP Culvert Scheduled for Replacement in 2017 or 2018
- Wetlands
- South Fork Newaukum River
- Fishbearing Stream
- Non-fishbearings Stream
- Stream of Unknown Fish Presence
- Road

**Figure 1: Watershed Information**

Frase Creek Culvert Removal  
Section 12, Township 13N, Range 1E

April 14, 2016











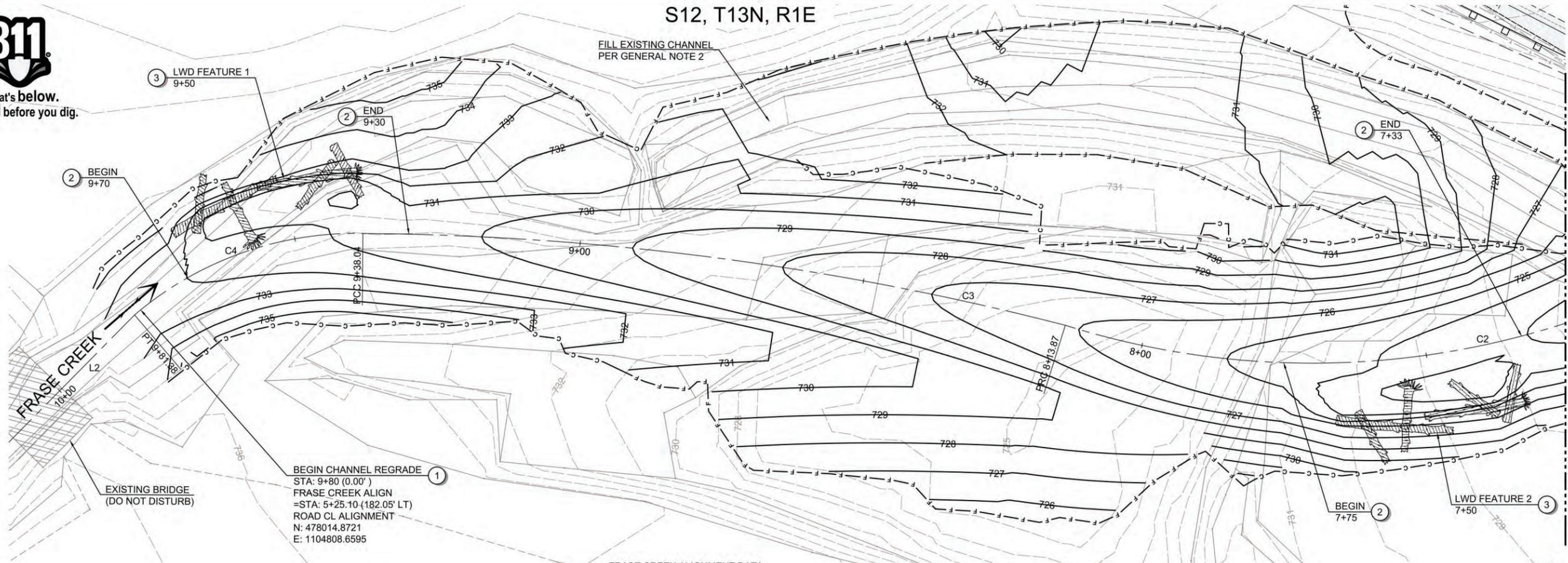






Know what's below.  
Call before you dig.

# S12, T13N, R1E



EXISTING BRIDGE  
(DO NOT DISTURB)

**BEGIN CHANNEL REGRADE** ①  
STA: 9+80 (0.00')  
FRASE CREEK ALIGN  
= STA: 5+25.10 (182.05' LT)  
ROAD CL ALIGNMENT  
N: 478014.8721  
E: 1104808.6595

### FRASE CREEK ALIGNMENT DATA

CENTERLINE LINE DATA		
#	Length	Direction
L2	42.916	N45° 36' 32.86"W

CENTERLINE CURVE DATA				
#	Δ	R	L	T
C2	41°11'27"	144.26	103.71	54.21
C3	13°55'51"	510.70	124.17	62.39
C4	41°40'09"	59.59	43.34	22.68

LARGE WOODY DEBRIS CONTROL TABLE				
LWD FEATURE #	STATION	OHW ELEVATION	LOGS*	VOLUME (FT <sup>3</sup> )
1	3+80	244.97	1,2,3,4,4,4	110
2	1+18	244.05	1,2,3,4,4,4	110

LOG SCHEDULE					
LOG #	LOG LENGTH (FT)	LOG DIAMETER (FT)	ROOTWAD LENGTH (FT)	ROOTWAD DIAMETER (FT)	VOLUME (FT <sup>3</sup> )
1*	18	1.5	2	3	40.3
2*	20	1.5	-	-	35.3
3	10	1	1.5	2	10.7
4	10	1	-	-	7.9

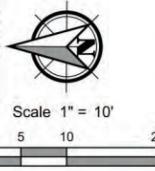
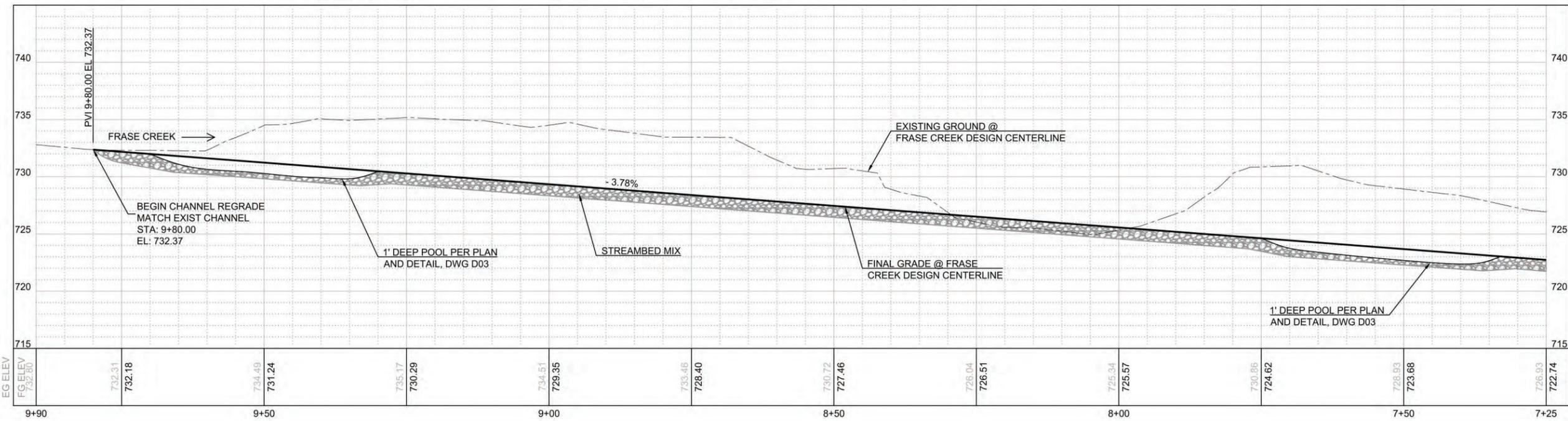
\* KEY LOG (VOLUME > 35 FT<sup>3</sup>)

### GENERAL NOTES:

1. THALWEG AND WOODY DEBRIS ARE TO BE PLACED AS SHOWN ON PLANS. MINOR CHANGES TO THE LOG FEATURES CAN BE MADE IN THE FIELD BY THE CONTRACTOR IF APPROVED BY THE ON-SITE REPRESENTATIVE.
2. FILL OUTSIDE OF CHANNEL SECTION SHALL CONSIST OF EXCAVATED NATIVE MATERIAL AND IN ACCORDANCE TO THE LANDSCAPE STABILIZATION PLAN.
3. SEE DWG L01 THRU L03 FOR LANDSCAPE STABILIZATION PLAN.

### CONSTRUCTION PLAN NOTES:

- ① RECONSTRUCT CREEK CHANNEL PER DETAIL, SEE DWG D03
- ② VARY TYP CHANNEL SECTION PER DETAIL, DWG D03, TO CONSTRUCT 1-FT DEEP POOL BELOW CHANNEL FINAL GRADE LINE AS SHOWN ON PROFILE.
- ③ INSTALL LARGE WOODY DEBRIS FEATURE PER TABLES, DWG C01 AND DETAIL, DWG D03



**PBS**  
Engineering + Environmental  
1180 NW Maple Street,  
Suite 100  
Issaquah, WA 98027  
425.654.8775  
www.pbsenv.com



**FRASE CREEK CULVERT REPLACEMENT**  
NORTH OF CENTRALIA ALPHA RD ON PIGEON SPRINGS RD  
LEWIS COUNTY PUBLIC WORKS  
**CREEK AND CULVERT PLAN AND PROFILE**

**100% PLANS**

NO.	REVISION	BY	DATE	CHK

PROJECT: 75238.003  
DRAWN: DKE  
CHECKED: RED  
DATE: 11-22-2017  
DWG NO. **C01** SHEET NO. **4** OF **14**

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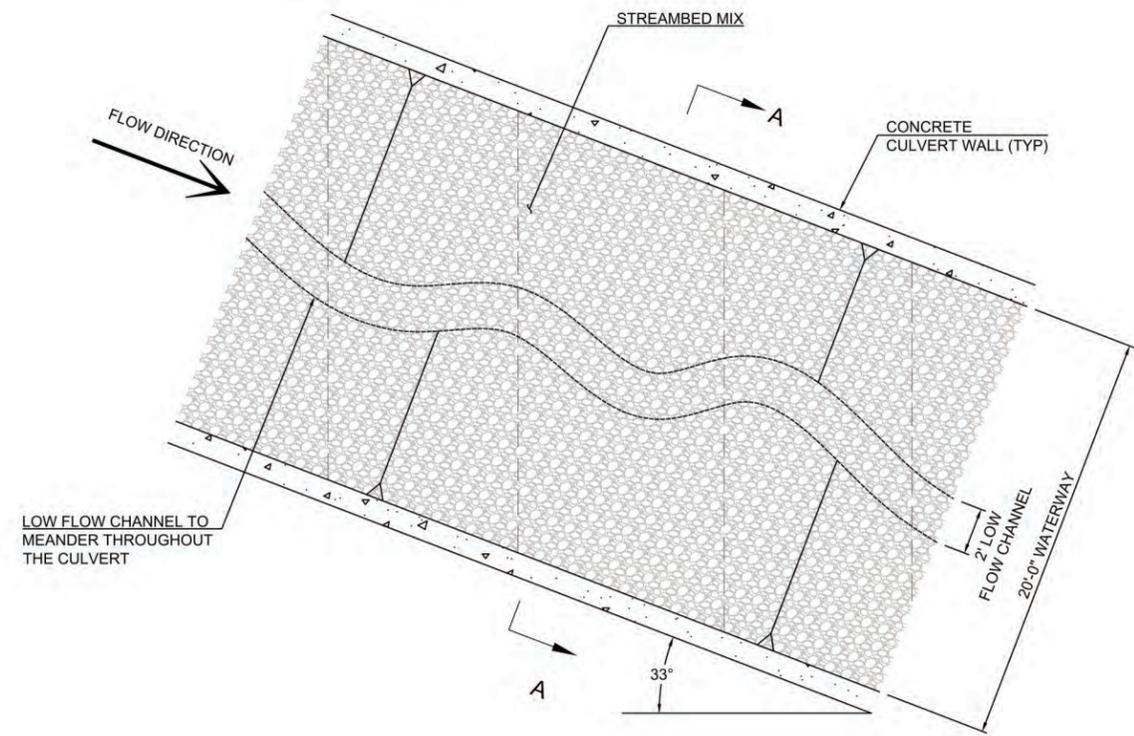






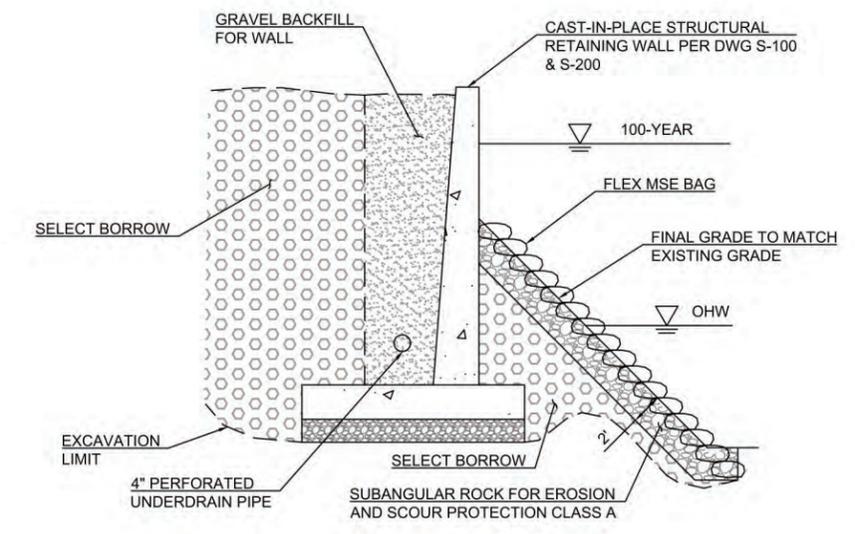






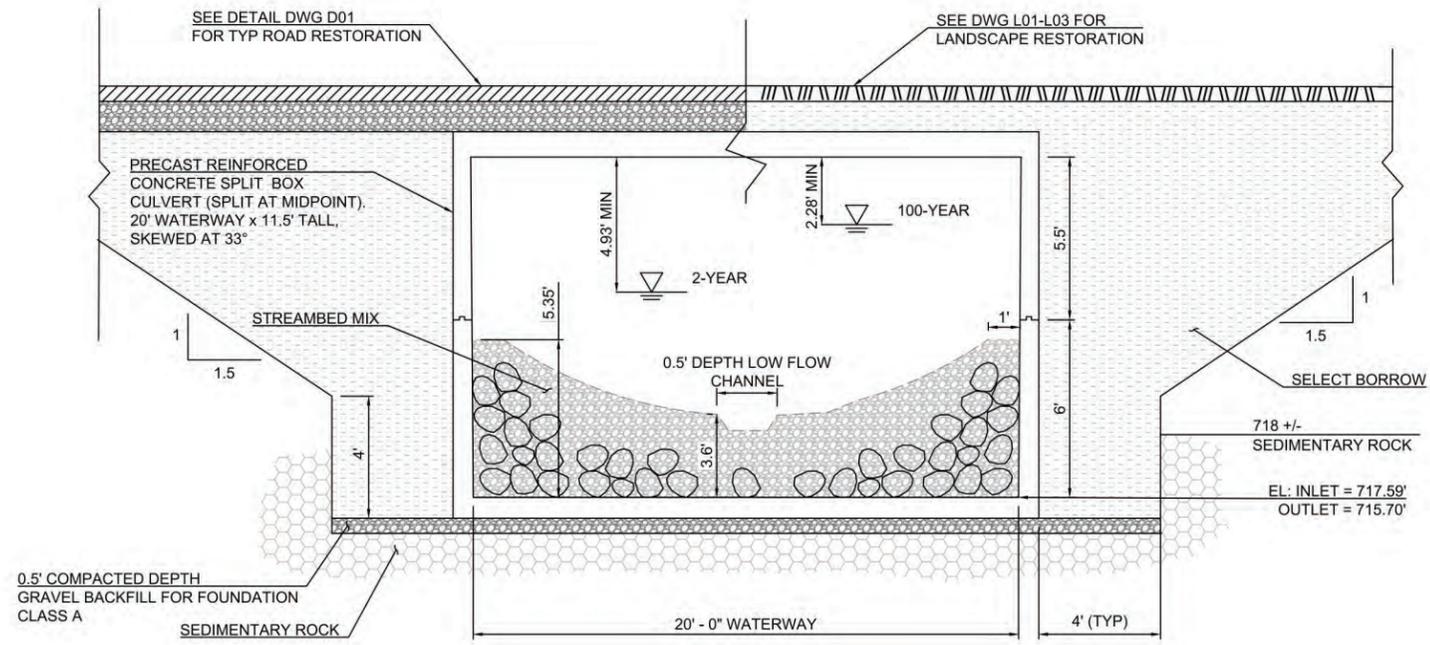
**PLAN VIEW**

- GENERAL NOTES:**
1. LARGE WOODY DEBRIS FEATURES AND THALWEG LOCATIONS ARE TO BE PLACED AS SHOWN ON PLANS. MINOR CHANGES TO THE WOOD FEATURES CAN BE MADE IN THE FIELD BY THE CONTRACTOR IF APPROVED BY THE ON-SITE REPRESENTATIVE.
  2. STREAMBED MIX: THREE PARTS 12" STREAMBED COBBLES SHALL BE MIXED THOROUGHLY WITH ONE PART STREAMBED SEDIMENT. TWO-MAN STREAMBED BOULDERS SHALL BE ADDED TO THE STREAMBED MIX AND PLACED AS DIRECTED BY THE ENGINEER.
  3. STREAMBED SEDIMENT IS TO PROVIDE STABILITY TO THE COBBLE MIX AND BE PLACED IN AREA OF VOIDS TO CREATE A UNIFORM, NON-POROUS BED.
  4. SEE DWG D03 FOR STREAMBED GRADATIONS.
  5. SEE LANDSCAPING PLANS ON DWG L01-L03 FOR FINAL STABILIZATION REQUIREMENTS.
  6. BANK PROTECTION SHALL NOT FILL MORE THAN 1 CY PER LINEAR FOOT OF NET FILL BELOW OHW.



**2 BANK PROTECTION**  
NOT TO SCALE

WINGWALL TABLE					
WINGWALL NO.	LENGTH (FT)	ANGLE TO CULVERT (DEGREES)	BEGIN HEIGHT (FT)	END HEIGHT (FT)	BOF ELEV
1	13	12	13.16	12.5	716.76
2	12	73	13.16	11.5	716.76

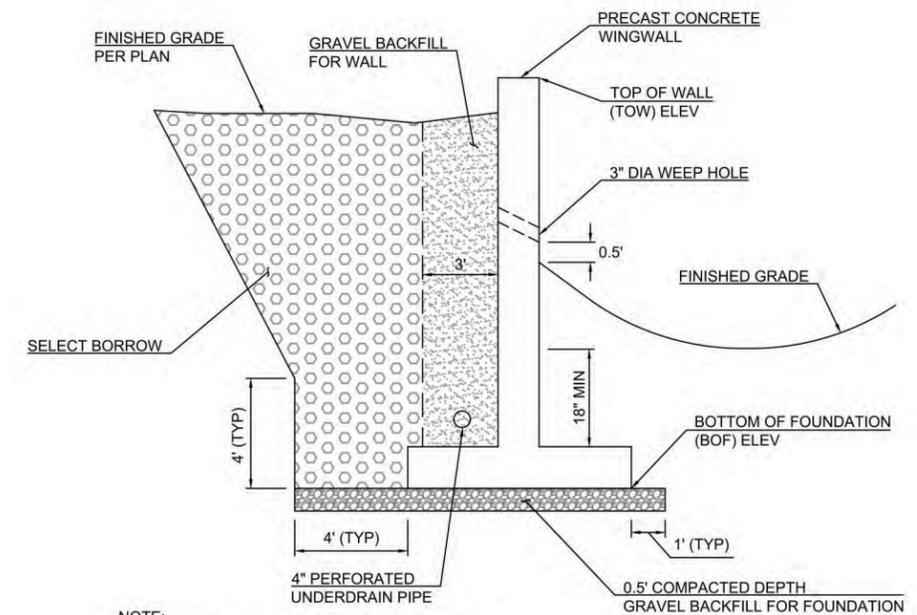


2-YEAR WATER SURFACE ELEVATIONS: INLET = 722.66'  
OUTLET = 722.17'

100-YEAR WATER SURFACE ELEVATIONS: INLET = 724.92'  
OUTLET = 724.86'

**1 PRECAST SPLIT BOX CULVERT**  
NOT TO SCALE

**NOTE:**  
CONTRACTOR SHALL PLACE TWO MAN STREAMBED BOULDERS AND COARSER MATERIAL ALONG THE CULVERT WALLS TO DEFINE THE CHANNEL IN THE CENTER OF THE CULVERT.



- NOTE:**
1. PRECAST WINGWALL TO BE DESIGNED AND PROVIDED BY CULVERT SUPPLIER. ENGINEER TO APPROVE DESIGN PRIOR TO CONSTRUCTION.
  2. SEE SHEET S-100 FOR TERMINATION OF PERFORATED UNDERDRAIN OUTSIDE OF WALL.

**3 PRECAST CONCRETE WINGWALL**  
NOT TO SCALE

L:\Projects\4500075328\_LewisCounty\Welding\75328\_003\_FraseCreekCulvert\Working\Sheet\75328\_003\_D01-D03.dwg Nov 22, 2017 01:45pm ddoge

**100% PLANS**

NO.	REVISION	BY	DATE	CHK

PROJECT: 75238.003  
DRAWN: DKE  
CHECKED: RED  
DATE: 11-22-2017  
DWG NO. **D02** SHEET NO. **8** OF **14**





**FRASE CREEK CULVERT REPLACEMENT**  
 NORTH OF CENTRALIA ALPHA RD ON PIGEON SPRINGS RD  
 LEWIS COUNTY PUBLIC WORKS

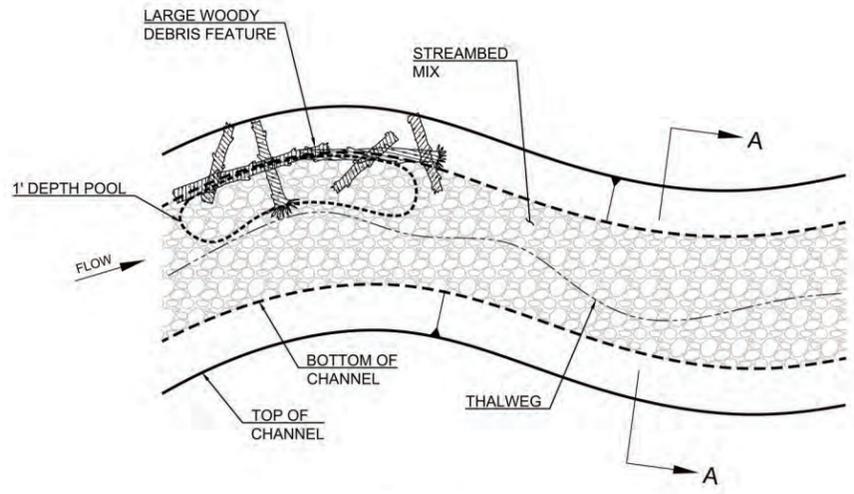
**DETAILS**

STREAMBED BOULDER SIZING	
ROCK SIZE	APPROXIMATE SIZE
TWO MAN	18" - 28"

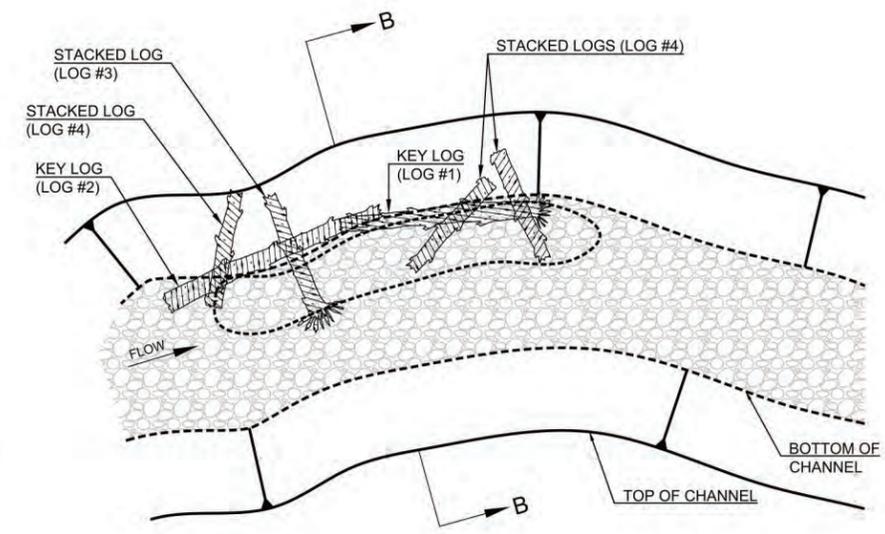
12" STREAMBED COBBLES GRADATION	
APPROXIMATE SIZE	% PASSING
12"	99 - 100
10"	70 - 90
5"	30 - 60
¾"	10 MAX

STREAMBED SEDIMENT GRADATION	
SIEVE SIZE	% PASSING
2.5"	99 - 100
2"	65 - 95
1"	50 - 85
U.S. NO. 4	26 - 44
U.S. NO. 40	16 MAX
U.S. NO. 200	5.0 - 9.0

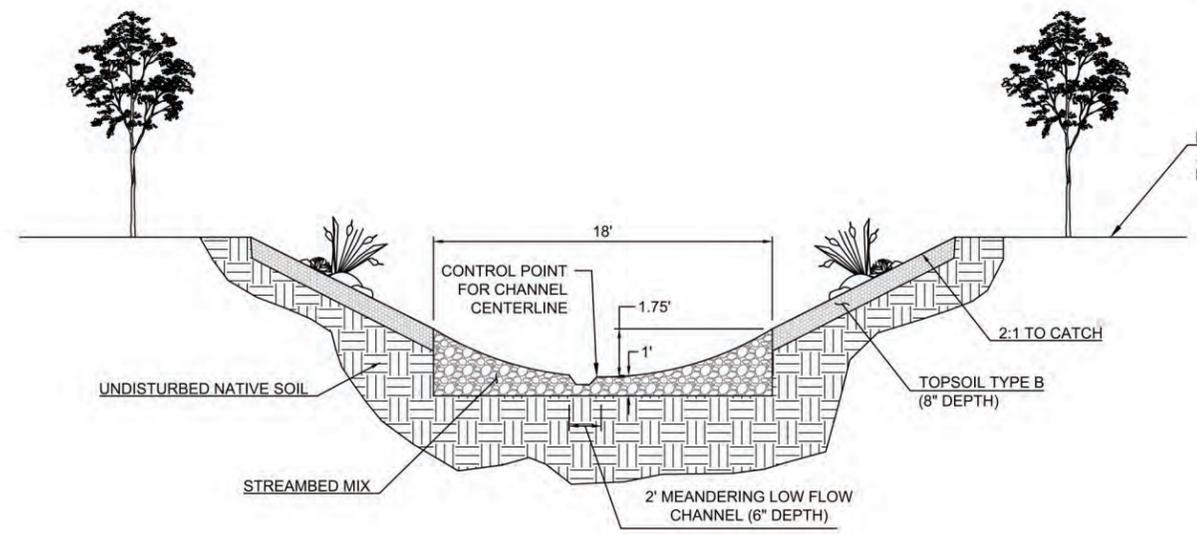
- GENERAL NOTES:**
- LARGE WOODY DEBRIS FEATURES AND THALWEG LOCATIONS ARE TO BE PLACED AS SHOWN ON PLANS. MINOR CHANGES TO THE WOOD FEATURES CAN BE MADE IN THE FIELD BY THE CONTRACTOR IF APPROVED BY THE ON-SITE REPRESENTATIVE.
  - STREAMBED MIX: THREE PARTS 12" STREAMBED COBBLES SHALL BE MIXED THOROUGHLY WITH ONE PART STREAMBED SEDIMENT. TWO-MAN STREAMBED BOULDERS SHALL BE ADDED TO THE STREAMBED MIX AND PLACED AS DIRECTED BY THE ENGINEER.
  - STREAMBED SEDIMENT IS TO PROVIDE STABILITY TO THE COBBLE MIX AND BE PLACED IN AREA OF VOIDS TO CREATE A UNIFORM, NON-POROUS BED.
  - SEE LANDSCAPING PLANS ON DWG L01-L03 FOR FINAL STABILIZATION REQUIREMENTS.



**CHANNEL PLAN**

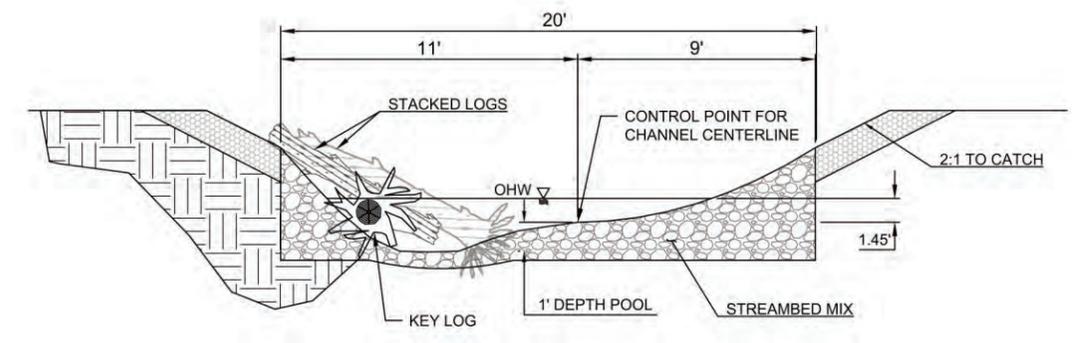


**LARGE WOODY DEBRIS PLAN**



**CHANNEL SECTION A-A**

**1 FRASE CREEK CHANNEL**  
 NOT TO SCALE



**LARGE WOODY DEBRIS SECTION B-B**

**2 LARGE WOODY DEBRIS FEATURE**  
 NOT TO SCALE

**100% PLANS**

NO.	REVISION	BY	DATE	CHK

PROJECT: 75238.003  
 DRAWN: DKE  
 CHECKED: RED  
 DATE: 11-22-2017

DWG NO. **D03** SHEET NO. **9** OF **14**

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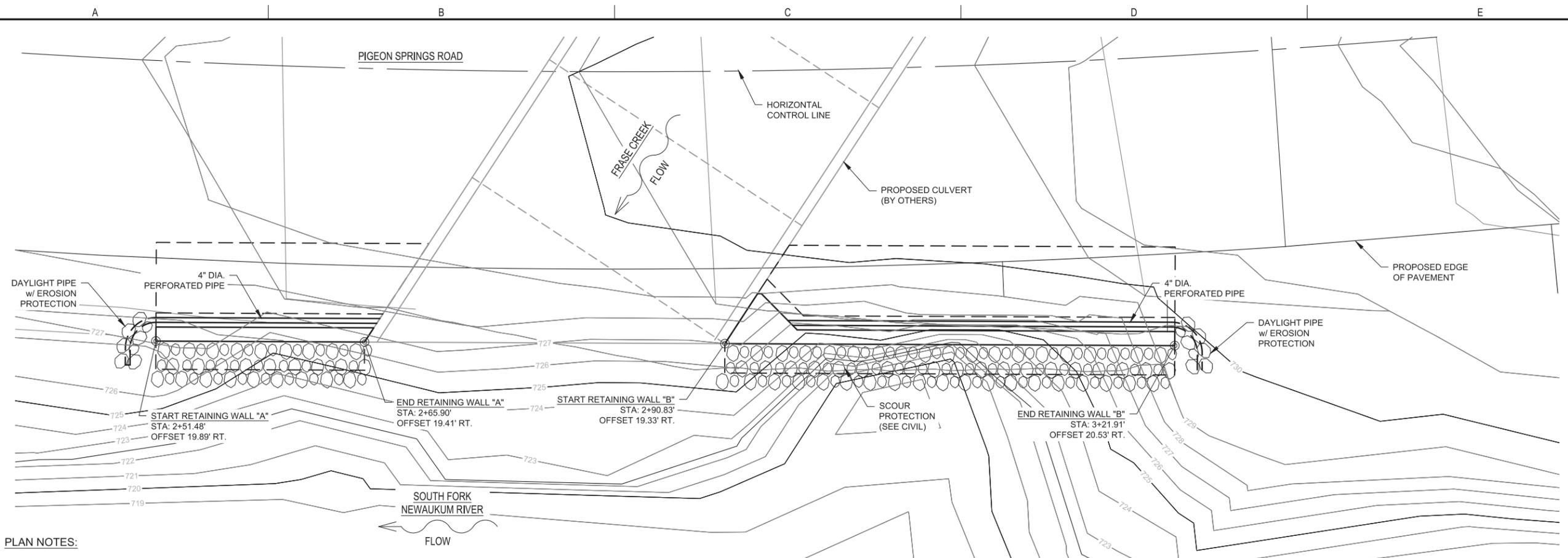






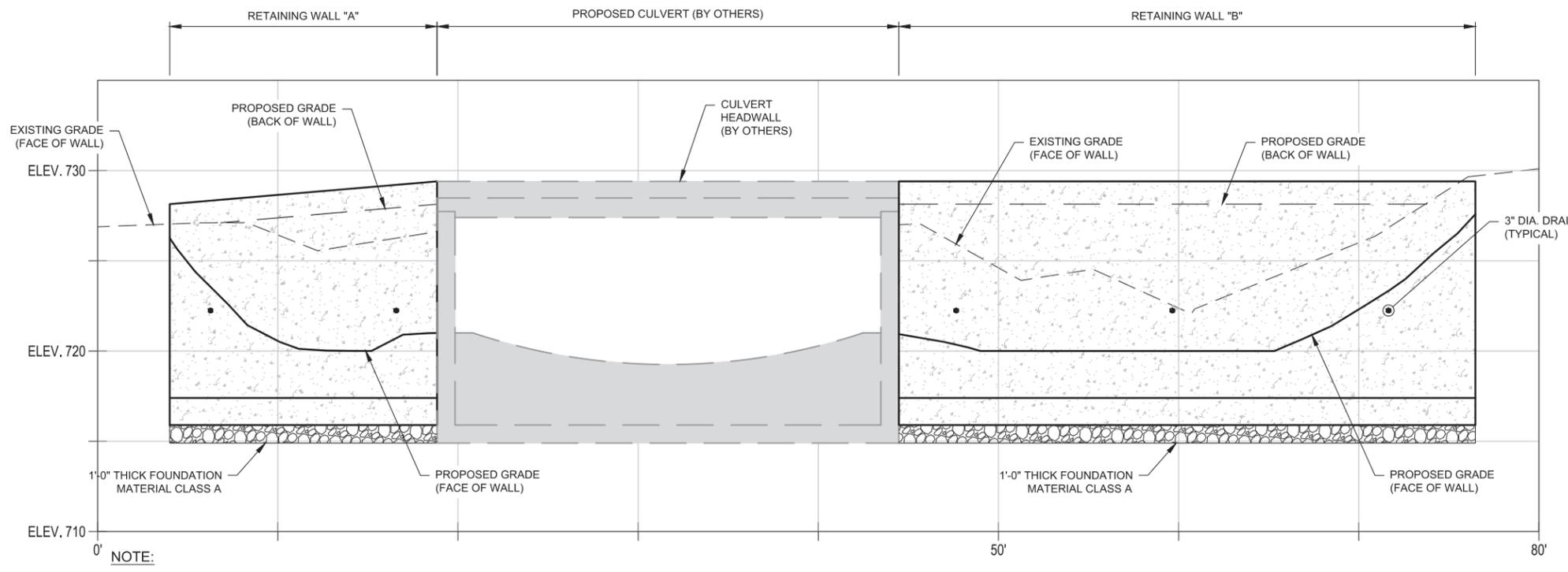






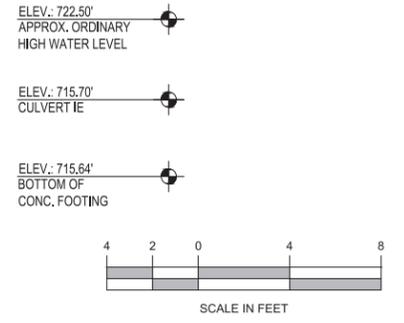
- PLAN NOTES:**
- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2016 WSDOT STANDARD SPECIFICATIONS.
  - SEE SHEET S-200 FOR MATERIAL AND CONSTRUCTION NOTES.

**RETAINING WALLS - PLAN VIEW**  
SEE BAR SCALE



- NOTE:**
- SCOUR PROTECTION NOT SHOWN FOR CLARITY (SEE CIVIL).

**RETAINING WALLS - ELEVATION VIEW**  
SEE BAR SCALE



REV.	DATE	DESCRIPTION
2	11/21/2017	REVISED ELEVATIONS
1	06/12/2017	REVISED RETAINING WALL LAYOUT
0	05/04/2017	ISSUE FOR BID

**APTUM**  
411 NE 6TH AVENUE SUITE D  
CAMAS, WA 98607  
TEL: (860) 216-4086

DESIGN: MBD  
DRAWN: SL/MC  
CHECKED: SAZ  
APPROVED: MBD  
DATE SUBMITTED: 06/12/2017

**FRASE CREEK CULVERT RETAINING WALLS**  
46° 37' 24.6"N 122° 37' 56.0"W

**RETAINING WALLS  
PLAN & ELEVATION VIEWS**

**S-100**  
SHEET NO.









