



Project Location  
King County



# Washington State Recreational Conservation Office

## Preliminary Design of Bear Creek Reach 6 Restoration Phase 2 SRFB #15-1059

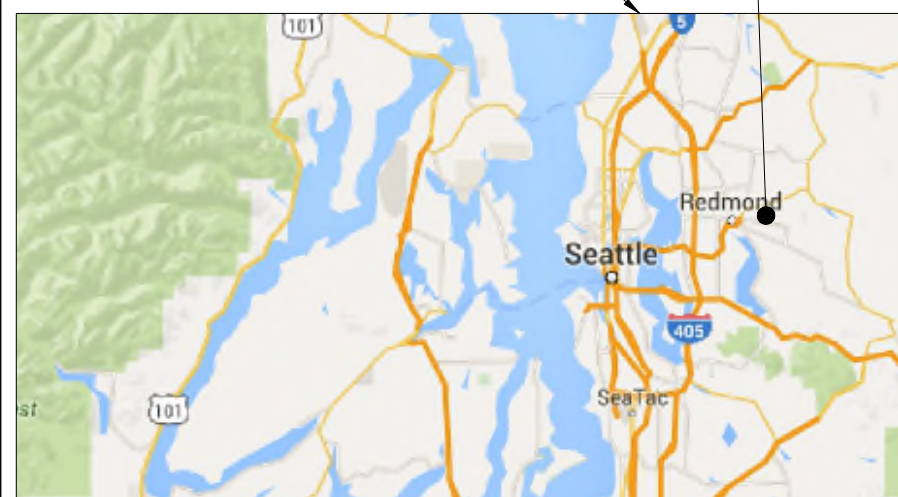
PREPARED  
BY:



860 Windrose Drive  
Coupeville, Washington 98239  
(360) 678-4747  
**Professional Consulting Engineers**

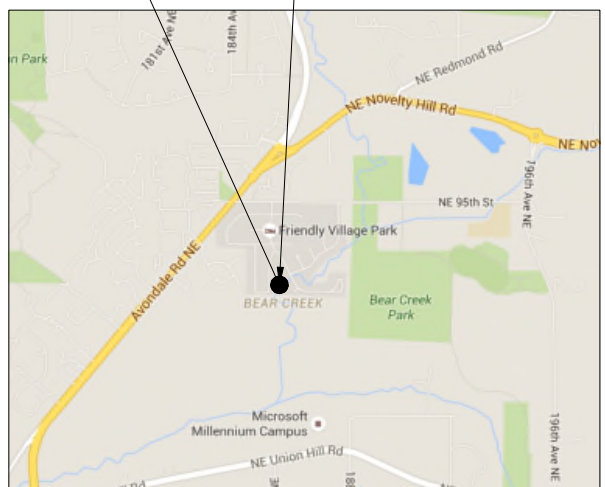
PREPARED  
for:

## Adopt-A-Stream Foundation Everett, WA



To Tacoma

Project Locations



Project Location  
SE1/4 NW1/4 S6 T25N R6E WM  
Lat - 47°40'58.06"N  
Long- 122° 5'36.66"W  
King County

### VICINITY MAPS



### Project Manager

Walter Rung  
Adopt-A-Stream Foundation  
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APPROVED AT CHINOOK ENGINEERING: April 12, 2016  
DATE

1" Bar at Original Scale



REV	DATE	ISSUE	DWG	DES	CHK	APP
1	4-12-2016	Issued for Review	JSK	JSK	JSK	JSK
2	12-16-16	Issued for Final Design				
3						
4						
PROJECT NO. 15236						

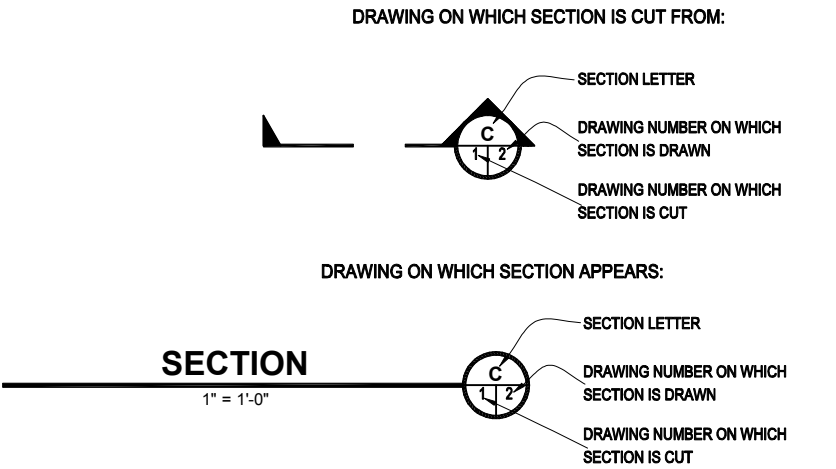
WA State Recreation Conservation Office  
15-1059 SE1/4 NW1/4 S6 T25N R6E WM  
**Bear Creek Reach 6 Restoration Phase 2**  
Cover

DRAWING NO.  
**CVR**  
1 OF 11

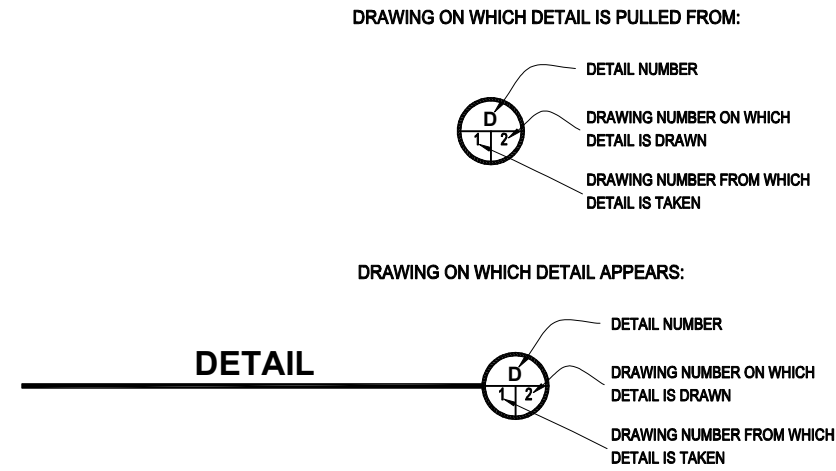
ABBREVIATIONS:

%	PERCENT	L	for rebar LONGITUDINAL
&	AND	L	LENGTH OF CURVE
@	AT	L	ANGLE IRON
AB	ANCHOR BOLT	L	for rebar LONGITUDINAL
ABV	ABOVE	LF	LINEAR FOOT
AL	ALUMINUM	LG	LONG
ALG	ALONG	LOC	LOCATION
ALT	ALTERNATE	LOD	LARGE ORGANIC DEBRIS
ALUM	ALUMINUM	LWD	LARGE WOODY DEBRIS
APPROX or -	APPROXIMATELY	LP	LOW PRESSURE
ASPH	ASPHALT	LP	LOW POINT
ASSOC	ASSOCIATION	MANUF	MANUFACTURER
AVG	AVERAGE	MAX	MAXIMUM
BOT	BOTTOM	MEZZ	MEZZANINE
B.O.F.	BOTTOM OF FOOTING	MH	MANHOLE
B.O.P.	BEGINNING OF PROJECT	MIN	MINIMUM
BF	BUTTERFLY	MUTCD	MANUAL ON UNIFORM TRAFFIC
BLDG	BUILDING		CONTROL DEVICES FOR
BVC	BEGIN OF VERTICAL CURVE		STREETS AND HIGHWAYS
C	CHANNEL	N	NORTH or NORTHING
CIP	CAST-IN-PLACE	NAF	NEAR AND FAR
CL	CENTER LINE	NEC	NECESSARY
CLR	CLEAR	NIC	NOT IN CONTRACT
CMP	CORRUGATED METAL PIPE	NML	NORMAL or NOMINAL
CONC	CLEAN OUT	NO or #	NUMBER
CONC	CONCRETE	NTS	NOT TO SCALE
CY	CUBIC YARD	O.C.	ON CENTER
DEF	DEFINITION	PC	POINT OF CURVATURE
DESC	DESCRIPTION	PE	POLYETHYLENE
DET	DETAIL	PERF	PERFORATED
DI	DUCTILE IRON	PI	POINT OF INTERSECTION
DIA or $\phi$	DIAMETER	PL	PLATE
DIST	DISTRIBUTION OR DISTRIBUTOR	PL	PLATE
DS	DOWNSIDE	PLCS	PLACES
DWG	DRAWING	PROP	PROPOSED
E	EAST or EASTING	PS	PUMP STATION
E.O.P.	END OF PROJECT	PT	POINT OF TANGENCY
EA	EACH	PVC	POINT OF VERTICAL CURVE
EF	EACH FACE	RAD	RADIUS
EL or ELEV	ELEVATION	RD	ROAD
ELL	ELBOW	RED	REDUCER
EQ or EQUIV	EQUIVALENT	REF	REFERENCE
EVC	END VERTICAL CURVE	REINF	REINFORCEMENT
EW	EACH WAY	REQD	REQUIRED
EXIST or EX	EXISTING	ROW	RIGHT OF WAY
FAB	FABRICATOR, ED, TION	RW	RACEWAY
FB	FLAT BAR	S	SOUTH
FCA	FLANGE COUPLING ADAPTER	SC	SQUARE CORNER
FF or FIN FLR	FINISH FLOOR	SCH or SCHED	SCHEDULE
FL	FLOW LINE	SPA or SPCS	SPACE OR SPACES
FOC	FACE OF CURVE	SPEC	SPECIFICATIONS
FT or ' "	FEET	SS	STAINLESS STEEL
GALV	GALVANIZED	STA	STATION
GB	GRADE BREAK	STD	STANDARD
GS	GROUND SURFACE	STL	STEEL
HDBOX	HEADBOX	T	for rebar TRANSVERSE
HOPE	HIGH DENSITY POLYETHYLENE	TEMP	TEMPERATURE
HEX	HEXAGONAL	TOC	TOP OF CONCRETE
HORIZ	HORIZONTAL	TOF	TOP OF FOOTING
HP	HIGH PRESSURE	TOS	TOP OF SLAB
ID	INSIDE DIAMETER	TS	TUBE STEEL
IE	INVERT ELEVATION	TYP	TYPICAL
IN or " "	INCHES	UON	UNLESS OTHERWISE NOTED
INT	INTERSECTION	US	UPSTREAM
		VERT	VERTICAL
		VIC	VICTAULIC
		VPC	VERTICAL POINT OF CURVATURE
		VPI	VERTICAL POINT OF INTERSECT
		VPT	VERTICAL POINT OF TANGENCY
		W	WITH
		WF	WIDE FLANGE
		WT	WIDE TEE STEEL SECTION
		WWF	WELDED WIRE FABRIC
		$\Delta$	DEFLECTION ANGLE

SECTION INDICATOR:



DETAIL INDICATOR:



LEGEND:

	FNC	EXISTING FENCE
	2200	EXISTING CONTOUR
		EXISTING GRAVEL ROAD
	W	EXISTING WATER
	P	EXISTING POWER
	T	EXISTING TELEPHONE
	M	EXISTING WATER MANHOLE W/ METER
		EXISTING POWER POLE
		EXISTING MONITORING WELL
	FNC	FENCE
		ASPHALT PAVED ROAD
	(V)1 2(H) 2:1	SLOPE DESIGNATION
		FLOW DIRECTION
		BUILDING
		CATCH BASIN
		TELEPHONE/POWER RISER
	P	POWER
	W	WATER (POTABLE)
	PW	PROCESS WATER
	T	TELEPHONE
		TRANSVERSE DRAINAGE STRUCTURE
	8%	GRADE
		RETAINING WALL



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PROJECT NO. 15236

WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

**Bear Creek Reach 6 Restoration Phase 2**  
**Abbreviations**



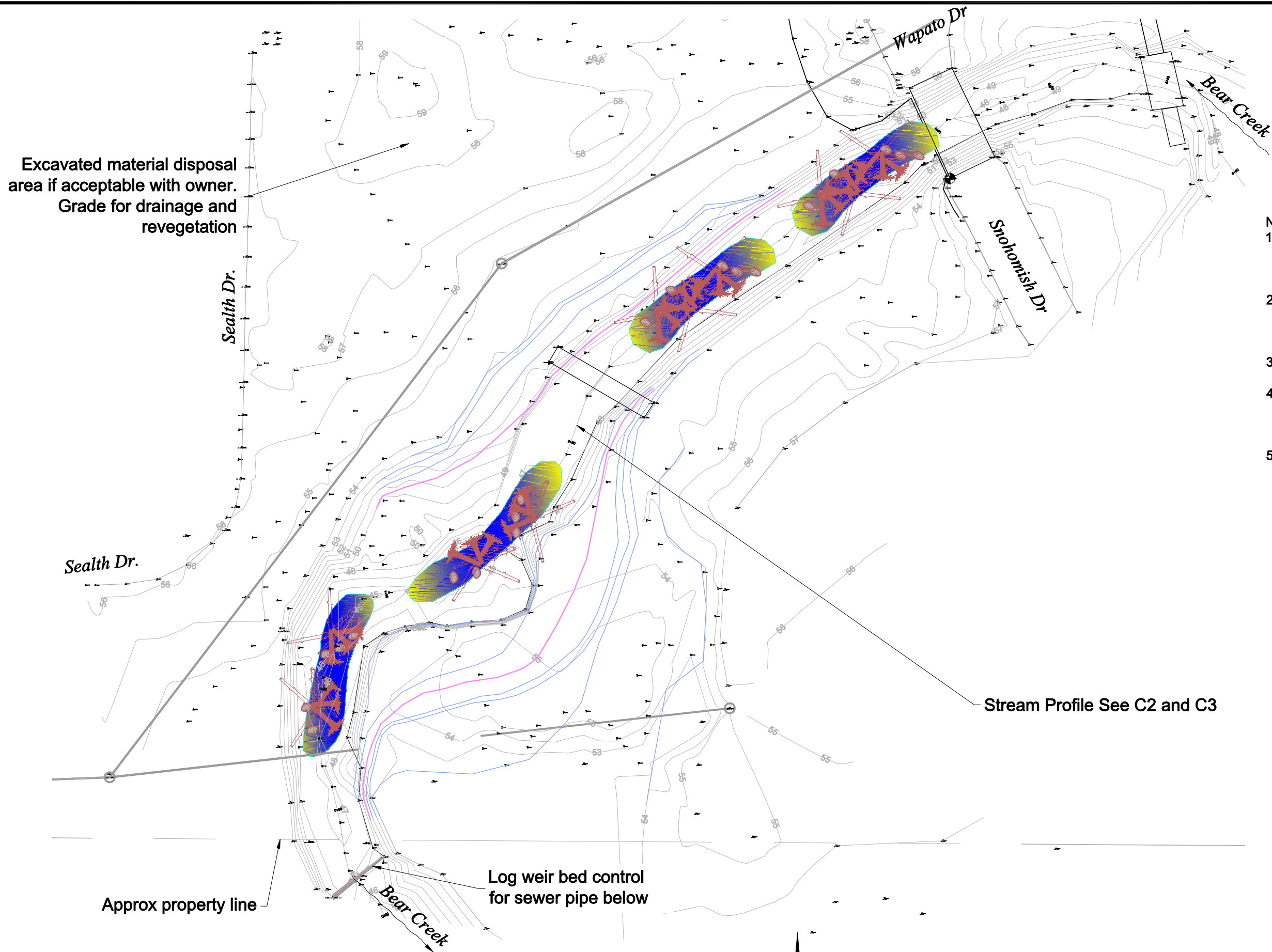
1" Bar at Original Scale



All work performed under these contract documents shall be in accordance with the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction, M41-10, most recent version. In the event of a conflict between the following attached specifications and the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction, M41-10, the attached specifications on this sheet for this contract shall prevail. Special Provisions shall follow and then the WSDOT M41-10.

<b>AAWA</b>	<b>Architectural Aluminum Manufacturers' Association</b>
<b>ACI</b>	<b>American Concrete Institute</b>
<b>AISC</b>	<b>American Institute of Steel Construction</b>
<b>ANSI</b>	<b>American National Standards Institute</b>
<b>APA</b>	<b>American Plywood Association</b>
<b>APWA</b>	<b>American Public Works Association</b>
<b>AREA</b>	<b>American Railway Engineering Association</b>
<b>ASCE</b>	<b>American Society of Civil Engineers</b>
<b>ASHRAE</b>	<b>American Society of Heating, Refrigerating and Air Conditioning Engineers</b>
<b>ASME</b>	<b>American Society of Mechanical Engineers</b>
<b>ASTM</b>	<b>American Society For Testing of Materials</b>
<b>AWPA</b>	<b>American Wood Preservers Association</b>
<b>AWS</b>	<b>American Welding Society</b>
<b>AWWA</b>	<b>American Water Works Association</b>
<b>WSDOT</b>	<b>Washington Standard Specifications for Road, Bridge, and Municipal Construction, M41-10</b>





**Know what's below.  
Call before you dig.**

**Notes:**

1. Elevations based on data obtained from Chinook Engineering. Survey completed for work on this project. Vertical Datum is NAVD 88.
2. All precise elevations and locations must be field verified during construction when setting grades with engineer.
3. Construction surveying shall be the responsibility of the contractor.
4. Staging of equipment and materials is allowed on the landowner property but is very limited.
5. Any damage to area, survey monuments, utilities or sewer installed in the road embankment from construction staging, track loads, heavy wheel loads or other activities shall be restored to original condition at Contractors cost.



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15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

**Bear Creek Reach 6 Restoration Phase 2  
Overall Site Plan**



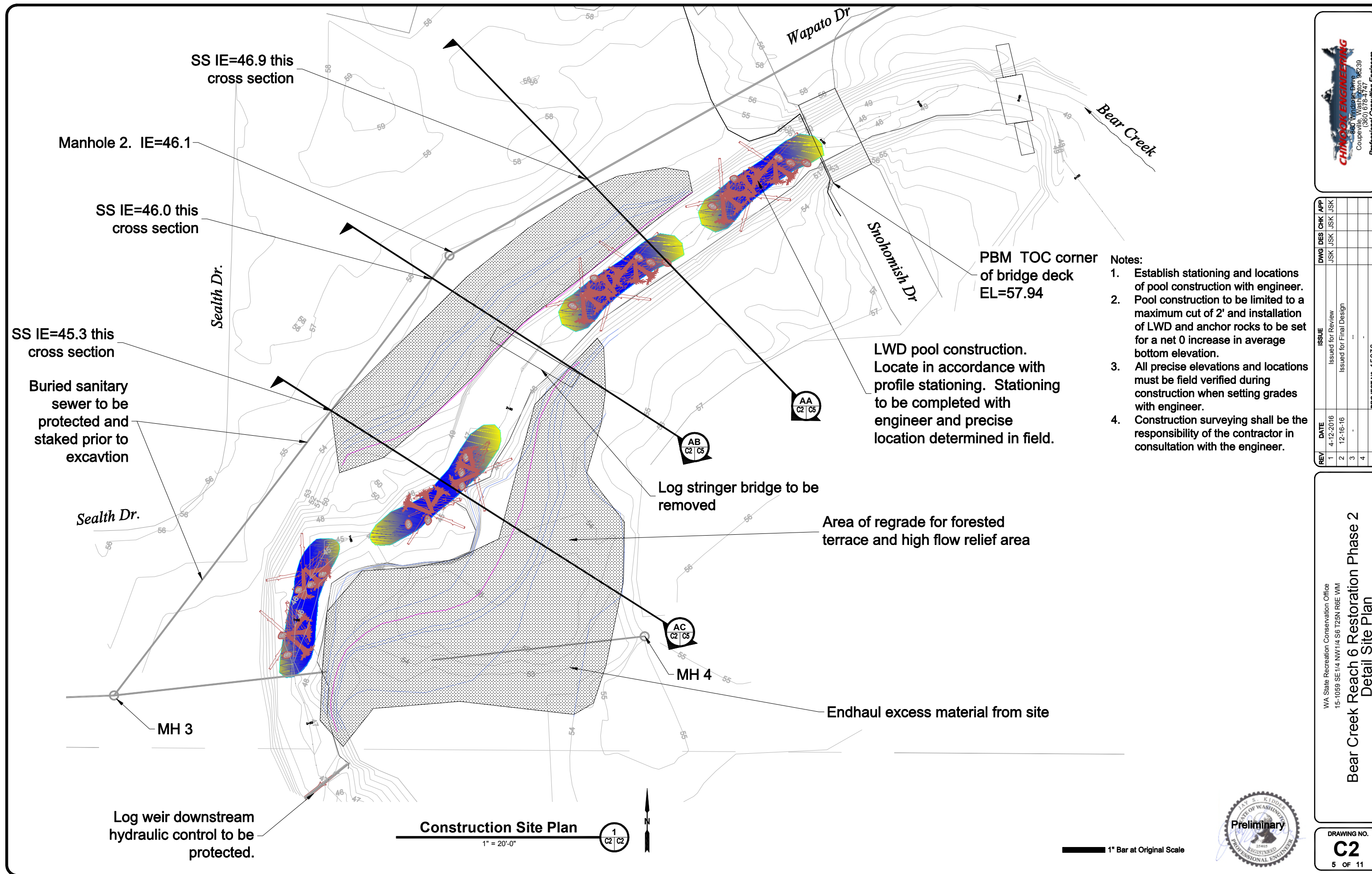
**Site Plan**  
1" = 20'-0"



1" Bar at Original Scale

DRAWING NO.  
**C1**  
4 OF 11





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4						

PROJECT NO. 15236

- Notes:
1. Establish stationing and locations of pool construction with engineer. Pool construction to be limited to a maximum cut of 2' and installation of LWD and anchor rocks to be set for a net 0 increase in average bottom elevation.
  2. All precise elevations and locations must be field verified during construction when setting grades with engineer.
  3. Construction surveying shall be the responsibility of the contractor in consultation with the engineer.

PBM TOC corner of bridge deck EL=57.94

LWD pool construction. Locate in accordance with profile stationing. Stationing to be completed with engineer and precise location determined in field.

Log stringer bridge to be removed

Area of regrade for forested terrace and high flow relief area

Endhaul excess material from site

SS IE=46.9 this cross section

Manhole 2. IE=46.1

SS IE=46.0 this cross section

Sealth Dr.

SS IE=45.3 this cross section

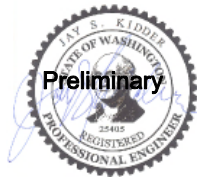
Buried sanitary sewer to be protected and staked prior to excavation

Sealth Dr.

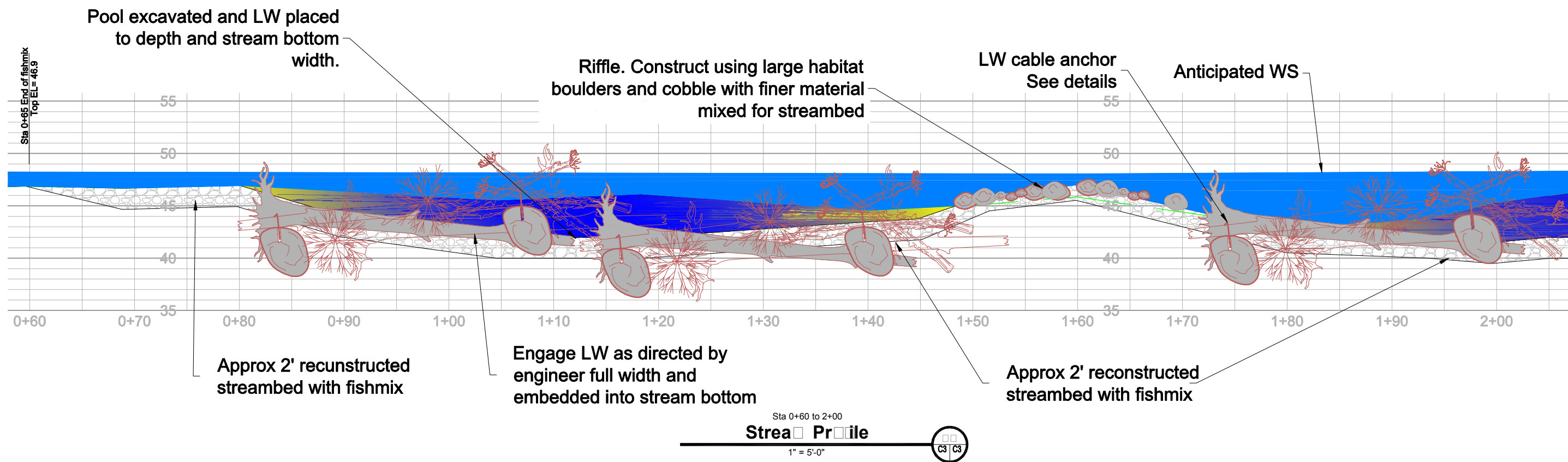
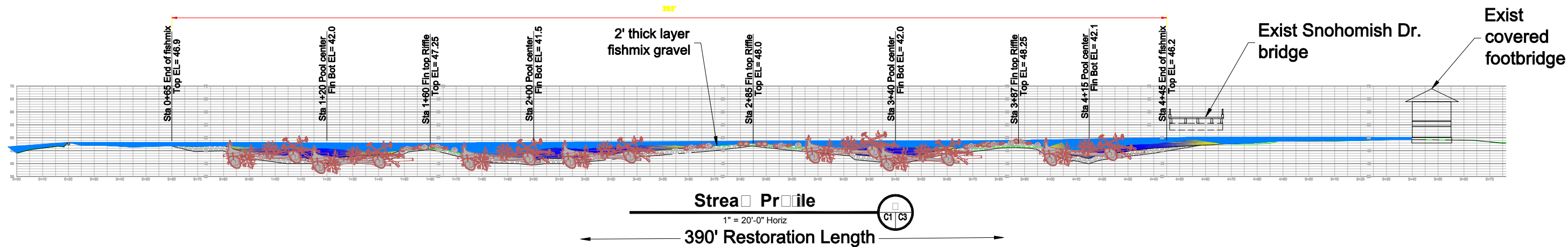
MH 3

Log weir downstream hydraulic control to be protected.

**Construction Site Plan**  
1" = 20'-0"



1" Bar at Original Scale



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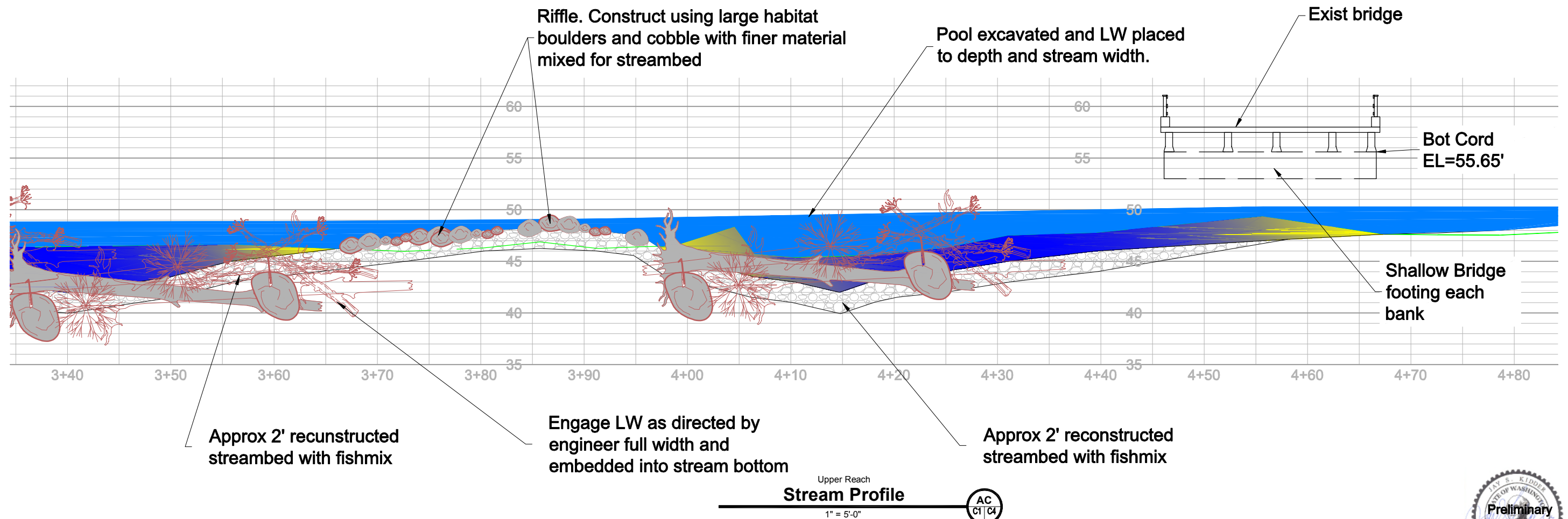
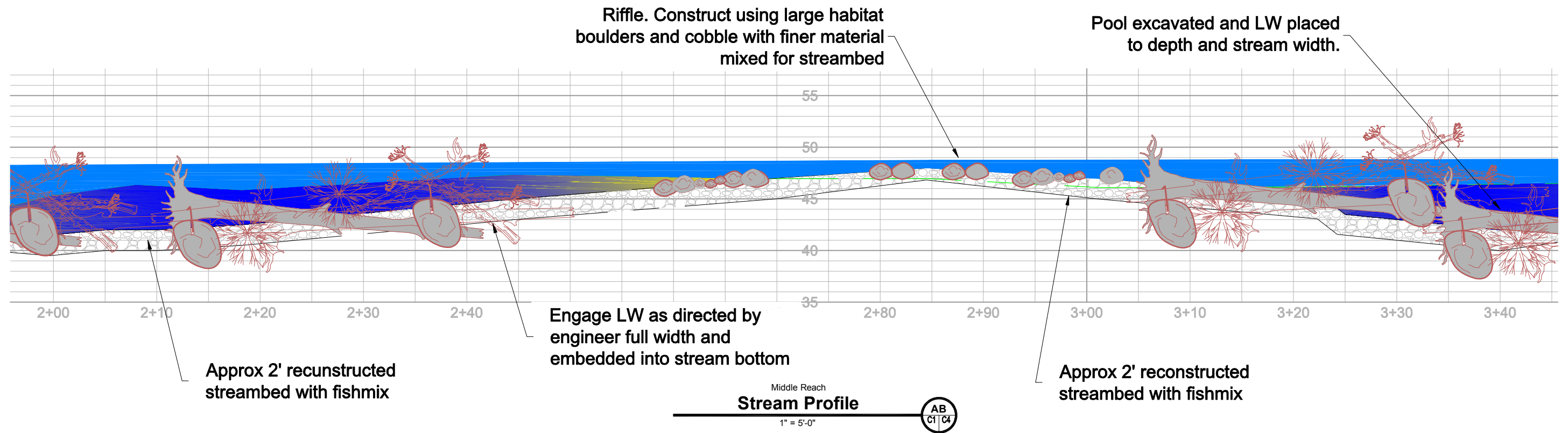
WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

**Bear Creek Reach 6 Restoration Phase 2**  
Stream Profiles

DRAWING NO.  
**C**  
6 OF 11

1" Bar at Original Scale





1" Bar at Original Scale



WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

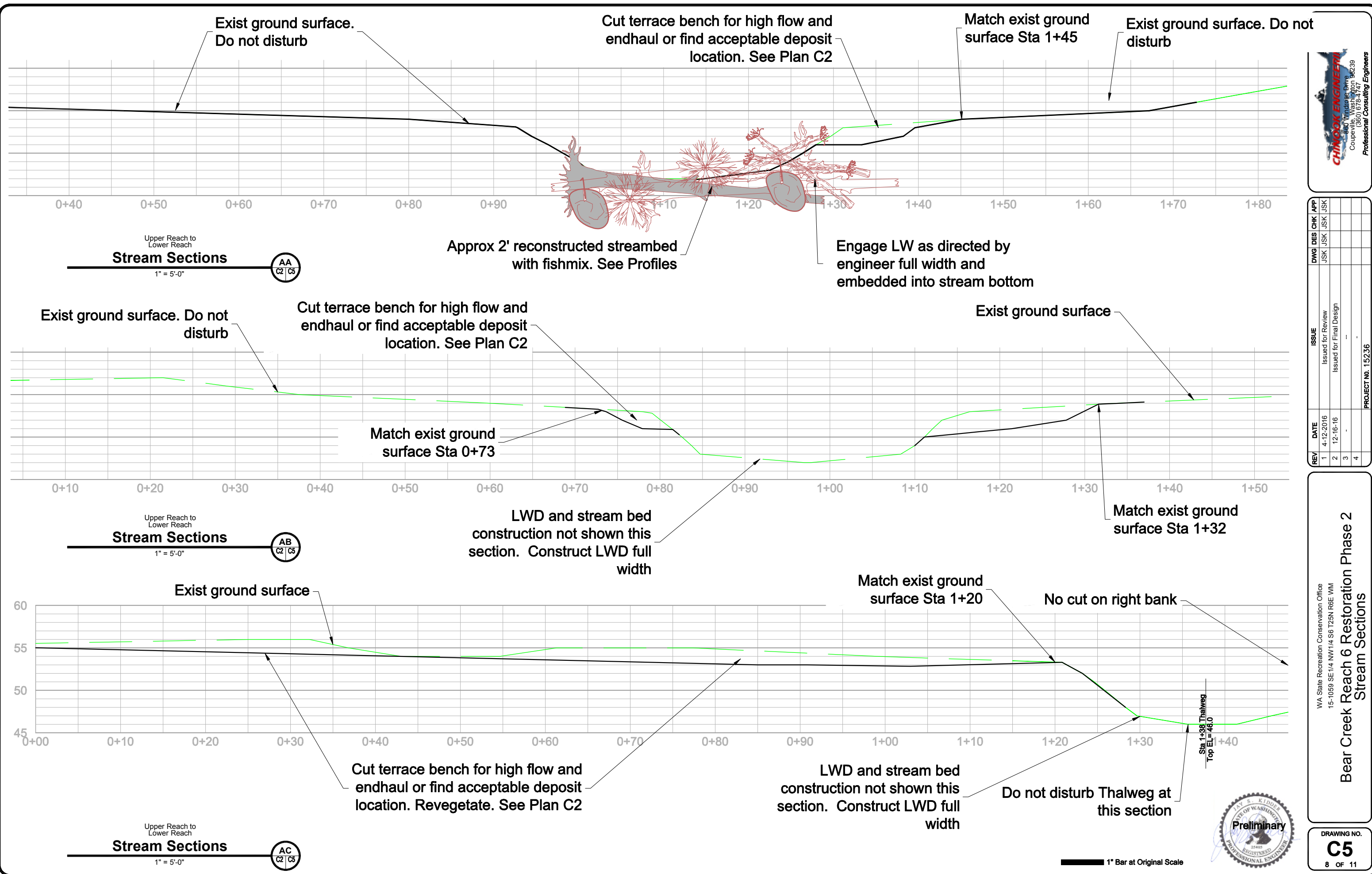
**Bear Creek Reach 6 Restoration Phase 2**  
**Stream Profiles continued**

DRAWING NO.  
**C4**  
7 OF 11

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PROJECT NO. 15236

**CHINOOK ENGINEERING**  
960 Windrose Drive  
Coupeville, Washington 98239  
(360) 678-4747  
Professional Consulting Engineers



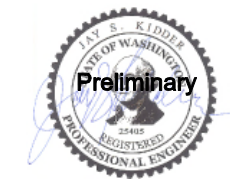
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WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

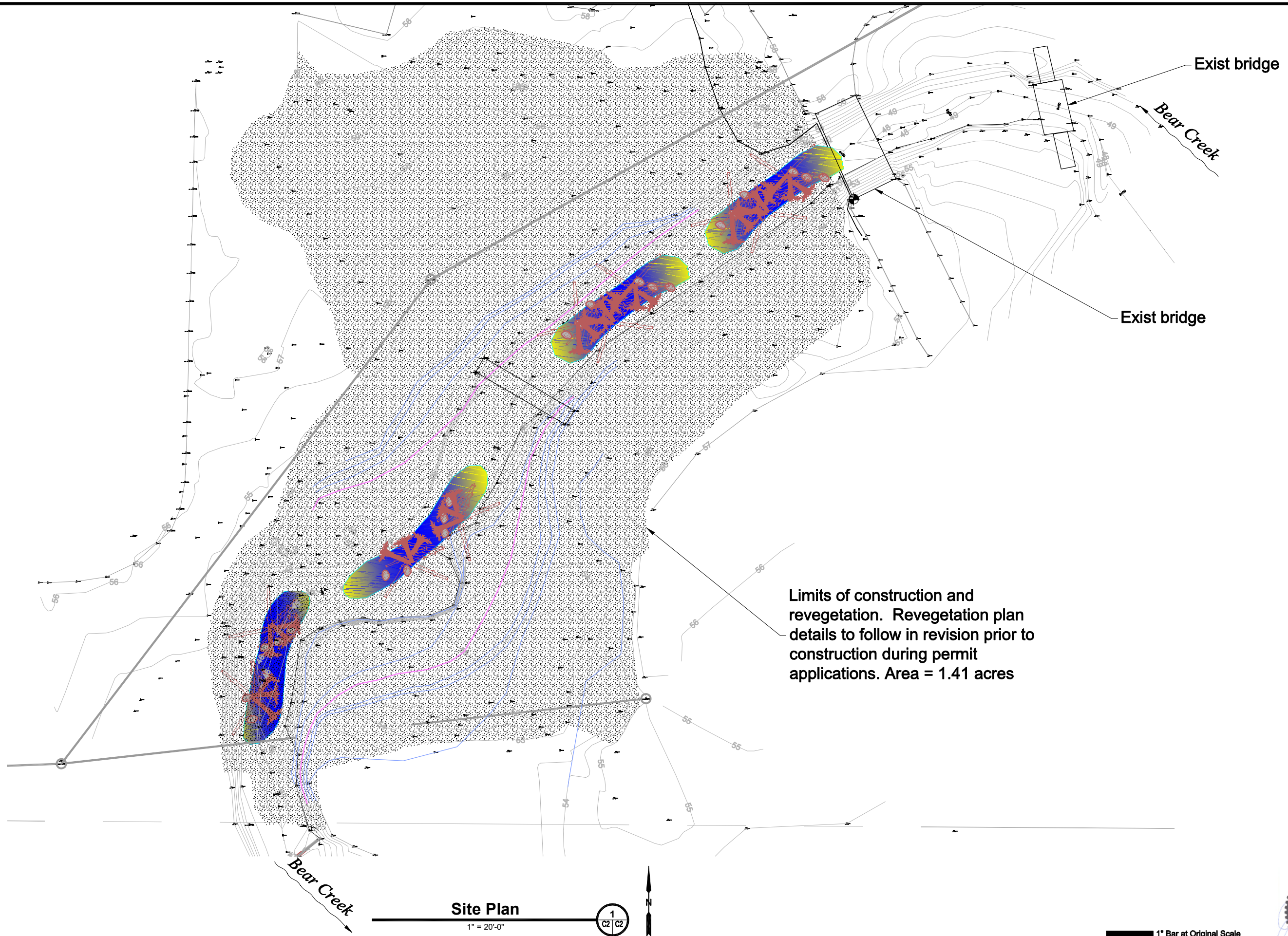
**Bear Creek Reach 6 Restoration Phase 2  
Stream Sections**

DRAWING NO. **C5**  
8 OF 11



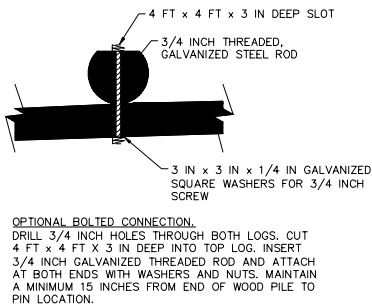
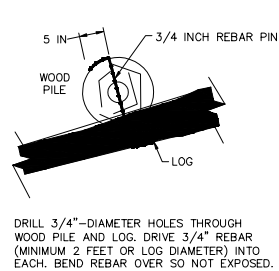
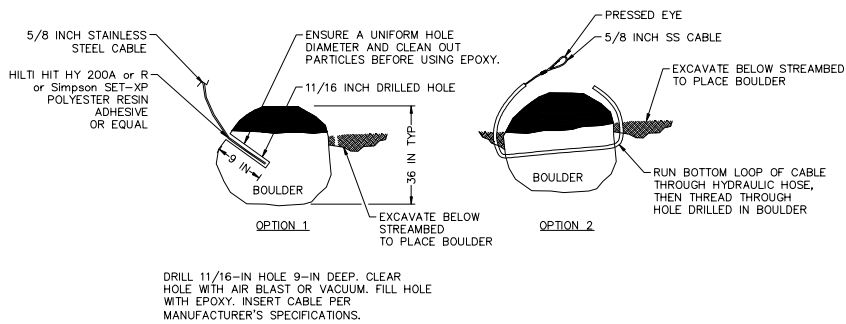
1" Bar at Original Scale





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15-1059 SE 1/4 NW1/4 S6 T25N R6E WM  
**Bear Creek Reach 6 Restoration Phase 2**  
Construction Limits



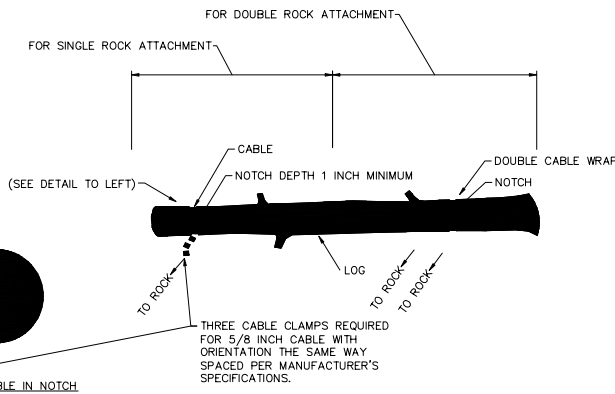
## LW Anchoring Details

NTS

1  
C12/C12

### Notes:

1. All Large Wood Debris (LWD or LW) shall be competent and not rotten and in good condition. No salvaged boom logs shall be used. Large branches and tangled roots are beneficial. Do not trim.
2. LWD with rootwads shall have roots attached.
3. Habitat boulders shall be sized according to table this sheet and are estimates. Size and quality shall be as per WSDOT. See specifications.
4. All LWD shall be approved in writing piece by piece by engineer prior to transport to the site for staging.
5. Racking material may be reservoir salvaged wood, or pieces of deciduous wood but not key members.
6. Species shall include and be limited to Douglas Fir, Spruce, Cedar, or other Fir spp. or other evergreen.
7. Rootwads of 24" DBH shall be 40' and 20' long approximately and within 2' of that length.
8. Straight logs of 24" DBH shall be 40' and 20' long approximately and within 2' of that length.
9. Racking material shall be utilized to fill voids in LWD structures and shall not be floatable.
10. Care shall be taken to anchor all installed wood with cables as shown on this sheet.
11. Cable shall be all Type 304 6X19 stainless steel, 35,000 pound breaking strength. All cable fittings shall be stainless steel to match  $\frac{5}{8}$ " cable. Chain if used shall be  $\frac{3}{8}$ " hot dipped galvanized all chain fittings and shackles shall be hot dipped galvanized and shall not be mixed with stainless steel cable.
12. Anchor epoxy shall be Hilti HIT HY-200A or 200R, or Simpson SET-XP. All holes drilled in rock shall be cleaned with air blasts or vacuum prior to placing cable and epoxy. Hole size for  $\frac{5}{8}$ " SS cable shall be  $\frac{3}{4}$ " diameter.
13. Clean holes in rock, inject mixed epoxy to partially fill hole, then set SS cable into hole until epoxy is displaced out hole with a remnant amount showing for inspection. Special inspection required.
14. All cable anchors shall be tested by lifting all rocks with cable free end and cable grips for full weight or more in a dynamic swing or lift. Special inspection required.



LWD ANCHOR TABLE ASSUMING TWO ROCKS PER LWD PIECE (WEIGHT OF EACH ROCK, ROCK DIAMETER)				
LOG LENGTH (FEET, TIP TO BASE)				
LOG DIAMETER (INCHES)	10	20	30	40
12	570 LBS, 22 INCH	1050 LBS, 27 INCH	1530 LBS, 27 INCH	
18	1150 LBS, 28 INCH	1870 LBS, 33 INCH	2600 LBS, 37 INCH	3300 LBS, 40 INCH
24	1630 LBS, 31 INCH	2600 LBS, 36 INCH	3500 LBS, 41 INCH	4500 LBS, 44 INCH
36	2400 LBS, 36 INCH	3800 LBS, 42 INCH	5300 LBS, 46 INCH	6700 LBS, 50 INCH

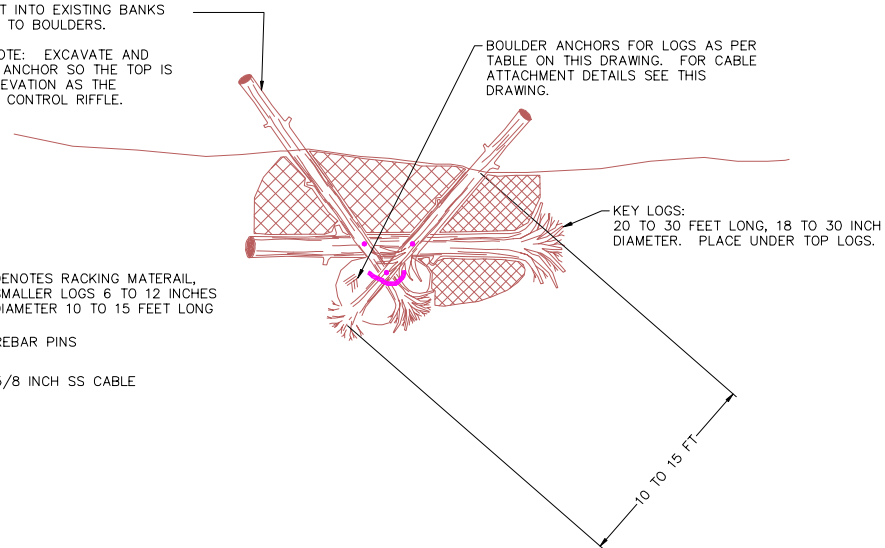
#### ASSUMPTIONS

1. VALUES ARE FOR EACH ROCK.
2. LOGS HAVE ROOTWADS ATTACHED
3. LOG DIAMETER IS AVERAGE OF BASE AND END

TOP LOGS:  
15 TO 18 INCH DIAMETER, 20 TO 30 FEET LONG. TRENCH EXCAVATE TO BURY 10 FEET INTO EXISTING BANKS AND ANCHOR TO BOULDERS.

ELEVATION NOTE: EXCAVATE AND PLACE ROCK ANCHOR SO THE TOP IS THE SAME ELEVATION AS THE DOWNSTREAM CONTROL RIFFLE.

- DENOTES RACKING MATERAIL, SMALLER LOGS 6 TO 12 INCHES DIAMETER 10 TO 15 FEET LONG
- REBAR PINS
- 5/8 INCH SS CABLE



## LW Anchoring and Pinning

NTS

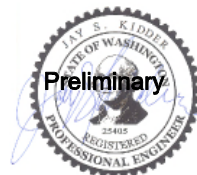
2  
C12/C12

Log and Anchor Boulder Schedule	
Location	Total
Materials	
Habitat Boulders, 4-5 man assumed	100
Rootwad 24" DBH x 40'	40
Rootwad 24" DBH 20'	40
Straight Log 18-24" DBH x 40'	20
Straight Log 12-14" DBH x 20'	20
Racking material, 12" dbh and smaller	200

## LW and Anchor Rock Table

NTS

3  
C12/C12



WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

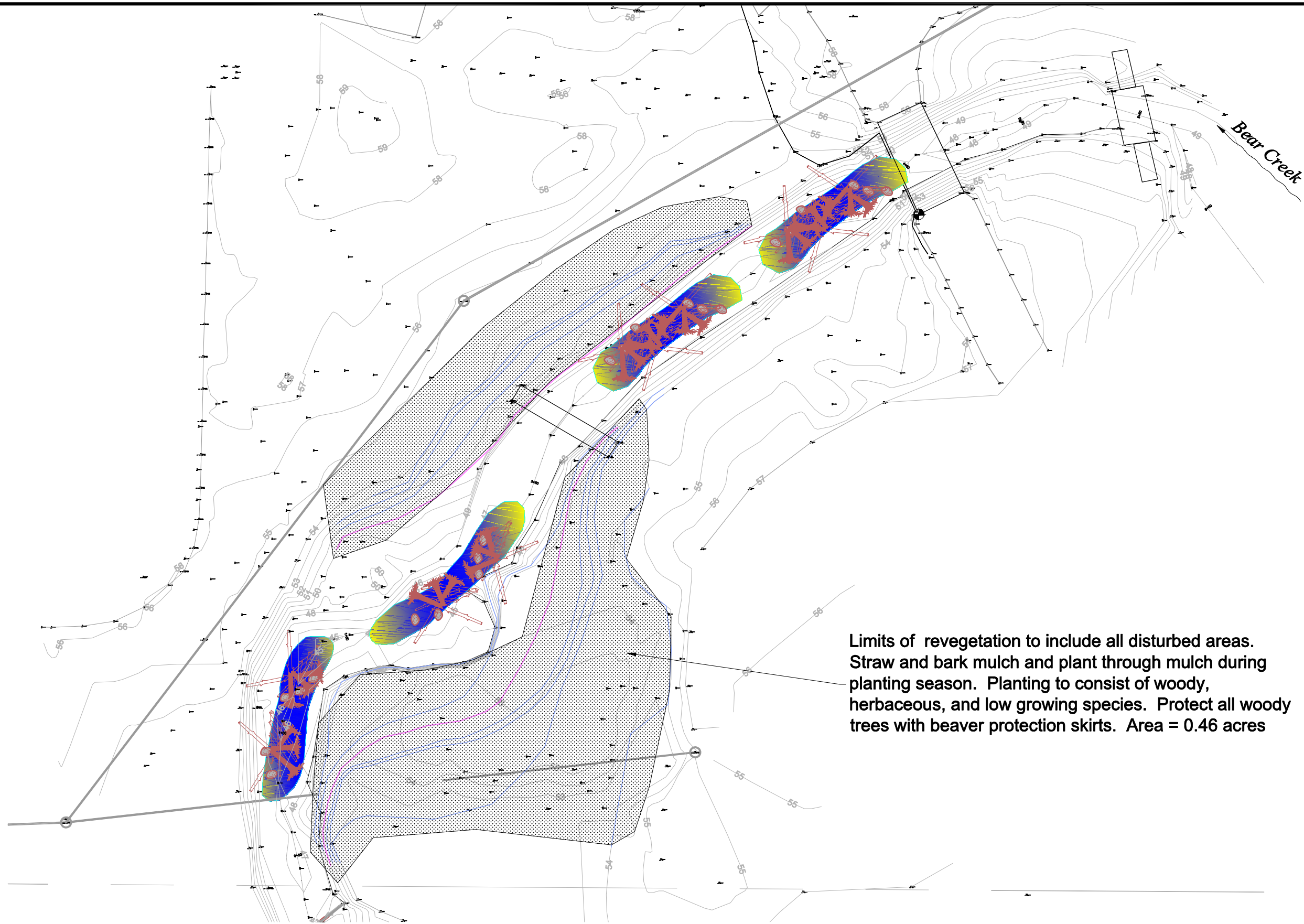
**Bear Creek Reach 6 Restoration Phase 2**  
Construction Limits

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**C7**  
10 OF 11

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Limits of revegetation to include all disturbed areas. Straw and bark mulch and plant through mulch during planting season. Planting to consist of woody, herbaceous, and low growing species. Protect all woody trees with beaver protection skirts. Area = 0.46 acres

# Revegetation Site Plan

1" = 20'-0"

1  
C2 C8



WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM  
**Bear Creek Reach 6 Restoration Phase 2  
Revegetation Plan**

DRAWING NO.  
**C8**  
11 OF 11

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