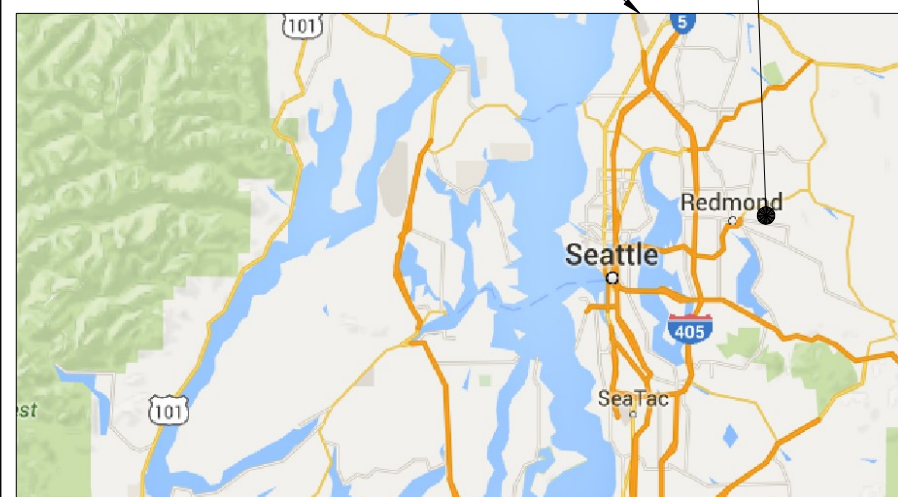


Project Location  
King County



Know what's below.  
Call before you dig.

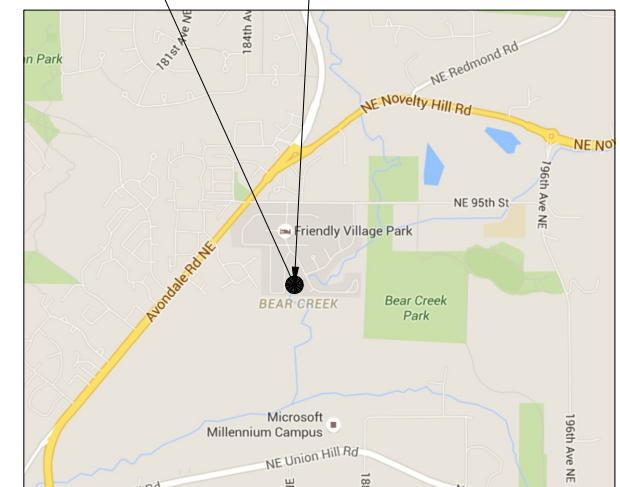
Project Location  
SE1/4 NW1/4 S6 T25N R6E WM  
Lat - 47°40'58.06"N  
Long- 122° 5'36.66"W  
King County



To Tacoma

To Everett

Project Locations



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

PREPARED  
for:

**Adopt-A-Stream Foundation  
Everett, WA**



**Project Manager**

**Walter Rung**  
Adopt-A-Stream Foundation  
NW Stream Center 600 -128th Street SE  
Everett, WA 98208  
Email: [walterr@streamkeeper.org](mailto:walterr@streamkeeper.org)

**VICINITY MAPS**

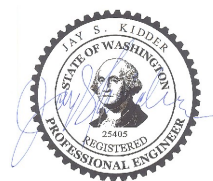


**Jay S. Kidder, P.E.**  
Project Engineer  
Chinook Engineering  
360-672-5528

INDEX OF DRAWINGS		
NO.	SHT NO.	TITLE
1	CVR	Cover Sheet
2	ABBV	Abbreviations
3	SPECS	Specifications
4	C-1	Overall Site Plan
5	C-2	Site Plan
6	C-3	Stream Profiles
7	C-4	Stream Profiles continues
8	C-5	Construction Limits
9	C-6	LWD Anchoring Details
10	C-7	Anchoring Details
11	C-8	Revegetation Plan

APPROVED AT CHINOOK ENGINEERING: \_\_\_\_\_ DATE \_\_\_\_\_

1" Bar at Original Scale





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

REV	DATE	ISSUE	DWG	DES	CHK	APP
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4						

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**  
Cover

ABBREVIATIONS:

%	PERCENT	INT	INTERSECTION
&	AND	L	for rebar LONGITUDINAL
@	AT	L	LENGTH OF CURVE
AB	ANCHOR BOLT	L	ANGLE IRON
ABV	ABOVE	L	for rebar LONGITUDINAL
AL	ALUMINUM	LF	LINEAR FOOT
ALG	ALONG	LG	LONG
ALT	ALTERNATE	LOC	LOCATION
ALUM	ALUMINUM	LOD	LARGE ORGANIC DEBRIS
APPROX or ~	APPROXIMATELY	LWD	LARGE WOODY DEBRIS
ASPH	ASPHALT	LP	LOW PRESSURE
ASSOC	ASSOCIATION	LP	LOW POINT
AVG	AVERAGE	MANUF	MANUFACTURER
BOT	BOTTOM	MAX	MAXIMUM
B.O.F.	BOTTOM OF FOOTING	MEZZ	MEZZANINE
B.O.P.	BEGINNING OF PROJECT	MH	MANHOLE
BF	BUTTERFLY	MIN	MINIMUM
BLDG	BUILDING	MUTCD	MANUAL ON UNIFORM TRAFFIC
BVC	BEGIN OF VERTICAL CURVE		CONTROL DEVICES FOR
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	DOWNSTREAM	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
HDPE	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

Description	Unit	Quantity
Mobilize	L.S.	1
Access Improvements and traffic	L.S.	1
Stream Diversions and Bypass	L.S.	1
Erosion Control	L.S.	1
Dewater	L.S.	1
Fish Removal	L.S.	1

Mobilization and Site Prep SUBTOTAL

Excavation, Common Stream	C.Y.	361
Excavation, Common Terrace	C.Y.	722
Excavation fill and grading	C.Y.	1083
Rmv. & Disp. Timber Bridge	EA	1

Excavation SUBTOTAL

Purchase LWD Stump w/ 40' Stem	EA	36
Purchase LWD 20' logs	EA	20
Racking wood	EA	200
Transport LWD	EA	256
Install LWD 20' and 40'	EA	56
Install LWD racking pieces	EA	200
Anchor Habitat Boulders with eyes	EA	144
Chain, eyes and hardware	LF	1000
Habitat boulders	EA	144
Stream Sediment Fish Mix	CY	195

LWD Installation SUBTOTAL

LWD on terrace	EA.	50
Trim and topology	C.Y.	300
Streambed Gravel, Fishmix	C.Y.	25
Revegetation	LS	1
Rake and reseed	LS	1

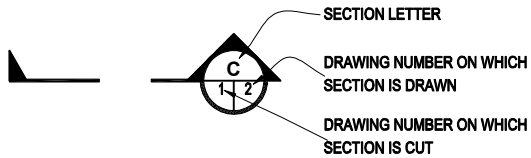
Schedule of Quantities Est

NTS

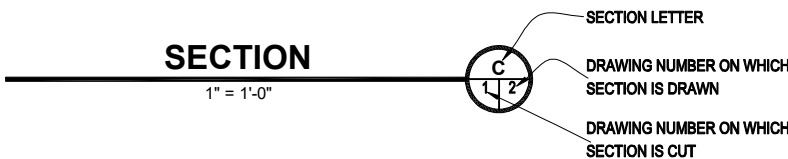


SECTION INDICATOR:

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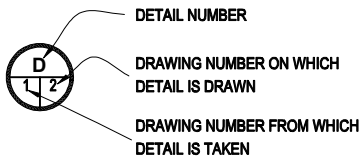


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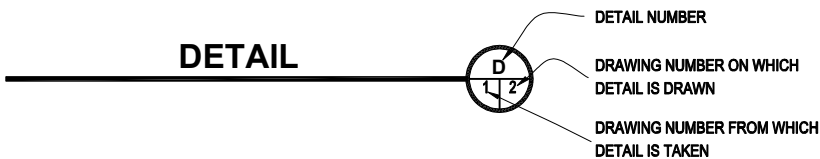


DETAIL INDICATOR:

DRAWING ON WHICH DETAIL IS PULLED FROM:



DRAWING ON WHICH DETAIL APPEARS:



LEGEND:

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

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

DRAWING NO.  
**ABBV**  
2 OF 11

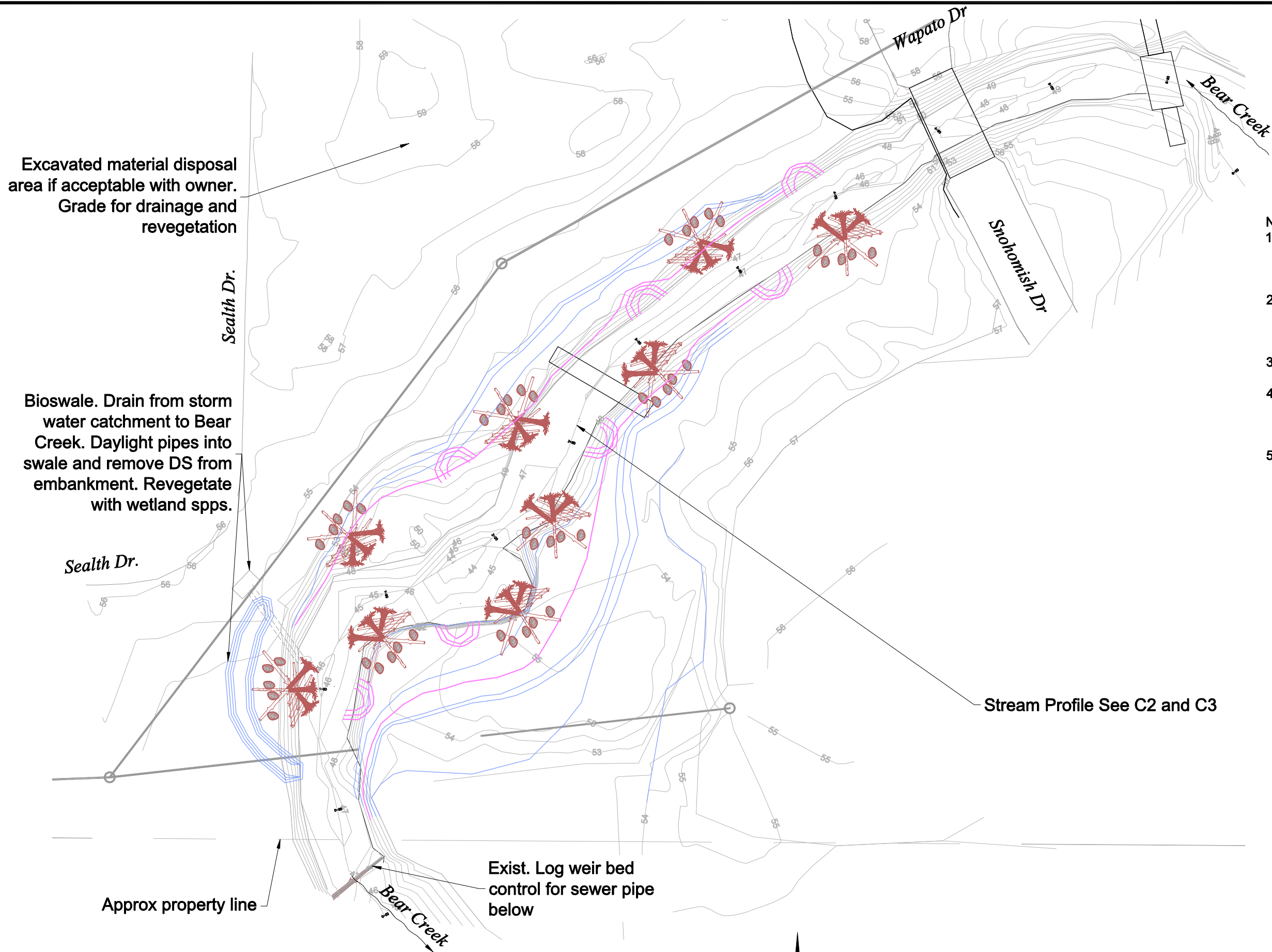


Professional Consulting Engineers







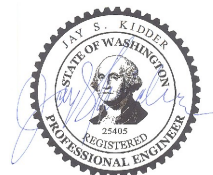


Know what's below.  
Call before you dig.

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.

WA State Recreation Conservation Office  
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"



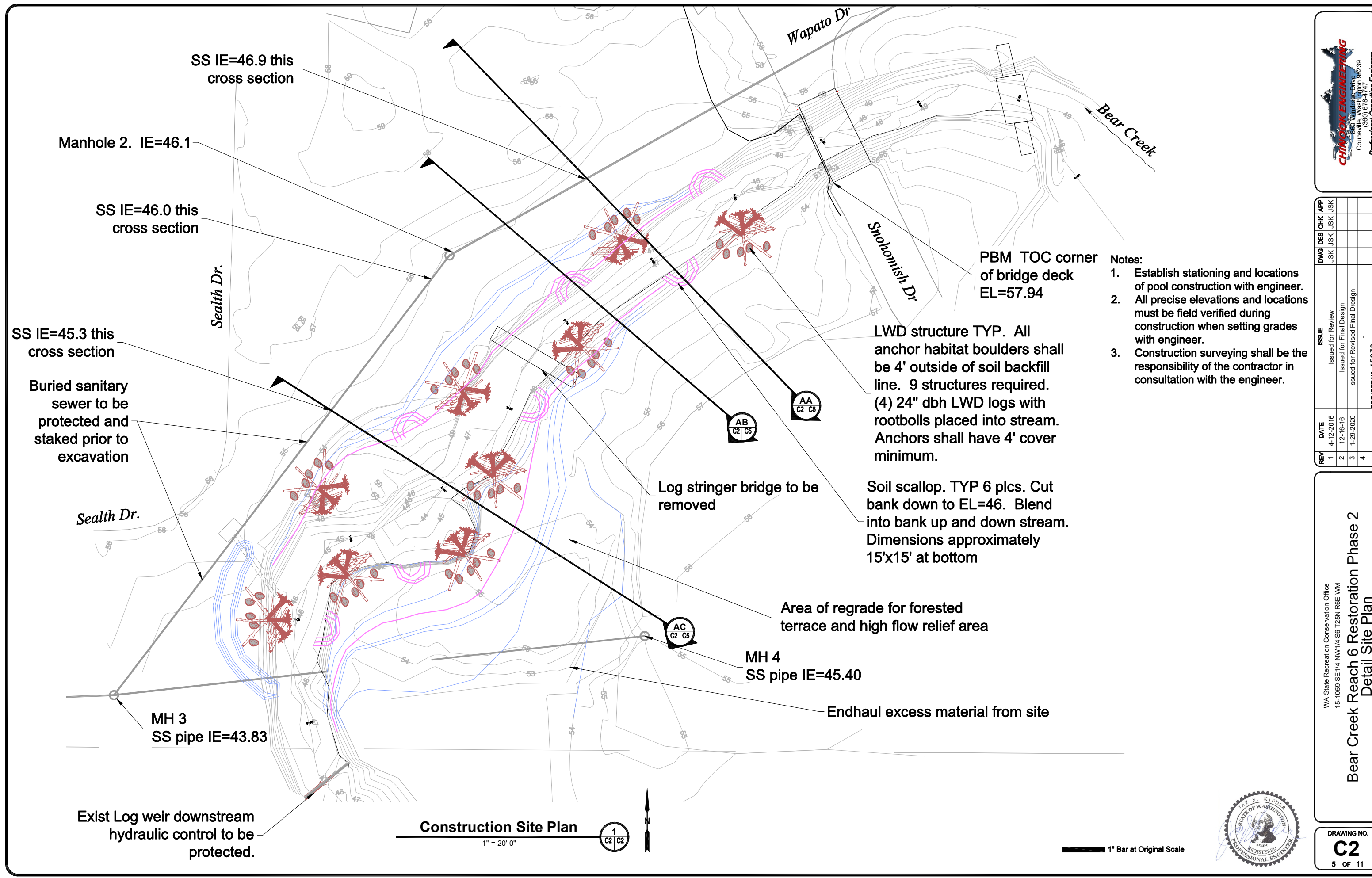
1" Bar at Original Scale

DRAWING NO.  
**C1**  
4 OF 11

**CHINOOK ENGINEERING**  
660 Wapato Dr  
Coupeville, Washington 98239  
(360) 678-4747  
Professional Consulting Engineers

REV	DATE	ISSUE	DWG	DES	CHK	APP
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4						

PROJECT NO. 15236



SS IE=46.9 this cross section

Manhole 2. IE=46.1

SS IE=46.0 this cross section

SS IE=45.3 this cross section

Buried sanitary sewer to be protected and staked prior to excavation

Sealth Dr.

Sealth Dr.

MH 3  
SS pipe IE=43.83

Exist Log weir downstream hydraulic control to be protected.

Construction Site Plan

1" = 20'-0"

1  
C2 C2

Wapato Dr

Bear Creek

Snohomish Dr

PBM TOC corner of bridge deck  
EL=57.94

LWD structure TYP. All anchor habitat boulders shall be 4' outside of soil backfill line. 9 structures required. (4) 24" dbh LWD logs with rootbolls placed into stream. Anchors shall have 4' cover minimum.

Soil scallop. TYP 6 plds. Cut bank down to EL=46. Blend into bank up and down stream. Dimensions approximately 15'x15' at bottom

Log stringer bridge to be removed

Area of regrade for forested terrace and high flow relief area

MH 4  
SS pipe IE=45.40

Endhaul excess material from site

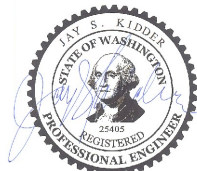
- Notes:
1. Establish stationing and locations of pool construction with engineer.
  2. All precise elevations and locations must be field verified during construction when setting grades with engineer.
  3. Construction surveying shall be the responsibility of the contractor in consultation with the engineer.



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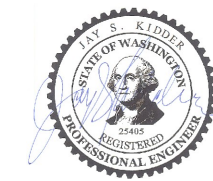
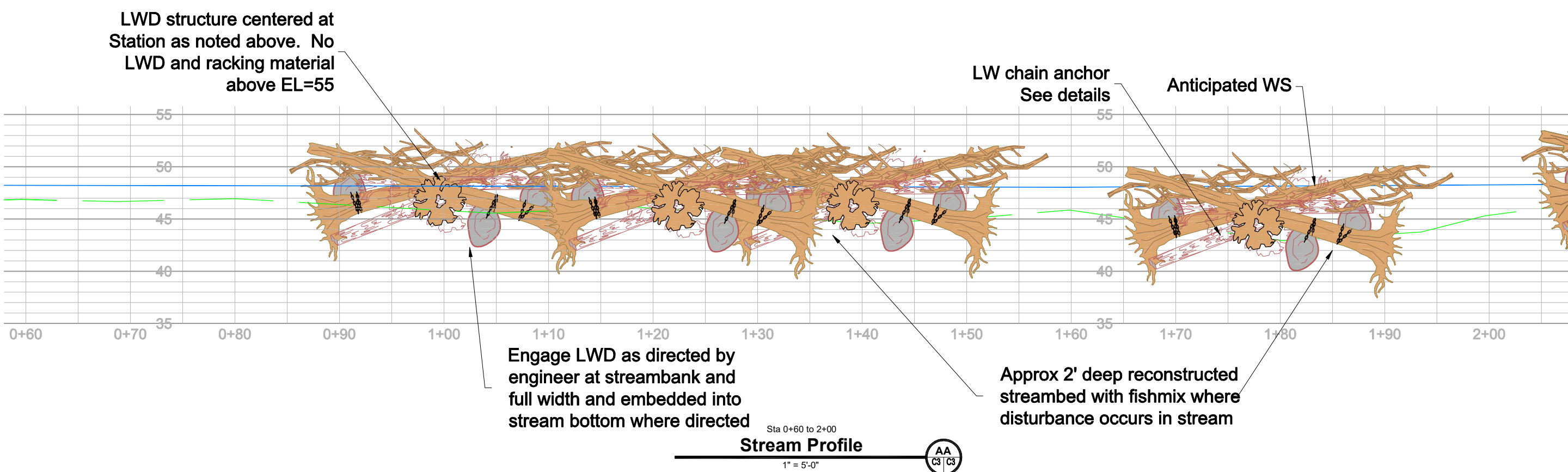
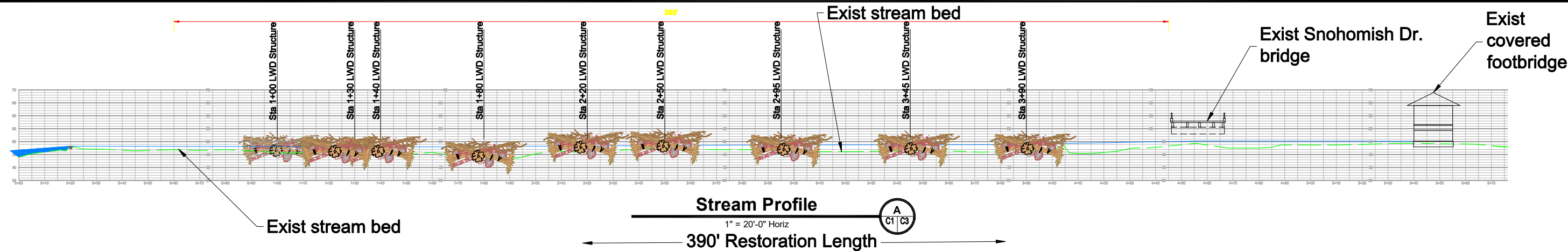
WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM  
Bear Creek Reach 6 Restoration Phase 2  
Detail Site Plan



DRAWING NO.  
**C2**  
5 OF 11

1" Bar at Original Scale





**CHINOOK ENGINEERING**  
6600 Middlesex Drive  
Coupeville, Washington 98239  
(360) 678-4747  
Professional Consulting Engineers

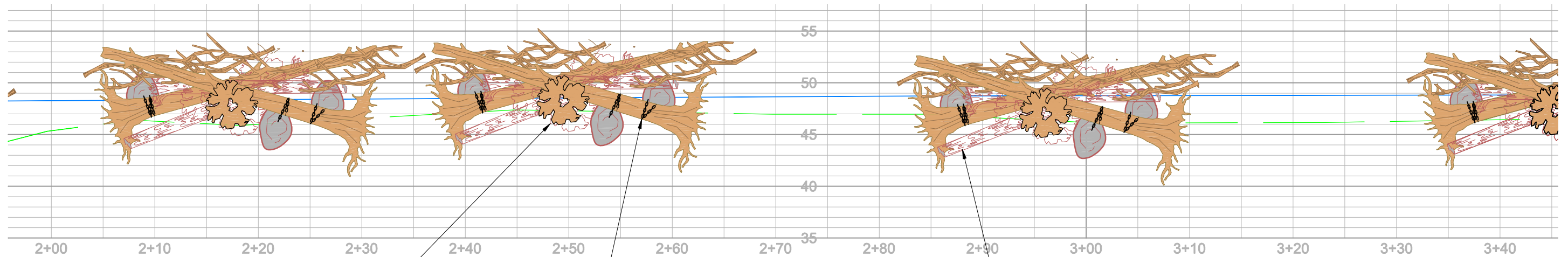
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PROJECT NO. 15236

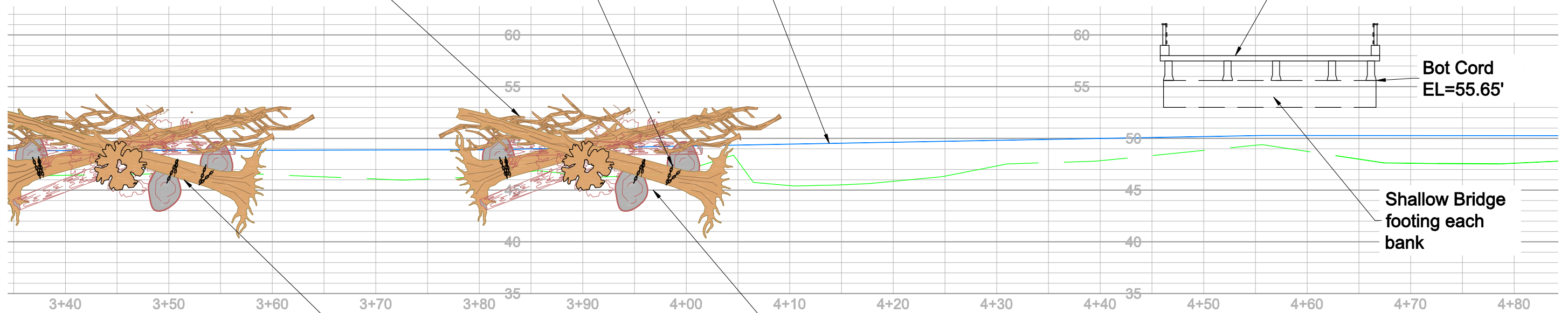
WA State Recreation Conservation Office  
15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM

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

1" Bar at Original Scale



Middle Reach  
**Stream Profile**  
1" = 5'-0" (AB C1 C4)



Upper Reach  
**Stream Profile**  
1" = 5'-0" (AC C1 C4)

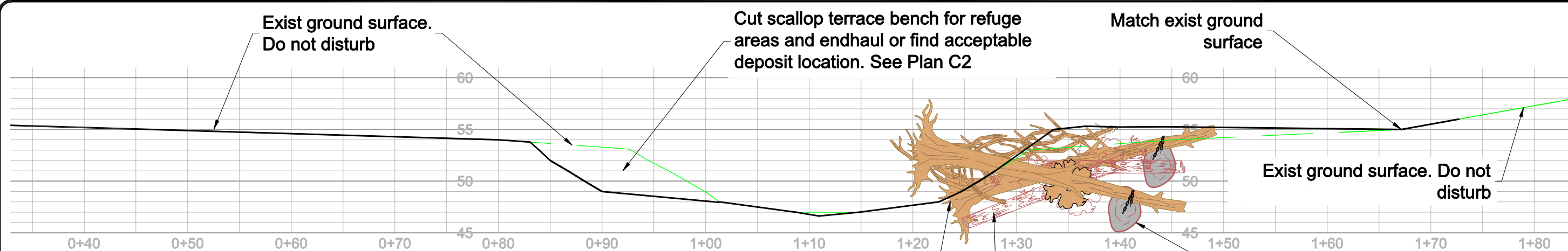
1" Bar at Original Scale



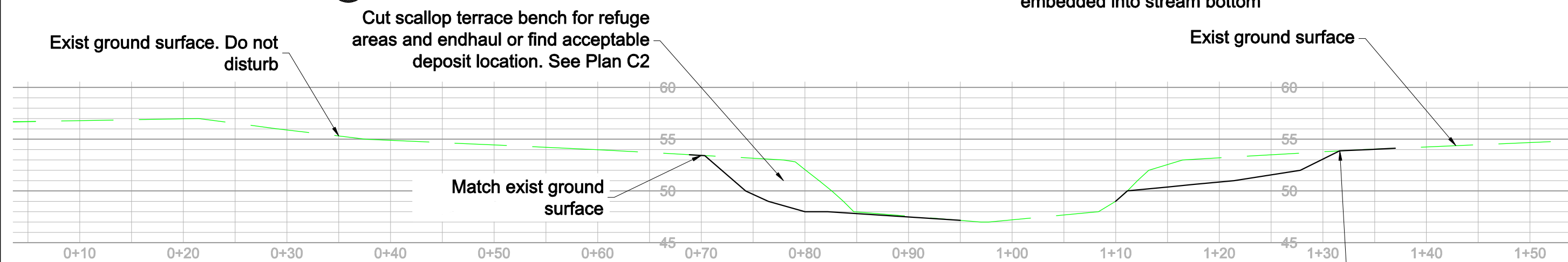
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15-1059 SE 1/4 NW 1/4 S6 T25N R6E WM  
**Bear Creek Reach 6 Restoration Phase 2**  
**Stream Profiles continued**

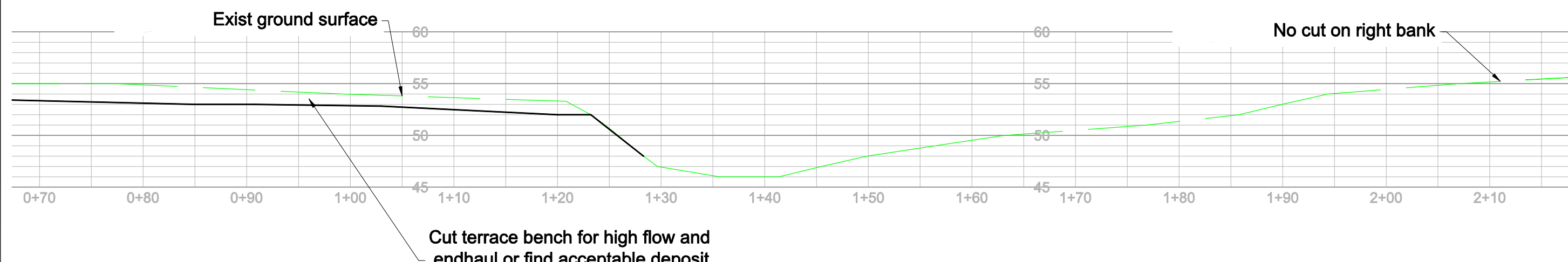
DRAWING NO.  
**C4**  
7 OF 11



Upper Reach to Lower Reach  
**Stream Section Looking DS**  
 1" = 5'-0"  
 AA  
 C2 | C5

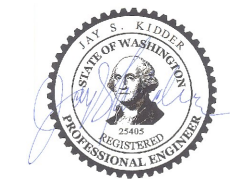


Upper Reach to Lower Reach  
**Stream Section Looking DS**  
 1" = 5'-0"  
 AB  
 C2 | C5



Upper Reach to Lower Reach  
**Stream Section Looking DS**  
 1" = 5'-0"  
 AC  
 C2 | C5

1" Bar at Original Scale



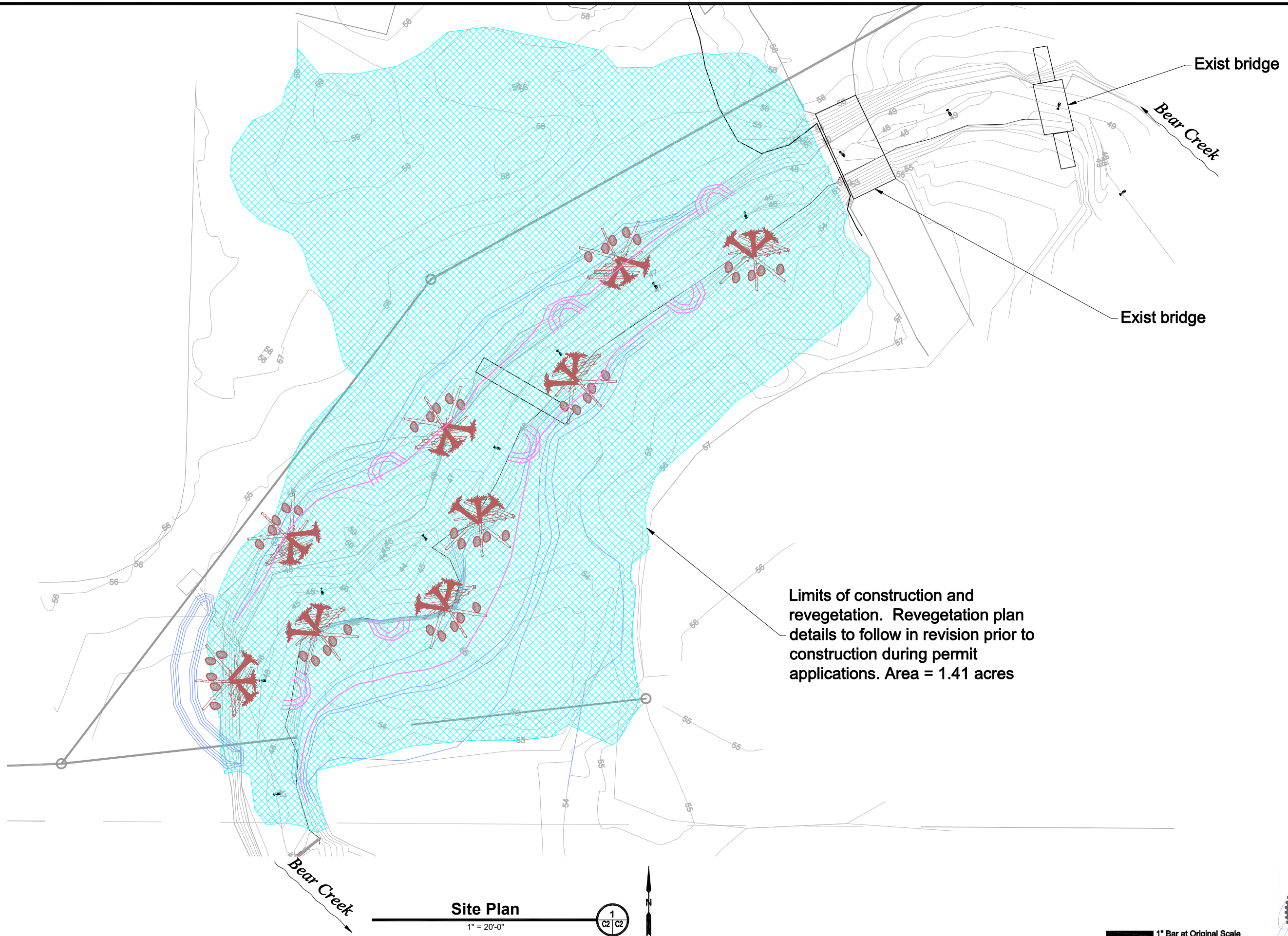
**CHIN COOK ENGINEERING**  
 6600 Windrose Drive  
 Coupeville, Washington 98239  
 (360) 678-4747  
 Professional Consulting Engineers

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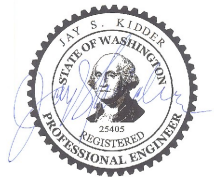
PROJECT NO. 15236

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





Limits of construction and revegetation. Revegetation plan details to follow in revision prior to construction during permit applications. Area = 1.41 acres



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

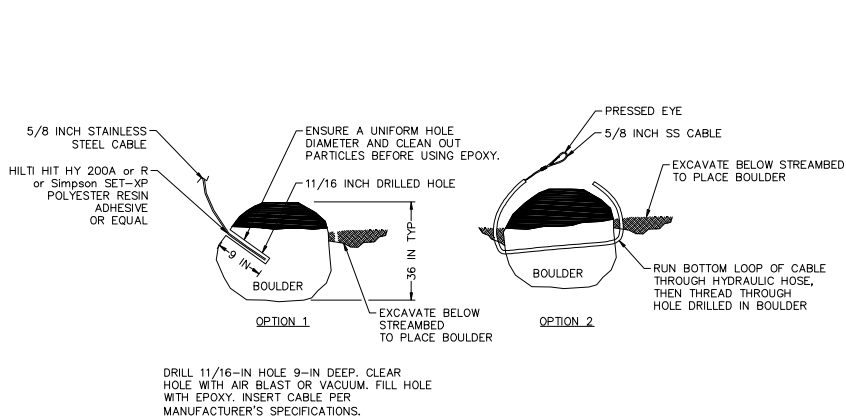
## Bear Creek Reach 6 Restoration Phase 2

### Construction Limits

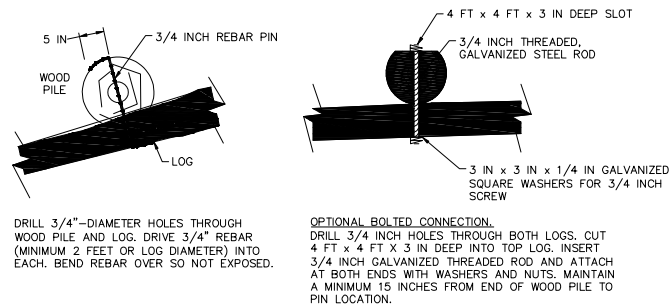
DRAWING NO.  
**C6**  
9 OF 11

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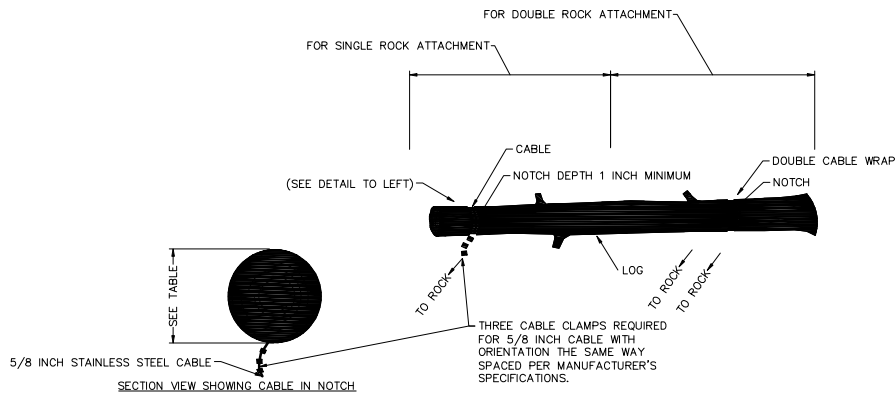
PROJECT NO. 15236



DRILL 11/16-IN HOLE 9-IN DEEP. CLEAR HOLE WITH AIR BLAST OR VACUUM. FILL HOLE WITH EPOXY. INSERT CABLE PER MANUFACTURER'S SPECIFICATIONS.



OPTIONAL BOLTED CONNECTION. DRILL 3/4 INCH HOLES THROUGH BOTH LOGS. CUT 4 FT x 4 FT x 3 IN DEEP INTO TOP LOG. INSERT 3/4 INCH GALVANIZED THREADED ROD AND ATTACH AT BOTH ENDS WITH WASHERS AND NUTS. MAINTAIN A MINIMUM 15 INCHES FROM END OF WOOD PILE TO PIN LOCATION.



LWD ANCHOR TABLE ASSUMING TWO ROCKS PER LWD PIECE (WEIGHT OF EACH ROCK, ROCK DIAMETER)				
LOG DIAMETER (INCHES)	10	20	30	40
12	570 LBS, 22 INCH	1050 LBS, 27 INCH	1530 LBS, 32 INCH	2010 LBS, 37 INCH
18	1150 LBS, 28 INCH	1870 LBS, 33 INCH	2600 LBS, 38 INCH	3300 LBS, 43 INCH
24	1630 LBS, 31 INCH	2600 LBS, 36 INCH	3500 LBS, 41 INCH	4500 LBS, 46 INCH
36	2400 LBS, 36 INCH	3800 LBS, 42 INCH	5300 LBS, 48 INCH	6700 LBS, 54 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 MATERIAL, 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

## LW Anchoring Details

NTS

1  
C12/C12

### Notes:

- 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.
- LWD with rootwads shall have roots attached.
- Habitat boulders shall be sized according to table this sheet and are estimates. Size and quality shall be as per WSDOT. See specifications.
- All LWD shall be approved in writing piece by piece by engineer prior to transport to the site for staging.
- Racking material may be reservoir salvaged wood, or pieces of deciduous wood but not key members.
- Species shall include and be limited to Douglas Fir, Spruce, Cedar, or other Fir spp. or other evergreen.
- Rootwads of 24" DBH shall be 40' and 20' long approximately and within 2' of that length.
- Straight logs of 24" DBH shall be 40' and 20' long approximately and within 2' of that length.
- Racking material shall be utilized to fill voids in LWD structures and shall not be floatable.
- Care shall be taken to anchor all installed wood with cables as shown on this sheet.
- Cable shall be all Type 304 6X19 stainless steel, 35,000 pound breaking strength. All cable fittings shall be stainless steel to match 5/8" cable. Chain if used shall be 3/8" hot dipped galvanized all chain fittings and shackles shall be hot dipped galvanized and shall not be mixed with stainless steel cable.
- 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 5/8" SS cable shall be 3/4" diameter.
- 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.
- 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.

### Log and Anchor Boulder Schedule

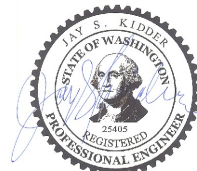
Location	Total
Habitat Boulders, 4-5 man assumed	144
Rootwad 24" DBH x 40'	36
Straight Log 12-14" DBH x 20'	20
Racking material, 12" dbh and smaller	200

## LW and Anchor Rock Table

NTS

3  
C12/C12

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  
Construction Limits

DRAWING NO.  
**C7**  
10 OF 11

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PROJECT NO. 15236

**CHINOOK ENGINEERING**  
6600 Middlese Highway  
Coupeville, Washington 98230  
(360) 678-4747  
Professional Consulting Engineers





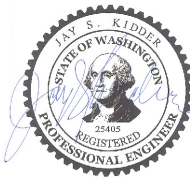
Revegetation Site Plan

1" = 20'-0"

1  
C2 C8

1" Bar at Original Scale

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 ~ 1.0 acres



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

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	1-29-2020	Issued for Revised Final Design				
4						

PROJECT NO. 15236

