San Juan Shagit Skagit Shagit Shagit

Washington

To Everett

Washington State Recreational Conservation Office Preliminary Design of Bear Creek Reach 6 Restoration Phase 2 SRFB #15-1059

PREPARED BY:

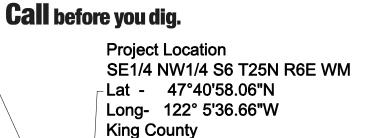


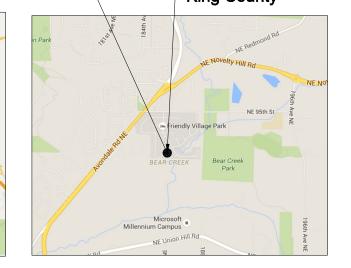
860 Windrose Drive Coupeville, Washington 98239 (360) 678-4747 **Professional Consulting Engineers**

PREPARED for:

Adopt-A-Stream Foundation Everett, WA







Know what's **below**.

VICINITY MAPS

Project Locations

Project Manager

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

To Tacoma

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









REV	DATE	ISSNE	DWG	DWG DES CHK AF	托	₹
-	4-12-2016	Issued for Review	JSK	SK XSK XSK XSK	JSK	==
2	12-16-16	Issued for Final Design				
က	1-29-2020	Issued for Revised Final Dresign				
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
Cover



ABBREVIATIONS:

	PERCENT	1111	for rebar LONGITUDINAL
	AND	Ĺ	LENGTH OF CURVE
	AT	Ĺ	ANGLE IRON
3	ANCHOR BOLT	Ĭ.	for rebar LONGITUDINAL
3V	ABOVE	LF	LINEAR FOOT
-	ALUMINUM	LG	LONG
.G	ALONG	LOC	LOCATION
.T	ALTERNATE	LOD	LARGE ORGANIC DEBRIS
LUM	ALUMINUM	LWD	LARGE WOODY DEBRIS
PPROX or ~	APPROXIMATELY	LP	LOW PRESSURE
SPH	ASPHALT	I.P.	LOW POINT
SSOC	ASSOCIATION	MANUF	MANUFACTURER
/G	AVERAGE	MAX	MAXIMUM
OT	ВОТТОМ	MEZZ	MEZZANINE
O.F.	BOTTOM OF FOOTING	MH	MANHOLE
O.P.	BEGINNING OF PROJECT	MIN	MINIMUM
	BUTTERFLY		MANUAL ON UNIFORM TRAFFIC
.DG	BUILDING	MUTCD	CONTROL DEVICES FOR
/C	BEGIN OF VERTICAL CURVE		STREETS AND HIGHWAYS
	CHANNEL	N	NORTH or NORTHING
P	CAST-IN-PLACE	NAF	NEAR AND FAR
-	CENTER LINE	NEC	NECESSARY
.R	CLEAR	NIC	NOT IN CONTRACT
ИP	CORRUGATED METAL PIPE	NML	NORMAL or NOMINAL
ONC	CLEAN OUT	NO or #	NUMBER
ONC	CONCRETE	NTS	NOT TO SCALE
1	CUBIC YARD	O.C.	ON CENTER
EF	DEFINITION	PC PC	POINT OF CURVATURE
SC	DESCRIPTION	PE	POLYETHYLENE
T	DETAIL	PERF	PERFORATED
	DUCTILE IRON	PI	POINT OF INTERSECTION
A or Ø	DIAMETER	PL	PLATE
ST	DISTRIBUTION OR DISTRIBUTOR	PL	PLATE
3	DOWNSTREAM	PLCS	PLACES
NG	DRAWING	PROP	PROPOSED
	EAST or EASTING	PS	PUMP STATION
0.P.	END OF PROJECT	PT	POINT OF TANGENCY
4	EACH	PVC	POINT OF VERTICAL CURVE
	EACH FACE	RAD	RADIUS
or ELEV	ELEVATION	RD	ROAD
.L	ELBOW	RED	REDUCER
or EQUIV	EQUIVALENT	REF	REFERENCE
/C	END VERTICAL CURVE	REINF	REINFORCEMENT
N /	EACH WAY	REQ'D	REQUIRED
(IST or EX	EXISTING	ROW	RIGHT OF WAY
AB	FABRICATOR, ED, TION	RW	RACEWAY
3	FLAT BAR	S	SOUTH
CA	FLANGE COUPLING ADAPTER	SC	SQUARE CORNER
or FIN FLR	FINISH FLOOR	SCH or SCHED	SCHEDULE
	FLOW LINE	SPA or SPCS	SPACE OR SPACES
OC .	FACE OF CURVE	SPEC	SPECIFICATIONS
or'	FEET	SS	STAINLESS STEEL
ALV	GALVANIZED	STA	STATION
3	GRADE BREAK	STD	STANDARD
3	GROUND SURFACE	STL	STEEL
DBOX	HEADBOX	T	for rebar TRANSVERSE
PE	HIGH DENSITY POLYETHYLENE	TEMP	TEMPERATURE
X	HEXAGONAL	TOC	TOP OF CONCRETE
ORIZ	HORIZONTAL	TOF	TOP OF CONCRETE
•	HIGH PRESSURE	TOS	TOP OF SLAB
	INSIDE DIAMETER	TS	TUBE STEEL
	INVERT ELEVATION	TYP	TYPICAL
or "	INCHES	UON	UNLESS OTHERWISE NOTED
Т	INTERSECTION	US	UPSTREAM
		VERT	VERTICAL
Danadation	11-4 0	VIC	VICTAULIC
Description	Unit Quantity	VPC	VERTICAL POINT OF CURVATURE

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	m C.Y.	361
Excavation, Common Terrac	ce C.Y.	722
Excavation fill and grading	C.Y.	1083
Rmv. & Disp. Timber Bridge	e EA	1

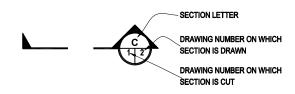
Excavation SUBTOTAL

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

LWD Installation SUBTOTAL

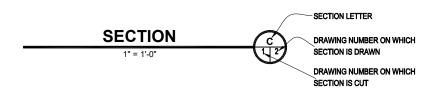
LWD on terrace	EA.	50
Trim and topology	C.Y.	300
Streambed Gravel, Fishmix	C.Y.	25
Revegetation	LS	1

DRAWING ON WHICH SECTION IS CUT FROM:



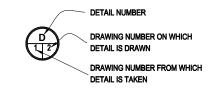
DRAWING ON WHICH SECTION APPEARS:

SECTION INDICATOR:

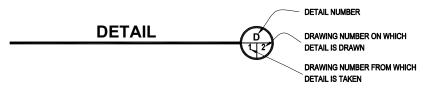


DETAIL INDICATOR:

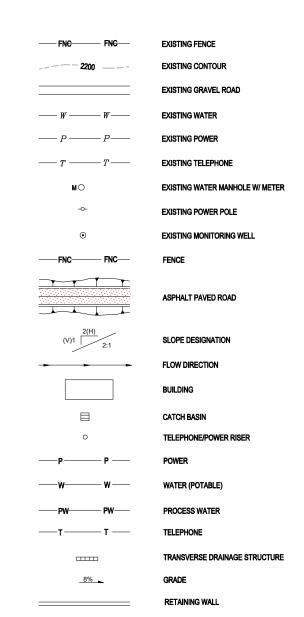
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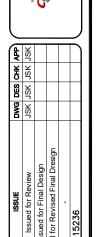


DRAWING ON WHICH DETAIL APPEARS:



LEGEND:

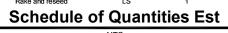






WA State Recreation Conservation Office
15-1059 SE1/4 NW/1/4 SG T2SN RGE WM
Bear Creek Reach 6 Restoration Phase
Abbreviations







VERTICAL POINT OF CURVATURE

VERTICAL POINT OF INTERSECT VERTICAL POINT OF TANGENCY

WIDE FLANGE WIDE TEE STEEL SECTION

WELDED WIRE FABRIC

SPECIFICATIONS

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

The following most current provisions, codes and specific material and workmanship specifications are attached to this contract and shall be

Architectural Aluminum Manufactures' Association AAWA ACI American Concrete Institute American Institute of Steel Construction ANSI American National Standards Institute APA American Plywood Association **APWA** American Public Works Association ARFA American Railway Engineering Association American Society of Civil Engineers ASCE ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers American Society of Mechanical Engineers ASME American Society For Testing of Materials **ASTM** AWPA American Wood Preservers Association AWS American Welding Society American Water Works Association AWWA Washington Standard Specifications for Road, Bridge, and WSDOT

Municipal Construction, M41-10

Items in Specifications

Certain items described in the specification may not be utilized in this project but are listed as general items and may or may not apply specifically to this project.

Alternates

Alternative materials and construction methods are acceptable. The overall size and concept of the project shall be unchanged. Alternate methods of construction and any dimensional alternates shall be provided in writing for approval by the engineer, prior to installation. Changes in cost associated with alternates shall be at the risk of the contractor. Any alternates installed without prior written approval may be removed and replaced at the discretion of the engineer at no cost to the owner.

Submittals for appurtenances installed under this contract shall be provided to the engineer prior to installation for approval. The following notes apply unless indicated otherwise:

Special inspection, as noted shall be provided by the owner's

International Building Code, 2015 edition and AASHTO Standard Specifications for Highway Bridges 17th ed with errata.

Design soil pressure:

Surface 2ksf max dead + live load allowable as per AASHTO Cast footings and slab on grade over 12" thick compacted granular fill over compacted subgrade 95% min. compaction. Special inspection required.

=100 psf

= ANSI 58.1

Design loads:

Snow drift Seismic Design Category 1.00 Fv= 1.50 1.626 Sm1= 1.023 Sds= 1 084 Sd1=

Equivalent lateral Fluid pressure

Cantilevered walls 35 pcf Restrained

Wind 50 psf on exposure

Culverts

Culverts shall be as specified on the drawing and shall be supplied by Pacific Corrugated, contact Bill Sullivan, 541-461-0990, BigR contact Doug Meyers, (253) 797-8293 or Contech Michael Blank 253.952.1154 or equal. Culvert shall be fabricated from a minimum of 8 gage, 0.1644" steel thickness and shall be galvanized as per AASHTO M274 and ASTM A 929 UNO on the drawings. Culvert backfill soil compaction shall be constructed in multiple 8" loose soil thickness layers subsequently compacted to 95% maximum density at optimum moisture content. Care shall be taken to compact the haunches of the culvert to the same 95% maximum soil density. Shop drawing submittals shall be submitted for bevels and skews.

Bridges

Bridge shall be fabricated in accordance with AASHTO Standard Specifications for Highway Bridges, 17th Edition with errata or AASHTO LRFD Bridge Design Specifications, 5th or 6th Edition. Furnish a prefabricated concrete or steel superstructure. Prefabricated steel superstructures shall be fabricated with corrosion resistant steel meeting the requirements of ASTM A588 for the primary structural elements; steel decking may be galvanized. Fabrication of the steel bridge shall be performed in a plant certified by AISC for Simple Bridge Fabrication. Concrete super structures shall be cons in accordance with the ACI 318. Special inspection is required for reinforcement by engineer of record. Bridge rail elements to be timber and/or weathering steel with galvanized hardware; incorporate railing bolts or attachments into the prefabricated superstructure as required by the design. The bridge superstructure shall be designed and sealed by a professional engineer licensed in the State of Washington, in accordance with the required design specifications. Concrete bridges may be substituted as a three sided concrete structure placed on footings UNO. Submit shop drawings and calculations that have been stamped and sealed by a professional enginee licensed in the State of Washington. All bridges shall meet minimum specifications as set by AASHTO and shall be capable of resisting HL93 U80/L90 intermittent overload loads unless noted otherwise. Rail loading shall be half AASHTO (5 kip) and steel or approved equal.

Crushed gravel surfacing

Crushed gravel surfacing shall meet WSDOT spec. 9-03.9(3) for crushed surfacing rock and shall meet WSDOT spec. 9-03.9(3) for base course or top coarse as indicated on the drawings

Culvert Demolition

Culverts shall be removed and disposed of offsite in a location as approved by the landowner or engineer.

Structural fill

Structural fill material, shall be composed of crushed gravel, or quarry spalls as specified herein or approved by the project engineer and shall be compacted to 95% maximum density at optimum moisture content and shall be placed in 8" maximum loose lifts prior to compaction and in accordance with WSDOT 2-03.3(14)C compacting earth embankment Method C.

WSDOT spec. 9-13.1(2) light loose rip rap. Riprap may exist on site and shall be salvaged and reused as shown in the drawings.

Quarry spalls

Quarry spalls shall be WSDOT 9-13.6

Fish mix gravel shall consist of washed round river gravel consisting by volume, 50% of the volume to be, sand - 2" rock, as per WSDOT 9-03.11(1) Streambed Sediment 30% of the volume to be, 2" - 4" rock, per WSDOT 9-03.11(2) Streambed Cobbles, 20% of the volume to be, 4" - 10" rock as WSDOT 9-03.11(2) Streambed Cobbles. Fish mix shall be supplemented as necessary with native bed material and/or imported pit run in order to match existing bed material gradation and prevent subsurface flow. All fish mix gravel shall be approved in writing by the engineer at the gravel pit prior to

Stream Dewatering

If stream dewatering is anticipated to be necessary during construction, a pump and diversion or gravity system will be required. The pump intake shall be screened and water discharged downstream of the project site. Discharge pipeline shall be placed and/or protected so as to prevent erosion in the channel. Upon completion of diversion, sponsor, contractor and/or project biologist will remove stranded fish, if present. Pumped diversions shall run. continuously for the duration of the diversion UNO. Turbidity curtains may be employed in lieu of full stream diversion.

Pump intakes shall be affixed with a fish screen with mesh openings of 1/16" and shall be maintained clean. Through screen velocities shall not exceed 0.33 feet per second.

Exact locations of all in-stream habitat structures are to be approved by written submittal prior to construction by project manager or project engineer prior to installation.

Reinforced Concrete:

All concrete - fc = 4000 psi at 28 days minmum, maximum w/c = 0.45, 6 sacks of cement minimum per cubic vard. Submit mix design. Special inspection required steel bars per ASTM A615, grade 60. Submit reinforcing steel shop drawings with details per ACI 315 manual of standard practice. Lap bars with a class B splice. Field bending bars not permitted w/o written approval. Welded wire fabric (WWF) per ASTM A185. Furnish WWF in flat sheets, not rolls. Lap edges 1 1/2 mesh minimum.

Concrete cover:

Footings 3". Pile caps 3". Walls 1", except 1 1/2" where Exposed to weather and 2" against earth. Beams and Columns 11/2" to stirrups or ties. Slabs and joists 1". Slabs on grade 11/2". Cover to be not less than nearest bar diameter

Footings:

Provide 2-#5 longitudinal bottom bars in wall footings. Provide corner bars of same size and number at corners and inter-sections, 40 diameters each leg. Provide vertical dowels of same size, number and spacing as vertical bars with a 90 degree standard hook at bottom of footing.

Rigidly support bars with concrete blocks or approved accessories. Provide #5 support bars all slabs. Where main slab bars are parallel to a support, provide #4 @ 12 top bars extending 2'-0" beyond each face of support into slab. Where slab is on one side only, provide a 90 degree standard hook at discontinuous face. At slab openings over 12" square, provide two additional bottom main slab bars or 2-#5 minimum on all four sides of the opening extending 40 diameters past opening. Slabs on grade shall have contraction joints and construction joints as indicated on the plans. Contraction joints shall be saw cut to a depth

Provide 1-#5x4'-0" diagonal bottom bar all four corners. All slabs Provide slab temperature bars as follows:

4" slabs, #3 @ 15 bottom,

5" slabs, #4 @ 18 bottom,

6" slabs, #4 @ 18 bottom.

7" slabs, #4 @ 15 bottom

8" slabs, #3 @ 18 top, #4 @ 18 bottom, 9" slabs, #3 @ 18 top, #4 @ 18 bottom,

10" slabs. #3 @ 16 top, #4 @ 18 bottom,

11" slabs, #4 @ 18 top, #4 @ 18 bottom,

12" slabs. #4 @ 18 top, #4 @ 18 bottom.

Reinforce as follows:

6" walls, #4 @ 12 horizontal and vertical @ center of wall, 8" walls, #5 @ 15 horizontal and vertical @ center of wall,

10" walls, #4 @ 16 horizontal and vertical each face,

12" walls, #4 @ 12 horizontal and vertical each face.

At openings over 12" square, provide 2-#5 bars @ center of wall all four sides, except 10" walls and over provide 1-#6 bar each face all four sides, extending 40 diameters past opening. Provide 1-#5 x 4'-0" diagonal bar @ center of wall all four corners. At corners, provide corner bars in outside face of same size and spacing as horizontal bars, 40 diameter each leg. At intersections, provide corner bars of same size, number and spacing as horizontal bars of intersecting wall, 40 diameter each leg. Provide 2-#5 longitudinal bars at top and bottom of walls. Provide roughened surface at construction. Provide vertical dowels of same size, number and spacing as vertical bars.

Grout shall be 6000 psi minimum 7-day cube strength per ASTM C109. Grout to be premixed, non-shrink "Masterflow" by Master Builders or "Concresive" by Adhesive Engineering or approved equal. ICBO certification required. use specific grout mix recommended by manufacturer for each grout application and follow manufacturer's instructions. Special inspection required.

Anchor Bolts

Anchor bolts shall be hot dipped galvanized ASTM A307. Special inspection required. Set all anchor bolts by template.

Drill In Expansion Boits

"Kwik-Bolts" by Hilti fastening systems, "Parabolts" by USM Corp, "Red Head Wedge Anchor" by ITT Phillips or approved equal ICBO certification required. Special inspection required.

"Hy-150" by Hilti inc., or Simpson SET-XP use A36 or A307 threaded rod. ICBO certification required for bolts and rod. May be applied to stainless steel cable. Special inspection required.

Structural Steel

All steel ASTM A36 or A588, fy = 36 ksi. Special inspection required. Fabrication and erection per AISC Specifications. Submit shop drawings. Welding per AWS D1.1. Minimum size welds 3/16" continuous fillet. Welders certified per AWS for rod and position. Use cold galvanizing spray on finished surface for field weld. High - strength bolts per ASTM A325. Typical bolted connections - friction type. Tension high-strength bolts by direct tension indicator method using load indicator washers installed per manufacturer's instructions. All steel shall be hot dip galvanized unless otherwise noted. Where ASTM A588 steel is used galvaninzing is not allowed.

Revegetation Sponsor to Complete

Revegetate all disturbed areas of construction. Replant riparian areas as follows: red osier dogwood and willow (salix spp.) shall be live staked along the waters edge at 2'-0" on center for 4 rows back from anticipated Ordinary

High Water (OHW) edge. Disturbed areas 10' from OHW edge shall be replanted as follows: western red cedar, black cottonwood and Douglas fir shall be interspersed and planted as pull ups with roots in soil throughout disturbed upland areas @ 25' O.C.. Erosion control seed mixture appropriate for local shall be hand broadcast or hydroseeded in all upland disturbed areas.

Streambed Cobbles and Boulders

Streambed rock including Cobbles and Boulders shall be in conformance with WSDOT spec. 9-03.11(2) and 9-03.11(3). Rock size shall be as indicated on the plans and shall be as found in a naturally occurring fluvial sediment and shall be rounded or semi-rounded.

Geotextile fabric

Geotextile fabric shall be woven material in conformance with WSDOT spec. 9-33.1 and 9-33.2. Geotextile shall be woven Layfield LP 350 or equal.

Erosion control seed mixture

Erosion control seed mixture shall consist of 20% white clover, 20% annual rye, 60% creeping red fescue.

Rootwads and Large Woody Debris (LOD or LWD)

Rootwads and large organic debris shall be utilized from live trees and shall have a minimum of 15 feet of tree stem integral with the roots UNO. LOD shall be from live or recently live wood. All LOD shall have a minimum diameter of 10" at the DBH UNO. LOD shall be Douglas fir, western red cedar, spruce, or hemlock unless otherwise approved by project engineer.

Habitat and Stream Restoration Work

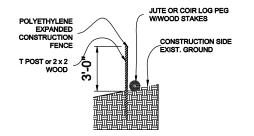
All work water ward of the OHWL shall be completed in the dry UNO. Work shall be completed during the WDFW seasonal in water work window as indicated in the project HPA.

All works shall be completed with the minimum of impact to the disturbed footprint of work, stream bank disturbance, stream bed disturbance and shall be completed in such a way as to protect existing riparian and stream

Coir blanket shall be placed for steep slopes as identified in the drawings and along all areas that are identified for revegetation. Coir fabric shall be Rolanka blanket BioD-Mat 70 weight or equal and in accordance with WSDOT 9-14.5(2), Biodegradable Erosion Control Blanket. All edges shall be anchored with soil by trenching in 6" Ø soil ballasts. Blanket fields shall be staked at 2' o.c. with 2"x2" wood stakes to anchor.

T.E.S.C. PLAN:

Appropriate erosion control BMP's shall be installed and remain throughout the duration of the project where there is a risk of sediment runoff. This may include but is not limited to the use of plastic sheeting, straw mulch, hay bales and silt fence. Fences shall be installed as shown in the detail on sheet SPC. Upon completion of the project or during construction periods of inclement weather all disturbed areas shall be seeded or covered with plastic to prevent



TESC Fence Section





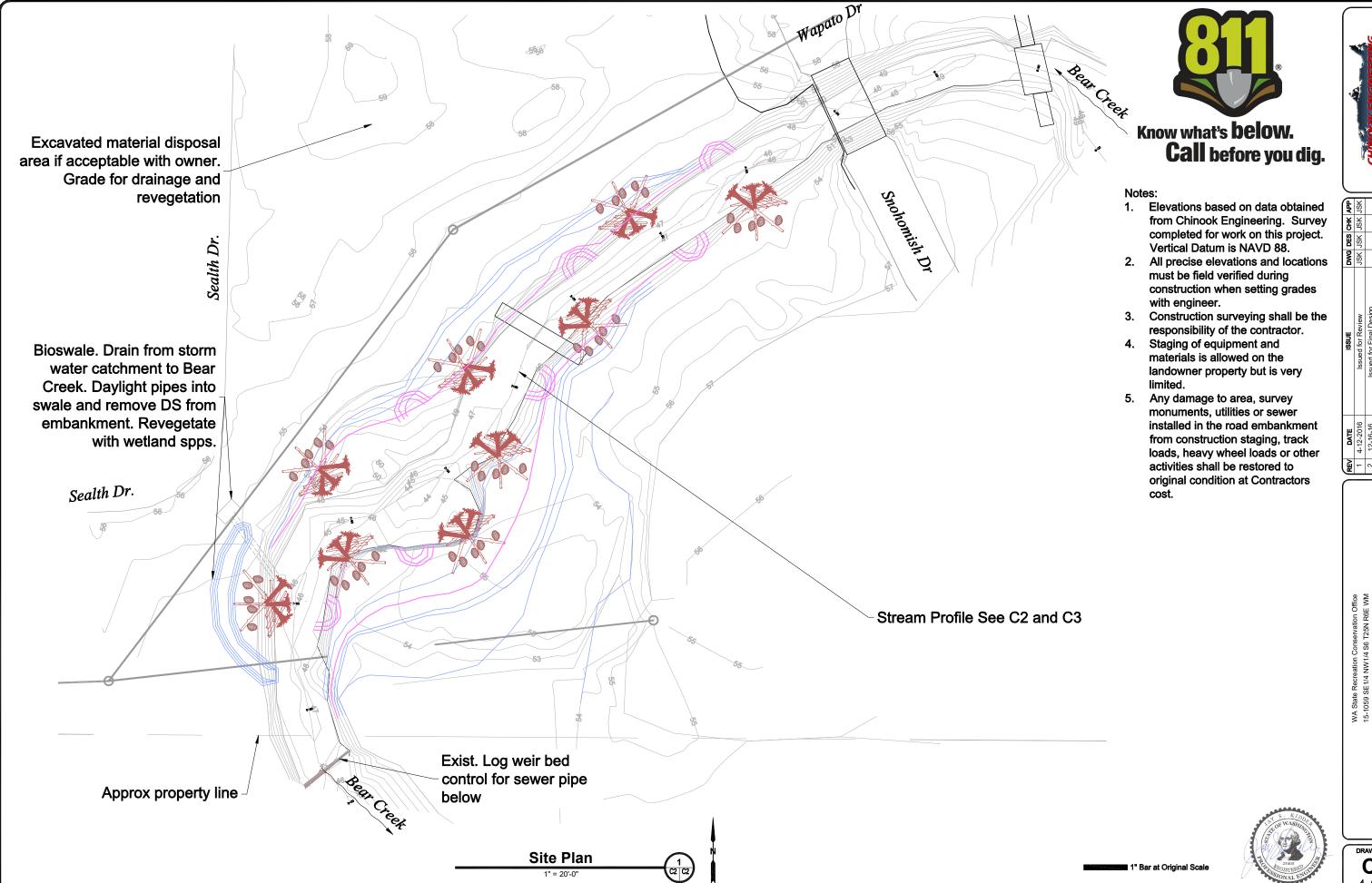


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-	4-12-2016	Issued for Review	JSK	JSK	ASL ASL ASL ASL	JSK
2	12-16-16	Issued for Final Design				
က	1-29-2020	Issued for Revised Final Dresign				
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		PROJECT NO. 15236				`

Phase Reach 6 Restoration Specifications ۸ Creek ear

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DRAWING NO. **SPC**



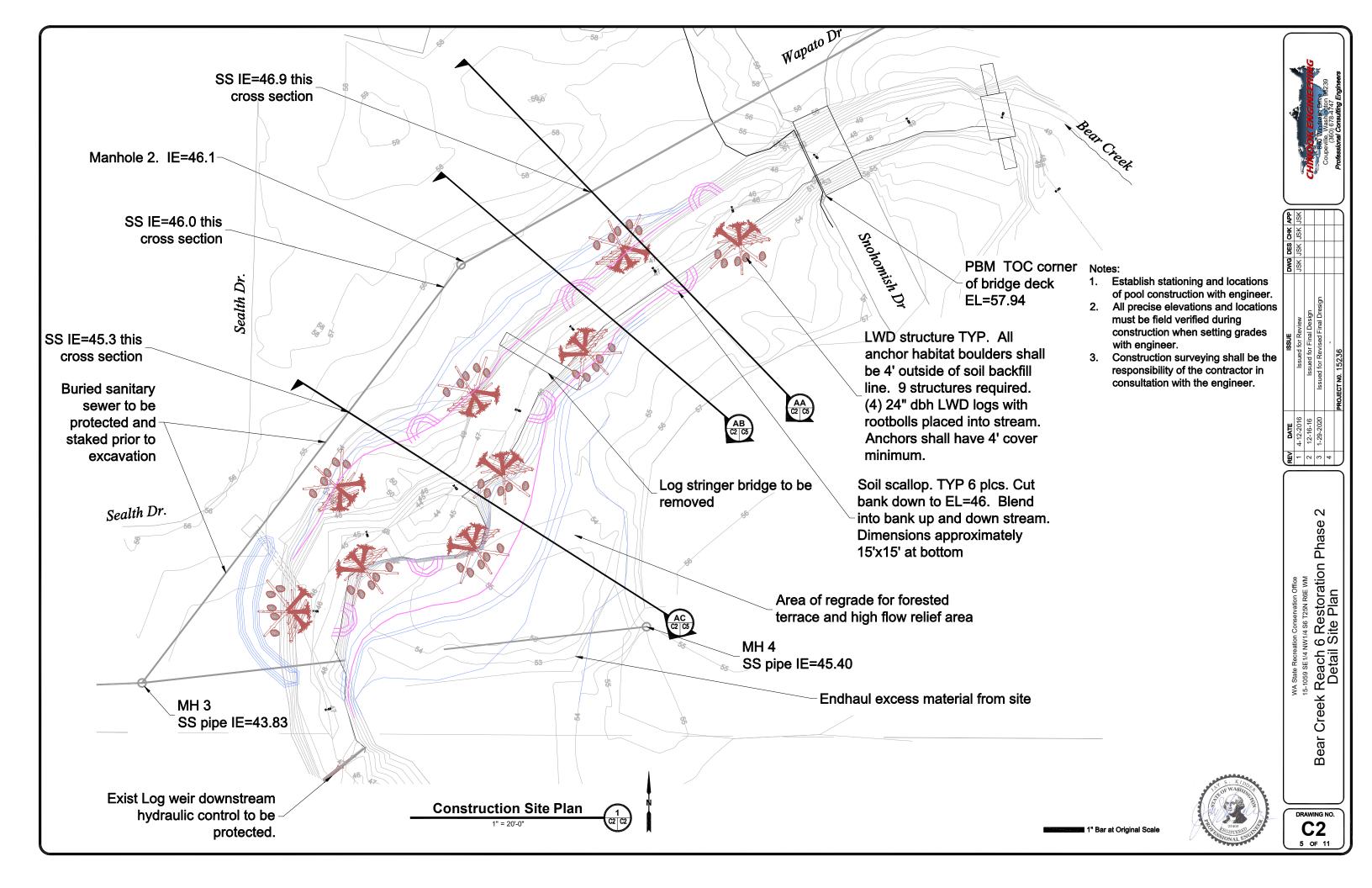


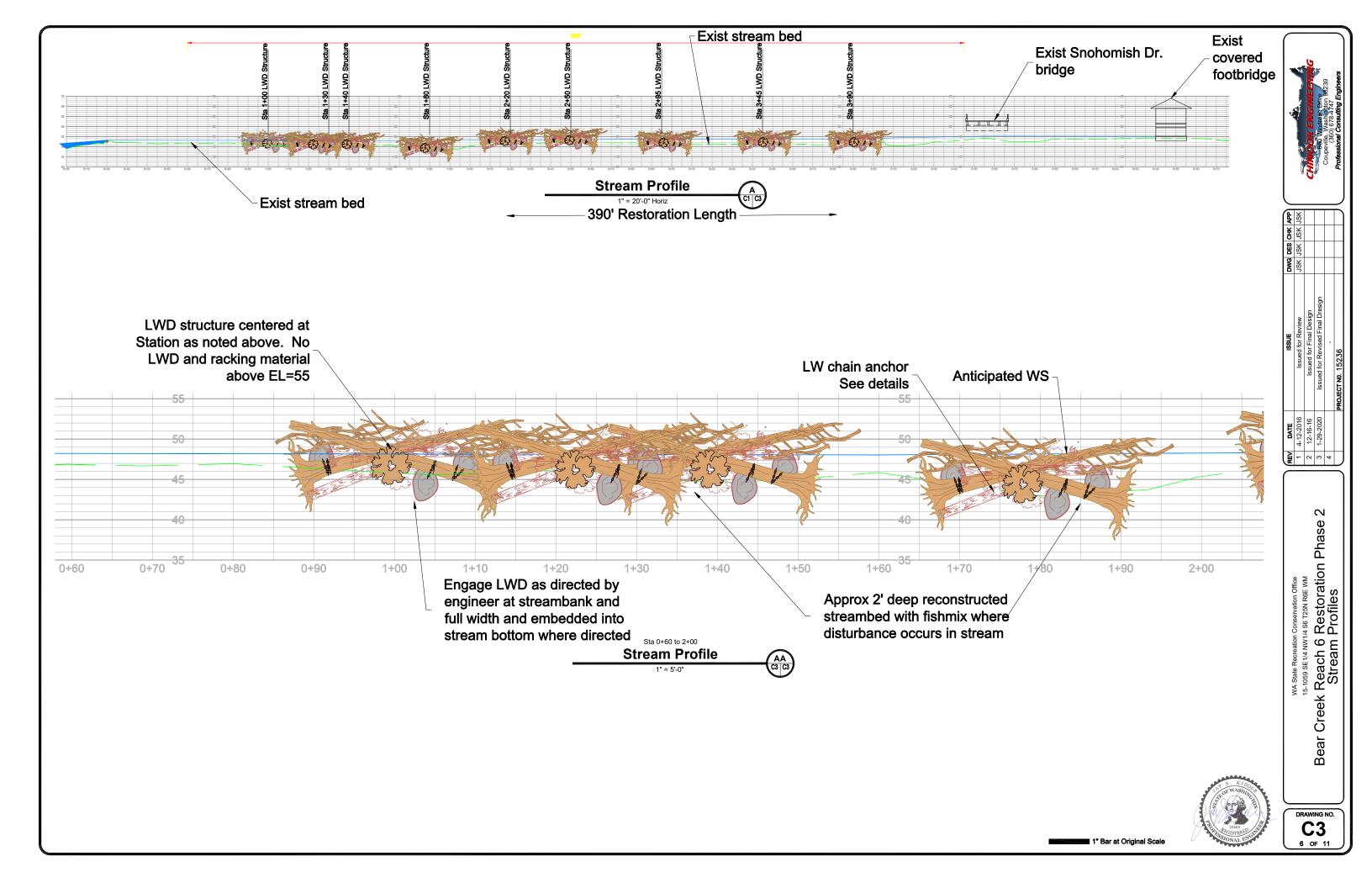
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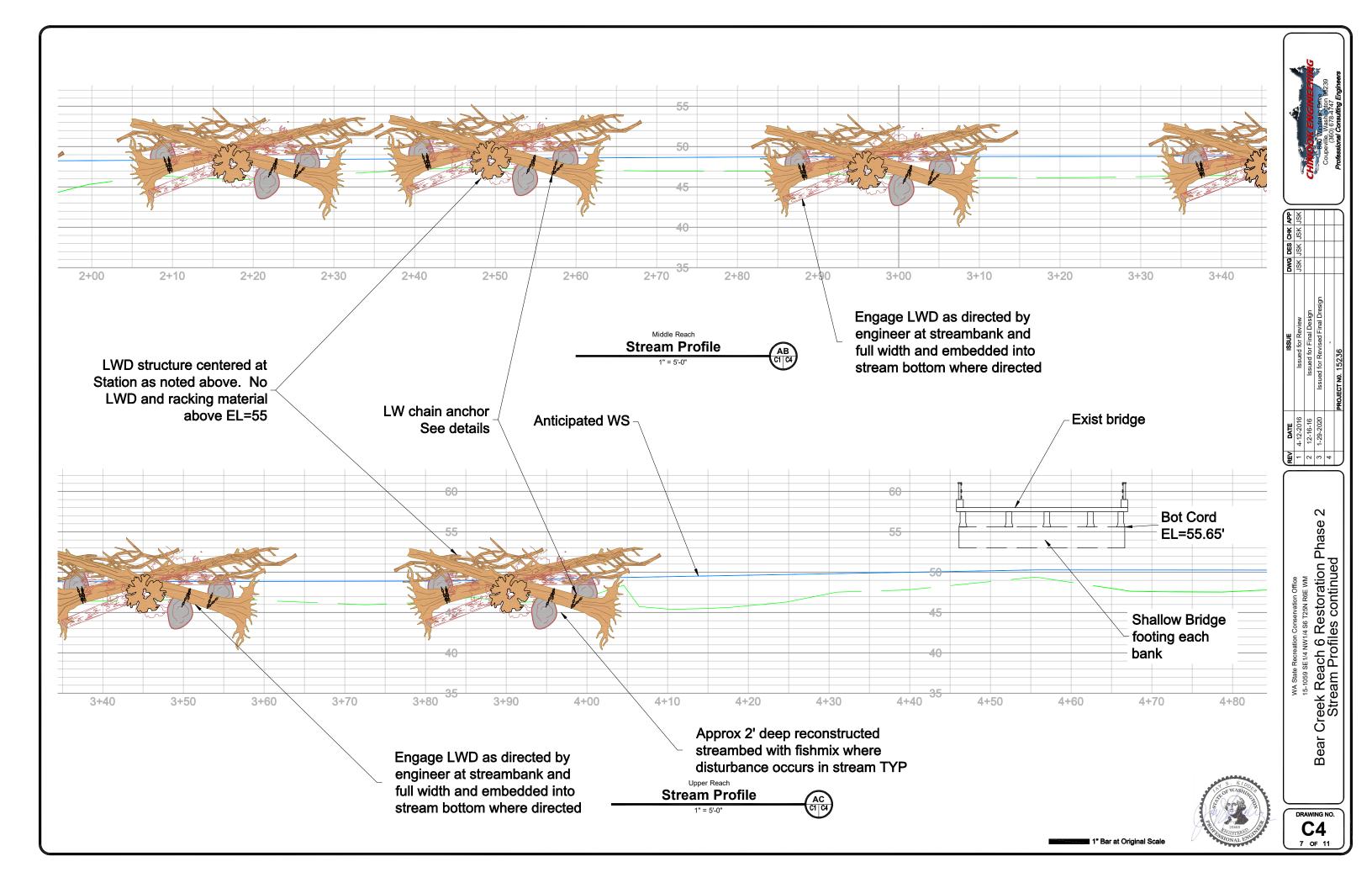
WA State Recreation Conservation Office
15-1059 SE1/4 NW/14 S6 T25N R6E WM
Bear Creek Reach 6 Restoration Phase 2
Overall Site Plan

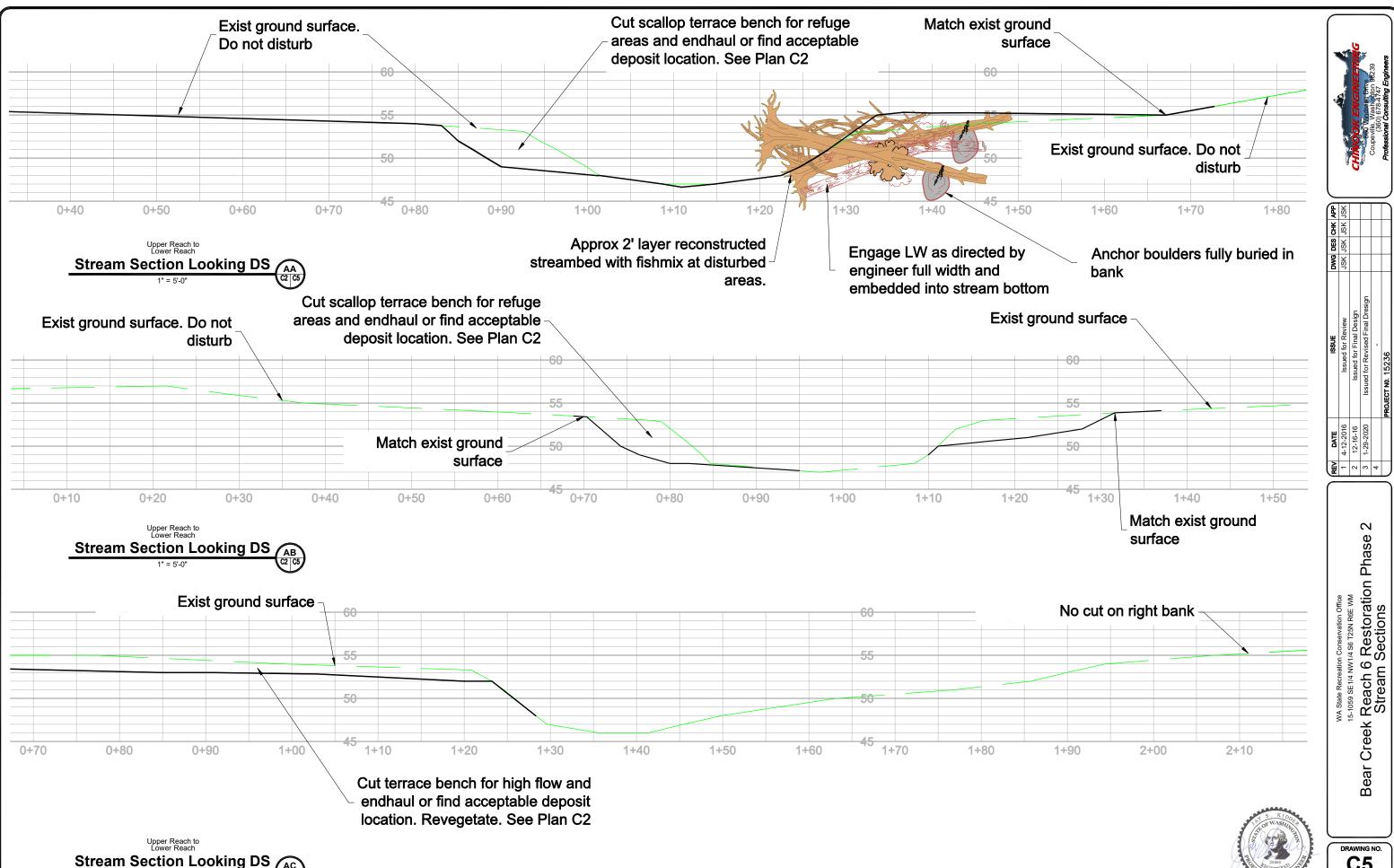
DRAWING NO.

C1
4 OF 11



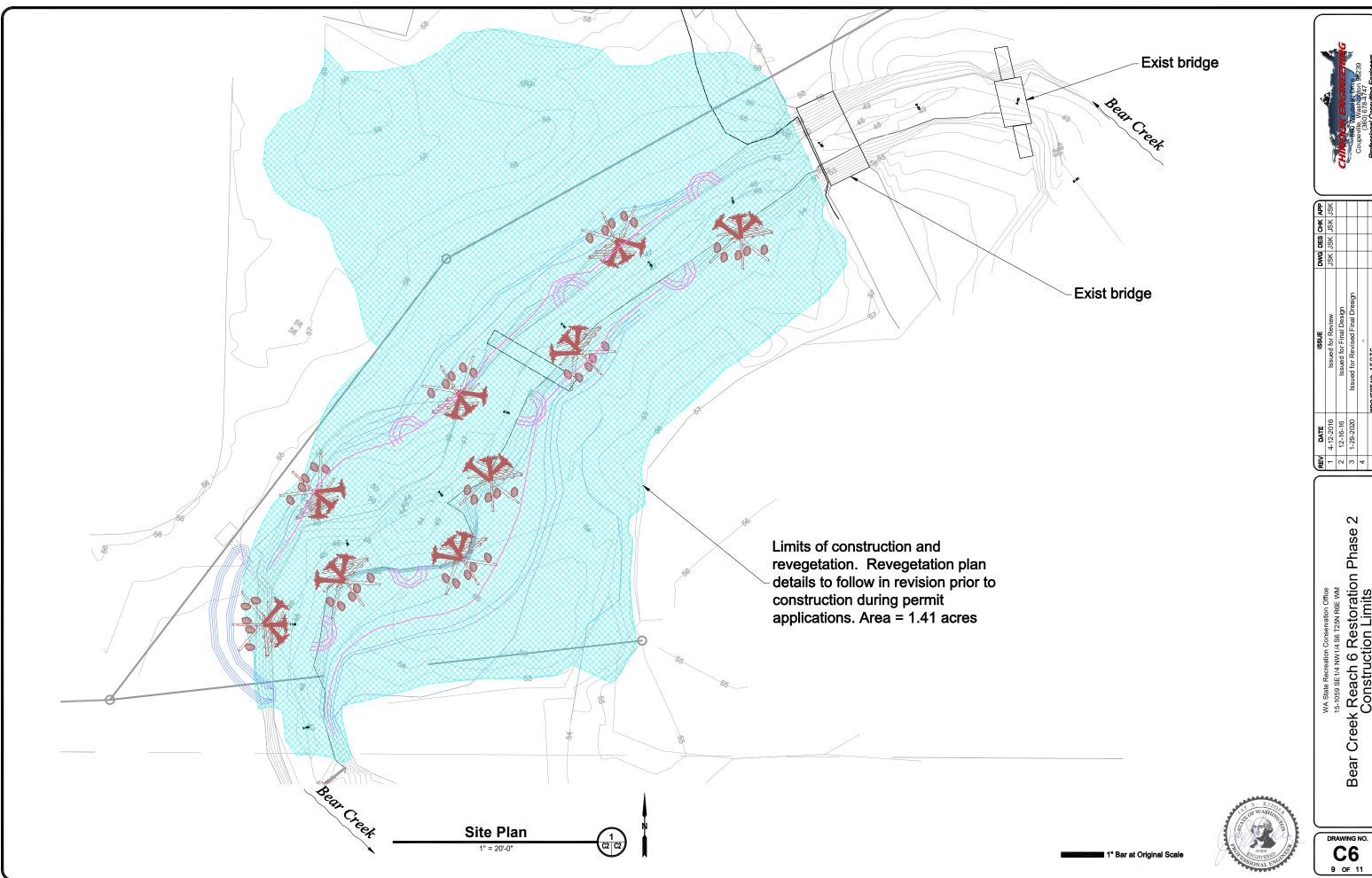






DRAWING NO. **C5**

1" Bar at Original Scale



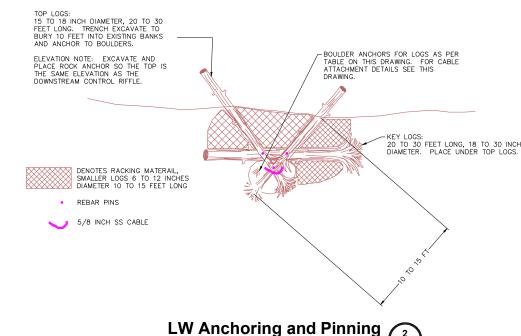


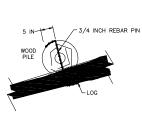
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	2	12-16-16	Issued for Final Design		
	က	1-29-2020	Issued for Revised Final Dresign		
	4		-		
_			PROJECT NO. 15236		

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



FOR DOUBLE ROCK ATTACHMEN FOR SINGLE ROCK ATTACHMENT - CABLE (SEE DETAIL TO LEFT HREE CABLE CLAMPS REQUIRED FOR 5/8 INCH CABLE WITH ORIENTATION THE SAME WAY SPACED PER MANUFACTURER'S SPECIFICATIONS. 5/8 INCH STAINLESS STEEL CABLE-SECTION VIEW SHOWING CABLE IN NOTCH





DRILL 3/4"-DIAMETER HOLES THROUGH WOOD PILE AND LOG. DRIVE 3/4" REBAR (MINIMUM 2 FEET OR LOG DIAMETER) INTO EACH. BEND REBAR OVER SO NOT EXPOSED.

Log and Anchor Boulder Schedule

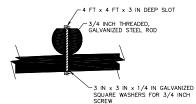
Material.

Habitat Boulders, 4-5 man assumed

Racking material, 12" dbh and smalle

Rootwad 24" DBH x 40'

Straight Log 12-14" DBH x 20'



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

			ROCKS PER OCK DIAMETE	
	LOG	LENGTH (FEI	ET, TIP TO B	ASE)
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



- 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 5" cable. Chain if used shall be 3" 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 Hiti 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.





Total

144

36

20

2 Phase

ear

DRAWING NO.

C7

WA State Recreation Conservation Office 15-1059 SE1/4 NW1/4 S6 T2SN R6E WM Creek Reach 6 Restoration Construction Limits





			PROJECT NO. 15236		
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			Issued for Final Design	12-16-16	2
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wA State Recreation Conservation Office
15-1059 SE1/4 NW1/4 S6 T25N R6E WM

Bear Creek Reach 6 Restoration Phase 2

Revegetation Plan

DRAWING NO. **C8**