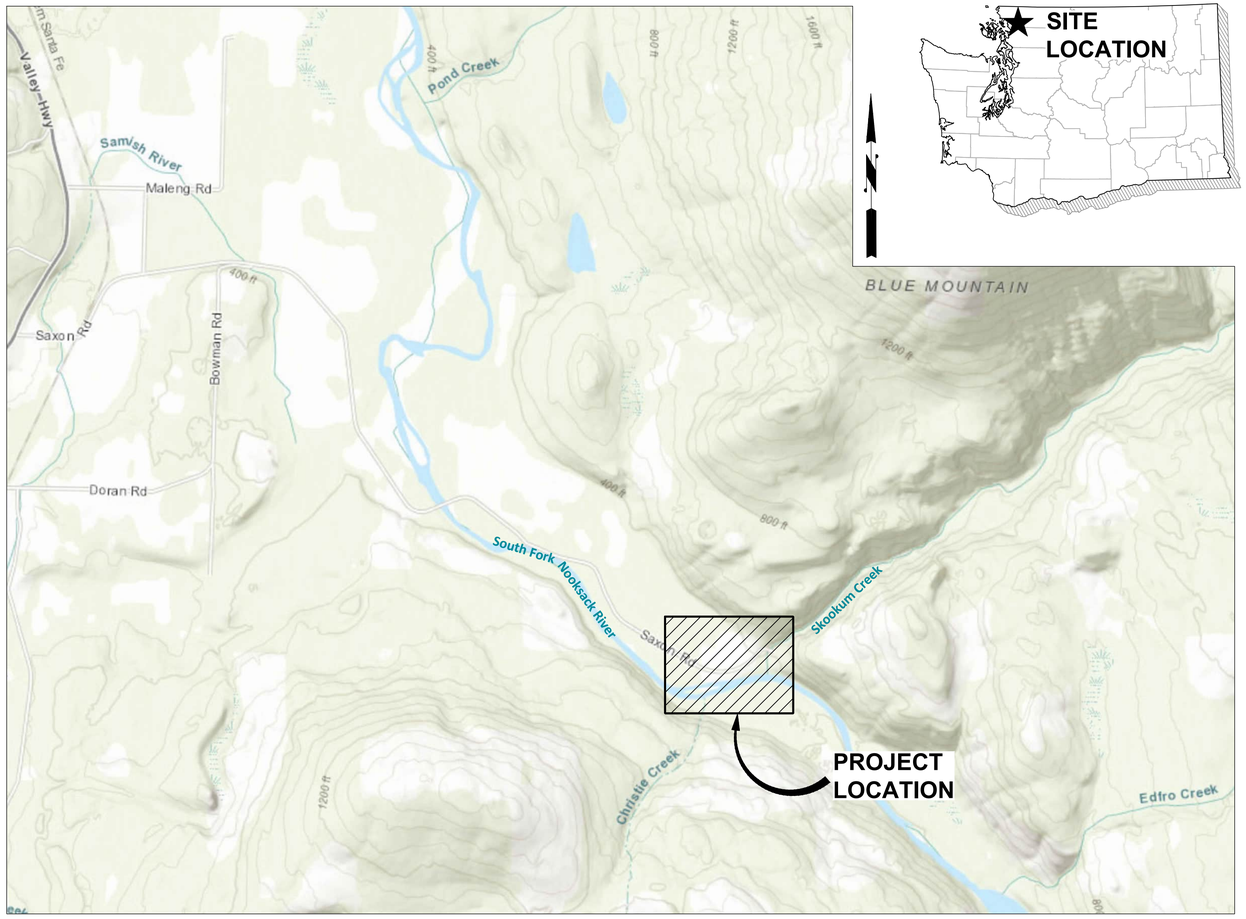
SOUTH FORK NOOKSACK RIVER
SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT
PHASE 1 ADAPTIVE MANAGEMENT

WHATCOM COUNTY, WASHINGTON



VICINITY MAP

SCALE: 1"=1/4 MILE

OWNER:

LUMMI NATION
2616 KWINA ROAD
BELLINGHAM, WA 98226
CONTACT: ALEX LEVELL
PHONE: (360) 410-1988
EMAIL: alexl@lummi-nsn.gov

ENGINEER:

HERRERA ENVIRONMENTAL CONSULTANTS
2200 SIXTH AVENUE, SUITE 1100
SEATTLE, WA 98121
CONTACT: IAN MOSTRENKO, P.E.
PHONE: (206) 441-9080
EMAIL: imostrenko@herrerainc.com

SHEET INDEX

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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LUMMI NATION TREATY OF 1855

IAN B. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 05/14/25

DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT
PHASE 1 ADAPTIVE MANAGEMENT

COVER SHEET

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: G0.01
SHEET NO: 1 OF 20

CALL 811 BEFORE YOU DIG

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ABBREVIATIONS

APPROX	APPPROXIMATE
AVG	AVERAGE
BLDG	BUILDING
BMP	BEST MANAGEMENT PRACTICE
CB	CATCH BASIN
CG	CLEAR AND GRUB
C/L, CL	CENTERLINE
CONC	CONCRETE
CONST	CONSTRUCT, CONSTRUCTION
CP	CONTROL POINT
CY	CUBIC YARD
DIA	DIAMETER
DR	DRIVE
DWG	DRAWING
E	EAST, EASTING
EA	EACH
EG	EXISTING GROUND
EL	ELEVATION
ELS	ENGINEERED LOG STRUCTURE
EX	EXISTING
FG	FINISHED GROUND
FT	FEET/FOOT
HC	HATCHERY CHANNEL
IN	INCH/INCHES
LB	LEFT BANK
LT	LEFT
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH/NORTHING
NA	NOT APPLICABLE
NTS	NOT TO SCALE
OC	ON CENTER
OHW	ORDINARY HIGH WATER
QTY	QUANTITY
RB	RIGHT BANK
RD	ROAD
REF	REFERENCE
RT	RIGHT
S	SOUTH, SLOPE
SD	STORM DRAIN
SPEC	SPECIFICATION
STA	STATION
STD	STANDARD
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TYP	TYPICAL
W	WEST, WATER
WSE	WATER SURFACE ELEVATION

1 / C3.01 — REFERENCE NUMBER; SHEET WHERE REFERENCE APPEARS

DETAIL (PROFILE) — SCALE: NTS

1 (A) / C3.01 — REFERENCE NUMBER (LETTER); SHEET WHERE REFERENCE APPEARS

A / C2.01 — REFERENCE LETTER; SHEET WHERE REFERENCE APPEARS

A — SECTION SHOWN ON SAME SHEET

"-" INDICATES THAT THE DETAIL IS SHOWN ON THE SAME SHEET OR IS A TYPICAL DETAIL

"VAR" SPECIFIES THAT DETAIL/SECTION WAS TAKEN FROM VARIOUS DRAWINGS

DETAIL/SECTION REFERENCING

LEGEND - EXISTING

- PARCEL LINE (APPROX)
- ORDINARY HIGH WATER (OHW)
- FLOW DIRECTION
- EDGE OF PAVEMENT
- GUARDRAIL
- FENCE
- EDGE OF GRAVEL ROAD
- OVERHEAD POWER LINE (OP)
- UTILITY POLE (PP)
- TREE
- ELSs FROM PHASE 1 PROJECT

LEGEND - PROPOSED

- PROJECT LIMITS
- CLEAR AND GRUB LIMITS (CG)
- HAUL ROUTE
- THALWEG
- ACCESS ROAD
- CONSTRUCTION STAGING AREA
- STABILIZED CONSTRUCTION ENTRANCE
- SILT FENCE, STRAW WATTLES, OR EQUIVALENT (SF)
- BULK BAG ISOLATION
- TREE REMOVAL
- TREE PROTECTION
- FILL LINE (FILL)
- CUT LINE (CUT)
- EXISTING FENCE REMOVAL
- ELS BACKFILL SELECTED MATERIALS
- EMBANKMENT SELECTED MATERIALS
- TOPSOIL TYPE B
- STREAMBED MATERIAL
- CONCRETE (FOR VAULT AND CONCRETE BLOCKS)
- ROCK FOR EROSION PROTECTION CLASS A
- EMERGENCY WEIR
- EMERGENCY FISHWAY VAULT
- TYPE 2 STREAMBED BOULDER
- HATCHERY CHANNEL BED ELS
- HATCHERY CHANNEL BANK ELS
- RIVER BANK ELS

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JAN M. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 5/14/25

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SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

ABBREVIATIONS AND LEGEND

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: G0.02
SHEET NO: 2 OF 20

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GENERAL CONSTRUCTION NOTES:

1. PHOTOGRAPHS DOCUMENTING EXISTING CONDITIONS SHALL BE TAKEN BY THE CONTRACTOR AND SUBMITTED TO THE OWNER 5 WORKING DAYS PRIOR TO THE CONTRACTOR INITIATING WORK.
2. PROJECT CULTURAL RESOURCES ASSESSMENT SHALL BE COMPLETED BY THE OWNER PRIOR TO CONSTRUCTION.
3. ENGINEER IS DEFINED AS THE OWNER'S ENGINEER. LUMMI NATION IS DEFINED AS THE OWNER.
4. PRIOR TO INITIATING CONSTRUCTION ACTIVITIES THE CONTRACTOR SHALL STAKE FOR APPROVAL BY THE ENGINEER THE LOCATIONS OF EACH ELS INCLUDING LENGTHS, WIDTHS, ORIENTATION AND ELEVATIONS. PRIOR TO INITIATING CONSTRUCTION ACTIVITIES THE CONTRACTOR SHALL STAKE FOR APPROVAL BY THE ENGINEER TEMPORARY CONSTRUCTION ACCESS PATHS, TEMPORARY WATER CROSSINGS, TEMPORARY BRIDGE LOCATIONS, TEMPORARY FLOW DIVERSION MEASURES, AND ALL GRADING/EXCAVATION EXTENTS.
5. THE CONTRACTOR SHALL STAKE CLEARING LIMITS FOR APPROVAL BY THE ENGINEER AT LEAST 5 WORKING DAYS PRIOR TO COMMENCING CLEARING ACTIVITIES. CLEARING LIMITS FOR CONSTRUCTION SHALL BE LIMITED TO THE AREA REQUIRED FOR SAFE EQUIPMENT OPERATION AND TO MINIMIZE THE AREA OF DISTURBANCE. CLEARING LIMITS SHALL NOT BE EXPANDED UNLESS APPROVED BY THE ENGINEER.
6. TREES AND BRUSH NOT SHOWN ON THE PLANS WILL BE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES. THE ENGINEER SHALL IDENTIFY AND FLAG ALL TREES TO BE PROTECTED FROM DAMAGE PRIOR TO CONSTRUCTION. FOLLOWING CLEARING OF ALLOWED VEGETATION, THE CONTRACTOR SHALL STOCKPILE ALL TREES AND BRUSH IDENTIFIED BY THE ENGINEER, PRIOR TO AND DURING CONSTRUCTION ACTIVITIES, FOR USE AS RACKING AND SLASH MATERIALS IN THE ELS, FOR USE IN AREAS AS SHOWN ON THE PLANS, AND AS DESIGNATED BY THE ENGINEER TO CREATE ROUGH FINISHED GRADED SURFACES. CERTAIN VEGETATION MAY BE FLAGGED BY THE ENGINEER OR THE OWNER FOR SALVAGE, AND CARE SHOULD BE TAKEN TO PROTECT THOSE PLANTS FROM DEHYDRATION.
7. ALTERATION OR DISTURBANCE OF THE CHANNEL, FLOODPLAIN, AND ANY BANK AND FLOODPLAIN VEGETATION SHALL BE MINIMIZED TO THAT NECESSARY TO CONSTRUCT THE PROJECT. THE CONTRACTOR SHALL KEEP DISTURBED AREAS WITHIN THE PROJECT CONSTRUCTION LIMITS SHOWN ON THE PLANS, AND SHALL NOT EXTEND THESE LIMITS UNLESS APPROVED BY THE ENGINEER.
8. THE CONTRACTOR SHALL PROVIDE 24 HOURS ADVANCE NOTICE TO THE OWNER OR ENGINEER PRIOR TO ANY REQUIRED INSPECTION.
9. CONSTRUCTION MATERIAL AND EQUIPMENT STAGING AREAS SHALL BE LOCATED AS SHOWN ON THE PLANS. CONSTRUCTION MATERIALS AND EQUIPMENT SHALL NOT BE STORED OUTSIDE OF IDENTIFIED STAGING AREAS, UNLESS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL PROTECT ALL CONSTRUCTION MATERIALS AND EQUIPMENT FROM DAMAGE AT ALL TIMES.
10. NO EQUIPMENT SHALL BE STORED OVERNIGHT BELOW THE ORDINARY HIGH WATER (OHW) LINE.
11. EQUIPMENT USED FOR THIS PROJECT SHALL BE FREE OF EXTERNAL PETROLEUM-BASED PRODUCTS WHILE WORKING NEAR ANY SURFACE WATER OR WETLANDS. ACCUMULATION OF SOILS OR DEBRIS SHALL BE REMOVED FROM THE DRIVE MECHANISMS (WHEELS, TRACKS, TIRES, ETC.) AND UNDERCARRIAGE OF EQUIPMENT PRIOR TO ITS WORKING BELOW THE OHW LINE.
12. ALL EQUIPMENT OPERATING IN AREAS OTHER THAN EXISTING UNIMPROVED ACCESS ROADS SHALL USE ONLY BIODEGRADABLE, VEGETABLE BASED HYDRAULIC FLUIDS OR APPROVED OTHER.
13. EQUIPMENT SHALL BE CHECKED AT THE BEGINNING OF EACH WORK SHIFT FOR LEAKS, AND ANY NECESSARY REPAIRS SHALL BE COMPLETED PRIOR TO COMMENCING WORK ACTIVITIES.
14. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT-LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE RIVER, WETLANDS OR THE PROJECT SITE FROM EQUIPMENT OR SUPPLIES USED DURING CONSTRUCTION.
15. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO THE PROJECT CONSTRUCTION LIMITS DEFINED ON THE PLANS OR IDENTIFIED AS ACCEPTABLE BY THE ENGINEER.
16. IF AT ANY TIME, AS A RESULT OF PROJECT ACTIVITIES, FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE OWNER SHALL BE NOTIFIED IMMEDIATELY BY THE CONTRACTOR. THE WASHINGTON DEPARTMENT OF FISH AND WILDLIFE AND THE WASHINGTON STATE DEPARTMENT OF ECOLOGY SHALL BE CONTACTED IMMEDIATELY BY THE OWNER. WORK SHALL NOT RESUME UNTIL FURTHER APPROVAL BY THE OWNER.
17. EROSION AND SEDIMENT CONTROL METHODS SHALL BE USED TO PREVENT SILT-LADEN WATER FROM ENTERING THE RIVER. MINIMUM EROSION AND SEDIMENT CONTROL METHODS ARE SHOWN ON THE PLANS. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE ENGINEER 5 WORKING DAYS PRIOR TO CONSTRUCTION, A TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) PLAN ADDRESSING SITE SPECIFIC EROSION AND SEDIMENT CONTROL TECHNIQUES AND METHODS.
18. IF HIGH FLOW CONDITIONS THAT MAY CAUSE SILTATION, EROSION OR A DANGEROUS WORK ENVIRONMENT ARE ENCOUNTERED DURING CONSTRUCTION, WORK SHALL STOP UNTIL THE FLOW SUBSIDES.
19. LOGS SHALL BE DECKED IN THE STAGING AREA SHOWN ON THE PLANS FOR INSPECTION BY THE ENGINEER AND ORGANIZED BY LOG TYPE, DIAMETER AND LENGTH. LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS IN A PLACE VISIBLE FOR INSPECTION PRIOR TO PLACEMENT WITH LEAD-FREE, SURVEY MARKING PAINT.

GENERAL ELS CONSTRUCTION SEQUENCING:

1. STAKE AND CONSTRUCT ACCESS TO WORK AREA, STAKE CLEARING LIMITS, INSTALL TESC MEASURES, THEN COMPLETE NECESSARY CLEARING.
2. PREPARE STAGING AREAS AT LOCATIONS SHOWN ON PLANS AND IMPORT CONSTRUCTION MATERIAL AS NEEDED FOR CONSTRUCTION TO WORK AREA.
3. VERIFY LOCATION OF EACH ELS AND CLEARLY STAKE ELS EXCAVATION LIMITS .
4. IF NEEDED, THE CONTRACTOR SHALL INSTALL FISH BLOCK NETS AND THE OWNER SHALL CONDUCT FISH REMOVAL (SEINING) PRIOR TO ANY EXCAVATION, GRADING, OR CONSTRUCTION OF INSTREAM STRUCTURES. SEE REQUIREMENTS ON WATER MANAGEMENT DETAILS.
5. IF NEEDED, CONTRACTOR SHALL INSTALL OR CONSTRUCT A FLOW DIVERSION MEASURE TO ISOLATE AND DIVERT FLOW AROUND THE ACTIVE WORK AREA. SEE REQUIREMENTS ON WATER MANAGEMENT DETAILS.
6. DEWATER ISOLATED WORK AREA AS REQUIRED. PUMP WATER FROM ACTIVE WORK AREA TO UPLAND AREA FOR INFILTRATION. ENGINEER OR OWNER SHALL APPROVE OF ALL INFILTRATION AREAS PRIOR TO USE.
7. INSTALL ELSs PER THE STRUCTURE DETAILS. NATIVE EXCAVATED ALLUVIUM MATERIAL WILL BE ADDED TO THE STRUCTURES PER THE ENGINEERS DESIGNATION. ALL SUBGRADE ELEVATIONS SHALL BE CONFIRMED AND VERIFIED WITH THE ENGINEER PRIOR TO LOG AND BACKFILL PLACEMENT.
8. REMOVE ALL MATERIALS FROM STAGING AREA WHEN ELS CONSTRUCTION IS COMPLETE.
9. REMOVE ALL DEWATERING AND FLOW DIVERSION MEASURES.
10. REMOVE ALL TESC MEASURES.

GENERAL WORK SEQUENCE NOTES:

1. THIS WORK SEQUENCE IS PRESENTED FOR A GENERAL UNDERSTANDING OF THE PROJECT AND ITS CONSTRAINTS IN RELATION TO CONSTRUCTION AND SITE RESTORATION. THE CONTRACTOR IS RESPONSIBLE FOR DEVELOPING A DETAILED WORK SEQUENCE AND PHASING PLAN, WHICH SHALL INCLUDE CONSTRUCTION OF TEMPORARY FACILITIES, CONSTRUCTION OF THE DESIGN FEATURES INCLUDED ON THESE PLANS AND AS DESCRIBED IN THE SPECIFICATIONS, REMOVAL OF ALL TEMPORARY FACILITIES, AND RESTORATION AND STABILIZATION OF THE SITE.
2. THE CONTRACTOR SHALL SUBMIT A DETAILED WORK SEQUENCE AND PHASING PLAN FOR APPROVAL BY THE ENGINEER 5 WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. THE PLAN SHALL INCLUDE ALL WORK SHOWN ON THESE PLANS AND AS DESCRIBED IN THE SPECIFICATION; MOBILIZATION AND DEMOBILIZATION; ALL WORK NEEDED TO CONSTRUCT, MAINTAIN, AND REMOVE TEMPORARY FACILITIES; AND SITE RESTORATION AND STABILIZATION.
3. IN GENERAL, THE WORK SHALL BE SEQUENCED AND PERFORMED IN A MANNER THAT MINIMIZES IMPACTS TO THE RIVER, EXISTING VEGETATION, AQUATIC LIFE, THE WORK SITE, AND INFRASTRUCTURE.
4. THE CONTRACTOR MAY DECIDE HOW TO SEQUENCE THE WORK. HOWEVER THIS PROJECT WILL BE CONSTRAINED BY AN IN-WATER WORK WINDOW SET FORTH IN THE PROJECT HPA PERMIT AND THE SECTION 404 PERMIT, OUTSIDE OF WHICH NO IN-WATER WORK MAY OCCUR.

SURVEY NOTES:

1. BASIS OF BEARINGS IS THE WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE, NAD 83/91.
2. ELEVATIONS ARE BASED ON 2017 LIDAR (NAVD88)
3. ELEVATIONS ARE APPROXIMATE AND MAY VARY.

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TREATY OF 1855

IAN B. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 5/13/2025

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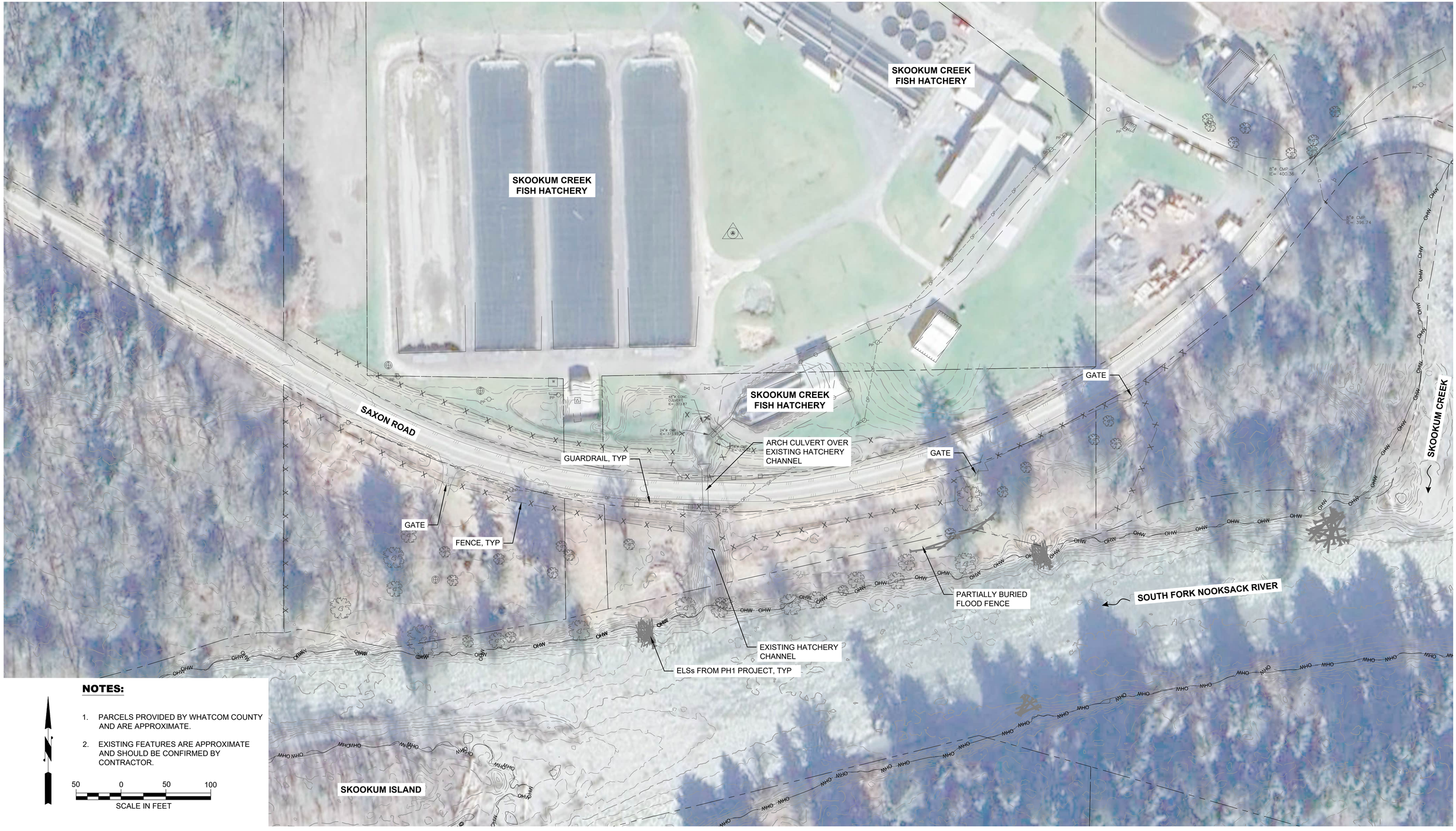
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT
PHASE 1 ADAPTIVE MANAGEMENT

NOTES

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: G0.03
SHEET NO: 3 OF 20



NOTES:

1. PARCELS PROVIDED BY WHATCOM COUNTY AND ARE APPROXIMATE.
2. EXISTING FEATURES ARE APPROXIMATE AND SHOULD BE CONFIRMED BY CONTRACTOR.

50 0 50 100
SCALE IN FEET

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SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

EXISTING CONDITIONS

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C0.01
SHEET NO: 4 OF 20

SKOOKUM CREEK FISH HATCHERY

SAXON ROAD

SKOOKUM CREEK FISH HATCHERY

48"ø CONC. CULVERT IE= 373.67

24"ø CMP IE= 373.93

18"ø CMP IE= 376.32

STAGING AREA, TYP

FENCE REMOVAL, TYP

EXISTING ACCESS ROAD

STABILIZED CONSTRUCTION ENTRANCE PER WSDOT STD PLAN I-80.10-02, TYP

EXISTING ACCESS ROAD

EXISTING SD STRUCTURE

CLEAR AND GRUB LIMITS, TYP

TREE PROTECTION, TYP

TREE REMOVAL, TYP

PROJECT LIMITS, TYP

SOUTH FORK NOOKSACK RIVER

SKOOKUM ISLAND

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30 0 30 60

SCALE IN FEET

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SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

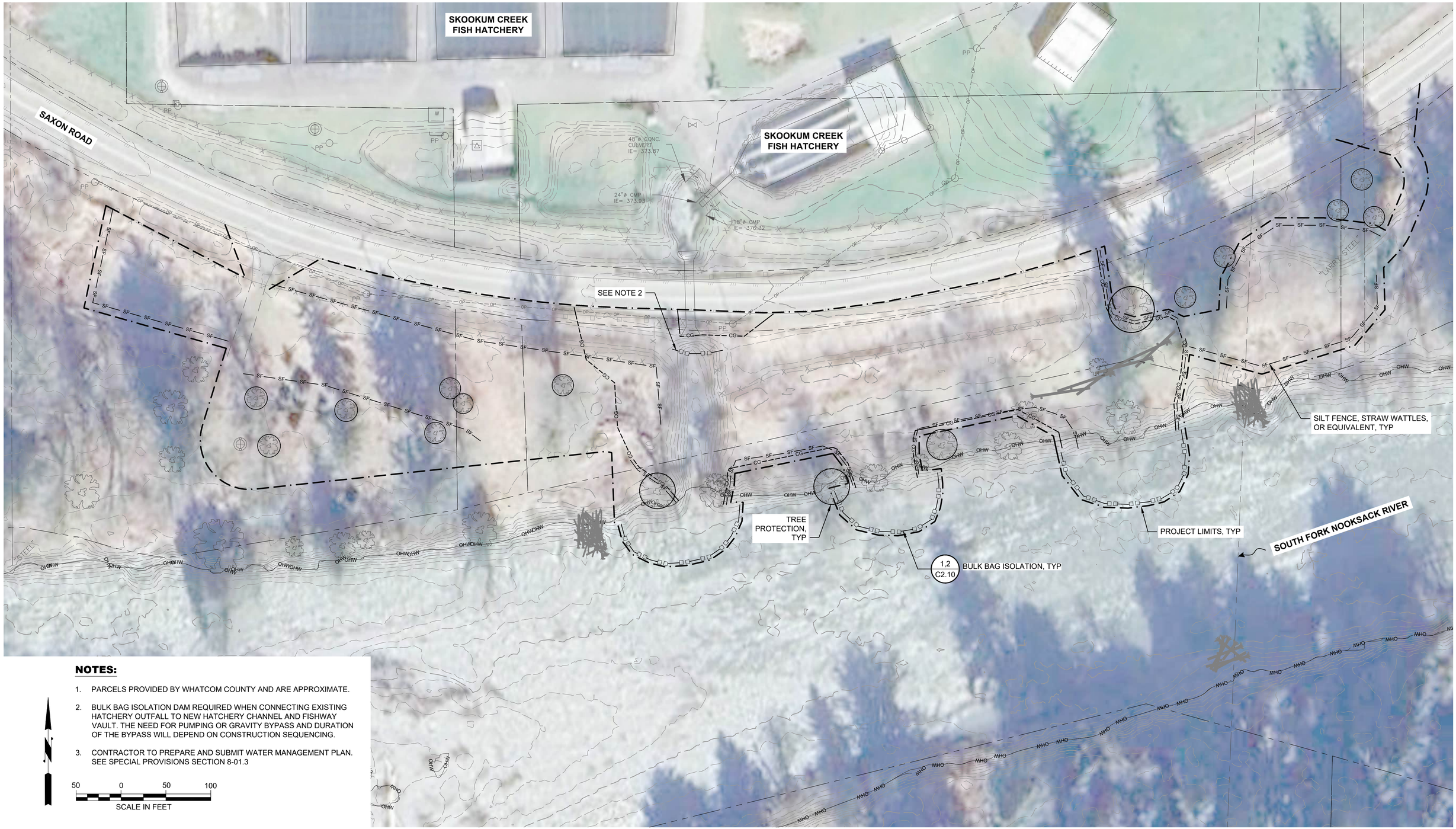
SITE PREPARATION, ACCESS ROADS, AND STAGING AREA

DATE: MAY 2025

PROJECT NO: 14-05790-000

DRAWING NO: C1.01

SHEET NO: 5 OF 20



NOTES:

1. PARCELS PROVIDED BY WHATCOM COUNTY AND ARE APPROXIMATE.
2. BULK BAG ISOLATION DAM REQUIRED WHEN CONNECTING EXISTING HATCHERY OUTFALL TO NEW HATCHERY CHANNEL AND FISHWAY VAULT. THE NEED FOR PUMPING OR GRAVITY BYPASS AND DURATION OF THE BYPASS WILL DEPEND ON CONSTRUCTION SEQUENCING.
3. CONTRACTOR TO PREPARE AND SUBMIT WATER MANAGEMENT PLAN. SEE SPECIAL PROVISIONS SECTION 8-01.3

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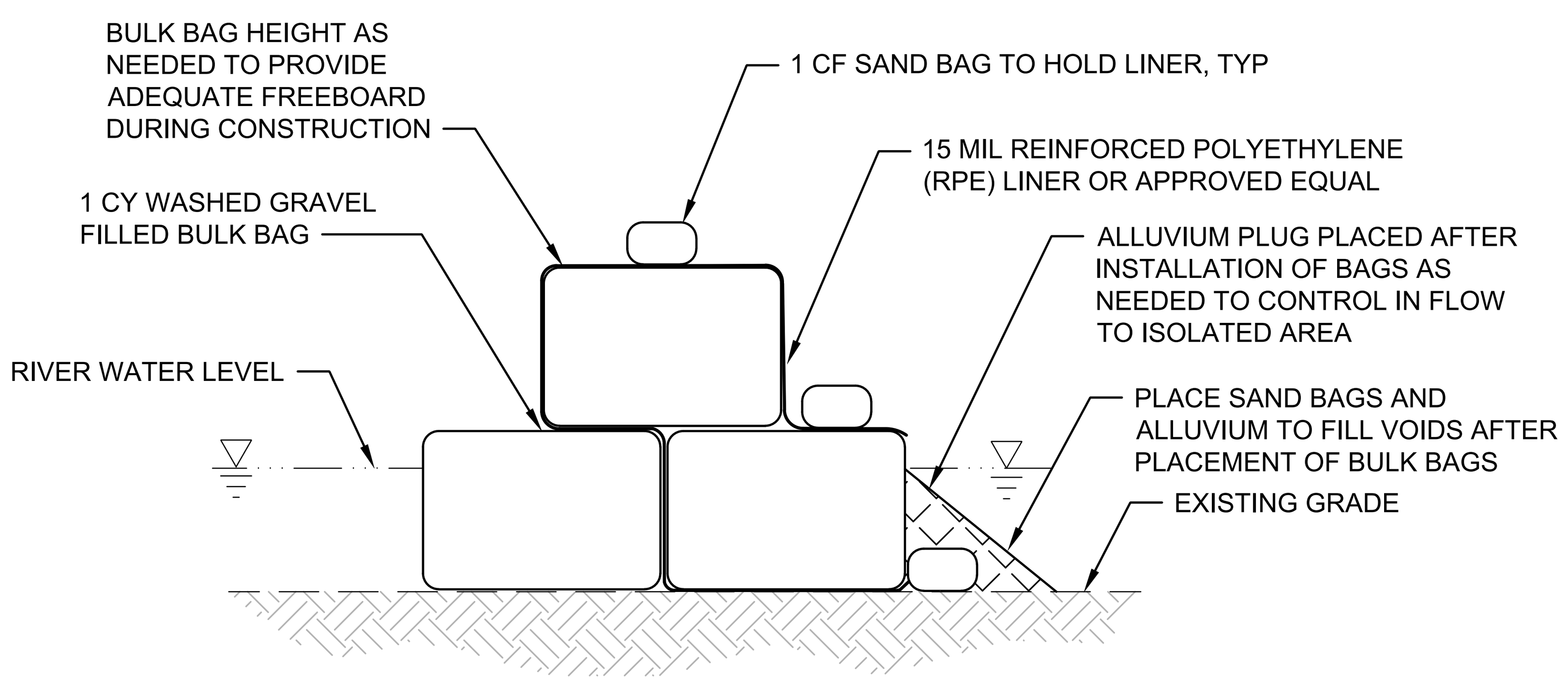
SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

TESC AND WATER MANAGEMENT PLAN

DATE:	MAY 2025
PROJECT NO:	14-05790-000
DRAWING NO:	C2.01
SHEET NO:	6 OF 20

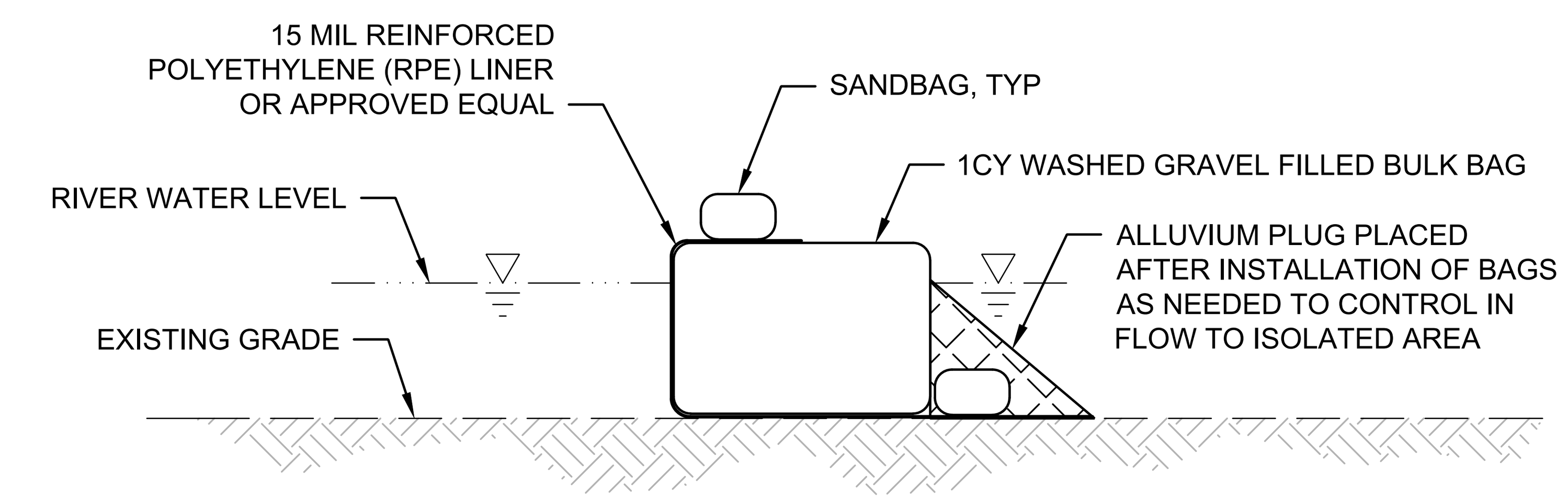


DETAIL - TYPICAL BULK BAG ISOLATION 1 / C2.01

SCALE: NTS

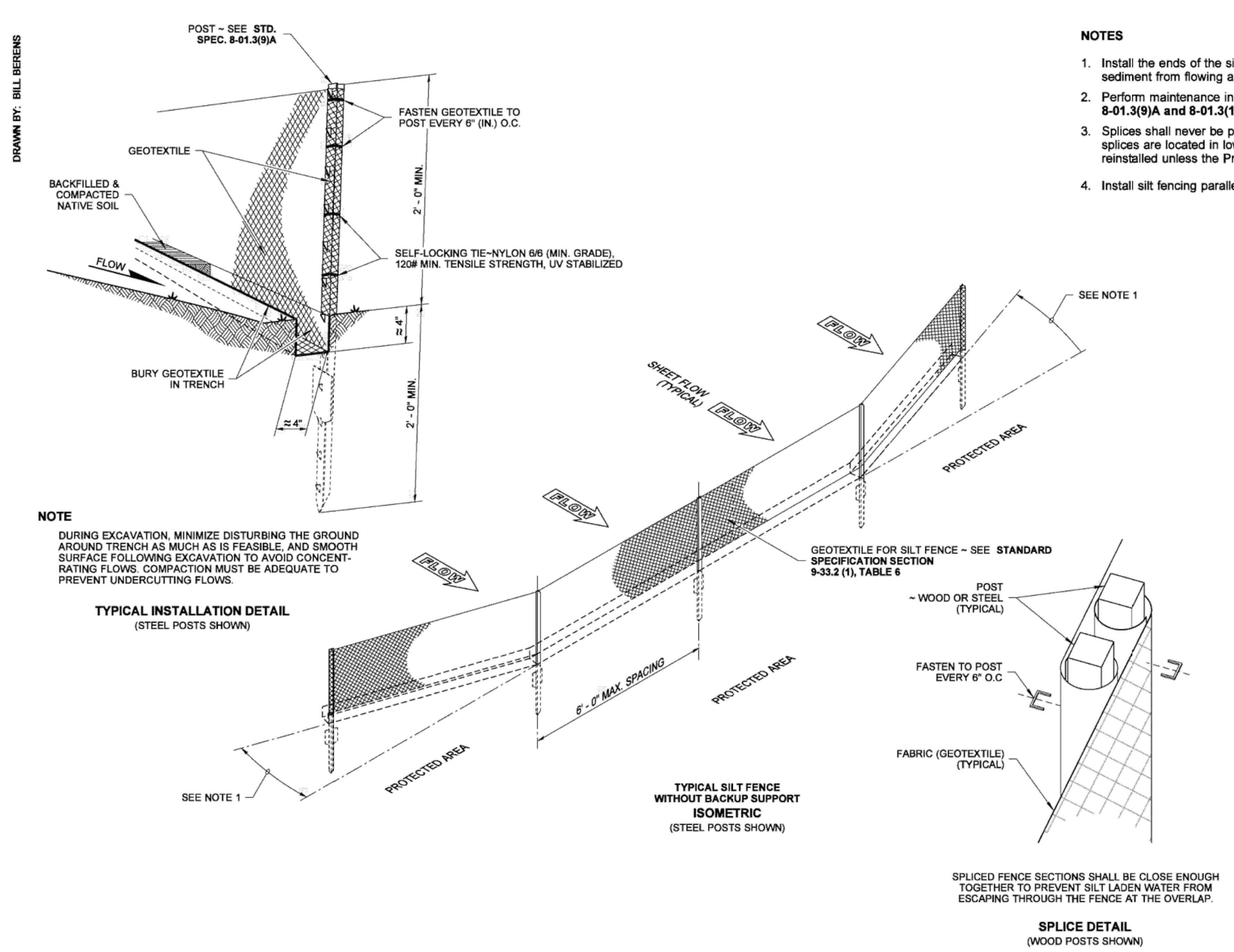
BULK BAG NOTES:

1. PLACE/REMOVE ALLUVIUM AS LAST/FIRST STEP OF BULK BAG ISOLATION SYSTEM INSTALLATION/REMOVAL.
2. ONLY INSTALL SINGLE BULK BAG ISOLATION WHERE WATER DEPTH EXPECTED TO BE LESS THAN 2 FT.
3. TRANSITION LINER FROM EXTERIOR (UPSTREAM END) OF ISOLATION TO INTERIOR OF ISOLATION APPROXIMATELY 1/2 THE LENGTH OF THE ISLOLATION WHERE RIVER WATER INFILTRATION INTO THE WORK AREA TRANSITIONS TO EXFILTRATION.
4. TRANSITION ISOLATION HEIGHT INTO BANKS USING SAND BAGS.



DETAIL - TYPICAL SINGLE BULK BAG ISOLATION 2 / C2.01

SCALE: NTS



NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15).**
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.

SILT FENCE

STANDARD PLAN I-30.15-02

SHEET 1 OF 1 SHEET

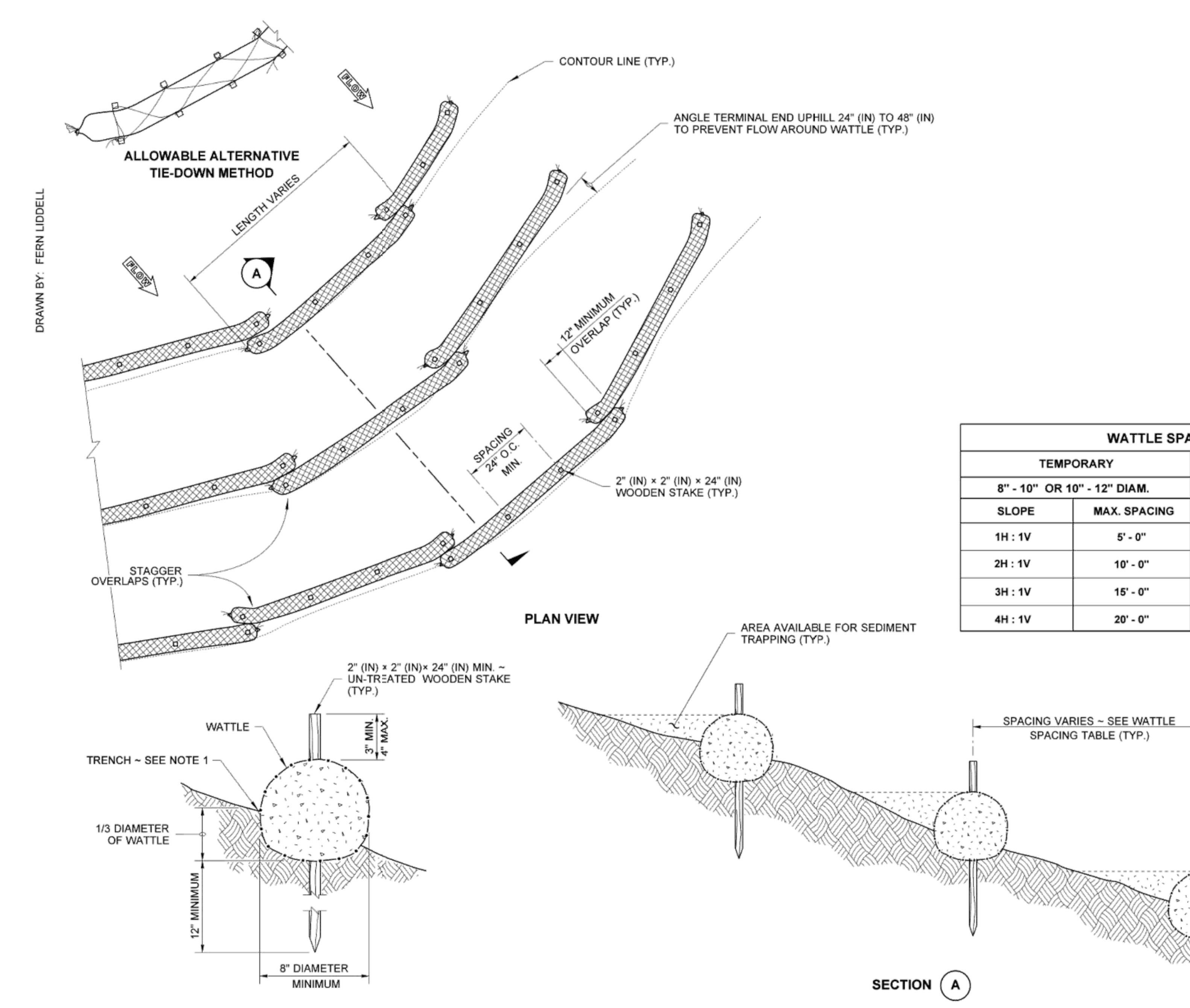
APPROVED FOR PUBLICATION

Pasco Bakotich III 3/22/13

Washington State Department of Transportation

DETAIL - SILT FENCE 3 / C2.01

SCALE: NTS



NOTES

1. Wattles shall be in accordance with **Standard Specification, Section 9-14.5(5).** Install Wattles along contours. Installation shall be in accordance with **Standard Specification, Section 8-01.3(10)**.
2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" (in) behind one another and securely tie together.
3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.
4. Install Wattle perpendicular to flow along contours.
5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.
6. Perform maintenance in accordance with **Standard Specification, Section 8-01.3(15).**
7. Refer to **Standard Specification, Section 8-01.3(16)** for removal.

WATTLE SPACING TABLE			
TEMPORARY		PERMANENT	
8" - 10" OR 10" - 12" DIAM.		10" - 12" DIAM.	
SLOPE	MAX. SPACING	SLOPE	MAX. SPACING
1H : 1V	5' - 0"	-	-
2H : 1V	10' - 0"	2H : 1V	5' - 0"
3H : 1V	15' - 0"	3H : 1V	10' - 0"
4H : 1V	20' - 0"	4H : 1V	15' - 0"

WATTLE INSTALLATION ON SLOPE

STANDARD PLAN I-30.30-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Washington State Department of Transportation

DETAIL - STRAW WATTLES 4 / C2.01

SCALE: NTS

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SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

TESC AND WATER MANAGEMENT DETAILS

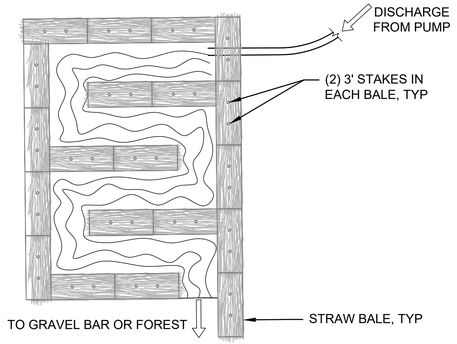
DATE: MAY 2025

PROJECT NO: 14-05790-000

DRAWING NO: C2.10

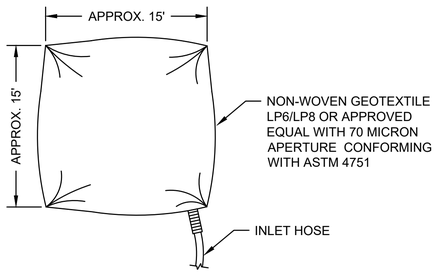
SHEET NO: 7 OF 20

CALL 811 BEFORE YOU DIG



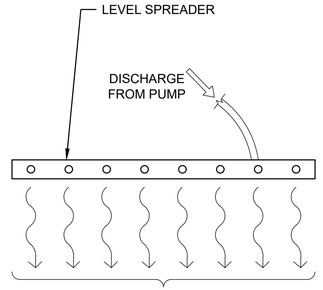
DETAIL - ENERGY DISSIPATER 1 / -

SCALE: NTS



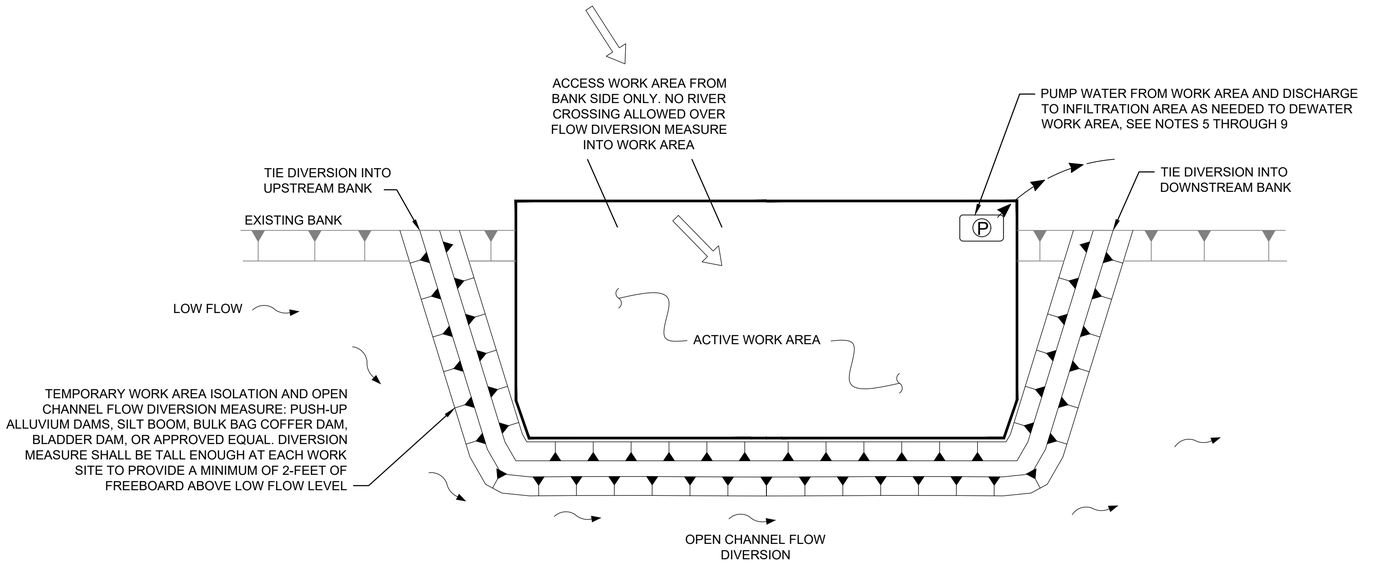
DETAIL - SILT BAG 2 / -

SCALE: NTS



DETAIL - LEVEL SPREADER 3 / -

SCALE: NTS



DETAIL - WORK AREA ISOLATION SCHEMATIC 4 / -

SCALE: NTS

WATER MANAGEMENT NOTES:

1. WATER MANAGEMENT METHODS SHALL BE USED TO DIVERT FLOW AND ISOLATE WORK AREAS AS NECESSARY TO COMPLETE CONSTRUCTION OF ELS AND TO AVOID IMPACTS TO WATER QUALITY. DIVERSION AND ISOLATION MEANS MAY INCLUDE PUSH-UP DAMS USING NATIVE ALLUVIUM FROM ACTIVE WORK AREAS, SILT BOOMS, BULK BAGS, BLADDER DAMS, OR APPROVED EQUAL AS NECESSARY TO ALLOW CONSTRUCTION WHILE PREVENTING IMPACTS TO WATER QUALITY. COMBINATION OF DIVERSION AND ISOLATION MEASURES MAY BE USED AS NECESSARY. CONTRACTOR SHALL PREPARE, SUBMIT, AND IMPLEMENT A WATER MANAGEMENT PLAN PER THE CONTRACT PLANS AND SECTION 8-01 OF THE CONTRACT SPECIFICATIONS.
2. SMALL FLOW BY-PASS CHANNELS MAY BE CONSTRUCTED AS NEEDED TO ROUTE FLOW AROUND THE WORK AREA ISOLATION MEASURE AND/OR THE WORK AREA. IF NECESSARY, BEFORE CONSTRUCTING THE BY-PASS CHANNEL THE OWNER SHALL INSTALL FISH EXCLUSION NETS AND COMPLETE ALL FISH REMOVAL BEFORE THE CONTRACTOR CONSTRUCTS AND ACTIVATES THE BY-PASS CHANNEL. COORDINATE WITH THE ENGINEER BEFORE CONSTRUCTING BY-PASS CHANNELS TO VERIFY AND APPROVE CHANNEL SIZE, ALIGNMENT AND SLOPE. BY-PASS CHANNELS MAY BE CONSTRUCTED WITHIN THE MAIN ACTIVE (NON-VEGETATED) CHANNEL, GRAVEL BARS, AND THE FLOODPLAIN NEAR THE ELS. FOLLOWING COMPLETION OF ELS CONTRACTOR SHALL RESTORE THE AREA IMPACTED BY THE BY-PASS CHANNEL CONSTRUCTION, BACKFILL THE BY-PASS CHANNEL WITH ALLUVIUM, AND RESTORE FLOW IN THE MAIN CHANNEL TO ITS ORIGINAL ALIGNMENT. LENGTH OF BY-PASS CHANNEL NEEDED WILL VARY AT EACH WORK AREA. CONTRACTOR SHALL DETERMINE THE LENGTH OF BY-PASS CHANNEL NEEDED FOR EACH WORK AREA.
3. CONTRACTOR SHALL CONSTRUCT TEMPORARY FLOW DIVERSION MEASURES STARTING AT UPSTREAM END OF WORK AREA TO DIRECT WATER AWAY FROM WORK AREA. LENGTH OF FLOW DIVERSION MEASURES NEEDED WILL VARY AT EACH WORK AREA. CONTRACTOR SHALL DETERMINE THE LENGTH OF FLOW DIVERSION MEASURES NEEDED FOR EACH WORK AREA.
4. CONSTRUCTION WITHIN THE ISOLATED WORK AREA MAY NOT COMMENCE UNTIL THE OWNER HAS COMPLETED ALL FISH EXCLUSION ACTIVITIES. ALL TEMPORARY FISH EXCLUSION NETS INSTALLED BY THE OWNER MUST REMAIN IN PLACE DURING REMOVAL OF FLOW DIVERSION AND OTHER TESC MEASURES. THE OWNER SHALL BE RESPONSIBLE FOR REMOVING FISH EXCLUSION NETS.
5. GROUND WATER ENCOUNTERED DURING ELS EXCAVATIONS MAY BE PUMPED AS NECESSARY TO INFILTRATION AREAS TO ALLOW CONSTRUCTION AND INSPECTION OF ELS STRUCTURES, AND TO FACILITATE THE REMOVAL OF SEDIMENT AND TURBIDITY FROM THE WATER. INFILTRATION AREAS ARE NOT SHOWN ON THE PLANS. ALL INFILTRATION AREAS PROPOSED BY THE CONTRACTOR SHALL BE APPROVED BY THE ENGINEER OR OWNER BEFORE THEIR USE. ANY DISCHARGE OF WATER RETURNING TO THE RIVER (DUE TO DEWATERING ACTIVITIES) SHALL NOT EXCEED THE WATER QUALITY REQUIREMENTS SET FORTH IN THE PROJECT PERMITS.
6. GROUND WATER MAY BE PUMPED TO INFILTRATION AREAS AND DISCHARGED THROUGH AN ENERGY DISSIPATOR, LEVEL SPREADER, SILT BAGS, OR OTHER AS APPROVED BY THE ENGINEER. WATER DISCHARGED OR INFILTRATED SHALL NOT CAUSE EROSION OR RESULT IN TURBIDITY IMPACTS TO THE RIVER.
7. GROUND WATER MAY NOT BE PUMPED DIRECTLY TO WETLANDS OR NEW OR EXISTING CHANNELS WITHOUT PRIOR APPROVAL FROM THE ENGINEER. WATER SHALL BE DISCHARGED IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS AND PERMITS
8. THE ENGINEER SHALL BE NOTIFIED 24 HOURS IN ADVANCE OF ANY WATER PUMPING ACTIVITIES.
9. CONSTRUCTION DEWATERING SHALL BE MAINTAINED 24 HOURS PER DAY DURING CONSTRUCTION AND MONITORED BY THE CONTRACTOR DURING NON-WORKING HOURS.

SHORING NOTES:

1. CONTRACTOR SHALL DESIGN ALL REQUIRED SHORING AND ALL FLOW AND WATER EXCLUSION STRUCTURES AND SYSTEMS. HYDROSTATIC PRESSURES SHALL BE ADDED TO LATERAL PRESSURES DUE TO EARTH, SURCHARGES AND SPECIAL PRESSURES. SPECIAL PRESSURES MAY INCLUDE BUT ARE NOT LIMITED TO HYDROSTATIC PRESSURES RESULTING FROM BACKWATER CONDITIONS, TEMPORARY SHORING SEEPAGE, MACHINERY SURCHARGE AND FLUCTUATING GROUNDWATER.
2. OTHER SURCHARGES SHALL BE DETERMINED BY THE CONTRACTOR ON THE BASIS OF CONSTRUCTION TRAFFIC, EQUIPMENT STORAGE, SPOILS HANDLING, WORK SEQUENCE AND OTHER FACTORS.
3. ALL TEMPORARY SHORING SYSTEMS SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER WITH A MINIMUM FACTOR OF SAFETY OF 1.4 (FS = 1.4).

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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LUMMI NATION TREATY OF 1855

JAN B. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 05/16/25

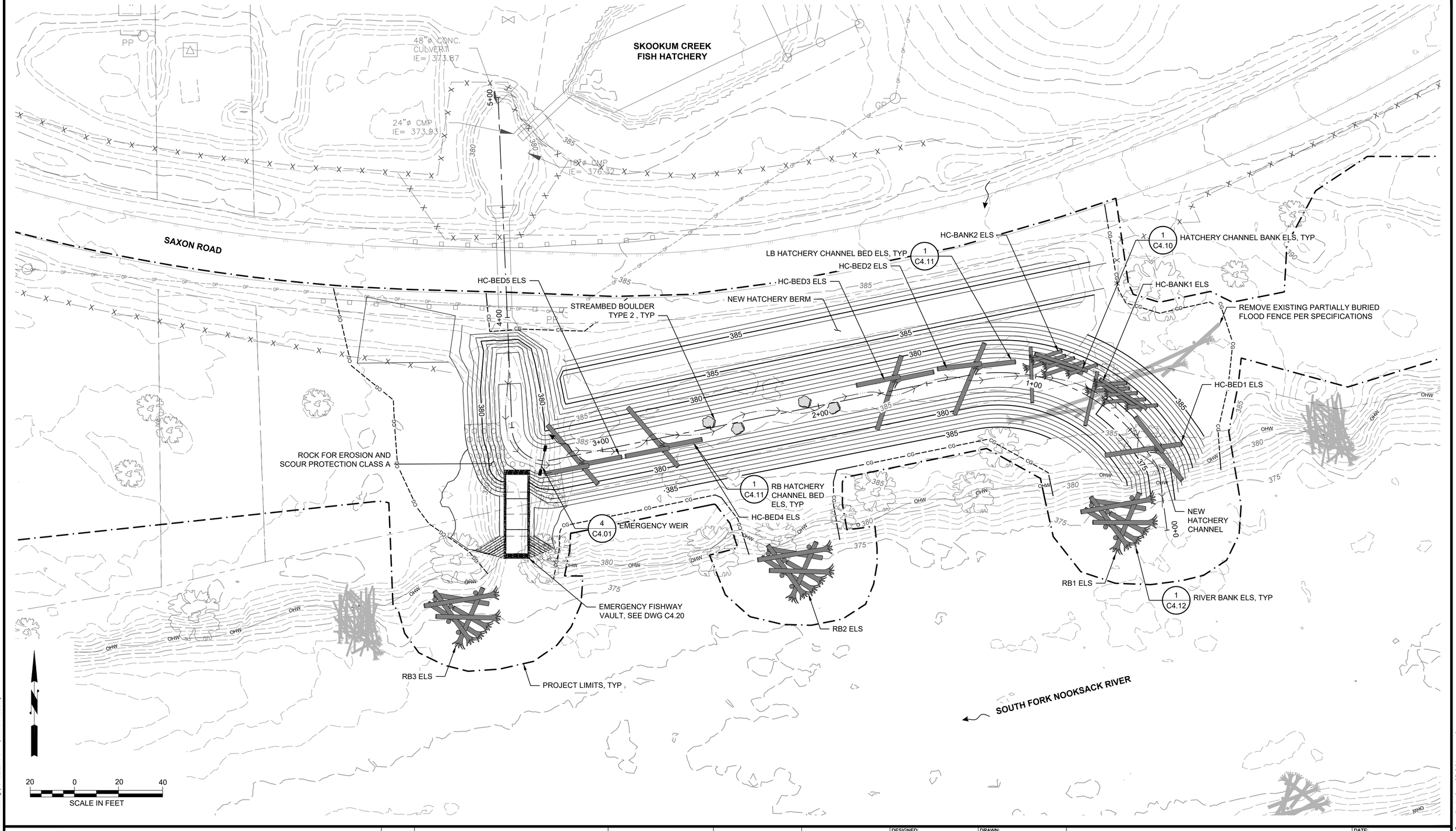
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY	DATE: MAY 2025	
DESIGNED: T. FOULK	DRAWN: E. MARSHALL	PROJECT NO: 14-05790-000	
DESIGNED: B. SCOTT	CHECKED: B. SCOTT	DRAWING NO: C2.11	
SCALE: AS NOTED	APPROVED: M. EWBANK	SHEET NO: 8 OF 20	

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

WATER MANAGMENT NOTES AND WORK AREA ISOLATION

CALL 811 BEFORE YOU DIG



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LUMMI NATION
TREATY OF 1855

JANE M. MOSTRENKO
STATE OF WASHINGTON
36069
REGISTERED
PROFESSIONAL ENGINEER
5/16/25

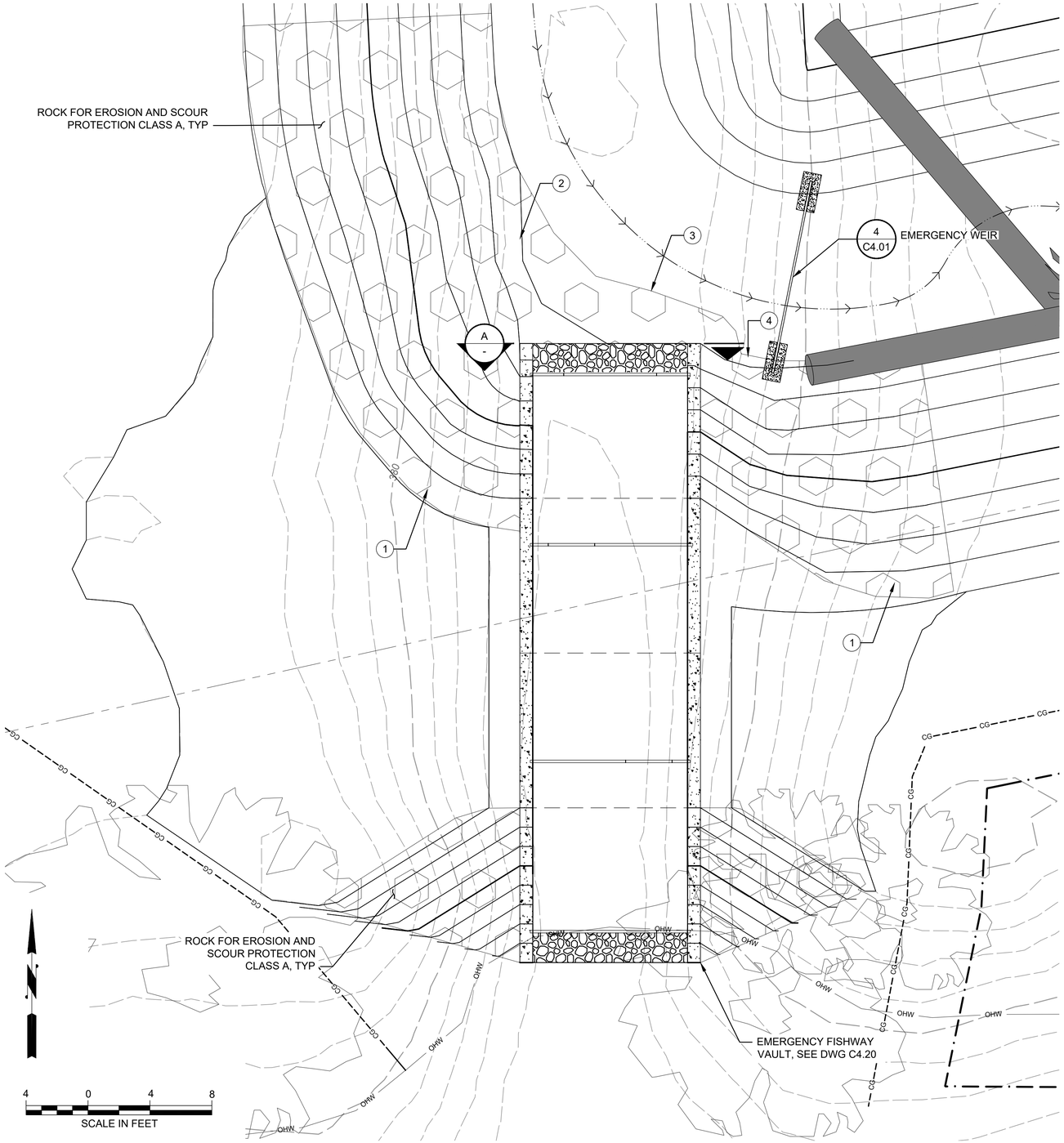
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

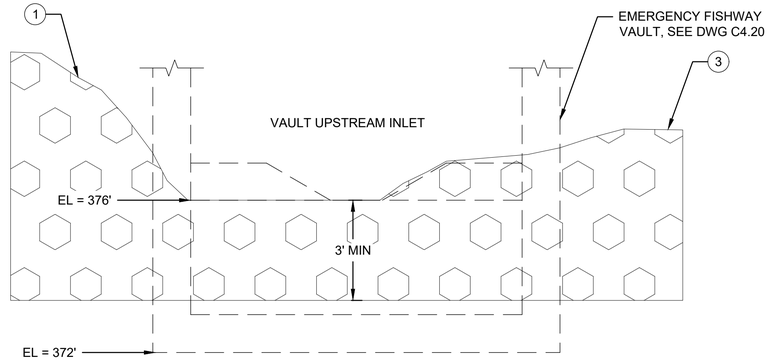
SITE PLAN

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C3.01
SHEET NO: 9 OF 20



KEYNOTES

1. USE ROCK FOR EROSION AND SCOUR PROTECTION CLASS A TO TRANSITION SLOPES FROM 2H:1V to 1.5H:1V AS SHOWN AND AS DIRECTED BY THE ENGINEER
2. PLACE ROCK FOR EROSION AND SCOUR PROTECTION CLASS A ALONG BED TO CONTINUE BANKLINE TO DEFLECT FLOW ALONG GENERAL HATCHERY CHANNEL FLOWPATH AS DIRECTED BY THE ENGINEER
3. PLACE ROCK FOR EROSION AND SCOUR PROTECTION CLASS A TO ESTABLISH BED ELEVATION LEADING INTO VAULT
4. PLACE LARGEST ROCK FOR EROSION AND SCOUR PROTECTION CLASS A TO CREATE OVERSTEEPENED BANK AT DOWNSTREAM EDGE OF VAULT



DETAIL - GRADING OF ROCK UPSTREAM OF VAULT (A / -)

SCALE: NTS

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No.	REVISION	BY	APP'D	DATE

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IAN B. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 05/16/25

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DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

EMERGENCY FISHWAY VAULT PLAN

DATE:	MAY 2025
PROJECT NO:	14-05790-000
DRAWING NO:	C3.02
SHEET NO:	10 OF 20

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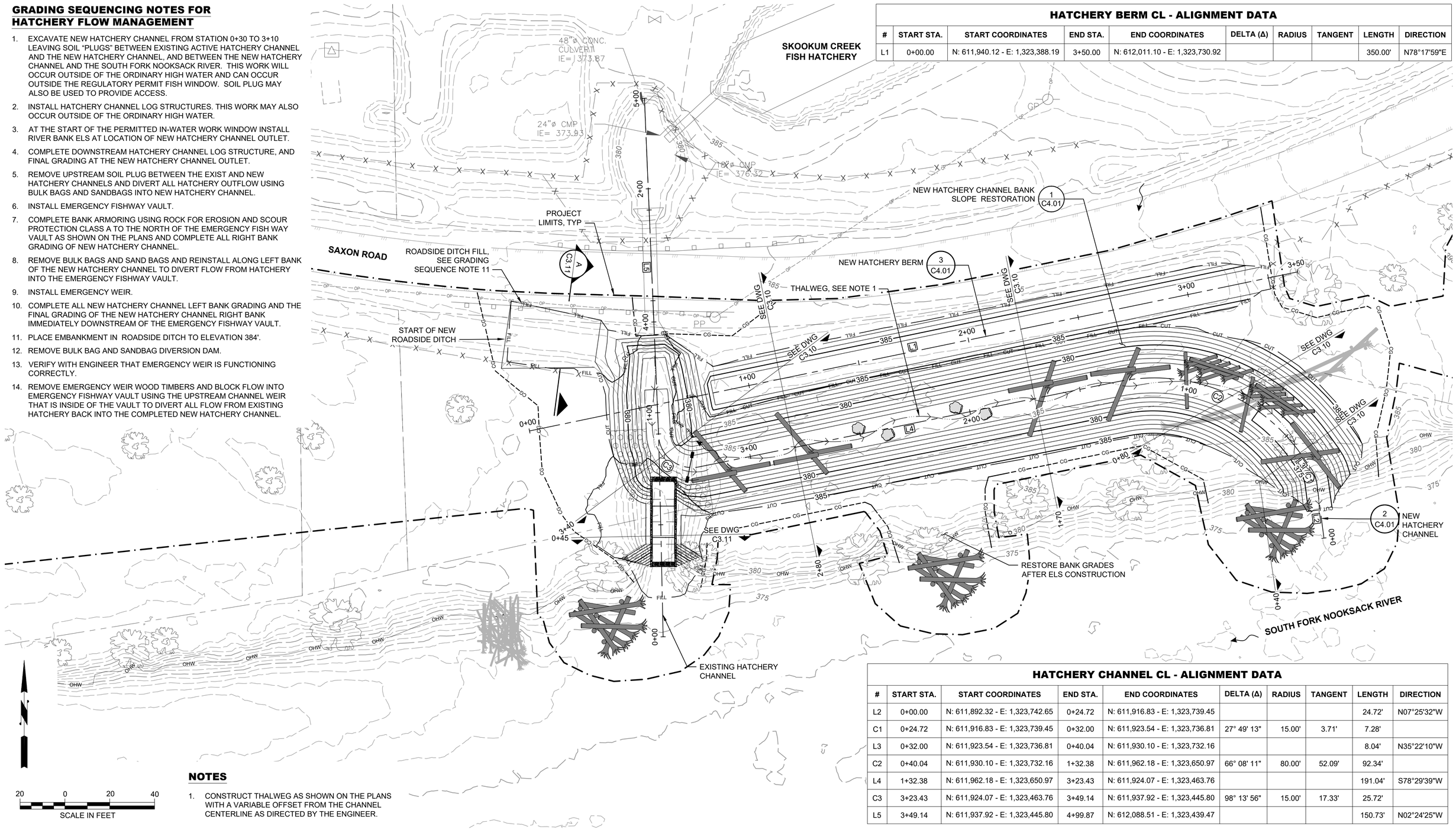
GRADING SEQUENCING NOTES FOR HATCHERY FLOW MANAGEMENT

1. EXCAVATE NEW HATCHERY CHANNEL FROM STATION 0+30 TO 3+10 LEAVING SOIL "PLUGS" BETWEEN EXISTING ACTIVE HATCHERY CHANNEL AND THE NEW HATCHERY CHANNEL, AND BETWEEN THE NEW HATCHERY CHANNEL AND THE SOUTH FORK NOOKSACK RIVER. THIS WORK WILL OCCUR OUTSIDE OF THE ORDINARY HIGH WATER AND CAN OCCUR OUTSIDE THE REGULATORY PERMIT FISH WINDOW. SOIL PLUG MAY ALSO BE USED TO PROVIDE ACCESS.
2. INSTALL HATCHERY CHANNEL LOG STRUCTURES. THIS WORK MAY ALSO OCCUR OUTSIDE OF THE ORDINARY HIGH WATER.
3. AT THE START OF THE PERMITTED IN-WATER WORK WINDOW INSTALL RIVER BANK ELS AT LOCATION OF NEW HATCHERY CHANNEL OUTLET.
4. COMPLETE DOWNSTREAM HATCHERY CHANNEL LOG STRUCTURE, AND FINAL GRADING AT THE NEW HATCHERY CHANNEL OUTLET.
5. REMOVE UPSTREAM SOIL PLUG BETWEEN THE EXIST AND NEW HATCHERY CHANNELS AND DIVERT ALL HATCHERY OUTFLOW USING BULK BAGS AND SANDBAGS INTO NEW HATCHERY CHANNEL.
6. INSTALL EMERGENCY FISHWAY VAULT.
7. COMPLETE BANK ARMORING USING ROCK FOR EROSION AND SCOUR PROTECTION CLASS A TO THE NORTH OF THE EMERGENCY FISH WAY VAULT AS SHOWN ON THE PLANS AND COMPLETE ALL RIGHT BANK GRADING OF NEW HATCHERY CHANNEL.
8. REMOVE BULK BAGS AND SAND BAGS AND REINSTALL ALONG LEFT BANK OF THE NEW HATCHERY CHANNEL TO DIVERT FLOW FROM HATCHERY INTO THE EMERGENCY FISHWAY VAULT.
9. INSTALL EMERGENCY WEIR.
10. COMPLETE ALL NEW HATCHERY CHANNEL LEFT BANK GRADING AND THE FINAL GRADING OF THE NEW HATCHERY CHANNEL RIGHT BANK IMMEDIATELY DOWNSTREAM OF THE EMERGENCY FISHWAY VAULT.
11. PLACE EMBANKMENT IN ROADSIDE DITCH TO ELEVATION 384'.
12. REMOVE BULK BAG AND SANDBAG DIVERSION DAM.
13. VERIFY WITH ENGINEER THAT EMERGENCY WEIR IS FUNCTIONING CORRECTLY.
14. REMOVE EMERGENCY WEIR WOOD TIMBERS AND BLOCK FLOW INTO EMERGENCY FISHWAY VAULT USING THE UPSTREAM CHANNEL WEIR THAT IS INSIDE OF THE VAULT TO DIVERT ALL FLOW FROM EXISTING HATCHERY BACK INTO THE COMPLETED NEW HATCHERY CHANNEL.



HATCHERY BERM CL - ALIGNMENT DATA

#	START STA.	START COORDINATES	END STA.	END COORDINATES	DELTA (Δ)	RADIUS	TANGENT	LENGTH	DIRECTION
L1	0+00.00	N: 611,940.12 - E: 1,323,388.19	3+50.00	N: 612,011.10 - E: 1,323,730.92				350.00'	N78°17'59"E

HATCHERY CHANNEL CL - ALIGNMENT DATA

#	START STA.	START COORDINATES	END STA.	END COORDINATES	DELTA (Δ)	RADIUS	TANGENT	LENGTH	DIRECTION
L2	0+00.00	N: 611,892.32 - E: 1,323,742.65	0+24.72	N: 611,916.83 - E: 1,323,739.45				24.72'	N07°25'32"W
C1	0+24.72	N: 611,916.83 - E: 1,323,739.45	0+32.00	N: 611,923.54 - E: 1,323,736.81	27° 49' 13"	15.00'	3.71'	7.28'	
L3	0+32.00	N: 611,923.54 - E: 1,323,736.81	0+40.04	N: 611,930.10 - E: 1,323,732.16				8.04'	N35°22'10"W
C2	0+40.04	N: 611,930.10 - E: 1,323,732.16	1+32.38	N: 611,962.18 - E: 1,323,650.97	66° 08' 11"	80.00'	52.09'	92.34'	
L4	1+32.38	N: 611,962.18 - E: 1,323,650.97	3+23.43	N: 611,924.07 - E: 1,323,463.76				191.04'	S78°29'39"W
C3	3+23.43	N: 611,924.07 - E: 1,323,463.76	3+49.14	N: 611,937.92 - E: 1,323,445.80	98° 13' 56"	15.00'	17.33'	25.72'	
L5	3+49.14	N: 611,937.92 - E: 1,323,445.80	4+99.87	N: 612,088.51 - E: 1,323,439.47				150.73'	N02°24'25"W

20 0 20 40
SCALE IN FEET

NOTES

1. CONSTRUCT THALWEG AS SHOWN ON THE PLANS WITH A VARIABLE OFFSET FROM THE CHANNEL CENTERLINE AS DIRECTED BY THE ENGINEER.

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION TREATY OF 1855

JAN E. MOSTRENKO STATE OF WASHINGTON 36069 REGISTERED PROFESSIONAL ENGINEER 5/16/25

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SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

GRADING PLAN

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C3.03
SHEET NO: 11 OF 20

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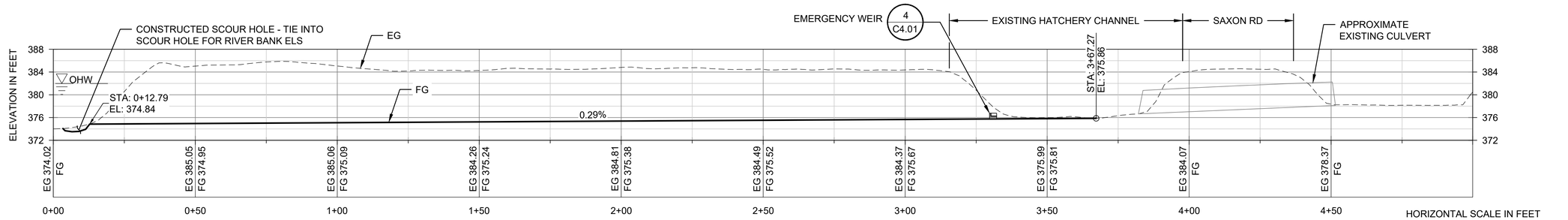
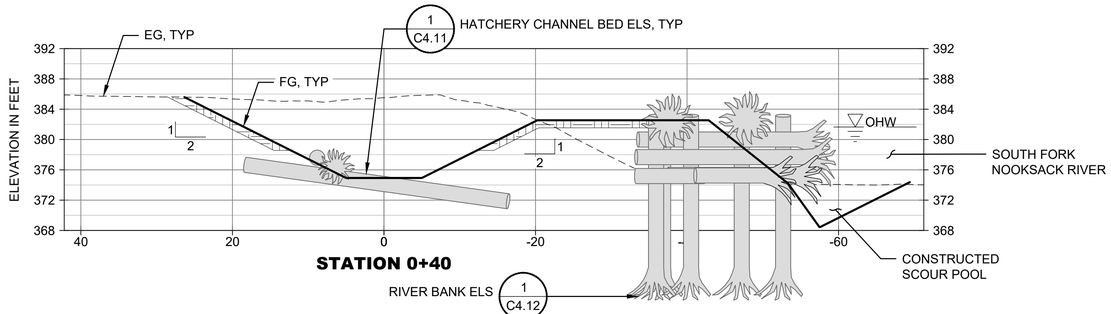
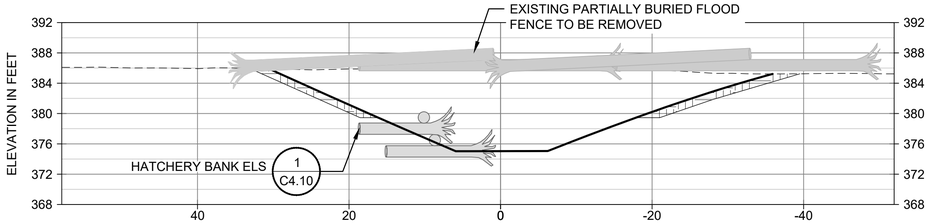


PROFILE - NEW HATCHERY CHANNEL

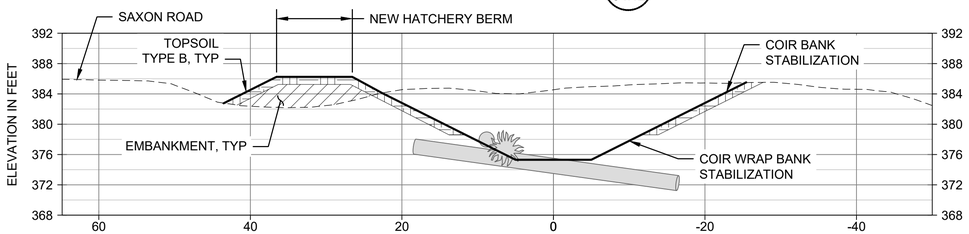
HORIZ. SCALE: 1"=20'
VERT. SCALE: 1"=10'



STATION 0+40

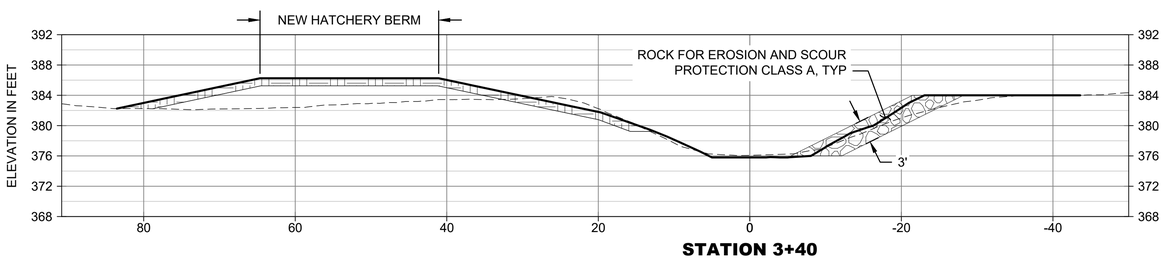


STATION 0+80



STATION 1+70

STATION 2+80



STATION 3+40

SECTIONS - HATCHERY CHANNEL

HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'

HORIZONTAL SCALE IN FEET
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION X 1

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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DESIGNED: B. SCOTT	CHECKED: B. SCOTT		
SCALE: AS NOTED	APPROVED: M. EWBANK		

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

PROFILES AND SECTIONS 1

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C3.10
SHEET NO: 12 OF 20

CALL 811 BEFORE YOU DIG

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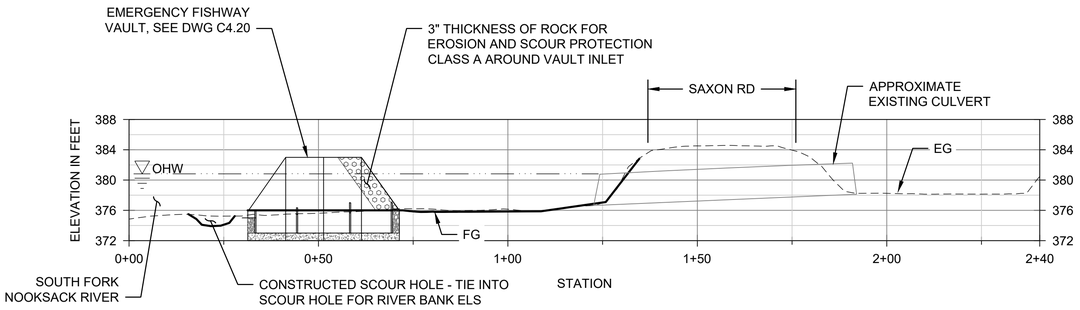
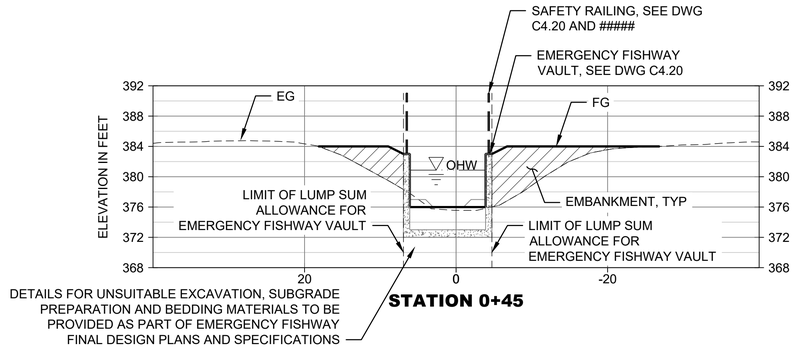


PROFILE - EXISTING HATCHERY CHANNEL

HORIZ. SCALE: 1"=20'
VERT. SCALE: 1"=10'

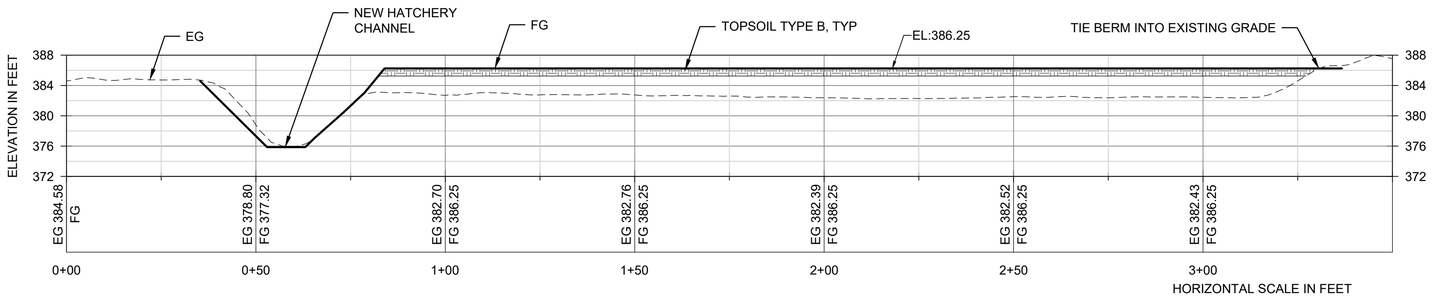
HORIZONTAL SCALE IN FEET
20 0 20 40
10 0 10 20
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION X 2



SECTION - EXISTING HATCHERY CHANNEL

HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'

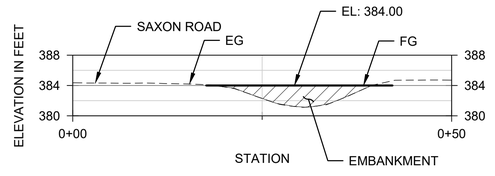
HORIZONTAL SCALE IN FEET
10 0 10 20
10 0 10 20
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION X 1



PROFILE - NEW HATCHERY BERM

HORIZ. SCALE: 1"=20'
VERT. SCALE: 1"=10'

HORIZONTAL SCALE IN FEET
20 0 20 40
10 0 10 20
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION X 2



SECTION - ROADSIDE DITCH

A
C3.03

HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION
TREATY OF 1855

IAN B. MOSTRENKO
STATE OF WASHINGTON
36069
REGISTERED
PROFESSIONAL ENGINEER
5/14/25

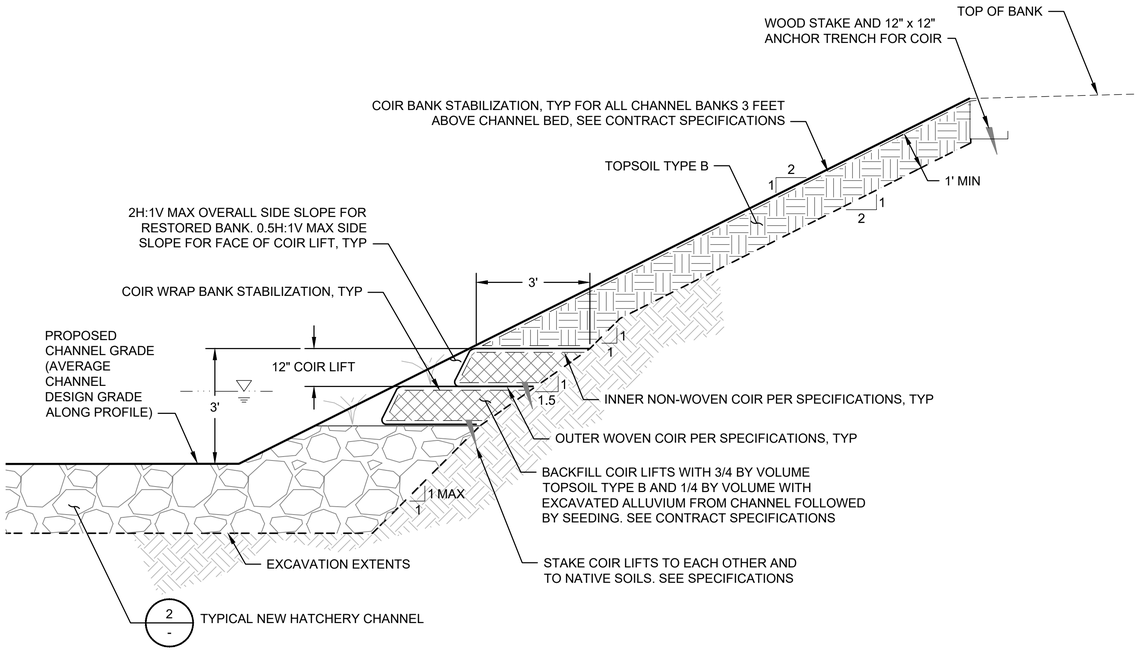
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

PROFILES AND SECTIONS 2

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C3.11
SHEET NO: 13 OF 20



COIR WRAP PREPARATION

(SEE SPECIFICATIONS)

STEP 1
- OVEREXCAVATE TO PLACE COIR WRAP SOIL LIFTS
- PROTECT SUBGRADE FROM FOOT TRAFFIC AND CONSTRUCTION ACTIVITIES THAT COULD CAUSE SOIL DISTURBANCE OR BANK SETTLEMENT PRIOR TO COIR PLACEMENT

STEP 2
- PLACE OUTER WOVEN COIR FOR THE BOTTOM OF THE LIFT
- PLACE INNER NON-WOVEN COIR
- STAKE COIR FABRIC TO NATIVE SOIL BELOW LIFT

STEP 3
- INSTALL FORM (IF CONTRACTOR CHOOSES) TO HOLD COIR WRAP AND SOIL TO DESIGN DIMENSIONS
- PLACE 12" HIGH LAYER OF SOIL COMPOSED OF TOPSOIL TYPE B AMENDED WITH ALLUVIUM AND COMPACT PER SPECIFICATIONS

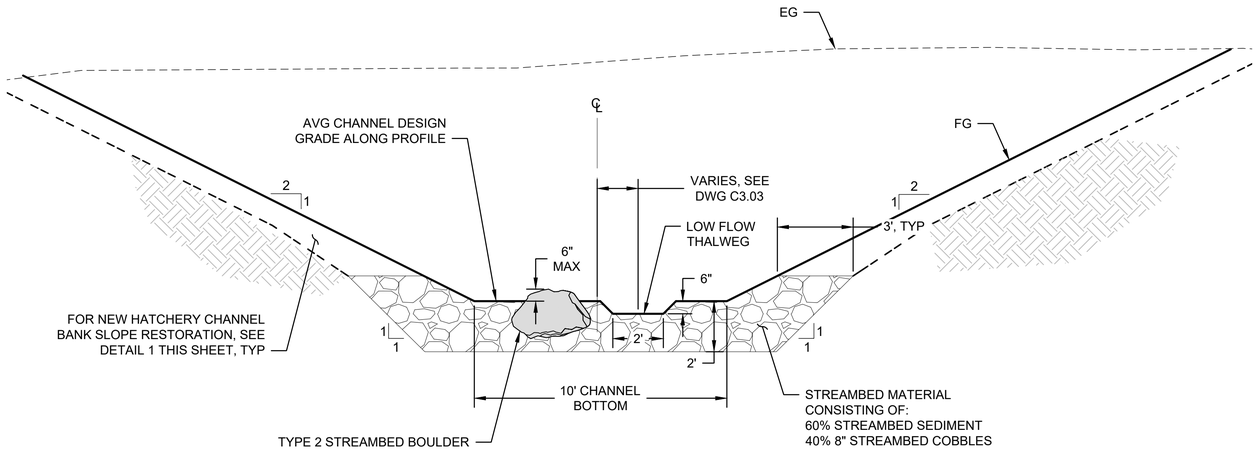
STEP 4
- PLACE SEED MIX PER PLANTING PLAN AND SPECIFICATIONS

STEP 5
- WRAP OUTER WOVEN COIR AND INNER NON-WOVEN COIR AROUND SOIL LIFT TO ENCASE THE LIFT

STEP 6
- STAKE PER DETAIL

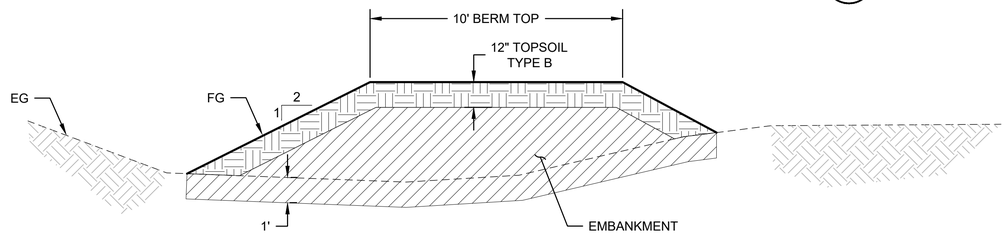
DETAIL - NEW HATCHERY CHANNEL BANK SLOPE RESTORATION — 1 / C3.03

SCALE: NTS



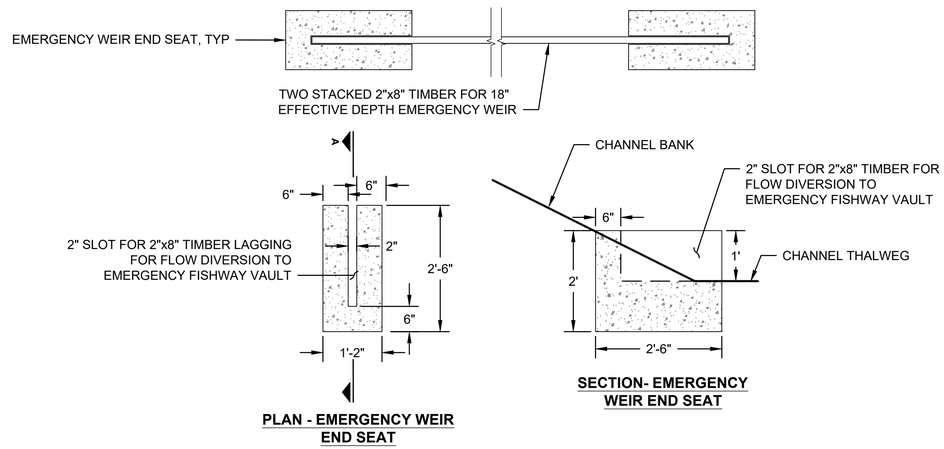
DETAIL - TYPICAL NEW HATCHERY CHANNEL — 2 / C3.03

SCALE: NTS



DETAIL - TYPICAL NEW HATCHERY BERM — 3 / C3.03

SCALE: NTS



DETAIL - EMERGENCY WEIR — 4 / C3.01

SCALE: NTS

No.	REVISION	BY	APP'D	DATE

FINAL DESIGN - BID SET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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LUMMI NATION TREATY OF 1855

JAN B. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 5/16/25

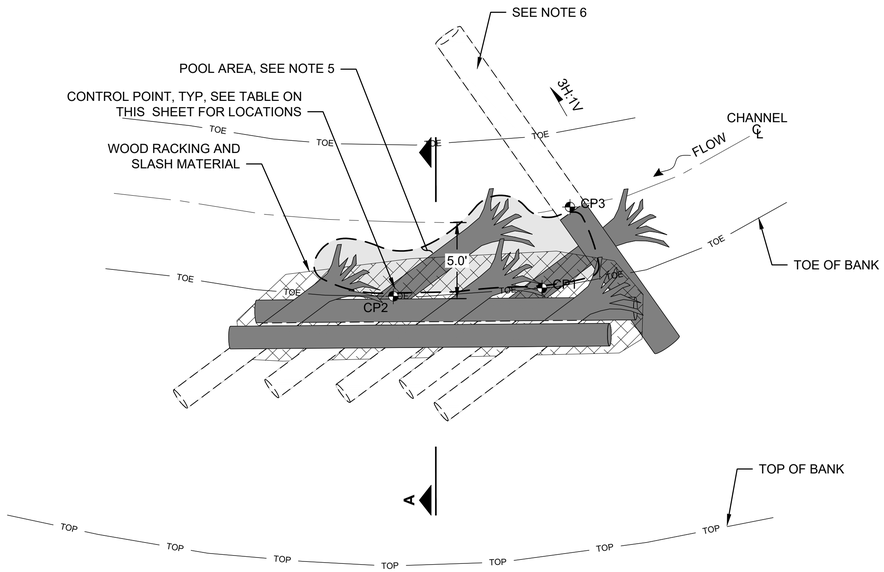
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY		
DESIGNED: T. FOULK	DRAWN: E. MARSHALL		
DESIGNED: B. SCOTT	CHECKED: B. SCOTT		
SCALE: AS NOTED	APPROVED: M. EWBANK		

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

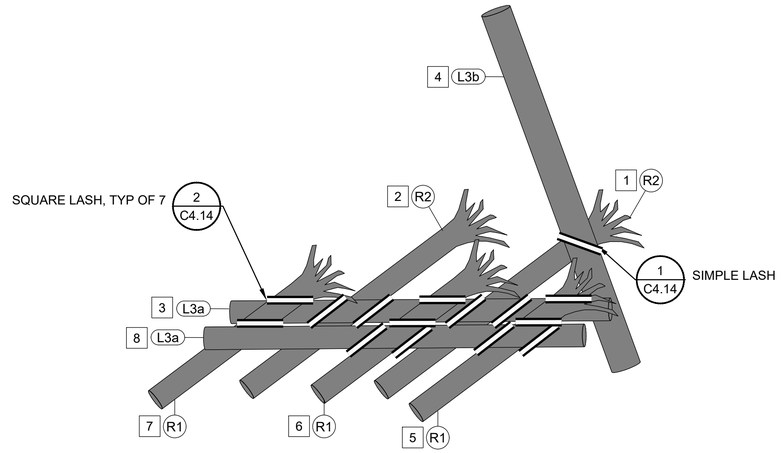
PHASE 1 ADAPTIVE MANAGEMENT

SITE DETAILS

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C4.01
SHEET NO: 14 OF 20



PLAN



LOG LAYERING AND LASHING

NOTES:

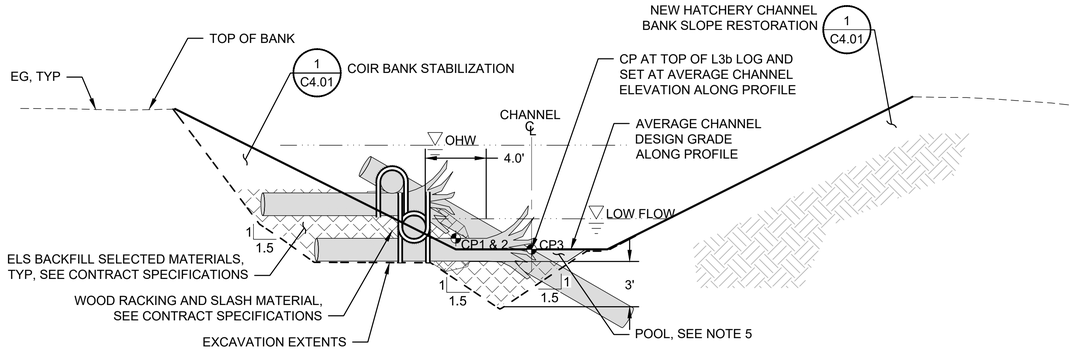
1. STRUCTURE LOCATION AND LOG ORIENTATION AND DEPTH SHOWN IS APPROXIMATE AND WILL VARY FOR EACH STRUCTURE BASED ON SITE SPECIFIC CONDITIONS. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL STAKE STRUCTURE CONTROL POINT LOCATIONS. THE ENGINEER SHALL THEN MAKE ANY NECESSARY FIELD ADJUSTMENTS TO LOG LOCATIONS, ORIENTATIONS AND DEPTHS. CONTRACTOR SHALL VERIFY FINAL STRUCTURE LOCATION AND EXCAVATION EXTENTS WITH ENGINEER PRIOR TO CONSTRUCTION. SEE CONTRACT SPECIFICATIONS.
2. LOGS SHALL BE PLACED AT THE LOCATIONS, ELEVATIONS, DEPTHS AND ORIENTATIONS SPECIFIED ON THE PLANS OR AS DESIGNATED BY THE ENGINEER.
3. CONTRACTOR SHALL BACKFILL ALL EXCAVATIONS AS SHOWN. SEE CONTRACT SPECIFICATIONS FOR COMPACTION REQUIREMENTS.
4. BURIED PORTION OF LOGS SHOWN ON PLAN VIEW ONLY.
5. EXCAVATE SCOUR POOL 1 FOOT BELOW AVERAGE CHANNEL DESIGN GRADES. LOCATION AND DIMENSIONS TO BE ADJUSTED IN THE FIELD AS DESIGNATED BY THE ENGINEER.
6. LOWER 10 FEET OF LOG TO BE BURIED BELOW CHANNEL BED AND TOE IN APPROXIMATE POSITION SHOWN, AS DIRECTED BY THE ENGINEER.

LEGEND:

X#	LOG TYPE ID
#	LOG PLACEMENT SEQUENCING ORDER
CP#	CONTROL POINT
	BURIED PORTION OF LOG
	EXPOSED PORTION OF LOG

LOG SCHEDULE - HATCHERY CHANNEL BANK ELS:

LOG TYPE	MIN DIA (IN)	LENGTH (FT)	ROOTWAD (YES/NO)	TOTAL QTY PER STRUCTURE
R1	18	15	YES	3
R2	18	20	YES	2
L3a	18	25	NO	2
L3b	24	25	NO	1
RACKING	4-16	15-30	-	5
SLASH	-	-	-	20 CY



SECTION

HATCHERY CHANNEL BANK ELS CONTROL POINTS TABLE

STRUCTURE # - CONTROL POINT	NORTHING	EASTING	ELEVATION
HC-BANK1-CP1	611967.1	1323683.6	375.85
HC-BANK1-CP2	611964.7	1323693.1	375.82
HC-BANK1-CP3	611962.5	1323681.2	375.10
HC-BANK2-CP1	611955.7	1323712.3	375.76
HC-BANK2-CP2	611950.8	1323719.2	375.74
HC-BANK2-CP3	611952.2	1323708.4	375.02

DETAIL - HATCHERY CHANNEL BANK ELS

SCALE: NTS

1 C3.01

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION TREATY OF 1855

JAMES R. MOSTRENKO STATE OF WASHINGTON 36069 REGISTERED PROFESSIONAL ENGINEER 5/16/25

DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY		
DESIGNED: T. FOULK	DRAWN: E. MARSHALL		
DESIGNED: B. SCOTT	CHECKED: B. SCOTT		
SCALE: AS NOTED	APPROVED: M. EWBANK		

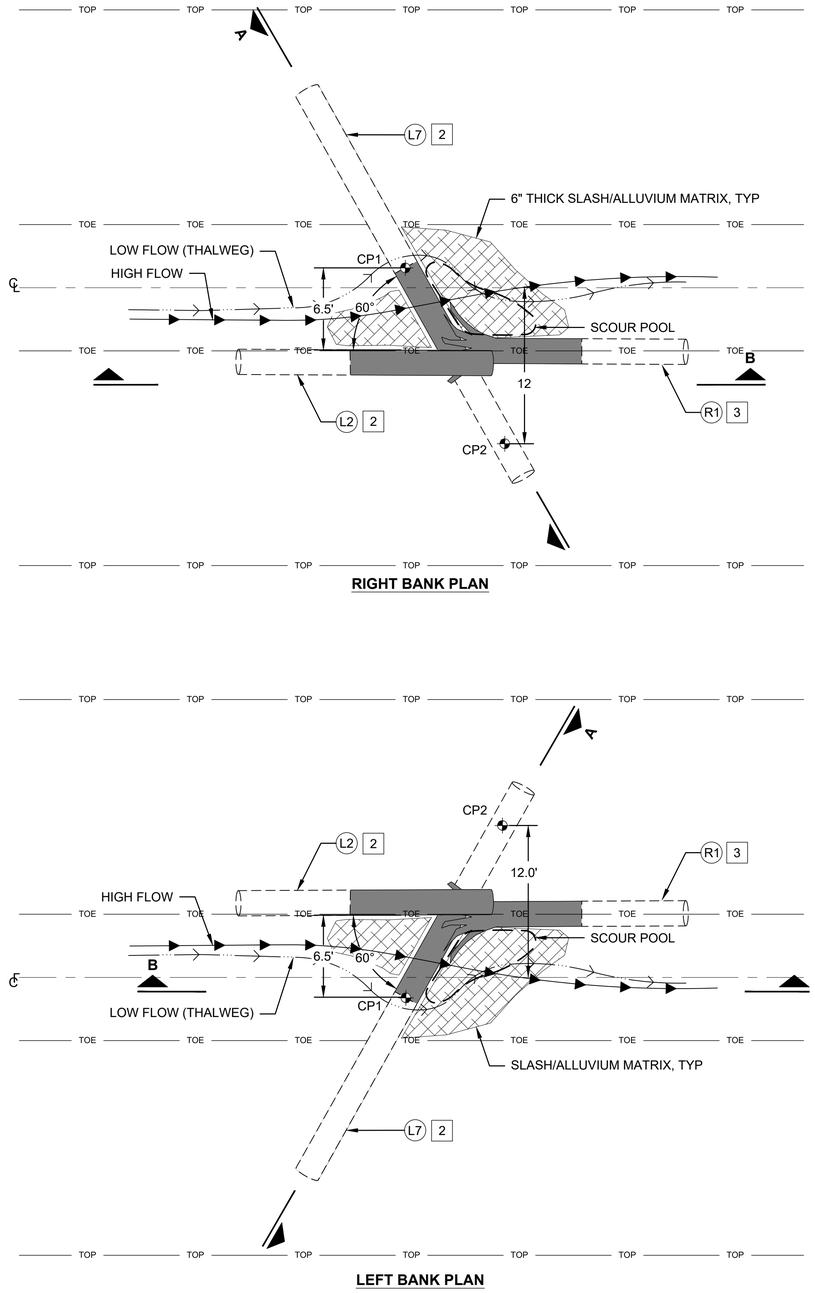
SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

HATCHERY CHANNEL BANK ELS DETAILS

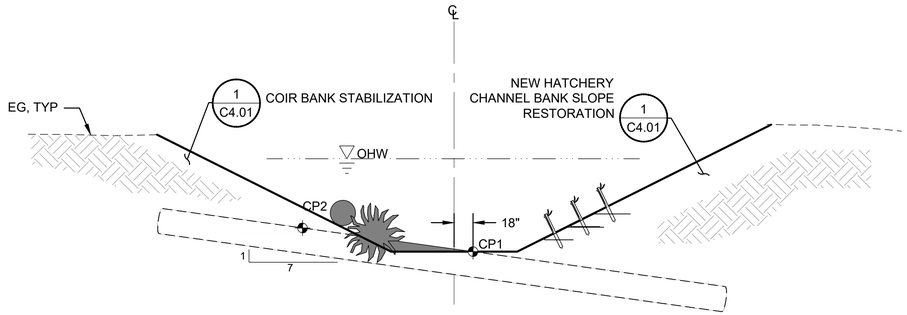
DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C4.10
SHEET NO: 15 OF 20

CALL 811 BEFORE YOU DIG

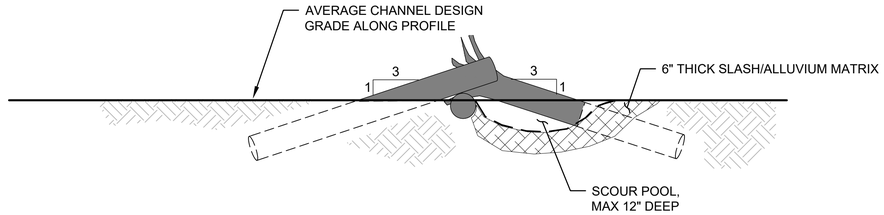


RIGHT BANK PLAN

LEFT BANK PLAN



SECTION A



SECTION B

NOTES:

1. STRUCTURE LOCATION AND LOG ORIENTATION AND DEPTH SHOWN IS APPROXIMATE AND WILL VARY FOR EACH STRUCTURE BASED ON SITE SPECIFIC CONDITIONS. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL STAKE STRUCTURE CONTROL POINT LOCATIONS. THE ENGINEER SHALL THEN MAKE ANY NECESSARY FIELD ADJUSTMENTS TO LOG LOCATIONS, ORIENTATIONS AND DEPTHS. CONTRACTOR SHALL VERIFY FINAL STRUCTURE LOCATION AND EXCAVATION EXTENTS WITH ENGINEER PRIOR TO CONSTRUCTION. SEE CONTRACT SPECIFICATIONS.
2. LOGS SHALL BE PLACED AT THE LOCATIONS, ELEVATIONS, DEPTHS AND ORIENTATIONS SPECIFIED ON THE PLANS OR AS DESIGNATED BY THE ENGINEER.
3. CONTRACTOR SHALL BACKFILL ALL EXCAVATIONS AS SHOWN WITH SELECTED MATERIALS. SEE CONTRACT SPECIFICATIONS FOR BACKFILL MATERIALS AND COMPACTION REQUIREMENTS.

LOG SCHEDULE - HATCHERY CHANNEL BED ELS:

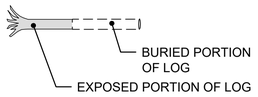
LOG ID #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD	QTY/ STRUCT
(L2)	24	20	NO	1
(L7)	24	45	NO	1
(R1)	18	15	YES	1
SLASH	-	-		1 CY

LEGEND:

(X#) LOG TYPE ID

[#] LOG PLACEMENT SEQUENCING ORDER

CP# CONTROL POINT



HATCHERY CHANNEL BED ELS CONTROL POINTS TABLE

STRUCTURE # - CONTROL POINT	NORTHING	EASTING	ELEVATION
HC-BED1-CP1	611928.8	1323731.5	374.92
HC-BED1-CP2	611930.7	1323744.8	377.75
HC-BED2-CP1	611962.1	1323653.6	375.18
HC-BED2-CP2	611973.8	1323658.5	377.86
HC-BED3-CP1	611954.7	1323616.8	375.29
HC-BED3-CP2	611966.7	1323619.6	378.10
HC-BED4-CP1	611934.0	1323510.1	375.61
HC-BED4-CP2	611924.4	1323518.3	378.35
HC-BED5-CP1	611926.5	1323473.3	375.72
HC-BED5-CP2	611917.0	1323481.5	378.46

DETAIL - HATCHERY CHANNEL BED ELS

SCALE: NTS

1 / C3.01

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION TREATY OF 1855

IAN E. MOSTRENKO STATE OF WASHINGTON 36069 REGISTERED PROFESSIONAL ENGINEER 05/14/25

DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

HATCHERY CHANNEL BED ELS DETAILS

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C4.11
SHEET NO: 16 OF 20

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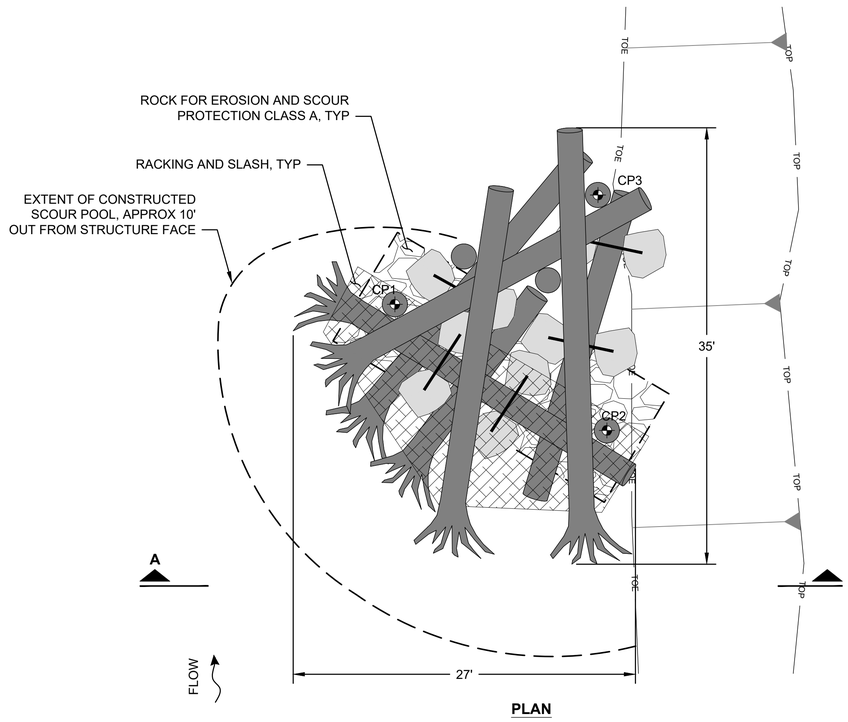
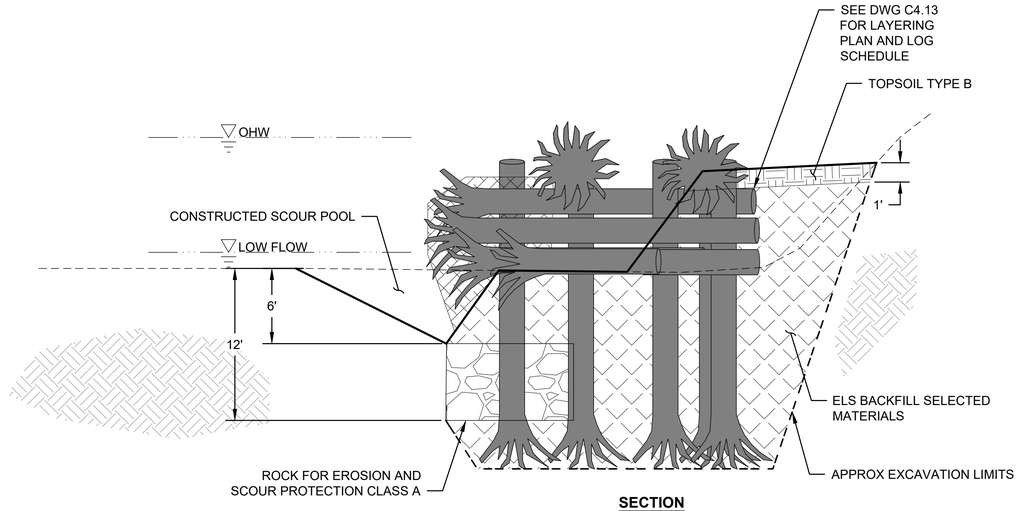


PLAN



SECTION

DETAIL - RIVER BANK ELS

SCALE: NTS

1 / C3.01

GENERAL NOTES:

1. UP TO 3 PILE LOCATIONS PER RIVER BANK ELS SHALL BE STAKED BY THE CONTRACTOR AND VERIFIED (AND ADJUSTED IF NECESSARY) BY THE ENGINEER.
2. EXCAVATION SPOILS SHALL BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS, AND TO BE REUSED AS SELECTED MATERIALS FOR BACKFILL.
3. LOG MATERIALS SHALL BE PLACED AT THE LOCATIONS AND ELEVATIONS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER OR OWNER.
4. TRIM LOGS AS REQUIRED.
5. TOE OF BANK VARIES PER EACH RIVER BANK ELS.
6. SLASH AND RACKING TO FILL VOIDS BETWEEN LOG LAYERS. SEQUENCING OF SLASH PLACEMENT MAY NEED TO BE MODIFIED FOR LASHING. SUBSEQUENT LOG LAYERS SHALL COMPRESS SLASH AND RACKING PLACED IN PREVIOUS LAYERS.
7. RACKING PLACEMENT SHALL BE COORDINATED WITH LOG LAYER PLACEMENT AND SLASH PLACEMENT TO ENSURE LOG MEMBERS EXTEND THROUGH AND BIND RACKING MEMBERS AND RACKING MEMBERS EXTEND THROUGH AND BIND SLASH MATERIAL.
8. PLACE BALLAST ROCKS AS LOW WITHIN THE ELS AS POSSIBLE AND ENSURE CHAIN BETWEEN BALLAST ROCKS HAS NO SLACK.
9. AUGMENT OR DELETE ROCK QUANTITIES AS NEEDED TO MAINTAIN AN ELS ROCK BALLAST OF 20 TONS MINIMUM.
10. CONTRACTOR SHALL STAKE 3 VERTICAL LOG LOCATIONS FOR RIVER BANK ELS BASED ON APPROX 10' TO THE RELATIVE DEPTH TO THE ADJACENT CHANNEL BOTTOM, DEPTH SHALL NOT EXCEED 15' BELOW BASE FLOW WATER SURFACE. CONTRACTOR SHALL MARK DEPTH OF BURIAL LOCATION ON ALL VERTICAL LOGS PRIOR TO PLACEMENT WITH BLAZE ORANGE MARKING PAINT.
11. CONTRACTOR SHALL EXPECT FIELD FITTING
12. RACKING, SLASH, AND LASHINGS ONLY SHOWN IN LAYERS WHERE PLACEMENT OCCURS FOR CLARITY.
13. ALL LOG TO LOG LASHING SHALL BE 3/8"Ø GRADE 43 NATURAL FINISH CHAIN UNLESS OTHERWISE SPECIFIED IN LAYER PLAN. BOULDER TO LOG LASHING SHALL BE 3/8"Ø GRADE 43 NATURAL FINISH CHAIN. SEE SHEET C4.14 FOR LASHING TYPES AND CONDITIONS.
14. ALL CONNECTING HARDWARE SHALL HAVE A RATED BREAKING LOAD LIMIT OF EQUAL OR GREATER STRENGTH THAN CHAIN. SHACKLES SHALL BE SAFETY SHACKLES AND THREADS SHALL BE MARRED TO PREVENT REMOVAL OF SHACKLES.

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION TREATY OF 1855

JAMES R. MOSTRENKO — STATE OF WASHINGTON — 36069 — REGISTERED PROFESSIONAL ENGINEER — 5/16/25

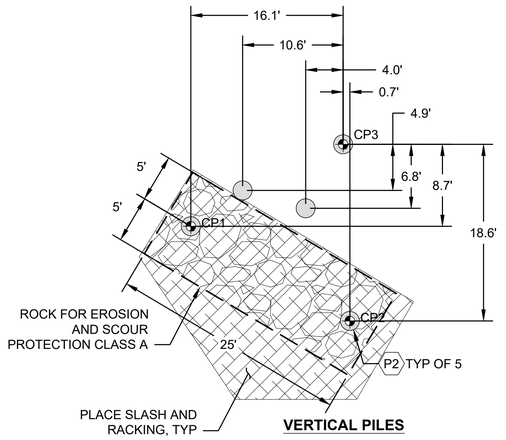
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

RIVER BANK ELS DETAILS

DATE:	MAY 2025
PROJECT NO:	14-05790-000
DRAWING NO:	C4.12
SHEET NO:	17 OF 20



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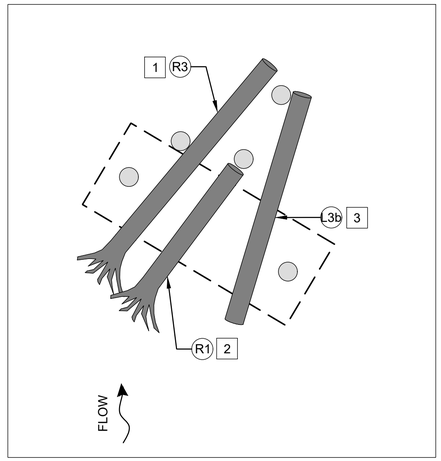
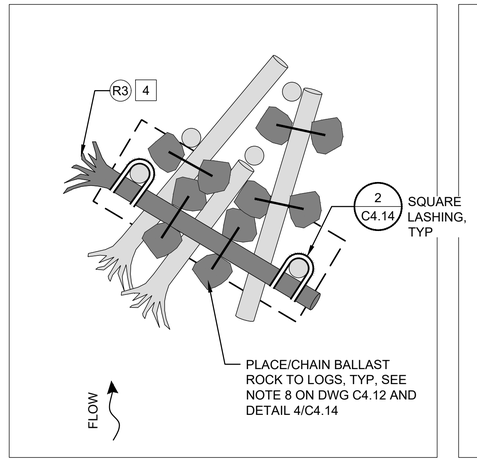


LAYER 1



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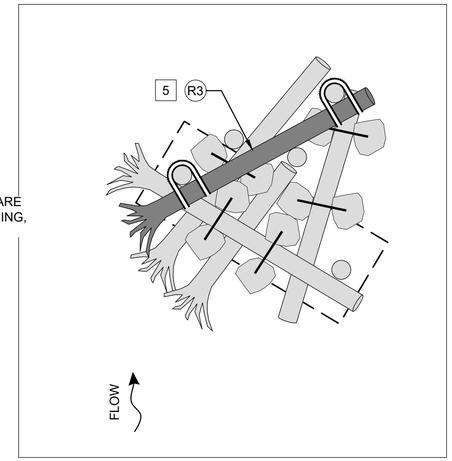

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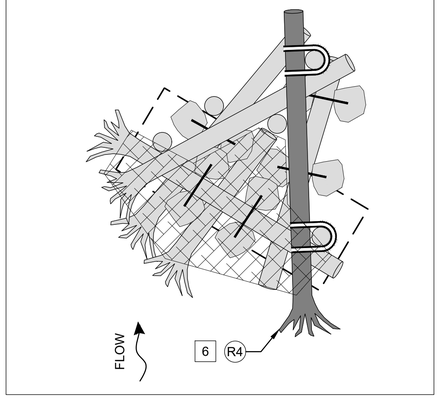

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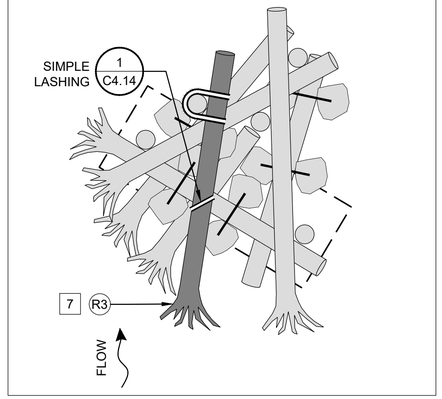
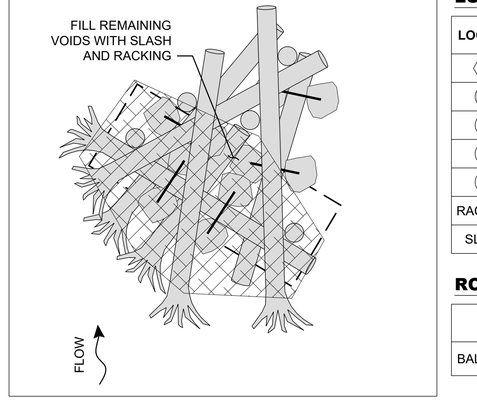


LAYER 5



COMPLETE

LOG SCHEDULE - RIVER BANK ELS:

LOG ID #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD	QTY/ STRUCT
P2	24	20	YES	5
L3b	24	25	NO	1
R1	18	15	YES	1
R3	24	25	YES	4
R4	24	30	YES	1
RACKING	4-16	15-30		50
SLASH	-	-		30 CY

ROCK SCHEDULE - RIVER BANK ELS:

	WEIGHT (TONS)	QTY/ STRUCT
BALLAST ROCKS	2	10

RIVER BANK ELS CONTROL POINTS TABLE

STRUCTURE # - CONTROL POINT	NORTHING	EASTING
RB1-CP1	611846.0	1323421.5
RB1-CP2	611864.0	1323429.3
RB1-CP3	611860.9	1323410.8
RB2-CP1	611866.9	1323572.6
RB2-CP2	611884.8	1323580.4
RB2-CP3	611881.7	1323562.0
RB3-CP1	611888.9	1323719.3
RB3-CP2	611907.0	1323726.8
RB3-CP3	611903.6	1323708.4

LEGEND:

- X# — LOG TYPE ID
- # — LOG PLACEMENT SEQUENCING ORDER
- CP# — CONTROL POINT

RIVER BANK ELS LAYERING PLAN

SCALE: NTS

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

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LUMMI NATION TREATY OF 1855

IAN B. MOSTRENKO STATE OF WASHINGTON 36069 REGISTERED PROFESSIONAL ENGINEER 5/16/2025

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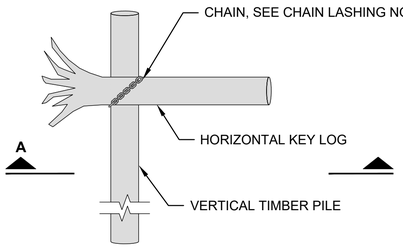
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

RIVER BANK ELS LAYERING PLAN

DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C4.13
SHEET NO: 18 OF 20



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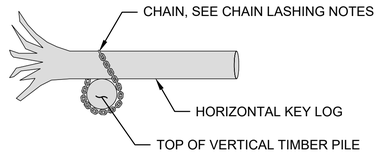
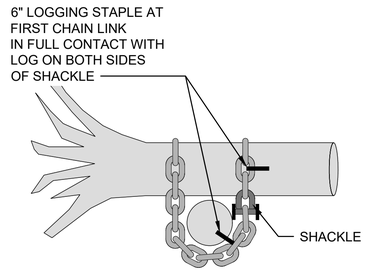


SECTION

DETAIL - SIMPLE CHAIN LASHING

SCALE: NTS

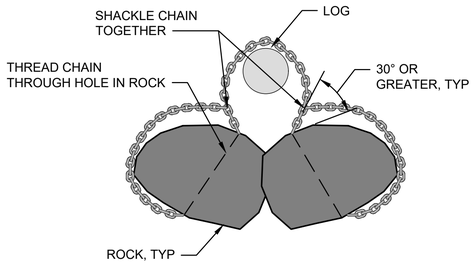
1 / -



DETAIL - CHAIN CONNECTION

SCALE: NTS

3 / -

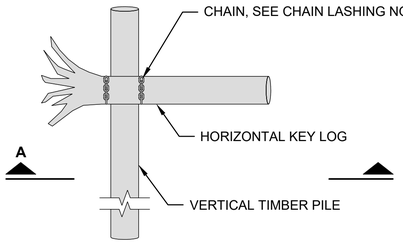


NOTE:
REMOVE SLACK IN CHAIN OVER LOG.

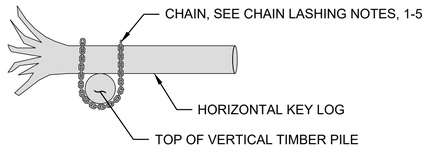
DETAIL - LOG TO ROCK CONNECTION

SCALE: NTS

4 / -



PLAN



SECTION

DETAIL - SQUARE CHAIN LASHING

SCALE: NTS

2 / -

CHAIN LASHING NOTES:

1. LASH HORIZONTAL LOGS TO VERTICAL TIMBER PILES WITH CHAIN AS SHOWN ON DETAIL AND LAYERING PLAN OR AS DIRECTED BY ENGINEER. CHAIN LASHING SYSTEM SHALL BE PUT IN TENSION TO 1/4 OF THE CHAIN WORKING LOAD LIMIT AND BE MAINTAINED DURING CHAIN SHACKLING.
2. CHAIN LENGTH NEEDED PER LASHING WILL VARY BASED ON DIAMETER OF LOGS AT THE ACTUAL LOCATIONS THEY ARE LASHED TOGETHER.
3. CHAIN FOR LASHING SHALL BE 3/8 INCH DIAMETER CARBON-WELDED GRADE 43 HIGH-TEST CHAIN, WITH A MINIMUM WORKING LOAD LIMIT OF 5400 LBS.
4. ALL HARDWARE USED FOR LASHING SHALL BE STAINLESS STEEL OR NATURAL UNTREATED STEEL, AND CONNECTIONS SHALL BE OF THE QUANTITY AND TYPE SPECIFIED BY THE MANUFACTURER WITH AN EQUAL OR GREATER STRENGTH THAN THE CHAIN BREAKING STRENGTH OR AS APPROVED BY THE ENGINEER.
5. MAR OR ROUND ALL EXPOSED HARDWARE NUTS AND BOLT THREADS AFTER INSTALLATION FOR THEFT PROTECTION. ENGINEER OR OWNER SHALL APPROVE ANY COATING PRIOR TO CONTRACTOR APPLYING IT. SECURE CHAIN TO LOG AND PILE USING 6 INCH LOGGING STAPLE.
6. CONTRACTOR MAY SUBMIT ALTERNATIVE CHAIN CONNECTION SYSTEM FOR APPROVAL.

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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LUMMI NATION
TREATY OF 1855

IAN B. MOSTRENKO
STATE OF WASHINGTON
36069
REGISTERED
PROFESSIONAL ENGINEER

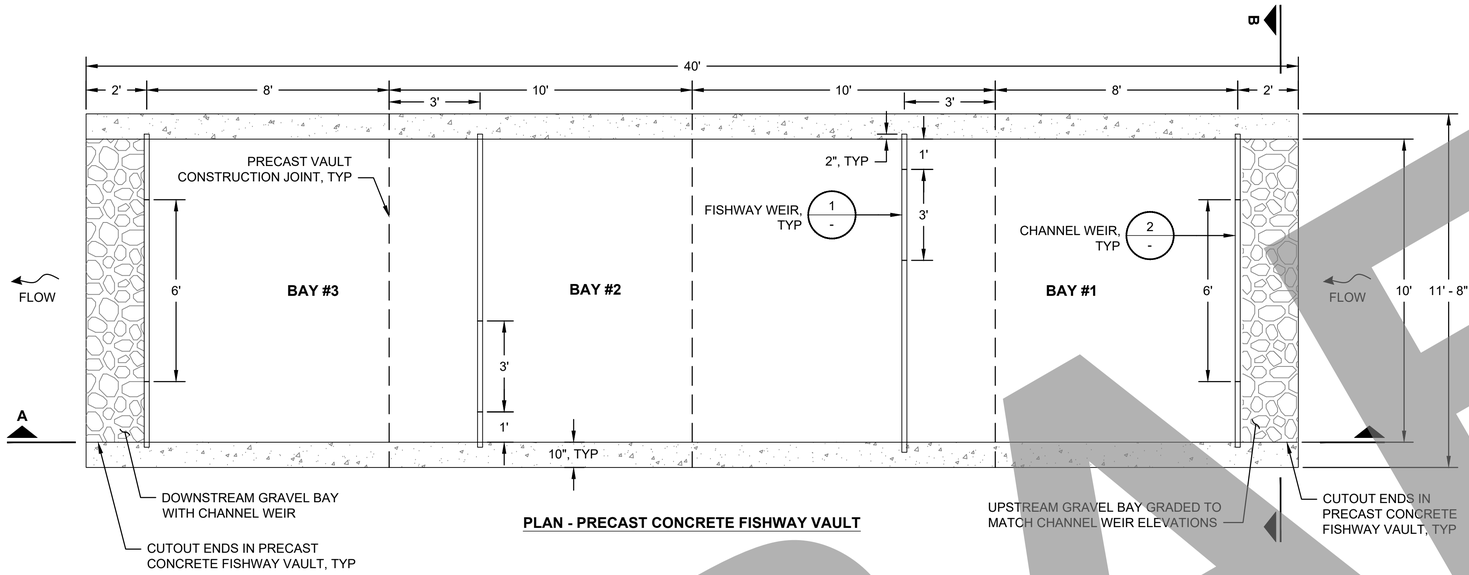
DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

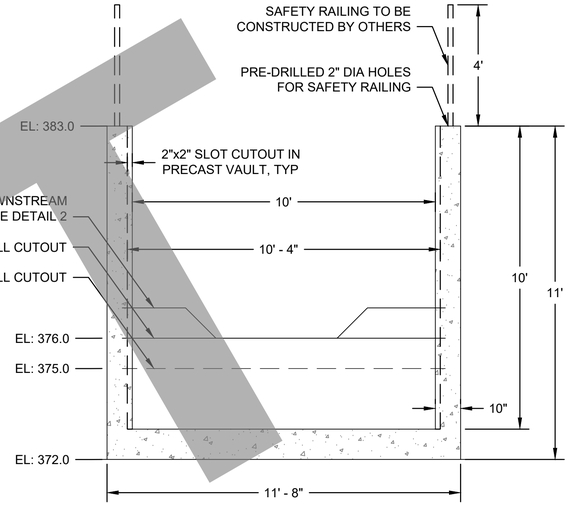
PHASE 1 ADAPTIVE MANAGEMENT

LOG CONNECTION DETAILS

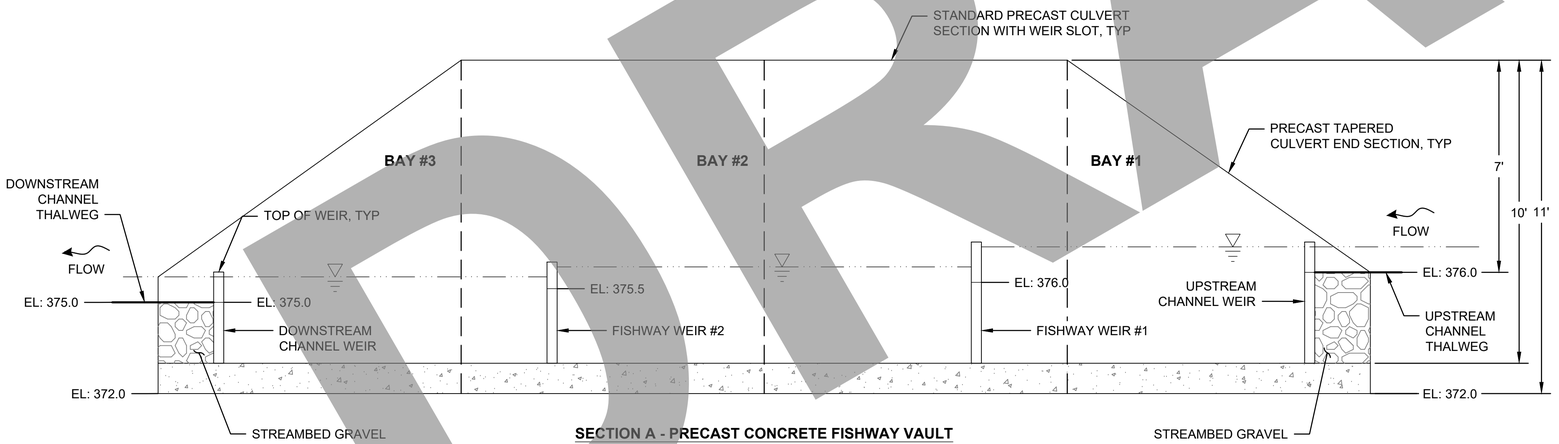
DATE: MAY 2025
PROJECT NO: 14-05790-000
DRAWING NO: C4.14
SHEET NO: 19 OF 20



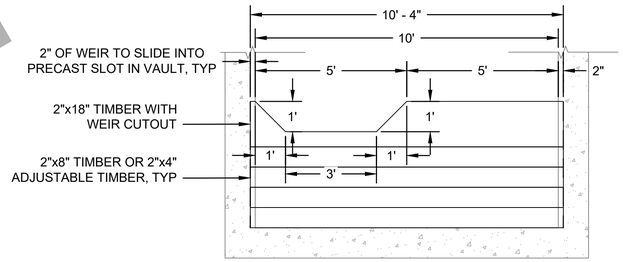
PLAN - PRECAST CONCRETE FISHWAY VAULT



SECTION B - PRECAST FISHWAY VAULT CUTOUTS ON ENDS OF VAULT

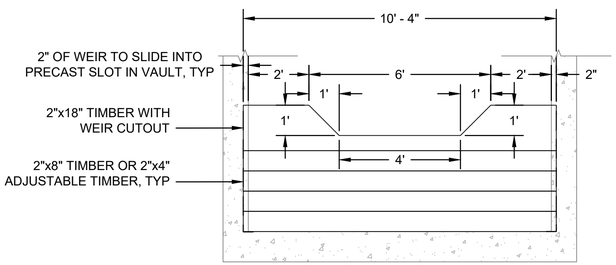


SECTION A - PRECAST CONCRETE FISHWAY VAULT



DETAIL - FISHWAY WEIR 1 / -

SCALE: NTS



DETAIL - CHANNEL WEIR 2 / -

SCALE: NTS

FINAL DESIGN - BID SET

No.	REVISION	BY	APP'D	DATE

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

HERRERA Science + Planning + Design herrerainc.com

LUMMI NATION TREATY OF 1855

DESIGNED: I. MOSTRENKO	DRAWN: M. McCARTHY
DESIGNED: T. FOULK	DRAWN: E. MARSHALL
DESIGNED: B. SCOTT	CHECKED: B. SCOTT
SCALE: AS NOTED	APPROVED: M. EWBANK

SOUTH FORK NOOKSACK RIVER SKOOKUM-EDFRO REACH HABITAT RESTORATION PROJECT

PHASE 1 ADAPTIVE MANAGEMENT

EMERGENCY FISHWAY VAULT DETAILS 1

DATE:	MAY 2025
PROJECT NO:	14-05790-000
DRAWING NO:	C4.20
SHEET NO: / OF	20 / 20

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