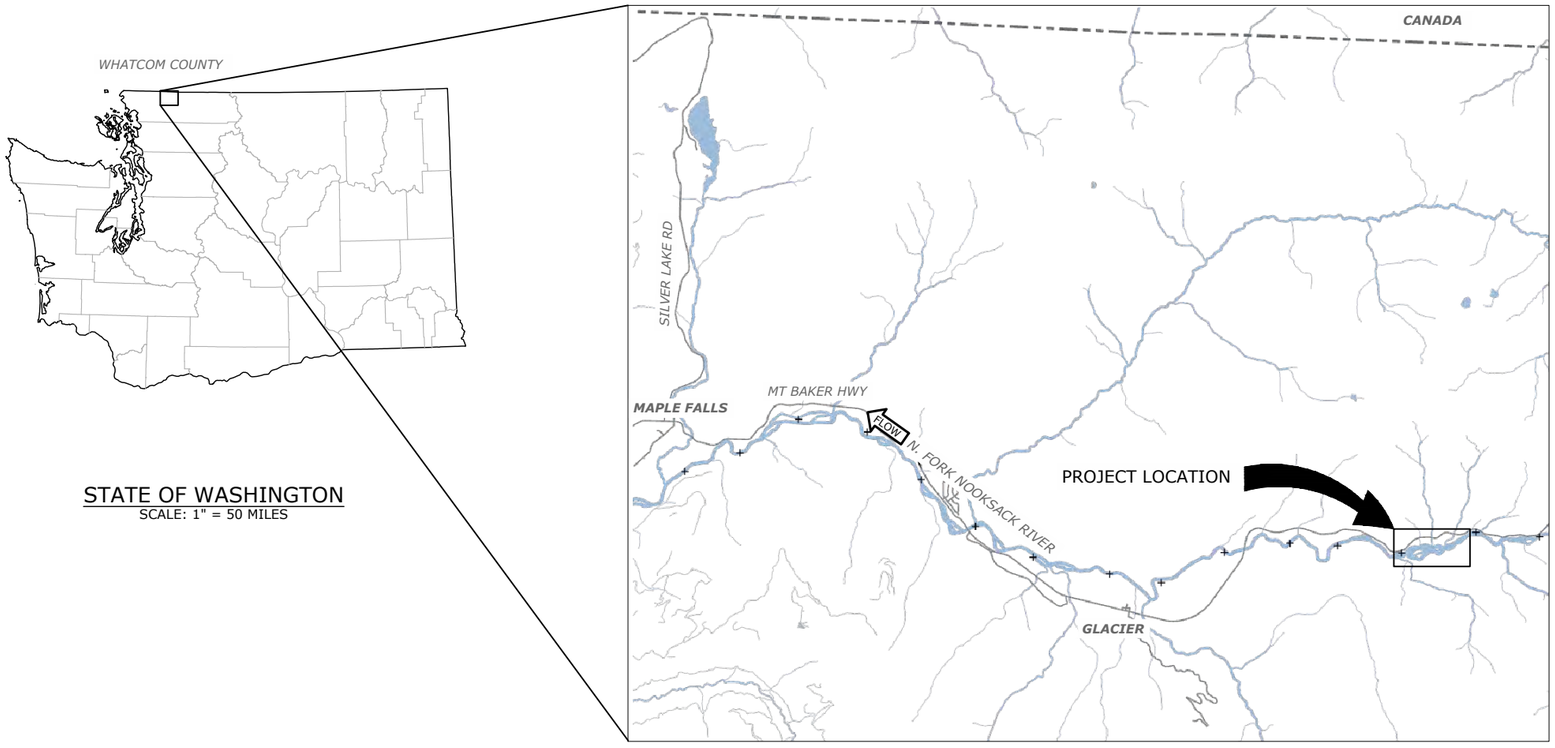
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

CONSTRUCTION PLANS



STATE OF WASHINGTON
SCALE: 1" = 50 MILES

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VICINITY MAP
SCALE: 1" = 1 MILE

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CONTACT INFORMATION

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Natural Systems Design + Coastal Geologic Services

EVAN LOUIS DORO — STATE OF WASHINGTON — 24061 — REGISTERED PROFESSIONAL ENGINEER

State of Washington — 04/27/2026 — 25014975 — Licensed Geologist

Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT
COVER
CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN_ED SH_ DRAWN LV
CHECK NT CHECK XX

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SHEET
1 OF 16

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GENERAL NOTES

1. THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF THE NOOKSACK INDIAN TRIBE, HEREAFTER REFERRED TO AS "CONTRACTING AGENCY", AND THEIR AUTHORIZED AGENTS.

2. NATURAL SYSTEMS DESIGN, HEREAFTER REFERRED TO AS "ENGINEER" IS RESPONSIBLE FOR THE PREPARATION OF THESE ORIGINAL PLANS AND ASSOCIATED SPECIFICATIONS; AND WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGE, OR USE, OF THESE PLANS WHICH INCLUDES ALTERATION, DELETION, OR EDITING OF THIS DOCUMENT WITHOUT EXPLICIT WRITTEN PERMISSION FROM THE ENGINEER. ANY OTHER UNAUTHORIZED USE OF THIS DOCUMENT IS PROHIBITED.

3. THE LOCATION OF ALL FEATURES SHOWN IS APPROXIMATE. FINAL LOCATIONS SHALL BE FLAGGED IN THE FIELD BY THE ENGINEER PRIOR TO CONSTRUCTION.

PERMIT NOTES

1. THE CONTRACTOR SHALL CONDUCT THE ACTIVITIES SHOWN IN THESE PLANS IN A MANNER THAT MINIMIZES THE ADVERSE IMPACT ON WATER QUALITY, FISH AND WILDLIFE, AND THE NATURAL ENVIRONMENT.

2. ALL WORK SHALL BE IN COMPLIANCE WITH PERMIT CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE COPIES OF ALL PERMITS ON THE JOB SITE, UNDERSTAND AND COMPLY WITH ALL PERMIT CONDITIONS.

3. IF AT ANY TIME FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE ENGINEER OR CONTRACTING AGENCY SHALL BE NOTIFIED IMMEDIATELY.

4. AVOID AND MINIMIZE ADVERSE IMPACTS TO WATERS OF THE UNITED STATES, INCLUDING MINIMIZING THE NUMBER, DURATION, AND EXTENT OF WORK BELOW ORDINARY HIGH WATER AND EQUIPMENT CROSSINGS OF WETTED CHANNELS.

5. IF, DURING CONSTRUCTION, ARCHAEOLOGICAL REMAINS ARE ENCOUNTERED, CONSTRUCTION IN THE VICINITY SHALL BE HALTED, AND THE STATE OFFICE OF HISTORIC PRESERVATION AND THE ENGINEER OR CONTRACTING AGENCY SHALL BE NOTIFIED IMMEDIATELY.

SURVEY NOTES

1. SURVEY FOR THIS PROJECT WAS COLLECTED IN 2025 AND IS REPRESENTATIVE OF 2025 CONDITIONS. THE VERTICAL DATUM IS NAVD88 (FT). THE HORIZONTAL DATUM IS NAD83 WASHINGTON STATE PLANE NORTH AND THE UNIT IS US SURVEY FEET.

2. GATES, FENCELINES, AND UTILITIES WERE NOT SURVEYED. CONTRACTOR TO VERIFY IN FIELD.

3. AERIAL IMAGERY WAS COLLECTED ON DECEMBER 30, 2025 BY NSD.

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY.

2. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER OR CONTRACTING AGENCY PRIOR TO PROCEEDING WITH THE WORK.

3. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, VEGETATION, AND IMPROVEMENTS NOT INDICATED FOR REMOVAL.

4. THE CONTRACTOR SHALL KEEP THE JOB SITE CLEAN AND HAZARD FREE.

5. THE CONTRACTOR SHALL DISPOSE OF ALL DIRT, DEBRIS, AND RUBBISH GENERATED BY THE WORK. UPON COMPLETION OF WORK, CONTRACTOR SHALL REMOVE ALL MATERIAL AND EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY.

6. NO TREES OR VEGETATION SHALL BE REMOVED UNLESS NOTED ON THE PLANS OR SPECIFIED ON-SITE BY THE ENGINEER OR CONTRACTING AGENCY. NO GRADING SHALL TAKE PLACE WITHIN THE DRIP LINE OF TREES NOT TO BE REMOVED UNLESS OTHERWISE APPROVED.

7. THE CONTRACTOR SHALL MAINTAIN A SET OF PLANS ON THE JOB SHOWING "AS-CONSTRUCTED" CHANGES MADE TO DATE. UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL SUPPLY TO ENGINEER OR CONTRACTING AGENCY A SET OF PLANS, MARKED UP TO THE SATISFACTION OF THE ENGINEER OR CONTRACTING AGENCY, REFLECTING THE AS-CONSTRUCTED MODIFICATIONS.

ELJ NOTES

1. WOOD FOR THIS PROJECT IS PROVIDED BY THE CONTRACTING AGENCY. WORK INCLUDES SORTING AND STAGING WOOD THAT HAS BEEN CLEARED BY OTHERS. APPROXIMATE WOOD CLEARING STOCKPILE AREAS ARE SHOWN ON THE PLANS. WHEN FURNISHING WOOD IS INCLUDED IN THE CONTRACT, REFER TO THE SPECIAL PROVISIONS.

2. ALL POSTS SHALL BE DOUGLAS FIR. LOGS TO BE USED AS POSTS SHALL BE APPROVED BY ENGINEER OR CONTRACTING AGENCY PRIOR TO INSTALLATION.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSPORTING STOCKPILED LOGS FROM AREAS SHOWN ON THE PLANS TO THE ELJ LOCATIONS SHOWN ON THE PLANS.

4. EXISTING WOODY MATERIAL AT THE STRUCTURE LOCATION SHALL BE MOVED OR PROTECTED FROM CONSTRUCTION ACTIVITIES AND THEN INCORPORATED INTO THE STRUCTURE AS DIRECTED BY THE ENGINEER OR CONTRACTING AGENCY.

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GENERAL NOTES

CONSTRUCTION PLANS

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GENERAL LEGEND

SITE FEATURES

- EXISTING GRAVEL ROAD EDGE
- PROPOSED GRAVEL ROAD EDGE
- EXISTING PAVED ROAD EDGE

NATURAL RESOURCES

- EXISTING CHANNEL THALWEG
- FLOW LINE
- EXISTING OHW (OHWM — OHWM)

TOPOGRAPHY & GRADING

- EXISTING MINOR CONTOUR (1)
- EXISTING MAJOR CONTOUR (5)
- PROPOSED MINOR CONTOUR (1)
- PROPOSED MAJOR CONTOUR (5)
- LIMIT OF EXCAVATION (CUT — CUT)
- LIMIT OF FILL PLACEMENT (FILL — FILL)
- SLOPED EMBANKMENT

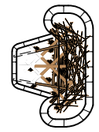
SITE PREPARATION AND DEWATERING

- PROJECT LIMIT
- STRAW WATTLE
- SILT FENCE
- TURBIDITY CURTAIN
- HIGH VISIBILITY FENCING (HVF — HVF)
- CLEARING AND GRUBBING LIMIT (CG — CG — CG)
- CLEARING LIMIT (CLR — CLR)
- COFFER DAM
- BYPASS
- FISH SCREEN / BLOCKNET
- TEMPORARY ACCESS ROUTE
- PUMP (P)
- PUMP OUTLET
- TEMPORARY BRIDGE
- STAGING AREA

SURVEY AND LEGAL BOUNDARIES

- EXISTING PROPERTY LINE
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- BENCHMARK
- CONTROL POINT

HABITAT STRUCTURES



ELJ TYPE 1

ELJ TYPE 2

KEY PIECE PLACEMENT

BID ITEMS SUMMARY TABLE

BID ITEM NO.	BID ITEM	SPECIFICATION	QUANTITY	UNIT	BRIEF SUMMARY (DOES NOT SUPERCEDE SPECIFICATIONS OR PLAN NOTES)
BASE ITEMS					
1	MOBILIZATION	2-01 (ST)	1	LS	PER SPECIFICATION
2	TEMPORARY WORK ACCESS	2-05 (SP)	1	LS	INCLUDES DEVELOPING ACCESS ROUTES FOR EQUIPMENT MACHINERY FROM FS37 TO THE IN-WATER WORK AREA. INCLUDES SELECTIVE CLEARING OF NATIVE VEGETATION, WHEN SPECIFIED BY THE CONTRACTING AGENCY, MINOR GRADING TO CREATE DRIVEABLE SURFACES, INSTALLING TEMPORARY BRIDGES AND STREAM CROSSINGS AS NEEDED, AS WELL AS REMOVAL AND DECOMMISSIONING OF ALL TEMPORARY FEATURES.
3	EROSION CONTROL AND WATER POLLUTION PREVENTION	8-01 (ST)	1	LS	INCLUDES BMPS TO PROTECT WATER QUALITY PER STANDARD SPECIFICATIONS AND ALL PERMIT REQUIREMENTS. TEMPORARY WATER MANAGEMENT AND DEWATERING IS PAID SEPARATELY.
4	WOOD SORTING AND STAGING	8-26 (SP)	1	LS	INCLUDES EQUIPMENT AND LABOR TO SORT, TRANSPORT, AND STOCKPILE TREES FOR ELJ CONSTRUCTION. WORK ALSO INCLUDES WORKING WITH THE CONTRACTING AGENCY AND ENGINEER TO SELECTIVELY CHOOSE TREES THAT WILL BE USED FOR ROOTWAD POSTS AND TIMBER PILES. TREES WILL BE SALVAGED FROM THE ADJACENT FR37 ROAD PROJECT BY A SEPARATE CONTRACTOR. THIS WORK REQUIRES COORDINATION WITH THE CONTRACTING AGENCY AND THEIR CONTRACTOR.
5	FURNISHING RACKING LOGS	8-26 (SP)	5,000	EA	INCLUDES FURNISHING RACKING LOGS AND STAGING AT THE PROJECT SITE NEAR ELJ LOCATIONS.
6	TYPE 1 ELJ INSTALLATION	8-26 (SP)	5	EA	INCLUDES EXCAVATION, LOG PLACEMENT, AND INSTALLING MECHANICAL CONNECTIONS, AND BACKFILLING. ALL CHAIN, ROPE, FASTENERS, AND ROOTWADS ARE PROVIDED BY THE CONTRACTING AGENCY.
7	TYPE 2 ELJ INSTALLATION	8-26 (SP)	13	EA	INCLUDES EXCAVATION, LOG PLACEMENT, AND INSTALLING MECHANICAL CONNECTIONS, AND BACKFILLING. ALL CHAIN, ROPE, FASTENERS, AND ROOTWADS ARE PROVIDED BY THE CONTRACTING AGENCY.
8	ADDITIONAL GRADING, WOOD PLACEMENTS, AND CLEANUP	8-26 (SP)	1	EST	CONTRACTING AGENCY DIRECTED WORK PAID PER FORCE ACCOUNT 1-09.6. SUBMIT EQUIPMENT AND LABOR RATES AS PART OF SUBMITTAL.
9	TEMPORARY WATER MANAGEMENT	8-31 (SP)	1	LS	INCLUDES ALL WATER ISOLATION MEASURES TO WORK WITHIN OHW, ALSO INCLUDES DEWATERING ASSOCIATED WITH ELJ CONSTRUCTION. DEFISHING WILL BE PERFORMED BY THE CONTRACTING AGENCY. THE CONTRACTOR IS REQUIRED TO COORDINATE ALL WATER MANAGEMENT ACTIVITIES WITH THE CONTRACTING AGENCY.
10	TWM ADAPTIVE MANAGEMENT	8-31 (SP)	1	EST	CONTRACTING AGENCY DIRECTED WORK PAID PER FORCE ACCOUNT 1-09.6. SUBMIT EQUIPMENT AND LABOR RATES AS PART OF SUBMITTAL.
ALTERNATE BID ITEMS					
A1	TIMBER PILE DRIVING	8-26 (SP)	100	EA	INCLUDES PROVIDING A PILE DRIVING SYSTEM AND DRIVING TIMBER PILES. ALL TIMBER IS PROVIDED BY THE CONTRACTING AGENCY THROUGH PILES NEED PREPARED BY THE CONTRACTOR PER OTHER WORK DESCRIBED IN THE CONTRACT.
A2	WOOD HAUL FROM SECONDARY STOCKPILE	8-26 (SP)	1	EST	PAID PER FORCE ACCOUNT 1-09.6. INCLUDES PROVIDING LABOR AND EQUIPMENT TO HAUL TREES SALVAGED BY OTHERS FROM THE SECONDARY STOCKPILE, LOCATED 2.5-MILES AWAY, TO THE PROJECT SITE.

ST = STANDARD SPECIFICATION, 2026
SP = PROJECT-SPECIFIC SPECIAL PROVISION

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NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

LEGEND AND BID ITEM SUMMARY

CONSTRUCTION PLANS

DATE APRIL 2026
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SHEET
3 OF 16

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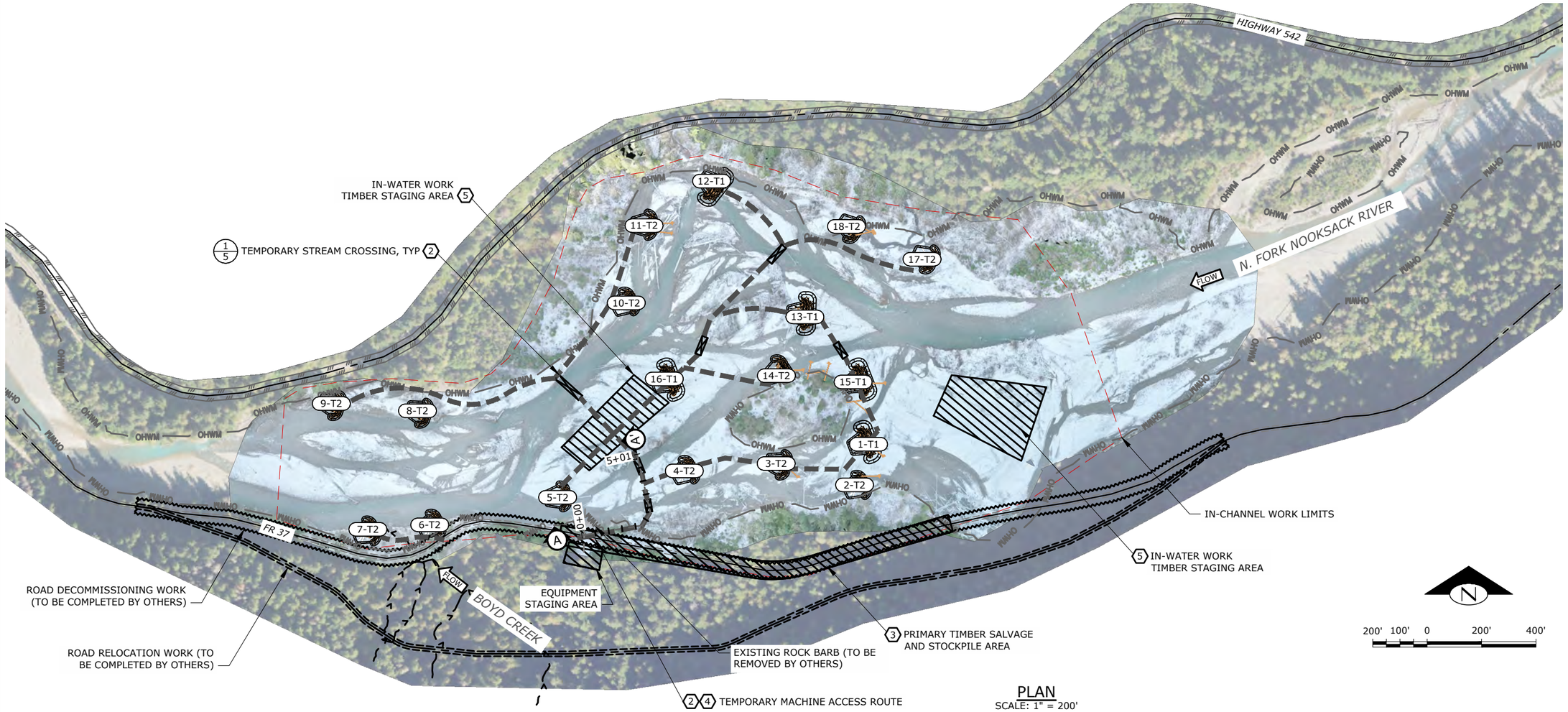
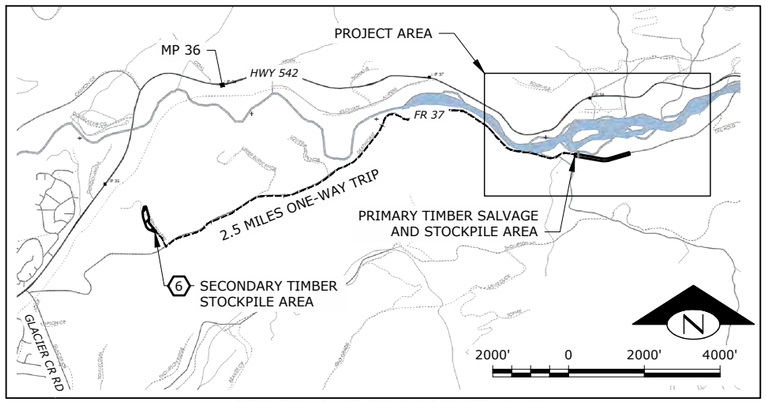


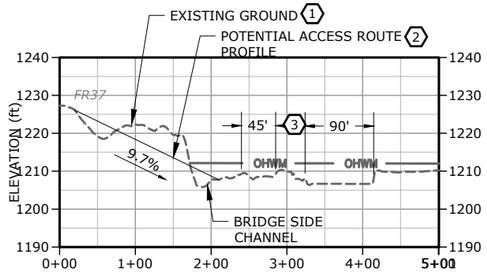
PLAN
SCALE: 1" = 200'

NOTES

1. IMAGERY REFLECTS CONDITIONS FROM DECEMBER, 2025 WHEN FLOW WAS APPROXIMATELY 830 CFS AT USGS 12205000.
2. ACCESS ROUTES AND TEMPORARY STREAM CROSSING LOCATIONS ARE APPROXIMATE AND COMPATIBLE WITH THE RIVER POSITION AT THE TIME OF ORTHO IMAGERY COLLECTION. THE POSITION, SIZE, AND NUMBER OF CHANNELS MAY BE SIGNIFICANTLY DIFFERENT AT THE TIME OF CONSTRUCTION WARRANTING ADJUSTMENTS TO ACCESS ROUTES AND CROSSING LOCATIONS. THE CONTRACTOR SHALL DESIGN THE TYPE, SIZE, AND LOCATION OF TEMPORARY STREAM CROSSINGS AS PART OF THE TEMPORARY WORK ACCESS PLAN SUBMITTAL PER 2-05.3(1).
3. TREES SALVAGED BY OTHERS AS PART OF ROAD RELOCATION WORK WILL BE STOCKPILED WITHIN THE EXISTING FR37 CORRIDOR. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER OR CONTRACTING AGENCY DURING TREE SALVAGE OPERATIONS TO MOVE STOCKPILES TO ELJ SITES AND DECK TREES BY SIZE CLASSES SPECIFIED IN THE ELJ MATERIAL SCHEDULES.
4. GRADE AN ACCESS ROAD FROM FR37 TO THE RIVER ELEVATION IN VICNITY SHOWN. WHEN ACCESS TO OHW IS MADE, ACCESS ROUTES SHALL BE BUILT ON BARE GRAVEL BARS TO THE EXTENT FEASIBLE. DO NOT CLEAR TREES OR VEGETATION WITHOUT CONTRACTING AGENCY APPROVAL.
5. MOVE TIMBER MATERIALS FROM PRIMARY SALVAGE AND STOCKPILE AREA TO STAGING AREAS ON DRY GRAVEL BARS NEAR ELJ SITES.
6. IF TIMBER MATERIALS ARE STOCKPILED AT THE SECONDARY STOCKPILE AREA BY THE OTHER CONTRACTOR, THIS CONTRACT MAY REQUIRE HAULING OF TIMBER MATERIALS FROM THE SECONDARY STOCKPILE TO THE PROJECT SITE. THIS WORK WOULD BE PAID FOR UNDER THE ALTERNATE BID ITEM A2 BY FORCE ACCOUNT.



STAGING AREA VICINITY MAP
SCALE: 1" = 2000'



ACCESS POINT A-A'

1. EXISTING GROUND TOPOGRAPHY IS REPRESENTATIVE OF 2025 CONDITIONS AND WILL LIKELY BE DIFFERENT AT TIME OF CONSTRUCTION.
2. ACCESS ROAD ALIGNMENT TO BE PROPOSED BY CONTRACTOR AND APPROVED BY THE CONTRACTING AGENCY. THE ALIGNMENT SHOWN IN A-A' IS APPROXIMATE AND FOR ILLUSTRATION OF GENERAL TERRAIN TOPOGRAPHY.
3. CHANNEL LOCATIONS AND DIMENSIONS WILL VARY AT TIME OF CONSTRUCTION. LOCATIONS SHOWN ON THESE PLANS ARE FROM 2025.

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4 OF 16

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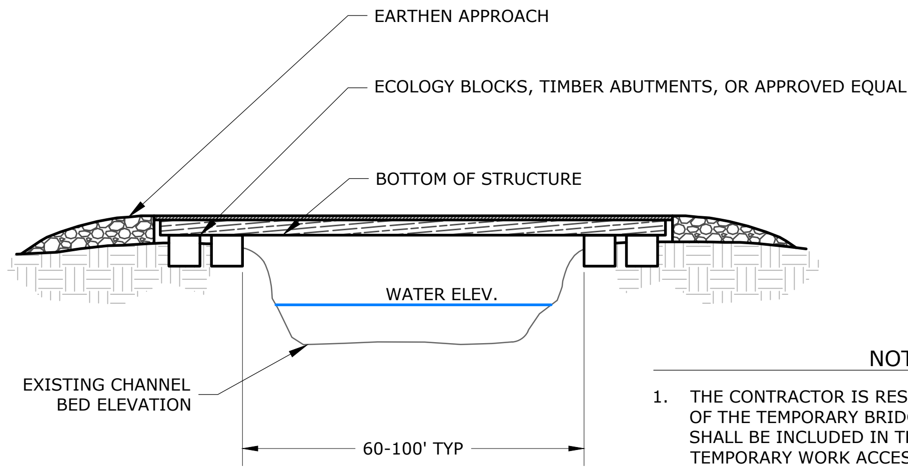
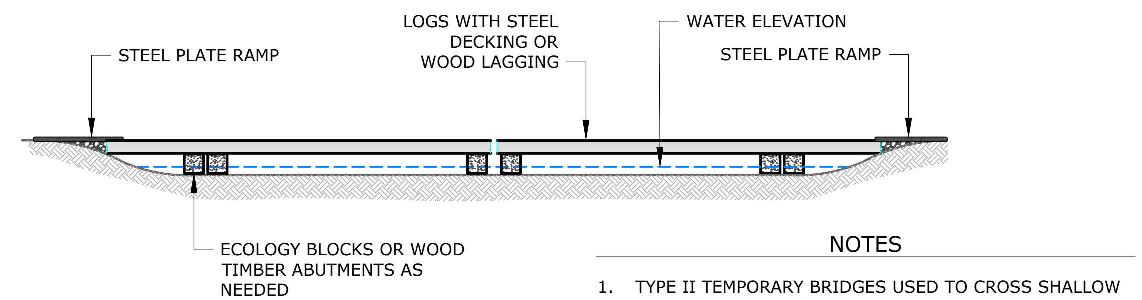


NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE TEMPORARY BRIDGE. THE BRIDGE DESIGN SHALL BE INCLUDED IN THE CONTRACTOR'S TEMPORARY WORK ACCESS PLAN SUBMITTAL PER 2-05.3(1).
2. CONCRETE ECOLOGY BLOCKS OR WOOD ABUTMENTS MAY BE USED TO SUPPORT ENDS OF TEMPORARY BRIDGE AS NEEDED.
3. BRIDGES MAY BE CONSTRUCTED FROM LOGS, RAIL CAR BEDS OR APPROVED EQUAL AND DECKED WITH STEEL SHEET, WOOD LAGGING OR APPROVED EQUAL.

SINGLE SPAN EXAMPLE



NOTES

1. TYPE II TEMPORARY BRIDGES USED TO CROSS SHALLOW CHANNELS WITH LOW SLOPING BANKS TYPICAL OF YOUNG CHANNELS OR MAIN STEM CHANNELS.
2. TYPE II BRIDGES MAY OFTEN BE CONSTRUCTED BY PLACING TEMPORARY ABUTMENT SUPPORTS INTO THE CHANNEL AS SHOWN. THESE SUPPORTS MAY CONSIST OF LARGE DIAMETER LOGS OR ECOLOGY BLOCKS OR SIMILAR MATERIAL.
3. ENDS OF BRIDGE SHALL BEAR DIRECTLY ONTO EXISTING GROUND.
4. SPANS MAY BE LINKED IN SERIES TO CROSS BROAD, SHALLOW WATER WAYS.

MULTI-SPAN EXAMPLE

TEMPORARY STREAM CROSSING

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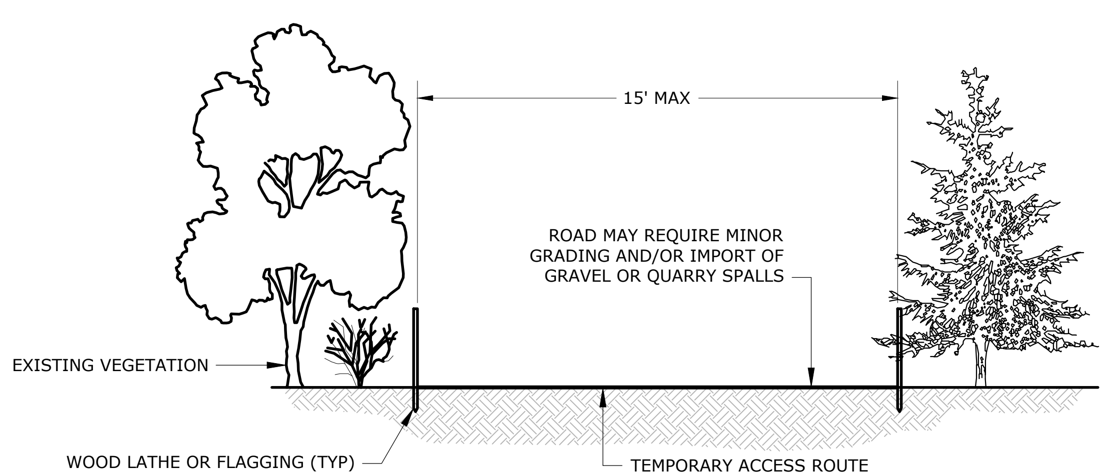
1
5



NOTES

1. THE CONTRACTOR SHALL PREPARE A TEMPORARY WORK ACCESS PLAN SUBMITTAL PER 2-05.3(1) THAT OUTLINES LOCATIONS, DIMENSIONS, AND SURFACING (IF NEEDED) OF ALL PROPOSED TEMPORARY ACCESS ROUTES.
2. THE CONTRACTOR SHALL FLAG OR STAKE CLEARING LIMITS OF ACCESS ROUTES FOR THE ENGINEER AND CONTRACTING AGENCY TO REVIEW PRIOR TO CONSTRUCTION.
3. NO VEGETATION SHALL BE CLEARED WITHOUT ENGINEER OR CONTRACTING AGENCY APPROVAL. ALL TREES GREATER THAN 12" IN DIA. APPROVED FOR REMOVAL SHALL BE TIPPED WITH ROOTWADS IN-TACT AND PLACED WITHIN ELJS AS DIRECTED BY THE ENGINEER OR CONTRACTING AGENCY.

TEMPORARY ACCESS ROUTE

NTS

2
5

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TYPICAL TEMPORARY WORK ACCESS DETAILS
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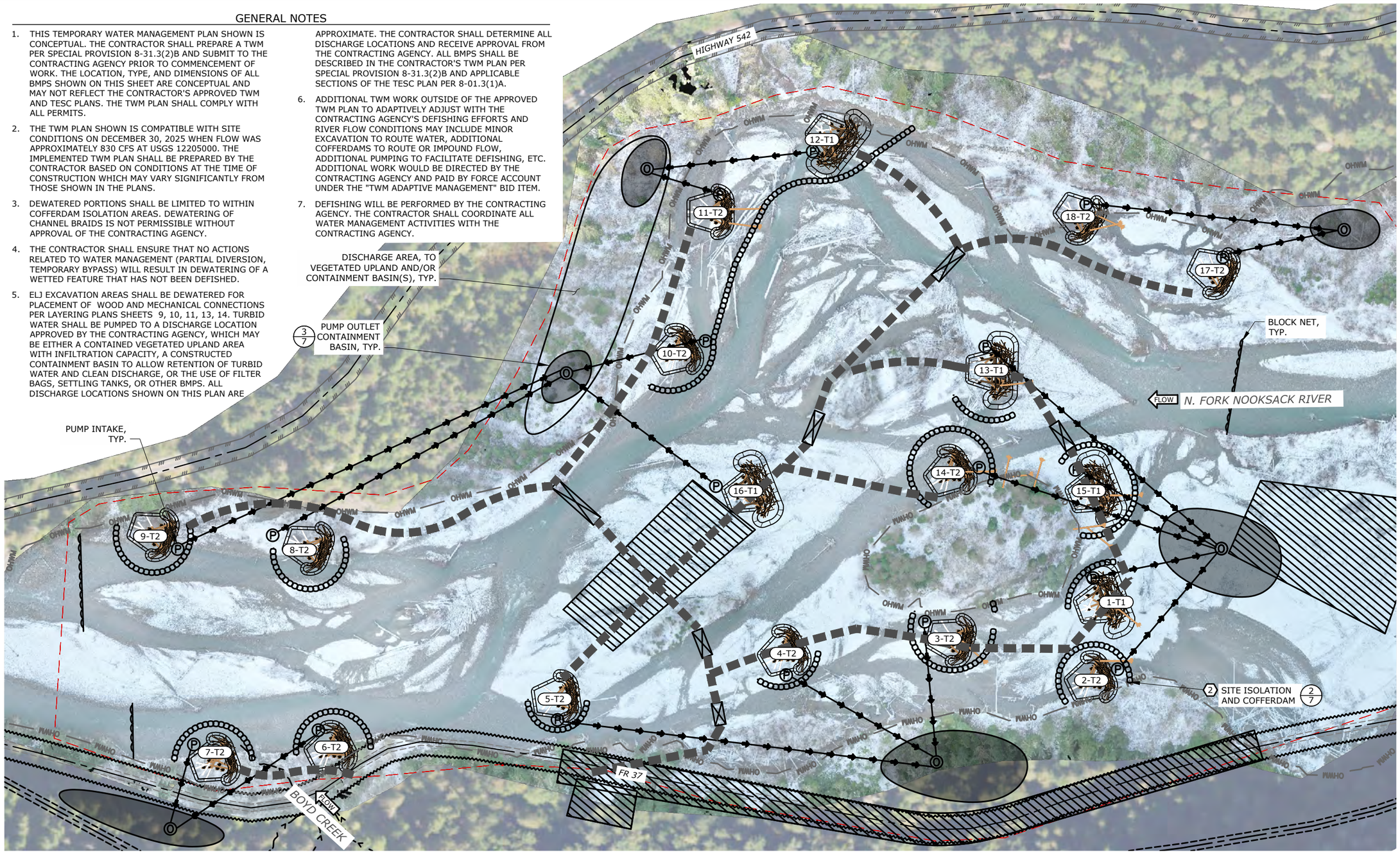
GENERAL NOTES

1. THIS TEMPORARY WATER MANAGEMENT PLAN SHOWN IS CONCEPTUAL. THE CONTRACTOR SHALL PREPARE A TWM PER SPECIAL PROVISION 8-31.3(2)B AND SUBMIT TO THE CONTRACTING AGENCY PRIOR TO COMMENCEMENT OF WORK. THE LOCATION, TYPE, AND DIMENSIONS OF ALL BMPS SHOWN ON THIS SHEET ARE CONCEPTUAL AND MAY NOT REFLECT THE CONTRACTOR'S APPROVED TWM AND TESC PLANS. THE TWM PLAN SHALL COMPLY WITH ALL PERMITS.
2. THE TWM PLAN SHOWN IS COMPATIBLE WITH SITE CONDITIONS ON DECEMBER 30, 2025 WHEN FLOW WAS APPROXIMATELY 830 CFS AT USGS 12205000. THE IMPLEMENTED TWM PLAN SHALL BE PREPARED BY THE CONTRACTOR BASED ON CONDITIONS AT THE TIME OF CONSTRUCTION WHICH MAY VARY SIGNIFICANTLY FROM THOSE SHOWN IN THE PLANS.
3. DEWATERED PORTIONS SHALL BE LIMITED TO WITHIN COFFERDAM ISOLATION AREAS. DEWATERING OF CHANNEL BRAIDS IS NOT PERMISSIBLE WITHOUT APPROVAL OF THE CONTRACTING AGENCY.
4. THE CONTRACTOR SHALL ENSURE THAT NO ACTIONS RELATED TO WATER MANAGEMENT (PARTIAL DIVERSION, TEMPORARY BYPASS) WILL RESULT IN DEWATERING OF A WETTED FEATURE THAT HAS NOT BEEN DEFISHED.
5. ELJ EXCAVATION AREAS SHALL BE DEWATERED FOR PLACEMENT OF WOOD AND MECHANICAL CONNECTIONS PER LAYERING PLANS SHEETS 9, 10, 11, 13, 14. TURBID WATER SHALL BE PUMPED TO A DISCHARGE LOCATION APPROVED BY THE CONTRACTING AGENCY, WHICH MAY BE EITHER A CONTAINED VEGETATED UPLAND AREA WITH INFILTRATION CAPACITY, A CONSTRUCTED CONTAINMENT BASIN TO ALLOW RETENTION OF TURBID WATER AND CLEAN DISCHARGE, OR THE USE OF FILTER BAGS, SETTLING TANKS, OR OTHER BMPS. ALL DISCHARGE LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE. THE CONTRACTOR SHALL DETERMINE ALL DISCHARGE LOCATIONS AND RECEIVE APPROVAL FROM THE CONTRACTING AGENCY. ALL BMPS SHALL BE DESCRIBED IN THE CONTRACTOR'S TWM PLAN PER SPECIAL PROVISION 8-31.3(2)B AND APPLICABLE SECTIONS OF THE TESC PLAN PER 8-01.3(1)A.
6. ADDITIONAL TWM WORK OUTSIDE OF THE APPROVED TWM PLAN TO ADAPTIVELY ADJUST WITH THE CONTRACTING AGENCY'S DEFISHING EFFORTS AND RIVER FLOW CONDITIONS MAY INCLUDE MINOR EXCAVATION TO ROUTE WATER, ADDITIONAL COFFERDAMS TO ROUTE OR IMPOUND FLOW, ADDITIONAL PUMPING TO FACILITATE DEFISHING, ETC. ADDITIONAL WORK WOULD BE DIRECTED BY THE CONTRACTING AGENCY AND PAID BY FORCE ACCOUNT UNDER THE "TWM ADAPTIVE MANAGEMENT" BID ITEM.
7. DEFISHING WILL BE PERFORMED BY THE CONTRACTING AGENCY. THE CONTRACTOR SHALL COORDINATE ALL WATER MANAGEMENT ACTIVITIES WITH THE CONTRACTING AGENCY.



100' 50' 0 100' 200'

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Natural Systems Design
+ Coastal Geologic Services

NOOKSACK INDIAN TRIBE

EVAN LOUIS DORO — STATE OF WASHINGTON — 24061 — REGISTERED PROFESSIONAL ENGINEER

State of Washington — 04/27/2026 — 25014975 — Licensed Geologist

Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

POTENTIAL TEMPORARY WATER MANAGEMENT PLAN

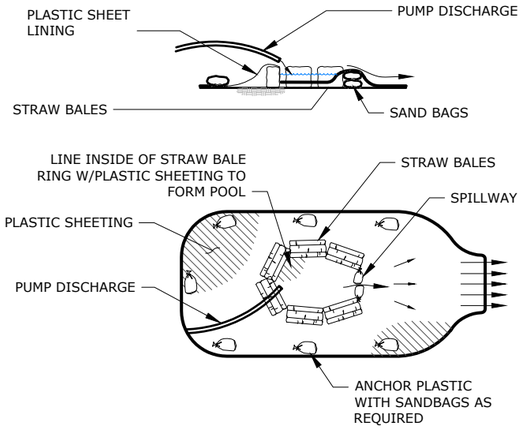
CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED,SH DRAWN LV
CHECK NT CHECK XX

0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

SHEET
6 OF 16

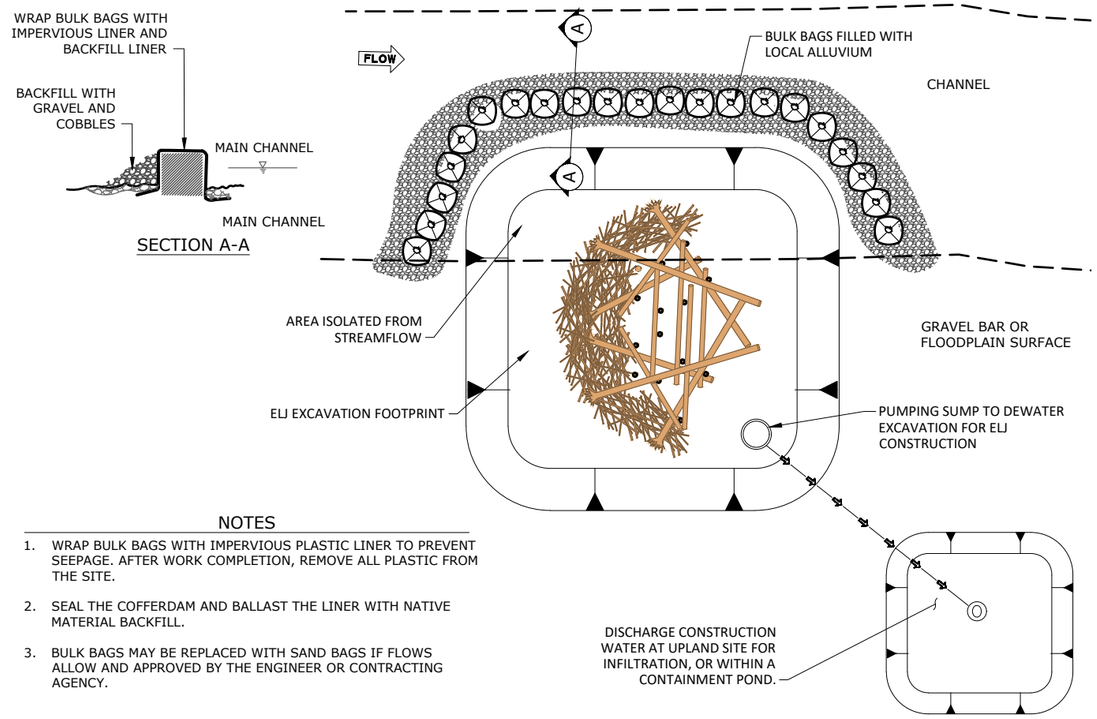
P:\N_P\NOOKSACK TRIBE\WOOTR-006_BOYDCREEKREACH_FINALDESIGN\DESIGN\PLANS\CAD\WATER MANAGEMENT.DWG Evandoro 04/25/2026 12:16:43 PM



ENERGY DISSIPATOR

NTS

1/7



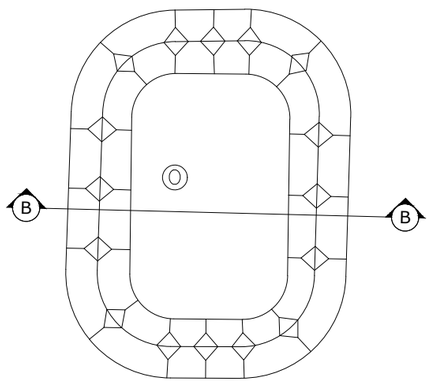
NOTES

1. WRAP BULK BAGS WITH IMPERVIOUS PLASTIC LINER TO PREVENT SEEPAGE. AFTER WORK COMPLETION, REMOVE ALL PLASTIC FROM THE SITE.
2. SEAL THE COFFERDAM AND BALLAST THE LINER WITH NATIVE MATERIAL BACKFILL.
3. BULK BAGS MAY BE REPLACED WITH SAND BAGS IF FLOWS ALLOW AND APPROVED BY THE ENGINEER OR CONTRACTING AGENCY.

SITE ISOLATION AND COFFERDAM

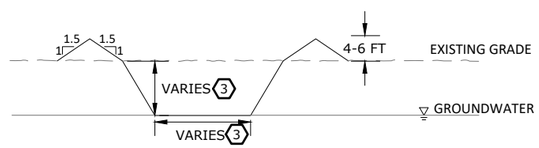
NTS

2/7



NOTES

1. CONTAINMENT BASIN LOCATION SHALL BE DETERMINED BY CONTRACTOR AND APPROVED BY THE ENGINEER OR CONTRACTING AGENCY.
2. PUMP OUTLET MAY BE LOCATED ON UPLAND SITE OR VEGETATED FLOODPLAIN IF EXISTS, OR ON GRAVEL BARS DISCONNECTED FROM FLOWING WATERS.
3. DISCHARGE CONTAINMENT BASIN SHALL BE SIZED BY THE CONTRACTOR TO ACCOMMODATE THE PUMP DISCHARGE AND RETENTION POND OUTFLOW RATE.
4. CONTRACTOR SHALL MAINTAIN BASIN TO REDUCE RISK OF BASIN FAILURE.
5. FOLLOWING USE, MATERIALS SHALL BE RETURNED TO GRAVEL BAR AND GRADED TO PRE PROJECT CONDITIONS.



SECTION B-B

PUMP OUTLET CONTAINMENT BASIN

NTS

3/7

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NOOKSACK INDIAN TRIBE

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Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPICAL WATER MANAGEMENT DETAILS

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED_SH DRAWN LV
CHECK NT CHECK XX

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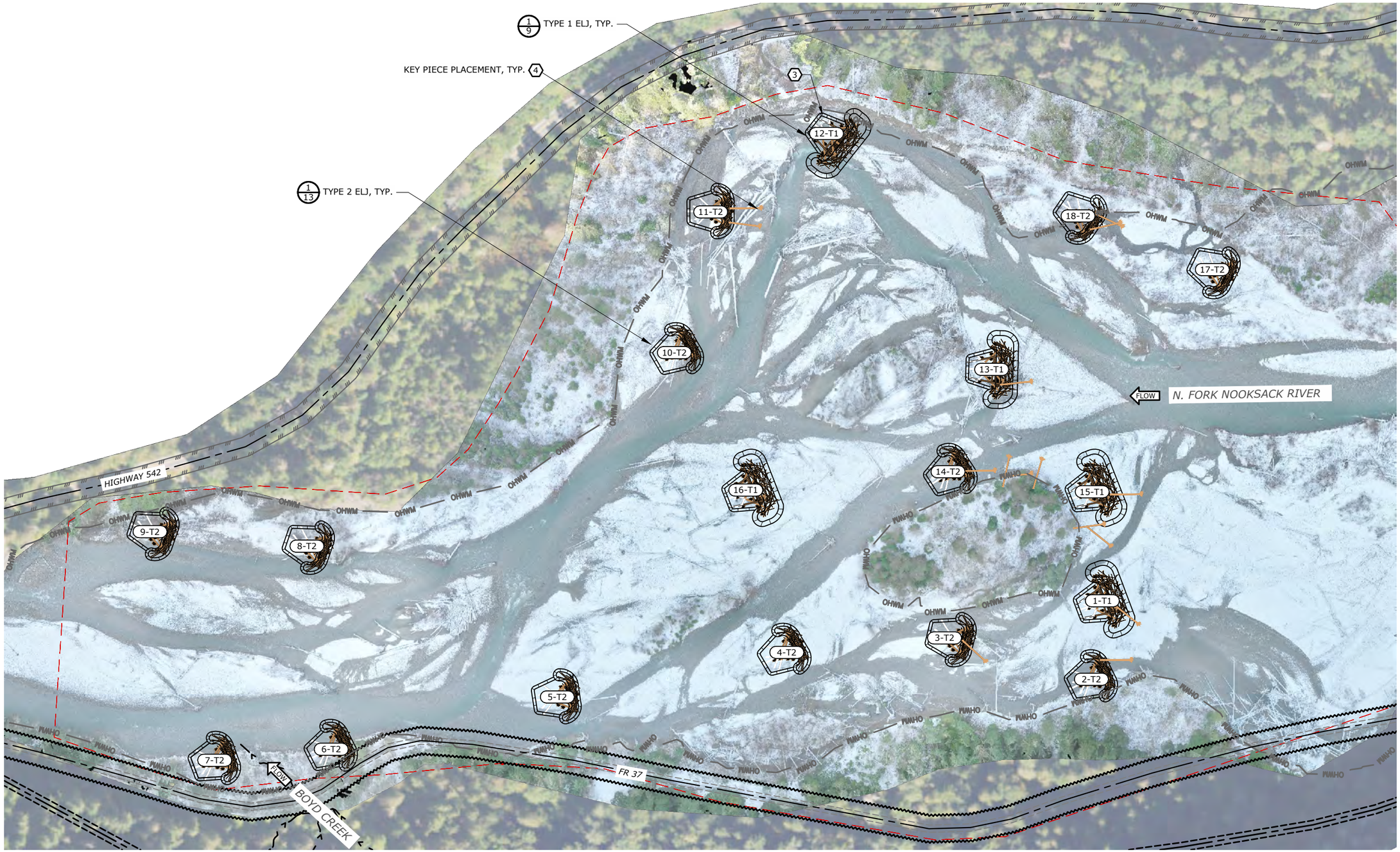
SHEET
7 OF 16



NOTES

1. IMAGERY REFLECTS CONDITIONS FROM DECEMBER, 2025 WHEN FLOW WAS APPROXIMATELY 830 CFS AT USGS 12205000.
2. ELJ LOCATIONS ARE APPROXIMATE AND COMPATIBLE WITH THE RIVER POSITION AT THE TIME OF ORTHO IMAGERY COLLECTION. THE POSITION, SIZE, AND NUMBER OF CHANNELS MAY BE SIGNIFICANTLY DIFFERENT AT THE TIME OF CONSTRUCTION WARRANTING ADJUSTMENTS TO ELJ LOCATIONS.

3. FIELD-FIT WOOD PLACEMENT TO EXISTING WOOD STRUCTURE TO CONNECT TO TOE OF SLOPE.
4. KEY PIECE PLACEMENTS CONSIST OF PLACING TREES OF 36" DBH OR GREATER ON CHANNEL AND FLOODPLAIN SURFACES AS DIRECTED BY THE ENGINEER OR CONTRACTING AGENCY. WORK WILL BE PAID FOR BY FORCE ACCOUNT UNDER ADDITIONAL GRADING, WOOD PLACEMENTS, AND CLEANUP BID ITEM. NOT ALL WOOD PLACEMENTS OR ADDITIONAL WORK IS SHOWN ON THESE PLANS.

PLAN
SCALE: 1" = 100'

100' 50' 0 100' 200'

N

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NOOKSACK INDIAN TRIBE

Evan Louis D'Oro — State of Washington — 24061 — Registered Professional Engineer

State of Washington — Licensed Geologist — 25014975 — 04/27/2026 — Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT
ELJ LAYOUT PLAN
CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED SH DRAWN LV
CHECK NT CHECK XX

0 1
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SHEET
8 OF 16

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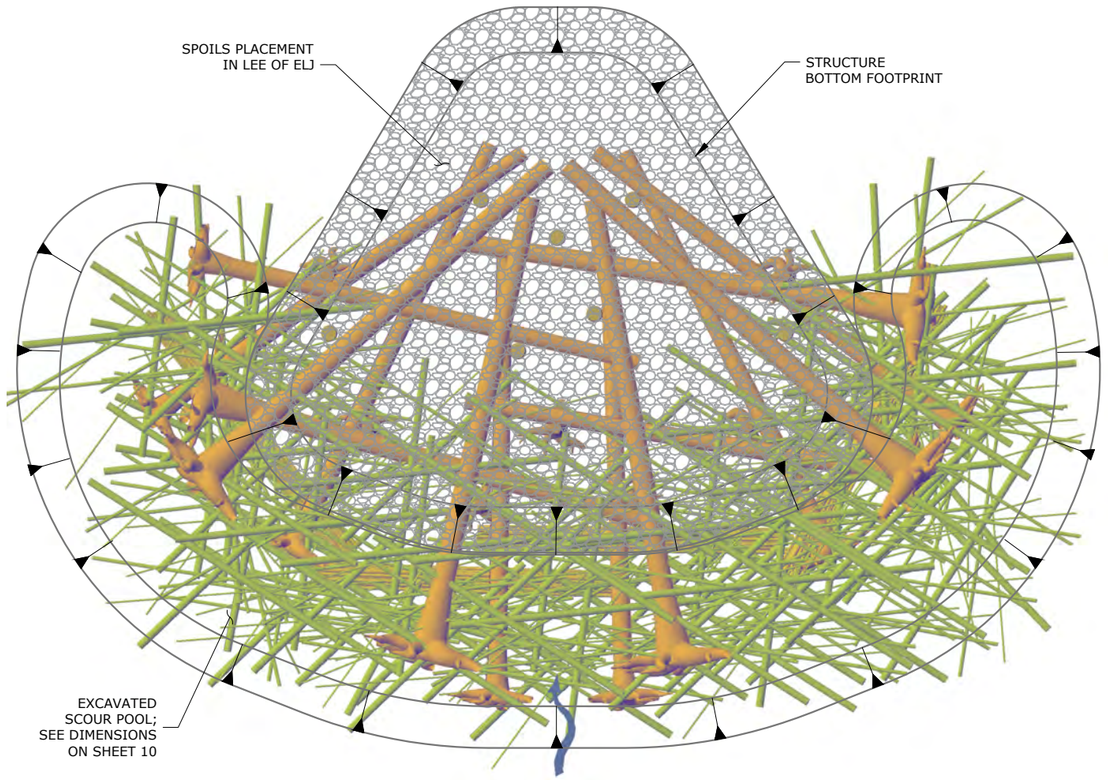
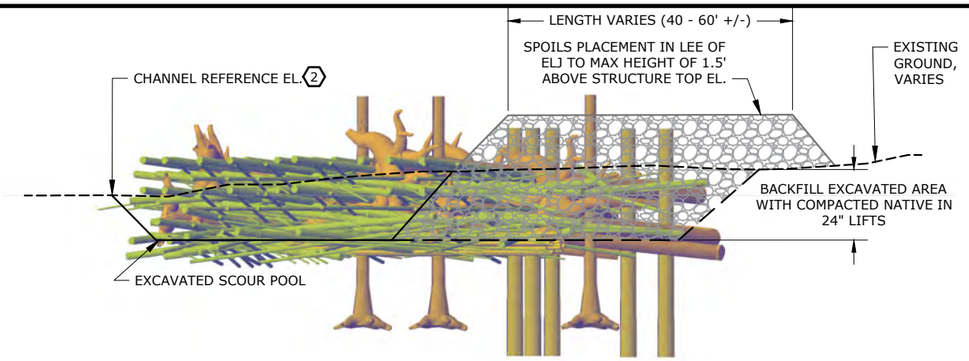


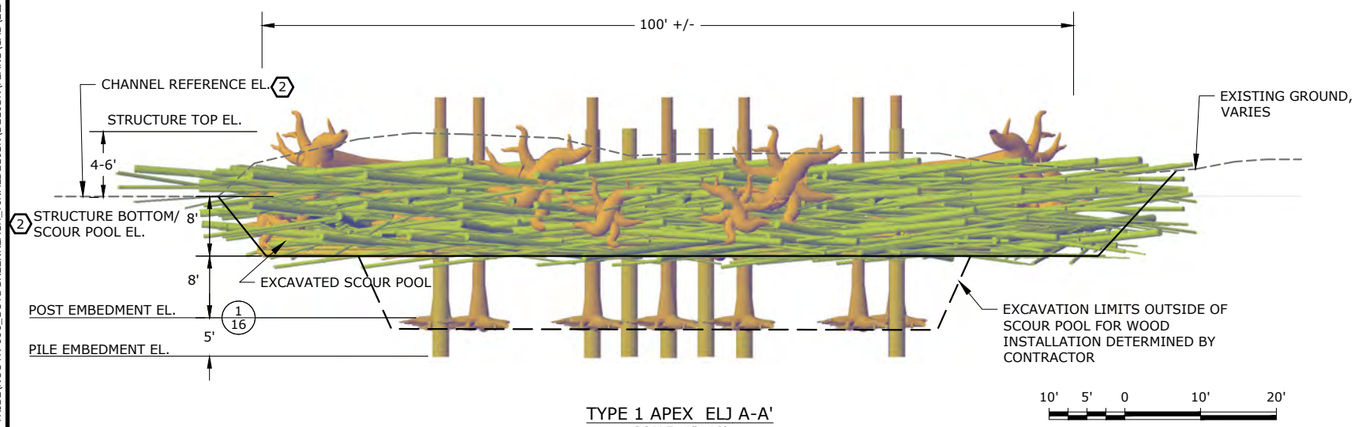
TYPE 1 APEX ELJ PLAN
SCALE: 1" = 10'



TYPE 1 APEX ELJ B-B'
SCALE: 1"=10'

TYPE 1 ELJ QUANTITIES SCHEDULE

MATERIAL	DESCRIPTION	DIA.	LENGTH	QUANTITY PER STRUCTURE	UNIT	NOTE
RP	ROOTWAD POST	19-31"	30'	7	EA	
P	TIMBER PILE	18-24"	30'	7	EA	
RW-S	STRUCTURAL ROOTWAD	25-31"	60'	10	EA	
RW-K	KEY ROOTWAD	32-40"	60'	6	EA	
LR	LOOSE RACKING	6-18"	20-40'	350-450	EA	FURNISH 350 PIECES OF 6-12" RACKING; ADDITIONAL RACKING DEPENDING ON SALVAGED WOOD (6 TO 18" DIA.) FROM CONTRACTING AGENCY
RB	RACKING BUNDLE	48"	40-50'	4	EA	APPROXIMATELY 10-15 PIECES OF RACKING PER BUNDLE
CL	CHAIN LASHING	1/2"	40-45'	20	EA	CONTRACTING AGENCY PROVIDES CHAIN AND FASTENERS
EXCAVATION	POOL			2,600	CY	ESTIMATED AVERAGE CUT FOR APPROXIMATELY 6,000 SF POOL. EXCAVATION QUANTITY VARIES BY STRUCTURE DEPENDING ON DEPTH OF OVERBURDEN ABOVE THE CHANNEL REFERENCE ELEVATION. DOES NOT INCLUDE PILE OR POST EXCAVATION.
	TEMPORARY EXCAVATION FOR STUCTURE BOTTOM FOOTPRINT			1,000	CY	AVERAGE ESTIMATED CUT FOR APROXIMATELY 2,400 SF FOOTPRINT BEHIND POOL. EXCAVATION LIMITS DETERMINED BY CONTRACTOR. QUANTITY WILL VARY BY STRUCTURE DEPENDING ON DEPTH OF OVERBURDEN ABOVE THE CHANNEL REFERENCE ELEVATION. DOES NOT INCLUDE PILE OR POST EXCAVATION.
	BACKFILL			3,600	CY	NO OFF HAUL. ALL EXCESS MATERIAL AFTER BACKFILLING AROUND LOG ENDS WITHIN STRUCTURE FOOTPRINT IS SPOILED IN THE LEE OF THE ELJ.



TYPE 1 APEX ELJ A-A'
SCALE: 1"=10'

TYPE 1 APEX ELJ
SCALE: AS SHOWN

1
9

NOTES

1. LOCATIONS OF EACH STRUCTURE WILL BE STAKED IN THE FIELD BY THE ENGINEER OR GEOMORPHOLOGIST. LOCATIONS MAY VARY FROM THOSE SHOWN ON THE PLANS BASED ON RIVER CONDITIONS AT TIME OF CONSTRUCTION.
2. THE ENGINEER WILL STAKE STAKEOUT POINTS 1 AND 2 SHOWN ON SHEET 10 AND SPECIFY THE CHANNEL REFERENCE ELEVATION. THE STRUCTURE BOTTOM DEPTH BELOW THE REFERENCE EL. WILL VARY BETWEEN 6 AND 9' AND IS 8' ON AVERAGE. THE CONTRACTOR SHALL STAKE CLEARING LIMITS, EXCAVATION EXTENTS AND POST LOCATIONS FOR THE ENGINEER'S REVIEW.
3. THE CONTRACTOR SHALL DETERMINE THE EXCAVATION LIMITS TO MAINTAIN A SAFE EXCAVATION IN ORDER TO INSTALL THE STRUCTURE TO THE ELEVATIONS IDENTIFIED BY THE ENGINEER. EXCAVATION SPOILS SHALL BE STAGED ACCORDING TO THE PERMIT REQUIREMENTS.
4. THE ELJ WORK AREA SHALL BE DEFISHED AND DEWATERED WHERE ISOLATION IS REQUIRED. SEE PROJECT SPECIFICATIONS 8-31.
5. THE WOOD LAYER PLACEMENT IN EACH LOGJAM LAYER SHALL BE FIELD VERIFIED BY THE ENGINEER OR CONTRACTING AGENCY PRIOR TO LASHING OR BACKFILLING. SEE LAYERING PLAN SHEETS 10 THROUGH 12.
6. WOOD SIZES AND TYPES MAY BE ADJUSTED BY THE ENGINEER OR CONTRACTING AGENCY BASED ON MATERIALS THAT ARE AVAILABLE.

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NOOKSACK INDIAN TRIBE

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04/27/2026
25014975
Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT
TYPE 1 ELJ DETAILS
CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED_SH DRAWN LV
CHECK NT CHECK XX

0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

SHEET
9 OF 16

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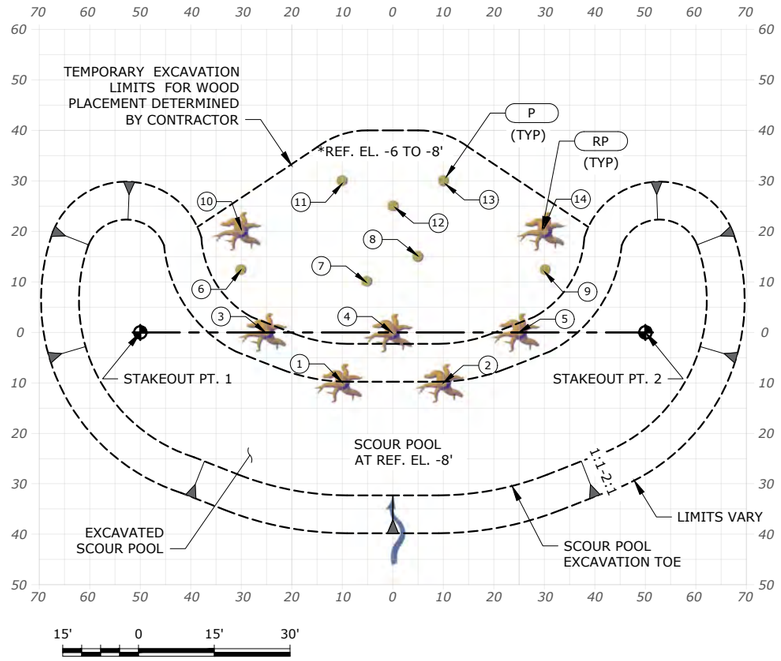

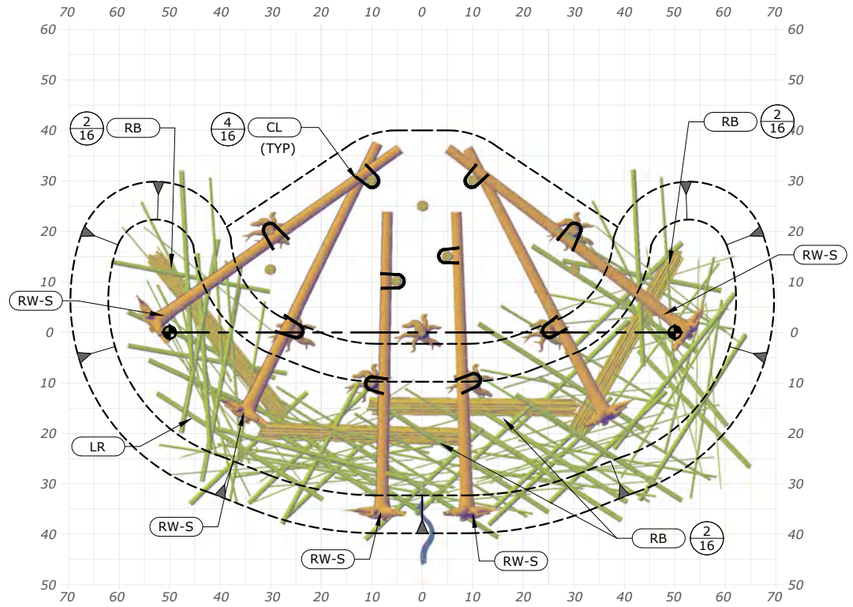

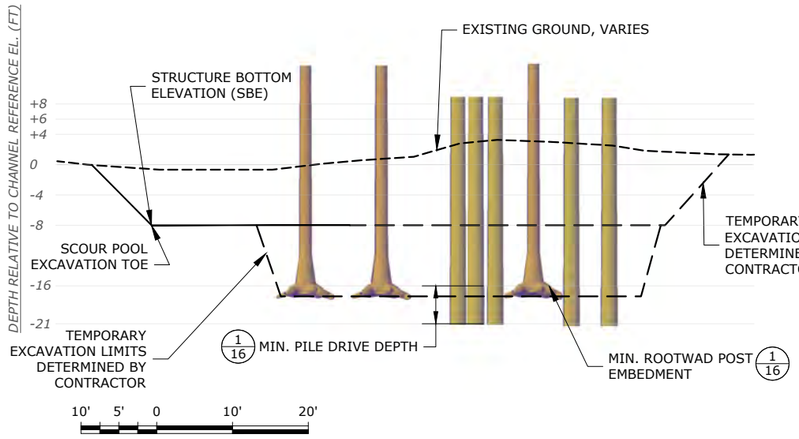

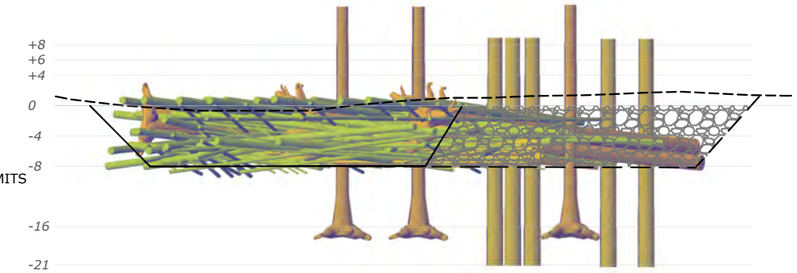

LAYER 0

1. EXCAVATE THE ENTIRE SCOUR POOL TO 6' BELOW THE REFERENCE ELEVATION. THE STRUCTURE FOOTPRINT EXCAVATION LIMITS AND LOWEST ELEVATION SHALL BE DETERMINED BY THE CONTRACTOR.
   1.1. *LEAVING THE WOOD PLACEMENT FOOTPRINT 1 TO 2' ABOVE THE STRUCTURE BOTTOM ELEVATION IS ACCEPTABLE IF LAYER 1 LOGS ARE INDIVIDUALLY TRENCHED IN AND PILES/POSTS ARE EMBEDDED TO THE SPECIFIED ELEVATION.
2. INSTALL ROOTWAD POSTS AND TIMBER PILES PER DETAIL 1 SHEET 16.

LAYER 1

1. PLACE 4 RACKING BUNDLES AT THE STRUCTURE BOTTOM/SCOUR POOL EL. AROUND THE INNER PERIMETER OF THE SCOUR POOL.
2. PLACE APPROXIMATELY 100-150 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO ELEVATION OF APPROXIMATELY 2' BELOW CHANNEL REFERENCE ELEVATION.
3. PLACE 6 STRUCTURAL ROOTWADS BETWEEN THE POSTS SHOWN AND WITHIN THE MATRIX OF RACKING. THE TOP OF THE BOLE OF THE ROOTWAD ABOVE THE RACKING BUNDLES SHOULD BE AT APPROXIMATELY THE CHANNEL REFERENCE ELEVATION.
4. INSTALL 10 CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.
5. BACKFILL AROUND THE LOGS ENDS, OUTSIDE OF THE POOL, UP TO CHANNEL REFERENCE ELEVATION.

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NOOKSACK INDIAN TRIBE
EVAN LOUIS DORO — STATE OF WASHINGTON — 53061 — REGISTERED PROFESSIONAL ENGINEER
State of Washington — 04/27/2026 — 25014975 — Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPE 1 ELJ LAYERING 1

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED_SH DRAWN LV
CHECK NT CHECK XX

0 1
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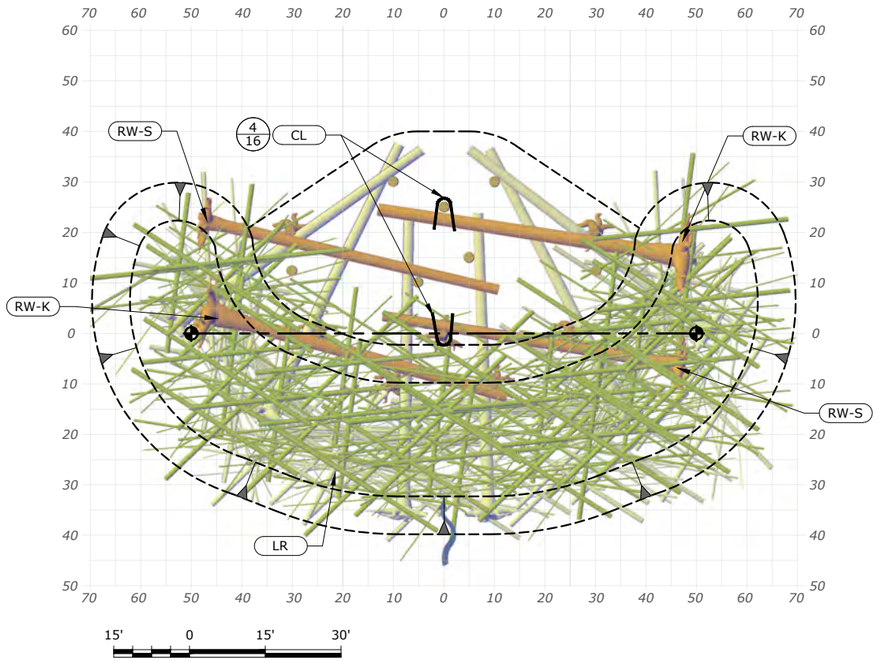
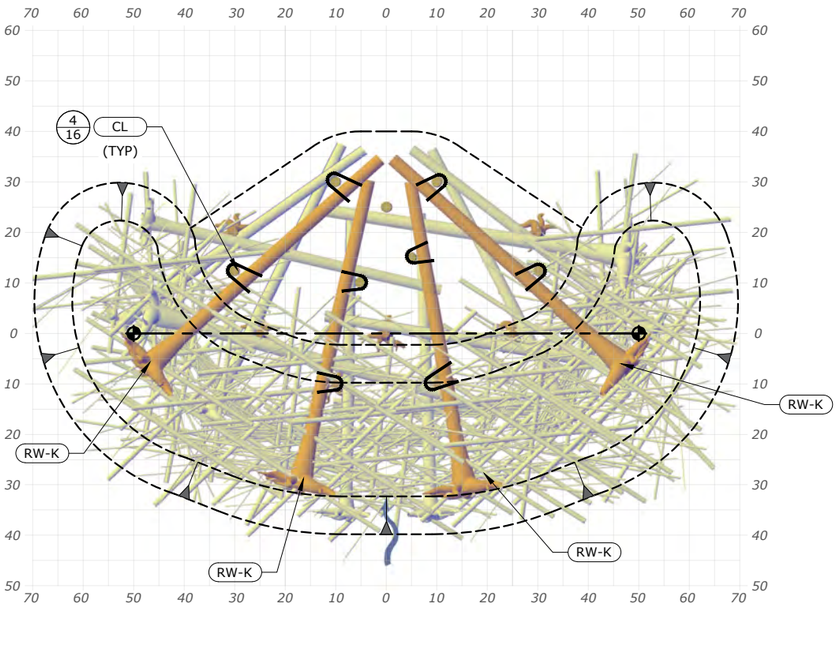
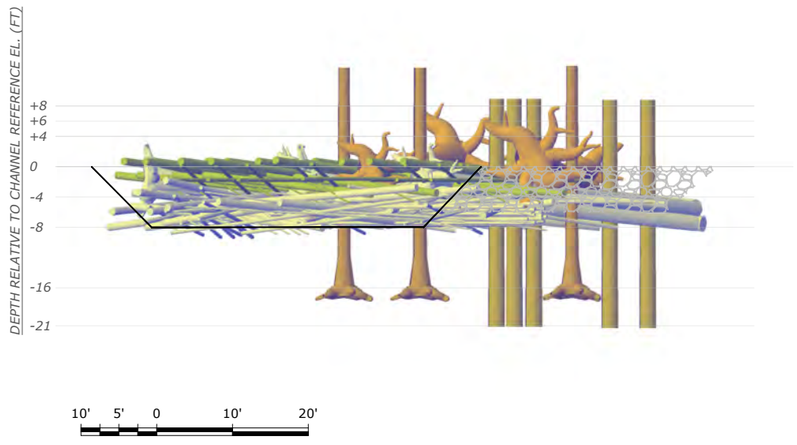
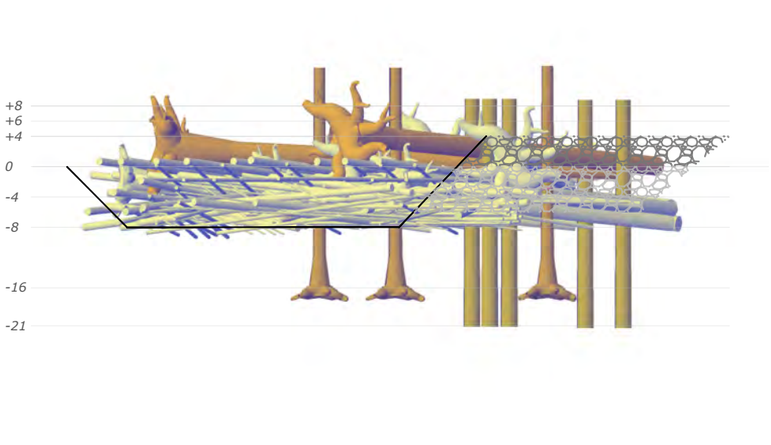
SHEET
10 OF 16









LAYER 2

1. PLACE 100-150 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO APPROXIMATELY 2' ABOVE THE CHANNEL REFERENCE ELEVATION.
2. PLACE 2 STRUCTURAL ROOTWADS AND 2 KEY ROOTWADS AS SHOWN. THE TOP OF THE BOLE OF THE ROOTWAD SHOULD BE AT APPROXIMATELY 1-3' ABOVE THE CHANNEL REFERENCE ELEVATION.
4. INSTALL TWO CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.

LAYER 3

1. PLACE FOUR KEY ROOTWADS BETWEEN PILES/POSTS AS SHOWN.THE TOP OF THE BOLE OFTHE ROOTWAD SHOULD BE AT APPROXIMATELY 4-6' ABOVE THE CHANNEL REFERENCE ELEVATION.
2. INSTALL EIGHT CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.
3. BACKFILL UP TO 4' ABOVE CHANNEL REFERENCE ELEVATION.

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04/27/2026
25014975
Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPE 1 ELJ LAYERING 2

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED, SH DRAWN LV
CHECK NT CHECK XX

0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

SHEET
11 OF 16

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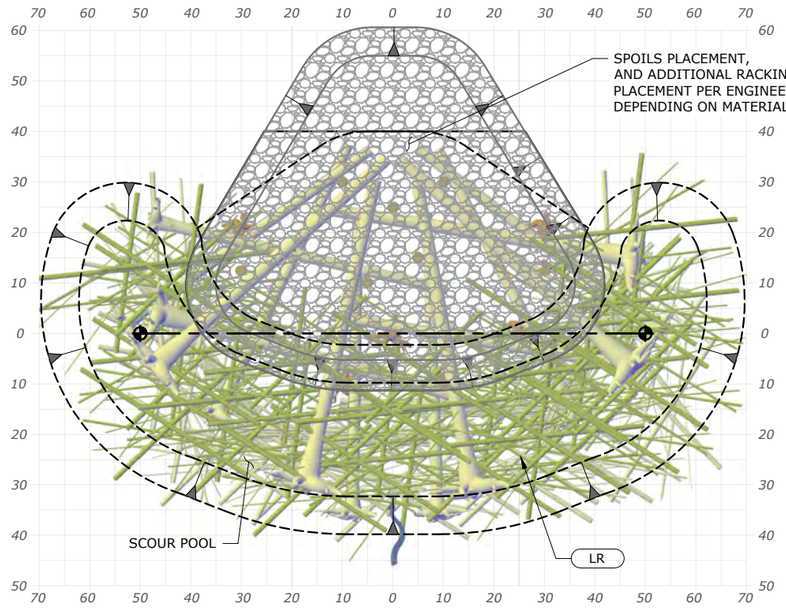

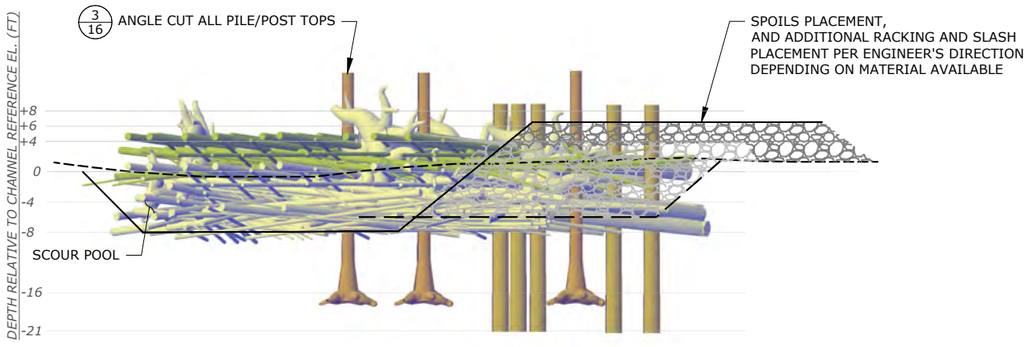

LAYER 4

1. PLACE 100-150 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO APPROXIMATELY 3-5' ABOVE THE CHANNEL REFERENCE ELEVATION.
2. BACKFILL EXCAVATION AREA AND PLACE REMAINING SPOILS IN LEE OF ELJ UP TO 1.5' ABOVE STRUCTURE TOP ELEVATION.
3. DEPENDING ON AVAILABLE SLASH AND WOOD, THE CONTRACTING AGENCY MAY DIRECT PLACEMENT OF RACKING LOGS, OR LARGER LOGS, INTO THE BACKFILL SURFACE TO PROVIDE ADDITIONAL EROSION RESISTANCE OF FILL MATERIAL.

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NOOKSACK INDIAN TRIBE

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04/27/2026
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Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPE 1 ELJ LAYERING 3

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN ED, SH DRAWN LV
CHECK NT CHECK XX

0 1
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SHEET
12 OF 16

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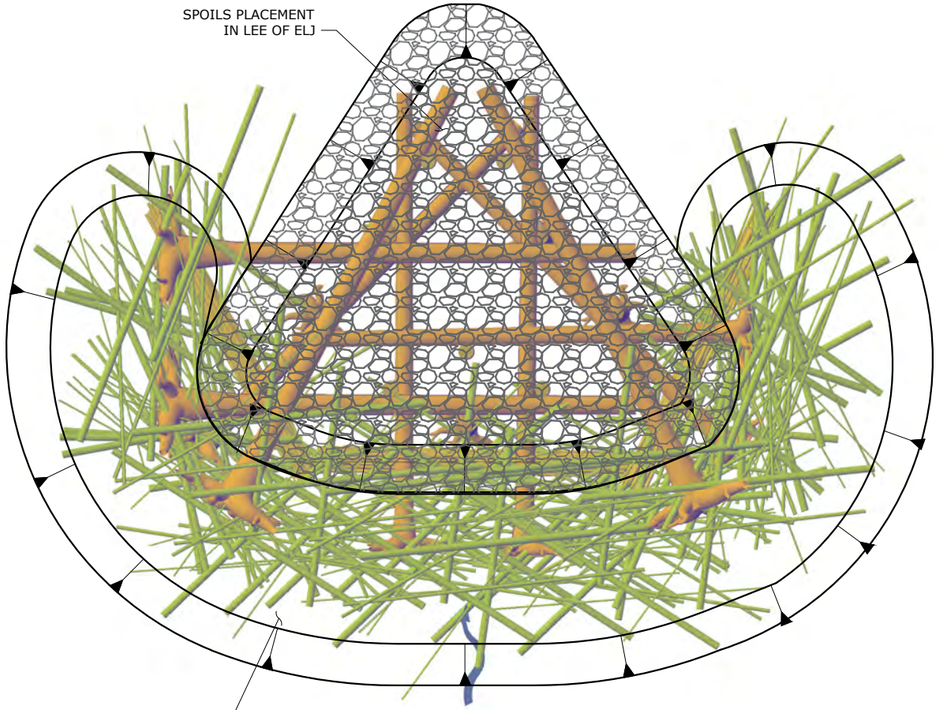
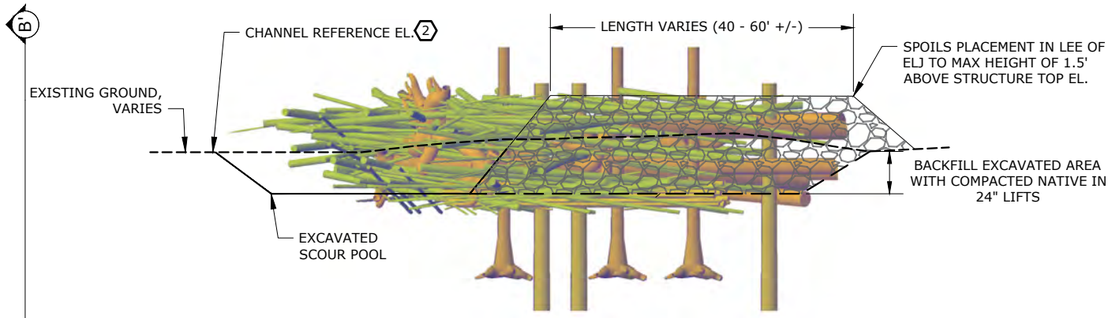


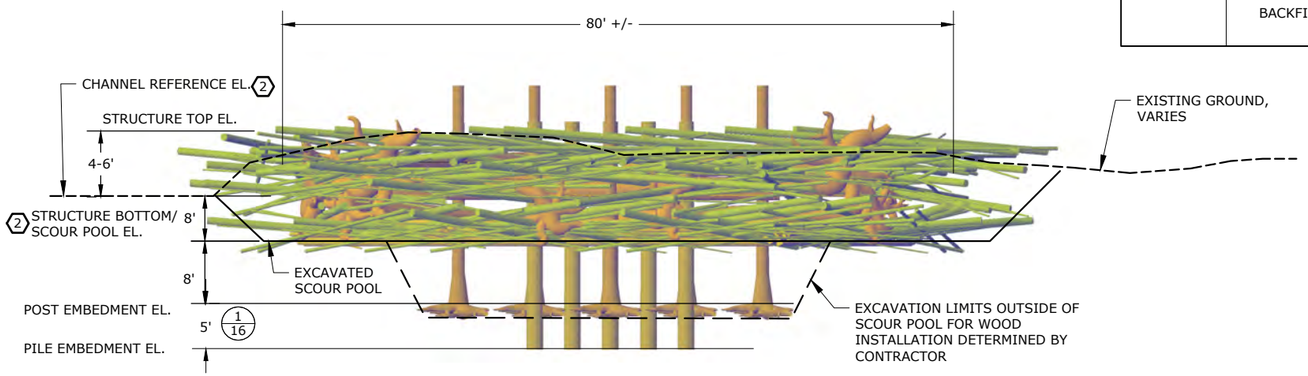
TYPE 2 APEX ELJ PLAN
SCALE: 1" = 10'



TYPE 2 APEX ELJ B-B'
SCALE: 1"=10'

TYPE 2 ELJ QUANTITIES SCHEDULE

MATERIAL	DESCRIPTION	DIA.	LENGTH	QUANTITY PER STRUCTURE	UNIT	NOTE
RP	ROOTWAD POST	19-31"	30'	5	EA	
P	TIMBER PILE	18-24"	30'	5	EA	
RW-S	STRUCTURAL ROOTWAD	25-31"	60'	5	EA	
RW-K	KEY ROOTWAD	32-40"	60'	4	EA	
LR	LOOSE RACKING	6-18"	20-40'	250-350	EA	FURNISH 250 PIECES OF 6-12" RACKING; ADDITIONAL RACKING DEPENDING ON SALVAGED WOOD (6 TO 18" DIA.) FROM CONTRACTING AGENCY
RB	RACKING BUNDLE	48"	40-50'	3	EA	APPROXIMATELY 10-15 PIECES OF RACKING PER BUNDLE
CL	CHAIN LASHING	1/2"	40-45'	14	EA	CONTRACTING AGENCY PROVIDES CHAIN AND FASTENERS
EXCAVATION	POOL			1,700	CY	ESTIMATED AVERAGE CUT FOR APPROXIMATELY 4,000 SF POOL. EXCAVATION QUANTITY VARIES BY STRUCTURE DEPENDING ON DEPTH OF OVERBURDEN ABOVE THE CHANNEL REFERENCE ELEVATION. DOES NOT INCLUDE PILE OR POST EXCAVATION.
	TEMPORARY EXCAVATION FOR STUCTURE BOTTOM FOOTPRINT			520	CY	AVERAGE ESTIMATED CUT FOR APROXIMATELY 1,200 SF FOOTPRINT BEHIND POOL. EXCAVATION LIMITS DETERMINED BY CONTRACTOR. QUANTITY WILL VARY BY STRUCTURE DEPENDING ON DEPTH OF OVERBURDEN ABOVE THE CHANNEL REFERENCE ELEVATION. DOES NOT INCLUDE PILE OR POST EXCAVATION.
	BACKFILL			2,220	CY	NO OFF HAUL. ALL EXCESS MATERIAL AFTER BACKFILLING AROUND LOG ENDS WITHIN STRUCTURE FOOTPRINT IS SPOILED IN THE LEE OF THE ELJ.



TYPE 2 APEX ELJ A-A'
SCALE: 1"=10'

NOTES

1. LOCATIONS OF EACH STRUCTURE WILL BE STAKED IN THE FIELD BY THE ENGINEER OR GEOMORPHOLOGIST. LOCATIONS MAY VARY FROM THOSE SHOWN ON THE PLANS BASED ON RIVER CONDITIONS AT TIME OF CONSTRUCTION.
2. THE ENGINEER WILL STAKE STAKEOUT POINTS 1 AND 2 SHOWN ON SHEET 14 AND SPECIFY THE CHANNEL REFERENCE ELEVATION. THE STRUCTURE BOTTOM DEPTH BELOW THE REFERENCE EL. WILL VARY BETWEEN 6 AND 9' AND IS 8' ON AVERAGE. THE CONTRACTOR SHALL STAKE CLEARING LIMITS, EXCAVATION EXTENTS AND POST LOCATIONS FOR THE ENGINEER'S REVIEW.
3. THE CONTRACTOR SHALL DETERMINE THE EXCAVATION LIMITS TO MAINTAIN A SAFE EXCAVATION IN ORDER TO INSTALL THE STRUCTURE TO THE ELEVATIONS IDENTIFIED BY THE ENGINEER. EXCAVATION SPOILS SHALL BE STAGED ACCORDING TO THE PERMIT REQUIREMENTS.
4. THE ELJ WORK AREA SHALL BE DEFISHED AND DEWATERED WHERE ISOLATION IS REQUIRED. SEE PROJECT SPECIFICATIONS 8-31.
5. THE WOOD LAYER PLACEMENT IN EACH LOGJAM LAYER SHALL BE FIELD VERIFIED BY THE ENGINEER OR CONTRACTING AGENCY PRIOR TO LASHING OR BACKFILLING. SEE LAYERING PLAN SHEETS 14 THROUGH 15.
6. WOOD SIZES AND TYPES MAY BE ADJUSTED BY THE ENGINEER OR CONTRACTING AGENCY BASED ON MATERIALS THAT ARE AVAILABLE.

TYPE 2 APEX ELJ
SCALE: AS SHOWN

1
13

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NOOKSACK INDIAN TRIBE

EVAN LOUIS D'ORO
STATE OF WASHINGTON
24061
REGISTERED PROFESSIONAL ENGINEER

State of Washington
04/27/2026
25014975
Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT
TYPE 2 ELJ DETAILS
CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN_ED.SH. DRAWN LV
CHECK NT CHECK XX

0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

SHEET
13 OF 16

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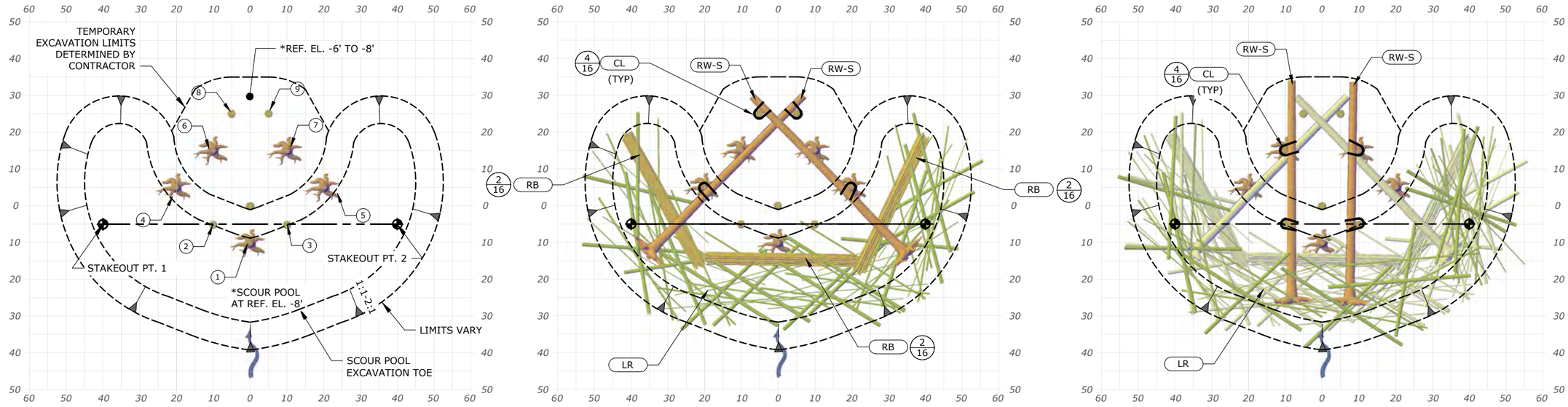

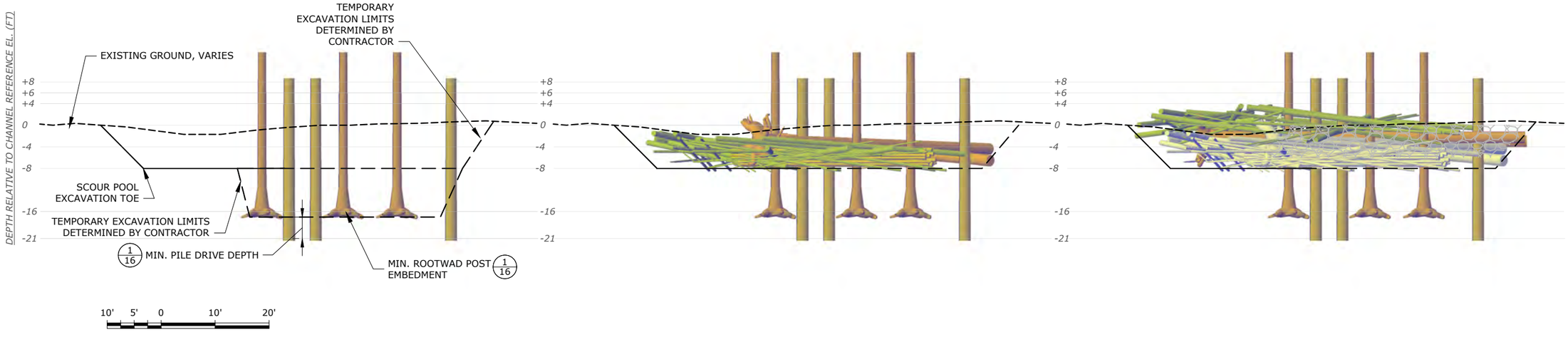

LAYER 0

1. EXCAVATE THE ENTIRE SCOUR POOL TO THE STRUCTURE BOTTOM EL. THE SCOUR POOL FOOTPRINT IS APPROXIMATELY 4,000 SF. THE STRUCTURE FOOTPRINT BEHIND THE SCOUR POOL IS APPROXIMATELY 1,200 SF AS SHOWN. THE EXCAVATION LIMITS AND LOWEST ELEVATION SHALL BE DETERMINED BY THE CONTRACTOR.
   1.1. *LEAVING THE WOOD PLACEMENT FOOTPRINT 1 TO 2' ABOVE THE SBE IS ACCEPTABLE IF LAYER 1 LOGS ARE INDIVIDUALLY TRENCHED IN AND PILES/POSTS ARE EMBEDDED TO THE SPECIFIED ELEVATION.
2. INSTALL ROOTWAD POSTS AND TIMBER PILES PER DETAIL 1 SHEET 16.

LAYER 1

1. PLACE 3 RACKING BUNDLES AT THE STRUCTURE BOTTOM/SCOUR POOL EL. AROUND THE INNER PERIMETER OF THE SCOUR POOL.
2. PLACE APPROXIMATELY 60-80 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO ELEVATION OF APPROXIMATELY 4' BELOW CHANNEL REFERENCE ELEVATION.
3. PLACE 2 STRUCTURAL ROOTWADS BETWEEN THE POSTS SHOWN AND WITHIN THE MATRIX OF RACKING. THE TOP OF THE BOLE OF THE ROOTWAD ABOVE THE RACKING BUNDLES SHOULD BE AT APPROXIMATELY THE CHANNEL REFERENCE ELEVATION.
4. INSTALL 4 CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.

LAYER 2

1. PLACE APPROXIMATELY 60-80 PIECES OF LOOSE RACKING BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO APPROXIMATELY 2' ABOVE CHANNEL REFERENCE ELEVATION.
2. PLACE 2 STRUCTURAL ROOTWADS BETWEEN THE POSTS SHOWN AND WITHIN THE MATRIX OF RACKING. THE TOP OF THE BOLE OF THE ROOTWAD SHOULD BE AT APPROXIMATELY THE CHANNEL REFERENCE ELEVATION.
3. INSTALL 4 CHAIN LASHING TO CONNECT TO PILES/POSTS WHERE SHOWN.
5. BACKFILL AROUND THE LOGS ENDS, OUTSIDE OF THE POOL, UP TO CHANNEL REFERENCE ELEVATION.

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Natural Systems Design + Coastal Geologic Services
NOOKSACK INDIAN TRIBE
Evan Louis Doroff, State of Washington, 24061, Registered Professional Engineer
State of Washington, 04/27/2026, 25014975, Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPE 2 ELJ LAYERING 1

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN_ED SH DRAWN LV
CHECK NT CHECK XX

0 1
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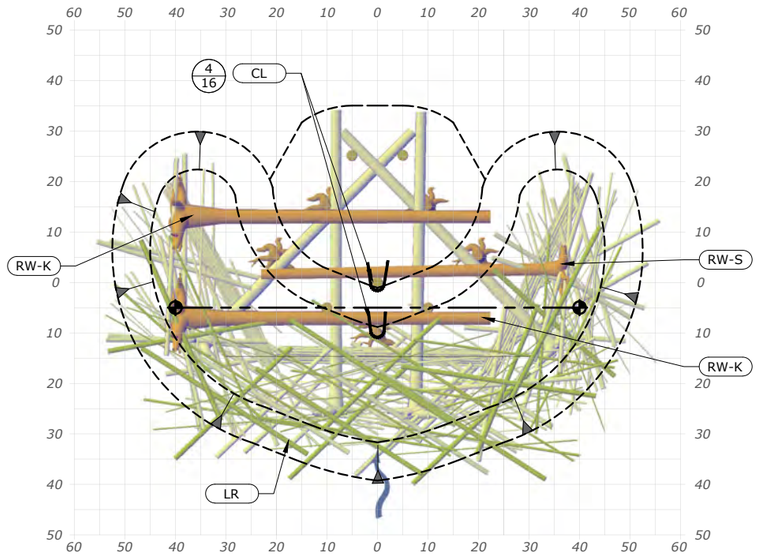
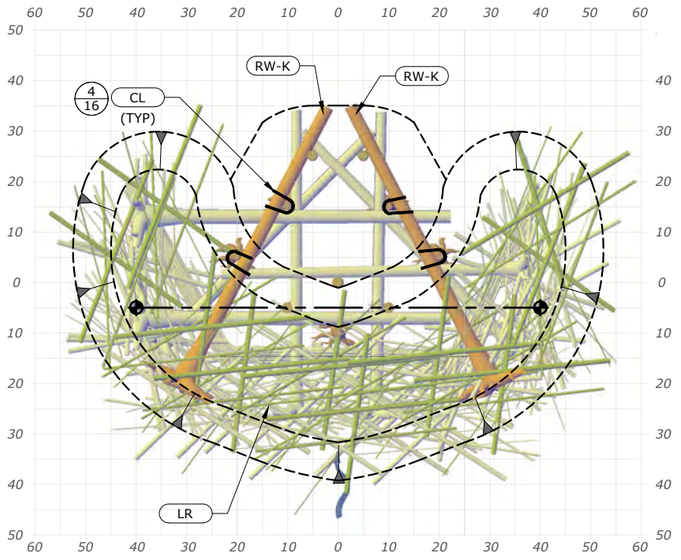
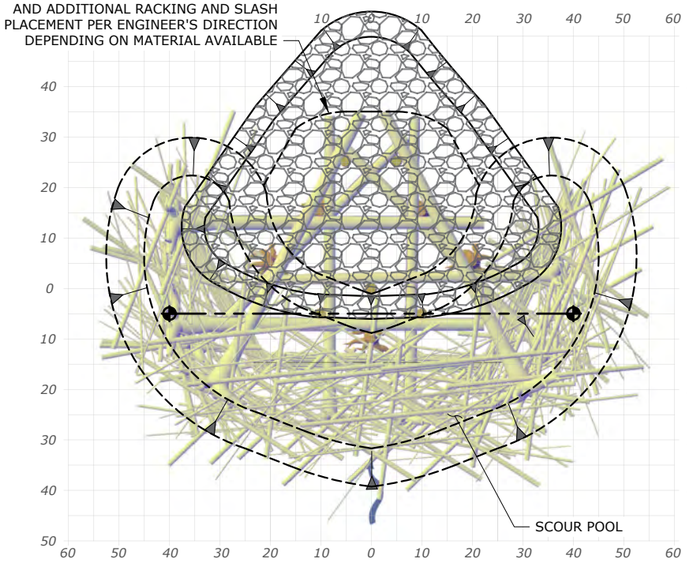
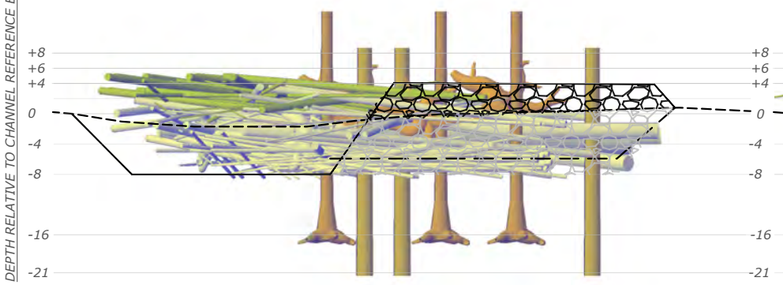
SHEET
14 OF 16

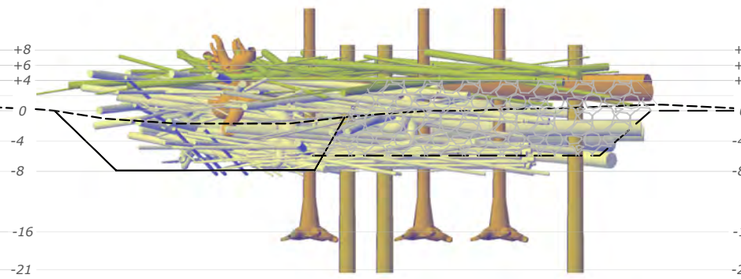


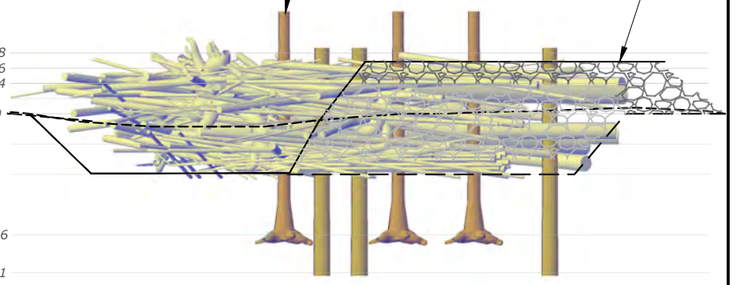




15' 0 15' 30'







10' 5' 0 10' 20'

LAYER 3

1. PLACE APPROXIMATELY 60-80 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO APPROXIMATELY 4' ABOVE THE CHANNEL REFERENCE ELEVATION.
2. PLACE 2 KEY ROOTWADS AND 1 STRUCTURAL ROOTWAD BETWEEN THE POSTS SHOWN. THE TOP OF THE BOLE OF THE ROOTWADS SHOULD BE AT APPROXIMATELY 1-3' ABOVE THE CHANNEL REFERENCE ELEVATION.
3. INSTALL 2 CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.
4. BACKFILL UP TO 4' ABOVE CHANNEL REFERENCE ELEVATION.

LAYER 4

1. PLACE 2 KEY ROOTWADS BETWEEN THE POSTS AS SHOWN. THE TOP OF THE BOLE OF THE ROOTWADS SHOULD BE AT APPROXIMATELY 4-6' ABOVE THE CHANNEL REFERENCE ELEVATION.
2. INSTALL 4 CHAIN LASHINGS TO CONNECT TO PILES/POSTS WHERE SHOWN.
3. PLACE APPROXIMATELY 60-80 PIECES OF RACKING LOOSELY BUT INTERLOCKING WITHIN THE SCOUR POOL UP TO APPROXIMATELY 6' ABOVE THE CHANNEL REFERENCE ELEVATION.

LAYER 5

1. BACKFILL EXCAVATION AREA AND PLACE REMAINING SPOILS IN LEE OF ELJ UP TO 1.5' ABOVE STRUCTURE TOP ELEVATION.
2. DEPENDING ON AVAILABLE SLASH AND WOOD, THE ENGINEER MAY DIRECT PLACEMENT OF RACKING LOGS, OR LARGER LOGS, INTO THE BACKFILL SURFACE TO PROVIDE ADDITIONAL EROSION RESISTANCE OF FILL MATERIAL.

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NOOKSACK INDIAN TRIBE

EVAN LOUIS DORO
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State of Washington
04/27/2026
25014975
Licensed Geologist
Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

TYPE 2 ELJ LAYERING 2

CONSTRUCTION PLANS

DATE APRIL 2026
COUNTY WHATCOM
LATITUDE 48°54'07"N
LONGITUDE 121°51'48"W
TN/SC/RG T39N/S2/R7W
DESIGN_ED.SH. DRAWN LV
CHECK NT CHECK XX

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SHEET
15 OF 16

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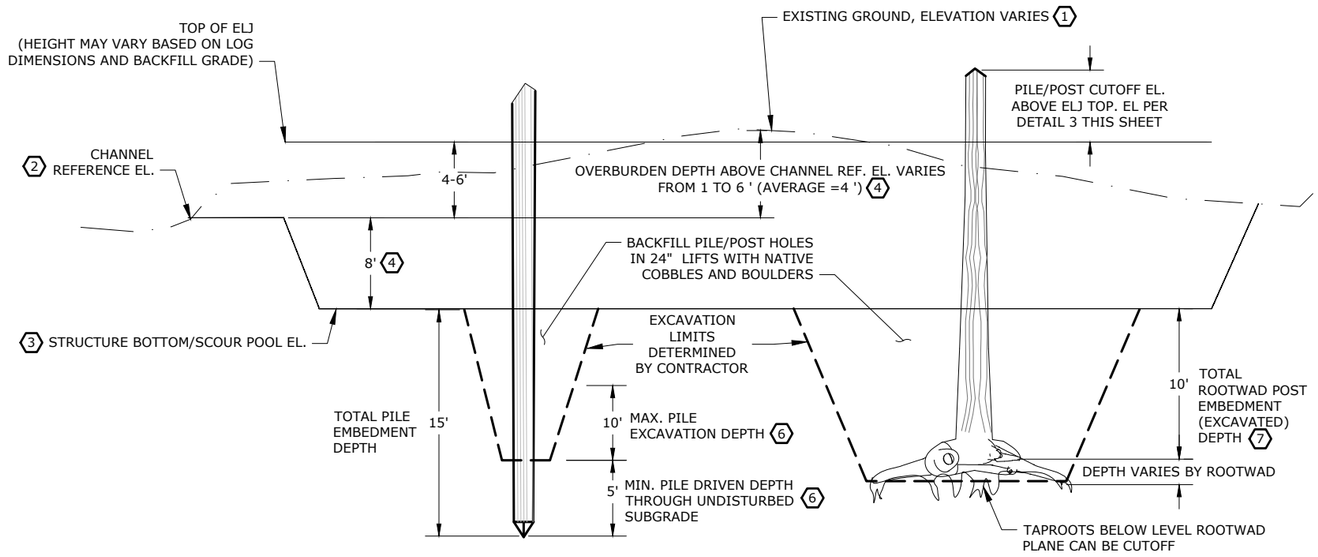
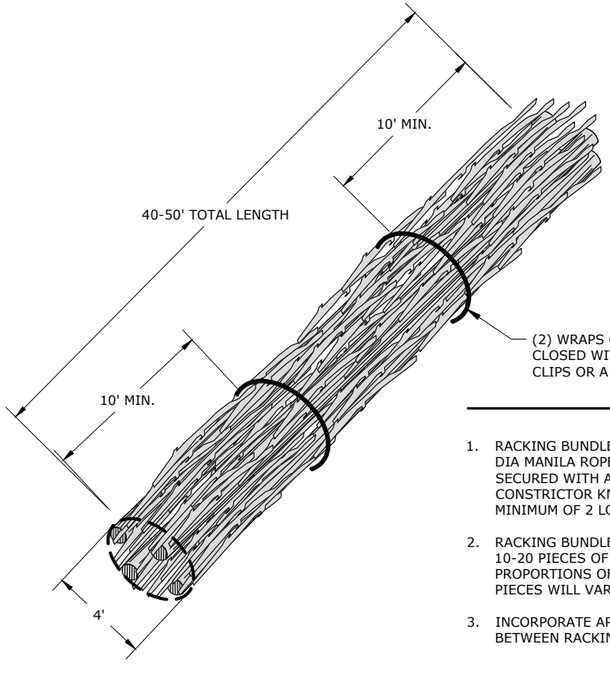


PILE AND POST ELEVATION
NTS

NOTES

1. THE EXISTING GROUND ELEVATION WILL BE REALIZED AT THE TIME OF CONSTRUCTION. CHANNEL MIGRATION SINCE THE TIME OF SURVEY HAS ALTERED ELEVATIONS ACROSS THE CHANNEL CORRIDOR, HENCE ELEVATIONS IN NAVD88 ARE NOT REPORTED ON THE PLANS.
2. THE ENGINEER WILL SPECIFY THE CHANNEL REFERENCE ELEVATION AND PROVIDE AN ELEVATION HUB AT EACH ELJ SITE, OR PROVIDE A HUB THAT CAN REFERENCE MULTIPLE ELJ SITES.
3. THE ENGINEER WILL SPECIFY THE STRUCTURE BOTTOM ELEVATION AFTER THE CHANNEL REFERENCE ELEVATION IS ESTABLISHED. THE ENGINEER WILL SCRIBE THE STRUCTURE BOTTOM ELEVATION ON THE STAKES SET AT EACH STAKEOUT POINT. STAKEOUT POINT LOCATIONS FOR EACH ELJ SITE ARE SHOWN ON SHEETS 10 AND 14.
4. EXCAVATION DEPTH BELOW EXISTING GROUND TO REACH THE STRUCTURE BOTTOM ELEVATION WILL VARY BETWEEN APPROXIMATELY 8.5 AND 15.5-FEET. AN ESTIMATED CUT VOLUME IS PROVIDED IN THE MATERIAL TABLES ON SHEETS 9 AND 13.
5. REFER TO SPECIAL PROVISION 8-26.5: EXCAVATION TO REACH THE STRUCTURE BOTTOM ELEVATION, AND TO INSTALL PILES AND POSTS, IS INCIDENTAL TO ELJ INSTALLATION BID ITEMS. IF THE CONTRACTOR CONTESTS THE AVERAGE EXCAVATION QUANTITIES PROVIDED IN THE BID PLANS IS ABOVE 10% OF THE ESTIMATED VALUE, THE CONTRACTOR SHALL PROVIDE SURVEY NOTES AND TAKEOFFS FOR THE ENGINEER AND CONTRACTING AGENCY TO REVIEW.
6. REFER TO SPECIAL PROVISION 8-26.3(2)H AND 8-26.5: EXCAVATION TO INSTALL PILES IS INCIDENTAL TO ELJ INSTALLATION. THE ALTERNATE BID ITEM FOR TIMBER PILE DRIVING IS PAID WHEN PILES ARE DRIVEN VIA VIBRATORY OR IMPACT HAMMER METHODS TO THE MINIMUM DRIVE DEPTH SHOWN.
7. ROOTWAD EMBEDMENT DEPTH IS MEASURED FROM THE TOP OF THE ROOTWAD FAN AND DOES NOT INCLUDE THE FAN ITSELF.

1/16

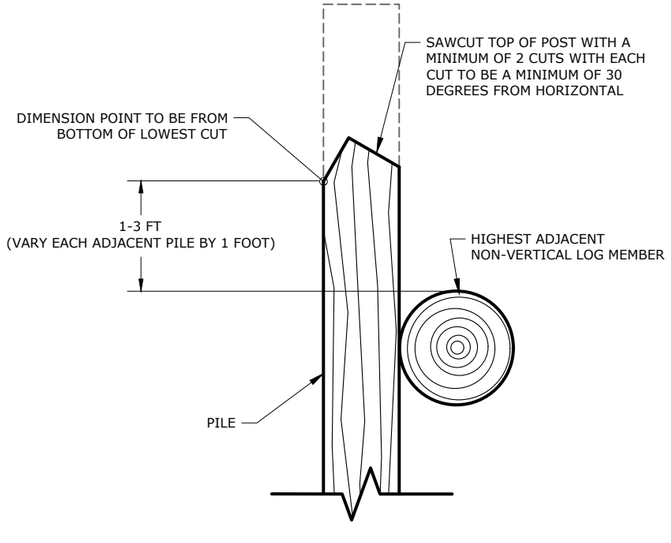


RACKING BUNDLE
NTS

NOTES

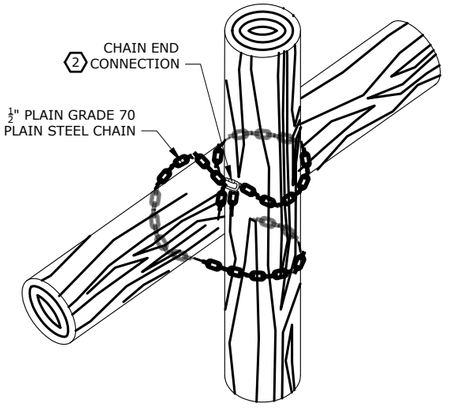
1. RACKING BUNDLES SHALL BE SECURED WITH A MIN 1" DIA MANILA ROPE WRAPPED TWICE AROUND AND SECURED WITH A TRUCKERS HITCH OR COMPARABLE CONSTRICTOR KNOT OR (2) WIRE ROPE CLIPS AT MINIMUM OF 2 LOCATIONS AS SHOWN.
2. RACKING BUNDLES CONSIST OF APPROXIMATELY 10-20 PIECES OF RACKING WITH NEAR EQUAL PROPORTIONS OF 6", 9" AND 12" LOGS. QUANTITY OF PIECES WILL VARY BASED ON SIZES OF LOGS USED.
3. INCORPORATE APPROXIMATELY 10-20 CY OF SLASH BETWEEN RACKING LOGS WITHIN CORE OF BUNDLE.

2/16



SAWCUT POST TOPS
NTS

3/16



NOTES

1. THE CONTRACTING AGENCY WILL PROVIDE CHAIN AND CHAIN-END CONNECTIONS. ADDITIONAL TOOLS (E.G., BINDERS) TO ADD TENSION TO CHAIN WHILE INSTALLING COUPLING LINKS OR EQUIVALENT IS RESPONSIBILITY OF THE CONTRACTOR.
2. CHAIN END CONNECTION SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON SHEETS 10, 11, 12, 14, AND 15. THE TYPE OF CONNECTION MAY VARY DEPENDING ON MATERIALS PROVIDED BY THE CONTRACTING AGENCY. THE TYPE OF CONNECTION AND LOCATION FOR EACH TYPE OF CONNECTION WILL BE SPECIFIED BY THE ENGINEER AT THE TIME OF CONSTRUCTION AND BE EITHER:
   - 2.1. JAW & JAW BINDER WITH REMOVABLE HANDLE FOR LASHINGS SHOWN IN LAYERS FOR THE UPPER LAYER LASHINGS USE RATCHET CHAIN BINDER (SIZED TO MATCH CHAIN) TO TIGHTEN CHAIN TO MINIMUM 500 LB TENSION.
   - 2.2. GRAB & JAW OR GRAB & GRAB BINDER WITH LEVEL LEFT IN PLACE, AND SECURED SHUT WITH TACK WELD OR SHACKLE BOLT.
   - 2.3. COUPLING OR REPAIR LINK WITH WORKING LOAD LIMIT EQUAL TO CHAIN.
3. ADD TWO SPIKES OR 4" TIMBER STAPLES TO SECURE THE CHAIN TO THE LOG ON EACH END OF CONNECTION.

CHAIN LASHING
NTS

4/16

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NOOKSACK INDIAN TRIBE

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State of Washington — 04/27/2026 — 25014975 — Licensed Geologist

Shawn Higgins

NOOKSACK INDIAN TRIBE
NORTH FORK NOOKSACK RIVER BOYD REACH HABITAT ENHANCEMENT PROJECT

ELJ CONSTRUCTION DETAILS

CONSTRUCTION PLANS

DATE	APRIL 2026
COUNTY	WHATCOM
LATITUDE	48°54'07"N
LONGITUDE	121°51'48"W
TW/SC/RG	T39N/S2/R7W
DESIGN_ED SH	DRAWN LV
CHECK NT	CHECK XX

0 1
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SHEET
16 OF 16

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