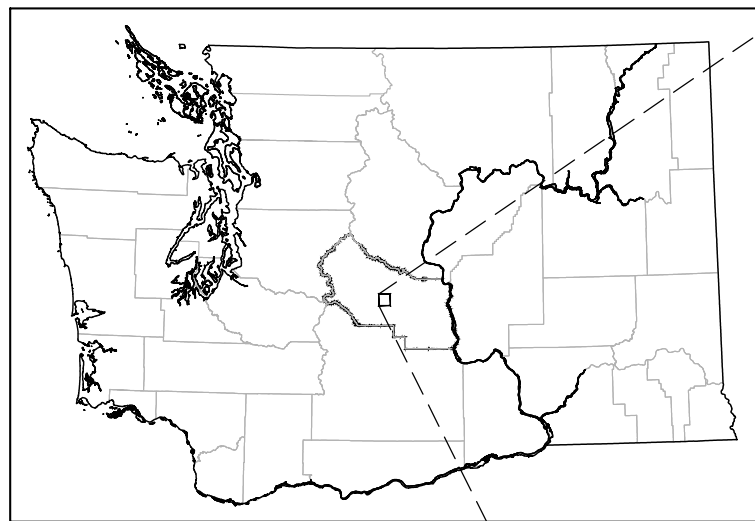


TANEUM CREEK HABITAT ENHANCEMENT

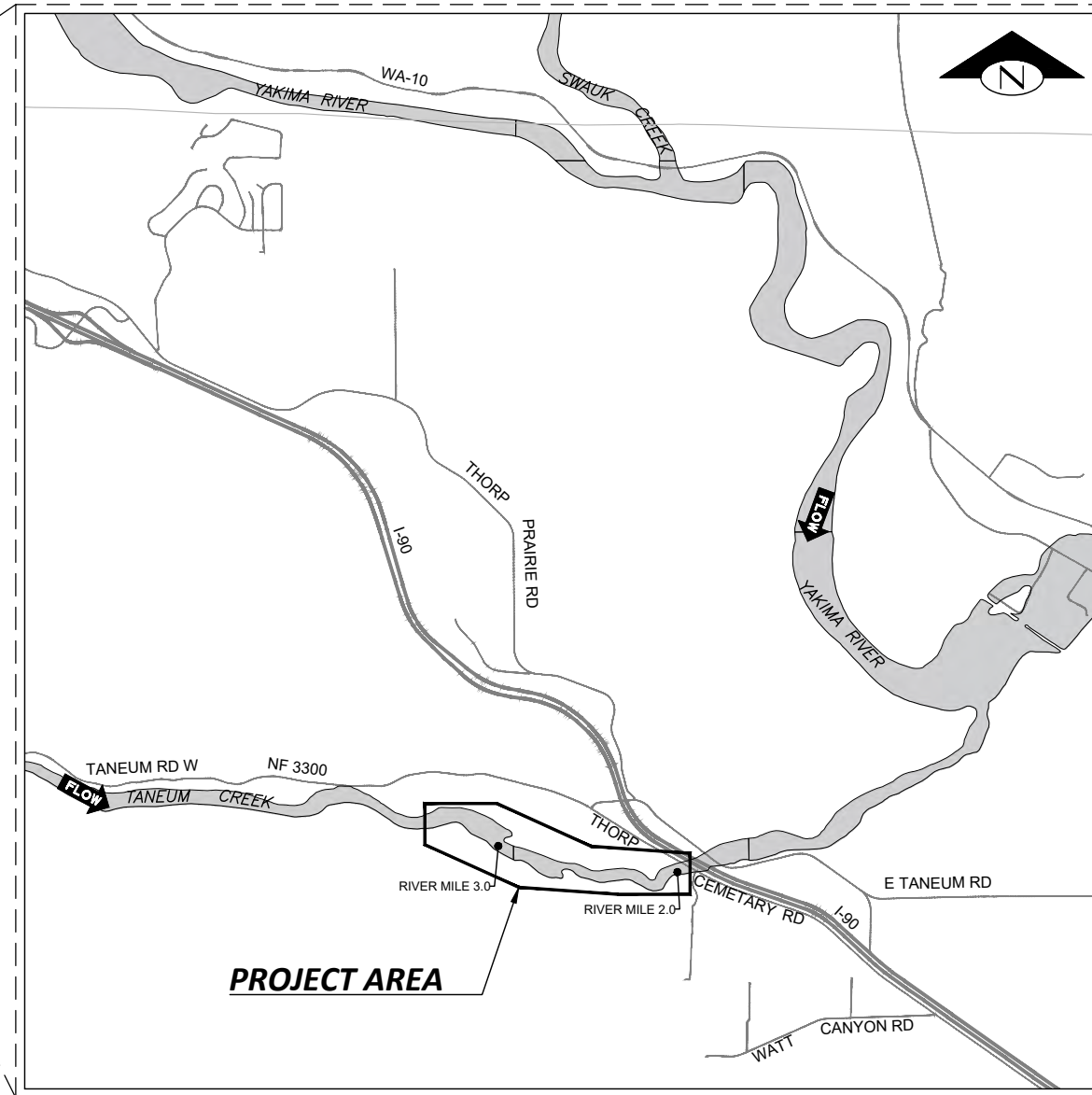
RAGHEART SITE

YAKAMA NATION - YAKIMA KLICKITAT FISHERIES PROJECT



PROJECT LOCATION

SCALE: 1"=50 MILES



PROJECT AREA

SCALE: 1"=2,000'

SHEET LIST TABLE

Sheet Number	Sheet Title
1	COVER SHEET
2	GENERAL LEGEND AND QUANTITIES
3	HIP GENERAL CONSERVATION MEASURES (1)
4	HIP GENERAL CONSERVATION MEASURES (2)
5	HIP GENERAL CONSERVATION MEASURES (3)
6	EXISTING CONDITIONS
7	ACCESS AND STAGING PLAN
8	PROPOSED CONDITIONS - SITE 1
9	PROPOSED CONDITIONS - SITE 2
10	PROPOSED CONDITIONS - SITE 4
11	PROPOSED CONDITIONS - SITE 5
12	TYPE 1 ELJ DETAILS
13	KEY PIECE PLACEMENT DETAILS
14	BANK PLANTING DETAILS
15	TESC DETAILS

PROJECT SPONSOR CONTACT INFORMATION

YAKAMA NATION-YAKIMA KLICKITAT FISHERIES PROJECT

P.O. BOX 151
TOPPENISH, WA 98948
(509) 945-7195

ENGINEER CONTACT INFORMATION

NATURAL SYSTEMS DESIGN, INC

1900 N NORTHLAKE WAY, SUITE 211
SEATTLE, WA 98103
(206) 834-0175



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



NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED JA.ELD	LATITUDE 47°4'56"N
CHECKED BH	LONGITUDE 120°45'1"W
DRAWN ELD	TN/SC/RG 118N S5&6 R17E
CHECKED BH, MTS	COUNTY KITTITAS, WASHINGTON

TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE

COVER SHEET

1

SHEET 1 OF 15

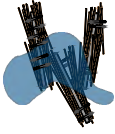

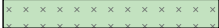
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FINAL PLANS; ISSUED 04-26-2021

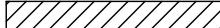


GENERAL LEGEND

- PROPERTY LINE (APPROXIMATE)
- ===== EXISTING ROAD
- REACH BREAK
- - - - -5- - - - - EXISTING MAJOR CONTOUR
- - - - -1- - - - - EXISTING MINOR CONTOUR
- o---o---o---o---o--- EXISTING FENCE
- OHWM ----- EXISTING OHWM
- WL WL WL WL WL EXISTING WETLAND
- RR---RR---RR---RR---RR EXISTING RIPRAP

PROPOSED CONDITIONS LEGEND

-  TYPE 1 ELJ
-  PROPOSED KEY PIECE PLACEMENT
-  PROPOSED BANK PLANTING AREA (PERFORMED BY OTHERS IN SEPARATE CONTRACT)

TEMPORARY ACCESS, STAGING, AND EROSION CONTROL LEGEND

-  PROPOSED EQUIPMENT STAGING AREAS
-  PROPOSED NATURAL MATERIALS STAGING AREAS
-  TEMPORARY ACCESS ROAD

DETAIL AND SECTION REFERENCING

- ① NOTE REFERENCING NUMBER
- $\frac{4}{6}$ ← DETAIL REFERENCE NUMBER SHEET ON WHICH DETAIL APPEARS
- $\frac{4}{2}$ ← DETAIL REFERENCE NUMBER SHEET FROM WHICH DETAIL WAS TAKEN
- (TYP) SPECIFIES THAT DETAIL IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED
- (VAR) SPECIFIES THAT DETAIL WAS TAKEN FROM SEVERAL SHEETS

Base Bid Items - Ragland Reach Site 1				
Item #	Item Description	Specification Section	Quantity	Unit
1	Mobilization	4	1	LS
2	Temporary Construction Access and Staging	5	1	LS
3	Type 1 ELJ	6	5	EA
4	Key Piece Placements	6	8	EA
Additive Bid Items - Heart K Reach Sites 2,4,5				
Item #	Item Description	Specification Section	Quantity	Unit
5	Mobilization	4	1	LS
6	Temporary Construction Access and Staging	5	1	LS
7	Type 1 ELJ	6	13	EA
8	Key-Piece Placements	6	39	EA

BID ITEMS SUMMARY
SCALE: NOT TO SCALE

MATERIAL	DIAMETER (IN)	LENGTH (FT)	ROOTWAD DIAMETER (FT)	TOTAL QUANTITY	UNIT	TOTAL QUANTITY SITE 1	TOTAL QUANTITY SITE 2	TOTAL QUANTITY SITE 3	TOTAL QUANTITY SITE 4	TOTAL QUANTITY SITE 5	PROJECT SPONSOR OR CONTRACTOR PROVIDED
BATTER PILE	16	20	NA	270	EA	75	30	0	45	120	CONTRACTOR SUPPLIED, STAGED, AND INSTALLED
KEY LOG (FOR TYPE 1 ELJ)	16-20	40	6	54	EA	15	6	0	9	24	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED
RACKING	4-10	20-40	NA	540	EA	150	60	0	90	240	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED
SLASH	<1 TO 6	5-10	NA	540	CY	150	60	0	90	240	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED
KEY PIECE	20	40	7	47	EA	8	8	0	3	28	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED
SEEDING	NA	NA	NA	7.5	AC	1.8	0.6	0.3	0.7	4.2	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED
SEED	NA	NA	NA	151	LB	36	11	6	14	83	PROJECT SPONSOR SUPPLIED AND STAGED; CONTRACTOR INSTALLED

MATERIALS SUMMARY
SCALE: NOT TO SCALE



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CHECKED BH, MTS	COUNTY KITTITAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**GENERAL LEGEND AND
QUANTITIES**

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FINAL PLANS; ISSUED 04-26-2021

HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

1. STATE AND FEDERAL PERMITS.

- A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.

2. TIMING OF IN-WATER WORK.

- A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
- B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
- C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
- D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
- E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS.

- A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
- B. THE SITE ASSESSMENT WILL SUMMARIZE:
 - 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
 - 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
 - 3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
 - 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING.

- A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
- B. AREAS TO BE FLAGGED WILL INCLUDE:
 - 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
 - 2. EQUIPMENT ENTRY AND EXIT POINTS;
 - 3. ROAD AND STREAM CROSSING ALIGNMENTS;
 - 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
 - 5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS.

- A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.
- B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.
- C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
- D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
- E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
- F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL ESA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.

6. TEMPORARY STREAM CROSSINGS.

- A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
- B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
- C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
 - 1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
 - 2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
 - 3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
 - 4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS.

- A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND. STAGING AREAS CLOSER THAN 150 FEET WILL BE APPROVED BY THE EC LEAD.
- B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
- C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
- D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT.

- A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
- B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

- C. EQUIPMENT WILL BE REFUELED IN A VEHICLE STAGING AREA OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS).
- D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
- E. EQUIPMENT WILL BE INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND.
- F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

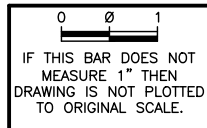
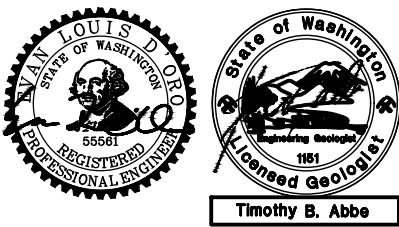
9. EROSION CONTROL.

- A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
 - 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
 - 2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
 - 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
 - 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
 - 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
 - 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 - 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 - 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT.

- A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.
- B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
- C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.
- D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
- E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
- F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

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DESIGNED	JA.ELD	LATITUDE	47°4'56"N
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**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**HIP GENERAL CONSERVATION
MEASURES (1)**

3
SHEET **3** OF **15**

FINAL PLANS; ISSUED 04-26-2021

PROJECT DESIGN AND SITE PREPARATION (CONTINUED).

11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES.

- A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
- B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
- C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
- D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
- E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.
- F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

12. INVASIVE SPECIES CONTROL.

- A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
- B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
- C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

WORK AREA ISOLATION AND FISH SALVAGE.

1. WORK AREA ISOLATION.

- A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300- FEET UPSTREAM FROM KNOWN SPAWNING HABITATS.
- B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.
- C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).
- D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

2. FISH SALVAGE.

- A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).
- B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, TYPICALLY PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES WHICH OCCUR IN THE MORNING VERSUS LATE IN THE DAY.
- C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:
 - 1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLITIONALLY.
 - 2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
 - 3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.
 - 4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE.

- 5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.
- 6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.
- 7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
- 8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
- 9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
- 10. ELECTROFISH TO CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.
- 11. CONTINUE TO SLOWLY DEWATER STREAM REACH.
- 12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.
- 13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.
- 14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.
- 15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.
- 16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.
- 17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.

D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH.

- 1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.
- 2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION.
- 3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
- 4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.
- 5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.
- 6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).
- 7. SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).
- 8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.
- 9. MUSSELS MAY BE TRANSFERRED IN COOLERS.
- 10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT.

3. ELECTROFISHING.

A. INITIAL SITE SURVEY AND INITIAL SETTINGS.

- 1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID.
- 2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18 DEGREES CELSIUS.
- 3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.
- 4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.
- 5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK.

B. ELECTROFISHING TECHNIQUE.

- 1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.
- 2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.
- 3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.
- 4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS. MAXIMUM PULSE RATE IS 70 HERTZ
- 5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.
- 6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.
- 7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.
- 8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).
- 9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.

C. SAMPLE PROCESSING.

- 1. FISH SHALL BE SORTED BY SIZE TO AVOID PREDATION DURING CONTAINMENT.
- 2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.
- 3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES
- 4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

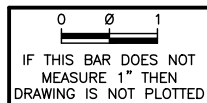
D. BULL TROUT ELECTROFISHING.

- 1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN FMO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.
- 2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.

E. LARVAL LAMPREY ELECTROFISHING.

- 1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.
- 2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".
- 3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS). BURSTED PULSES (THREE SLOW AND ONE SKIPPED) RECOMMENDED TO INCREASE EMERGENCE.
- 4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.
- 5. USE DIP NETS FOR VISIBLE LAMPREY. SIENES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.
- 6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.
- 7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.
- 8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).

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NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED JA.ELD	LATITUDE 47°4'56"N
CHECKED BH	LONGITUDE 120°45'1"W
DRAWN ELD	TN/SC/RG 118N S5&6 R17E
CHECKED BH, MTS	COUNTY KITTITAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**HIP GENERAL CONSERVATION
MEASURES (2)**

FINAL PLANS; ISSUED 04-26-2021

WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).

4. DEWATERING.

- A. DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- B. WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- C. WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- D. DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- E. SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.

1. FISH PASSAGE.

- A. FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVISEMENT BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER.

- A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
- C. CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

3. TIME AND EXTENT OF DISTURBANCE.

- A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
- B. MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

4. CESSATION OF WORK.

- A. PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).
- B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

5. SITE RESTORATION.

- A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
- B. PROJECT-RELATED WASTE WILL BE REMOVED.
- C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENEED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
- D. THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

6. REVEGETATION.

- A. PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

- B. A MIX OF NATIVE SPECIES (INVASIVE SPECIES NOT ALLOWED) APPROPRIATE TO THE SITE WILL BE USED TO REESTABLISH VEGETATION, PROVIDE SHADE, AND REDUCE EROSION. REESTABLISHED VEGETATION SHOULD BE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN THREE YEARS.
- C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.
- D. SHORT-TERM STABILIZATION MEASURE MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, OR OTHER SIMILAR TECHNIQUES.
- E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.
- F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
- G. INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY THREE YEARS POST-CONSTRUCTION).

7. SITE ACCESS AND IMPLEMENTATION MONITORING.

- A. THE PROJECT SPONSOR WILL PROVIDE CONSTRUCTION MONITORING DURING IMPLEMENTATION TO ENSURE ALL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED, EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED, AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.
- B. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL SUBMIT THE PROJECT COMPLETION FORM (PCF) WITHIN 30 DAYS OF PROJECT COMPLETION.

8. CWA SECTION 401 WATER QUALITY CERTIFICATION.

- A. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS (SEE TURBIDITY MONITORING) TO ENSURE IN-WATER WORK IS NOT DEGRADING WATER QUALITY.
- B. DURING CONSTRUCTION, WATER QUALITY PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

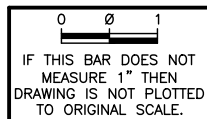
STAGED REWATERING PLAN.

- A. WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- B. THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
 - 1. TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
 - 2. PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
 - 3. INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
 - 4. STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
 - 5. INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
 - 6. REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
 - 7. INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
 - 8. INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
 - 9. IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

TURBIDITY MONITORING.

- A. RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- B. RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
 - 1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
 - 2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
 - 3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
 - 4. 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
- C. TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- D. IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- E. IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- F. IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- G. FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

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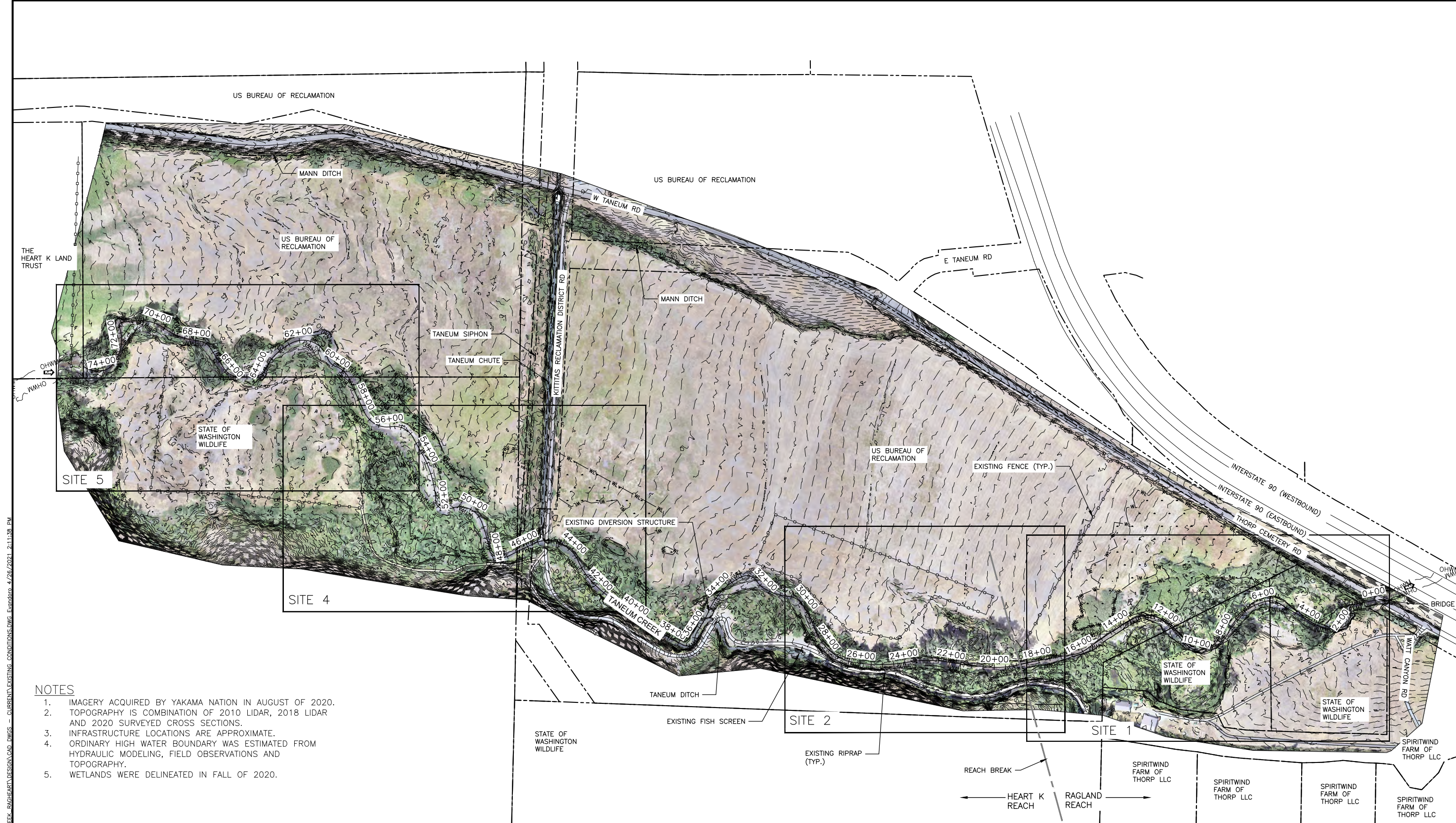
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CHECKED BH	LONGITUDE 120°45'1"W
DRAWN ELD	TN/SC/RG 118N S5&6 R17E
CHECKED BH, MTS	COUNTY KITTITAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**HIP GENERAL CONSERVATION
MEASURES (3)**

5
SHEET **5** OF **15**

FINAL PLANS; ISSUED 04-26-2021



- NOTES**
1. IMAGERY ACQUIRED BY YAKAMA NATION IN AUGUST OF 2020.
 2. TOPOGRAPHY IS COMBINATION OF 2010 LIDAR, 2018 LIDAR AND 2020 SURVEYED CROSS SECTIONS.
 3. INFRASTRUCTURE LOCATIONS ARE APPROXIMATE.
 4. ORDINARY HIGH WATER BOUNDARY WAS ESTIMATED FROM HYDRAULIC MODELING, FIELD OBSERVATIONS AND TOPOGRAPHY.
 5. WETLANDS WERE DELINEATED IN FALL OF 2020.

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Evan Louis D. Doro
Professional Engineer

Timothy B. Abbe
Licensed Geologist

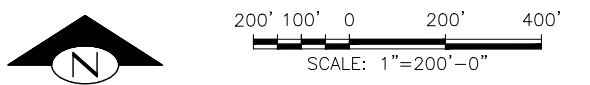
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CHECKED: BH, MTS	COUNTY: KITITTAS, WASHINGTON

TANEUM CREEK HABITAT ENHANCEMENT RAGHEART SITE

EXISTING CONDITIONS

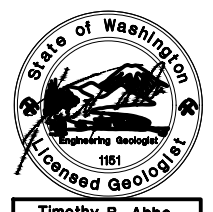




- NOTES**
1. ACCESS ROUTES ARE APPROXIMATE AND SHALL BE REFINED PRIOR TO CONSTRUCTION AND APPROVED BY PROJECT SPONSOR.
 2. STREAM DIVERSION AND DEWATERING IS NOT ANTICIPATED. LOGS WILL BE PLACED IN THE WET, BUT MACHINES SHALL NOT ENTER THE FLOWING CHANNEL. CONSTRUCTION SHALL OCCUR FROM BANKS AND DRY GRAVEL BARS.
 3. EQUIPMENT MUST BE STAGED MORE THAN 150 FT AWAY FROM STREAM CHANNEL. NATURAL MATERIALS CAN BE STAGED CLOSER.
 4. FOLLOWING CONSTRUCTION, ALL ACCESS ROUTES, STAGING AREAS, AND OTHER DISTURBED AREAS ARE TO BE DECOMPACTED AND PREPARED FOR SEEDING. SEEDING SHALL BE DONE BY THE PROJECT SPONSOR AND IS NOT RESPONSIBILITY OF CONTRACTOR.

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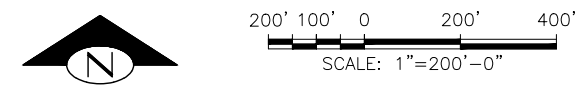
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**TANEUM CREEK
 HABITAT ENHANCEMENT
 RAGHEART SITE**

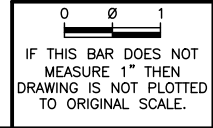
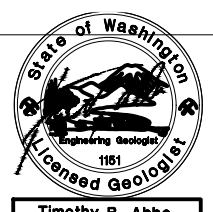
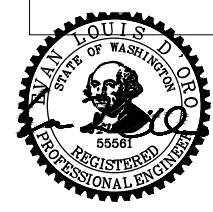
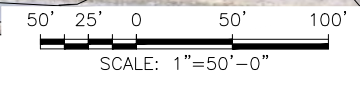
ACCESS AND STAGING PLAN





NOTES

1. KEY PIECE PLACEMENT DETAILS AND QUANTITIES ARE SHOWN ON SHEET 13. LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE DIRECTED IN THE FIELD BY THE ENGINEER OR PROJECT SPONSOR.
2. NOT ALL KEY PIECES ARE SHOWN. SEE SHEET 13 FOR KEY PIECE ZONE STATION INTERVALS.
3. BANK PLANTING WILL BE COORDINATED BY THE PROJECT SPONSOR. THE CONTRACTOR IS NOT RESPONSIBLE FOR BANK PLANTING.



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**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**PROPOSED CONDITIONS -
SITE 1**

8
SHEET **8** OF **15**

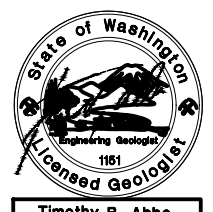
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- NOTES**
1. KEY PIECE PLACEMENT DETAILS AND QUANTITIES ARE SHOWN ON SHEET 13. LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE DIRECTED IN THE FIELD BY THE ENGINEER OR PROJECT SPONSOR.
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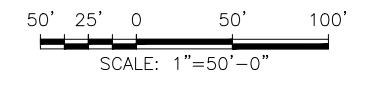


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**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**PROPOSED CONDITIONS -
SITE 2**

9
SHEET **9** OF **15**



FINAL PLANS; ISSUED 04-26-2021

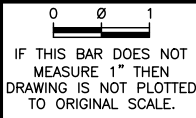
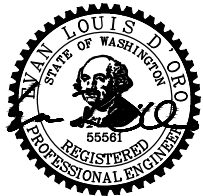


NOTES

1. KEY PIECE PLACEMENT DETAILS AND QUANTITIES ARE SHOWN ON SHEET 13. LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE DIRECTED IN THE FIELD BY THE ENGINEER OR PROJECT SPONSOR.
2. NOT ALL KEY PIECES ARE SHOWN. SEE SHEET 13 FOR KEY PIECE ZONE STATION INTERVALS.

NA PROJECTS\YAKAMA_NATION\TANEUM_CREEK_RAGHEART\DESIGN\CAD_DWG5 - CURRENTA_PROPOSED_CONDITIONS.DWG, 4/26/2021, 2:12:10 PM

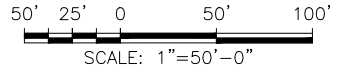
FINAL PLANS: ISSUED 04-26-2021



NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED JA,ELD	LATITUDE 47°4'56"N
CHECKED BH	LONGITUDE 120°45'1"W
DRAWN ELD	TN/SC/RG I18N S5&6 R17E
CHECKED BH, MTS	COUNTY KITITIAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**PROPOSED CONDITIONS -
SITE 4**

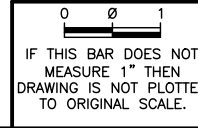
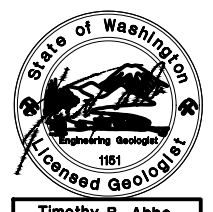




NOTES

1. KEY PIECE PLACEMENT DETAILS AND QUANTITIES ARE SHOWN ON SHEET 13. LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE DIRECTED IN THE FIELD BY THE ENGINEER OR PROJECT SPONSOR.
2. NOT ALL KEY PIECES ARE SHOWN. SEE SHEET 13 FOR KEY PIECE ZONE STATION INTERVALS.
3. BANK PLANTING WILL BE COORDINATED BY THE PROJECT SPONSOR. THE CONTRACTOR IS NOT RESPONSIBLE FOR BANK PLANTING.

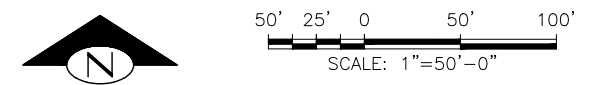
NA PROJECTS: YAKAMA, NATION, TANEUM, CREEK, RAGHEART DESIGN CAD DWGS - CURRENTLY PROCESSED, CONDITIONS DWG, E:\projects\4726\2021_2\12\15_BM



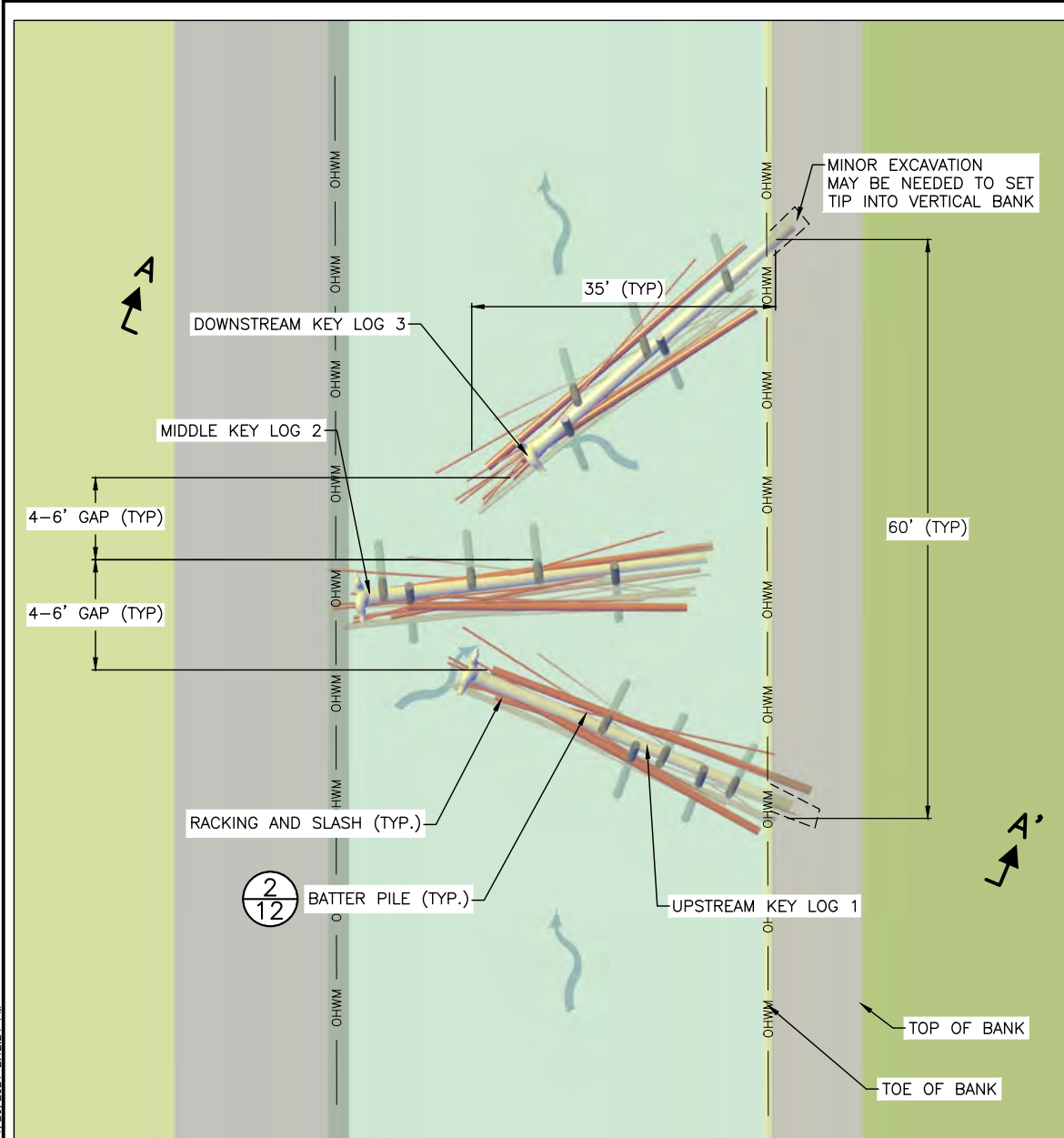
NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: JA,ELD	LATITUDE: 47°4'56"N
CHECKED: BH	LONGITUDE: 120°45'1"W
DRAWN: ELD	TN/SC/RG: I18N S5&6 R17E
CHECKED: BH, MTS	COUNTY: KITTITAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

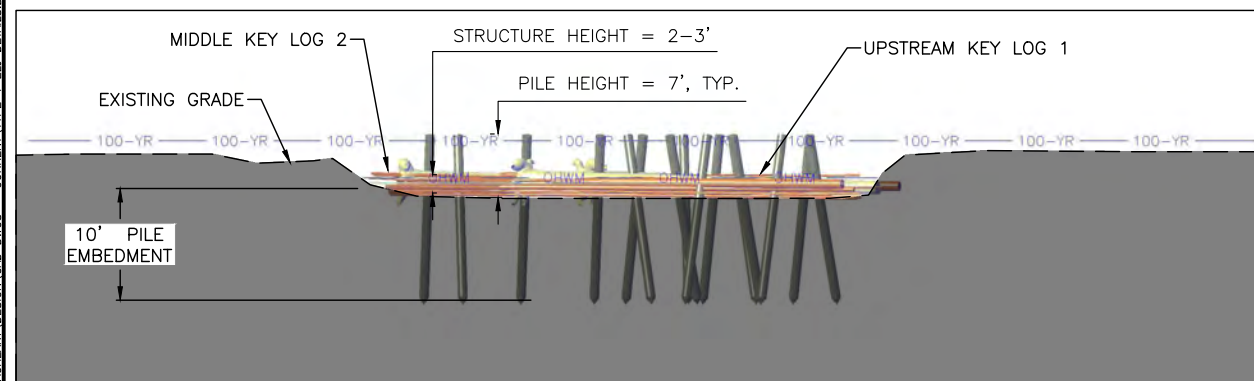
**PROPOSED CONDITIONS -
SITE 5**



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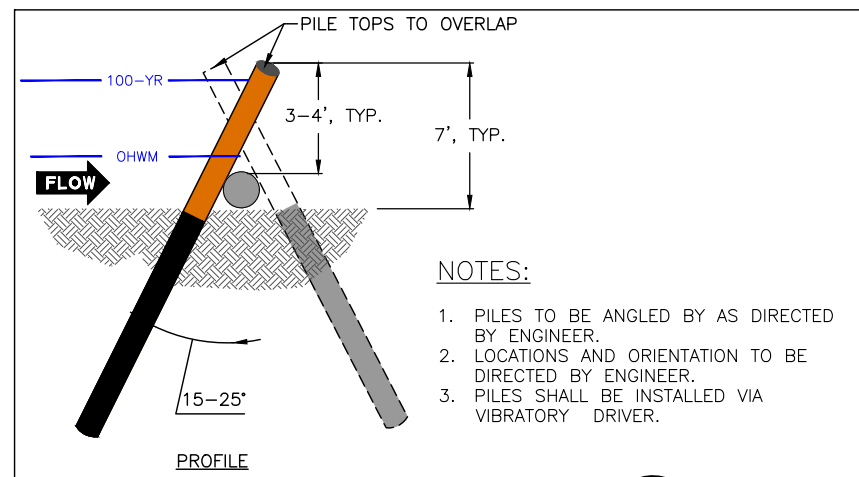
TYPE 1 ELJ PLAN
SCALE: 1" = 10'



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



CONSTRUCTED EXAMPLE OF SIMILAR STRUCTURE
SCALE: NOT TO SCALE



NOTES:

1. PILES TO BE ANGLED BY AS DIRECTED BY ENGINEER.
2. LOCATIONS AND ORIENTATION TO BE DIRECTED BY ENGINEER.
3. PILES SHALL BE INSTALLED VIA VIBRATORY DRIVER.

BATTER PILE DETAIL (2/12)
SCALE: NOT TO SCALE

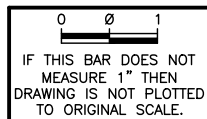
MATERIAL	DIAMETER (IN)	LENGTH (FT)	ROOTWAD DIAMETER (FT)	QUANTITY PER STRUCTURE	UNIT
BATTER PILE	16	20	NA	15	EA
KEY LOG	18-22	40	6	3	EA
RACKING	4-10	20-40	NA	30	EA
SLASH	<1 TO 6	5-10	NA	30	CY

TYPE 1 WOOD QUANTITIES
SCALE: NOT TO SCALE

NOTES

1. STRUCTURE INTENT IS TO DISSIPATE ENERGY WITHIN THE EXISTING LOW FLOW CHANNEL OVER A SERIES OF LOG STEPS IN ORDER TO TRAP AND STORE STREAMBED GRAVEL WHICH WILL RAISE THE WATER TABLE, INCREASE FLOODPLAIN CONNECTIVITY, CREATE POOLS, AND ADD COMPLEX COVER FOR SALMONIDS.
2. NO EXCAVATION BELOW OHWM IS PROPOSED, THUS TURBIDITY SHALL BE MINIMIZED. DEWATERING OF THE FLOWING CHANNEL IS NOT PROPOSED.
3. STRUCTURE LOCATIONS AND DESIGN ELEVATIONS OF LOGS TO BE STAKED IN THE FIELD BY THE ENGINEER PRIOR TO CONSTRUCTION. SITE CONDITIONS VARY AND EROSION OF HIGH EXPOSED BANKS HAS LIKELY OCCURRED SINCE THE TOPOGRAPHIC SURVEY.
4. TYPICAL INSTALLATION SEQUENCE IS AS FOLLOWS:
 - 4.1. REVIEW THE STAKES SET BY THE ENGINEER AND THE OWNER TO UNDERSTAND THE ORIENTATION AND DESIRED ELEVATIONS OF EACH LOG
 - 4.2. PLACE A LAYER OR SLASH (ROUGHLY 12" THICK, 4' WIDE AND 40' LONG BENEATH LOCATION OF EACH BED LOG
 - 4.3. ADD ROUGHLY 10 PIECES OF RACKING BENEATH LOCATION OF EACH KEY LOG
 - 4.4. PLACE KEY LOG ON TOP OF RACKING AND SLASH WITH ROOTWADS IN LOCATION DETERMINED BY ENGINEER OR OWNER.
 - 4.5. MINOR EXCAVATION MAY BE NEEDED TO SITUATE KEY LOG ON STEEP VERTICAL BANKS. EXCAVATION MAY ONLY OCCUR OUTSIDE OF OHWM AND SHOULD NOT RESULT IN TURBIDITY ENTERING THE STREAM CHANNEL. ANY MATERIAL EXCAVATED WILL BE LOCALLY STOCKPILED, THEN BACKFILLED OVER THE LOG AT THE END OF CONSTRUCTION.
 - 4.6. DRIVE BATTER PILES AROUND ALL WOOD MATERIAL TO PIN ALL WOOD TIGHT TO THE CHANNEL BED. BATTER PILES SHOULD HAVE DIRECT CONTACT WITH THE WOOD MATERIAL AND CROSS TO PREVENT ANY GAPS THAT WOOD CAN FLOAT OUTSIDE OF.
 - 4.7. WEAVE REMAINING RACKING MATERIAL BETWEEN DRIVEN PILES TO EXTEND INTO THE WETTED CHANNEL.

TYPE 1 ELJ (1/8,9,10,11)
SCALE: NOT TO SCALE



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DESIGNED: JA, ELD	LATITUDE: 47°45'56"N
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DRAWN: ELD	TN/SC/RG: 118N S5&6 R17E
CHECKED: BH, MTS	COUNTY: KITTITAS, WASHINGTON

**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

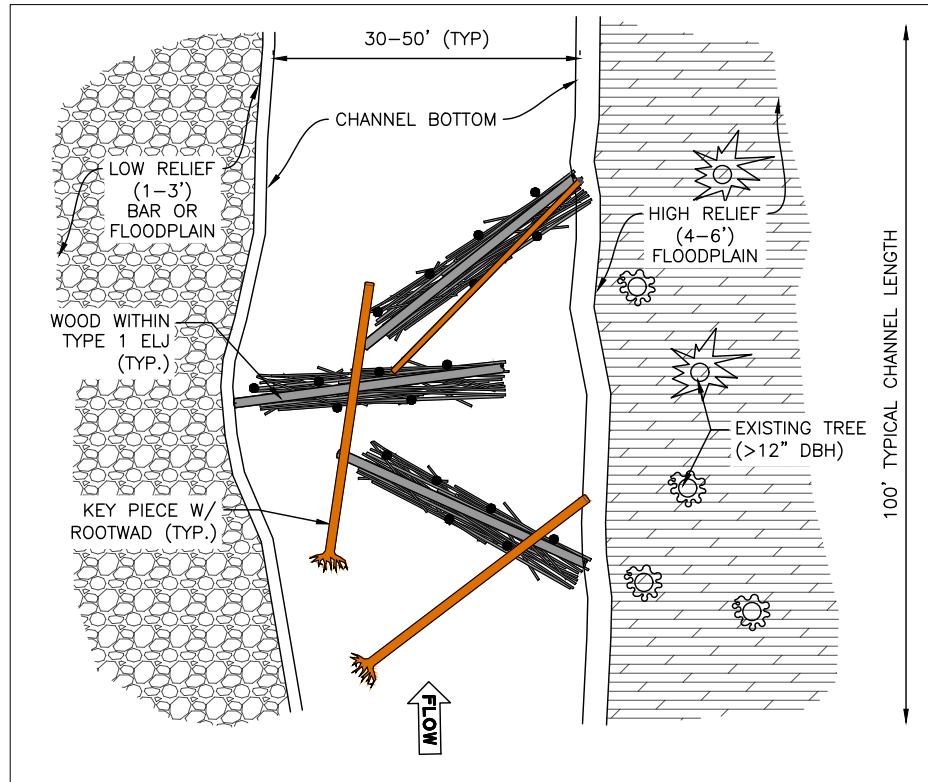
TYPE 1 ELJ DETAILS

12

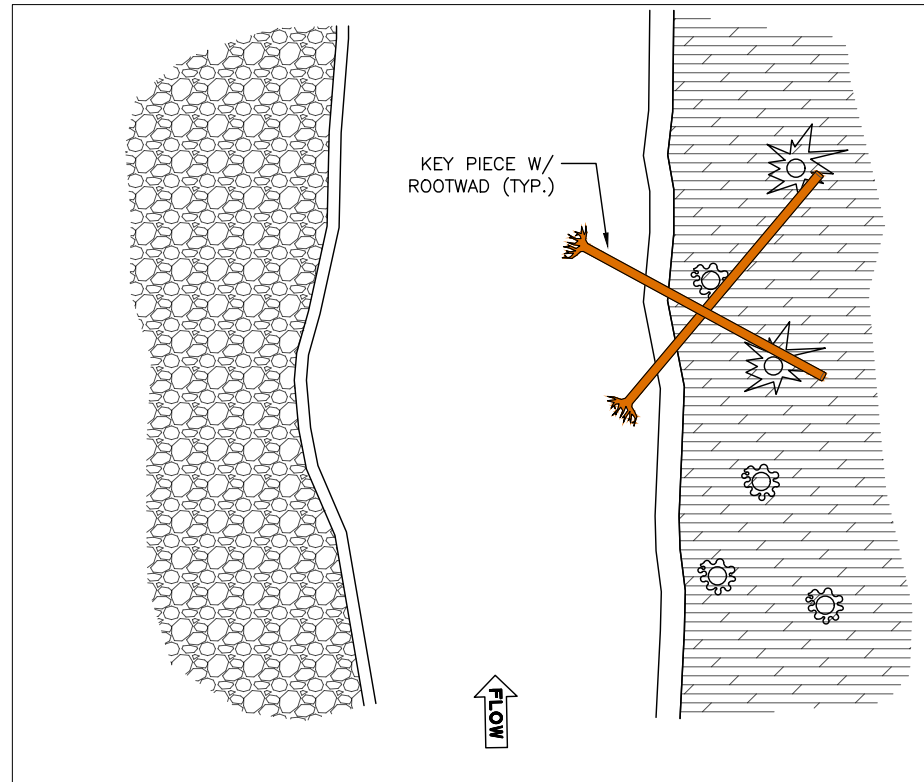
SHEET **12** OF **15**

NA PROJECTS \ YAKAMA \ NATANUM \ TANEUM_CREEK_RAGHEART \ DESIGN \ CAD \ DWGS - CURRENT \ TYPE 1_ELJ_DETAILS.DWG, E:\dwgs - 4/26/2021, 2:12:24 PM

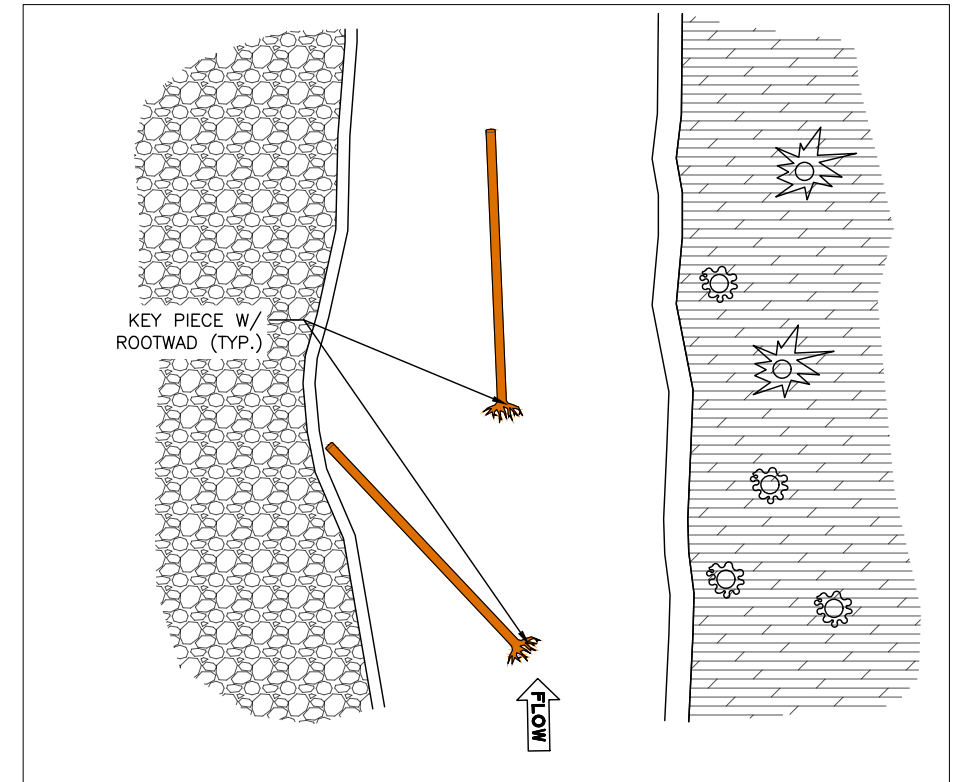
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KEY PIECE PLACEMENT TYPE A (1) (8,9,10)
SCALE: NOT TO SCALE



KEY PIECE PLACEMENT TYPE B (2) (8,9,11)
SCALE: NOT TO SCALE



KEY PIECE PLACEMENT TYPE C (3) (10,11)
SCALE: NOT TO SCALE

HATCHING LEGEND

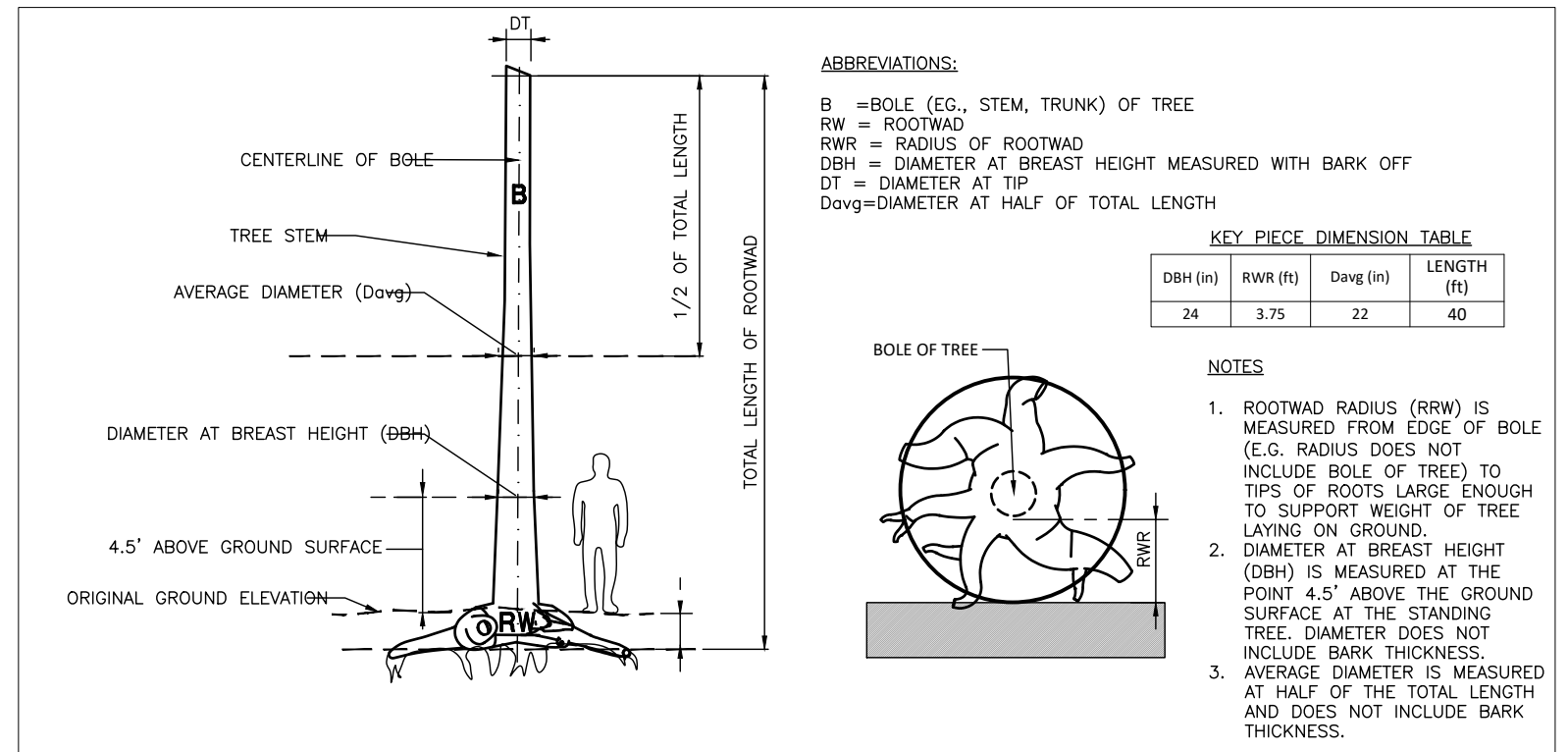
- GRAVEL BAR
- FLOODPLAIN BAR

SITE	STATION START	STATION END	PLACEMENT TYPE	IF A, ELJ TO BUILD ON	# OF KEY PIECES
1	12+50	13+50	A	05-T1	2
1	13+50	18+00	B	-	6
2	19+00	19+50	A	06-T1	2
2	19+50	22+00	B	-	4
2	22+50	23+00	A	07-T1	2
4	55+00	57+50	C	-	3
5	58+00	60+00	C	-	3
5	60+00	63+00	C	-	8
5	63+50	66+00	C	-	5
5	66+50	69+00	B	-	6
5	70+00	71+00	C	-	2
5	72+00	74+00	C	-	4
Totals					47

KEY PIECE LOCATIONS AND QUANTITIES
SCALE: NOT TO SCALE

NOTES

1. STATIONS LISTED IN TABLE REFER TO STREAM CHANNEL STATIONING SHOWN ON PLAN VIEW SHEET.
2. ALL KEY PIECE LOCATIONS SHALL BE STAKED IN THE FIELD BY THE ENGINEER OR GEOMORPHOLOGIST OR OWNER.
3. NO KEY PIECES SHALL BE PLACED BELOW STATION 12+50 NOR BETWEEN STATION 25+00 AND 24+00.



ABBREVIATIONS:

- B = BOLE (EG., STEM, TRUNK) OF TREE
- RW = ROOTWAD
- RWR = RADIUS OF ROOTWAD
- DBH = DIAMETER AT BREAST HEIGHT MEASURED WITH BARK OFF
- DT = DIAMETER AT TIP
- Davg = DIAMETER AT HALF OF TOTAL LENGTH

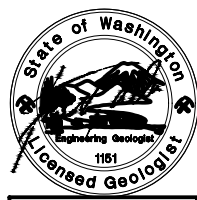
KEY PIECE DIMENSION TABLE

DBH (in)	RWR (ft)	Davg (in)	LENGTH (ft)
24	3.75	22	40

NOTES

1. ROOTWAD RADIUS (RWR) IS MEASURED FROM EDGE OF BOLE (E.G. RADIUS DOES NOT INCLUDE BOLE OF TREE) TO TIPS OF ROOTS LARGE ENOUGH TO SUPPORT WEIGHT OF TREE LAYING ON GROUND.
2. DIAMETER AT BREAST HEIGHT (DBH) IS MEASURED AT THE POINT 4.5' ABOVE THE GROUND SURFACE AT THE STANDING TREE. DIAMETER DOES NOT INCLUDE BARK THICKNESS.
3. AVERAGE DIAMETER IS MEASURED AT HALF OF THE TOTAL LENGTH AND DOES NOT INCLUDE BARK THICKNESS.

KEY PIECE DIMENSION DETAILS (5) (13)
SCALE: NOT TO SCALE



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



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DRAWN: ELD	TN/SC/RG: T18N S5&6 R17E
CHECKED: RH, MTS	COUNTY: KITTITAS, WASHINGTON

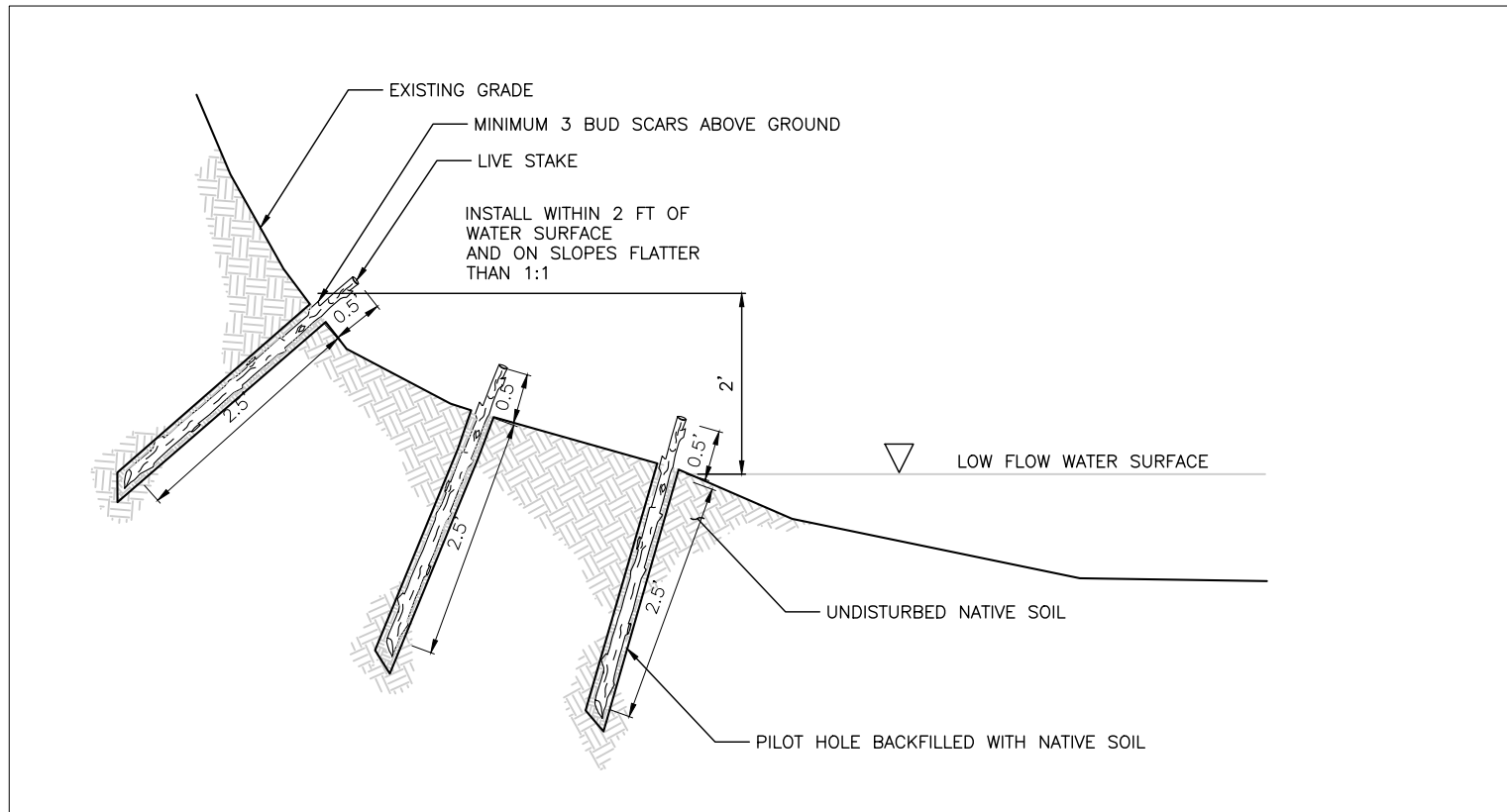
**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

**KEY PIECE PLACEMENT
DETAILS**

13
SHEET 13 OF 15

NON-PLOT LEAVE LAYER ON FOR PLOTTING

NA PROJECTS\YAKAMA\NATION\TANEUM_CREEK_RAGHEART\DESIGN\CAD\DWGS - CURRENT\BANK PLANTING\DETAILS\DWG Evendrop_4/26/2021_2:12:34 PM



BANK PLANTING TYPICAL DETAILS 1
SCALE: NOT TO SCALE 8,11

BANK PLANTING AREA QUANTITIES
SCALE: NOT TO SCALE

Bank Planting Area	Linear Feet	# of live stakes
1	110	165
2	160	240
3	160	240
4	240	360
5	100	150
Totals	770	1,155

NOTES

1. THE PROJECT SPONSOR WILL PERFORM BANK PLANTING. THE CONTRACTOR IS NOT RESPONSIBLE FOR BANK PLANTING AND IT IS NOT INCLUDED AS A BID ITEM.



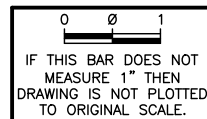
BANK PLANTING AREA 1 PHOTO
SCALE: NOT TO SCALE



BANK PLANTING AREA 2 PHOTO
SCALE: NOT TO SCALE



BANK PLANTING AREA 5 PHOTO
SCALE: NOT TO SCALE

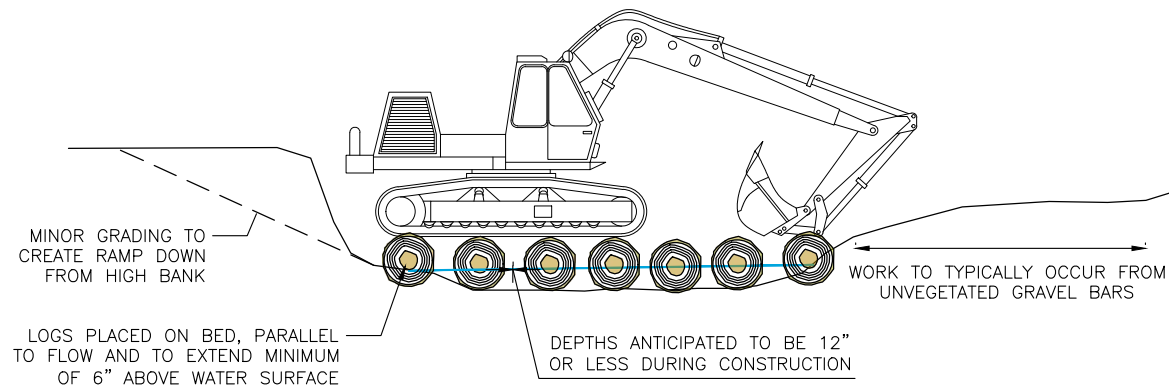


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**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

BANK PLANTING DETAILS

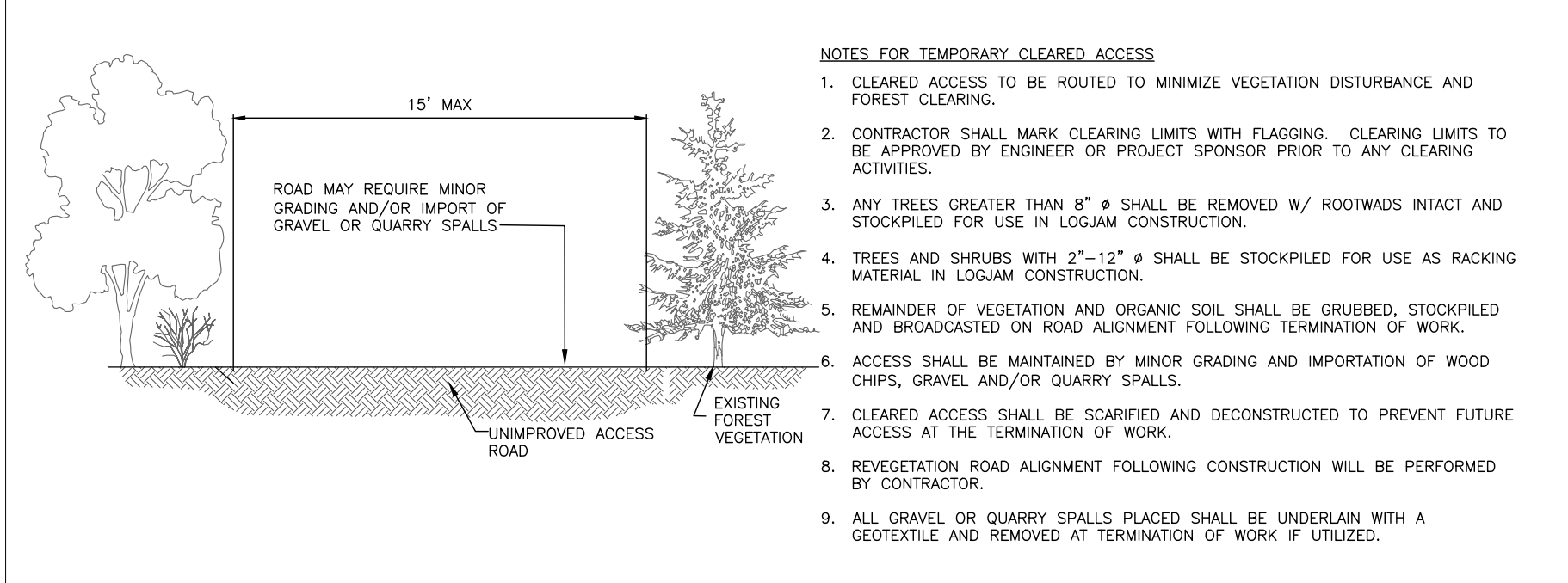
FINAL PLANS; ISSUED 04-26-2021



NOTES

1. WHEN FLOWING WATER IS ENCOUNTERED THAT MUST BE CROSSED, RATHER THAN WORKING FROM EITHER SIDE OF THE CHANNEL, A LOG CROSSING SHALL BE USED. THE ENGINEER OR PROJECT SPONSOR SHALL APPROVE ALL CROSSING LOCATIONS.

TEMPORARY LOG CROSSING 1
15
NOT TO SCALE



NOTES FOR TEMPORARY CLEARED ACCESS

1. CLEARED ACCESS TO BE ROUTED TO MINIMIZE VEGETATION DISTURBANCE AND FOREST CLEARING.
2. CONTRACTOR SHALL MARK CLEARING LIMITS WITH FLAGGING. CLEARING LIMITS TO BE APPROVED BY ENGINEER OR PROJECT SPONSOR PRIOR TO ANY CLEARING ACTIVITIES.
3. ANY TREES GREATER THAN 8" Ø SHALL BE REMOVED W/ ROOTWADS INTACT AND STOCKPILED FOR USE IN LOGJAM CONSTRUCTION.
4. TREES AND SHRUBS WITH 2"-12" Ø SHALL BE STOCKPILED FOR USE AS RACKING MATERIAL IN LOGJAM CONSTRUCTION.
5. REMAINDER OF VEGETATION AND ORGANIC SOIL SHALL BE GRUBBED, STOCKPILED AND BROADCASTED ON ROAD ALIGNMENT FOLLOWING TERMINATION OF WORK.
6. ACCESS SHALL BE MAINTAINED BY MINOR GRADING AND IMPORTATION OF WOOD CHIPS, GRAVEL AND/OR QUARRY SPALLS.
7. CLEARED ACCESS SHALL BE SCARIFIED AND DECONSTRUCTED TO PREVENT FUTURE ACCESS AT THE TERMINATION OF WORK.
8. REVEGETATION ROAD ALIGNMENT FOLLOWING CONSTRUCTION WILL BE PERFORMED BY CONTRACTOR.
9. ALL GRAVEL OR QUARRY SPALLS PLACED SHALL BE UNDERLAIN WITH A GEOTEXTILE AND REMOVED AT TERMINATION OF WORK IF UTILIZED.

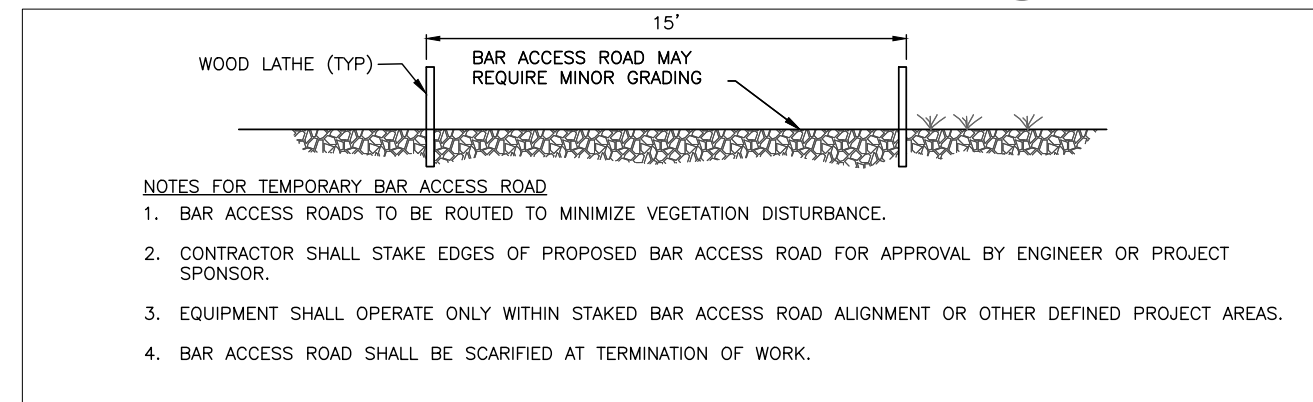
TEMPORARY ACCESS ROAD THROUGH RIPARIAN CORRIDOR 2
15
NOT TO SCALE

Species	Common Name	lbs PLS/ac	% of mix
Festuca idahoensis	Idaho fescue	5	25%
Elymus glaucus	Blue wildrye	5	25%
Bromus marginatus	Mountain brome	3	15%
Juncus balticus	Baltic rush	3	15%
Elymus lanceolatus	Thickspike wheatgrass	2	10%
Deschampia cespitosa	Tufted hairgrass	1	5%
Eleocharis palustris	Spikerush	1	5%
Total lbs/ac		20	

SEED MIX 4
15
NOT TO SCALE

NOTES

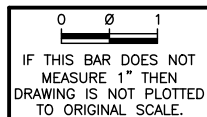
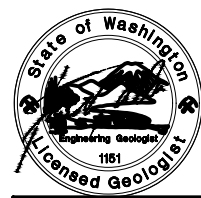
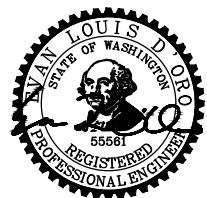
1. THE PROJECT SPONSOR WILL PERFORM BANK PLANTING. THE CONTRACTOR IS NOT RESPONSIBLE FOR BANK PLANTING AND IT IS NOT INCLUDED AS A BID ITEM.
2. NOTES FOR THE PROJECT SPONSOR DURING SEEDING:
 - 2.1. ALL SEED AREAS SHALL BE PREPARED BY RAKING OR CHAINING TO ENSURE A FRIABLE SURFACE FREE OF SOIL CLUMPS LARGER THAN 2 INCHES IN DIAMETER.
 - 2.2. APPLICATIONS OF SEED SHALL BE FOLLOWED BY THE APPLICATION OF WEED-FREE STRAW MULCH APPLIED AT A RATE OF 2,000 LBS/ACRE.



NOTES FOR TEMPORARY BAR ACCESS ROAD

1. BAR ACCESS ROADS TO BE ROUTED TO MINIMIZE VEGETATION DISTURBANCE.
2. CONTRACTOR SHALL STAKE EDGES OF PROPOSED BAR ACCESS ROAD FOR APPROVAL BY ENGINEER OR PROJECT SPONSOR.
3. EQUIPMENT SHALL OPERATE ONLY WITHIN STAKED BAR ACCESS ROAD ALIGNMENT OR OTHER DEFINED PROJECT AREAS.
4. BAR ACCESS ROAD SHALL BE SCARIFIED AT TERMINATION OF WORK.

TEMPORARY ACCESS ROAD THROUGH GRAVEL BAR 3
15
NOT TO SCALE



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**TANEUM CREEK
HABITAT ENHANCEMENT
RAGHEART SITE**

TESC DETAILS

15
SHEET **15** OF **15**

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