TOTAL MATERIAL QUANTITIES

TOTAL WOOD QUANTITIES

ITEM	*QUANTITY*	*DIAMETER*	*LENGTH*	*ROOTWAD*
CATEGORY 1 WOOD	96 EA	18 - 24 IN	20 - 30 FT	YES
CATEGORY 2 WOOD	33 EA	6 - 12 IN	10-15 FT	OPTIONAL
CATEGORY 3 WOOD	230 EA	3 -6 IN	5-10 FT	OPTIONAL
WILLOW CUTTINGS	1,800 EA	0.25-0.75 IN	10 FT	NO

TOTAL ROCK QUANTITIES

ITEM	*QUANTITY*	*DIAMETER*
BOULDERS	1,110 CY	30 - 60 IN

TOTAL FILL QUANTITIES

ITEM	*SUBGRADE FILL (CY)*	*STREAMBED FILL (CY)*	*FLOODPLAIN FILL (CY)*
SITE 1	850	150	3,150
SITE 2	70	90	1,700
SITE 3	415	170	1,975
TOTAL	1,335	410	6,825

FILL GRADATION

SIZE (INCHES)	PERCENT PASSING
30	100
28	90-100
16	50-80
8	30-50
4	10-30
FINES	10

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION.

NOTE: FILL GRADATION APPLIES TO ALL THREE FILL CATEGORIES. VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

BYPASS PIPE QUANTITIES

BYPASS PIPE	*QUANTITY*	*UNIT*
24" SMOOTH WALL PIPE - 20 LF SECTION	11	EA
18" SMOOTH WALL PIPE - 20 LF SECTION	53	EA

MISCELLANEOUS QUANTITIES

ITEM	*QUANTITY*	*UNIT*
NON-WOVEN GEOTEXTILE FABRIC	8	ROLL
RING SHANK NAILS	220	EA
SHRUB SALVAGE AND TRANSPLANT	75	EA
RECLAMATION SEED	10	PLS LBS

MATERIAL QUANTITIES BY STRUCTURE

BOULDER STEP POOL QUANTITIES

ITEM	*QUANTITY*	*UNIT*
BOULDER STEP POOLS	30	EA
BOULDERS	780	CY
STREAMBED FILL	300	CY
NON-WOVEN GEOTEXTILE FABRIC	3	ROLL

WOOD AND BOULDER STEP POOL QUANTITIES

ITEM	*QUANTITY*	*UNIT*
WOOD AND BOULDER STEP POOLS	15	EA
CATEGORY 1 WOOD	55	EA
BOULDERS	330	CY
STREAMBED FILL	110	CY
NON-WOVEN GEOTEXTILE FABRIC	5	ROLL
RING SHANK NAILS	220	EA

FLOODPLAIN ROUGHNESS QUANTITIES

ITEM	*QUANTITY*	*UNIT*
FLOODPLAIN ROUGHNESS AREA	0.95	AC
CATEGORY 1 WOOD	41	EA
CATEGORY 2 WOOD	33	EA
CATEGORY 3 WOOD	230	EA

REVEGETATION QUANTITIES

ITEM	*QUANTITY*	*UNIT*	*LENGTH*
WILLOW TRENCHES	360	LF	5 FT
WILLOW CUTTINGS	1800	EA	10 FT
SHRUB SALVAGE AND TRANSPLANT	75	EA	N/A
RECLAMATION SEED	10	PLS LBS	N/A

CHRIS J.O. NELSON STATE OF WASHINGTON 53282 REGISTERED PROFESSIONAL ENGINEER 2022-04-14

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue 311 SW Jefferson Avenue
Whitefish, MT 59937 Corvallis, OR 97333
406.862.4927 541.738.2920

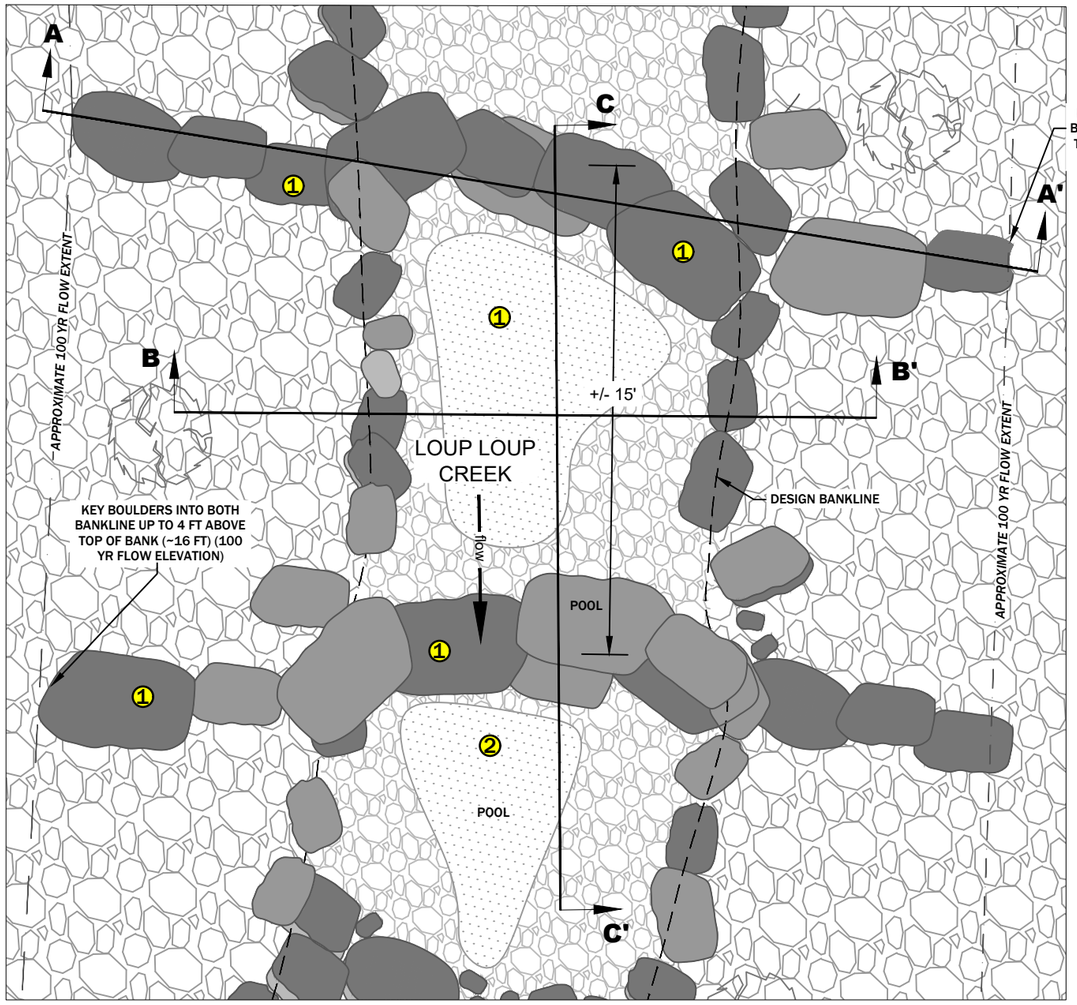
MATERIALS AND QUANTITIES
LOUP LOUP CREEK FISH PASSAGE PROJECT
MALOTT, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
*	08/2021	NW	30% DESIGN	CN
1	02/2022	NW	80% DESIGN	CN
2	04/2022	NW	FINAL DESIGN	CN

PROJECT NUMBER
RDG-21-027

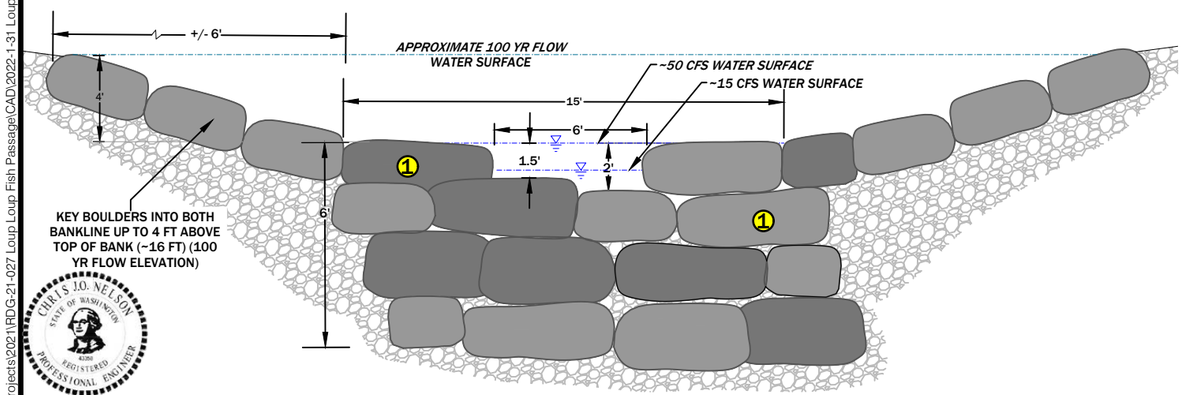
DRAWING NUMBER
8.0

M:\Projects\2021\RDG-21-027 Loup Loup Fish Passage\CAD\2022-1-31 Loup Loup 80 percent.dwg



1 BOULDER STEP POOL PLAN VIEW 1" = 6'

NOTE: STEP POOL STRUCTURES WILL BE FIT TO THE SITE DURING STAKING. POOL STRUCTURES WILL BE MORE IRREGULAR THAN SHOWN. BOULDER STEP POOLS AND WOOD AND BOULDER STEP POOLS MAY BE INTERCHANGED AT THE DIRECTION OF THE ENGINEER.



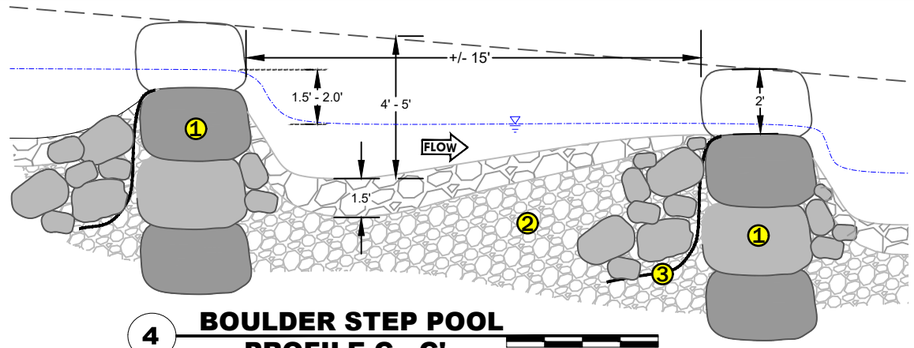
3 POOL SECTION B - B' 1" = 5'

GENERAL NOTES

1. THE INTENT OF THE BOULDER STEP POOL STRUCTURE IS TO PROVIDE VERTICAL AND LATERAL STABILITY FOR ENTRENCHED STREAM TYPES EXHIBITING STEEP GRADIENTS. THE STRUCTURE CONSISTS OF ALTERNATING GRADE CONTROL STEPS AND PLUNGE POOLS. VELOCITY AND ENERGY DISSIPATION IS CONTROLLED BY STEP SPACING WHICH IS DETERMINED AS A FUNCTION OF GRADIENT RELATIVE TO CHANNEL WIDTH. STEP HEIGHT IS DESIGNED TO MAINTAIN UPSTREAM FISH PASSAGE AT 15 CFS TO 50 CFS. PLUNGE POOLS PROVIDE RESTING AREAS FOR FISH TO STAGE.
2. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY ENGINEER.
3. ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATIONS FOR EACH BOULDER STEP POOL STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON BOULDER STEP POOL STRUCTURE

1. EXCAVATE TO THE EXCAVATION LIMITS AS SHOWN ON THE DRAWING. SALVAGE COBBLE FROM THE EXISTING CHANNEL AND STOCK ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. PREPARE THE BASE OF THE EXCAVATION BY PLACING AND BUCKET COMPACTING STREAMBED FILL TO SUBGRADE ELEVATIONS SHOWN ON THE DRAWINGS.
3. STEP POOLS SHALL BE CONSTRUCTED FROM ROCKS WITH THE DIMENSIONS SHOWN IN THE MATERIAL SCHEDULE. PREFERRED ROCK IS RECTANGULAR IN SHAPE FROM SOURCE APPROVED BY ENGINEER AND SHALL BE SOUND, DENSE (SG=2.65 MIN.) AND FREE FROM CRACKS, SEAMS OR OTHER DEFECTS THAT CAN ACCELERATE WEATHERING.
4. PLACE ROCKS ACCORDING TO THE LAYOUT AND ELEVATIONS SHOWN ON DRAWINGS SHEETS 5.0 - 7.2. FOOTER ROCKS SHALL BE PLACED UNDER ALL CAP ROCKS UNLESS CAP ROCKS EXTEND GREATER THAN SIX FEET BELOW TOP OF BANK ELEVATION. ALL ROCKS SHALL BE PLACED ON SUITABLE SUBGRADE CONSISTING OF COARSE ALLUVIUM AS APPROVED BY ENGINEER. ROCK SHALL BE EQUIPMENT-PLACED SO THAT LARGER ROCKS ARE UNIFORMLY DISTRIBUTED WITH NO GAPS BETWEEN BOTH FOOTER ROCKS AND CAP ROCKS. STREAMBED FILL SHALL BE PLACED IN VOIDS AROUND RIPARIAN CUTTINGS AND BETWEEN FOOTER ROCKS AND CAP ROCKS.
5. PLACE NON-WOVEN GEOTEXTILE FABRIC ON THE UPSTREAM SIDE OF STEP POOLS TO MINIMIZE PIPING OF WATER THROUGH THE STEPS. FABRIC SHALL BE PLACED ACROSS THE ENTIRE WIDTH OF THE STEP THROAT AND SHALL EXTEND BELOW THE ESTIMATED SCOUR DEPTH AS SHOWN ON THE DRAWINGS AND AS DIRECTED BY ENGINEER. BACKFILL FABRIC WITH STREAMBED FILL AND SMALL BOULDERS AS SHOWN ON THE DRAWINGS.
6. THE UPSTREAM TIE-IN WILL BE DEFINED AS THE MAJOR SLOPE BREAK IN THE STREAM PROFILE AS SHOWN ON SHEETS 5.0, 6.0, AND 7.0. THE DOWNSTREAM TIE-IN SHALL TRANSITION SMOOTHLY INTO EXISTING FEATURES AS DIRECTED BY ENGINEER. STRUCTURE TIE-IN LOCATIONS MAY BE STABILIZED WITH BOULDERS AND STREAMBED FILL AS DIRECTED BY ENGINEER.



4 BOULDER STEP POOL PROFILE C - C' 1" = 5'

STREAMBED FILL GRADATION

SIZE (INCHES)	PERCENT PASSING
30	100
28	90-100
16	50-80
8	30-50
4	10-30
FINES	10

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION.

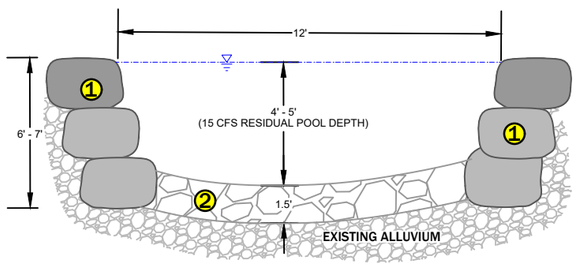
BOULDER GRADATION

SIZE (INCHES)	PERCENT PASSING
60	100
48	80-100
36	50-80
25	30-50
16	10-30
10	10

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION.

MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	QUANTITY	DIAMETER (IN.)
1	BOULDERS	42 CY	30 - 60
2	STREAMBED FILL	14 CY	SEE GRADATION
3	NON-WOVEN GEOTEXTILE FABRIC	30 FT	8MM THICKNESS



EXAMPLE OF A CONSTRUCTED BOULDER STEP POOL SYSTEM

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311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2920

BOULDER STEP POOL DETAILS

LOUP LOUP CREEK FISH PASSAGE PROJECT

MALOTT, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
*	08/2021	NW	30% DESIGN	CN
1	02/2022	NW	80% DESIGN	CN
2	04/2022	NW	FINAL DESIGN	CN

PROJECT NUMBER RDG-21-027

DRAWING NUMBER 9.0

Drawing 17 of 20

CHRIS J.O. NELSON STATE OF WASHINGTON 43260 REGISTERED PROFESSIONAL ENGINEER

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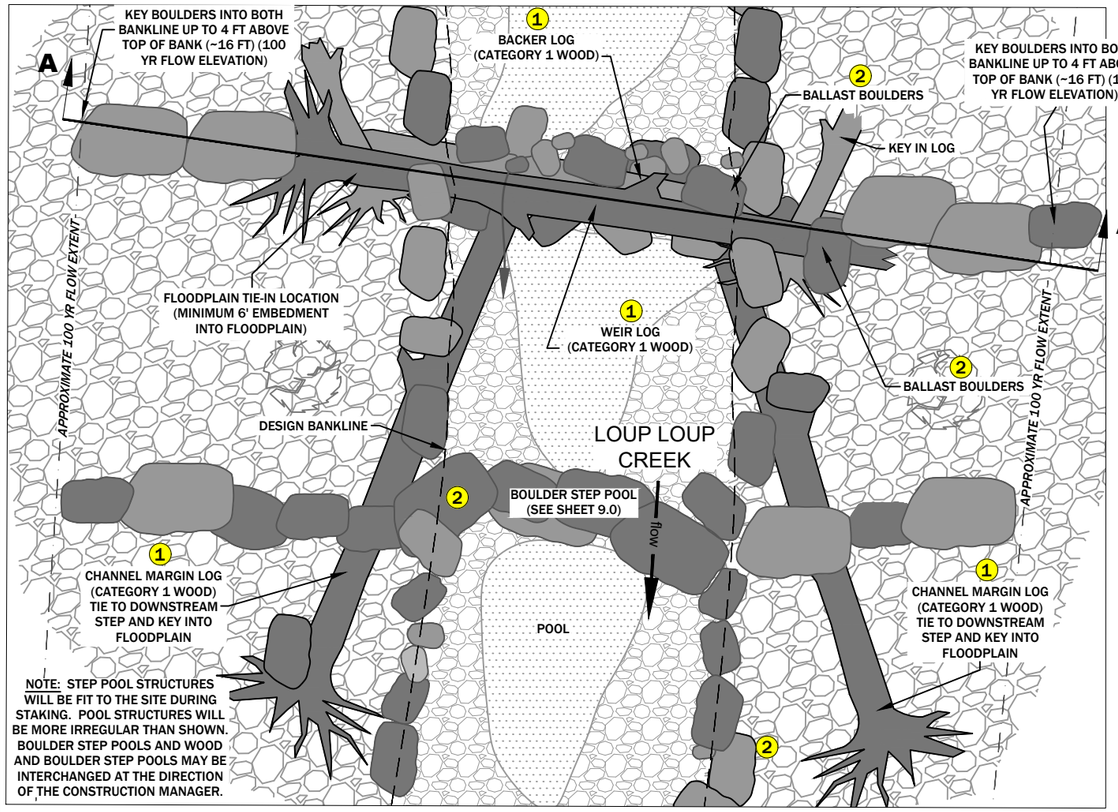
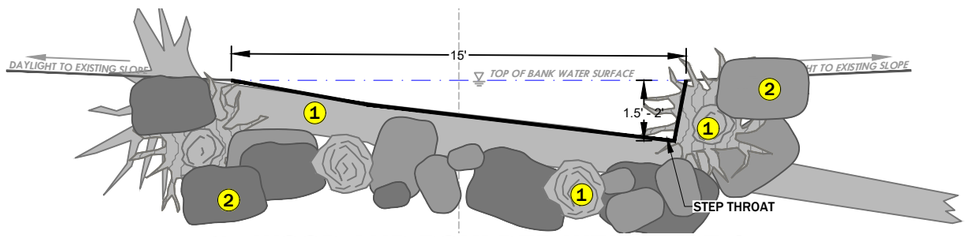


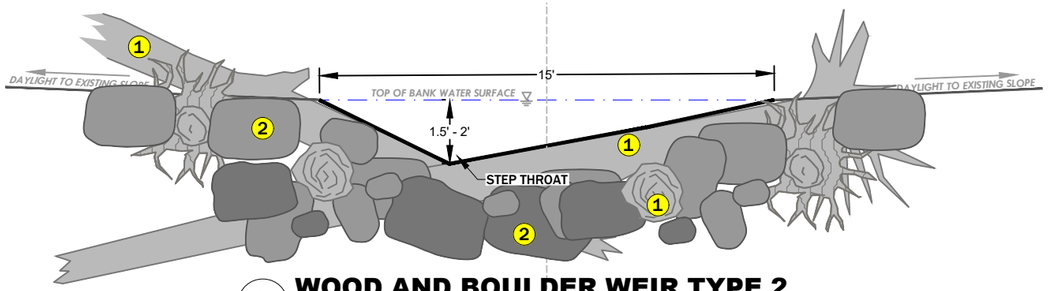
1 WOOD AND BOULDER STEP POOL PLAN VIEW

1" = 8'



2 WOOD AND BOULDER WEIR TYPE 1 SECTION A - A'

1" = 5'



3 WOOD AND BOULDER WEIR TYPE 2 SECTION A - A'

1" = 5'

GENERAL NOTES

1. THE INTENT OF THE WOOD AND BOULDER STEP POOL STRUCTURE IS TO PROVIDE VERTICAL AND LATERAL STABILITY FOR ENTRENCHED STREAM TYPES EXHIBITING STEEP GRADIENTS. THE STRUCTURE CONSISTS OF LARGE WOOD GRADE CONTROL STEPS AND PLUNGE POOLS. VELOCITY AND ENERGY DISSIPATION IS CONTROLLED BY STEP SPACING WHICH IS DETERMINED AS A FUNCTION OF GRADIENT RELATIVE TO CHANNEL WIDTH. STEP HEIGHT IS DESIGNED TO MAINTAIN UPSTREAM FISH PASSAGE AT 15 CFS TO 50 CFS. PLUNGE POOLS PROVIDE RESTING AREAS FOR FISH TO STAGE.
2. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY ENGINEER.
3. FIELD ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATIONS FOR EACH WOOD AND BOULDER STEP POOL STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON CONSTRUCTED WOOD AND BOULDER STEP POOL INSTALLATION

1. CONTRACTOR SHALL STOCKPILE WOOD AND ROCK PER SPECIFICATIONS NOTED ON THE DRAWINGS.
2. EXCAVATE TO THE EXCAVATION LIMITS. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
3. INSTALL A BASE ROW OF BOULDERS AND LARGE ROCK. INSTALL WEIR LOG (CATEGORY 1 WOOD) AT THE FLOODPLAIN TIE-IN LOCATIONS AND TO THE ORIENTATIONS NOTED ON THE DRAWING OR DIRECTED BY ENGINEER. KEY IN LOGS SHALL BE USED TO LOCK EACH END OF THE WEIR LOG INTO THE BANK. WEIR LOGS SHALL BE MIXED WITH BOULDERS TO CREATE A STABLE MATRIX OF WOOD AND ROCK. THE ROOTWADS OF THE LOGS SHALL BE EMBEDDED INTO THE STREAMBANK A MINIMUM OF 4-FT. RELATIVE TO FINISHED BANK LINE.
4. WEIR LOG SHALL BE ORIENTED IN A MANNER THAT THE WEIR LOG THROAT IS AT MAXIMUM RIFFLE DEPTH ELEVATION AS SHOWN ON THE PROFILE VIEWS.
5. INSTALL BACKER LOGS (CATEGORY 1 WOOD) ON THE UPSTREAM SIDE OF THE WEIR LOGS AS SHOWN ON THE DRAWINGS. BACKER LOGS SHALL BE FLUSH WITH THE WEIR LOGS AND EXTEND FROM THE FLOODPLAIN TIE-IN LOCATIONS TO THE TIPS OF THE WEIR LOGS.
6. INSTALL BOULDERS UPSTREAM AND DOWNSTREAM OF THE STREAMBANK TIE-IN LOCATIONS AND WEIR LOG TIPS. ROCK SHALL BE IN CONTACT WITH WEIR LOGS AND BACKER LOGS TO PROVIDE BALLAST AND TO PREVENT THE STRUCTURE FROM SHIFTING WHILE THE STRUCTURE IS BACKFILLED.
7. ATTACH NON-WOVEN GEOTEXTILE FABRIC TO WEIR LOGS AND EXTEND VERTICALLY TO THE MAXIMUM DEPTH OF THE POOL CHANNEL CROSS-SECTION ON THE UPSTREAM SIDE OF THE STRUCTURE, AS SHOWN ON DRAWING. BACKFILL WEIR AND BACKER LOGS WITH A MIX OF BOULDERS AND LARGE ROCK. USE STREAMBED FILL TO SHAPE THE UPSTREAM POOL TAILOUT.
8. CONSTRUCT CHANNEL MARGINS WITH BOULDERS OR CATEGORY 1 WOOD. REGRADE DOWNSTREAM CHANNEL STREAMBED POOL TO FINISHED GRADE ELEVATION. IF EXCESS MATERIAL IS SIDECAST IN POOL DURING CONSTRUCTION, CONTRACTOR SHALL RE-EXCAVATE POOL TO THE DESIGN DIMENSIONS AS APPROVED BY ENGINEER.

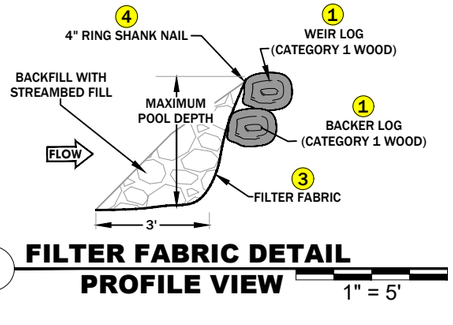
MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	QUANTITY	DIAMETER (IN.)
1	CATEGORY 1 WOOD	4	18 - 24
2	BOULDERS	35 CY/EA	30 - 60
3	NON-WOVEN GEOTEXTILE FABRIC	30	8MM THICKNESS
4	4" RING SHANK NAILS	20	

STREAMBED FILL GRADATION

SIZE (INCHES)	PERCENT PASSING
30	100
28	90-100
16	50-80
8	30-50
4	10-30
FINES	10

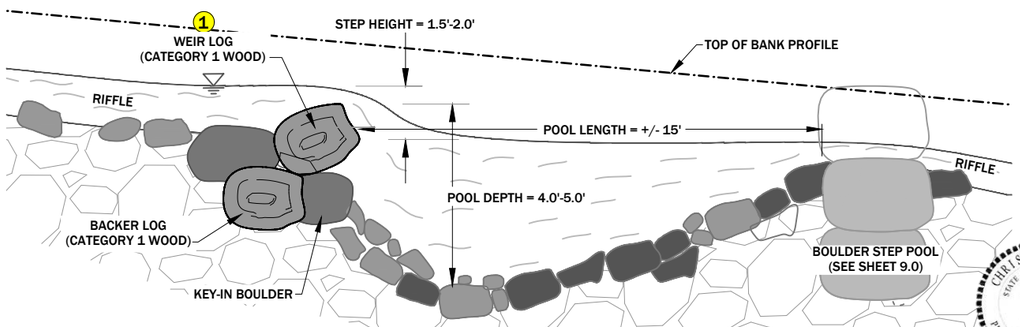
NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION.



5 FILTER FABRIC DETAIL PROFILE VIEW

1" = 5'

EXAMPLE OF A CONSTRUCTED CHANNEL LOG STEP POOL



4 WOOD AND BOULDER STEP POOL PROFILE VIEW

1" = 5'

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WOOD AND BOULDER STEP POOL DETAIL

LOUP LOUP CREEK FISH PASSAGE PROJECT

MALOTT, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
*	08/2021	NW	30% DESIGN	CN
1	02/2022	NW	80% DESIGN	CN
2	04/2022	NW	FINAL DESIGN	CN

PROJECT NUMBER RDG-21-027

DRAWING NUMBER 9.1

Drawing 18 of 20

CHRIS J.O. NELSON STATE OF WASHINGTON 43260 REGISTERED PROFESSIONAL ENGINEER 2022-04-14

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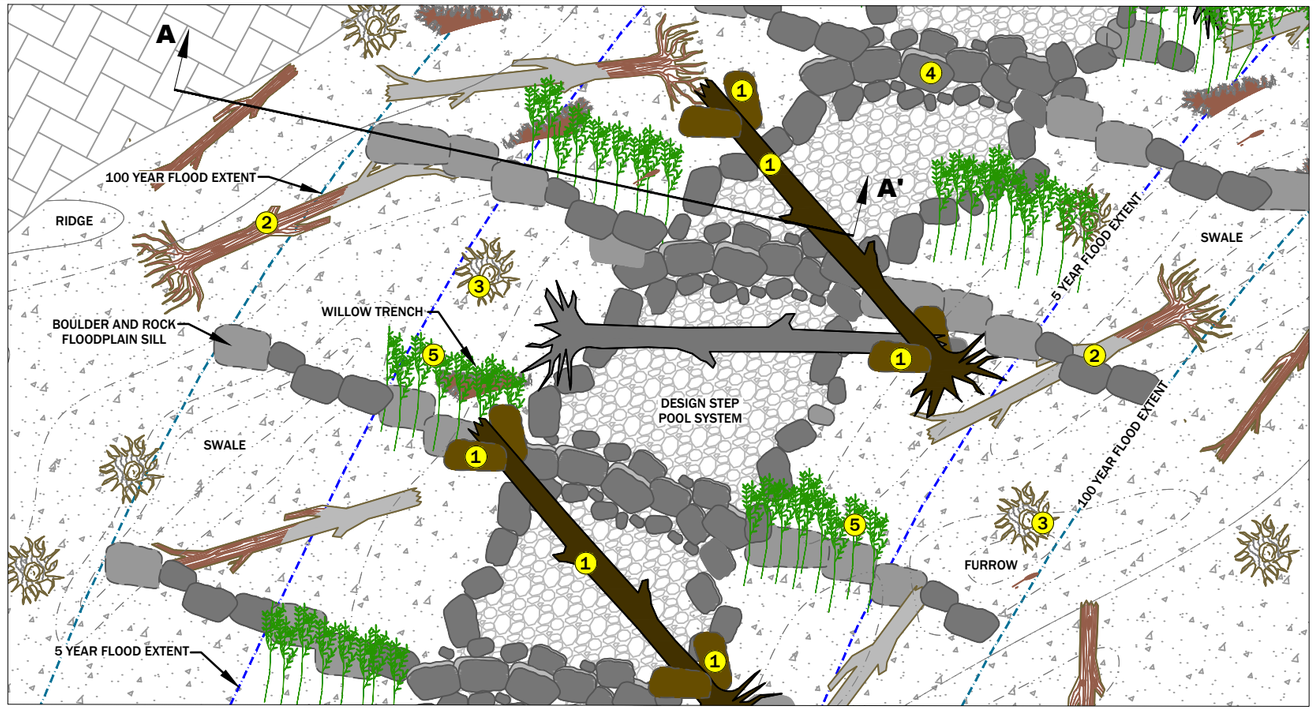
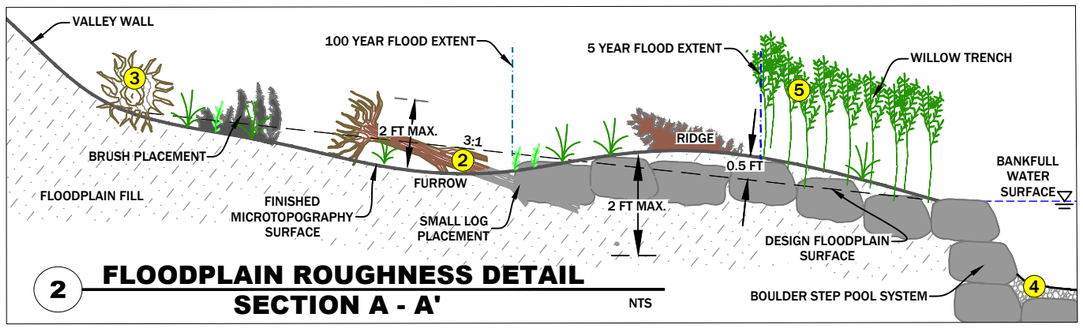


1 MICROTOPOGRAPHY AND FLOODPLAIN WOOD PLACEMENT
3D VIEW NTS

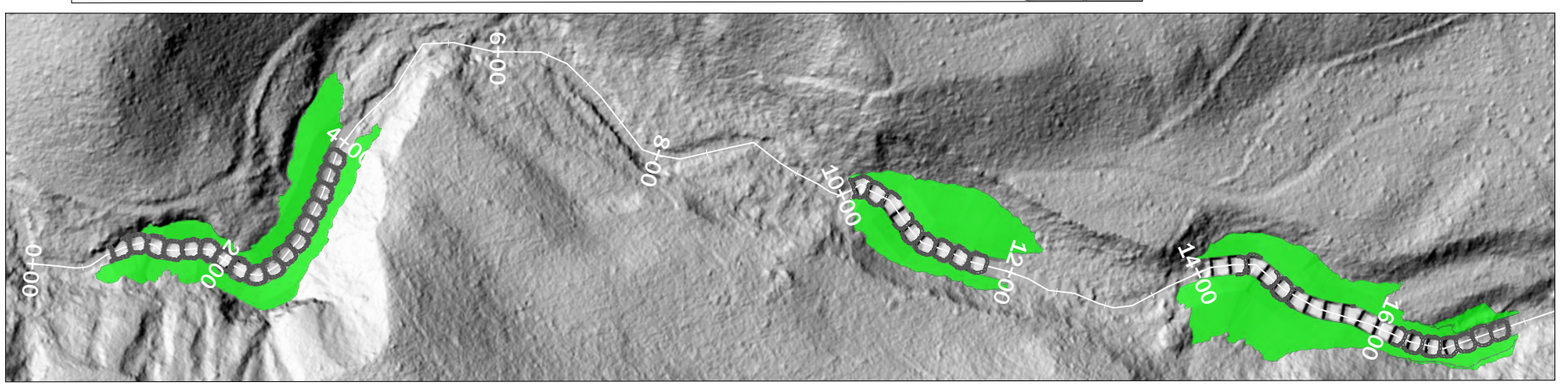


2 FLOODPLAIN ROUGHNESS DETAIL
SECTION A - A' NTS

FLOODPLAIN FILL GRADATION

SIZE (INCHES)	PERCENT PASSING
30	100
28	90-100
16	50-80
8	30-50
4	10-30
FINES	10

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION.



4 FLOODPLAIN TREATMENT
PLAN VIEW 1" = 150'

AREA OF FLOODPLAIN TREATMENT ~0.95 ACRES

GENERAL NOTES

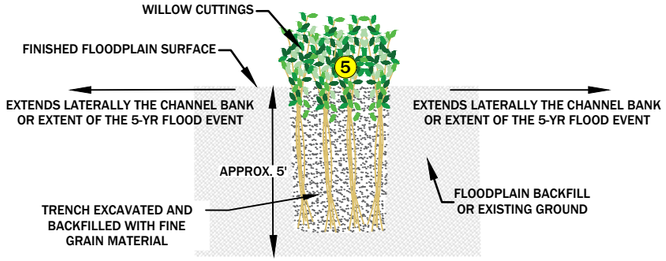
1. CONSTRUCTION OF FLOODPLAIN TREATMENT ELEMENTS WILL OCCUR AFTER CONSTRUCTION OF THE CHANNEL STEP POOL SYSTEM.
2. ANY ALTERATIONS TO THE FLOODPLAIN TREATMENT MUST BE APPROVED BY THE ENGINEER.

NOTES ON FLOODPLAIN TREATMENT INSTALLATION

1. HABITAT WOOD (CATEGORY 1) SHALL BE PLACED AT AN AVERAGE OF ONE PER STEP POOL. THE NUMBER OF LOGS IN ONE STEP POOL SHALL NOT EXCEED 2. PLACE MINIMUM OF 4 BOULDERS PER HABITAT LOG. BOULDERS SHALL BE PLACED IN CONTACT WITH HABITAT LOGS TO PROVIDE BALLAST AND TO PREVENT THE STRUCTURE FROM SLIDING
2. CONTRACTOR SHALL THEN DEVELOP MICROTOPOGRAPHY AND PLACE WOODY MATERIAL IN THE CONSTRUCTED FLOODPLAIN.
3. TRANSPORT SMALL WOOD (CATEGORY 2) AND BRUSH (CATEGORY 3) FROM FROM DESIGNATED STOCKPILE AREAS. PLACE SMALL WOOD WOOD AT A RATE OF 35 PIECES PER ACRE AND SPACED AT AN AVERAGE DISTANCE OF 20 FEET FROM OTHER SMALL WOOD. PLACE BRUSH SO IT COVERS 25 PERCENT OF THE FLOODPLAIN SURFACE (APPROXIMATELY 250 PIECES PER ACRE).
4. BURY SMALL WOOD AND BRUSH WITHIN THE FLOODPLAIN SURFACE, WITH ONE HALF OF THE LENGTH BURIED TO A DEPTH OF 2-FT., AND ONE HALF EXPOSED A MAXIMUM OF 2-FT ABOVE FINISHED GRADE AS SHOWN ON DRAWING. BOULDERS SHALL BURIED INTO THE FLOODPLAIN WITH A MAXIMUM PROTRUSION OF 0.5 FEET.
5. IN CONJUNCTION WITH WOOD AND ROCK PLACEMENT CONSTRUCT LOW AND HIGH FEATURES (RIDGES AND FURROWS) AS SHOWN ON THE DRAWINGS. MAXIMUM HEIGHT OF RIDGES AND DEPTH OF FURROWS SHALL BE NO GREATER THAN 0.5-FT. RELATIVE TO FINISHED FLOODPLAIN SURFACE.
6. CONTRACTOR SHALL CONSTRUCT WILLOW TRENCHES AT A RATE OF 1 PER STEP POOL AND ORIENTED PERPENDICULAR TO THE FLOW AT SHOWN ON THE DRAWING. A TRENCH SHALL BE PULLED BACK FROM THE BANKLINE AND EXTENT INTO THE FLOODPLAIN TO THE APPROXIMATE EXTENT OF THE 5 YEAR FLOOD WATER SURFACE. WILLOW CUTTINGS SHALL BE PLACED WITHIN THE EXCAVATED DITCH OF THE SILL FROM CHANNEL BANK OUT TO THE EXTENT OF THE MODELED 5-YEAR FLOOD ELEVATION.

MATERIAL SCHEDULE

	ITEM	DIA.	QUANTITY	UNIT
1	CATEGORY 1 WOOD	18" - 24"	1	PER POOL
2	CATEGORY 2 WOOD	6" - 12"	15 FT SPACING	EA
3	CATEGORY 3 WOOD	3" - 6"	8 FT SPACING	EA
4	BOULDERS	36" MIN.	4	PER POOL
5	WILLOW CUTTINGS	0.25" - 1"	60	EA



3 WILLOW TRENCH
SECTION VIEW NTS

EXAMPLE OF CONSTRUCTED FLOODPLAIN ROUGHNESS

CHRIS J.O. NELSON STATE OF WASHINGTON 53281 REGISTERED PROFESSIONAL ENGINEER 2022-04-14

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue Whitefish, MT 59937 406.862.4927
311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2920

FLOODPLAIN TREATMENT DETAIL

LOUP LOUP CREEK FISH PASSAGE PROJECT
MALOTT, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
*	08/2021	NW	30% DESIGN	CN
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2	04/2022	NW	FINAL DESIGN	CN

PROJECT NUMBER
RDG-21-027

DRAWING NUMBER
9.2

Drawing 19 of 20

M:\Projects\2021\RDG-21-027 Loup Loup Fish Passage\CAD\2022-1-31 Loup Loup 80 percent.dwg

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 MAY 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. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW) 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. 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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CONSERVATION MEASURES

LOUP LOUP CREEK FISH PASSAGE PROJECT

MALOTT, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
*	08/2021	NW	30% DESIGN	CN
1	02/2022	NW	80% DESIGN	CN
2	04/2022	NW	FINAL DESIGN	CN

PROJECT NUMBER
RDG-21-027

DRAWING NUMBER
10.0

Drawing 20 of 20

M:\Projects\2021\RDG-21-027 Loup Loup Fish Passage\CAD\2022-1-31 Loup Loup 80 percent.dwg