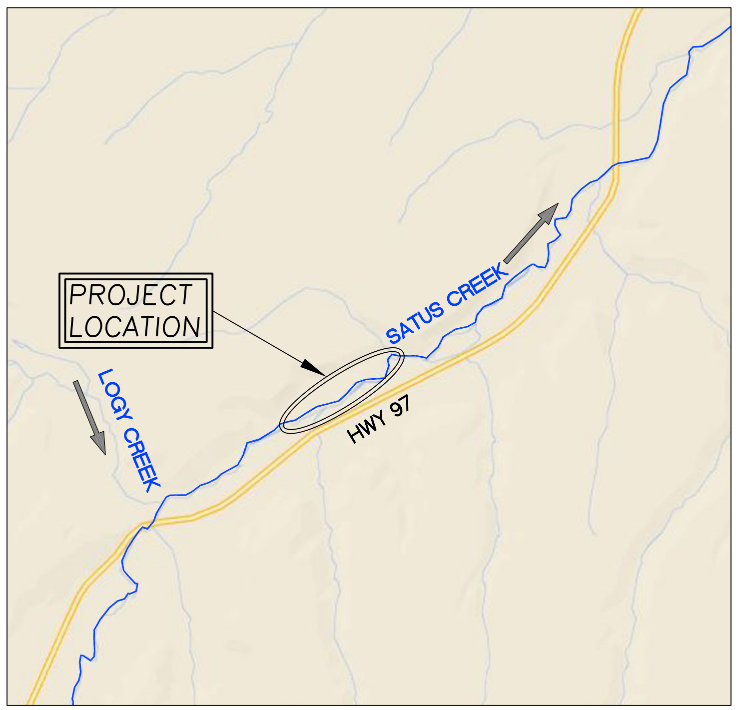
SATUS CREEK
RM 20-25 RESTORATION PROJECT
PHASE 1
100% DESIGN SUBMITTAL



VICINITY MAP
N.T.S. (GOOGLE)

REGIONAL MAP
N.T.S. (GOOGLE)

SHEET INDEX

PROJECT DESCRIPTION

THESE DRAWINGS PROVIDE 100% DESIGN LEVEL DETAILS FOR CONSTRUCTION OF LOG STRUCTURES, AND WOOD LOADING ON A REACH OF SATUS CREEK IN KLICKITAT COUNTY, WA.

** CALL BEFORE YOU DIG **

CONTACT UNDERGROUND SERVICE ALERT (USA)
PRIOR TO ANY CONSTRUCTION WORK 1-800-424-5555 (OR 811)

ABBREVIATIONS

AVG.	AVERAGE
CC	CONCRETE
CY	CUBIC YARDS
DIA.	DIAMETER
E	EXISTING
EG	EXISTING GROUND
ELEV.	ELEVATION
DI	DRAINAGE INLET
FG	FINISHED GRADE
FT	FEET
INV	INVERT
MIN	MINIMUM
N	NEW
NIC	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
RC	RELATIVE COMPACTION
RSP	ROCK SLOPE PROTECTION
SPK	SPIKE
SQ.FT.	SQUARE FOOT
T	TREE
T.B.D.	TO BE DETERMINED
TYP	TYPICAL
UNK	UNKNOWN
WSE	WATER SURFACE ELEVATION
YR	YEAR

SECTION AND DETAIL CONVENTION

SECTION OR DETAIL IDENTIFICATION (NUMBER OR LETTER)
5
C3
SHEET REFERENCE

GENERAL NOTES

1. LIDAR TOPOGRAPHIC MAPPING WAS PERFORMED BY:
   QUANTUM SPATIAL
   1100 NE CIRCLE BLVD, STE. 126
   CORVALLIS, OR 97330
   SURVEY DATES: FLOWN 2017
2. AERIAL PHOTO SOURCE: AUTOCAD CIVIL3D GEOLOCATION MAP.
3. CONTOUR INTERVAL IS AS NOTED. ELEVATIONS AND DISTANCES SHOWN ARE IN DECIMAL FEET.
1. THIS IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE NOT SHOWN HEREIN.
2. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE LATEST EDITION OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS, ISSUED BY THE DEPARTMENT OF TRANSPORTATION (HEREAFTER REFERRED TO AS "STANDARD SPECIFICATIONS").
3. THESE DESIGNS ARE INCOMPLETE WITHOUT THE FINAL STAMPED TECHNICAL SPECIFICATIONS PREPARED BY WATERWAYS CONSULTING, INC. REFER TO TECHNICAL SPECIFICATIONS FOR DETAILS NOT SHOWN HEREON.

WATERWAYS CONSULTING INC.
1020 SW TAYLOR STREET, STE. 380
PORTLAND, OR 97205
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WWW.WATWAYS.COM

JAKE HOFELD
STATE OF WASHINGTON
EXPIRES: 4/9/2026
JAKE D. HOFELD

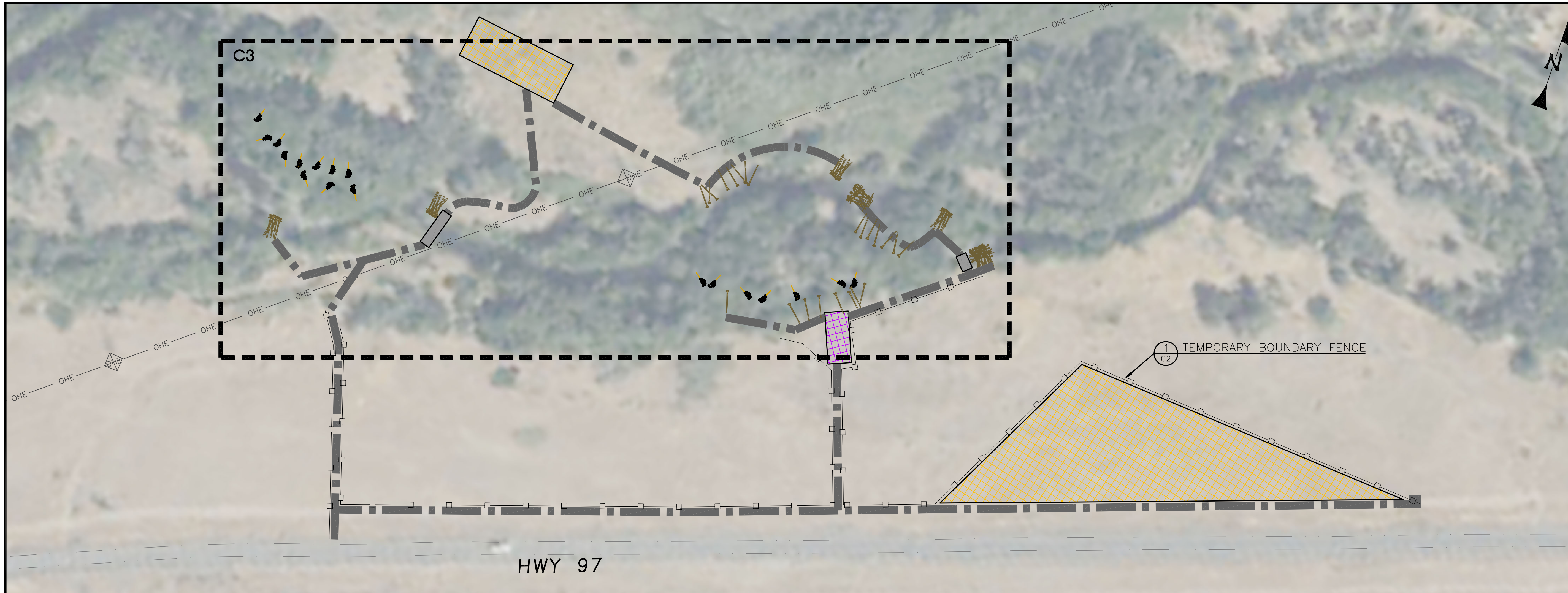
PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

COVER

SATUS CREEK RM 20-25
RESTORATION PROJECT
PHASE 1
100% DESIGN SUBMITTAL

DESIGNED BY:	J.H.
DRAWN BY:	M.M.
CHECKED BY:	J.H.
DATE:	11/6/2025
JOB NO.:	22-048

BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 1"

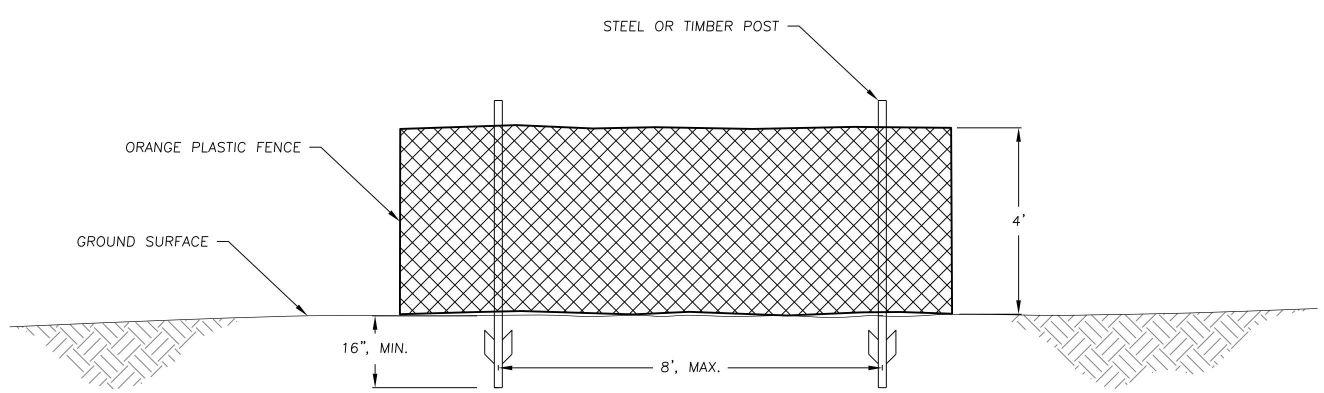


OVERVIEW, ACCESS, AND STAGING PLAN

SCALE: 1" = 100'

LEGEND

Symbol	Description
OHE	EXISTING OVERHEAD POWER LINE
	EXISTING EDGE OF ROAD
	PROPOSED ACCESS
	TEMPORARY BOUNDARY FENCING
	PROPOSED HEAVY EQUIPMENT STAGING AND STOCKPILING
	PROPOSED LOG STOCKPILE AREA
⊠	EXISTING OVERHEAD ELECTRICAL TOWER
	PROPOSED HABITAT LOG
	PROPOSED FELLED ALDER
	PROPOSED APEX LOG STRUCTURE
	PROPOSED LATERAL LOG STRUCTURE
	PROPOSED LARGE LATERAL LOG STRUCTURE
	TEMPORARY RIVER CROSSING



TEMPORARY BOUNDARY FENCE (1/C2)

SCALE: 1"=2'

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JAKE HOFELD — STATE OF WASHINGTON — PROFESSIONAL ENGINEER
EXPIRES: 4/9/2026

PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

OVERVIEW, ACCESS, AND STAGING PLAN

SATUS CREEK RM 20-25 RESTORATION PROJECT PHASE 1
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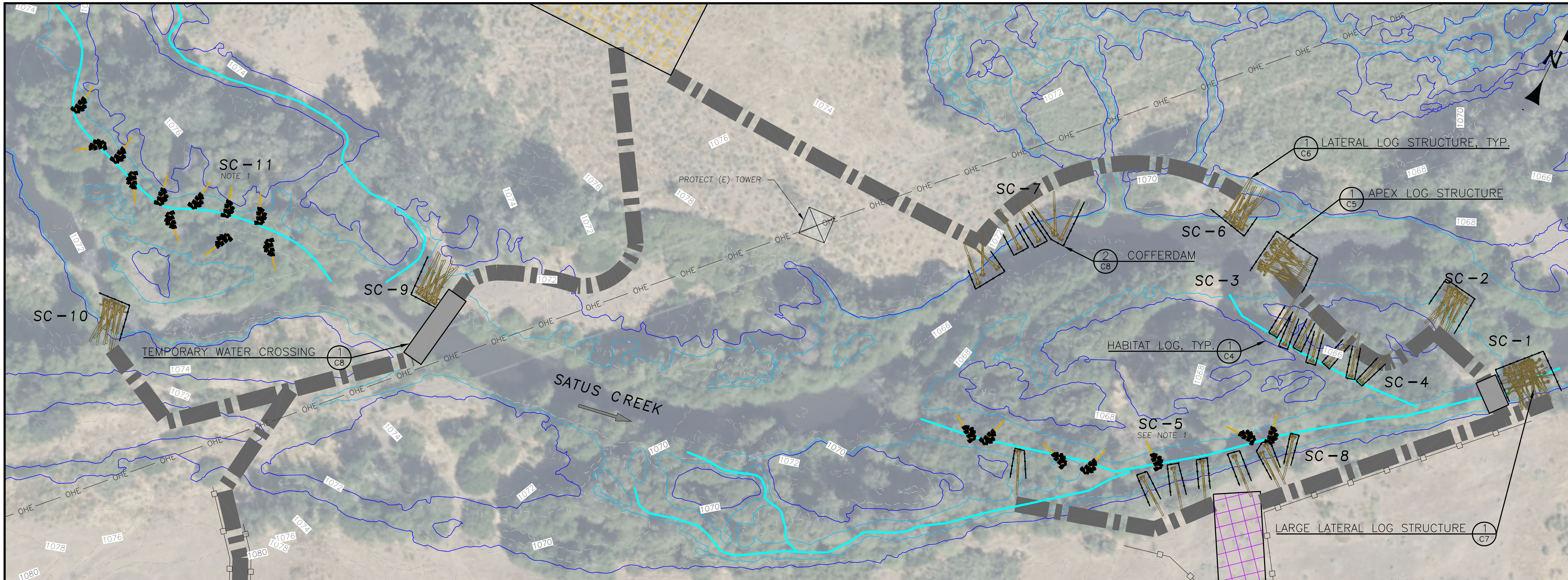

PROPOSED CONDITIONS PLAN

SCALE: 1" = 50'

LEGEND

- EXISTING LIDAR CONTOURS (2-FT INTERVAL)
- EXISTING OVERHEAD POWER LINE (OHE)
- EXISTING OHW INUNDATION BOUNDARY
- EXISTING 5-YR INUNDATION BOUNDARY
- EXISTING SIDE CHANNEL CENTERLINE (APPROX.)
- PROPOSED ACCESS
- PROPOSED TEMPORARY BOUNDARY FENCE
- PROPOSED COFFERDAM
- PROPOSED HEAVY EQUIPMENT STAGING AND STOCKPILING
- PROPOSED LOG STOCKPILE AREA
- PROPOSED HABITAT LOG
- PROPOSED FELLED ALDER
- PROPOSED APEX LOG STRUCTURE
- PROPOSED LATERAL LOG STRUCTURE
- PROPOSED LARGE LATERAL LOG STRUCTURE
- TEMPORARY WATER CROSSING

NOTES:

1. SELECTIVELY FELL ALDER TREES ON SOUTH SIDE OF CHANNEL THAT WILL NOT AFFECT THE AMOUNT OF SHADE ON THE CHANNEL AND AT THE DIRECTION OF THE ENGINEER.

TABLE 1: LOG STRUCTURE TABLE

STRUCTURE ID	STRUCTURE TYPE	LOGS WITH ROOTWADS (EA) 40 FT MIN. LENGTH 18-IN. DIA.	LOGS WITHOUT ROOTWADS (EA) 40 FT MIN. LENGTH 12-IN. DIA.	FOOTER LOG (EA) 30 FT LENGTH 12-IN. DIA.	LOG PILES (EA) 15 FT. LENGTH 12-IN. DIA.	LOG/LOG CONNECTIONS (EA)	SLASH (CY)	ALDER FELLING (LF)	MATERIAL AND CONSTRUCTION NOTES
SC-1	LARGE LATERAL	19	7	1	16	40	15	–	KEY LOGS INTO THE EXISTING BANK, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-2	LATERAL	4	3	1	8	16	5	–	KEY LOGS INTO THE EXISTING BANK, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-3	APEX	5	8	2	8	32	10	–	KEY LOGS INTO THE EXISTING GROUND, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-4	HABITAT LOG	7	–	–	–	–	–	–	EMBED LOGS INTO EXISTING BANK AT THE DIRECTION OF THE ENGINEER.
SC-5	FELLED ALDER TREES	–	–	–	–	–	–	315	CUT ALDER AT THE DIRECTION OF THE ENGINEER.
SC-6	LATERAL	4	3	1	8	16	5	–	KEY LOGS INTO THE EXISTING BANK, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-7	HABITAT LOG	8	–	–	–	–	–	–	EMBED LOGS INTO EXISTING BANK AT THE DIRECTION OF THE ENGINEER.
SC-8	HABITAT LOG	8	–	–	–	–	–	–	EMBED LOGS INTO EXISTING BANK AT THE DIRECTION OF THE ENGINEER.
SC-9	LATERAL	4	3	1	8	16	5	–	KEY LOGS INTO THE EXISTING BANK, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-10	LATERAL	4	3	1	8	16	5	–	KEY LOGS INTO THE EXISTING BANK, DRIVE VERTICAL PILE LOGS AND PIN LOGS TOGETHER AT THE DIRECTION OF THE ENGINEER.
SC-11	FELLED ALDER TREES	–	–	–	–	–	–	280	CUT ALDERS AT THE DIRECTION OF THE ENGINEER.
TOTAL		63	27	7	56	136	45	595	

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JAKE HOFELD, STATE OF WASHINGTON, PROFESSIONAL ENGINEER, EXPIRES: 4/9/2026

PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

PROPOSED CONDITIONS PLAN

SATUS CREEK RM 20-25 RESTORATION PROJECT
PHASE 1
100% DESIGN SUBMITTAL

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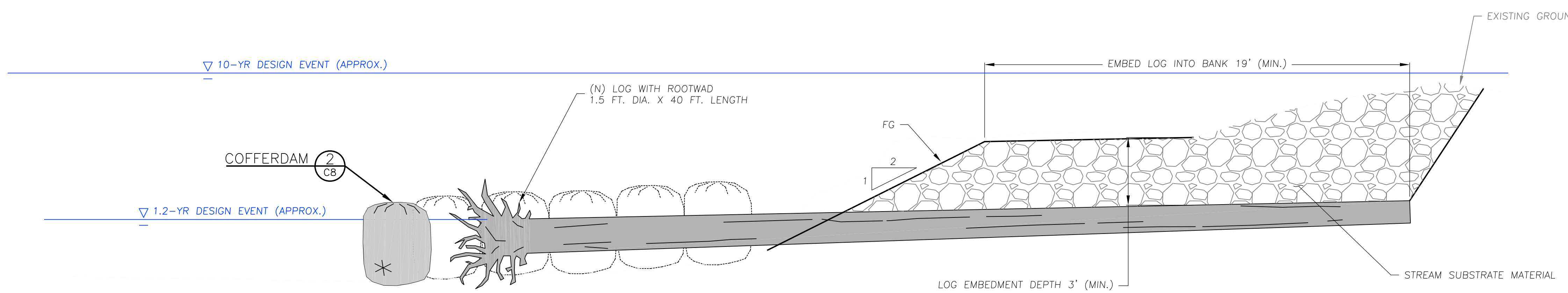
DRAWN BY: M.M.
CHECKED BY: J.H.
DATE: 11/6/2025
JOB NO.: 22-048

BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS

C3

HABITAT LOG NOTES:

1. ISOLATE THE WORK AREA AROUND THE LOG STRUCTURE WITH A COFFERDAM TO DIVERT CREEK FLOW AROUND THE WORK AREA, AND COORDINATE WITH OWNER'S REPRESENTATIVE FOR CONDUCTION AQUATIC ORGANISM SALVAGE WITHIN THE WORK AREA PRIOR TO ANY GROUND DISTURBING ACTIVITIES.
2. THE COFFERDAM HEIGHT SHALL BE BASED ON THE DEPTH OF WATER AT THE TIME OF CONSTRUCTION AT EACH LOG STRUCTURE LOCATION. COFFERDAMS SHALL MEET THE DESIGN CRITERIA SHOWN ON DETAIL 2, SHEET C8 AND SECTION 312316 OF THE TECHNICAL SPECIFICATIONS.



HABITAT LOG 1 / C3
SCALE: 1" = 3'

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JAKE HOFELD – STATE OF WASHINGTON – PROFESSIONAL ENGINEER – 53327
EXPIRES: 4/9/2026
JAKE D. HOFELD

PREPARED AT THE REQUEST OF:
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HABITAT LOG STRUCTURE DETAIL

SATUS CREEK RM 20-25 RESTORATION PROJECT
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0 1"

C4

APEX LOG STRUCTURE NOTES:

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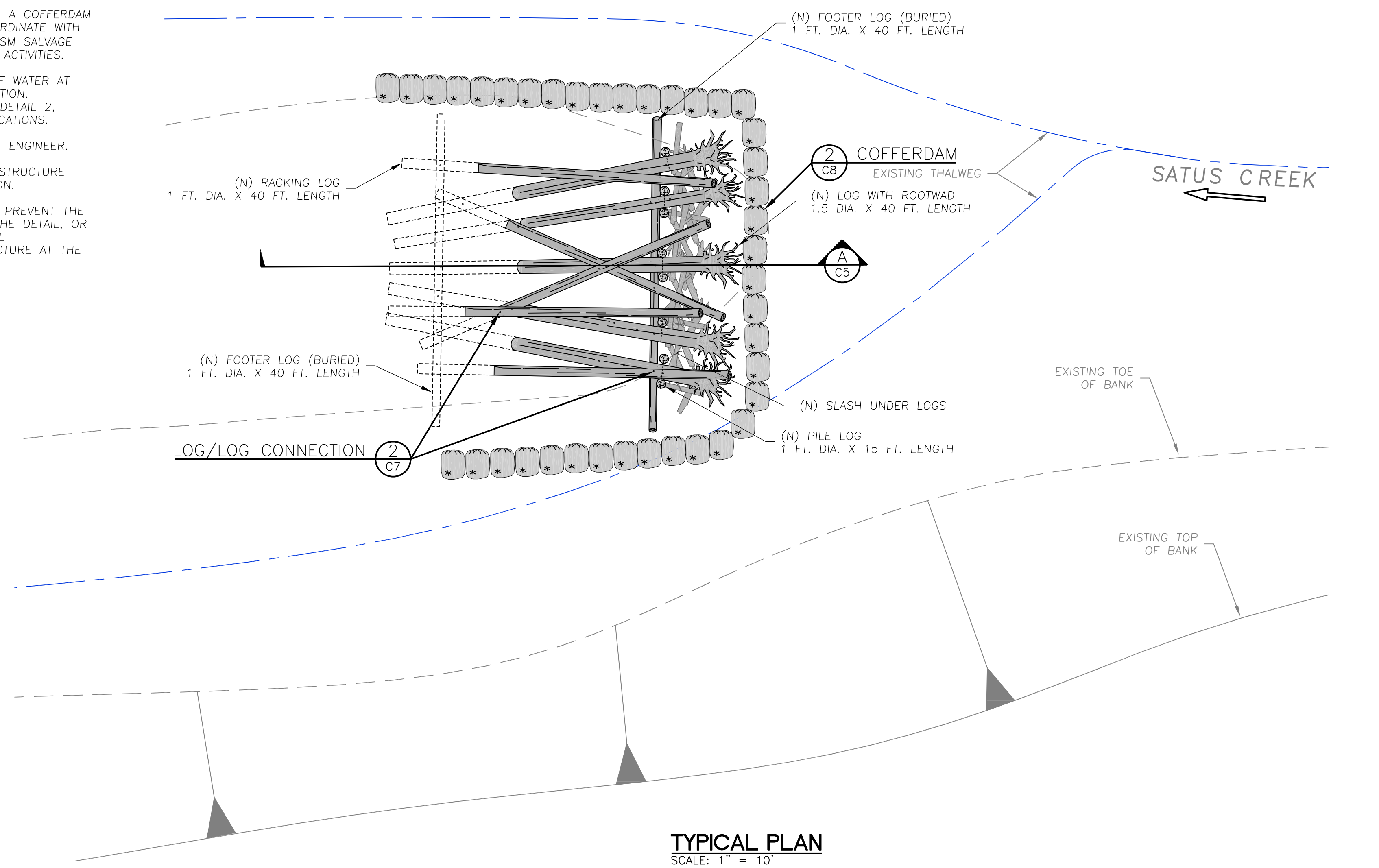
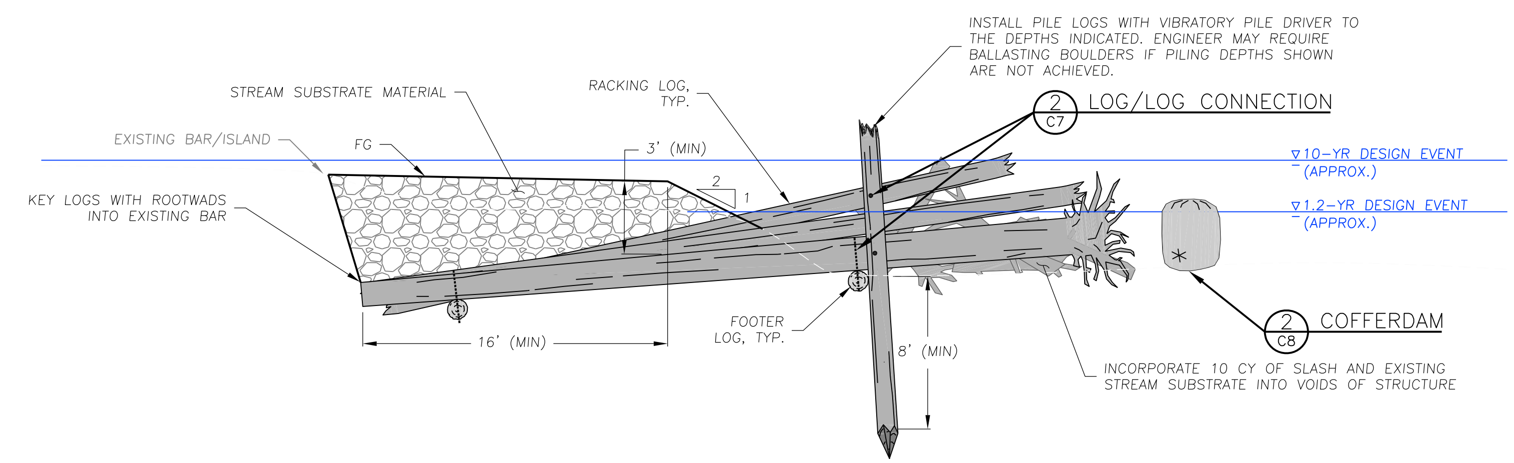
3. CONSTRUCT THIS LOG STRUCTURE AT THE DIRECTION OF THE ENGINEER.
4. CONFIRM DIMENSIONS OF ALL MATERIALS USED IN THE LOG STRUCTURE WITH THE ENGINEER PRIOR TO LOG STRUCTURE CONSTRUCTION.
5. IF SUBSURFACE CONDITIONS AT THE TIME OF CONSTRUCTION PREVENT THE EMBEDMENT OF PILE LOGS TO THE DIMENSIONS SHOWN IN THE DETAIL, OR TO THE PULLOUT RESISTANCE CALLED FOR IN THE TECHNICAL SPECIFICATIONS, ADD BALLAST BOULDERS TO THE LOG STRUCTURE AT THE DIRECTION OF THE ENGINEER.



TYPICAL PLAN
SCALE: 1" = 10'



TYPICAL SECTION (A / C5)
SCALE: 1" = 5'

TYPICAL APEX LOG STRUCTURE (1 / C3)
SCALE: VARIES

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APEX LOG STRUCTURE DETAIL

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0 1"

LATERAL LOG STRUCTURE NOTES:

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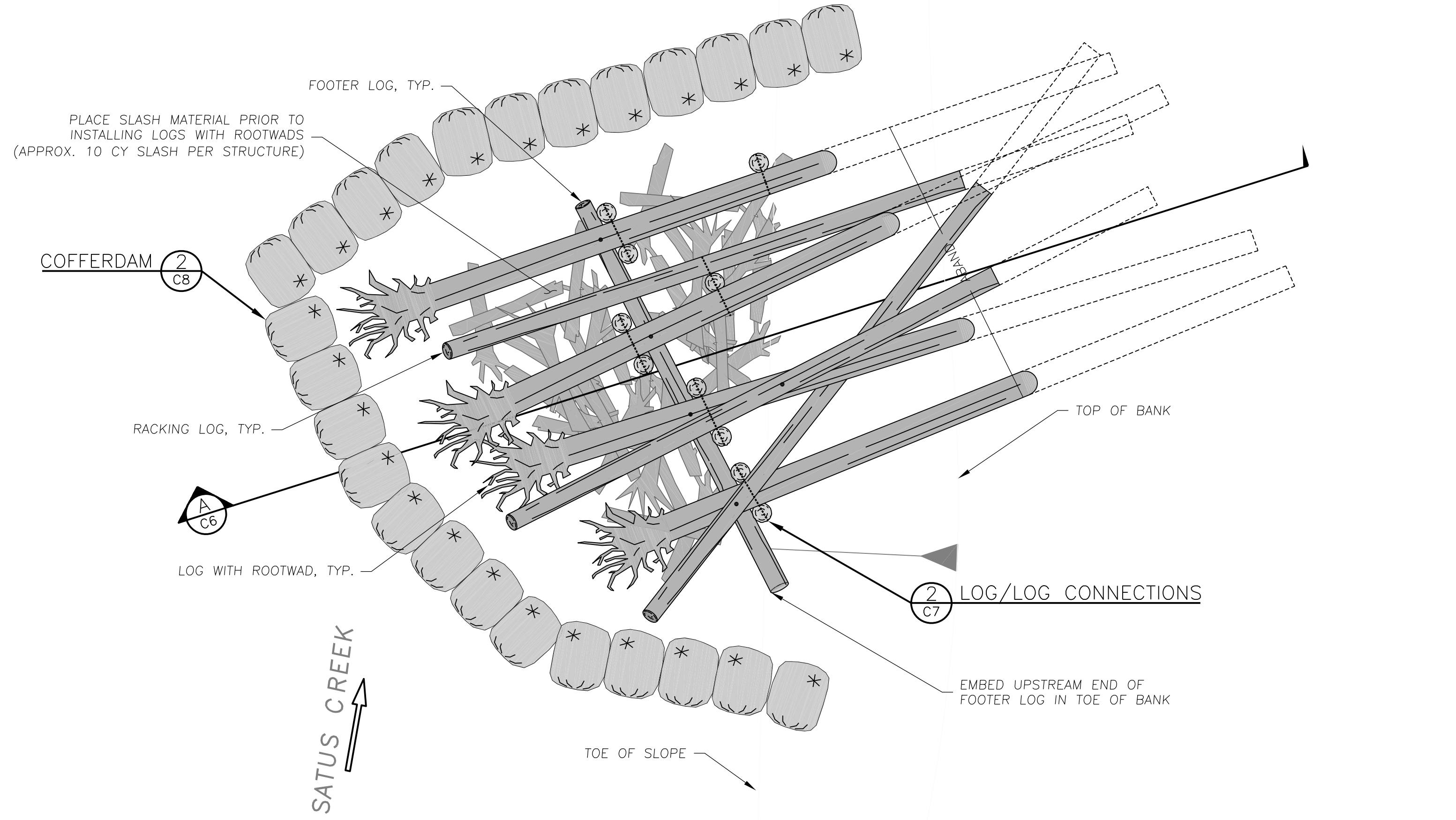
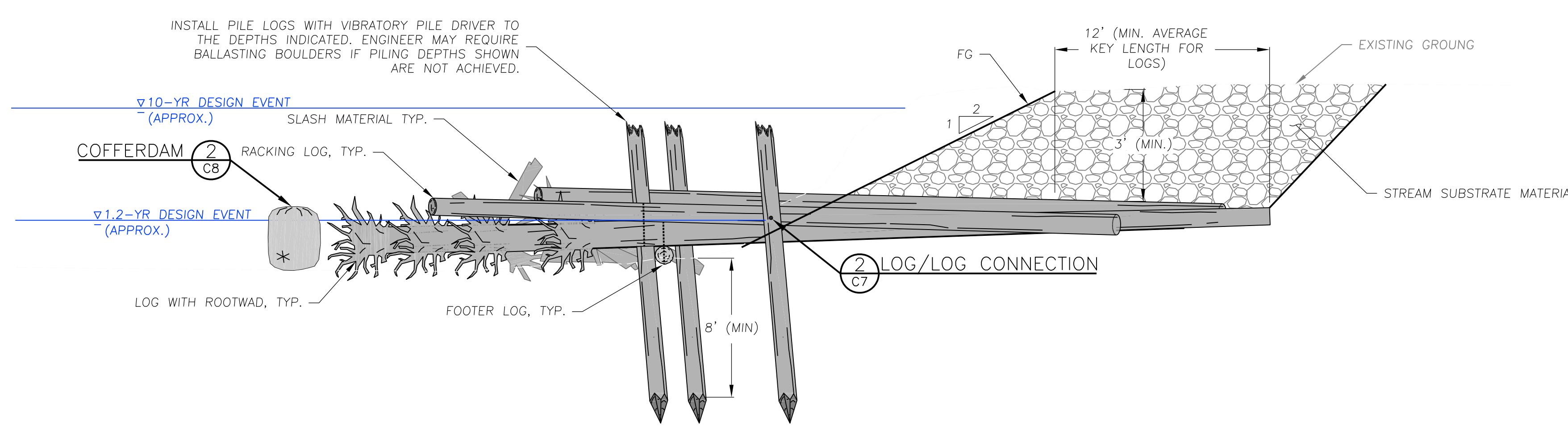


TYPICAL PLAN
SCALE: 1" = 5'



TYPICAL SECTION (A / C6)
SCALE: 1" = 5'

TYPICAL LATERAL LOG STRUCTURE (1 / C3)
SCALE: 1" = 5'

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LATERAL LOG STRUCTURE DETAIL

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0 1"

C6

LARGE LATERAL LOG STRUCTURE NOTES:

1. ISOLATE THE WORK AREA AROUND THE LOG STRUCTURE WITH A COFFERDAM TO DIVERT CREEK FLOW AROUND THE WORK AREA, AND COORDINATE WITH OWNER'S REPRESENTATIVE FOR CONDUCTION AQUATIC ORGANISM SALVAGE WITHIN THE WORK AREA PRIOR TO ANY GROUND DISTURBING ACTIVITIES.
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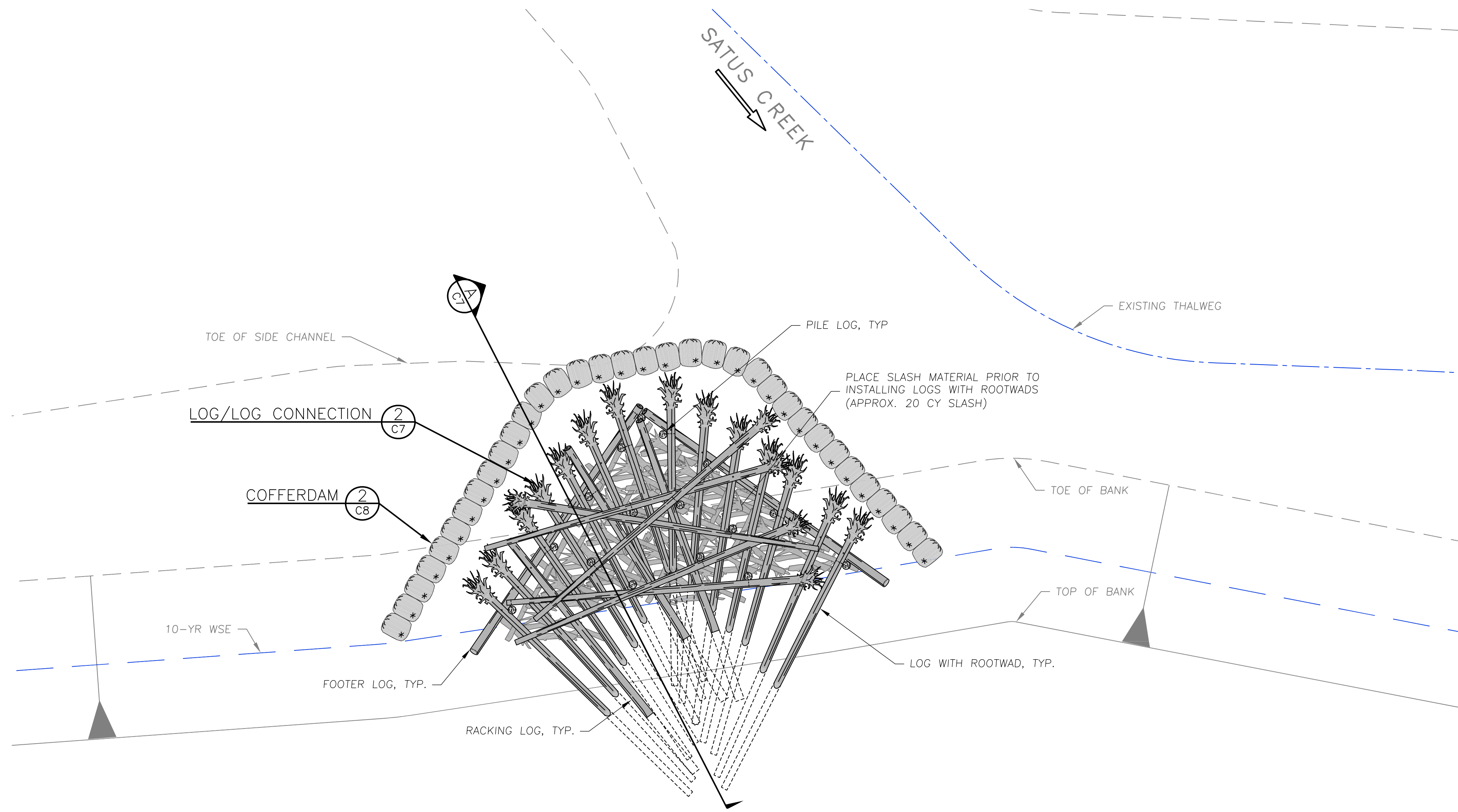
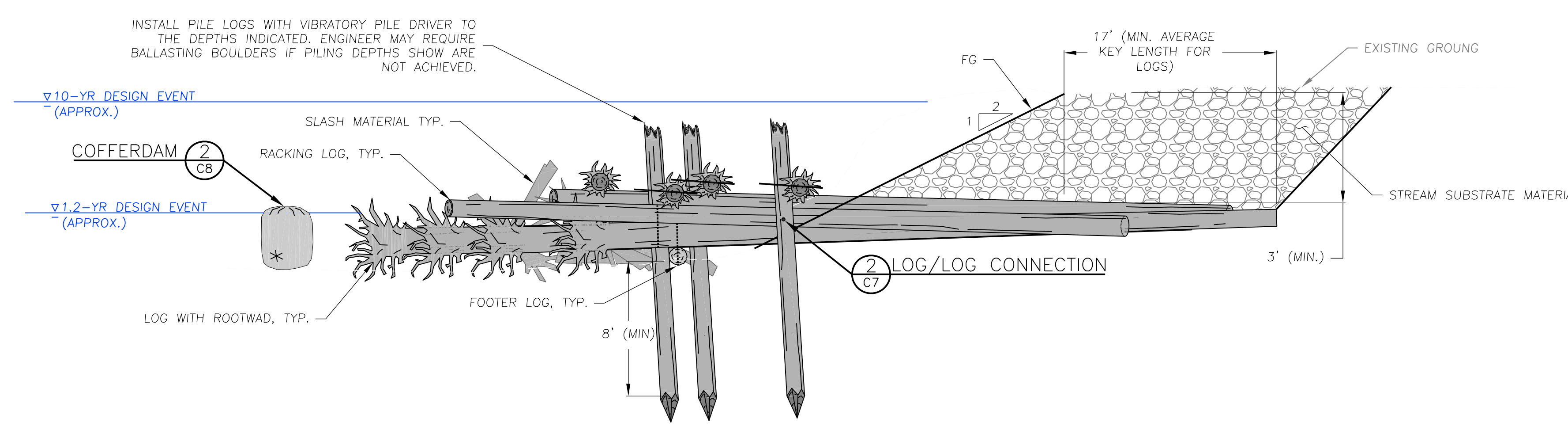
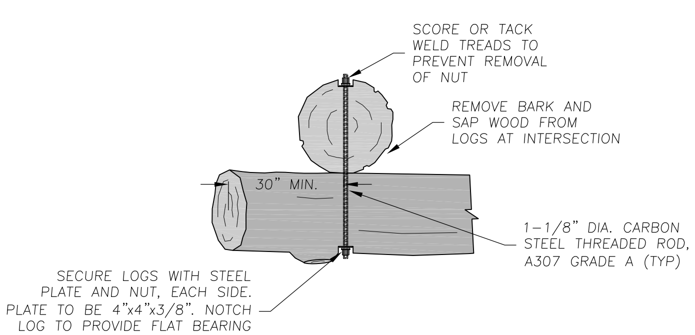


LARGE LATERAL LOG STRUCTURE (1/C3)
SCALE: 1" = 10'



LARGE LATERAL LOG STRUCTURE SECTION (A/C6)
SCALE: 1" = 5'



LOG/LOG CONNECTION (2/C6) C5, C6, C7
SCALE: 1" = 2'

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LARGE LATERAL JAM AND LOG LOG CONNECTION DETAILS

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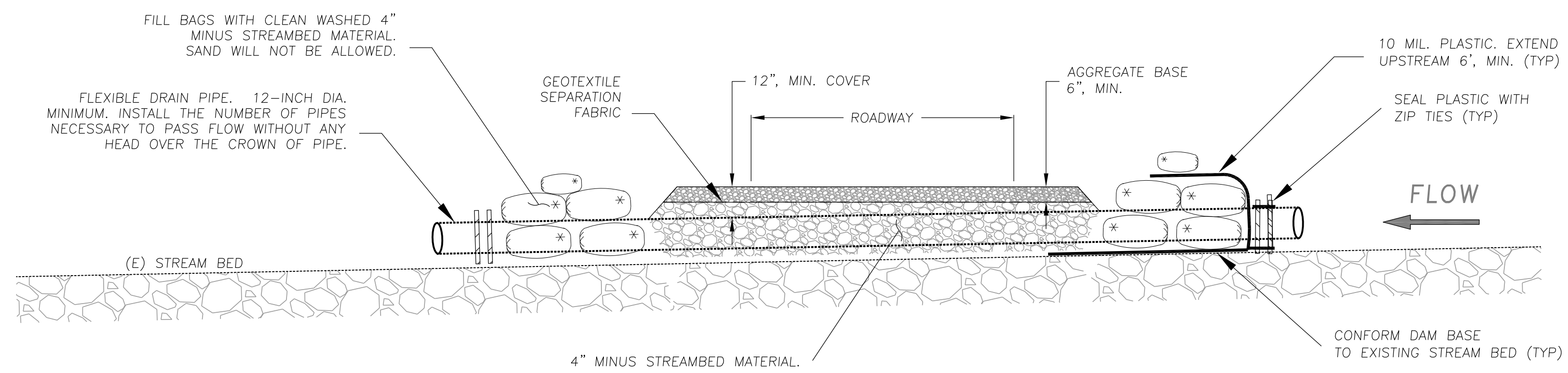
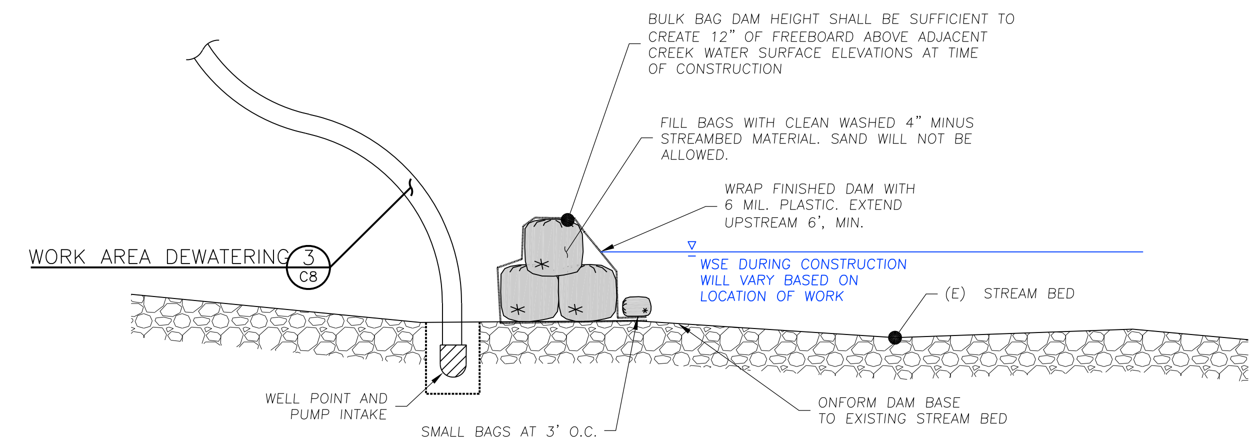
0 1"

STREAM CONSTRUCTION BEST MANAGEMENT PRACTICE NOTES

1. PERFORM STREAM CONSTRUCTION IN ACCORDANCE WITH THE PROJECT PERMITS, HIP 4 GENERAL CONSERVATION MEASURES, AND THE FOLLOWING BEST MANAGEMENT PRACTICES.
2. PRE-CONSTRUCTION FRESH WATER MUSSEL SURVEY
   - 2.1. A MINIMUM OF 1 MONTH PRIOR TO CONSTRUCTION, PROJECT BIOLOGIST SHALL PERFORM TWO SURVEYS OF MUSSEL BEDS WITHIN THE LIMITS OF WORK FOR THE LOG STRUCTURES, TEMPORARY CREEK CROSSINGS, AND DIVERSION DAMS AND THE ASSOCIATED DEWATERED AREAS DOWNSTREAM. THESE SURVEYS SHALL BE CONDUCTED AT LEAST 2 WEEKS APART AND LOCATIONS OF MUSSEL BEDS SHALL CLEARLY BE DELINEATED IN THE FIELD WITH FLAGGING. LOCATIONS OF THESE PROJECT FEATURES AND TEMPORARY DISTURBANCES MAY BE MODIFIED AT THE DIRECTION OF THE ENGINEER DEPENDING ON PRESENCE OF MUSSEL BEDS.
   - 2.2. IN THE EVENT THAT MUSSEL BEDS ARE DISCOVERED WITHIN WORK AREAS THAT CANNOT BE AVOIDED, MUSSELS SHALL BE RELOCATED IN ACCORDANCE WITH THE NEXT SECTION.
3. AQUATIC ORGANISM RELOCATION
   - 3.1. AQUATIC ORGANISM RELOCATION, INCLUDING BUT NOT LIMITED TO FISH AND MUSSELS, SHALL BE PERFORMED BY OTHERS IN COORDINATION WITH THE CONTRACTOR. PRIOR TO PERFORMING ANY CONSTRUCTION WITHIN THE WETTED CHANNEL. ALL AQUATIC ORGANISM RELOCATION WORK SHALL BE SUPERVISED BY A QUALIFIED FISHERIES BIOLOGIST WITH EXPERIENCE IN WORK AREA ISOLATION. PERFORM THE FOLLOWING STEPS IN THE ORDER LISTED FOR AQUATIC ORGANISM RELOCATION:
   - 3.2. CONDUCT AQUATIC ORGANISM RELOCATION ACTIVITIES DURING PERIODS OF THE DAY WITH THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE.
     - 3.2.1. BIOLOGIST SHALL IDENTIFY WHERE RELOCATED AQUATIC ORGANISMS WILL BE RELEASED FOR EACH WORK AREA PRIOR TO STARTING DEWATERING ACTIVITIES.
   - 3.3. ISOLATE THE WETTED STREAM CHANNEL AT THE UPSTREAM END OF THE LIMITS OF DISTURBANCE WITH BLOCK NETS. CLOSELY MONITOR ALL BLOCK NETS THROUGHOUT CONSTRUCTION TO ENSURE THEY STAY SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION.
   - 3.4. CONDUCT AN INITIAL SWEEP OF THE WETTED CHANNEL WITH SEIN NETS WITHIN THE WORK ZONE FROM UPSTREAM TO DOWNSTREAM.
   - 3.5. ISOLATE THE DOWNSTREAM END OF THE WETTED CHANNEL WITH BLOCK NETS.
   - 3.6. INSTALL DEWATERING EQUIPMENT AND BEGIN SLOWLY DEWATERING WHILE CONTINUING FISH RELOCATION ACTIVITIES.
4. DEWATERING/BYPASS FLOWS
   - 4.1. PUMPS: WHENEVER A PUMP IS USED TO DEWATER THE ISOLATION AREA AND ESA-LISTED FISH MAY BE PRESENT, A FISH SCREEN WILL BE USED THAT MEETS THE MOST CURRENT VERSION OF NMFS'S FISH SCREEN CRITERIA (NMFS 2011A). NMFS APPROVAL IS REQUIRED FOR PUMPING AT A RATE THAT EXCEEDS 3 CFS.
   - 4.2. TREAT ALL DISCHARGE WATER FROM DEWATERING ACTIVITIES WITHIN THE CONSTRUCTION AREA USING BEST MANAGEMENT PRACTICES TO REMOVE DEBRIS, SEDIMENT, PETROLEUM PRODUCTS, AND ANY OTHER POLLUTANTS LIKELY TO BE PRESENT.DEWATER THE SHORTEST LINEAR EXTENT OF WORK AREA PRACTICABLE.
   - 4.3. FLOW BYPASS SHALL BE PERFORMED AS SHOWN ON THE DRAWINGS, OR AS DIRECTED BY THE ENGINEER IN THE FIELD.
   - 4.4. RE-WATERING OF THE WORK AREA FOLLOWING CONSTRUCTION SHALL BE PERFORMED SLOWLY TO PREVENT LOSS OF SURFACE FLOW DOWNSTREAM AND ANY SUDDEN INCREASE IN STREAM TURBIDITY.
5. TEMPORARY CREEK CROSSING AND DIVERSION DAM INSTALLATION AND REMOVAL
   - 5.1. USE FLEXIBLE INTERMEDIATE BULK CONTAINERS (I.E. BULK BAGS) TO THE MAXIMUM EXTENT PRACTICABLE FOR CONSTRUCTION OF TEMPORARY CROSSING AND DIVERSION STRUCTURES. USE SMALLER GEOTEXTILE BAGS AS APPROPRIATE.
   - 5.2. INSTALL GEOTEXTILE SEPARATION FABRIC BETWEEN STREAM SUBSTRATE MATERIAL AND ANY CRUSHED ROCK USED FOR THE TEMPORARY CREEK CROSSING.
   - 5.3. AT THE CONCLUSION OF CONSTRUCTION REMOVE ALL MANMADE MATERIALS AND AGGREGATE BASE FROM THE CREEK CHANNEL. STREAMBED MATERIAL LEFT IN THE CREEK SHALL BE SPREAD SUFFICIENTLY FOR NO STREAMBED MATERIALS TO PROJECT ABOVE THE WATER SURFACE ELEVATION.

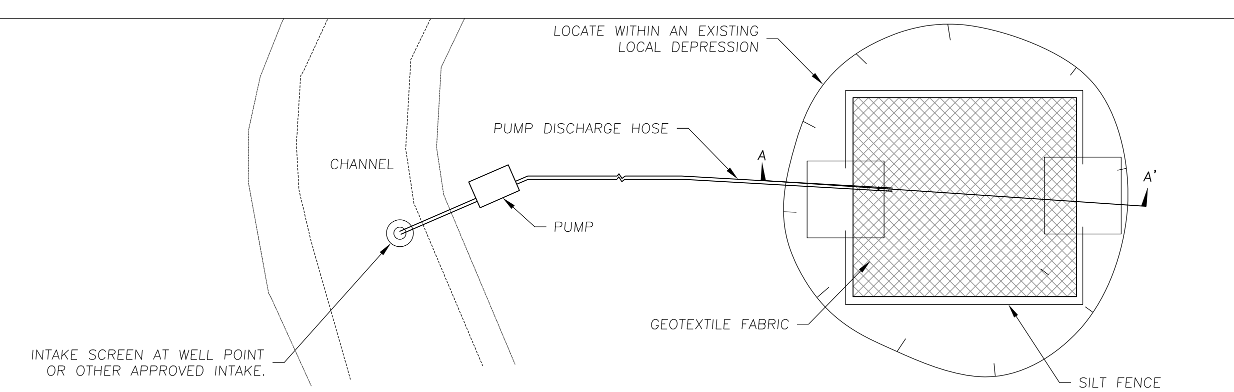


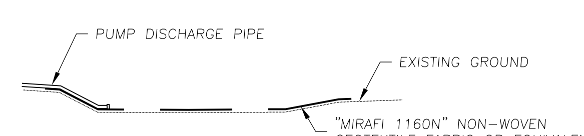
TEMPORARY CREEK CROSSING (1/C2)
SCALE: 1" = 3'



COFFERDAM PROFILE (2/C8)
SCALE: N.T.S.

NOTE: CONTRACTOR MAY USE ALTERNATE DAM DETAIL, SUBJECT TO APPROVAL OF THE ENGINEER AND THE PERMITTING AGENCIES.





SECTION A-A'

DEWATERING DISCHARGE AREA NOTES:

1. DEWATERING SHALL COMPLY WITH ALL PROJECT PERMITS.
2. THIS DETAIL REPRESENTS A POTENTIAL OPTION FOR DEWATERING OF WORK AREAS.
3. TURBID WATER RESULTING FROM DEWATERING ACTIVITIES WILL EITHER BE TREATED OR DISCHARGED TO A LOCAL DEPRSSION(S) TO INFILTRATE OR EVAPORATE.
4. TURBID WATERS WILL NOT BE ALLOWED TO DISCHARGE INTO PERMANENTE CREEK.
5. PROPOSED FILTRATION METHODS WILL BE FIELD-FIT TO EXISTING CONDITIONS AT THE TIME OF CONSTRUCTION, AS APPROVED BY THE ENGINEER.
6. REMOVE ACCUMULATED SEDIMENT AT THE COMPLETION OF DEWATERING ACTIVITIES AND DISPOSE OF AT AN APPROVED LOCATION.

WORK AREA DEWATERING (3/C8)
SCALE: N.T.S.

WATERWAYS CONSULTING INC.
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PORTLAND, OR 97205
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JAKE HOFELD — STATE OF WASHINGTON — PROFESSIONAL ENGINEER — 53337
EXPIRES: 4/9/2026

PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

STREAM NOTES AND CREEK CROSSING AND DEWATERING DETAILS

SATUS CREEK RM 20-25 RESTORATION PROJECT PHASE 1
100% DESIGN SUBMITTAL

DESIGNED BY:	J.H.
DRAWN BY:	M.M.
CHECKED BY:	J.H.
DATE:	11/6/2025
JOB NO.:	22-048

BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 — 1"

C8

HIP 4 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

1.A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.

1.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

2.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.

2.B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.

2.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.

2.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.

2.E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS

3.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.

3.B. THE SITE ASSESSMENT WILL SUMMARIZE:

3.B.1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;

3.B.2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;

3.B.3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND

3.B.4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING

4.A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.

4.B. AREAS TO BE FLAGGED WILL INCLUDE:

4.B.1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;

4.B.2. EQUIPMENT ENTRY AND EXIT POINTS;

4.B.3. ROAD AND STREAM CROSSING ALIGNMENTS;

4.B.4. STAGING, STORAGE, AND STOCKPILE AREAS; AND

4.B.5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS

5.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.

5.B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.

5.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.

5.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).

5.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.

5.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

6.A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.

6.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.

6.C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:

6.C.1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;

6.C.2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;

6.C.3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND

6.C.4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS

7.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.

7.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.

7.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.

7.D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT

8.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).

8.B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

8.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).

8.D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.

8.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.

8.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

9.A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:

9.A.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;

9.A.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;

9.A.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;

9.A.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;

9.A.5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND

9.A.6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.

9.B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:

9.B.1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND

9.B.2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT

10.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.

10.B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.

10.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.

10.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).

10.E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.

10.F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES

11.A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.

11.B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.

11.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.

11.D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.

11.E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.

11.F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

12. INVASIVE SPECIES CONTROL

12.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.

12.B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.

12.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.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES

1. FISH PASSAGE

1.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.

1.B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVISEMENT BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER

2.A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.

2.B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

2.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

3.A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.

3.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

4.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).

4.B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

5. SITE RESTORATION

5.A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.

5.B. PROJECT-RELATED WASTE WILL BE REMOVED.

5.C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.

5.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

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

6.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.

6.C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.

6.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.

6.E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.

6.F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.

6.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

7.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.

7.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

8.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.

8.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.

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.

B.1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.

B.2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.

B.3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.

B.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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JAKE D. HOFELD
EXPIRES: 4/9/2026

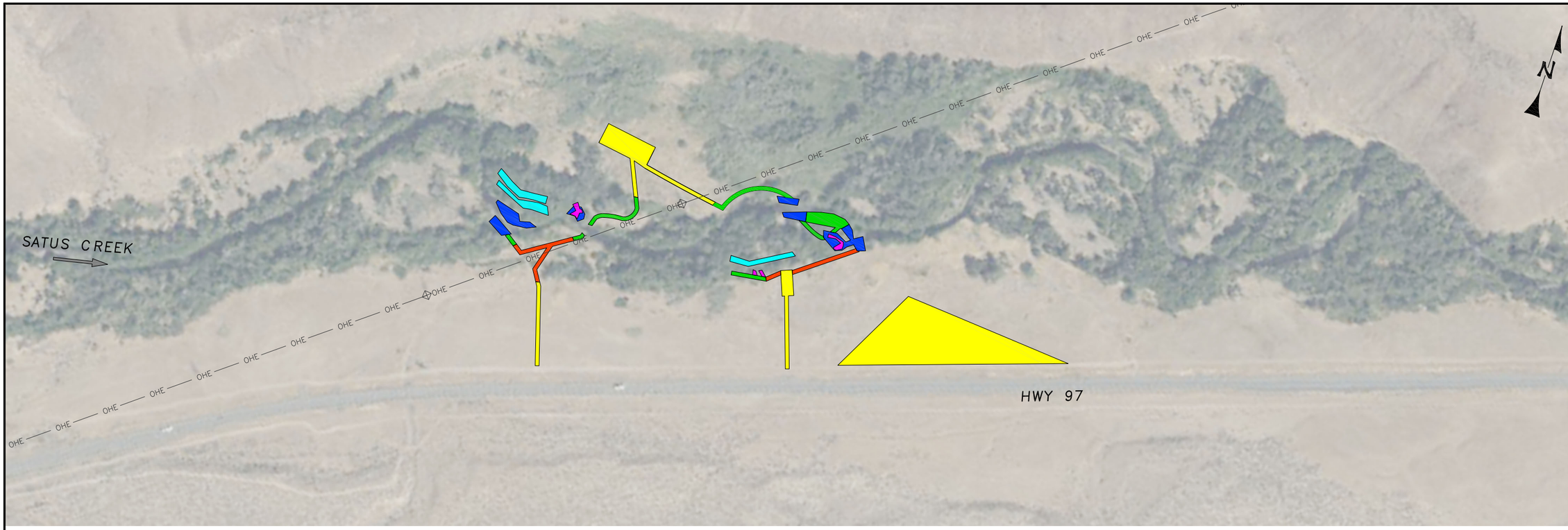
PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

HIP GENERAL CONSERVATION MEASURES

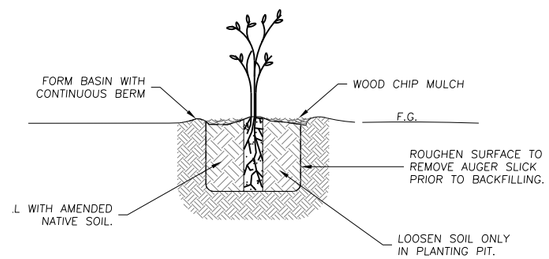
SATUS CREEK RM 20-25
RESTORATION PROJECT
PHASE 1
100% DESIGN SUBMITTAL

DESIGNED BY: J.H.
DRAWN BY: M.M.
CHECKED BY: J.H.
DATE: 11/6/2025
JOB NO.: 22-048

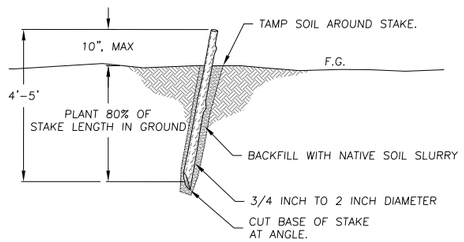
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"



PLANTING PLAN
SCALE: 1" = 200'



CONTAINER PLANTING
SCALE: N.T.S. — 1 / C10



LIVE STAKE
SCALE: N.T.S. — 2 / C10

LIVE STAKE NOTES
LIVE STAKES SHALL CONSIST OF LOCALLY-OBTAINED, NATIVE WILLOW SPECIES.

PREPARATION
1. CUT LIVE STAKE CUTTINGS WITH SHARP PRUNING SHEARS OR WITH A SHARP SAW BLADE, WITHOUT CAUSING INJURY TO THE BARK OR SPLITTING OF THE ENDS. ANGLE THE BUTT END OF THE CUTTING AND KEEP THE TOP END SQUARE. REMOVE ALL SIDE BRANCHES WITH SHARP PRUNING SHEARS. CUT FLUSH WITH STAKE, WITHOUT CAUSING INJURY.

2. CUT LIVE STAKES IN LENGTHS FROM 4 TO 5 FEET AND 0.75 TO 2.0 INCHES IN DIAMETER.

INSTALLATION
1. INSTALL LIVE STAKES WITHIN 6 HOURS OF BEING CUT OR SUBMERGE THEM IN CLEAN FRESH WATER FOR 24 HOURS, MIN. PRIOR TO INSTALLATION. DO NOT SOAK LIVE STAKES FOR MORE THAN 5 DAYS PRIOR TO INSTALLATION.

2. INSTALL LIVE STAKES WITH AT LEAST 2 BUDS AND/OR BUD SCARS ABOVE THE GROUND AFTER PLANTING.

3. INSTALL LIVE STAKES AS DEEP AS POSSIBLE INTO THE SOIL, PREFERABLY WITH 80% OF ITS LENGTH IN CONTACT WITH NATIVE SOIL. USE OF A POWER AUGER OR PILOT BAR MAY HELP WITH INSTALLATION.

4. DO NOT DAMAGE THE BUDS, SPLIT STAKE ENDS, OR STRIP THE BARK DURING INSTALLATION.

LEGEND

- OHE — EXISTING OVERHEAD POWER LINE
- EXISTING SATUS CREEK CENTERLINE
- UPLAND RIPARIAN EDGE (TABLES 1 AND 2)
- WILLOW ZONE (TABLE 8)
- RIPARIAN ZONE (TABLES 5 AND 6)
- RIPARIAN PLUGS (TABLES 5 AND 7)
- ALDER TIPPING ZONE (TABLE 9)
- UPLAND SHRUBSTEPPE (TABLES 1, 3, AND 4)

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JAKE HOFFELD — WASHINGTON — STATE OF — REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 4/9/2026

PREPARED AT THE REQUEST OF:
YAKAMA NATION FISHERIES

PLANTING PLAN

SATUS CREEK RM 20-25
RESTORATION PROJECT
PHASE 1
100% DESIGN SUBMITTAL

DESIGNED BY: J.H.
DRAWN BY: M.M.
CHECKED BY: J.H.
DATE: 11/6/2025
JOB NO.: 22-048

BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 — 1"

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TABLE 1: UPLAND SEED MIX

SPECIES	COMMON NAME	PERCENT	LBS
ACHILLEA MILLEFOLIUM	YARROW	5	3
AGROPYRON SPICATUS	BLUEBUNCH WHEATGRASS	15	9
CREPIS ATRABARBA	SLENDER HAWKSBEARD	5	3
ELYMUS CINEREUS	GIANT WILDRYE	10	6
ERIGERON PIPERIANUS	PIPER'S DAISY	5	3
ERIOGONUM DOUGLASII	DOUGLAS' BUCKWHEAT	5	3
ERIOGONUM MICROTHECUM	SLENDERBRUSH BUCKWHEAT	5	3
FESTUCA IDAHOENSIS	IDAHO FESCUE	15	9
LUPINUS SERICEUS	SILKY LUPINE	5	3
OENOTHERA PALLIDA	PALE EVENING-PRIMROSE	5	3
PENSTEMON TRIPHYLLUS	PENTEMON	5	3
SOLIDAGO CANADENSIS	CANADA GOLDENROD	5	3
STENOTUS STENOPHYLLUS	NARROWLEAF GOLDENWEED	5	3
STIPA COMATA	NEEDLE-AND-THREAD GRASS	10	6

NOTES:

1. ACRES: 3.7 ACRES
   POUNDS PER ACRE: 20 LB/ACRE
   TOTAL POUNDS: 74 LB.

TABLE 2: UPLAND SHRUBS TREE BUFFER

SPECIES	COMMON NAME	PERCENT	TOTAL	SIZE	TYPE
ARTEMISIA TRIDENTATA	BIG SAGEBRUSH	30	90	#1	SHRUB
ARTEMISIA TRIPARTITA	THREETIP SAGEBRUSH	10	30	#1	SHRUB
PHILADELPHUS LEWISII	MOCK-ORANGE	10	30	#1	SHRUB
PURSHIA TRIDENTATA	BITTERBRUSH	25	75	#1	SHRUB
ROSA NUTKANA	NOOTKA ROSE	15	45	#1	SHRUB
SYMPHORICARPOS ALBUS	COMMON SNOWBERRY	10	30	#1	SHRUB

NOTES:

1. ACRES: 0.25 ACRES
   STEMS PER ACRE: 1200 STEMS/ACRE
   TOTAL PLANTS: 300

TABLE 3: UPLAND SHRUBS

SPECIES	COMMON NAME	PERCENT	STEMS	SIZE	TYPE
AMELANCHIER ALNIFOLIA	SASKATOON	2.5	102	#1	TREE
ARTEMISIA TRIDENTATA	BIG SAGEBRUSH	15	612	#1	SHRUB
ARTEMISIA TRIPARTITA	THREETIP SAGEBRUSH	10	408	#1	SHRUB
CRATAEGUS DOUGLASII	BLACK HAWTHORN	2.5	102	#1	TREE
PHILADELPHUS LEWISII	MOCK-ORANGE	10	408	#1	SHRUB
POPULUS TRICHOCARPA	BLACK COTTONWOOD	2.5	102	#1	TREE
PRUNUS VIRGINIANA	CHOKE CHERRY	2.5	102	#1	TREE
PURSHIA TRIDENTATA	BITTERBRUSH	10	408	#1	SHRUB
ROSA NUTKANA	NOOTKA ROSE	15	612	#1	SHRUB
ROSA WOODSII	WOOD'S ROSE	10	408	#1	SHRUB
SACOBATUS VERMICULATUS	BLACK GREASEWOOD	10	408	#1	SHRUB
SYMPHORICARPOS ALBUS	COMMON SNOWBERRY	10	408	#1	SHRUB

NOTES:

1. ACRES: 3.4 ACRES
   STEMS PER ACRE: 1200 STEMS/ACRE
   TOTAL PLANTS: 4080

TABLE 4: UPLAND PLUGS

SPECIES	COMMON NAME	PERCENT	PLUGS	TYPE
ACHILLEA MILLEFOLIUM	YARROW	10	658	PLUGS
CREPIS ATRABARBA	SLENDER HAWKSBEARD	10	658	PLUGS
ERIGERON PIPERIANUS	PIPER'S DAISY	10	658	PLUGS
FESTUCA IDAHOENSIS	IDAHO FESCUE	10	658	PLUGS
LUPINUS SERICEUS	SILKY LUPINE	10	658	PLUGS
OENOTHERA PALLIDA	PALE EVENING-PRIMROSE	10	658	PLUGS
PENSTEMON TRIPHYLLUS	PENTEMON	10	658	PLUGS
SOLIDAGO CANADENSIS	CANADA GOLDENROD	10	658	PLUGS
STENOTUS STENOPHYLLUS	NARROWLEAF GOLDENWEED	10	658	PLUGS
STIPA COMATA	NEEDLE-AND-THREAD GRASS	10	658	PLUGS

NOTES:

1. ACRES: 3.4 ACRES
   PLUGS PER ACRE: 1936 PLUGS/ACRE
   TOTAL PLUGS: 6580

TABLE 5: RIPARIAN SEED MIX

SPECIES	COMMON NAME	PERCENT	LBS
AGROSTIS SCABRA	HAIR BENTGRASS	15	9.54
CAREX ATHROSTACHYA	SLENDER-BEAKED SEDGE	10	6.36
CAREX DEWEYANA	DEWEY'S SEDGE	10	6.36
ELEOCHARIS PALUSTRIS	CREEPING SPIKERUSH	10	6.36
ELYMUS GLAUCUS	BLUE WILDRYE	15	9.54
FESTUCA IDAHOENSIS	IDAHO FESCUE	15	9.54
LUPINUS POLYPHYLLUS	LARGE-LEAVED LUPINE	5	3.18
PLANTAGO MAJOR	COMMON PLANTAIN	5	3.18
SENECIO PSEUDAURENS SSP. PSEUDAUREUS	STREAMBANK BUTTERWEED	5	3.18
STIPA COMATA	NEEDLE-AND-THREAD GRASS	10	6.36

NOTES:

1. ACRES: 0.6 ACRES
   POUNDS PER ACRE: 20 LB/ACRE
   TOTAL POUNDS: 12 LB.

TABLE 6: RIPARIAN TREES AND SHRUBS

SPECIES	COMMON NAME	PERCENT	TOTAL	SIZE	TYPE
AMELANCHIER ALNIFOLIA	WESTERN SERVICEBERRY	4	52	#1	TREE
CORNUS STOLONIFERA	RED-OSIER DOGWOOD	6	78	#1	SHRUB
CORYLUS CORNUTA	BEAKED HAZELNUT	5	65	#1	SHRUB
CRATAEGUS DOUGLASII	BLACK HAWTHORN	4	52	#1	TREE
LONICERA INVOLUCRATA	BLACK TWINBERRY	6	78	#1	SHRUB
LONICERA UTAHENSIS	UTAH HONEYSUCKLE	5	65	#1	SHRUB
PHILADELPHUS LEWISII	MOCK-ORANGE	5	65	#1	SHRUB
PHYSOCARPUS MALVACEUS	MALLOW NINEBARK	5	65	#1	SHRUB
POPULUS TRICHOCARPA	BLACK COTTONWOOD	4	52	#1	TREE
PRUNUS VIRGINIANA	CHOKECHERRY	4	52	#1	TREE
RIBES AUREUM	GOLDEN CURRANT	5	65	#1	SHRUB
ROSA WOODSII	WOOD'S ROSE	5	65	#1	SHRUB
RUBUS PARVIFLORUS	THIMBLEBERRY	6	78	#1	SHRUB
SALIX AMYGDALOIDES	PEACHLEAF WILLOW	5	65	#1	SHRUB
SALIX EXIGUA	COYOTE WILLOW	5	65	#1	SHRUB
SALIX SCOULERIANA	SCOULER'S WILLOW	4	52	#1	TREE
SAMBUCUS CERULEA	BLUE ELDERBERRY	7	91	#1	SHRUB
SPIRAEA BETULIFOLIA VAR. LUCIDA	BIRCH-LEAVED SPIRAEA	5	65	#1	SHRUB
SPIRAEA DOUGLASII	DOUGLAS SPIRAEA	5	65	#1	SHRUB
SYMPHORICARPOS ALBUS	COMMON SNOWBERRY	5	65	#1	SHRUB

NOTES:

1. ACRES: 0.5 ACRES
   STEMS PER ACRE: 2600 STEMS/ACRE
   TOTAL PLANTS: 1300

TABLE 7: RIPARIAN PLUGS

SPECIES	COMMON NAME	PERCENT	PLUGS	TYPE
CAREX ATHROSTACHYA	SLENDER-BEAKED SEDGE	25	436	PLUGS
CAREX DEWEYANA	DEWEY'S SEDGE	25	436	PLUGS
ELEOCHARIS PALUSTRIS	CREEPING SPIKERUSH	25	436	PLUGS
LUPINUS POLYPHYLLUS	LARGE-LEAVED LUPINE	15	261	PLUGS
PLANTAGO MAJOR	COMMON PLANTAIN	5	87	PLUGS
SENECIO PSEUDAURENS SSP. PSEUDAUREUS	STREAMBANK BUTTERWEED	5	87	PLUGS

NOTES:

1. ACRES: 0.1 ACRES
   PLUGS PER ACRE: 17,424 PLUGS/ACRE
   TOTAL PLUGS: 1743

TABLE 8: WILLOW ZONE

CUTTINGS/CONTAINERS

SPECIES	COMMON NAME	PERCENT	STEMS	SIZE	TYPE
SALIX AMYGDALOIDES	PEACHLEAF WILLOW	5	125	CUTTING	SHRUB
SALIX AMYGDALOIDES	PEACHLEAF WILLOW	10	250	#1	SHRUB
SALIX EXIGUA	COYOTE WILLOW	10	250	CUTTING	SHRUB
SALIX EXIGUA	COYOTE WILLOW	25	625	#1	SHRUB
SALIX LASIANDRA	PACIFIC WILLOW	10	250	CUTTING	TREE
SALIX LASIANDRA	PACIFIC WILLOW	20	500	#1	TREE
SALIX SCOULERIANA	SCOULER WILLOW	20	500	#1	SHRUB

POLES

SPECIES	COMMON NAME	PERCENT	STEMS	SIZE	TYPE
SALIX LASIANDRA	PACIFIC WILLOW	1	218	POLE	TREE

NOTES:

1. ACRES: 0.50 ACRES
   CUTTINGS/CONTAINER STEMS PER ACRE: 5000
   TOTAL WILLOWS: 2500
   POLE STEMS PER ACRE: 436
   TOTAL POLES: 218

TABLE 9: ALDER ZONE

SPECIES	COMMON NAME	PERCENT	TOTAL	SIZE	TYPE
AMELANCHIER ALNIFOLIA	WESTERN SERVICEBERRY	5	52	#1	TREE
CORNUS STOLONIFERA	RED-OSIER DOGWOOD	5	52	#1	SHRUB
CORYLUS CORNUTA	BEAKED HAZELNUT	5	52	#1	SHRUB
CRATAEGUS DOUGLASII	BLACK HAWTHORN	5	52	#1	TREE
LONICERA INVOLUCRATA	BLACK TWINBERRY	5	52	#1	SHRUB
LONICERA UTAHENSIS	UTAH HONEYSUCKLE	5	52	#1	SHRUB
PHILADELPHUS LEWISII	MOCK-ORANGE	5	52	#1	SHRUB
PHYSOCARPUS MALVACEUS	MALLOW NINEBARK	5	52	#1	SHRUB
POPULUS TRICHOCARPA	BLACK COTTONWOOD	5	52	#1	TREE
PRUNUS VIRGINIANA	CHOKECHERRY	5	52	#1	TREE
RIBES AUREUM	GOLDEN CURRANT	5	52	#1	SHRUB
ROSA WOODSII	WOOD'S ROSE	5	52	#1	SHRUB
RUBUS PARVIFLORUS	THIMBLEBERRY	5	52	#1	SHRUB
SALIX AMYGDALOIDES	PEACHLEAF WILLOW	5	52	#1	SHRUB
SALIX EXIGUA	COYOTE WILLOW	5	52	#1	SHRUB
SALIX SCOULERIANA	SCOULER'S WILLOW	5	52	#1	TREE
SAMBUCUS CERULEA	BLUE ELDERBERRY	5	52	#1	SHRUB
SPIRAEA BETULIFOLIA VAR. LUCIDA	BIRCH-LEAVED SPIRAEA	5	52	#1	SHRUB
SPIRAEA DOUGLASII	DOUGLAS SPIRAEA	5	52	#1	SHRUB
SYMPHORICARPOS ALBUS	COMMON SNOWBERRY	5	52	#1	SHRUB

NOTES:

1. ACRES: 0.4 ACRES
   STEMS PER ACRE: 2600 STEMS/ACRE
   TOTAL PLANTS: 1040

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PLANTING TABLES

SATUS CREEK RM 20-25
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BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
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