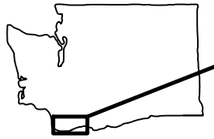
Exhibit G
Project Plans

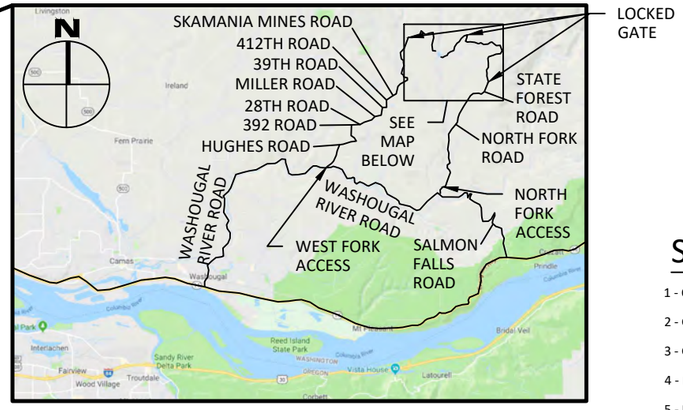
KWONEESUM DAM

FINAL REMOVAL DESIGN

SKAMANIA COUNTY, WASHINGTON

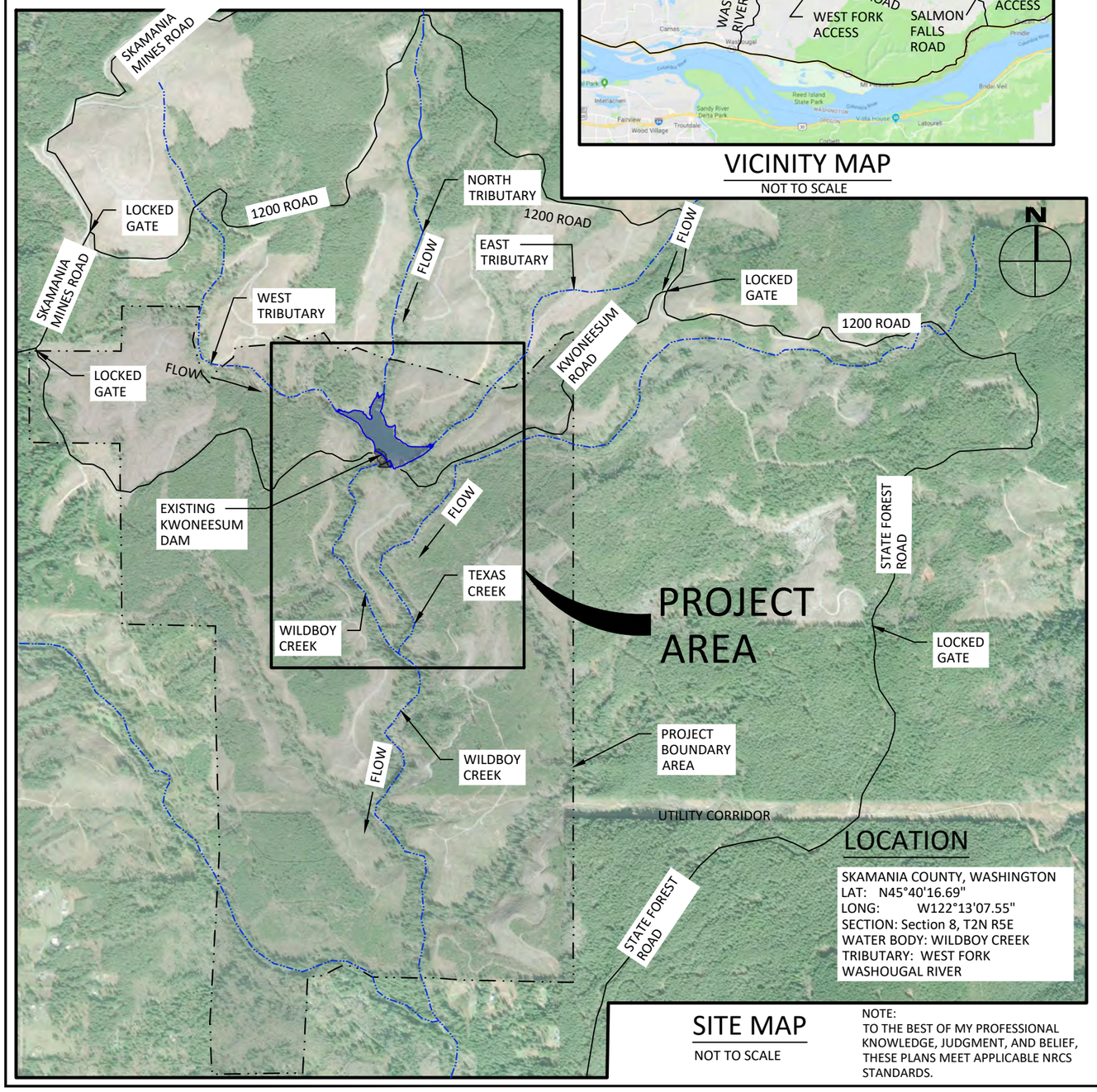
NOVEMBER 17, 2023





VICINITY MAP

NOT TO SCALE



SITE MAP

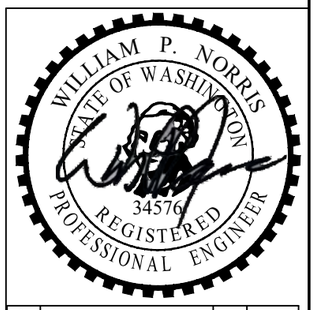
NOT TO SCALE

LOCATION

SKAMANIA COUNTY, WASHINGTON
LAT: N45°40'16.69"
LONG: W122°13'07.55"
SECTION: Section 8, T2N R5E
WATER BODY: WILDBOY CREEK
TRIBUTARY: WEST FORK WASHOUGAL RIVER

NOTE:
TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGMENT, AND BELIEF, THESE PLANS MEET APPLICABLE NRCS STANDARDS.

SHEET INDEX



REV:	DESCRIPTION:	BY:	DATE:
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2	-	-	-
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PARR excellence
302 W. Steuben St. #6
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CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: COVER, SHEET INDEX, AND PROJECT LOCATION

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	1	74

GENERAL NOTES

1. THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID SITE MEETING.
2. THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH OWNER PRIOR TO BEGINNING CONSTRUCTION.
3. ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE 2023 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT), AND LOCAL STANDARDS UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL.

WDFW IN-WATER WORK PERIODS

1. IN-WATER WORK SHALL OCCUR DURING THE PERMITTED IN-WATER WORK PERIOD STATED IN THE HYDRAULIC PROJECT APPROVAL.
2. IN-WATER WORK PERIOD FOR 2024 IS MAY 15TH TO SEPTEMBER 30TH.

EXISTING DATA

1. TOPOGRAPHIC DATA COLLECTED BY PARR EXCELLENCE USING RTK, TOTAL STATION, HYDROLITE (SONAR) AND DRONE BASED SFM FROM OCTOBER TO NOVEMBER 2018 AND SPRING 2023; GIS DATA PROVIDED BY VARIOUS AGENCIES INCLUDING AERIAL PHOTOGRAPHY, LIDAR, FISH USE, SURFACE SOILS INFORMATION, LAND OWNERSHIP, AND TRANSPORTATION ROUTES.
2. EXISTING DAM INFORMATION INCLUDED IN DEPARTMENT OF ECOLOGY DAM SAFETY REPORT (2006) INCLUDED SCANS OF DESIGN PLANS AND CH2M HILL SKETCH OF PRE-DAM TOPOGRAPHY.
3. HORIZONTAL DATUM: NAD83 WASHINGTON STATE PLANES, SOUTH ZONE, US FOOT
4. VERTICAL DATUM: NAVD88
5. HISTORICAL PHOTOS PROVIDED AS SUPPLEMENTAL INFORMATION. SEE GEODESIGN REPORT PROVIDED AS SUPPLEMENTAL INFORMATION.

SOILS

1. RESERVOIR SOILS WERE HIGHLY DISTURBED DURING DAM CONSTRUCTION, SEE HISTORICAL PHOTOS PROVIDED AS SUPPLEMENTAL INFORMATION. SEE GEODESIGN REPORT PROVIDED AS SUPPLEMENTAL INFORMATION.
2. SUBSURFACE SOILS ARE EXPECTED TO BE SILT, CLAY, SAND AND GRAVEL. CONTRACTOR SHALL CONDUCT OWN INVESTIGATIONS IF ADDITIONAL DATA IS REQUIRED AT NO ADDITIONAL COST.
3. SOILS ON SITE ARE MAPPED AS KINNEY LOAM (MAP UNITS 57, 58, & 59) AND WATER (MAP UNIT 177)
4. HTTPS://WEBSOILSURVEY.SC.EGOV.USDA.GOV
5. NON-SOIL DEBRIS MAY BE PRESENT IN EXCAVATION AREAS.

UTILITIES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.
2. THE CONTRACTOR SHALL CALL (800-424-5555) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.
4. THE CONTRACTOR SHALL PROVIDE EQUIPMENT OR LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST.

CONSTRUCTION ACCESS

1. ACCESS ROAD ALIGNMENTS WILL BE FLAGGED IN THE FIELD AND APPROVED PRIOR TO CLEARING. MINOR REROUTING OF ACCESS ROADS WILL OCCUR TO AVOID IMPACTING TREES GREATER THAN 12 INCH DBH.
2. ALL SAPLINGS AND TREES TO BE TRANSPLANTED OR REMOVED SHALL BE CLEARLY MARKED AND APPROVED BY THE OWNER.
3. ALL EQUIPMENT, MATERIALS AND PERSONNEL SHALL REMAIN WITHIN THE LIMITS OF DISTURBANCE. ACCESS LOCATIONS AND ALIGNMENTS MAY CHANGE WITHIN THE LIMITS OF DISTURBANCE ONLY IF APPROVED IN WRITING BY OWNER.
4. THE CONTRACTOR SHALL KEEP THE WORK AREAS IN NEAT CONDITION, FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.
5. ALL DISTURBED AREAS INCLUDING ROADS, DRIVEWAYS AND ACCESS ROUTES SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER AND RE-VEGETATED PER PLANS.

EROSION CONTROL

1. CONTRACTOR SHALL BE SOLELY RESPONSIBLE AT OWN EXPENSE FOR PROVIDING AND MAINTAINING ALL NECESSARY EROSION CONTROL FACILITIES TO COMPLY WITH APPLICABLE EROSION CONTROL REGULATIONS AND TO MAINTAIN CLEAN ACCESS ROUTES.

CONSTRUCTION STAKING

1. OWNER WILL PROVIDE STAKING, GRADE STAKES, AND ELEVATION CONTROL POINTS. SOME FIELD ADJUSTMENTS TO THE LINES AND GRADES ARE TO BE EXPECTED.
2. THE CONTRACTOR SHALL REPLACE DAMAGED OR DESTROYED CONSTRUCTION STAKES AT NO ADDITIONAL COST.

CONSTRUCTION MATERIALS

1. CONTRACTOR SHALL ALLOW FOR EXPANSION OF EXCAVATED MATERIAL AND COMPACTION OF PLACED MATERIAL AT NO ADDITIONAL MEASURE OR COST. MEASUREMENT AND PAYMENT SHALL NOT BE BASED ON WEIGHT TICKETS OR TRUCK MEASURE WITHOUT PRIOR WRITTEN APPROVAL.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS. LOCATION, ALIGNMENT, AND ELEVATION ARE SUBJECT TO ADJUSTMENT BASED ON FIELD CONDITIONS, ENCOUNTERED BEDROCK, AND MATERIAL SIZE.
3. ANY EXCESS MATERIAL SHALL BE STOCKPILED NEATLY IN AN APPROVED LOCATION OF THE STOCKPILE AND STAGING AREA.

TREE SALVAGE

1. VEGETATION REMOVED FROM TEMPORARILY DISTURBED AREAS, INCLUDING TEMPORARY ACCESS ROADS/ROUTES, SHALL BE SALVAGED, STOCKPILED AND RE-USED FOR DECOMMISSIONING OF THOSE AREAS OR INCORPORATED INTO LARGE WOOD STRUCTURES, OR PLACED AS FLOODPLAIN WOOD AS DIRECTED BY THE OWNER.
2. REMOVED VEGETATION, INCLUDING TREES UP TO 12" DBH SHALL BE INCORPORATED INTO LARGE WOOD STRUCTURES AS SLASH AT NO ADDITIONAL COST. VEGETATION LARGER THAN 12" DIAMETER AND 30' LENGTH SHALL BE USED AS STRUCTURAL ELEMENTS. SMALLER MATERIAL SHALL BE USED AS SLASH.
3. SELECT SALVAGED, SMALL TREES REMOVED WITHIN CLEARING LIMITS SHALL BE REMOVED WHOLE WITH ROOT WAD AND USED IN RESTORATION CONSTRUCTION. SELECT, LARGE SALVAGED TREES SHALL BE REMOVED WHOLE WITH ROOT WAD ATTACHED AND USED IN RESTORATION CONSTRUCTION AS DIRECTED BY OWNER. TREES FOR REMOVAL WILL BE FLAGGED BY OWNER FOLLOWING STAKING AND PRIOR TO CONSTRUCTION.

LIVE TREES

1. ALL TREES NOT MARKED FOR REMOVAL SHALL BE LEFT STANDING UNDISTURBED. CONSTRUCTION ACTIVITY SHALL NOT DEBARK OR DAMAGE LIVE TREES.
2. KEEP OUT OF DRIP LINE OF EXISTING TREES TO REMAIN.

CONTRACTOR

1. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING PLANS, INCLUDING THEIR MEANS AND METHODS OF PERFORMANCE FOR THEIR TESC PLAN FOR OWNER REVIEW AND APPROVAL:

A. TEMPORARY STREAM DIVERSION PLAN FROM TRIBUTARIES AND AROUND RESERVOIR, INCLUDING PUMPING. REMOVAL OF ALL EQUIPMENT AND PIPING FOLLOWING SURFACE WATER DIVERSIONS.

B. INITIAL DRAW DOWN PLAN, INCLUDING SILT TURBIDITY CURTAIN, FLOATING INTAKES, SECURING AND MOVING SILT TURBIDITY CURTAIN AND FLOATING INTAKES, PIPING, PUMPING, SPRAYERS AND SPRAYER PLATFORMS AND ALL OTHER METHODS PROPOSED BY CONTRACTOR.

C. STORM WATER POLLUTION PROTECTION PLAN (SWPPP).

D. RESERVOIR SEDIMENTS DEWATERING, INCLUDING: PROPOSED METHODS, SITE IMPACTS AND RESTORATION OF SITE IMPACTS REMOVAL OF ALL EQUIPMENT FOLLOWING DEWATERING INCLUDING ANY PROPOSED MODIFICATIONS TO FINAL GRADING.

E. DAM MATERIAL HANDLING AND DISPOSAL.

F. PLAN TO PROVIDE TOPSOIL TYPE B FOR NATIVE VEGETATION ESTABLISHMENT IN RESERVOIR AND AREAS USED FOR SEDIMENT DEWATERING.

G. MEANS AND METHODS DEPICTED IN PLANS ARE CONCEPTUAL IN NATURE. CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGNS WITH EQUAL PERFORMANCE THAT SATISFY REGULATORY REQUIREMENTS, MINIMIZE COST AND ACCELERATE THE SCHEDULE FOR OWNER REVIEW.

FISH SALVAGE AND EXCLUSION PLAN

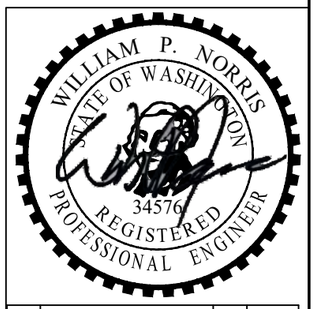
1. THE OWNER SHALL LEAD AND BE RESPONSIBLE FOR FISH SALVAGE. FISH AND FRESH WATER MUSSEL SALVAGE WILL INCLUDE ASSISTANCE FROM WDFW AND CONTRACTOR STAFF. CONTRACTOR TO PROVIDE PUMPS, HOSES AND LABOR TO DEWATER KWONEESUM RESERVOIR, WILDBOY CREEK, AND TRIBUTARIES POOL BY POOL AND PROVIDE TIME AND MATERIALS RATES FOR LABOR ASSISTANCE AND PROVIDE TIME AND MATERIALS RATES PER BID SHEET FOR FISH EXCLUSION ASSISTANCE.
2. THE CONTRACTOR SHALL PLAN OPERATIONS TO ANTICIPATE AND ALLOW FOR FISH EXCLUSION AND PROVIDE TWO WEEKS NOTICE TO THE OWNER PRIOR FISH RESCUE OPERATIONS. THE CONTRACTOR SHALL PROVIDE TWO LABORERS, PUMPS, PUMP SCREENS, AND A VEHICLE TO TRANSPORT LABORERS, EQUIPMENT, AND BUCKETS WITH SALVAGED FISH.
3. WHEN PUMPING IS REQUIRED, THE CONTRACTOR SHALL ISOLATE THE WORK AREA(S) WHEN FISH ARE PRESENT, AND PROVIDE A PUMP INTAKE FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 2011, OR MOST CURRENT). WIDER MESH SCREENS MAY BE USED AFTER ALL FISH HAVE BEEN REMOVED FROM THE ISOLATED AREA. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES SHALL TAKE PLACE 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 TO FISH SPECIES PRESENT.
4. DURING INITIAL DRAW DOWN OF THE RESERVOIR, PUMP INTAKES MUST BE SCREENED AS PER REGULATORY REQUIREMENTS. FOR PUMPING OF DIVERTED FLOWS, TRIBUTARY INTAKES MUST BE SCREENED AS PER REGULATORY PERMIT REQUIREMENTS FOR THE DURATION OF THE PROJECT. THE CONTRACTOR SHALL SCREEN, AND MAINTAIN TRIBUTARY DIVERSION INLETS WITH SEINE NETS SIZED AS PER REGULATORY PERMIT REQUIREMENTS AND SECURED WITH SANDBAGS OR EQUIVALENTS IF APPROVED BY OWNER.
5. FOR TEMPORARY ACCESS ROAD/ROUTE CROSSINGS OF TRIBUTARIES, PRIOR TO CONTRACTOR CONDUCTING ANY IN-WATER WORK, THE OWNER SHALL CONDUCT FISH SALVAGE/RESCUE WITHIN THE PROPOSED IN-WATER WORK AREAS.
6. THE OWNER SHALL BE RESPONSIBLE FOR SALVAGING ALL SALVAGEABLE FISH AND FRESHWATER MUSSELS TRAPPED IN RESIDUAL POOLS WITHIN THE PROJECT AREA. THEY WILL BE CAREFULLY COLLECTED BY SEINE AND/OR DIP NETS AND PLACED IN CLEAN TRANSFER CONTAINERS WITH ADEQUATE VOLUMES OF FRESH RIVER WATER.
7. ALL FISH AND FRESHWATER MUSSELS TRAPPED IN RESIDUAL POOLS WITHIN THE PROJECT AREA WILL BE CAREFULLY COLLECTED BY SEINE AND/OR DIP NETS AND PLACED IN CLEAN TRANSFER CONTAINERS WITH ADEQUATE VOLUME OF FRESH RIVER WATER.
8. FISH SHALL BE EXCLUDED FROM THE WORK AREA WITH SEINE NET OR OTHER METHOD APPROVED BY WDFW AND OWNER PERSONNEL.

RESERVOIR

1. FISH SALVAGE IN THE RESERVOIR SHALL OCCUR AFTER THE INITIAL DRAW DOWN OF THE RESERVOIR TO CONCENTRATE FISH IN A REDUCED AREA.
2. WDFW WILL ASSIST THE FISH SALVAGE/RESCUE EFFORT WITH THEIR ELECTRO-FISHING BOAT. THE CONTRACTOR SHALL ASSIST WDFW STAFF IN LAUNCHING AND TRAILERING THEIR ELECTRO-FISHING BOAT DUE TO POTENTIAL ACCESS CONSTRAINTS DUE TO WATER LEVELS/DRAW DOWN CONDITIONS. ELECTRO-FISHING SHALL CONTINUE UNTIL WDFW OR OWNER CONFIRM ALL SALVAGEABLE FISH HAVE BEEN SALVAGED.

WILDBOY CREEK

1. THE CONTRACTOR SHALL PERFORM FISH EXCLUSION IN WILDBOY CREEK WITH ASSISTANCE FROM THE COWLITZ INDIAN TRIBE FISHERIES BIOLOGIST. FISH SALVAGE SHALL INCLUDE THE CONTRACTOR PROVIDING SCREENED INTAKE PUMPS AND OPERATING THE PUMPS TO CONCENTRATE FISH IN POOLS. THE POOLS SHALL BE PUMPED DOWN TO ALLOW FOR SYSTEMATIC SEINE NETTING THROUGH THE WORK AREAS. FOLLOWING SEINE NETTING, THE WORK AREAS WILL BE ISOLATED TO EXCLUDE FISH WITH SEINE NETS THAT MUST BE KEPT CLEAN OF DEBRIS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SKIMMING DEBRIS OFF SEINE NETS THROUGHOUT CONSTRUCTION. AFTER OWNER COMPLETES FISH SALVAGE/RESCUE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING APPROPRIATELY SIZED SEINES OR EQUIVALENTS FOR FISH EXCLUSION FOR THE DURATION OF THE PROJECT. CONTRACTOR SHALL ALSO MAINTAIN FISH EXCLUSION MEASURES (SEINES OR EQUIVALENTS) FOR THE DURATION OF THE PROJECT.



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TEMPORARY EROSION SEDIMENTATION CONTROL (TESC) PLAN

1. THE TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) MEASURES DEPICTED IN THESE DRAWINGS IS FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING EROSION CONTROL MEASURES TO COMPLY WITH APPLICABLE REGULATIONS.

2. THE TESC PLAN MEASURES DEPICTED IN THESE DRAWINGS WILL PROVIDE A GUIDELINE FOR THE CONTRACTOR TO DEVELOP AND IMPLEMENT AN TESC PLAN.

3. THE IMPLEMENTATION OF AN TESC PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE TESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.

4. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.

5. THE CONTRACTOR'S TESC FACILITIES ARE TO BE CONSTRUCTED PRIOR TO CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER SURFACE WATERS, THE DRAINAGE SYSTEM, OR VIOLATE APPLICABLE WATER STANDARDS.

6. THE TESC MEASURES DEPICTED IN THESE DRAWINGS ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THE CONTRACTOR'S TESC FACILITIES SHALL BE UPGRADED AS NEEDED AT NO ADDITIONAL COST FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.

7. THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.

8. THE CONTRACTOR'STESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 24 HOURS FOLLOWING A STORM EVENT.

9. STABILIZED CONSTRUCTION ENTRANCES AND ADDITIONAL MEASURES MAY BE REQUIRED AND SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT TO ENSURE ALL ACCESS ROADS ARE KEPT CLEAN, MAINTAINED THROUGHOUT CONSTRUCTION, AND LEFT AT CONTRACTOR DEMOBILIZATION IN EQUAL OR BETTER CONDITION AT NO ADDITIONAL COST.

INSPECTION AND MAINTENANCE

1. ALL TESC FACILITIES SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL TESC FACILITIES SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD AND AFTER EVENTS EXCEEDING 2 HOURS DURATION. TURBIDITY MONITORING SHALL OCCUR AS PER ALL PERMIT REQUIREMENTS.

CONTRACTOR'S TESC RECORD

1. WEEKLY REPORTS SUMMARIZING THE SCOPE OF INSPECTIONS, THE PERSONNEL CONDUCTING THE INSPECTION, THE DATE(S) OF THE INSPECTION, MAJOR OBSERVATIONS RELATING TO THE IMPLEMENTATION OF THE CONTRACTOR'S EROSION AND SEDIMENT CONTROL PLAN, AND ACTIONS TAKEN AS A RESULT OF THESE INSPECTIONS SHALL BE PREPARED AND RETAINED ON SITE BY THE CONTRACTOR. IN ADDITION, A RECORD OF THE FOLLOWING DATES SHALL BE INCLUDED IN THE REPORTS:

A. WHEN MAJOR GRADING ACTIVITIES OCCUR.

B. DATES OF RAINFALL EVENTS EITHER EXCEEDING 2 HOURS DURATION OR MORE THAN 0.5 INCHES/24 HOURS.

C. WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON SITE, OR ON A PORTION OF THE SITE.

D. WHEN STABILIZATION MEASURES ARE INITIATED FOR PORTIONS OF THE SITE.

E. TESC RECORDS SHALL BE MADE AVAILABLE TO THE OWNER ON REQUEST AND SHALL BE PROVIDED FOR REVIEW AND APPROVAL PRIOR TO APPLICATION FOR PAYMENT.

STABILIZE SOILS AND PROTECT SLOPES

1. FROM MAY 1 THROUGH SEPTEMBER 30, ALL EXPOSED SOILS SHALL BE PROTECTED FROM EROSION BY MULCHING, HYDROSEED COVERING, OR OTHER APPROVED MEASURES WITHIN SEVEN DAYS OF GRADING. FROM OCTOBER 1 THROUGH APRIL 30, ALL EXPOSED SOILS MUST BE PROTECTED WITHIN 2 DAYS OF GRADING. SOILS SHALL BE STABILIZED BEFORE A WORK SHUTDOWN, HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. SOIL STOCK PILINGS MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES. MULCH AS SOON AS PRACTICAL ALL DISTURBED AREAS NOT INDICATED IN THE CONTRACT DOCUMENTS FOR OTHER PERMANENT STABILIZATION. MEASURES. HAY, STRAW, AND MULCH USED ON SITE SHALL BE 99.9% WEED FREE. CONTRACTOR SHALL CONDUCT INTERIM SEEDING WITH REGREEN OR OWNER-APPROVED EQUIVALENT TO STABILIZE SOILS AND PROTECT SLOPES WHERE NEEDED TO AVOID SEDIMENT DELIVERY TO PROJECT WATERS PRIOR TO PERMANENT SEEDING AND SITE RESTORATION EFFORTS.

2. DESIGN, CONSTRUCT, AND PHASE CUT AND FILL SLOPES IN A MANNER THAT WILL MINIMIZE EROSION. REDUCE SLOPE VELOCITIES ON DISTURBED SLOPES BY PROVIDING TEMPORARY BARRIERS. STORMWATER FROM OFF SITE SHOULD BE HANDLED SEPARATELY FROM STORMWATER GENERATED ON SITE.

AFTER FINAL SITE STABILIZATION

1. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BEST MANAGEMENT PRACTICES (BMPS) ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED FROM THE SITE OR INCORPORATED INTO FINISHED GRADING. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED UNLESS OTHERWISE DIRECTED BY THE OWNER IN WRITING.

CONSTRUCTION DEWATERING

1. CONTRACTOR SHALL PERFORM CONSTRUCTION DEWATERING IN SUCH A MANNER AS TO AVOID THE RELEASE OF SEDIMENT-LADEN WATER TO SURFACE WATERS. SEDIMENT LADEN WATER MAY BE PUMPED TO AN UPLAND DISCHARGE LOCATION AND ALLOWED TO INFILTRATE INTO THE GROUND. IF SURFACE RUNNOFF IS OCCURING AS A RESULT OF DEWATERING OPERATIONS, THE CONTRACTOR MAY BE REQUIRED TO THROTTLE DOWN PUMPS AND PROVIDE ADDITIONAL EROSION CONTROL MEASURES AS NECESSARY TO COMPLY WITH LAWS AND PERMIT REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.

ABBREVIATIONS

APPROX	APPROXIMATE
AV	AIR VOIDS
BMP	BEST MANAGEMENT PRACTICES
CMP	CORRUGATED METAL PIPE
DBH	DIAMETER BREAST HEIGHT
EA	EACH
ELEV	ELEVATION
GIS	GEOGRAPHICAL INFORMATION SYSTEM
HORIZ	HORIZONTAL
INV	INVERT
LWM	LARGE WOODY MATERIAL
MAX	MAXIMUM
MIN	MINIMUM
NMFS	NATIONAL MARINE FISHERIES SERVICE
OHW	ORDINARY HIGH WATER
%	PERCENT
RM	RIVER MILE
RTK	REAL TIME KINEMATICS
SFM	STRUCTURE FROM MOTION
STA	STATION
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TBD	TO BE DETERMINED
TYP	TYPICAL
DOE	WASHINGTON STATE DEPARTMENT OF ECOLOGY
EPA	ENVIRONMENTAL PROTECTION AGENCY
FOP	FIELD OPERATING PROCEDURE
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
QPL	QUALIFIED PRODUCTS LIST
RAM	REQUEST FOR APPROVAL OF MATERIAL
RCW	REVISED CODE OF WASHINGTON (LAWS OF THE STATE)
SEPA	STATE ENVIRONMENTAL POLICY ACT
SOP	STANDARD OPERATING PROCEDURE
WAC	WASHINGTON ADMINISTRATIVE CODE
WDFW	WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
WISHA	WASHINGTON INDUSTRIAL SAFETY AND HEALTH ADMINISTRATION
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
AGG.	AGGREGATE
AL.	ALUMINUM
BST	BITUMINOUS SURFACE TREATMENT
CL.	CLASS
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
COMB.	COMBINATION
CONC.	CONCRETE
CPA	COMPACTION PRICE ADJUSTMENT
CPF	COMPOSITE PAY FACTOR
CRIB.	CRIBBING
CULV.	CULVERT
CY OR CU YD.	CUBIC YARD
DIAM.	DIAMETER
EST.	ESTIMATE OR ESTIMATED
EXCL.	EXCLUDING
F	FAHRENHEIT
GPH	GALLON PER HOUR
GPM	GALLON PER MINUTE
HUND.	HUNDRED
HMA	HOT MIX ASPHALT
IN.	INCH
INCL.	INCLUDING
JMCAF	JOB MIX COMPLIANCE PRICE ADJUSTMENT
JMF	JOB MIX FORMULA
LB	POUND(S)
LF OR LIN. FT.	LINEAR FOOT (FEET)
LS	LUMP SUM
M	THOUSAND
MBM	THOUSAND FEET BOARD MEASURE
MUTS STRENGTH	MINIMUM ULTIMATE TENSILE
PCPS	PRECAST PRESTRESSED
PRES.	PRESSURE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
RAP	RECYCLED ASPHALT PAVEMENT
REG.	REGULATOR
REINF.	REINFORCED, REINFORCING
SEC.	SECTION
ST.	STEEL
STR.	STRUCTURAL
SY OR SQ. YD.	SQUARE YARD(S)
TH.	THICK OR THICKNESS
TR.	TREATMENT
VFA	VOIDS FILLED WITH ASPHALT
VMA	VOIDS IN MINERAL AGGREGATE
VERT	VERTICAL
WSE	WATER SURFACE ELEVATION
YR	YEAR

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER

REV:	DESCRIPTION:	BY:	DATE:
3	-	-	-
2	-	-	-
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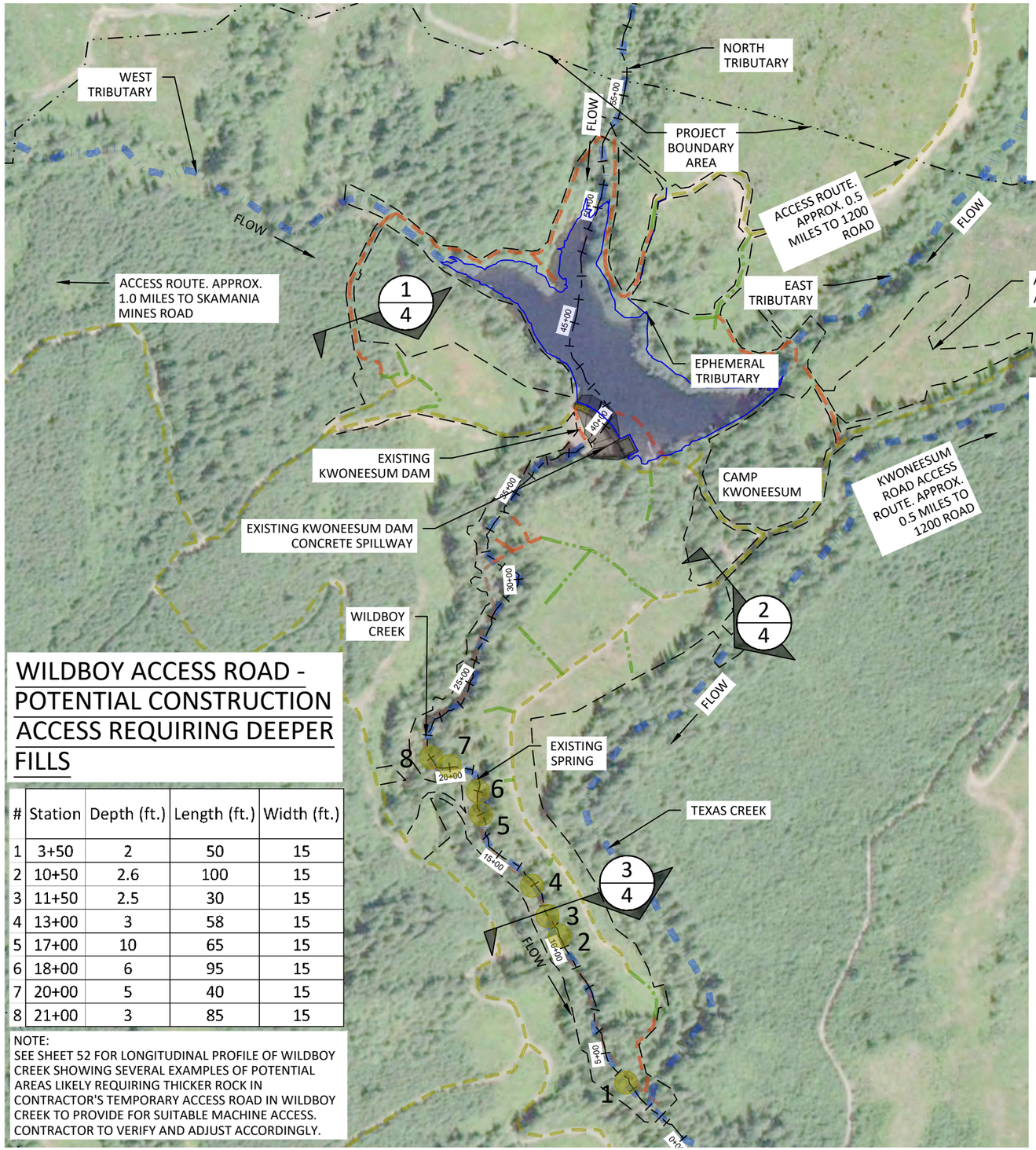
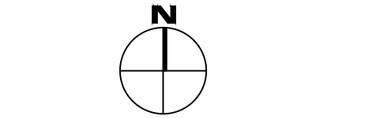


WILDBOY ACCESS ROAD - POTENTIAL CONSTRUCTION ACCESS REQUIRING DEEPER FILLS

#	Station	Depth (ft.)	Length (ft.)	Width (ft.)
1	3+50	2	50	15
2	10+50	2.6	100	15
3	11+50	2.5	30	15
4	13+00	3	58	15
5	17+00	10	65	15
6	18+00	6	95	15
7	20+00	5	40	15
8	21+00	3	85	15

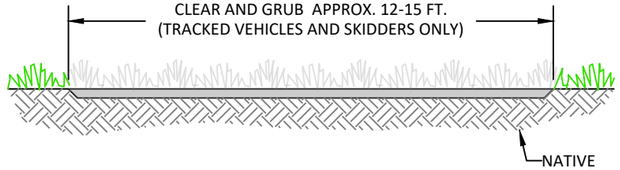
NOTE:
SEE SHEET 52 FOR LONGITUDINAL PROFILE OF WILDBOY CREEK SHOWING SEVERAL EXAMPLES OF POTENTIAL AREAS LIKELY REQUIRING THICKER ROCK IN CONTRACTOR'S TEMPORARY ACCESS ROAD IN WILDBOY CREEK TO PROVIDE FOR SUITABLE MACHINE ACCESS. CONTRACTOR TO VERIFY AND ADJUST ACCORDINGLY.

SITEMAP



LEGEND

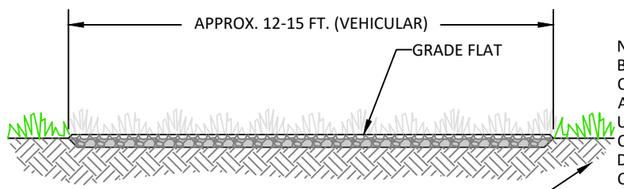
- EXISTING RIVER PATHWAYS
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROAD
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- 1 — POTENTIAL AREAS WITH THICKER ROCK IN TEMPORARY ACCESS ROAD IN WILDBOY CREEK



TYPICAL SECTION - PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)

1/4 NOT TO SCALE

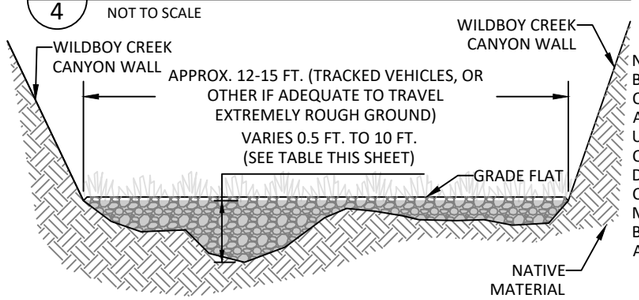
NOTE: THESE ACCESS ROADS ARE INTENDED FOR TRACKED VEHICLES AND SKIDDERS. ADD GRAVEL BORROW AS NEEDED FOR UNEVEN TERRAIN, OR IF SOFT SPOTS DEVELOP. CONTRACTOR SHALL MINIMIZE GRAVEL BORROW FILL FOR ACCESS.



TYPICAL SECTION - PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)

2/4 NOT TO SCALE

NOTE: ADD GRAVEL BORROW FROM ONSITE STOCKPILE AS NEEDED FOR UNEVEN TERRAIN, OR IF SOFT SPOTS DEVELOP. CONTRACTOR SHALL MINIMIZE GRAVEL BORROW FILL FOR ACCESS.

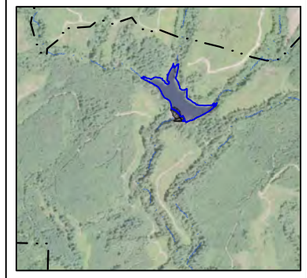


TYPICAL SECTION - PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)

3/4 NOT TO SCALE

NOTE: ADD SELECT BORROW FROM ONSITE STOCKPILE AS NEEDED FOR UNEVEN TERRAIN, OR IF SOFT SPOTS DEVELOP. CONTRACTOR SHALL MINIMIZE SELECT BORROW FILL FOR ACCESS.

Notes:



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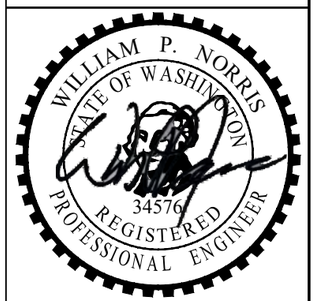

REV:	DESCRIPTION:	BY:	DATE:
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2	-	-	-
1	-	-	-

STATUS: FINAL DESIGN

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CLIENT:
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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: PROJECT AREA AND SITE MAP

SCALE:	DATE:	DRAWN:	CHECKED:
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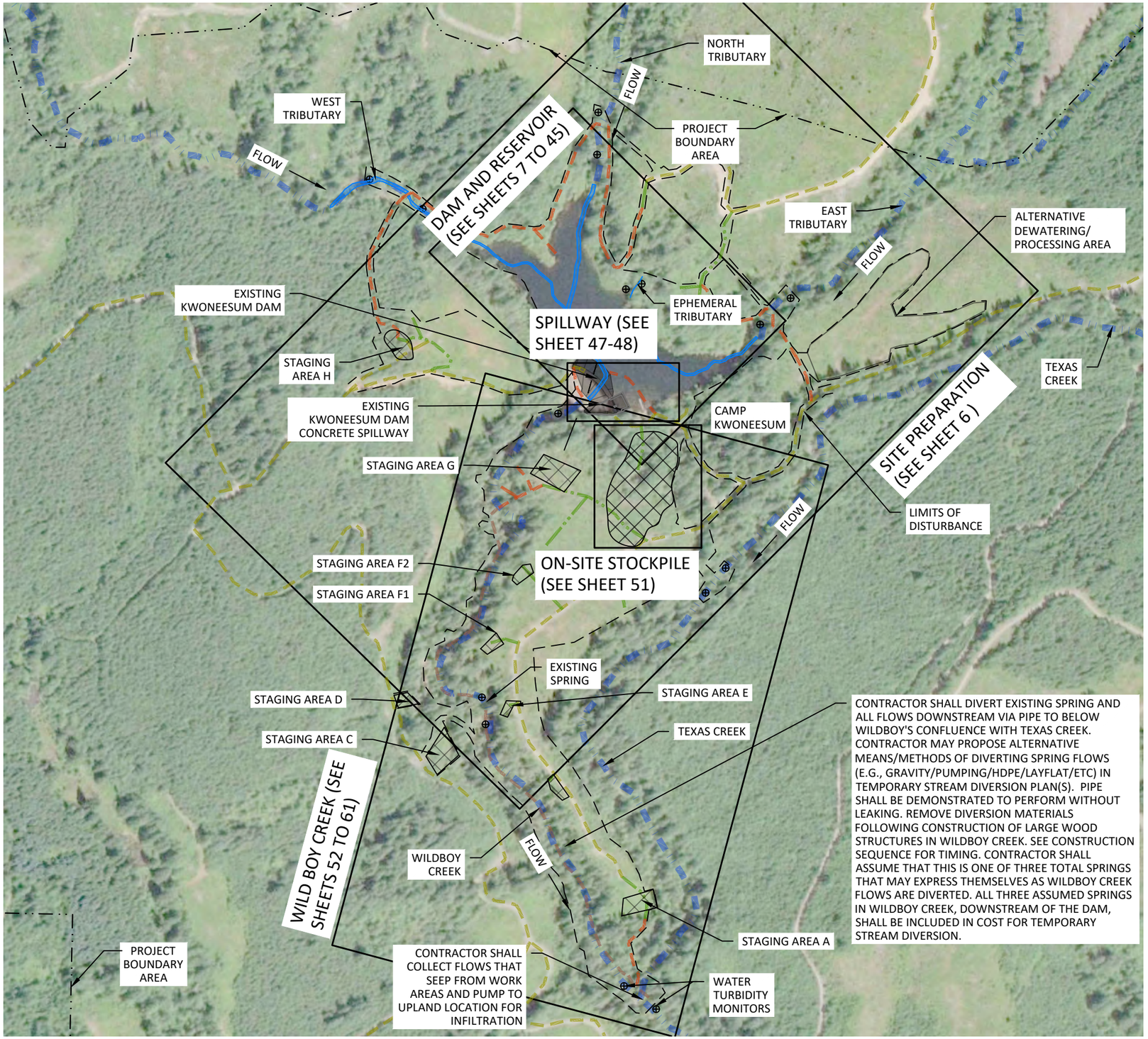
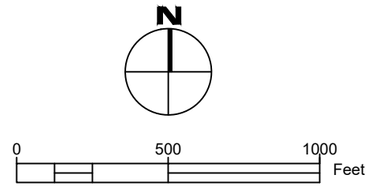
PROJ. NO:	DRAWING NO:	Total Sheets:
-	4	74



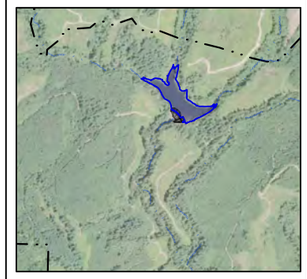
SITEMAP



LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROAD
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- PROPOSED ROCK CONTAINMENT (TO REMAIN, EXCLUDING BREACH FOR EAST TRIBUTARY)
- PROJECT BOUNDARY AREA
- PROPOSED TRIBUTARIES
- EPHEMERAL TRIBUTARY
- LIMITS OF DISTURBANCE
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS

Notes:



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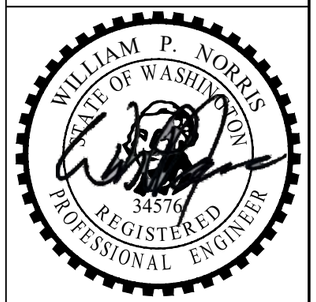

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: PROJECT INDEX MAP

SCALE:	DATE:	DRAWN:	CHECKED:
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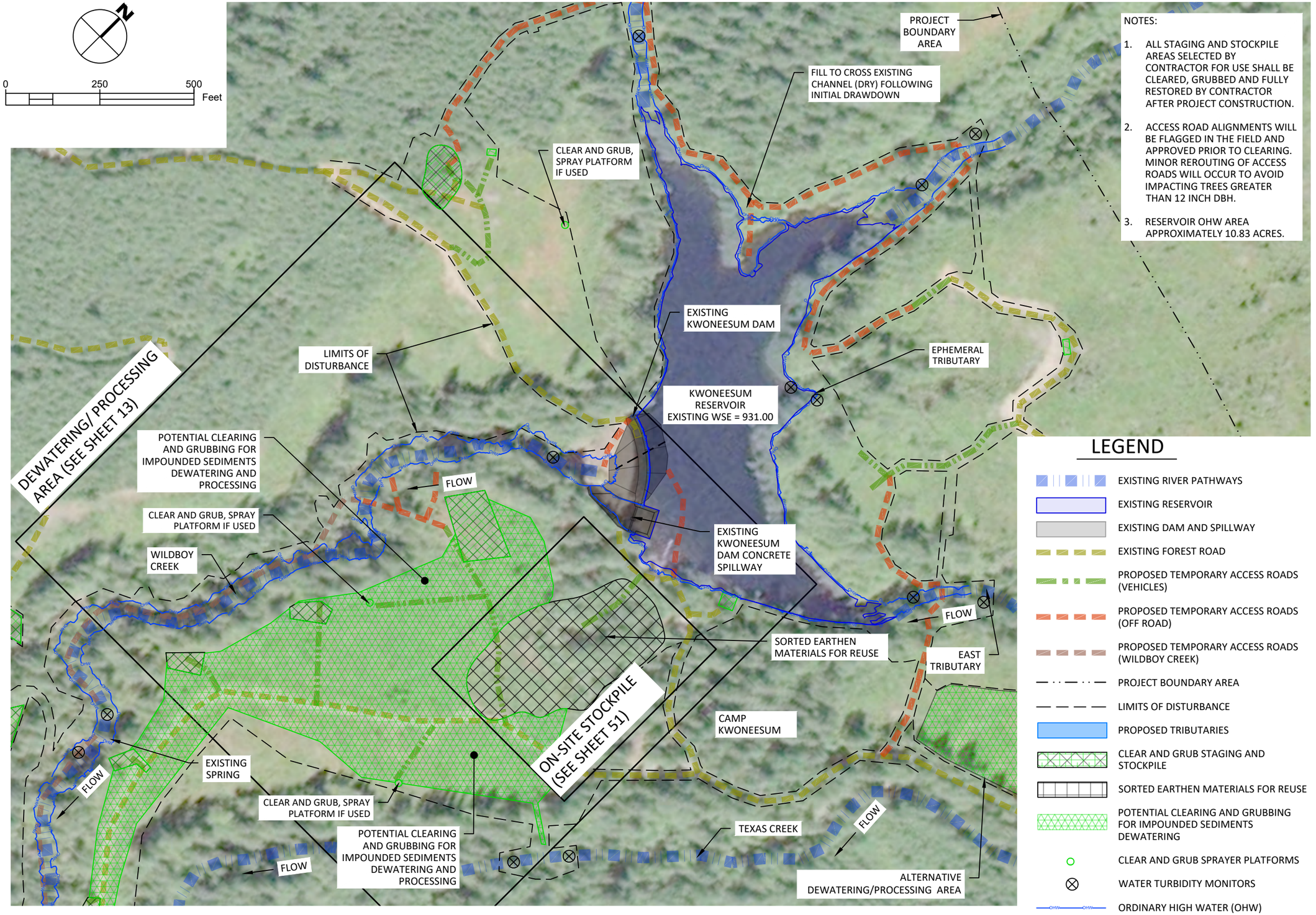
PROJ. NO:	DRAWING NO:	Total Sheets:
-	5	74



SITEMAP

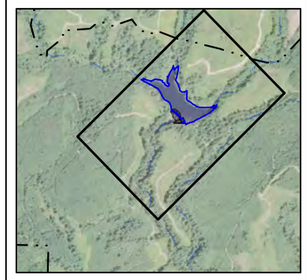
NOTES:

1. ALL STAGING AND STOCKPILE AREAS SELECTED BY CONTRACTOR FOR USE SHALL BE CLEARED, GRUBBED AND FULLY RESTORED BY CONTRACTOR AFTER PROJECT CONSTRUCTION.
2. ACCESS ROAD ALIGNMENTS WILL BE FLAGGED IN THE FIELD AND APPROVED PRIOR TO CLEARING. MINOR REROUTING OF ACCESS ROADS WILL OCCUR TO AVOID IMPACTING TREES GREATER THAN 12 INCH DBH.
3. RESERVOIR OHW AREA APPROXIMATELY 10.83 ACRES.

LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROAD
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- PROPOSED TRIBUTARIES
- CLEAR AND GRUB STAGING AND STOCKPILE
- SORTED EARTHEN MATERIALS FOR REUSE
- POTENTIAL CLEARING AND GRUBBING FOR IMPOUNDED SEDIMENTS DEWATERING
- CLEAR AND GRUB SPRAYER PLATFORMS
- WATER TURBIDITY MONITORS
- ORDINARY HIGH WATER (OHW)

Notes:



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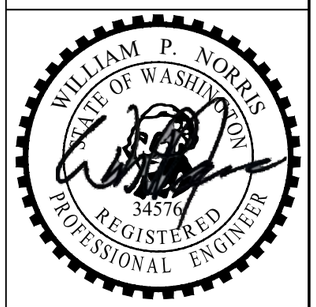

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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: SITE PREPARATION, CLEARING AND GRUBBING

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	6	74

SURVEY CONTROL

Point #	Northing	Easting	Elevation	Description
600200	128187.70	1201730.91	931.80	Rebar
201	128178.52	1201744.39	931.38	Rebar
301	128615.20	1200873.90	934.73	Rebar
400	128597.09	1200858.99	931.96	Rebar
600	128717.97	1200387.71	931.73	Rebar
500601	128721.71	1200359.19	931.86	Rebar
711	127819.15	1201162.14	936.43	Brass Cap
997	128100.03	1200973.16	936.45	Brass Cap
4000998	128114.32	1200905.04	936.32	Brass Cap
4000999	127990.90	1201075.72	936.52	Brass Cap
101001	128052.37	1201037.35	936.13	Brass Cap
1002	128021.95	1201064.24	936.22	Brass Cap
1003	127971.15	1201094.92	935.98	Brass Cap
101004	127900.58	1201130.28	936.02	Brass Cap

LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING GRADING (1 FOOT INTERVAL)
- ORDINARY HIGH WATER (OHW)
- SURVEY CONTROL (999)
- EXISTING DOWNED LARGE TREES FOR WILDBOY CREEK AT PLUNGE POOL DOWNSTREAM OF EXISTING DAM (1, 24 IN. FIR; ③)

NORTH TRIBUTARY
FLOW
EAST TRIBUTARY
EPHEMERAL TRIBUTARY
WEST TRIBUTARY
KWONEESUM RESERVOIR EXISTING WSE = 931.00
APPROXIMATE DAM FOOT PRINT IS BASED ON CHM2 HILL DRAWINGS
EXISTING KWONEESUM DAM
EXISTING OUTLET PIPE
EXISTING KWONEESUM DAM CONCRETE SPILLWAY
WILDBOY CREEK
CAMP KWONEESUM
600200
201
301
400
500601
600
711
997
1002
1003
4000998
4000999
101001
101004

N

0 100 200 Feet

NOTES:

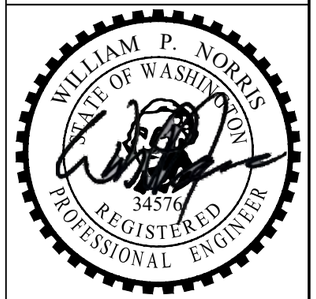
LIDAR WAS ACCESSED VIA WDNR LIDAR PORTAL. LIDAR IS 2M RESOLUTION AND HAS LIMITATIONS DUE TO QUALITY AND AGE OF DATA SET.

HORIZONTAL DATUM: NAD83 WASHINGTON STATE PLANES, SOUTH ZONE, US FOOT
VERTICAL DATUM: NAVD88

PLAN VIEW

Notes:

SHEET LOCATION



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - EXISTING CONDITIONS

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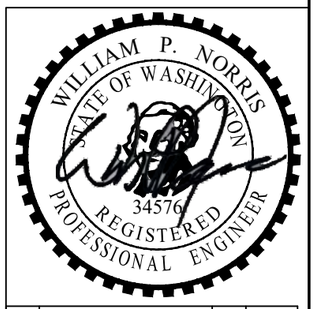
-	7	74

POTENTIAL CONSTRUCTION SEQUENCE

1. STEP 1 IN THIS SEQUENCE HAS BEEN PERFORMED UNDER A SEPARATE CONTRACT PRIOR TO THE DAM REMOVAL CONTRACT. SEPARATE PILES OF BOULDERS, COBBLE, GRAVEL AND SOIL ARE LOCATED IN THE STAGING AND STOCKPILE AREA LOCATED SOUTHEAST OF THE RESERVOIR.
2. CLEAR AND GRUB SELECTED STAGING AREAS, ACCESS ROADS, INCLUDING ACCESS AROUND THE RESERVOIR TO TRIBUTARY DIVERSION LOCATIONS, TEXAS CREEK DISCHARGE LOCATIONS, AND WILDBOY CREEK ACCESS LOCATIONS DOWNSTREAM OF DAM.
3. INSTALL TEMPORARY STREAM DIVERSION PIPING FROM TRIBUTARY DIVERSION LOCATIONS TO TEXAS CREEK.
4. INSTALL TRIBUTARY DIVERSION DAMS COORDINATE WITH OWNER TO ALLOW FOR FISH SALVAGE/RESCUE PRIOR TO INSTALLING TRIBUTARY DIVERSION DAMS. PLACE SCREENED INTAKES, PUMP, AND SPILL CONTAINMENT MEASURES. PLACE OUTLET EROSION CONTROL MEASURES IN TEXAS CREEK PRIOR TO INITIATING TEMPORARY STREAM DIVERSION.
5. AN EXPERIENCED BIOLOGIST WILL LEAD A TEAM THAT BEGINS CLEARING FISH 3-5 DAYS PRIOR TO DIVERTING TRIBUTARY FLOWS. THE OWNER EXPECTS TO HAVE MULTIPLE ELECTRO-FISHING CREWS AND WDFW VOLUNTEERS TO CLEAR THE 0.25 MILE REACH DOWNSTREAM OF THE DAM. AN INITIAL FISH RESCUE PASS WILL BE PERFORMED IN THE 0.25 MILE LONG REACH DOWNSTREAM OF THE DAM TO THE EXISTING SPRING LOCATED NEAR THE LEFT BANK OR WILDBOY CREEK. FISH CLEARING WILL OCCUR IN DEFINED SECTIONS/SUB REACHES BY USING SEINES AS BLOCK NETS.
6. DIVERT TRIBUTARY FLOWS EARLY IN THE MORNING TO CONCENTRATE REMAINING FISH IN RESIDUAL POOLS IN THE 0.25 MILE REACH DOWNSTREAM OF THE DAM. SIMULTANEOUSLY, BEGIN THE SECOND ROUND OF FISH CLEARING AS THE 0.25 MILE REACH DOWNSTREAM OF THE DAM BEGINS TO DEWATER. THE CONTRACTOR SHALL ASSIST BY PUMPING DOWN EACH RESIDUAL POOL WITH A NMFS APPROVED SCREENED INTAKE WHILE FISH RESCUE IS PERFORMED IN EACH REMAINING POOL. THE OWNER EXPECTS TO HAVE MULTIPLE ELECTRO-FISHING CREWS TO CLEAR THE 0.25 MILE REACH DOWNSTREAM OF THE DAM. THE SECOND PASS OF FISH CLEARING IS EXPECTED TO TAKE AN ADDITIONAL 2-4 DAYS TO FULLY CLEAR FISH FROM THE 0.25 REACH DOWNSTREAM OF THE DAM.
7. INSTALL A SANDBAG DAM TO FORM A SPRING COLLECTION POOL DOWNSTREAM OF THE SPRING AND INSTALL A GRAVITY PIPELINE ALONG THE BANK OF WILDBOY CREEK TO CONVEY WATER TO DOWNSTREAM OF THE CONFLUENCE WITH TEXAS CREEK. THIS IS THE EXAMPLE FOR PROVIDING COLLECTION AND CONVEYANCE FOR ONE SPRING. THE CONTRACTOR SHALL INCLUDE COLLECTION AND CONVEYANCE OF 3 SPRINGS IN THEIR BID FOR TEMPORARY STREAM DIVERSION. CONTRACTOR MAY PROPOSE ALTERNATIVE METHODS/METHODS OF DIVERTING SPRING FLOWS (E.G., GRAVITY/PUMPING/HDPE/LAYFLAT/ETC) IN TEMPORARY STREAM DIVERSION PLAN(S).
8. AFTER FISH ARE CLEARED FROM THE 0.25 MILE REACH DOWNSTREAM OF THE DAM, BEGIN CLEARING FISH FROM THE 0.25 MILE REACH FROM THE EXISTING SPRING TO THE CONFLUENCE WITH TEXAS CREEK. THE FIRST PASS OF FISH CLEARING WILL OCCUR IN THIS REACH WHILE THE SPRING IS STILL FLOWING TO THE CONFLUENCE WITH TEXAS CREEK. FISH CLEARING WILL OCCUR IN DEFINED SECTIONS/SUB REACHES BY USING SEINES AS BLOCK NETS. THE OWNER EXPECTS TO HAVE MULTIPLE ELECTRO-FISHING CREWS AND WDFW VOLUNTEERS TO CLEAR THE 0.25 MILE REACH TO TEXAS CREEK. THE FISH CLEARING IS EXPECTED TO TAKE AN ADDITIONAL 3-5 DAYS TO FULLY CLEAR FISH FROM THE 0.25 REACH TO THE CONFLUENCE WITH TEXAS CREEK.
9. PLACE SILT CURTAIN IN RESERVOIR. PLACE FLOATING INTAKES, PUMPS AND DEWATERING SPRAYERS TO PREPARE FOR INITIAL DRAWDOWN. PLACE CLEARWATER PUMP ON THE DAM FACE TO PREPARE FOR INITIAL DRAWDOWN. THE FLOATING INTAKES ARE INTENDED TO INTERCEPT TURBID WATER GENERATED ALONG SHORELINES DURING INITIAL DRAWDOWN. FLOWS PUMPED FROM THE FLOATING INTAKES WILL BE CONVEYED TO DEWATERING SPRAYERS FOR LAND APPLICATION AND INFILTRATION.
10. COMMENCE CLEARWATER DIVERSION PUMPING, AND FLOATING INTAKE PUMPING. THE MAXIMUM DRAWDOWN IN RESERVOIR WSE SHALL BE NO GREATER THAN 2 FEET PER 24 HOURS, UNLESS OTHERWISE APPROVED BY THE OWNER. APPROVAL OF INCREASED RESERVOIR WSE DRAWDOWN WILL REQUIRE AUTHORIZATION FROM DOE DAM SAFETY AND CONTRACTOR'S SUCCESSFUL DEMONSTRATION OF MEETING TURBIDITY MONITORING AND DISCHARGE REQUIREMENTS. THE 2 FEET PER DAY DRAWDOWN OF RESERVOIR WSE MAY BE REDUCED IF CONTRACTOR DOES NOT SUCCESSFULLY DEMONSTRATE MEETING TURBIDITY MONITORING AND DISCHARGE REQUIREMENTS. THE CONTRACTOR SHALL MONITOR SPRAY LOCATIONS (IF USED) IN THE DEWATERING/PROCESSING AREA AND THROTTLE DOWN PUMPED FLOWS TO AVOID SURFACE RUNOFF. THE CLEARWATER PUMP WILL PUMP WATER FROM DEEPER PORTIONS OF THE RESERVOIR OVER THE DAM, WHILE ASSURING THE CLEARWATER PUMP'S INTAKE IS SUFFICIENTLY ABOVE FINE SEDIMENTS LOCATED AT THE BOTTOM OF THE RESERVOIR TO AVOID MOBILIZING THOSE SEDIMENTS. FLOATING INTAKE PUMPS WILL OPERATE AT A SLIGHTLY HIGHER CUMULATIVE FLOW RATE THAN THE CLEARWATER PUMP TO AVOID TURBID WATER FROM PASSING UNDER THE SILT CURTAIN. CONTRACTOR MUST MONITOR PUMPING RATES AND TURBIDITY PLUMES TO AVOID SEDIMENT TRANSPORTED TO INSIDE OF SILT CURTAIN.
11. MONITOR TURBIDITY PLUMES IN THE ISOLATED RESERVOIR AND ADJUST LINES SECURING TURBIDITY CURTAIN AND FLOATING INTAKES AS RESERVOIR LEVELS DESCEND. ADJUST LOCATION OF TURBIDITY CURTAIN AND FLOATING INTAKES, AS NECESSARY TO AVOID DISTURBING RESERVOIR SEDIMENTS. CONTINUE TO MONITOR TURBIDITY LEVELS DURING INITIAL DRAWN DOWN. INITIAL DRAW DOWN OF MORE THAN 10 FEET WILL SIGNIFICANTLY REDUCE IMPOUNDED SEDIMENTS DEWATERING DURATION. CONTRACTOR MAY PUMP 24 HOURS PER DAY, PENDING APPROVAL OF WATER QUALITY MONITORING PLAN, ADEQUATE MONITORING AND MAINTAINING PERMIT COMPLIANCE.
12. PARTIALLY DEMOLISH CONCRETE DAM FACE WHILE RETAINING DEMOLITION DEBRIS AND CREATE A LEVEL PLATFORM TO MOVE CLEARWATER PUMP DOWN DAM FACE TO REDUCE SUCTION HEAD AS NECESSARY AS RESERVOIR LEVELS DESCEND. CONTINUE TO MONITOR TURBIDITY LEVELS IN THE RESERVOIR DURING INITIAL DRAWN DOWN. CONTRACTOR SHALL ASSIST WDFW IN DEPLOYING AND RETRIEVING ELECTROFISHING BOAT.
13. AFTER CLEARWATER PUMPING HAS CEASED, REMOVE THE SILT CURTAIN AND PERFORM FISH RESCUE WITHIN THE RESERVOIR. FLOATING INTAKES SHALL REMAIN IN THE RESERVOIR DURING FISH RESCUE. REMOVE CLEARWATER PUMP.
14. THE CONTRACTOR SHALL RELOCATE FLOATING INTAKES TO DEEPER PORTIONS OF THE RESERVOIR AND CONTINUE TO PUMP TO THE DEWATERING/PROCESSING AREA AS LONG AS FLOATING INTAKES ARE 2-FEET, MINIMUM, ABOVE FINE SEDIMENTS LOCATED AT THE BOTTOM OF THE RESERVOIR. CLEAR AND GRUB FOR IMPOUNDED SEDIMENTS DEWATERING AS NECESSARY.
15. LARGE WOOD STRUCTURES IN WILDBOY CREEK (SHEETS 52-66) DOWNSTREAM OF KWONEESUM DAM MAY BE CONSTRUCTED CONCURRENTLY WITH STEPS 15-20 OF THIS POTENTIAL CONSTRUCTION SEQUENCE PROVIDED FISH AND FRESHWATER MUSSEL SALVAGE/RESCUE HAS BEEN COMPLETED AND SUFFICIENT MATERIAL IS AVAILABLE.
16. DAM DEMOLITION CAN COMMENCE FROM THE TOP DOWN AS LONG AS 5 FEET OF FREEBOARD IS MAINTAINED. REMOVE AND PROPERLY DISPOSE OF CONCRETE (INCLUDING REBAR) OFFSITE ACCORDING TO SPECIFICATIONS. RELOCATE PUMPS AND CONTAINMENT IF ALLOWABLE SUCTION HEAD IS EXCEEDED.
17. PERFORM DEWATERING OF THE RESERVOIR SEDIMENTS. CONTRACTOR MAY USE A COMBINATION OF DEWATERING METHODS FOR RESERVOIR SEDIMENTS. THE DEWATERING/PROCESSING AREA SHOWN ON SHEETS 6 AND 13 MAY BE USED PROVIDING THE CONTRACTOR MEETS ALL PERMIT REQUIREMENTS FOR CONTAINMENT OF SEDIMENTS. THE DEWATERING/PROCESSING AREA MAY BE CLEARED AND RE-CONTOURED FOR DEWATERING PURPOSES AS LONG AS THE GROUND SURFACE IN THE DEWATERING/PROCESSING AREA IS RESTORED TO PRE CONSTRUCTION CONTOURS AND FREELY DRAINS, EXISTING VEGETATION IS SALVAGED AS SLASH, A NATIVE VEGETATION ESTABLISHMENT GROWING MEDIUM IS PROVIDED IN THE DEWATERING/PROCESSING AREA AND THE RESERVOIR, AND THE DEWATERING/PROCESSING AREA IS PLANTED WITH NATIVE VEGETATION WITH SPECIES AND DENSITY SIMILAR TO EXISTING CONDITIONS. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR RESTORATION OF ALTERNATIVE DEWATERING/PROCESSING AREAS.
18. CONTINUE DAM DEMOLITION WHILE MAINTAINING 5 FEET, MINIMUM FREEBOARD UNTIL FINE SEDIMENT HAVE BEEN RELOCATED.
19. INSTALL DEWATERING COFFERDAM 1 UPSTREAM OF DAM AND PUMP WATER DOWNSTREAM OF THE DAM PRIOR TO REMOVING BOTTOM 10 FEET OF CONCRETE APRON AT THE UPSTREAM FACE OF DAM, SHEET 26. AFTER FINE SEDIMENT HAS BEEN RELOCATED TO CONFINED AREAS OF THE FORMER RESERVOIR AND ALLOWED TO DRAIN, MIX WITH SOIL SALVAGED AND STOCKPILE ONSITE AS REFERENCED IN STEP 1 OF THIS SEQUENCE. THE DRAINED AND MIXED SOILS SHALL BE SPREAD IN UNCONFINED AREAS OF THE RESERVOIR, OUTSIDE OF STREAM CHANNEL ALIGNMENTS.
20. SALVAGE AND STOCKPILE DELTAIC SEDIMENTS (SAND AND GRAVEL) FOR CHANNEL CONSTRUCTION. STAGE AND STOCKPILE ROCK SALVAGED FROM DAM AND SPILLWAY DEMOLITION THAT WILL BE USED FOR LARGE WOOD STRUCTURE CONSTRUCTION AND OTHER PURPOSES.
21. USE DEWATERING COFFERDAM 1 TO COMPLETELY REMOVE DAM AND CONSTRUCT WILDBOY CREEK CHANNEL WITHIN FORMER DAM FOOTPRINT. USE THE PLUNGE POOL (DOWNSTREAM OF THE FORMER DAM) AS A SEDIMENT TRAP AFTER CHANNEL IS CONSTRUCTED WITHIN FORMER DAM FOOTPRINT. TURBID WATER COLLECTED IN THE PLUNGE POOL SHALL BE PUMPED TO UPLAND INFILTRATION AREA. ALTERNATE USE OF DEWATERING COFFERDAM 1 AND PLUNGE POOL DEWATERING, AS NECESSARY TO CONSTRUCT TRIBUTARY CHANNELS WITHIN THE RESERVOIR.
22. AFTER CHANNELS HAVE BEEN CONSTRUCTED WITHIN THE RESERVOIR, REINTRODUCE TRIBUTARY FLOWS, ONE AT A TIME TO FLUSH SEDIMENT FROM EACH CONSTRUCTED TRIBUTARY CHANNEL. THE ABILITY TO PUMP FROM EACH TRIBUTARY DIVERSION SHALL REMAIN INTACT UNTIL ALL CHANNELS HAVE BEEN FLUSHED, ONE AT A TIME. INITIAL FLUSHING OF TRIBUTARY CHANNELS SHALL BE COLLECTED IN THE PLUNGE POOL DOWNSTREAM OF THE FORMER DAM LOCATION AND PUMPED TO UPLAND FILTRATION AREA. AFTER ALL TRIBUTARIES HAVE BEEN FLUSHED ONE AT A TIME, SUBSEQUENTLY REMOVE TRIBUTARY DIVERSION DAM AND PIPING FOR EACH TRIBUTARY AND ALLOW FLOW THROUGH THE PROJECT.
23. CONTRACTOR SHALL FULLY DECOMMISSION AND RESTORE ALL TEMPORARILY DISTURBED AREAS PER THE SPECIFICATIONS.
24. PERFORM FINAL SITE STABILIZATION AND PERMANENT ACCESS ROAD REPAIRS PER BID SHEET AND SPECIFICATIONS.
25. PERFORM FINAL SITE STABILIZATION.



REV:	DESCRIPTION:	BY:	DATE:
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1	-	-	-

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Bingen, WA 98605
www.ers4life.com

CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

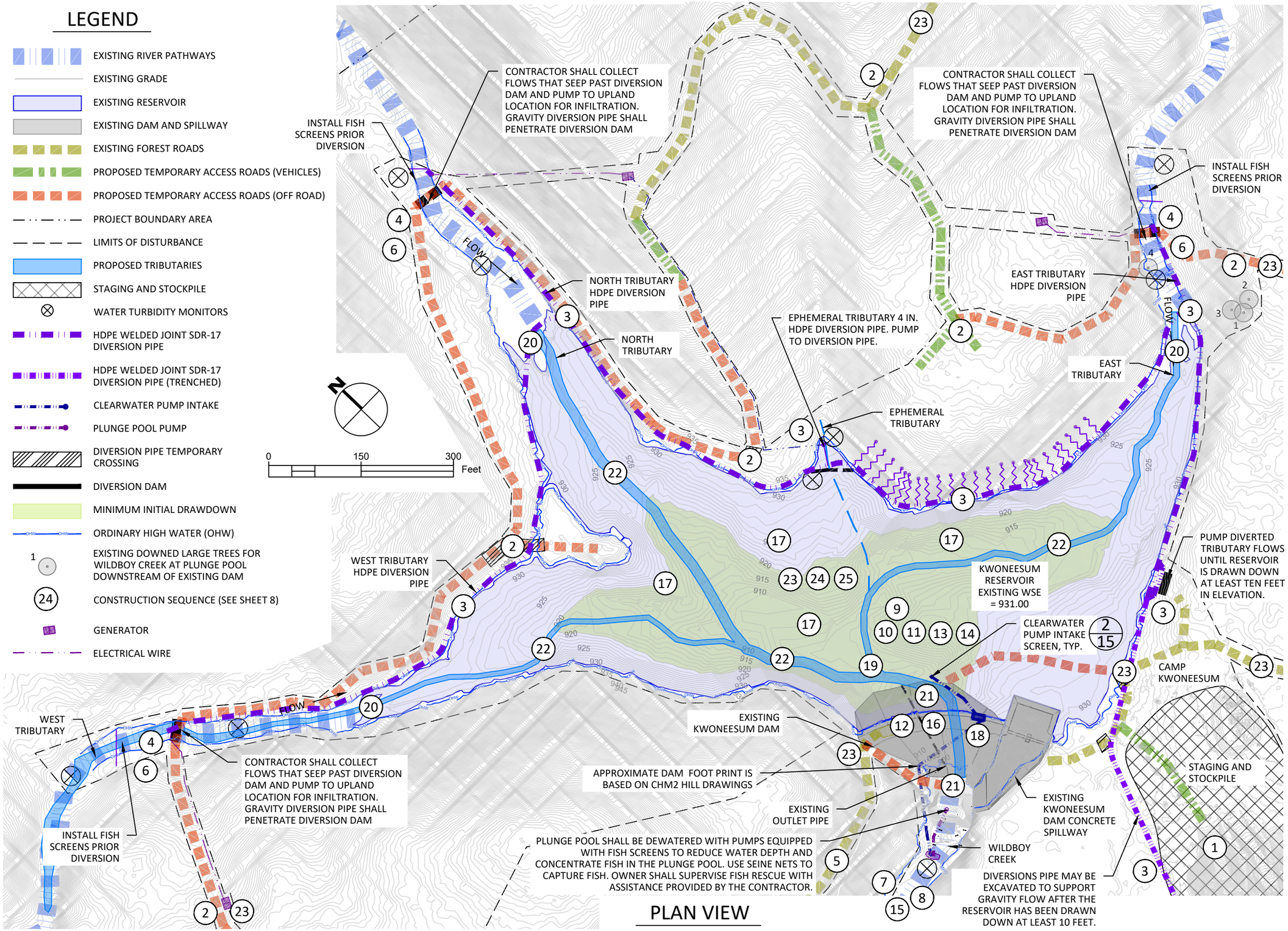
TITLE: CONSTRUCTION SEQUENCE NOTES

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	8	74

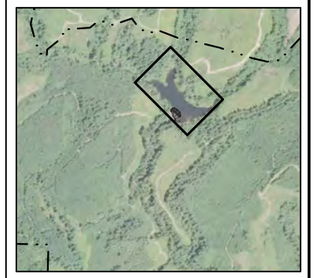
LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- PROPOSED TRIBUTARIES
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE (TRENCHED)
- CLEARWATER PUMP INTAKE
- PLUNGE POOL PUMP
- DIVERSION PIPE TEMPORARY CROSSING
- DIVERSION DAM
- MINIMUM INITIAL DRAWDOWN
- ORDINARY HIGH WATER (OHW)
- 1 — EXISTING DOWNED LARGE TREES FOR WILDBOY CREEK AT PLUNGE POOL DOWNSTREAM OF EXISTING DAM
- 24 — CONSTRUCTION SEQUENCE (SEE SHEET 8)
- GENERATOR
- ELECTRICAL WIRE

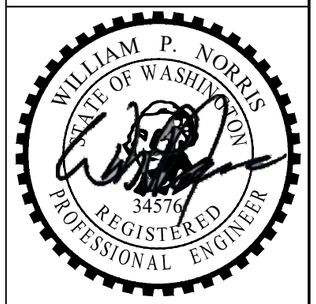


PLAN VIEW

Notes:



SHEET LOCATION



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - CONSTRUCTION SEQUENCE

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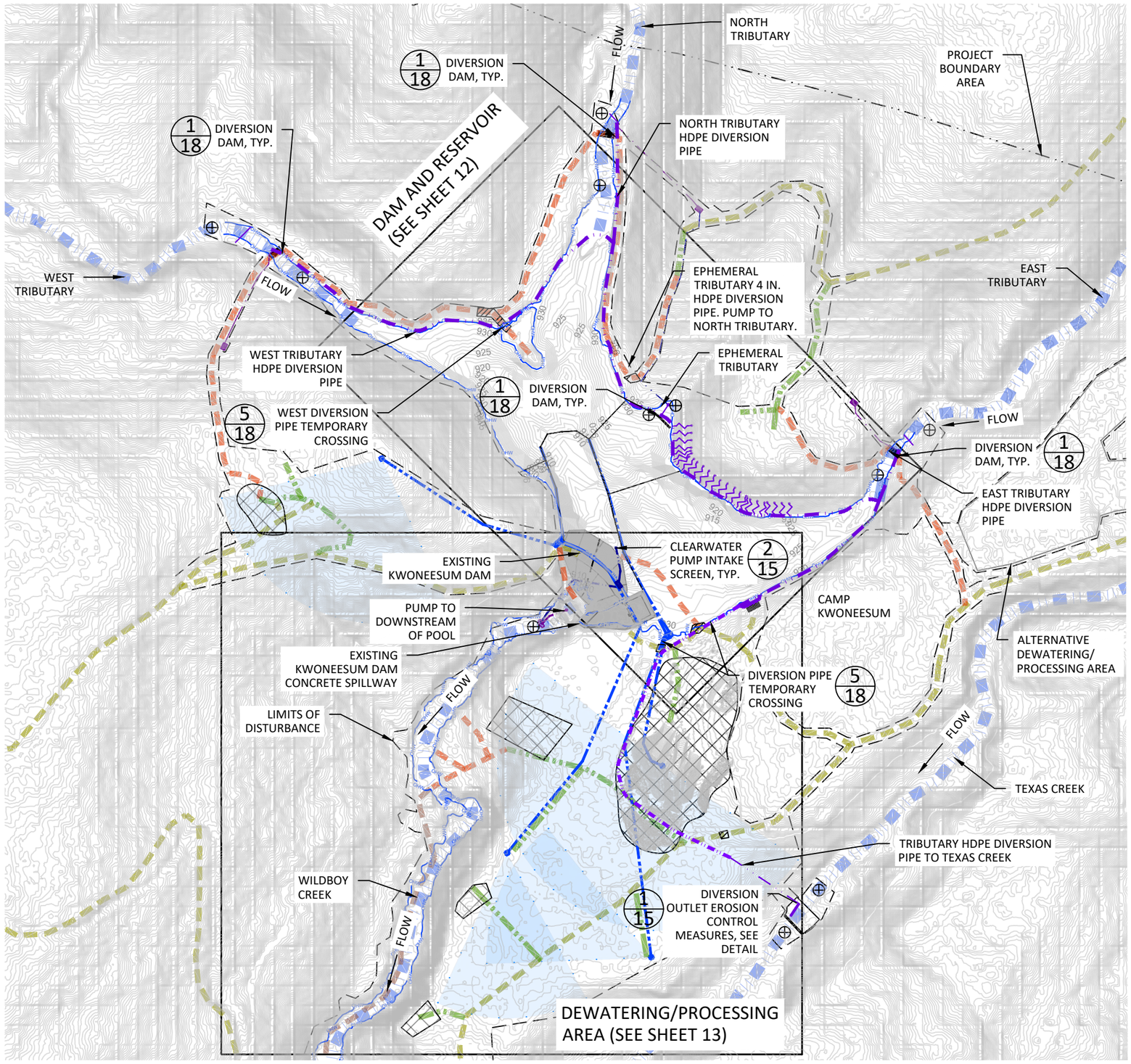

SITEMAP

N

0 300 600 Feet

LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE - PLACED ON GROUND SURFACE FOR PUMPED DIVERSION PLACED IN TRENCH FOR GRAVITY DIVERSION
- CLEARWATER PUMP INTAKE
- PLUNGE POOL PUMP
- DIVERSION PIPE TEMPORARY CROSSING
- 6-INCH WELDED JOINT SDR-11 CONVEYANCE PIPE
- SPRAY AREA
- GENERATOR
- ELECTRICAL WIRE

Notes:

SHEET LOCATION

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - INITIAL DRAWDOWN SITE PLAN

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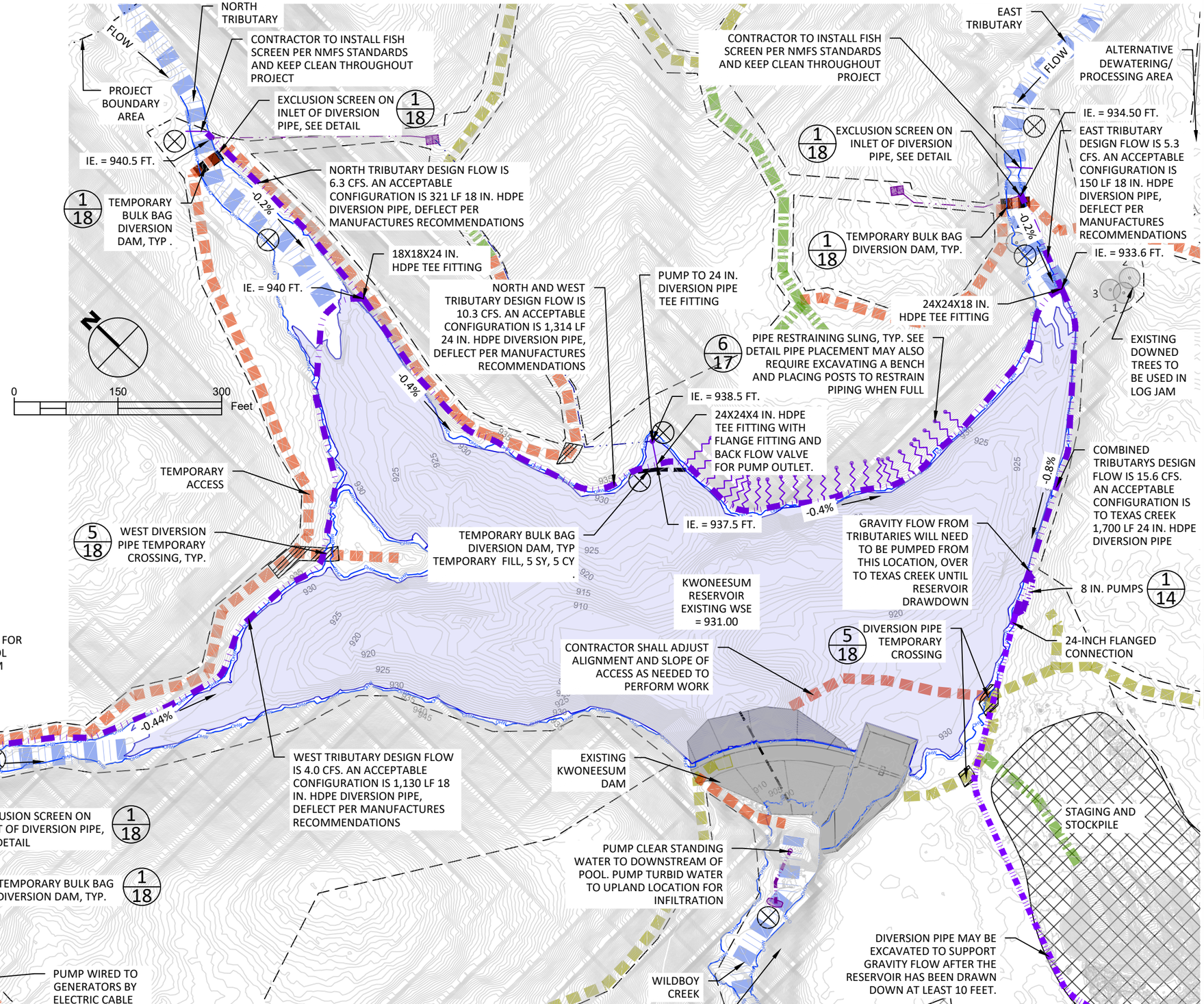
-	10	74

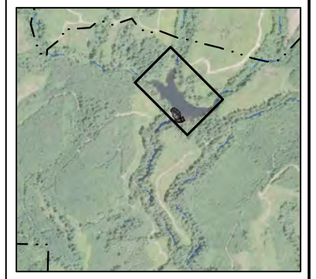
LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE - PLACED ON GROUND SURFACE FOR PUMPED DIVERSION PLACED IN TRENCH FOR GRAVITY DIVERSION
- PLUNGE POOL PUMP
- DIVERSION PIPE TEMPORARY CROSSING
- GENERATOR
- 1 ELECTRICAL WIRE
- DIVERSION DAM
- OHW ORDINARY HIGH WATER (OHW)
- EXISTING DOWNED LARGE TREES FOR WILDBOY CREEK AT PLUNGE POOL DOWNSTREAM OF EXISTING DAM



PLAN VIEW

Notes:



SHEET LOCATION

NOTES:

1. CONTRACTOR MAY PROPOSE ADJUSTMENTS TO DIVERSION DESIGN IN COMPLIANCE WITH REGULATORY PERMIT REQUIREMENTS.
2. RESERVOIR OHW AREA APPROXIMATELY 10.83 ACRES.

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - TEMPORARY STREAM DIVERSION PLAN

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EPHEMERAL TRIBUTARY

TEMPORARY BULK BAG DIVERSION DAM, TYP.

SECURE FLOATING INTAKE TO EXISTING SHORELINE TREES. ADJUST TENSION, AS NECESSARY WHILE WATER SURFACE DESCENDS.

FLOATING INTAKE 2, (SEE DETAILS ON SHEETS 16)

FLOATING INTAKE, (SEE DETAILS ON SHEETS 16 - 17)

FLOATING INTAKE 10 to 20 FT. SPACING OUTSIDE OF SILT CURTAIN

TYPE 2 TURBIDITY CURTAIN. TYP.

PROVIDE SUMP PUMPS AS BOOSTER PUMP FOR EACH HIGH HEAD PUMPS TO OVERCOME FRICTION LOSSES AS RESERVOIR LEVELS DESCEND

FIX FLOATING INTAKE 2 TO DAM FACE ANCHOR POINT WITH 1/2 WIRE ROPE. RELOCATE AND PROVIDE STABLE ANCHOR POINT TO FACILITATE ACCESS AND PERFORMANCE OF WORK AS RESERVOIR POOL ELEVATIONS DESCEND.

SECURE FLOATING INTAKE TO EXISTING SHORELINE TREES. ADJUST TENSION, AS NECESSARY WHILE WATER SURFACE DESCENDS.

SECURE TO WIRE ROPE 4-FT O.C. WITH HEAVY DUTY (175 LB.) ZIP TIES

CONNECT ENDS OF FLOATING INTAKES WITH 1/2 WIRE ROPE UNTIL SILT CURTAIN IS REMOVED. FOLLOWING REMOVAL OF SILT CURTAIN, REEF END OF FLOATING INTAKE 2 TOWARD OGEE CREST ANCHOR POINT AND REEF FLOATING INTAKE 1 TOWARD DAM FACE ANCHOR POINT. CONTINUE TO PUMP FROM FLOATING INTAKES TO DEWATERING/PROCESSING AREA UNTIL FLOATING INTAKES ARE 2 FEET FROM BOTTOM SLURRY. REEF ENDS OF FLOATING INTAKES TO MAXIMIZE DRAWDOWN.

TEMPORARILY BREACH FLOATING INTAKE TO ALLOW FOR WDFW ELECTRO FISHING BOAT INGRESS AND EGRESS

FLOATING INTAKE 1, (SEE DETAILS ON SHEETS 16)

SECURE TO WIRE ROPE 4-FT O.C. WITH HEAVY DUTY (175 LB.) ZIP TIES. RELOCATE AND PROVIDE STABLE ANCHOR POINT TO FACILITATE ACCESS AND PERFORMANCE OF WORK AS RESERVOIR POOL ELEVATIONS DESCEND.

FIX FLOATING INTAKE 1 TO OGEE CREST ANCHOR POINT WITH 1/2 WIRE ROPE. RELOCATE AND PROVIDE STABLE ANCHOR POINT TO FACILITATE ACCESS AND PERFORMANCE OF WORK AS RESERVOIR POOL ELEVATIONS DESCEND.

INSTALL ANCHOR POINT OGEE CREST, TYP.

TWO HIGH HEAD PUMPS TO SPRAYER. RELOCATE PUMPS AS NEEDED TO FACILITATE OPERATIONS.

CLEARWATER PUMP INTAKE SCREEN, TYP.

TWO HIGH HEAD PUMPS TO SPRAYER, RELOCATE PUMPS AS NEEDED TO FACILITATE OPERATIONS

INSTALL ANCHOR POINT ON DAM, TYP. RELOCATE AND PROVIDE STABLE ANCHOR POINT TO FACILITATE ACCESS AND PERFORMANCE OF WORK AS RESERVOIR POOL ELEVATIONS DESCEND

PUMP TO DOWNSTREAM OF POOL

PUMP CLEARWATER FROM DEEP WATER SIDE OF THE SILT CURTAIN TO THE SPILLWAY APRON. MOVE THE CLEARWATER PUMP DOWN IN ELEVATION TO REDUCE SUCTION HEAD AS RESERVOIR LEVELS DESCEND AND AS NEEDED TO FACILITATE OPERATIONS.

TEMPORARY ACCESS RAMP

8 IN. PUMPS

GRAVITY FLOW FROM TRIBUTARIES WILL NEED TO BE PUMPED FROM THIS LOCATION, OVER TO TEXAS CREEK UNTIL RESERVOIR DRAWDOWN

DIVERSION PIPE CROSSING, TYP.

CONTRACTOR SHALL ESTABLISH ACCESS FOLLOWING INITIAL DRAWDOWN AND ASSIST WITH LAUNCHING AND TRAILERING WDFW ELECTROFISHING BOAT

CAMP KWONEESUM

DIVERSION PIPE CROSSING, TYP.

STAGING AND STOCKPILE

TRIBUTARY HDPE DIVERSION PIPES PUMPED TO TEXAS CREEK

0 60 120 Feet

LEGEND

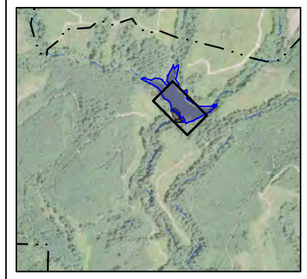
- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE - PLACED ON GROUND SURFACE FOR PUMPED DIVERSION PLACED IN TRENCH FOR GRAVITY DIVERSION
- 6-INCH WELDED JOINT SDR-11 CONVEYANCE PIPE
- DIVERSION PIPE TEMPORARY CROSSING
- SILT TURBIDITY CURTAIN
- DIVERSION DAM
- 10 FT DRAWDOWN
- MINIMUM INITIAL DRAWDOWN
- FLOATING INTAKE
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- HIGH HEAD PUMPS TO SPRAYERS
- CLEARWATER PUMP INTAKE
- PLUNGE POOL PUMP

NOTES:

1. SUBMERSIBLE (SUMP) PUMPS SHALL BE ATTACHED TO EACH 6 IN. DIA. SDR 11, WELDED JOINT HDPE CONVEYANCE PIPE AS BOOSTER PUMPS TO OVERCOME FRICTION LOSES AS RESERVOIR LEVELS DESCEND. SUMP PUMPS SHALL BE HYDRA-TECH. 6 IN. SUBMERSIBLE TRASH PUMP, S6TC, OR APPROVED EQUAL. EACH SUMP SHALL BE POWERED BY HYDRA-TECH, HT74DJV POWER UNIT, OR APPROVED EQUAL. OR RELOCATE HIGH HEAD PUMPS TO AVOID EXCEEDING PUMP SUCTION HEAD.
2. CONTRACTOR MAY PROVIDE A SIPHON DESIGN FOR APPROVAL IN LIEU OF CLEARWATER PUMP BUT WILL NEED TO NOTCH DAM AT SIPHON HIGH POINT AS RESERVOIR POOL ELEVATIONS DESCEND.
3. HIGH HEAD PUMPS SHALL BE PIONEER PUMP, PP66S12, OR APPROVED EQUAL.
4. RESERVOIR OPERATIONS ESCP PROVIDED BY EXISTING DAM.
5. CONTRACTOR TO ADJUST EROSION CONTROL DESIGN AS NECESSARY TO MEET APPLICABLE PERMIT REQUIREMENTS.
6. MEANS AND METHODS DEPICTED IN PLANS ARE CONCEPTUAL IN NATURE. CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGNS WITH EQUAL PERFORMANCE THAT SATISFY REGULATORY REQUIREMENTS, MINIMIZE COST AND/OR ACCELERATE SCHEDULE.

PLAN VIEW

Notes:



SHEET LOCATION

WILLIAM P. NORRIS STATE OF WASHINGTON 34576 REGISTERED PROFESSIONAL ENGINEER

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - INITIAL DRAWDOWN PUMP PLAN

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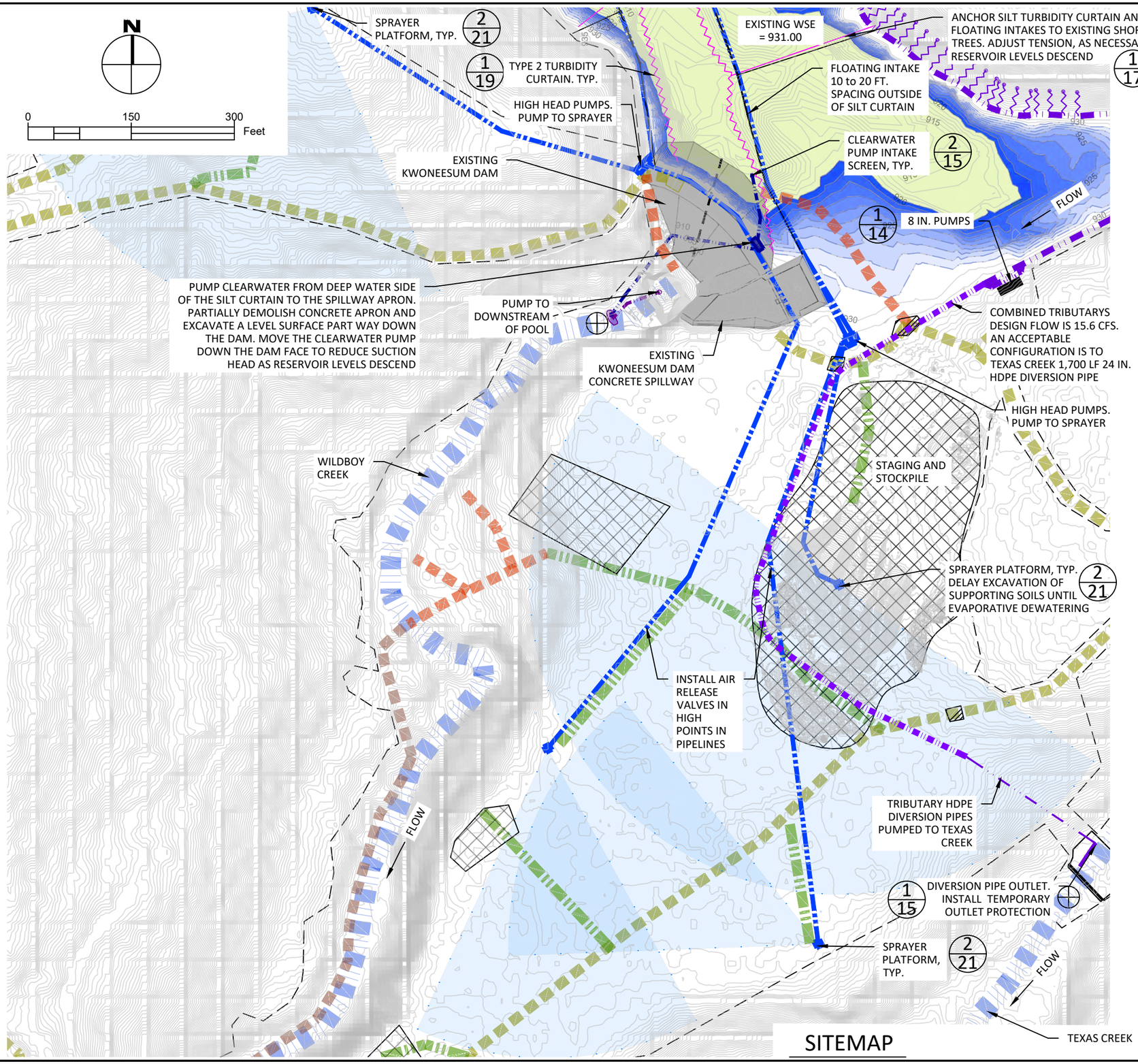


SITEMAP

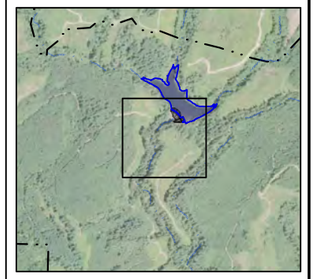
LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING RESERVOIR
- EXISTING DAM AND SPILLWAY
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- PROJECT BOUNDARY AREA
- LIMITS OF DISTURBANCE
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE - PLACED ON GROUND SURFACE FOR PUMPED DIVERSION PLACED IN TRENCH FOR GRAVITY DIVERSION
- CLEARWATER PUMP INTAKE
- PLUNGE POOL PUMP
- DIVERSION PIPE TEMPORARY CROSSING
- 6-INCH WELDED JOINT SDR-11 CONVEYANCE PIPE
- SILT TURBIDITY CURTAIN
- DIVERSION DAM
- 10 FT DRAW DOWN
- AREA TO BE FURTHER DEWATERED AFTER INITIAL DRAW DOWN
- SPRAY INFILTRATION AREA

NOTE:

1. "DEWATERING/PROCESSING AREA" INCLUDES THE AREAS WHERE WATER FROM FLOATING INTAKES WILL BE SPRAYED FOR LAND APPLICATION. THIS AREA MAY ALSO BE USED FOR IMPOUNDED SEDIMENTS DEWATERING.
2. CONTRACTOR TO ADJUST EROSION CONTROL DESIGN AS NECESSARY TO MEET APPLICABLE PERMIT REQUIREMENTS.

Notes:



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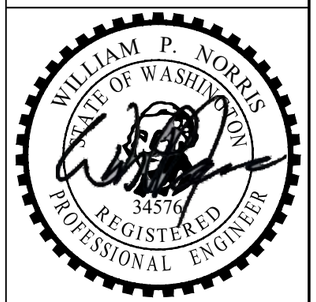

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TITLE: KWONEESUM RESERVOIR & DAM - INITIAL DRAWDOWN PLAN

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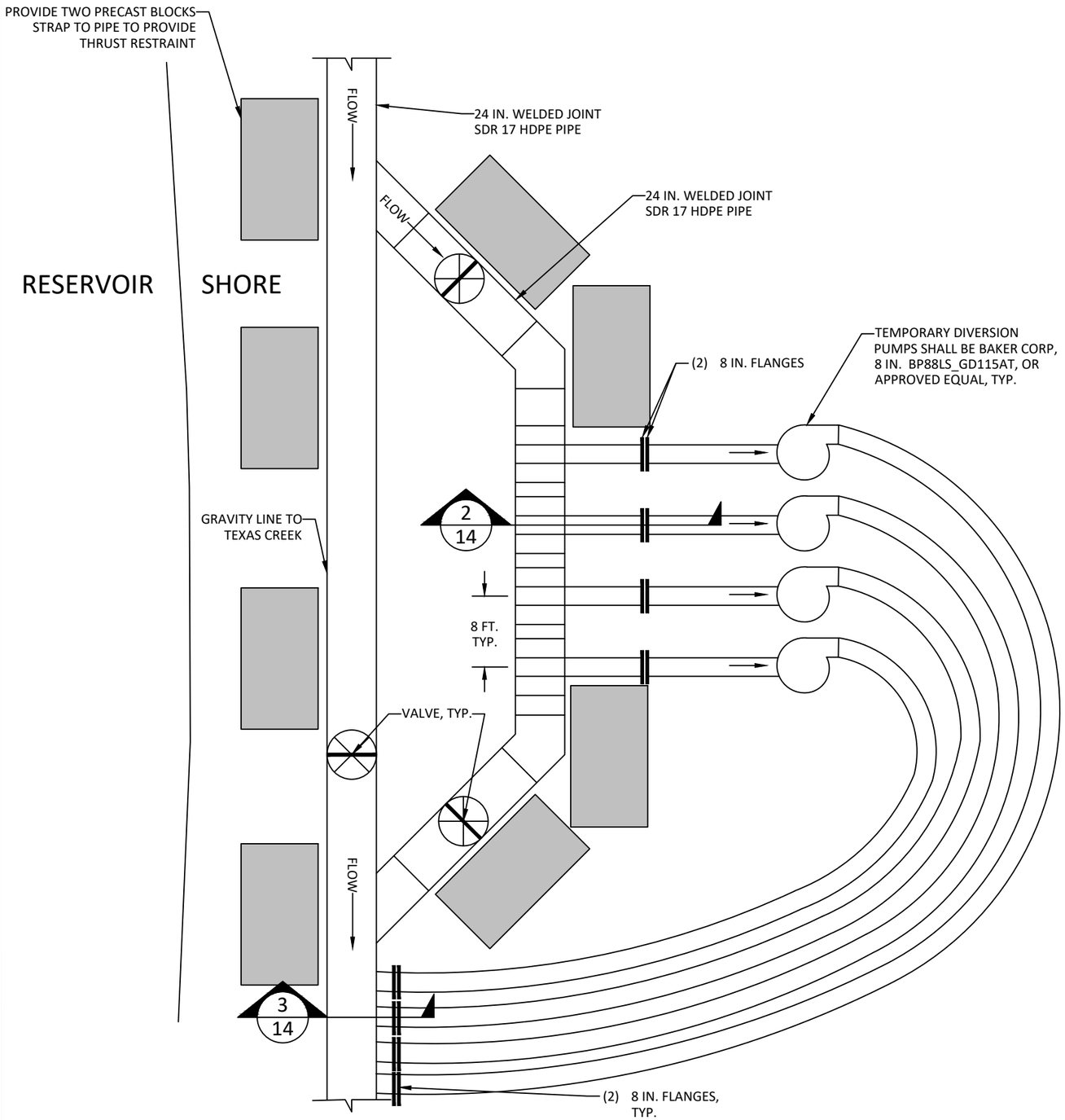
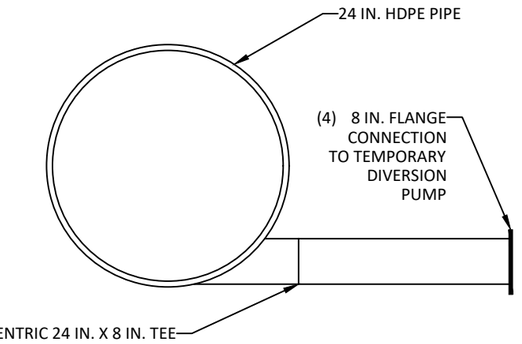
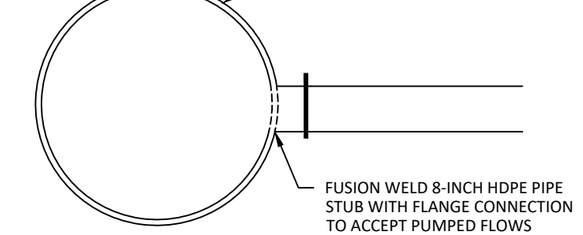


PLAN VIEW - TEMPORARY PUMPING HEADER



2/14 TYPICAL SECTION - PUMPING INLET HEADER

NOT TO SCALE



3/14 TYPICAL SECTION - PUMPING OUTLET FLANGE

NOT TO SCALE

NOTE: CONTRACTOR MAY PROVIDE ALTERNATE DESIGN WITH EQUAL PERFORMANCE.

1/14 TYPICAL DETAIL - TEMPORARY PUMPING HEADER

NOT TO SCALE

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STATE OF WASHINGTON
34576
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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM - DEWATERING TYPICAL DETAILS

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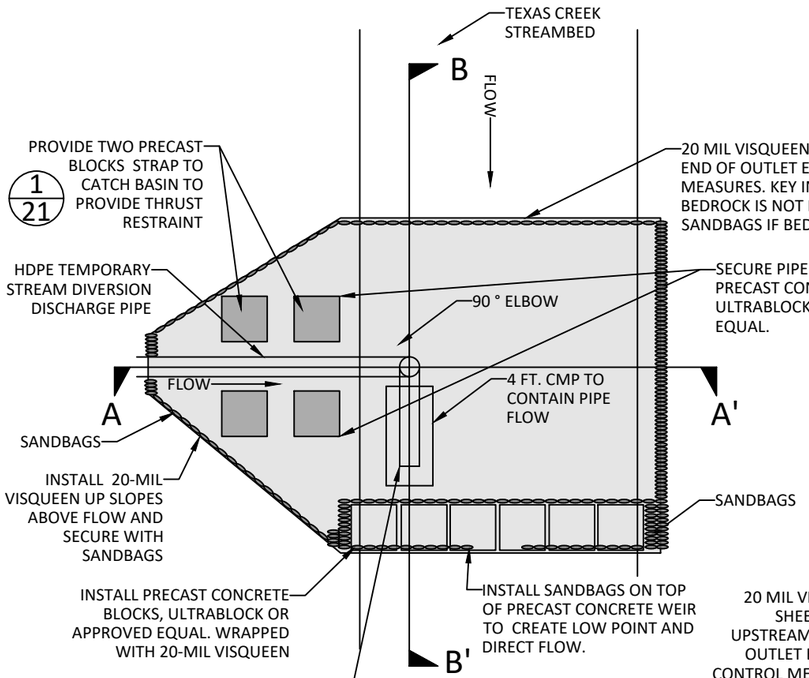
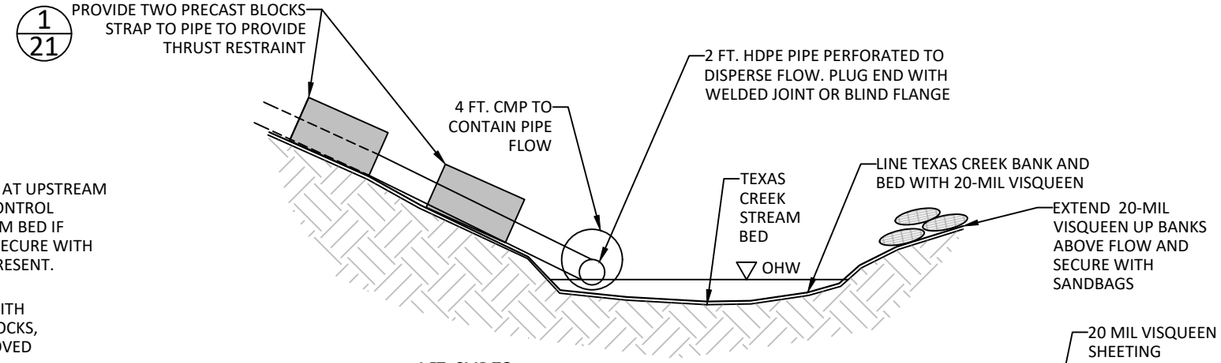
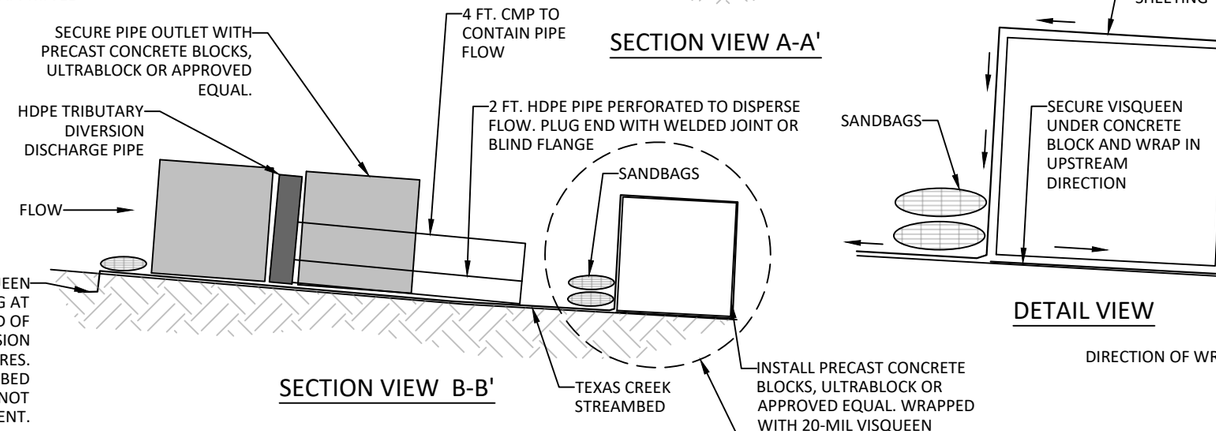


PLAN VIEW



SECTION VIEW A-A'



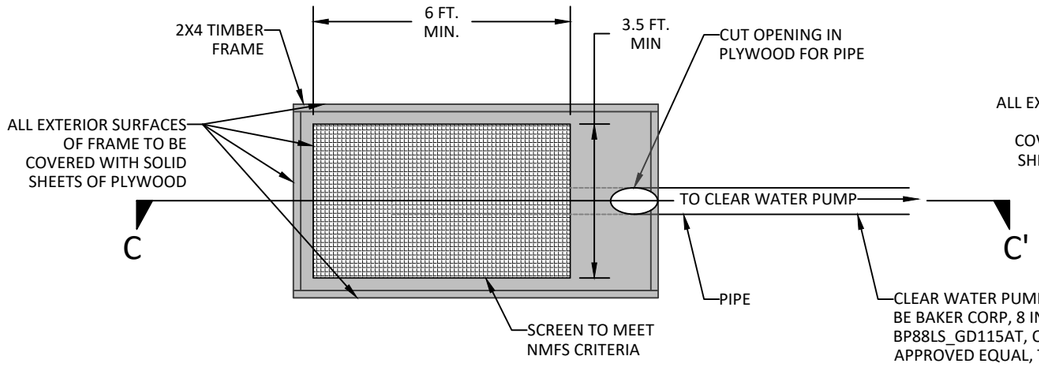
SECTION VIEW B-B'

DETAIL VIEW

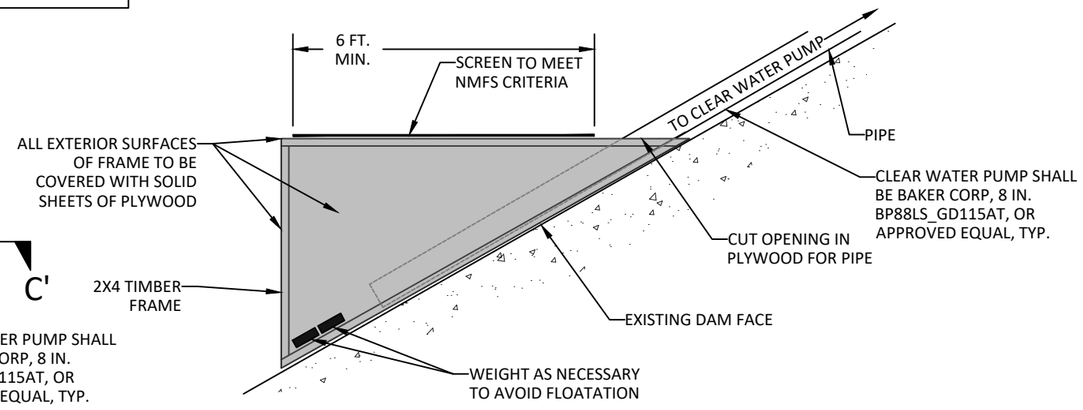
1/15 TYPICAL DETAILS: PUMPED DIVERSION OUTLET EROSION CONTROL MEASURES

NOT TO SCALE

NOTE:
CONTRACTOR TO ADJUST EROSION CONTROL DESIGN AS NECESSARY TO MEET APPLICABLE PERMIT REQUIREMENTS.



PLAN VIEW



SECTION VIEW C-C'

2/15 TYPICAL PLAN - CLEARWATER PUMP INTAKE SCREEN

NOT TO SCALE

NOTE:
1. MEANS AND METHODS DEPICTED IN PLANS ARE CONCEPTUAL IN NATURE. CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGNS WITH EQUAL PERFORMANCE THAT SATISFY REGULATORY REQUIREMENTS, MINIMIZE COST AND/OR ACCELERATE SCHEDULE.

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STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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7700 26TH AVE
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SITE:
KWONEESUM DAM REMOVAL DESIGN

TITLE:
KWONEESUM RESERVOIR & DAM - DEWATERING TYPICAL DETAILS

SCALE:	DATE:	DRAWN:	CHECKED:
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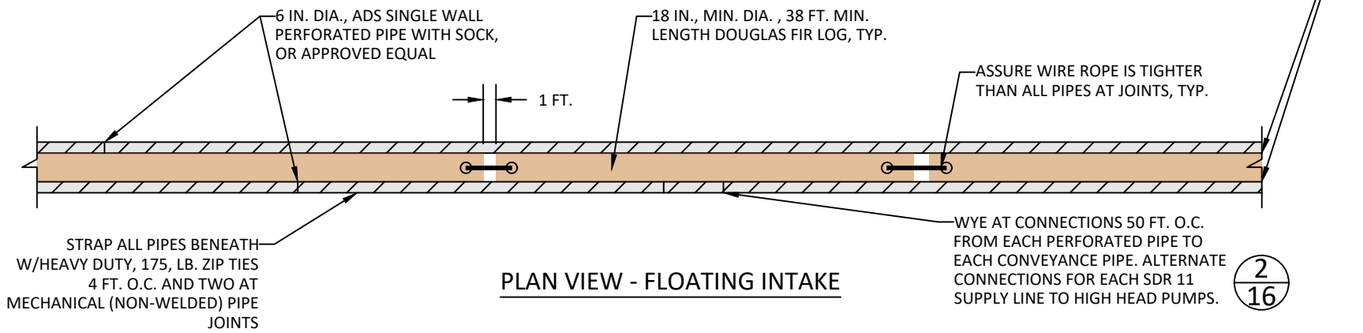
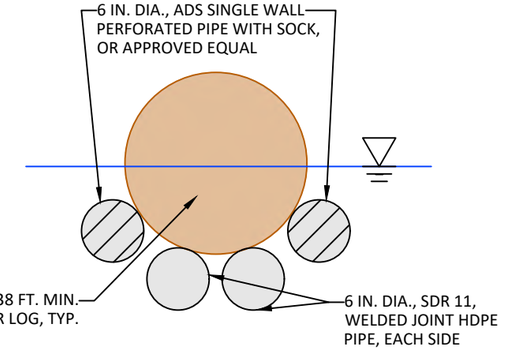
PROJ. NO:	DRAWING NO:	Total Sheets:
-	15	74

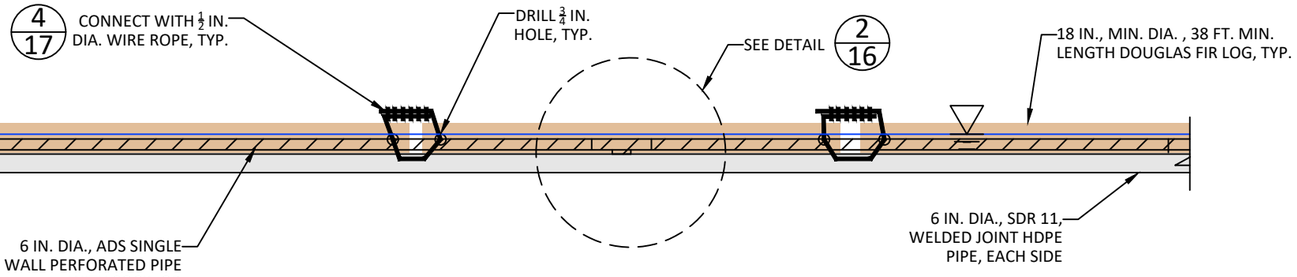


PLAN VIEW - FLOATING INTAKE

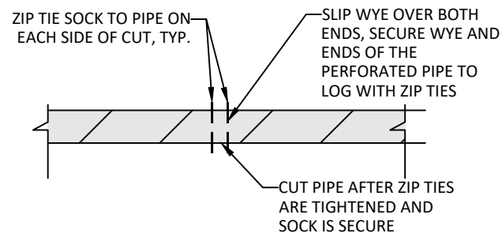


SECTION VIEW - FLOATING INTAKE

NOTE:
1. MEANS AND METHODS DEPICTED IN PLANS ARE CONCEPTUAL IN NATURE. CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGNS WITH EQUAL PERFORMANCE THAT SATISFY REGULATORY REQUIREMENTS, MINIMIZE COST AND/OR ACCELERATE SCHEDULE.



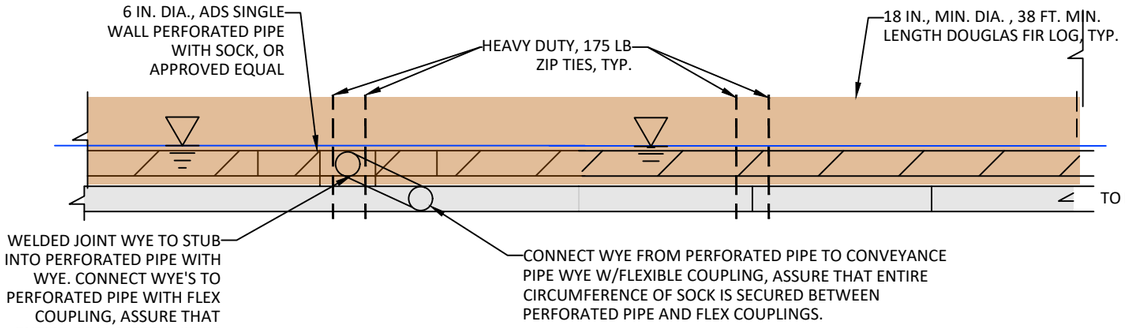
ELEVATION VIEW - FLOATING INTAKE



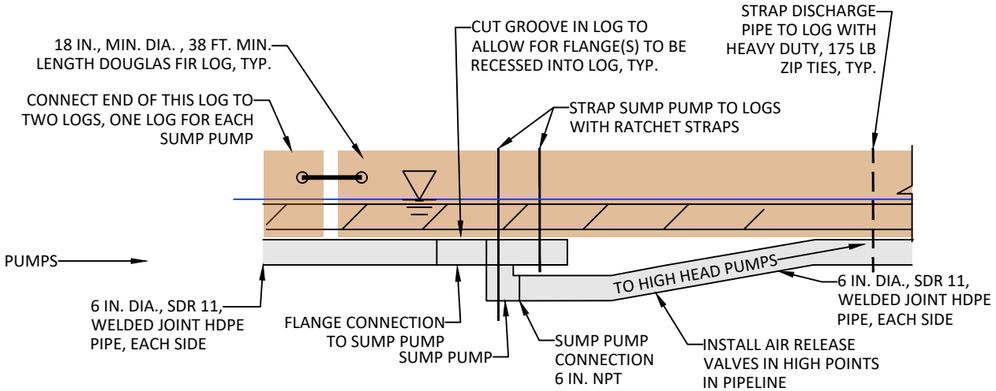
TYPICAL DETAIL - PERFORATED PIPE WITH SOCK CUT

1/16 TYPICAL DETAIL - FLOATING INTAKE
NOT TO SCALE

3/16 TYPICAL DETAIL - PERFORATED PIPE
NOT TO SCALE



2/16 TYPICAL DETAIL - PERFORATED PIPE CONNECTION
NOT TO SCALE



4/16 TYPICAL DETAIL - SUMP PUMP FLOAT CONNECTION
NOT TO SCALE

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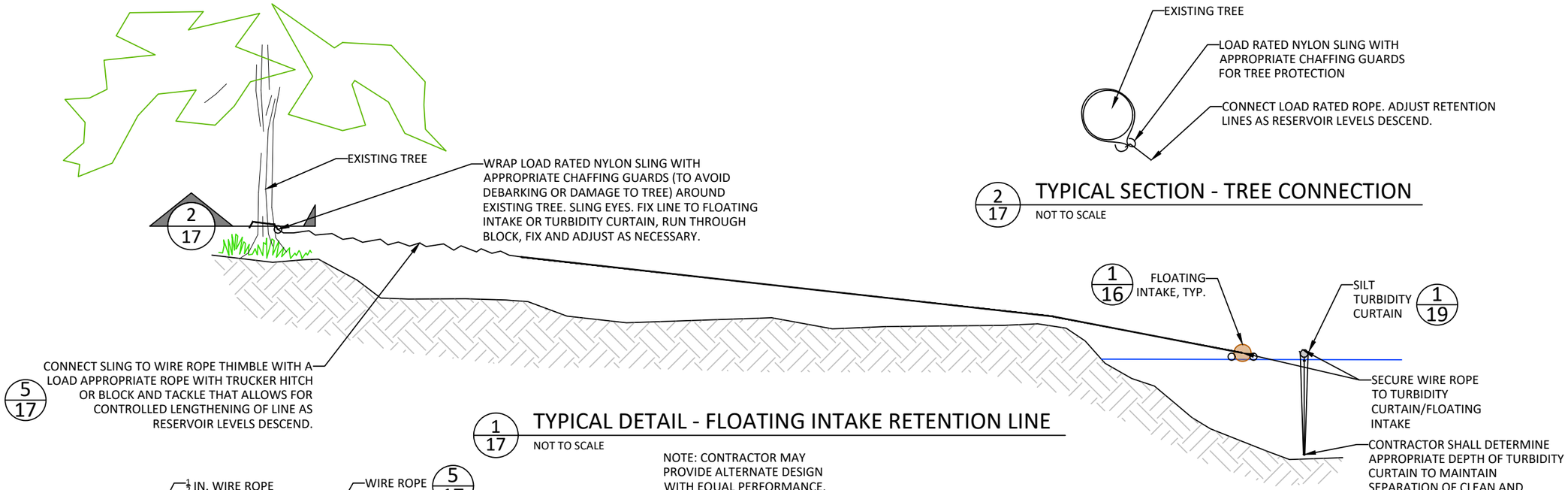
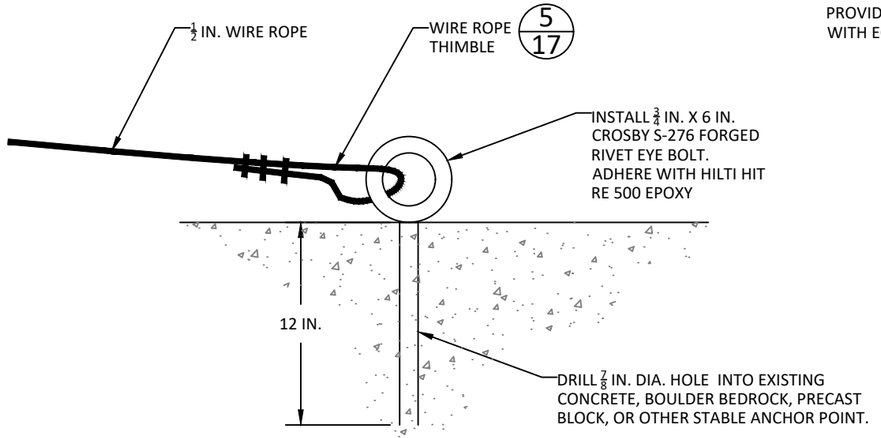


1/17 TYPICAL DETAIL - FLOATING INTAKE RETENTION LINE

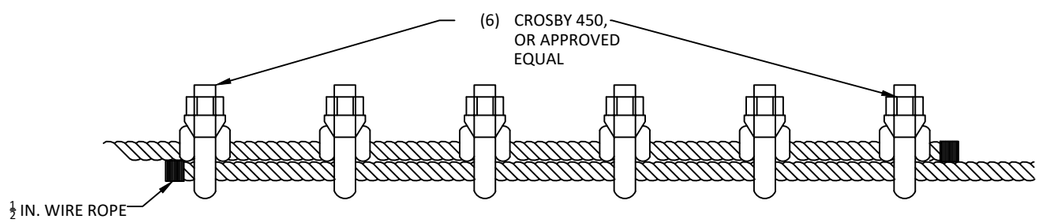
NOT TO SCALE

NOTE: CONTRACTOR MAY PROVIDE ALTERNATE DESIGN WITH EQUAL PERFORMANCE.



3/17 TYPICAL DETAIL - ANCHOR POINT

NOT TO SCALE

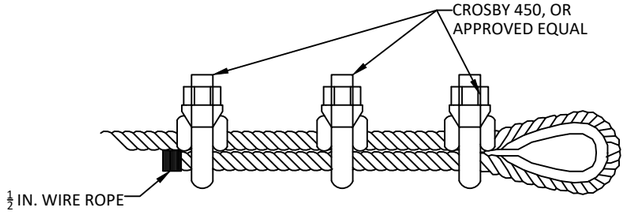


4/17 TYPICAL DETAIL - 1/2 IN. DIA. WIRE ROPE END OVERLAP CONNECTION

NOT TO SCALE

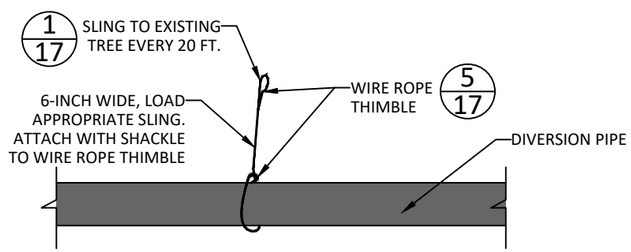
2/17 TYPICAL SECTION - TREE CONNECTION

NOT TO SCALE



5/17 TYPICAL DETAIL - WIRE ROPE THIMBLE

NOT TO SCALE



6/17 TYPICAL DETAIL - PIPE RESTRAINING SLING TO EXISTING TREE

NOT TO SCALE

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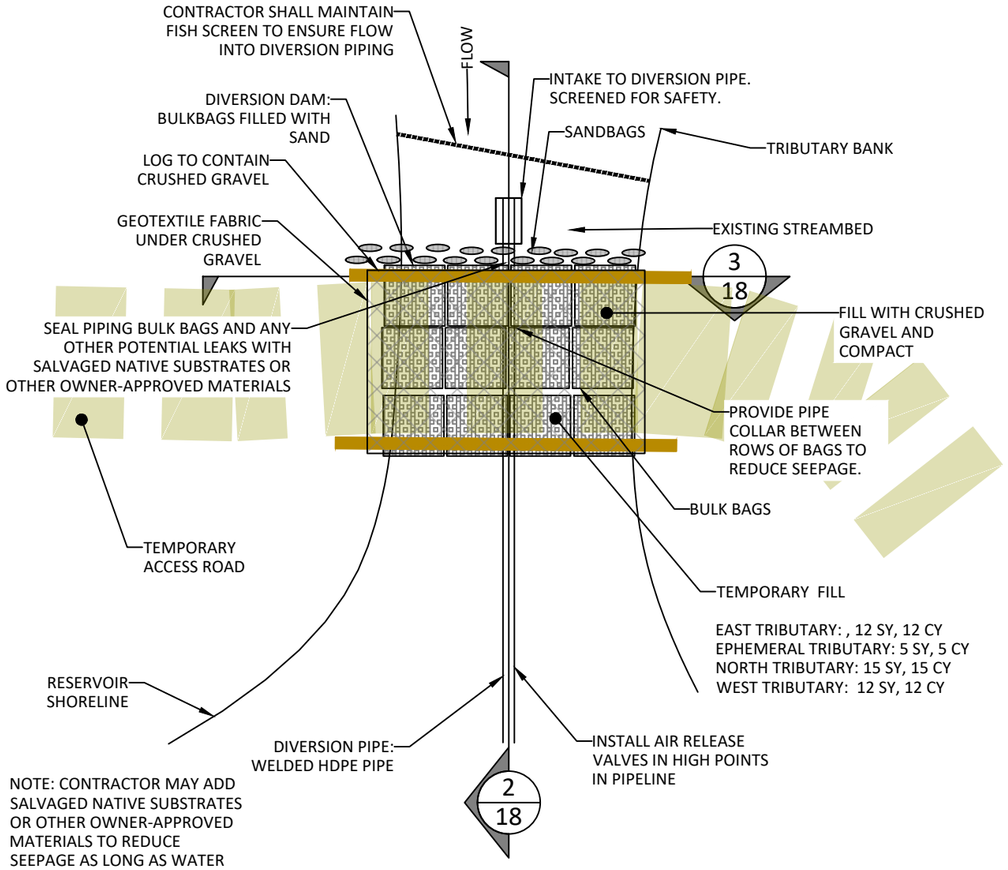
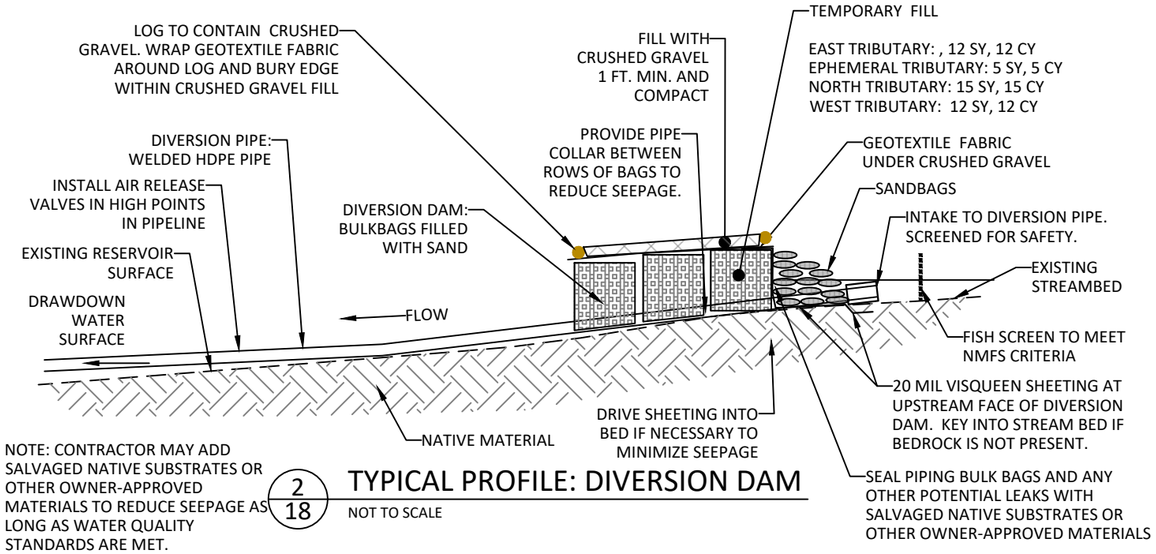


1/18 TYPICAL PLAN VIEW: DIVERSION DAM

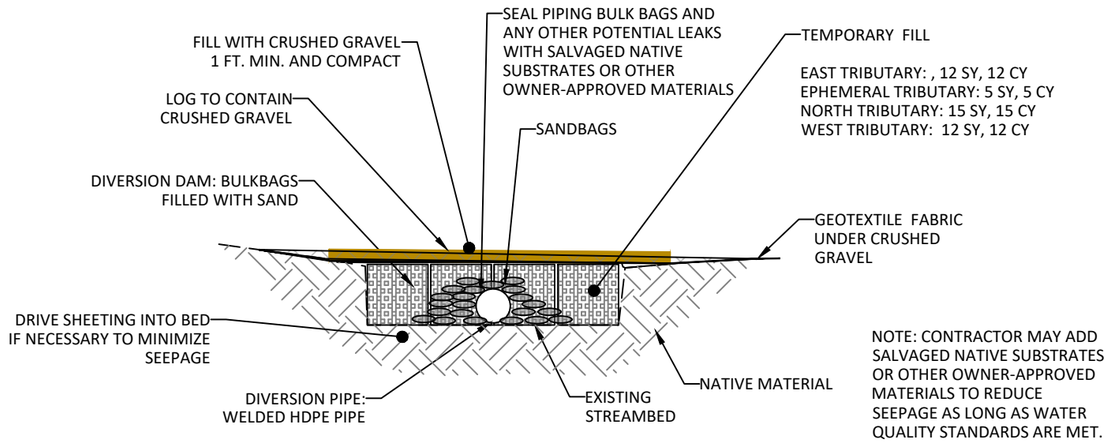
NOT TO SCALE



NOTE: CONTRACTOR MAY ADD SALVAGED NATIVE SUBSTRATES OR OTHER OWNER-APPROVED MATERIALS TO REDUCE SEEPAGE AS LONG AS WATER QUALITY STANDARDS ARE MET.

2/18 TYPICAL PROFILE: DIVERSION DAM

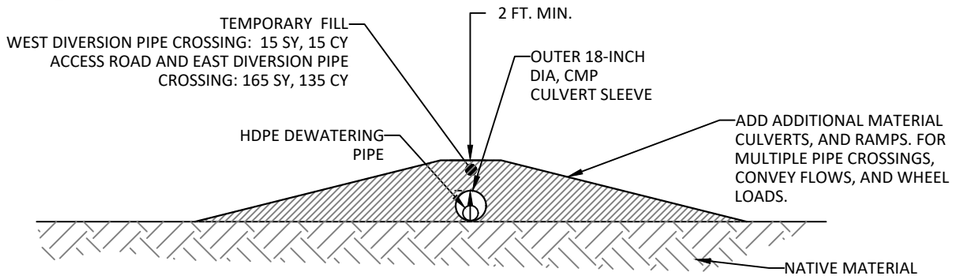
NOT TO SCALE



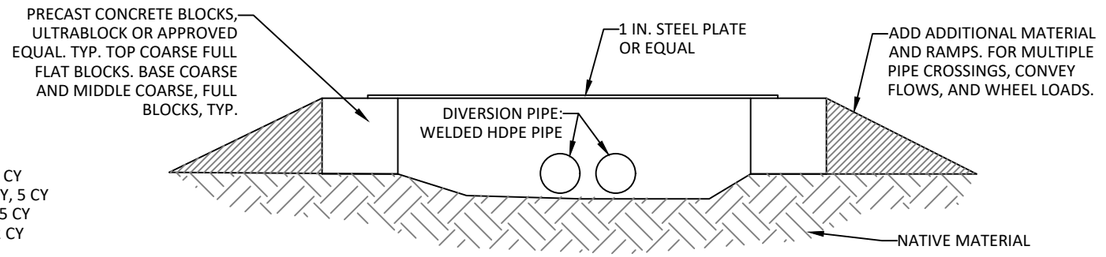
NOTE: CONTRACTOR MAY ADD SALVAGED NATIVE SUBSTRATES OR OTHER OWNER-APPROVED MATERIALS TO REDUCE SEEPAGE AS LONG AS WATER QUALITY STANDARDS ARE MET.

3/18 TYPICAL CROSS-SECTION: DIVERSION DAM WITH PIPE

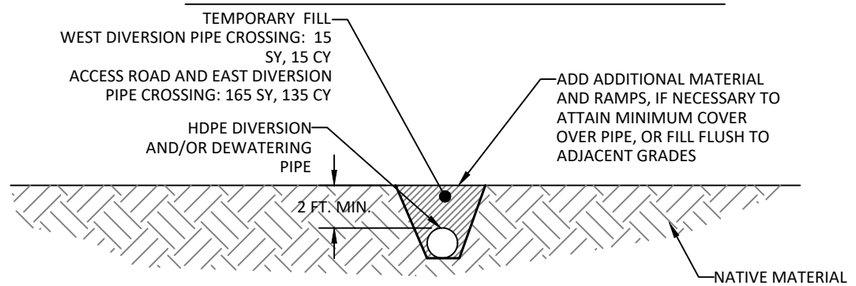
NOT TO SCALE



SECTION VIEW - PIPE CROSSING WITH CULVERT



SECTION VIEW - PIPE CROSSING PRECAST BLOCKS



SECTION VIEW - BURIED PIPE CROSSING

5/18 TYPICAL SECTION VIEW: TEMPORARY CROSSING

NOT TO SCALE

NOTE:
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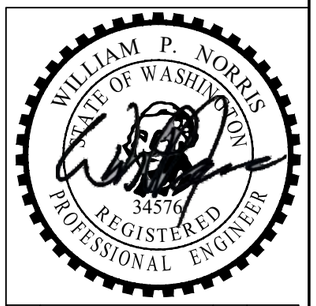

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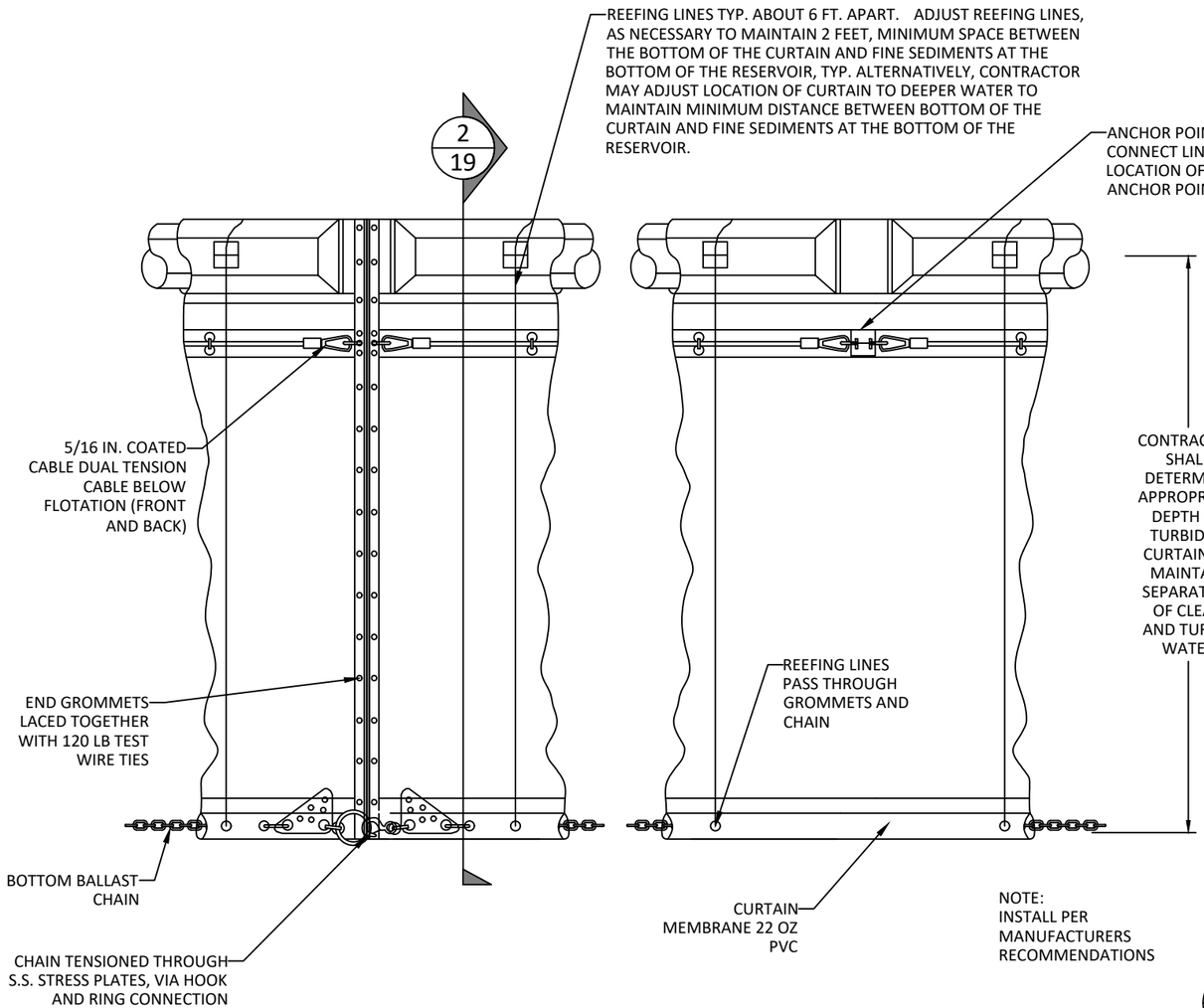
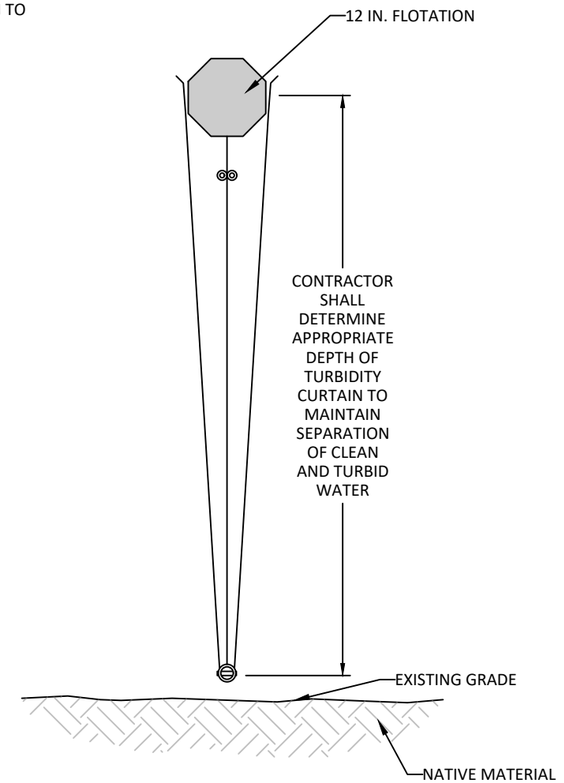


1/19 TYPICAL DETAIL - TYPE 2 TURBIDITY CURTAIN ELEVATION VIEW

NOT TO SCALE



2/19 TYPICAL SECTION - TYPE 2 TURBIDITY CURTAIN

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WILLIAM P. NORRIS
STATE OF WASHINGTON
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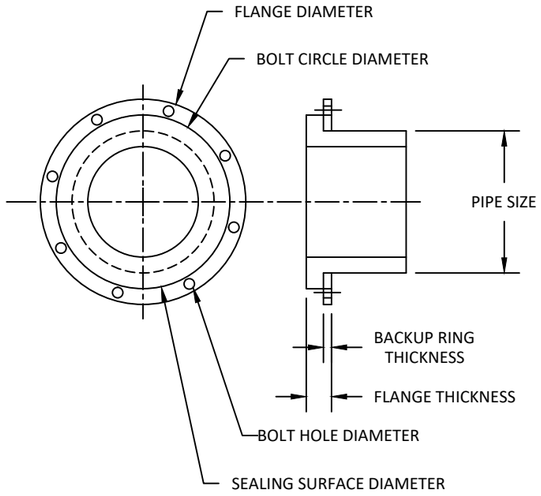
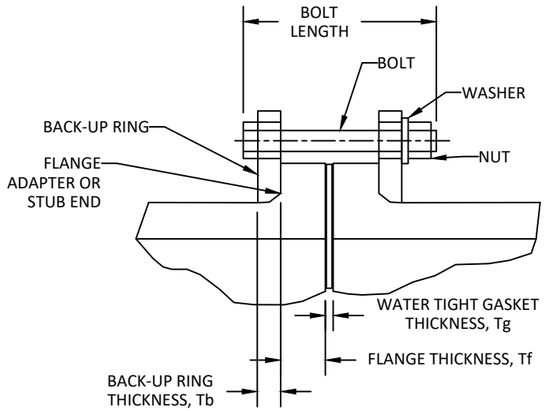


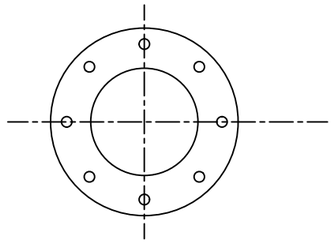
DETAIL - FLANGE ADAPTER AND BACK-UP RING



DETAIL - BOLT LENGTH PARAMETERS

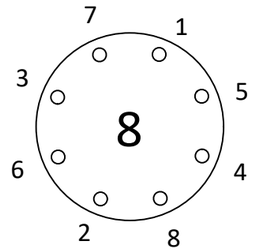
IPS PIPE SIZE	FLANGE OD	BOLT PIPE DIAMEER	BOLT HOLE DIAMETER	NO. OF BOLTS
6	11.00	9.50	0.88	8
8	13.50	11.75	0.88	8
18	25.00	22.75	1.25	16
24	32.00	29.50	1.38	20

TABLE - FLANGE DIMENSIONS (INCH SIZED) ANSI B16.5 CLASS 150

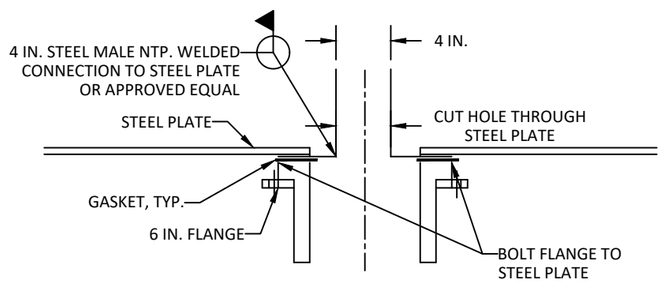


FULL FACE STYLE

DETAIL - FLANGE GASKET STYLES



DETAIL - FLANGE BOLT TIGHTENING PATTERNS

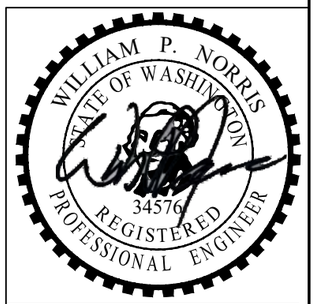


DETAIL - FLANGE CONNECTION TO SPRAYER PLATFORM

1/20 TYPICAL DETAIL - FLANGE ADAPTER AND BACKUP RING

NOT TO SCALE

NOTE: CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGN WITH EQUAL PERFORMANCE.



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SITE: KWONEESUM DAM REMOVAL DESIGN

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SCALE:	DATE:	DRAWN:	CHECKED:
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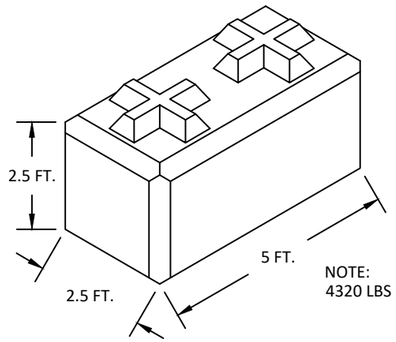
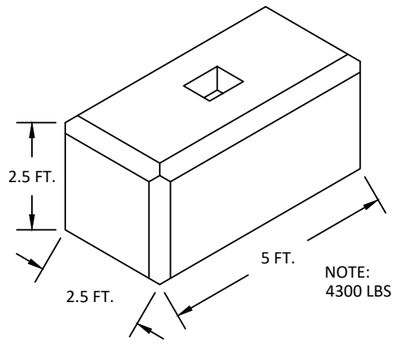
-	20	74



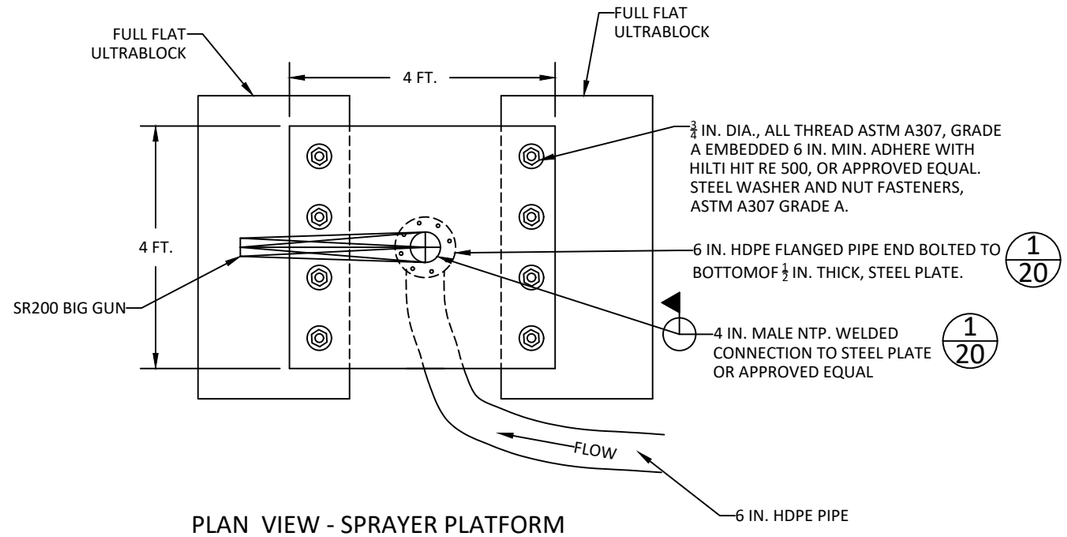
FULL



FULL FLAT

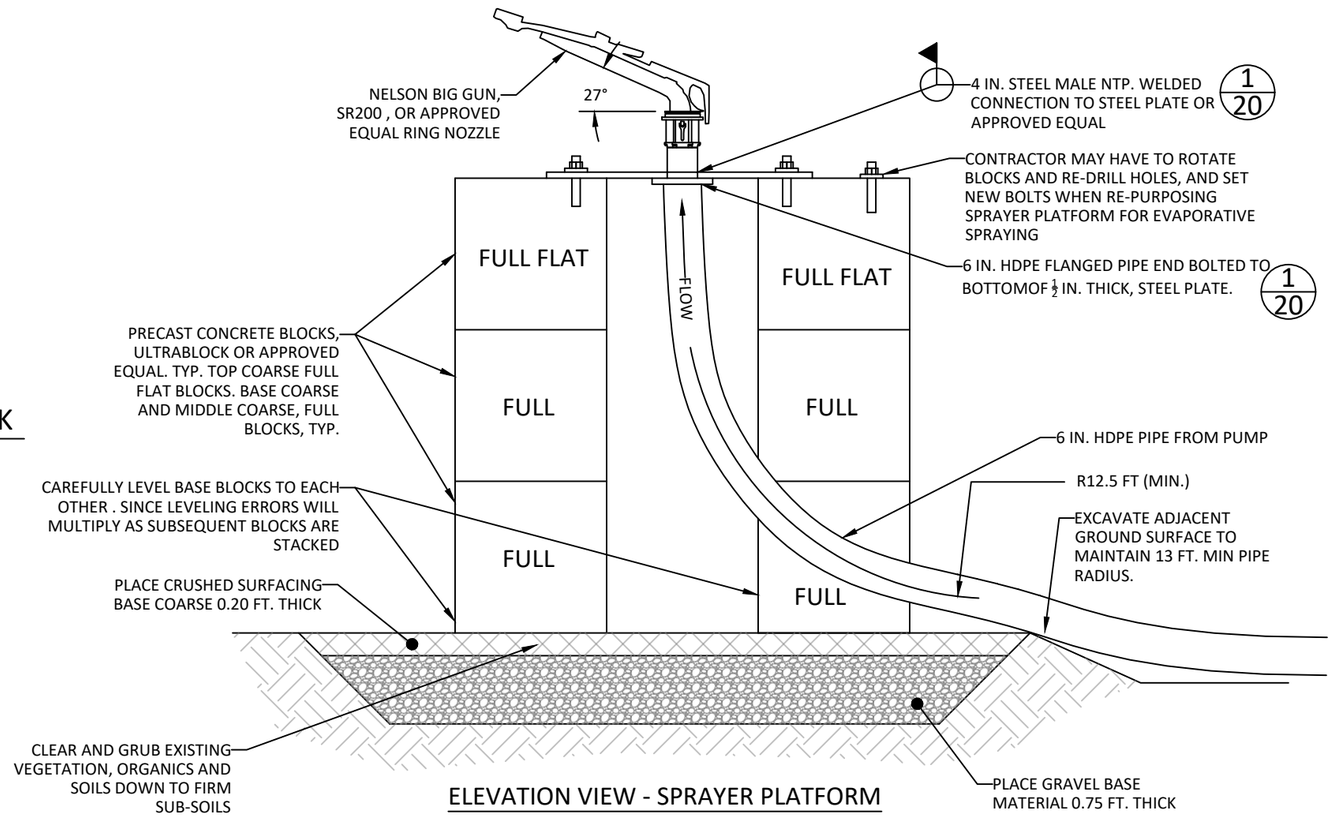
1/21 TYPICAL DETAIL - PRECAST CONCRETE BLOCK

NOT TO SCALE



PLAN VIEW - SPRAYER PLATFORM

NOT TO SCALE

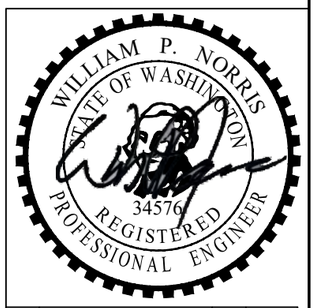


ELEVATION VIEW - SPRAYER PLATFORM

2/21 TYPICAL DETAIL - SPRAYER PLATFORM DETAILS

NOT TO SCALE

NOTE: CONTRACTOR MAY PROVIDE ALTERNATE DESIGN OR LOCATION WITH EQUAL PERFORMANCE.



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NOTE:
1. CONTRACTOR SHALL PROVIDE SUITABLE SOILS GROWING MEDIUM FOR ESTABLISHMENT OF NATIVE VEGETATION AS PER SPECIFICATIONS.

2. CONTRACTOR MAY PROPOSE MODIFICATIONS TO UPLAND PORTIONS OF THE RESERVOIR OR PROPOSE ALTERNATIVE OPTIONS FOR EXCESS MATERIALS SUBJECT TO OWNER APPROVAL. SUCH PROPOSALS ARE SUBJECT TO MAINTAINING PROPOSED CHANNEL GRADING SHOWN IN THESE PLANS AND PROVIDING TOPSOIL OVER ALL GROUND SURFACES ADEQUATE FOR NATIVE VEGETATIVE ESTABLISHMENT.

LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING DAM AND SPILLWAY
- TEMPORARY ACCESS ROADS
- STAGING AND STOCKPILE
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)

NORTH TRIBUTARY (SEE SHEETS 34-37)

NORTH TRIBUTARY

FLOW

EPHEMERAL TRIBUTARY (SEE SHEETS 49-50)

EAST TRIBUTARY (SEE SHEETS 38-41)

EAST TRIBUTARY

WEST TRIBUTARY (SEE SHEETS 42-45)

WEST TRIBUTARY

SPILLWAY AREA (SEE SHEETS 47-48)

DAM AREA (SEE SHEETS 30-33)

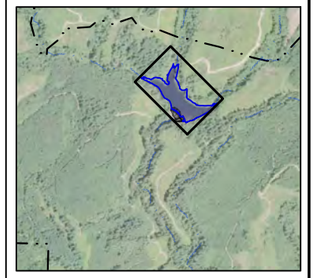
KWONEESUM DAM FOOTPRINT

CAMP KWONEESUM

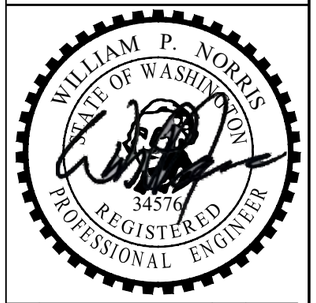
0 100 200 Feet

PLAN VIEW

Notes:



SHEET LOCATION



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SITE:
KWONEESUM DAM REMOVAL DESIGN

TITLE:
KWONEESUM RESERVOIR & DAM – ANTICIPATED RESERVOIR MASS GRADING

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PROJ. NO:	DRAWING NO:	Total Sheets:
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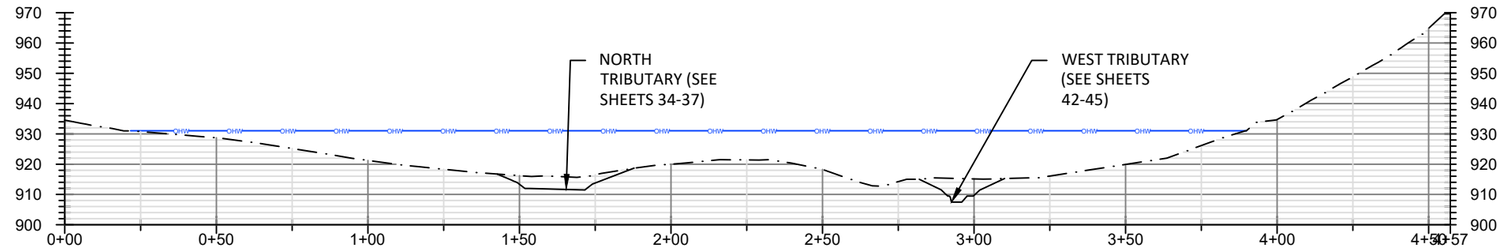
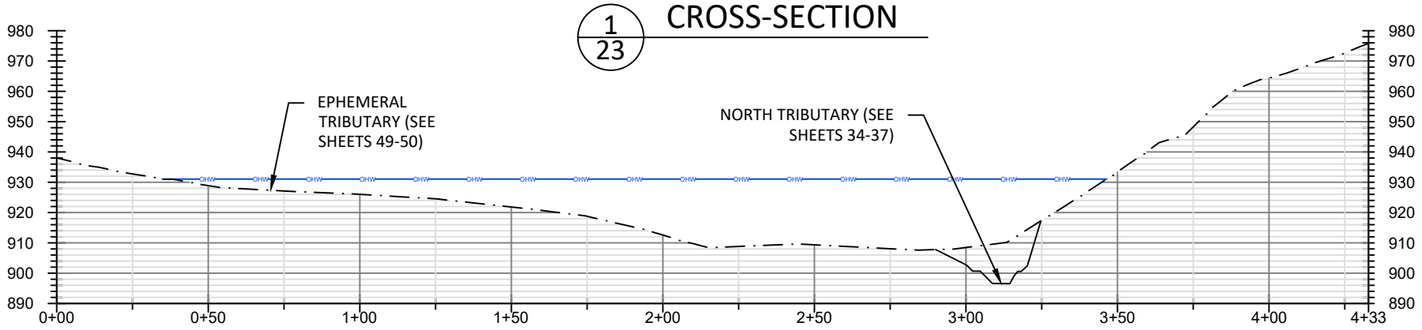


1/23 CROSS-SECTION



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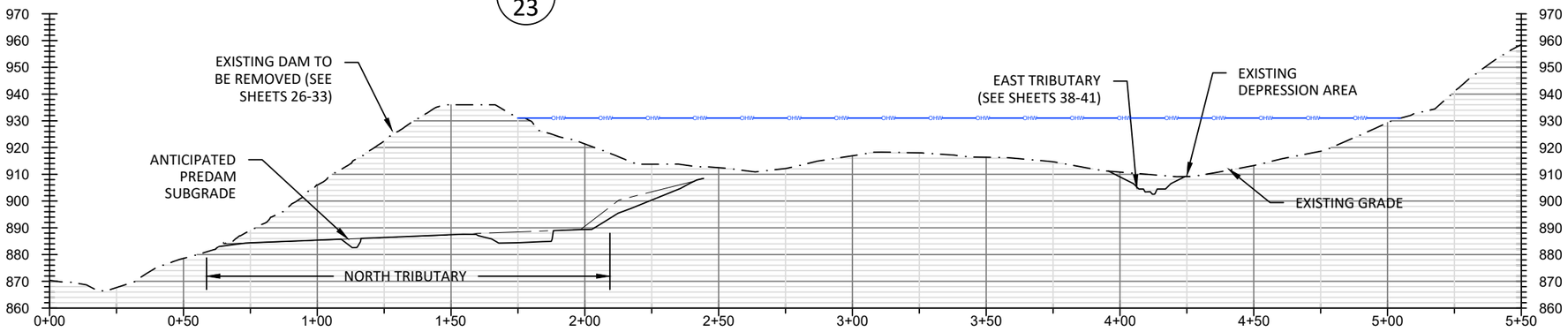

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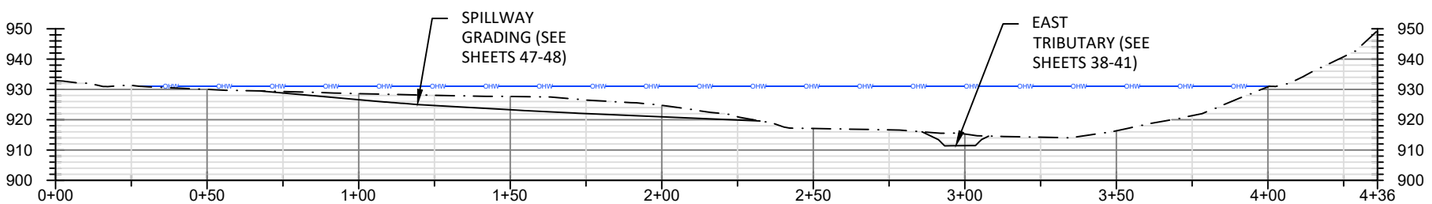

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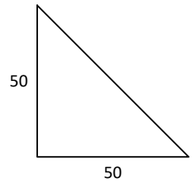
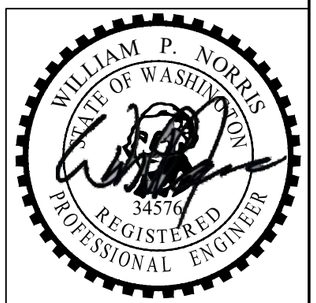


LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE
- ASSUMED DAM SUBGRADE

NOTES:
CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.



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www.ers4life.com

CLIENT:
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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM – MASS GRADING CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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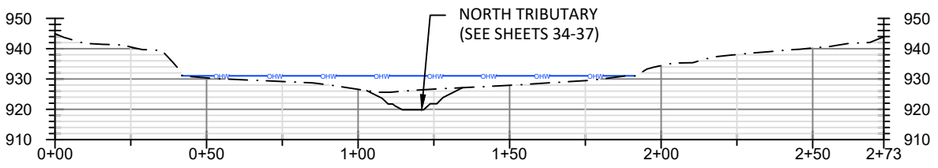
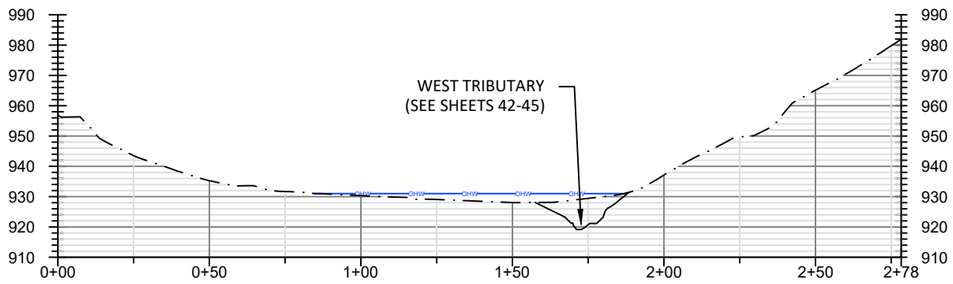
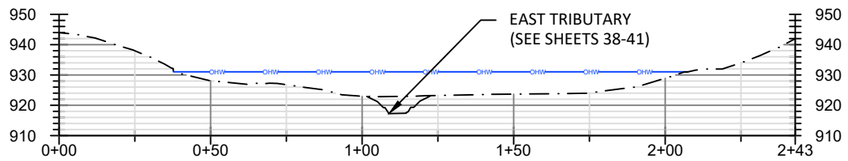


1/24 CROSS-SECTION - NORTH TRIBUTARY



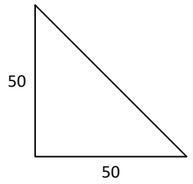
2/24 CROSS-SECTION - WEST TRIBUTARY



3/24 CROSS-SECTION - EAST TRIBUTARY

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



NOTES:
CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

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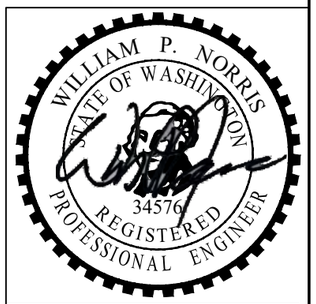

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR & DAM – MASS GRADING CROSS-SECTIONS

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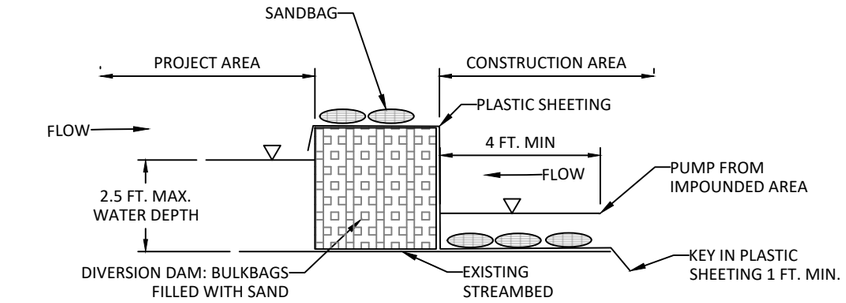
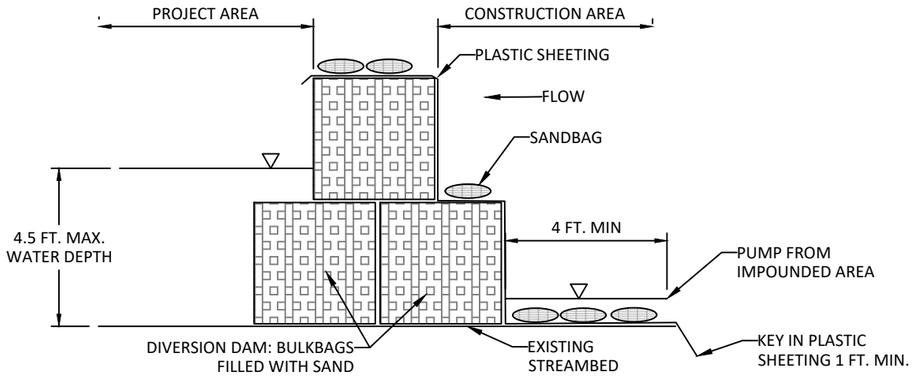


TYPICAL SECTION VIEW: SINGLE LAYER

NOT TO SCALE



TYPICAL SECTION VIEW: STACKED LAYERS

NOT TO SCALE

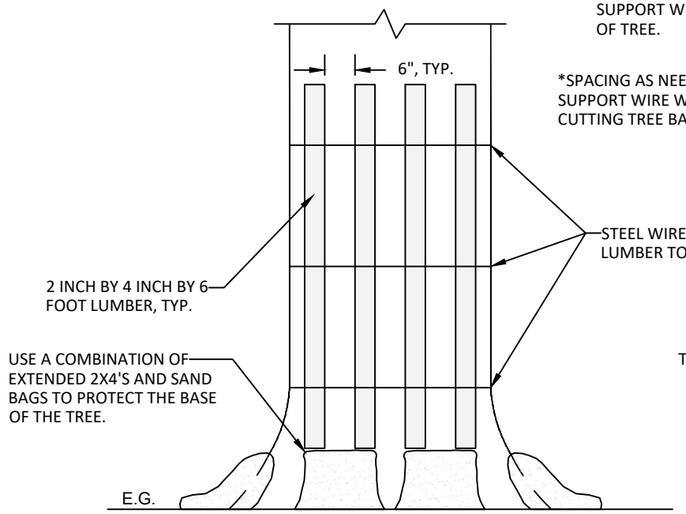
COFFERDAM NOTES:

1. BULKBAG COFFERDAM IS A PRE-APPROVED METHOD FOR ISOLATING THE WORK AREA FROM SURFACE FLOWS. CONTRACTOR MAY SUBMIT ALTERNATE COFFERDAM DESIGN TO THE OWNER FOR REVIEW AND APPROVAL. ALTERNATE DESIGN SUBMITTAL SHALL INCLUDE SHOP DRAWINGS AND/OR MATERIALS DATA AND MANUFACTURER'S RECOMMENDATIONS.
2. BULKBAGS SHALL BE FILLED WITH SAND. PLACE FILLED BULKBAGS ADJACENT TO ONE ANOTHER TO CREATE A CONTINUOUS ROW THAT ISOLATES THE WORK AREA FROM SURFACE FLOWS.
3. IF WATER DEPTH EXCEEDS 85% OF THE BULKBAG HEIGHT, AN ADDITIONAL TOP ROW OF BULKBAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULKBAGS.
4. BULKBAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON THE WORK AREA SIDE OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4-FEET FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF STANDARD SANDBAGS.
5. THE OUTWARD EDGE OF PLASTIC SHEETING ON WORK AREA SIDE SHALL BE TOED INTO THE CHANNEL BED MINIMUM 1-FT. TOEING IN THE OUTWARD EDGE OF PLASTIC SHEETING SHALL OCCUR AFTER THE COFFERDAM IS CLOSED TO PREVENT TURBIDITY RELEASE TO THE WATERWAY.
6. THE COFFERDAM SHALL BE TIGHTLY SEALED TO THE GROUND BY PLASTIC SHEETING AND STANDARD SANDBAGS. MULTIPLE LAYERS OF SHEETING AND SANDBAGS MAY BE REQUIRED TO FORM A WATERTIGHT SEAL.
7. BULKBAGS SHALL BE WATERPROOF CUBE-SHAPED POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
8. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL BE LONG ENOUGH TO ENSURE THAT ENTIRE LENGTH OF COFFERDAM WILL BE COVERED WITHOUT A SEAM. MINIMUM 12-FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16-FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULKBAG COFFERDAM.
9. CONTRACTOR SHALL PROVIDE PUMPING SUFFICIENT FOR A NET INFLOW TO THE WORK AREA, AND DISCHARGE TURBID WATER TO UPLAND FLOODPLAIN.
10. BULKBAG COFFERDAM SHALL BE COMPLETELY REMOVED AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED.
11. IF NECESSARY, GAPS BETWEEN BULKBAGS MAY BE FILLED WITH BENTONITE TO SEAL AND IMPROVE COFFERDAM SEAL.

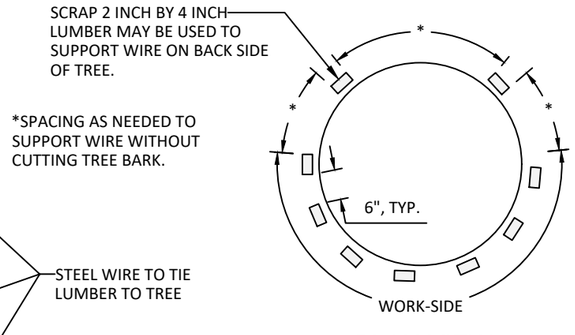
1/25 TYPICAL DETAIL: DAM REMOVAL COFFER DAM 1

NOT TO SCALE

NOTE: CONTRACTOR MAY PROVIDE ALTERNATE DESIGN WITH EQUAL PERFORMANCE.



ELEVATION VIEW



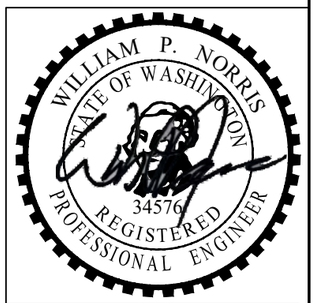
PLAN VIEW

TREE PROTECTION NOTES:

1. THE INTENT OF THIS DETAIL IS TO PROTECT EXISTING TREES FROM DAMAGE DURING CONSTRUCTION.
2. THIS TREE PROTECTION DETAIL SHALL BE USED WHEN DIRECTED BY OWNER.
3. ALL TREES SHALL BE SAVED UNLESS NOTED OTHERWISE ON THE PLANS OR AS DIRECTED BY THE OWNER.
4. LUMBER, WIRE, AND SANDBAGS MAY BE REUSED AT OTHER TREES, AS WORK PROGRESSES.
5. CONTRACTOR MAY PROVIDE ALTERNATIVE DESIGN WITH EQUAL PERFORMANCE.

2/25 TYPICAL DETAIL: TREE PROTECTION

NOT TO SCALE



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TITLE: KWONEESUM DAM – TYPICAL DETAILS DAM REMOVAL

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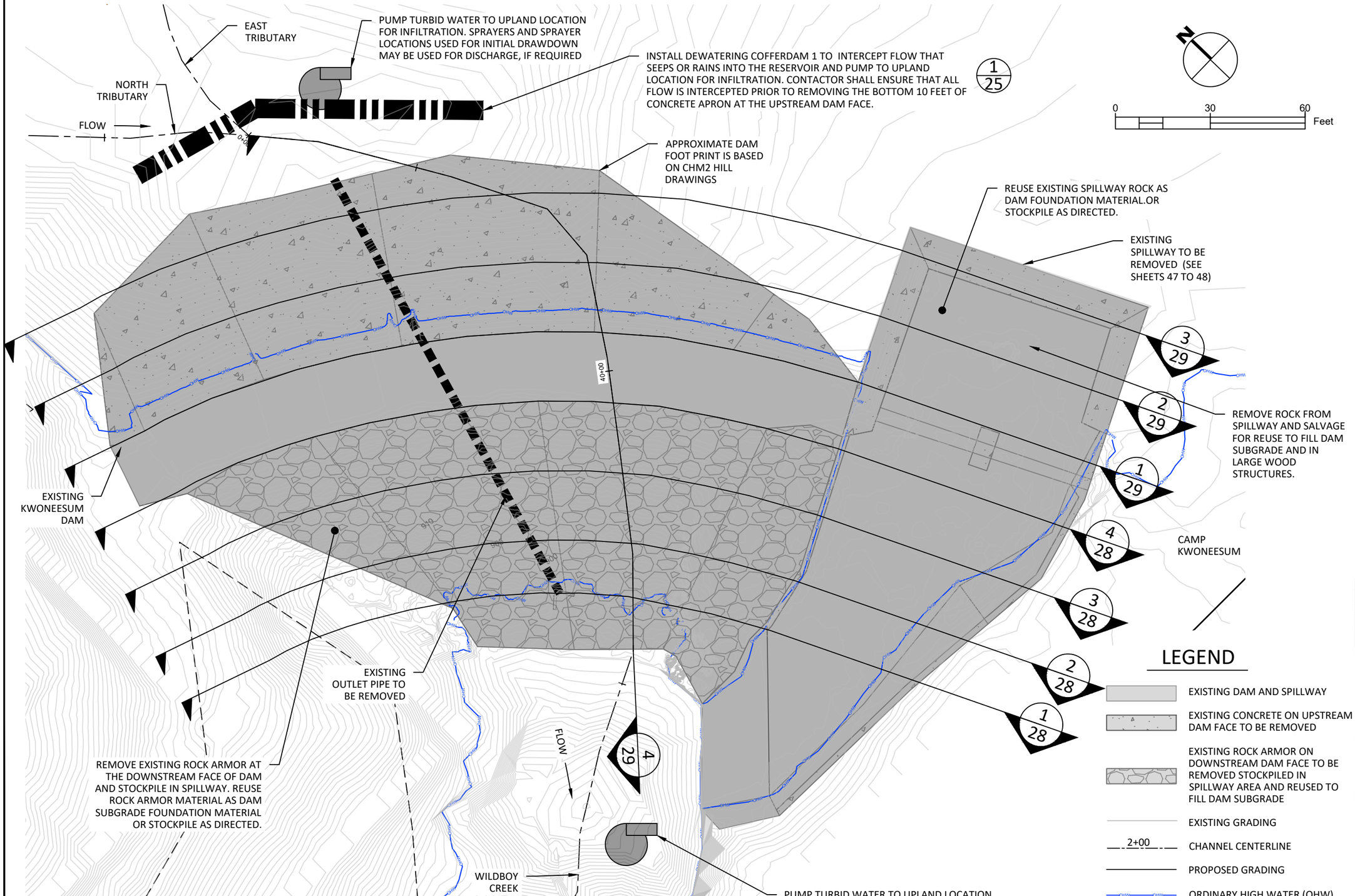
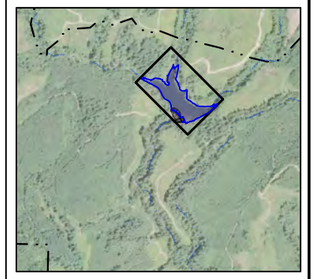


PLAN VIEW

LEGEND

- EXISTING DAM AND SPILLWAY
- EXISTING CONCRETE ON UPSTREAM DAM FACE TO BE REMOVED
- EXISTING ROCK ARMOR ON DOWNSTREAM DAM FACE TO BE REMOVED STOCKPILED IN SPILLWAY AREA AND REUSED TO FILL DAM SUBGRADE
- EXISTING GRADING
- 2+00 CHANNEL CENTERLINE
- PROPOSED GRADING
- OHW ORDINARY HIGH WATER (OHW)
- INSTALL PERMANENT SAFETY FENCE

Notes:



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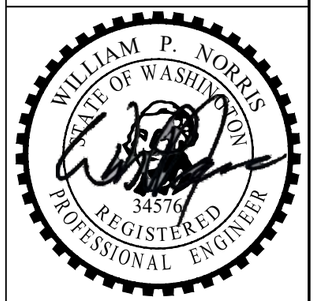

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TITLE: KWONEESUM DAM – DAM REMOVAL

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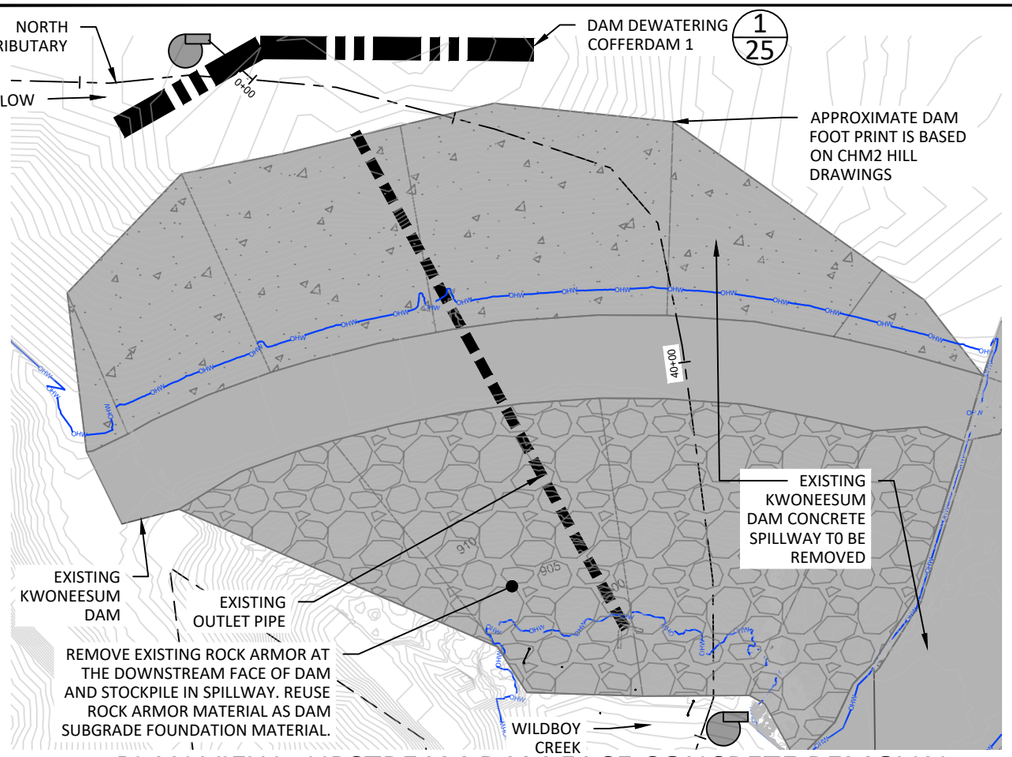
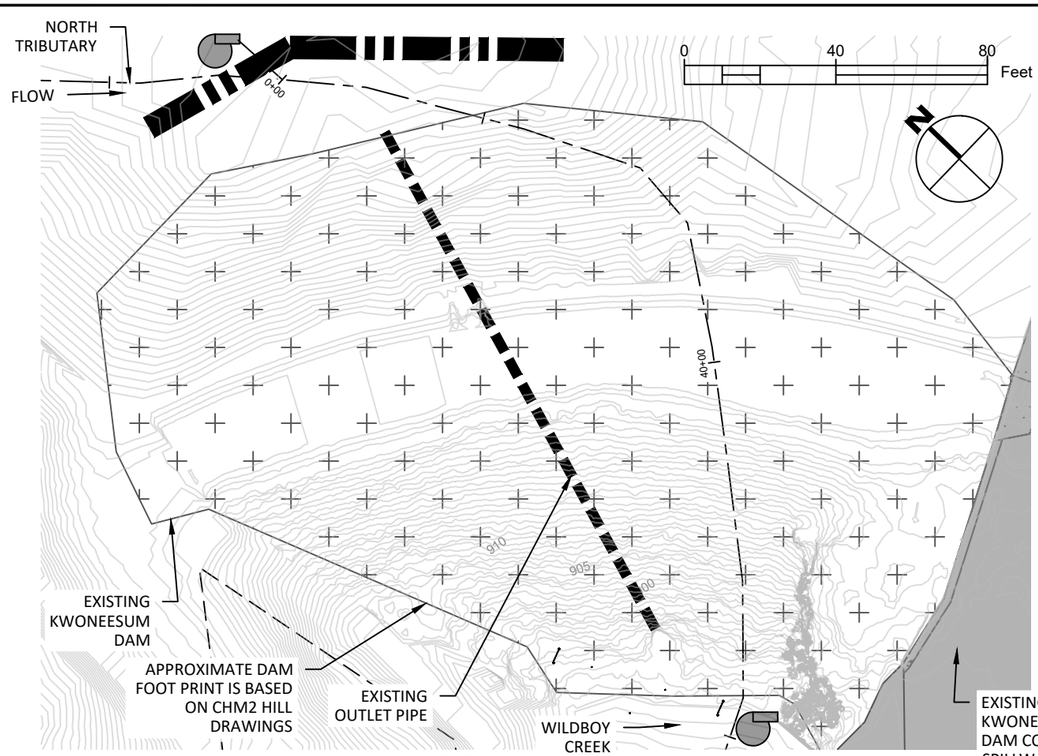
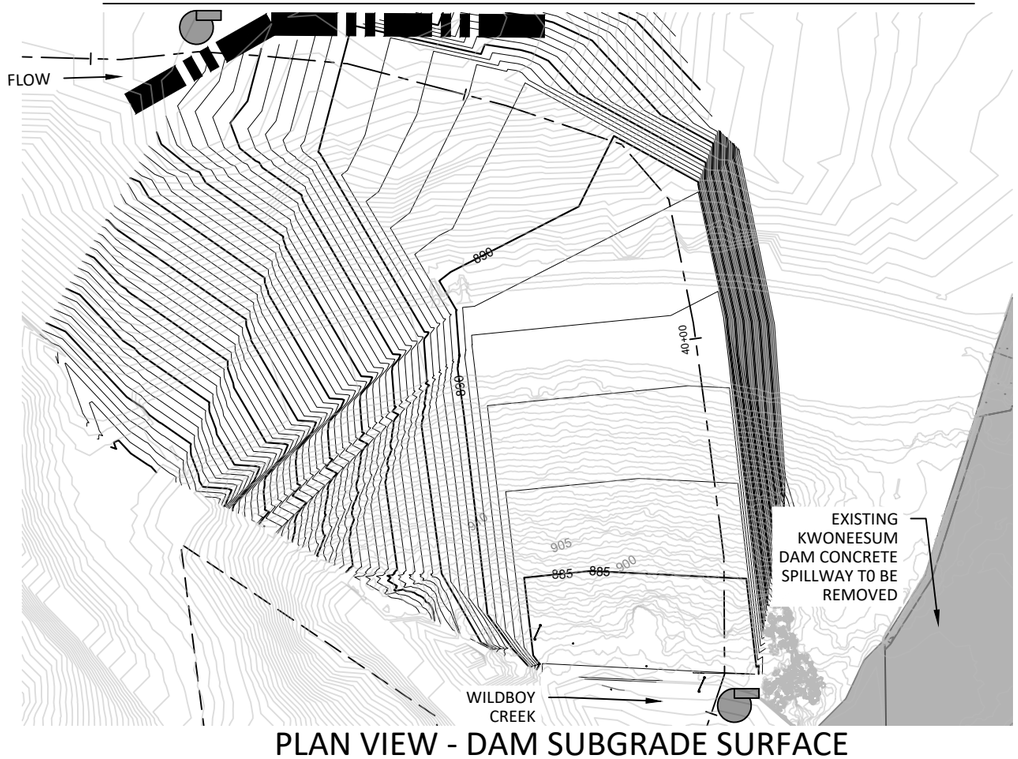


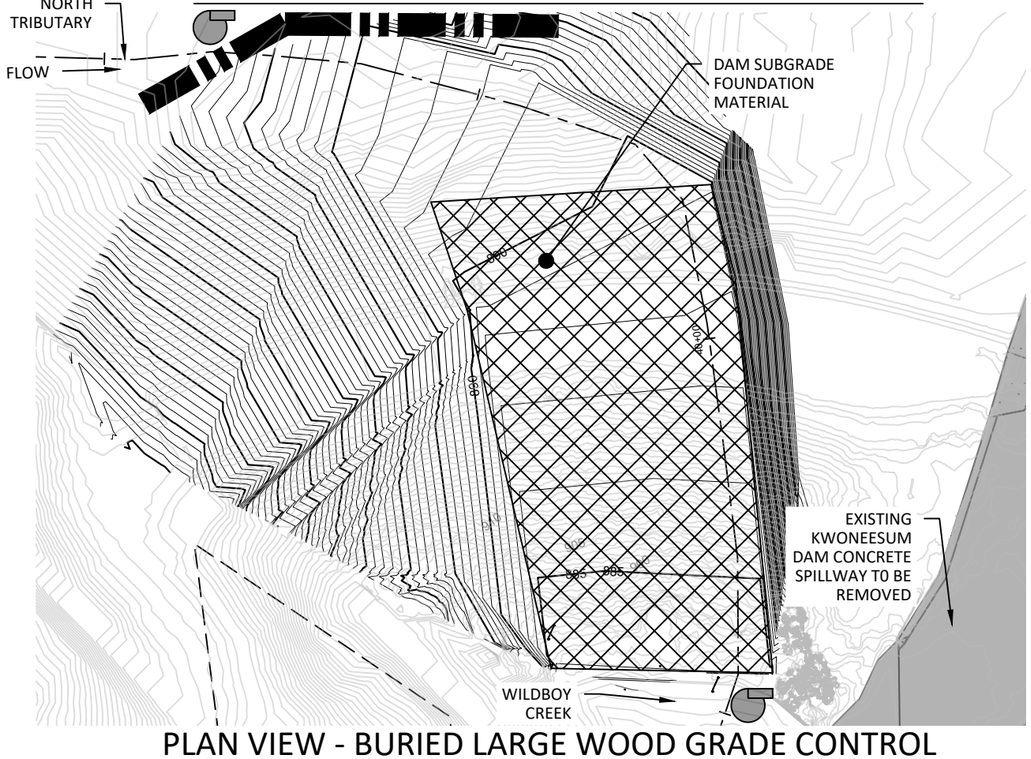
PLAN VIEW - UPSTREAM DAM FACE CONCRETE REMOVAL



PLAN VIEW - ROCK AND OUTLET PIPE REMOVAL



PLAN VIEW - DAM SUBGRADE SURFACE



PLAN VIEW - BURIED LARGE WOOD GRADE CONTROL

LEGEND

- EXISTING DAM AND SPILLWAY
- EXISTING GRADING
- EXISTING CONCRETE ON UPSTREAM DAM FACE TO BE REMOVED
- EXISTING ROCK ARMOR ON DOWNSTREAM DAM FACE TO BE REMOVED STOCKPILED IN SPILLWAY AREA AND REUSED TO FILL DAM SUBGRADE
- EXISTING DAM MATERIAL TO BE REMOVED
- DAM SUBGRADE MATERIAL
- CHANNEL CENTERLINE 2+00
- PROPOSED GRADING
- ORDINARY HIGH WATER (OHW)
- EXISTING OUTLET PIPE TO BE REMOVED
- DEWATERING COFFER DAM 1
- DEWATERING COFFER DAM 2

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STATE OF WASHINGTON
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SITE:
KWONEESUM DAM REMOVAL DESIGN

TITLE:
KWONEESUM DAM – DAM REMOVAL SEQUENCE

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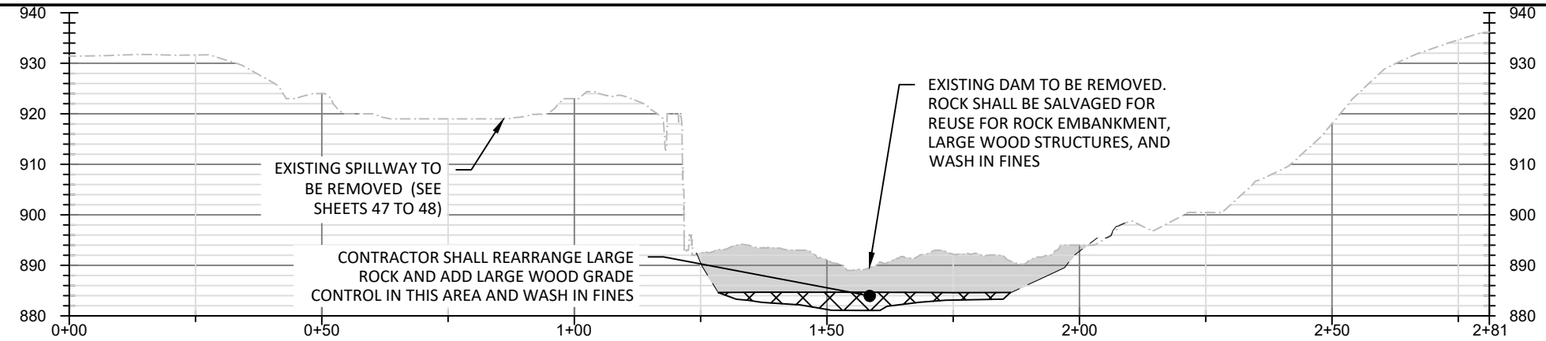
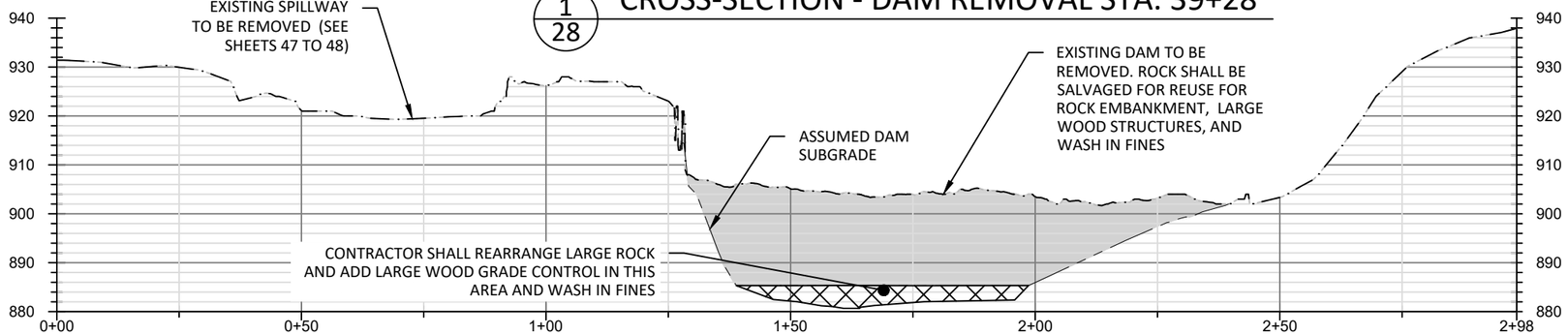
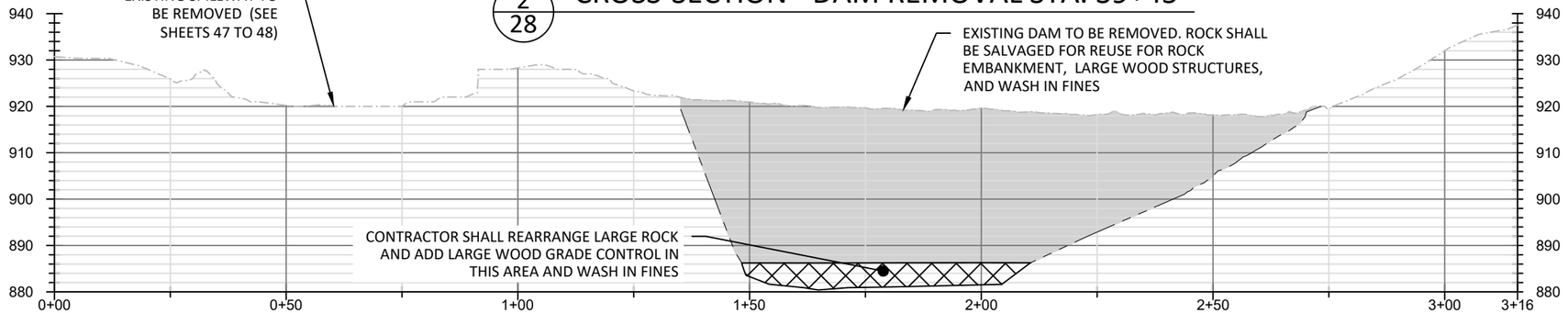


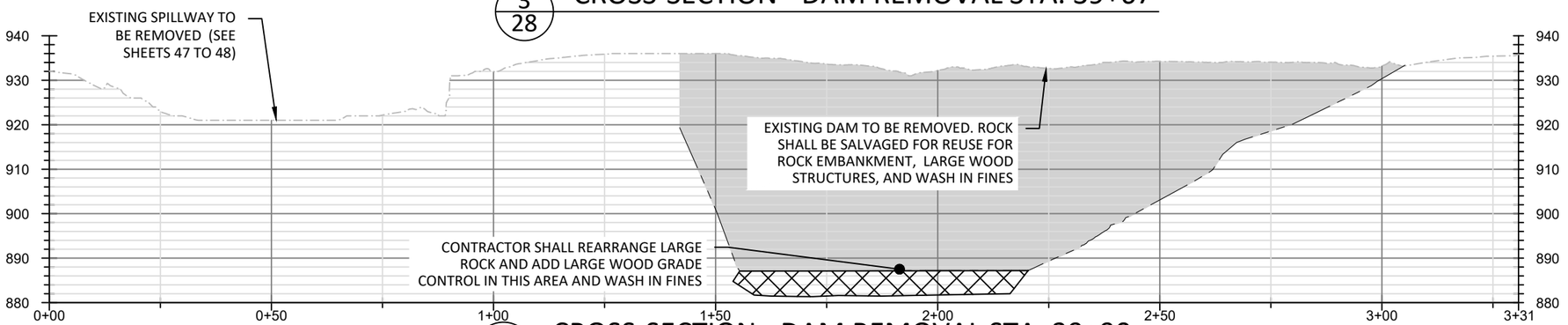
1/28 CROSS-SECTION - DAM REMOVAL STA. 39+28



2/28 CROSS-SECTION - DAM REMOVAL STA. 39+45



3/28 CROSS-SECTION - DAM REMOVAL STA. 39+67



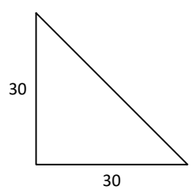
4/28 CROSS-SECTION - DAM REMOVAL STA. 39+90

NOTES:

1. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.
2. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
3. DAM SUBGRADE FOUNDATION MATERIALS VOLUME REQUIREMENTS MAY BE SUPPLEMENTED FROM BOULDERS LOCATED IN THE STOCKPILE AREA.

LEGEND

- EXISTING GRADE
- ASSUMED DAM SUBGRADE
- EXISTING DAM TO BE REMOVED
- DAM SUBGRADE FOUNDATION MATERIAL



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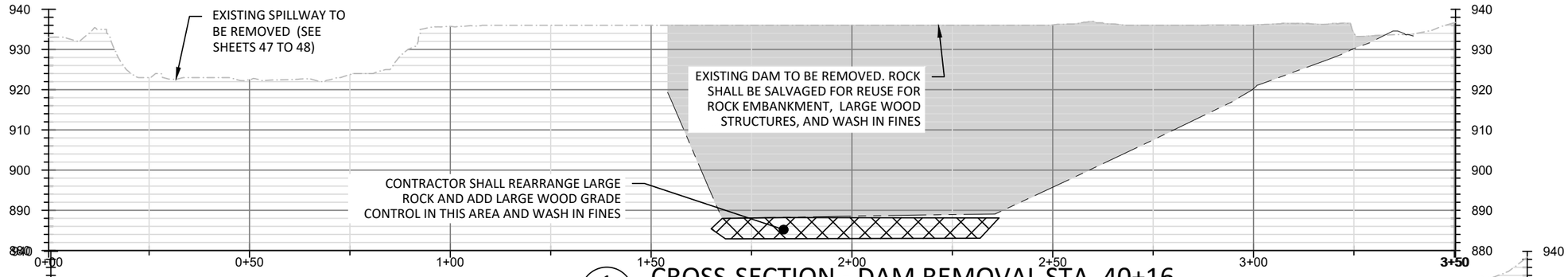
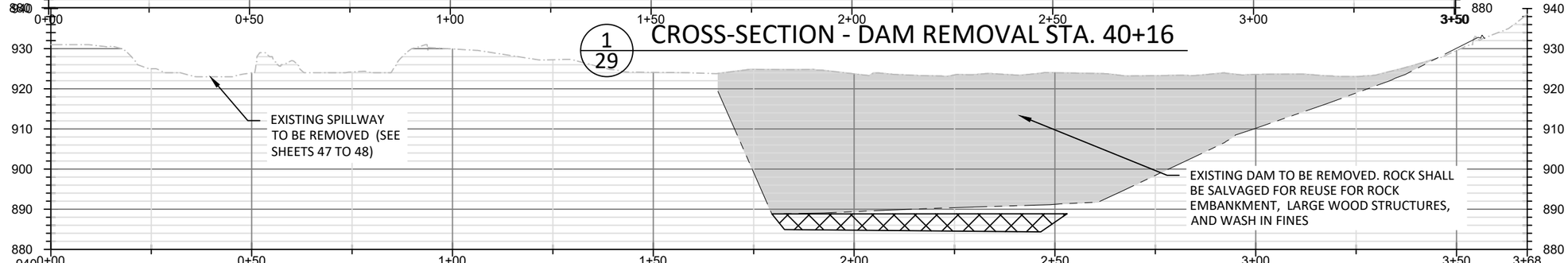
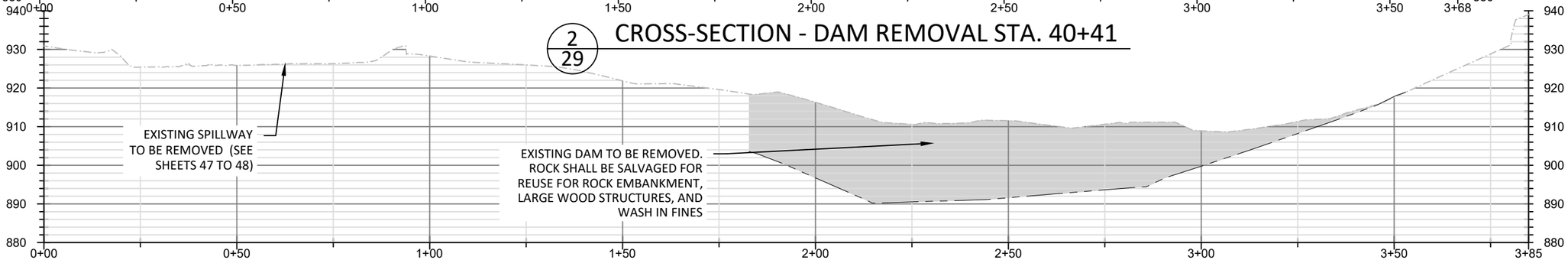


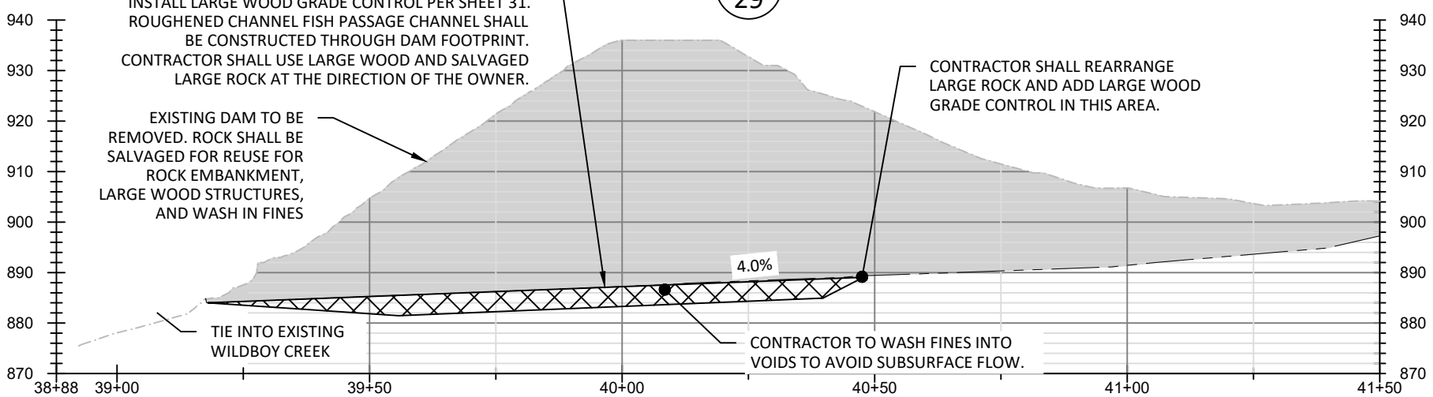
1/29 CROSS-SECTION - DAM REMOVAL STA. 40+16



2/29 CROSS-SECTION - DAM REMOVAL STA. 40+41



3/29 CROSS-SECTION - DAM REMOVAL STA. 40+67



4/29 PROFILE VIEW - DAM REMOVAL STA. 39+00 TO STA. 41+29

NOTES:

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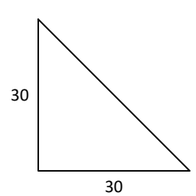
3. DAM SUBGRADE FOUNDATION MATERIALS VOLUME REQUIREMENTS MAY BE SUPPLEMENTED FROM BOULDERS LOCATED IN THE STOCKPILE AREA.



LEGEND

- EXISTING GRADE
- ASSUMED DAM SUBGRADE
- EXISTING DAM TO BE REMOVED
- DAM SUBGRADE FOUNDATION MATERIAL

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1	-	-	-

STATUS: FINAL DESIGN

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Bingen, WA 98605
www.ers4life.com

CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM – DAM SUBGRADE CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	29	74

EAST TRIBUTARY

FLOW

NORTH TRIBUTARY

POOLS, TYP.

EXISTING KWONEESUM DAM

EXISTING OUTLET PIPE

WILDBOY CREEK

EXISTING SPILLWAY TO BE REMOVED (SEE SHEETS 47 TO 48)

REMOVE ROCK FROM SPILLWAY AND SALVAGE FOR REUSE TO FILL DAM SUBGRADE AND IN LARGE WOOD STRUCTURES.

CAMP KWONEESUM

THE CONCRETE APRON AT THE LAST 30 FEET OF THE SPILLWAY IS UNDERCUT AND SHALL BE REMOVED WITH MINIMAL GROUND PRESSURE ABOVE EXISTING UNDERCUT ROCK

3/33 2/33 1/33 4/32 3/32 2/32 1/32 4/33

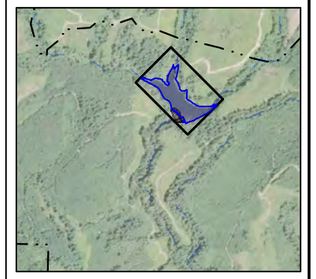
0 30 60 Feet

LEGEND

- EXISTING DAM AND SPILLWAY
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- ORDINARY HIGH WATER (OHW)
- SLASH
- PROPOSED TRIBUTARIES
- PROPOSED POOLS

PLAN VIEW

Notes:



SHEET LOCATION

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM – DAM REMOVAL AREA GRADING PLAN

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	30	74

ON-SITE TREE LIST

Salvaged Tree #	Approx. DBH (Inches)	Notes	Log JamID
1	32	Downed	AD
2	32	Downed	AD
3	32	Downed	AD
4	30	Downed	AD

Large Wood Structures: Dam Footprint

Item	#	Unit
Sill Logs	3	Pieces
Logs	2	Pieces
Rootwads	31	Pieces
Boulders	46	Pieces
Strawbales	32	Pieces
Select Borrow	20	CY
Gravel Borrow	15	CY
Slash	100	CY

NOTES:
1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LOGS, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. IF DISCRETE BEDROCK DROPS ARE ENCOUNTERED IN RESERVOIR CHANNELS. LARGE WOOD QUANTITIES SHALL REMAIN THE SAME, BUT SOME LARGE WOOD LOCATIONS WILL CHANGE TO BACKWATER THE BEDROCK DROP WITH LOG AND ROCK STEPS THAT ARE LESS THAN 8 INCHES IN HEIGHT.
3. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

EAST TRIBUTARY
FLOW
1 / 46
POOLS, TYP.
EXISTING SPILLWAY TO BE REMOVED (SEE SHEETS 47 TO 48)
CAMP KWONEESUM
EXISTING KWONEESUM DAM
ROUGHENED CHANNEL THROUGH FORMER DAM FOOTPRINT
9 / 66
PLACE IN UNDERCUT BANK BENEATH SPILLWAY
LARGE WOOD STRUCTURES PLACED IN WILDBOY CREEK (SEE SHEETS 67-73)
LARGE WOOD STRUCTURE AD
FLOW
WILDBOY CREEK
PLACE IN UNDERCUT BANK BENEATH SPILLWAY
4
3
2
1

Large Wood Structure: AD

Item	#	Unit
Sill Logs	0	Pieces
Logs	2	Pieces
Rootwads	8	Pieces
Rock Anchors	14	Connections
Threaded Rod Length	122	FT
Chain Connections Length	56	FT
Nuts	44	Pieces
Washers	44	Pieces
Strawbales	0	Pieces
Select Borrow	0	CY
Gravel Borrow	0	CY
Slash	30	CY

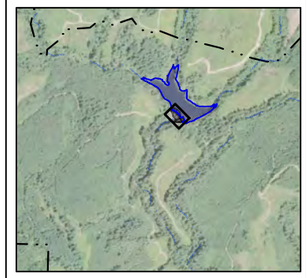
PLAN VIEW

0 30 60 Feet

LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- BOULDER
- SELECT BORROW OVERLAIN WITH 8-INCH, MIN. OF GRAVEL BORROW
- PLACED SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- STRAWBALES
- PROPOSED POOLS

Notes:



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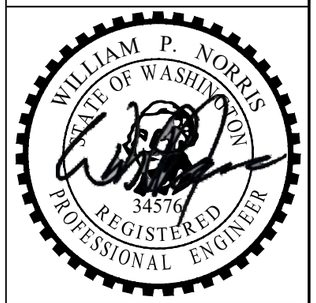

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1	-	-	-

STATUS: FINAL DESIGN

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CLIENT: COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM – DAM REMOVAL AREA LARGE WOOD

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
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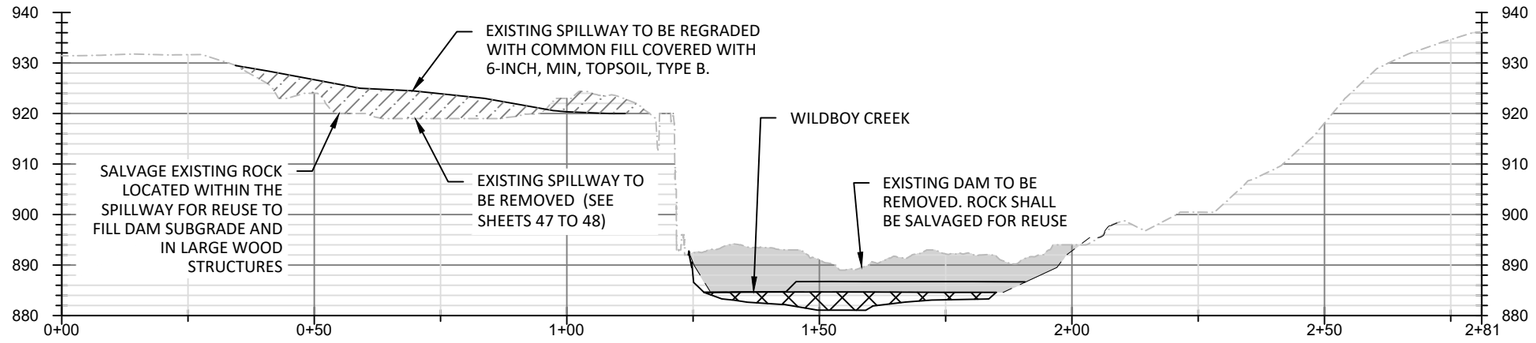
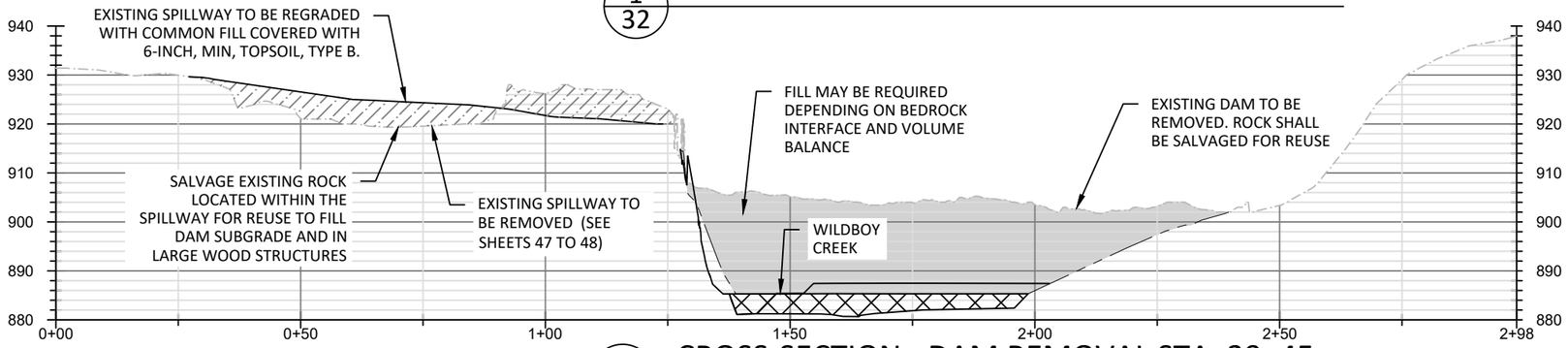
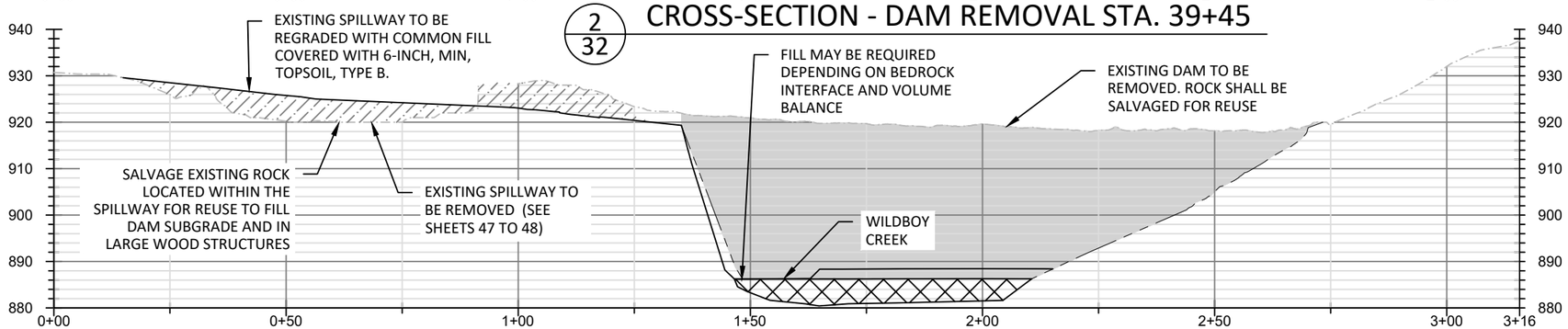


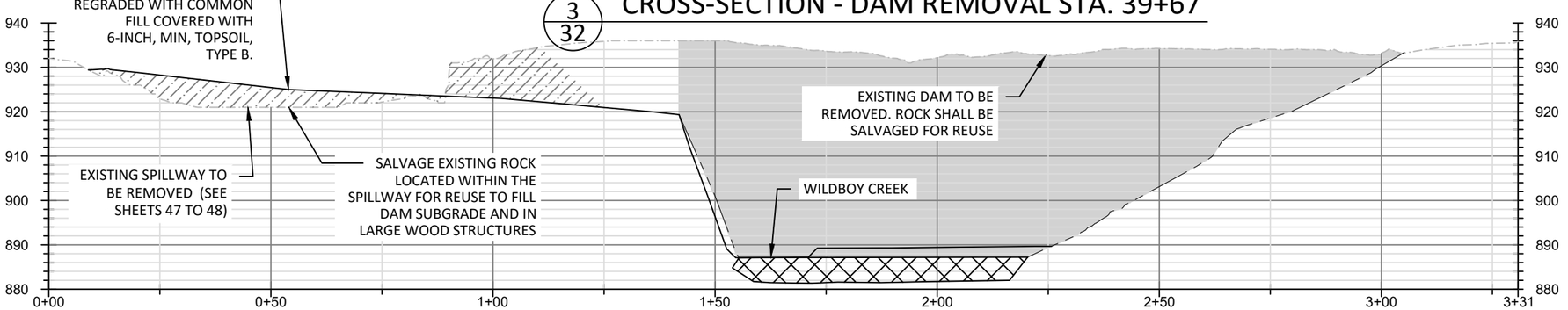
1/32 CROSS-SECTION - DAM REMOVAL STA. 39+28



2/32 CROSS-SECTION - DAM REMOVAL STA. 39+45



3/32 CROSS-SECTION - DAM REMOVAL STA. 39+67



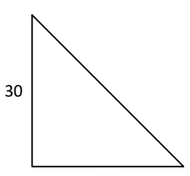
4/32 CROSS-SECTION - DAM REMOVAL STA. 39+90

NOTES:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
2. EXISTING DAM MATERIAL TO BE REMOVED, SORTED AND REPLACED TO PROVIDE AN ARMOR LAYER WITH LARGER ROCK ALONG CHANNEL BOUNDARIES.
3. DAM SUBGRADE FOUNDATION MATERIALS VOLUME REQUIREMENTS MAY BE SUPPLEMENTED FROM BOULDERS LOCATED IN THE STOCKPILE AREA.
4. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

LEGEND

- EXISTING GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE
- ASSUMED DAM SUBGRADE
- EXISTING DAM MATERIAL TO BE REMOVED TO ALLOW FOR PLACEMENT OF DAM SUBGRADE FOUNDATION MATERIAL AND FILLED WITH ROCK EMBANKMENT AND EARTH EMBANKMENT COVERED WITH 6-INCH, MIN, TOPSOIL, TYPE B
- DAM SUBGRADE FOUNDATION MATERIAL
- REGRADED SPILLWAY



WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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www.ers4life.com

CLIENT: COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM – DAM REMOVAL AREA CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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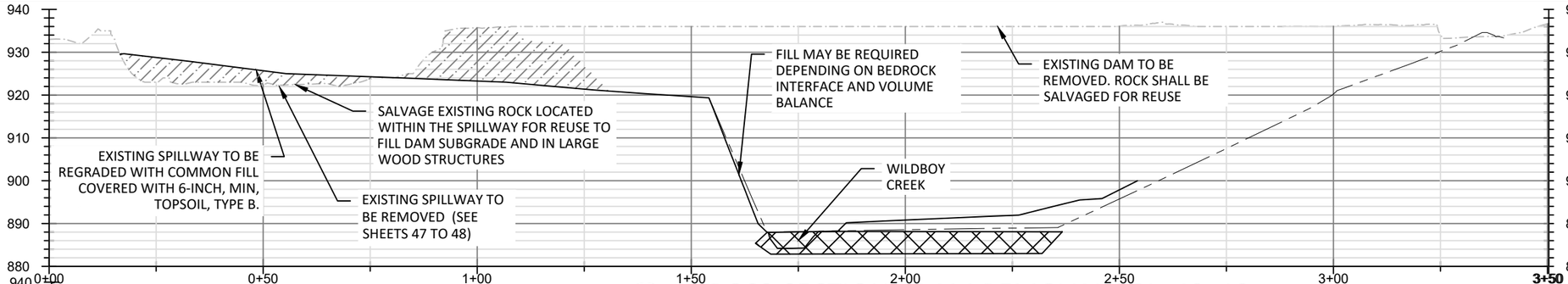
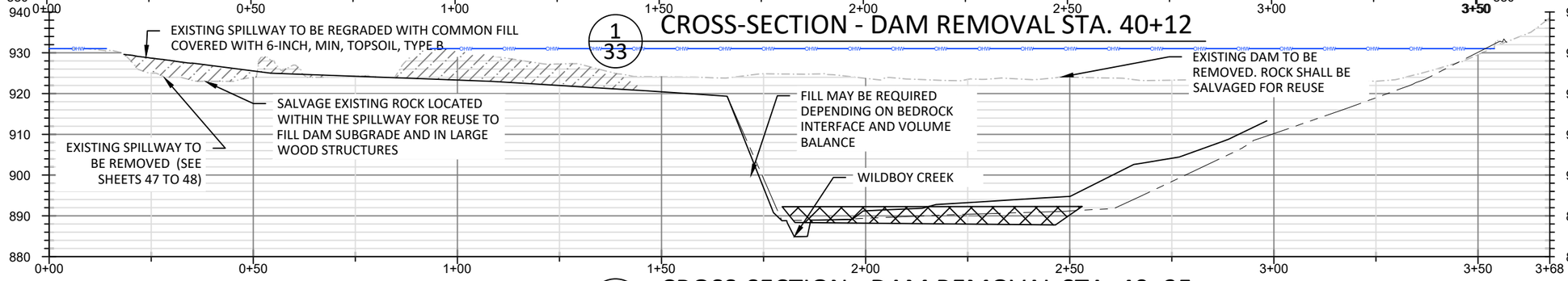
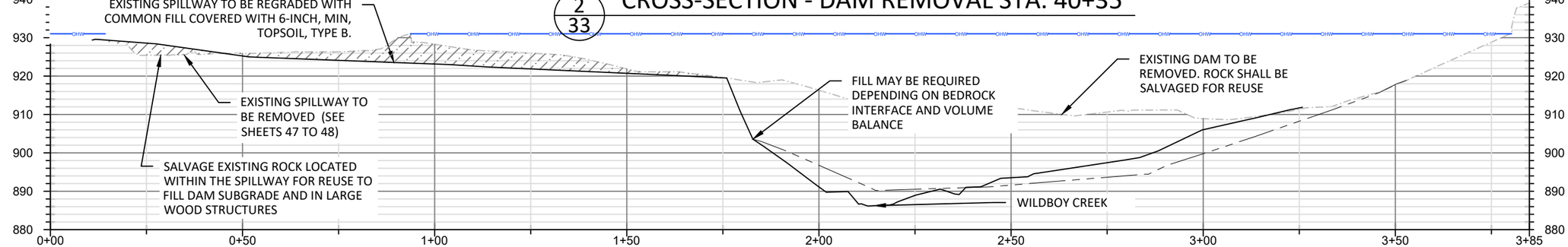


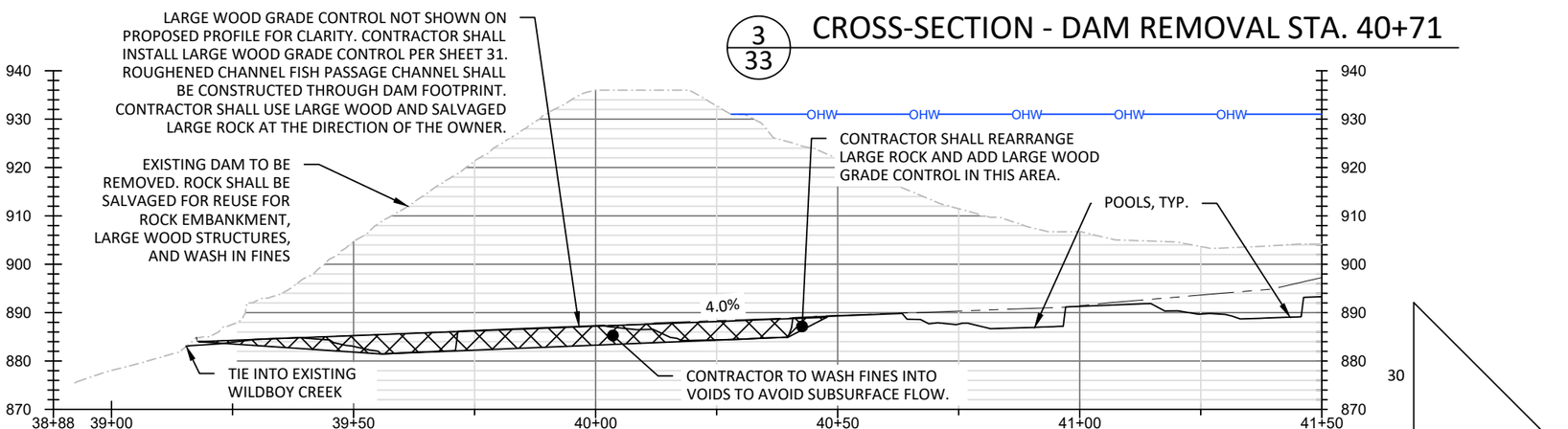
1/33 CROSS-SECTION - DAM REMOVAL STA. 40+12



2/33 CROSS-SECTION - DAM REMOVAL STA. 40+35



3/33 CROSS-SECTION - DAM REMOVAL STA. 40+71



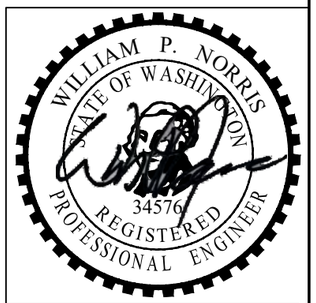
4/33 CROSS-SECTION - DAM REMOVAL STA. 40+79

NOTES:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
2. EXISTING DAM MATERIAL TO BE REMOVED, SORTED AND REPLACED TO PROVIDE AN ARMOR LAYER WITH LARGER ROCK ALONG CHANNEL BOUNDARIES.
3. DAM SUBGRADE FOUNDATION MATERIALS VOLUME REQUIREMENTS MAY BE SUPPLEMENTED FROM BOULDERS LOCATED IN THE STOCKPILE AREA.
4. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

LEGEND

- EXISTING GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE
- ASSUMED DAM SUBGRADE
- EXISTING DAM MATERIAL TO BE REMOVED TO ALLOW FOR PLACEMENT OF DAM SUBGRADE FOUNDATION MATERIAL AND FILLED WITH ROCK EMBANKMENT AND EARTH EMBANKMENT COVERED WITH 6-INCH, MIN, TOPSOIL, TYPE B
- DAM SUBGRADE FOUNDATION MATERIAL
- REGRADED SPILLWAY



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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM – DAM REMOVAL AREA CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

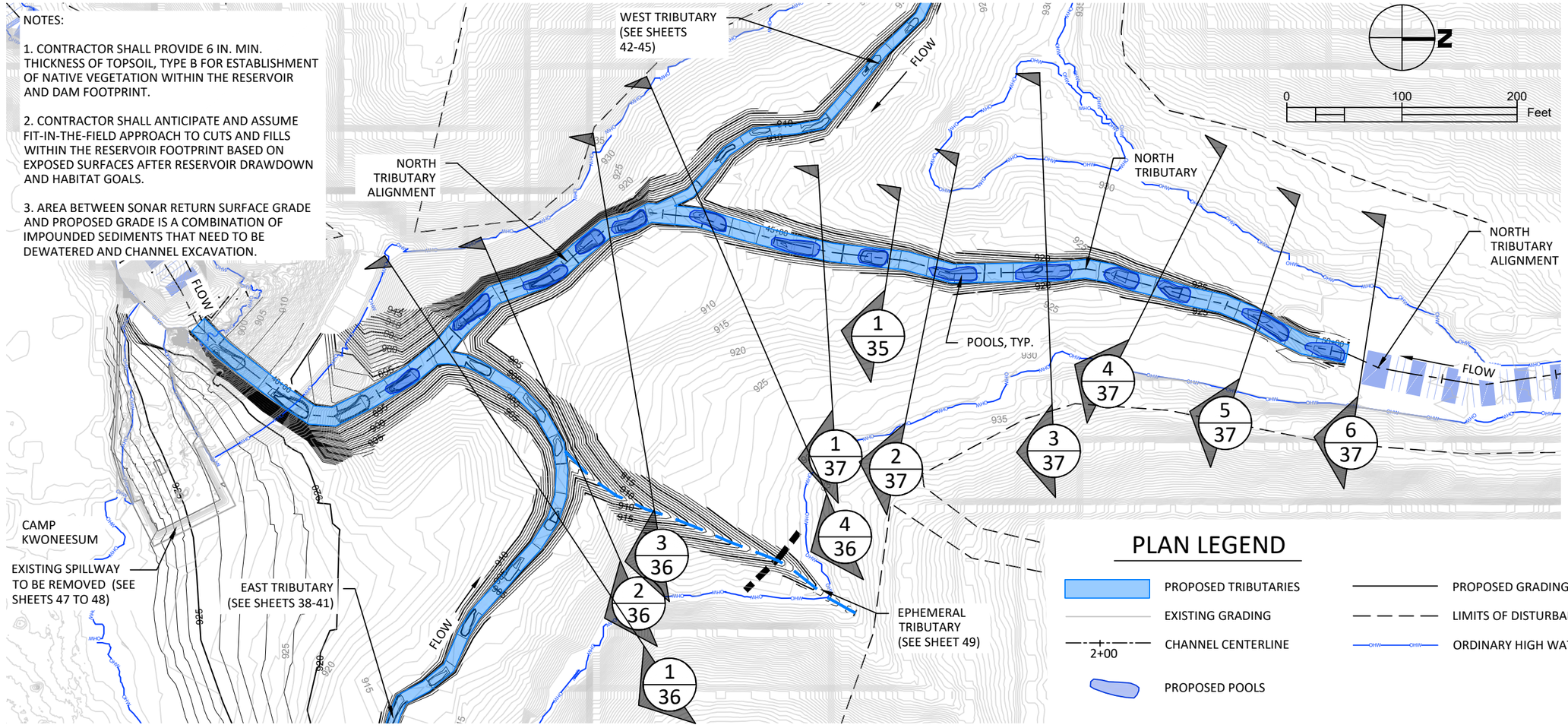
PROJ. NO:	DRAWING NO:	Total Sheets:
-	33	74

NOTES:

1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.

2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

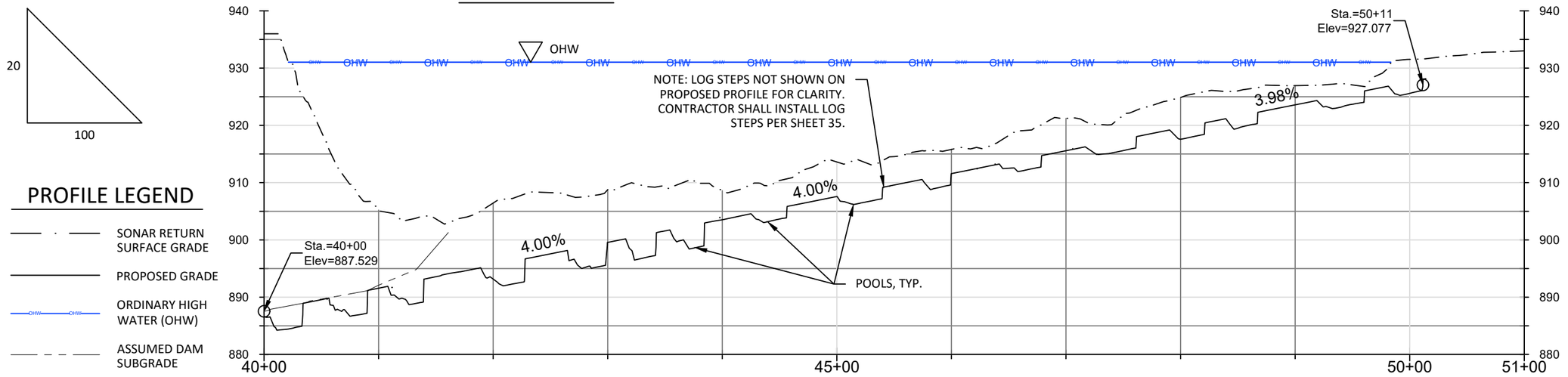
3. AREA BETWEEN SONAR RETURN SURFACE GRADE AND PROPOSED GRADE IS A COMBINATION OF IMPOUNDED SEDIMENTS THAT NEED TO BE DEWATERED AND CHANNEL EXCAVATION.



PLAN LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED POOLS
- PROPOSED GRADING
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)

PLAN VIEW

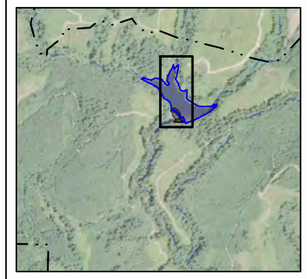


PROFILE LEGEND

- SONAR RETURN SURFACE GRADE
- PROPOSED GRADE
- ORDINARY HIGH WATER (OHW)
- ASSUMED DAM SUBGRADE

PROFILE VIEW - NORTH TRIBUTARY

Notes:



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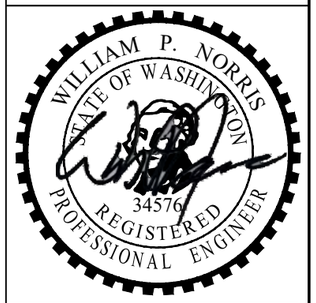

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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

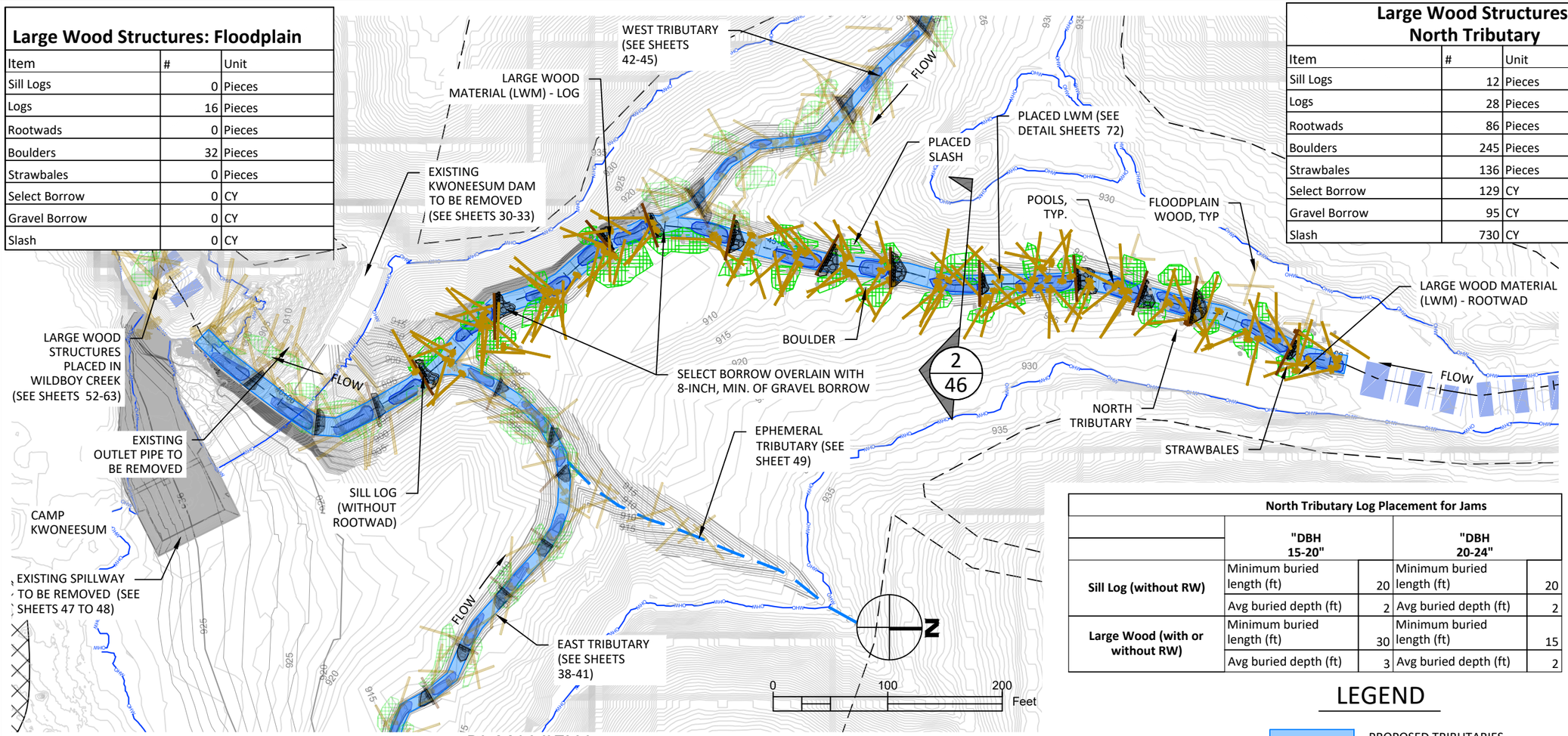
TITLE: KWONEESUM RESERVOIR - NORTH TRIB. GRADING PLAN & PROFILE

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	34	74

Large Wood Structures: Floodplain

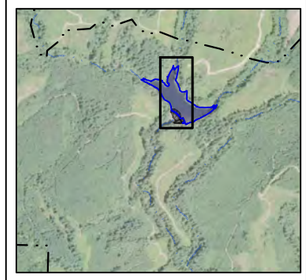
Item	#	Unit
Sill Logs	0	Pieces
Logs	16	Pieces
Rootwads	0	Pieces
Boulders	32	Pieces
Strawbales	0	Pieces
Select Borrow	0	CY
Gravel Borrow	0	CY
Slash	0	CY



Large Wood Structures: North Tributary

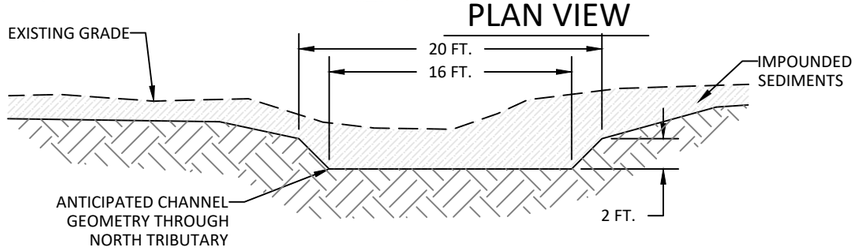
Item	#	Unit
Sill Logs	12	Pieces
Logs	28	Pieces
Rootwads	86	Pieces
Boulders	245	Pieces
Strawbales	136	Pieces
Select Borrow	129	CY
Gravel Borrow	95	CY
Slash	730	CY

Notes:



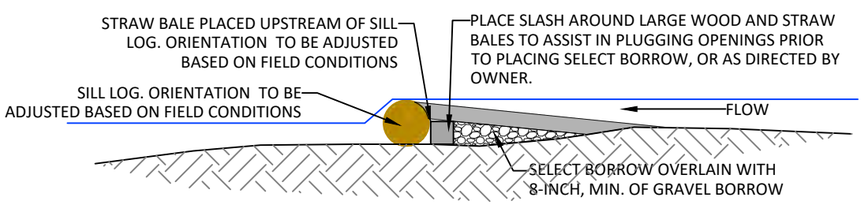
SHEET LOCATION

PLAN VIEW



1/35 TYPICAL CROSS-SECTION: NORTH TRIBUTARY CHANNEL GEOMETRY

NOT TO SCALE



TYPICAL PROFILE: LARGE WOOD STRUCTURES IN TRIBUTARIES

North Tributary Log Placement for Jams				
	"DBH 15-20"		"DBH 20-24"	
Sill Log (without RW)	Minimum buried length (ft)	20	Minimum buried length (ft)	20
	Avg buried depth (ft)	2	Avg buried depth (ft)	2
Large Wood (with or without RW)	Minimum buried length (ft)	30	Minimum buried length (ft)	15
	Avg buried depth (ft)	3	Avg buried depth (ft)	2

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LOGS, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
3. IF DISCRETE BEDROCK DROPS ARE ENCOUNTERED IN RESERVOIR CHANNELS. LARGE WOOD QUANTITIES SHALL REMAIN THE SAME, BUT SOME LARGE WOOD LOCATIONS WILL CHANGE TO BACKWATER THE BEDROCK DROP WITH LOG AND ROCK STEPS THAT ARE LESS THAN 8 INCHES IN HEIGHT.
4. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- 2+00 CHANNEL CENTERLINE
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- BOULDER
- SELECT BORROW OVERLAIN WITH 8-INCH, MIN. OF GRAVEL BORROW
- PLACED SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- STRAWBALES
- PROPOSED POOLS

REV:	DESCRIPTION:	BY:	DATE:
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2	-	-	-
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STATUS: FINAL DESIGN

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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR - NORTH TRIB. LARGE WOOD

SCALE:	DATE:	DRAWN:	CHECKED:
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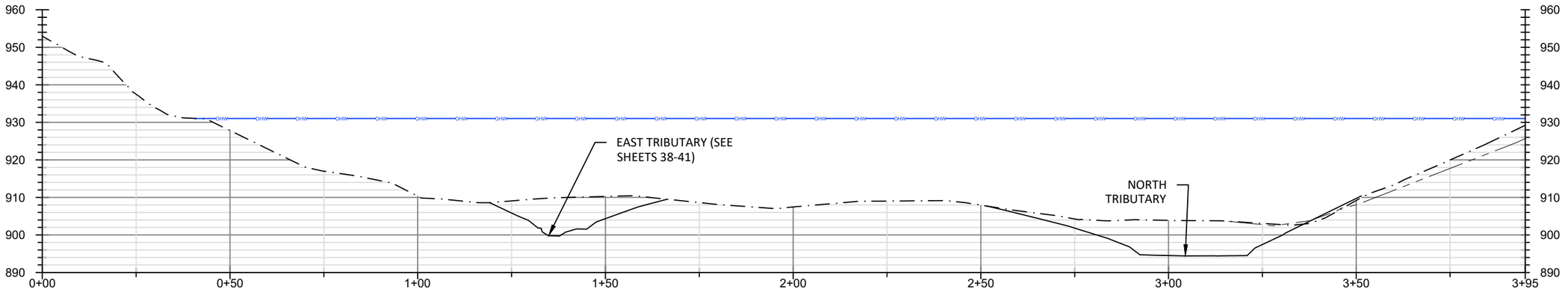
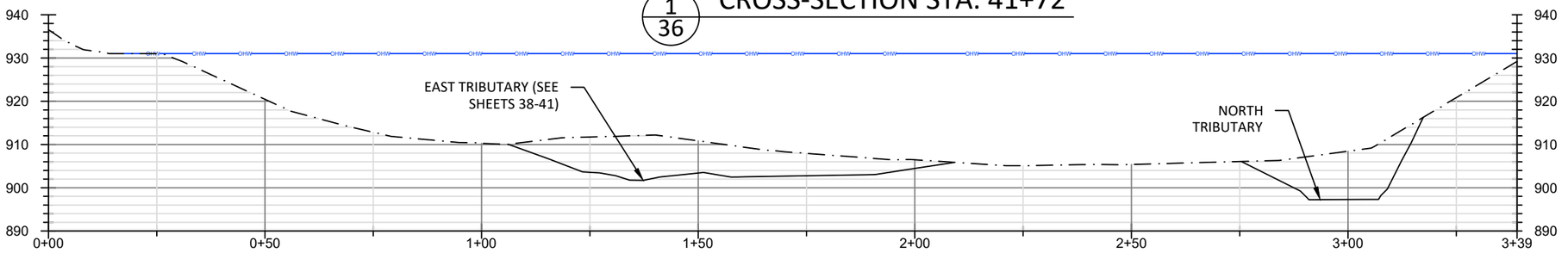
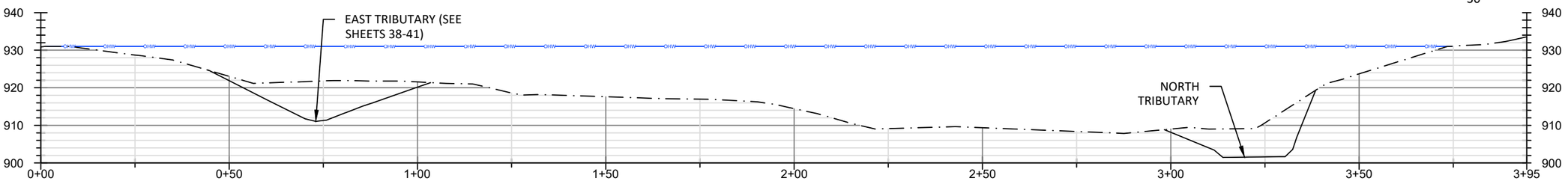
PROJ. NO:	DRAWING NO:	Total Sheets:
-	35	74



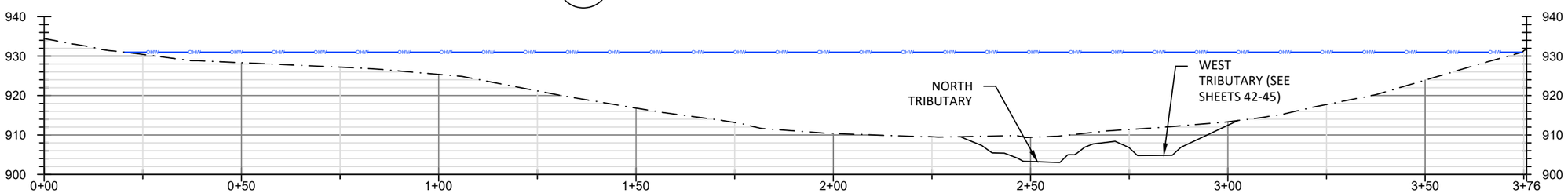
1/36 CROSS-SECTION STA. 41+72



2/36 CROSS-SECTION STA. 42+42



3/36 CROSS-SECTION STA. 43+50



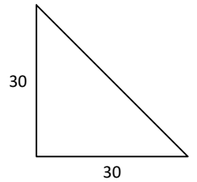
4/36 CROSS-SECTION STA. 44+40

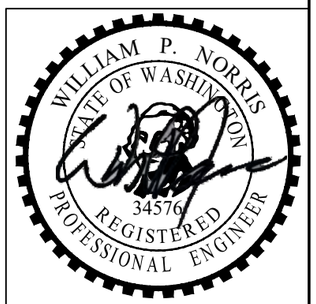
NOTE:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.
3. AREA BETWEEN SONAR RETURN SURFACE GRADE AND PROPOSED GRADE IS A COMBINATION OF IMPOUNDED SEDIMENTS THAT NEED TO BE DEWATERED AND CHANNEL EXCAVATION.

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE





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STATUS: FINAL DESIGN

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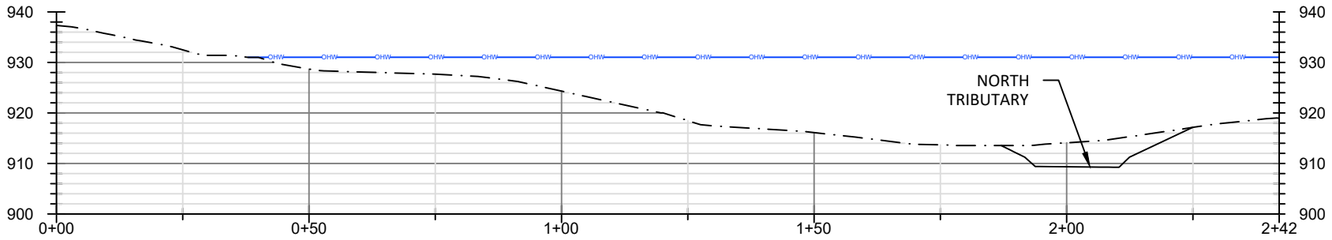
CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – NORTH TRIB. GRADING CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	36	74



LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE

NOTE:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
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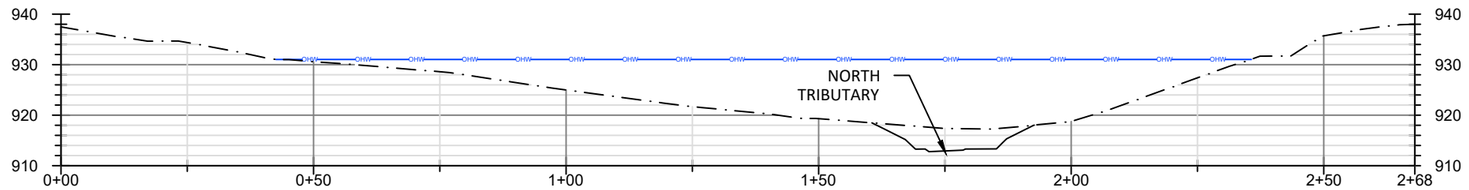
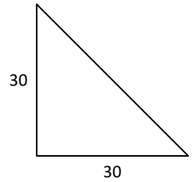
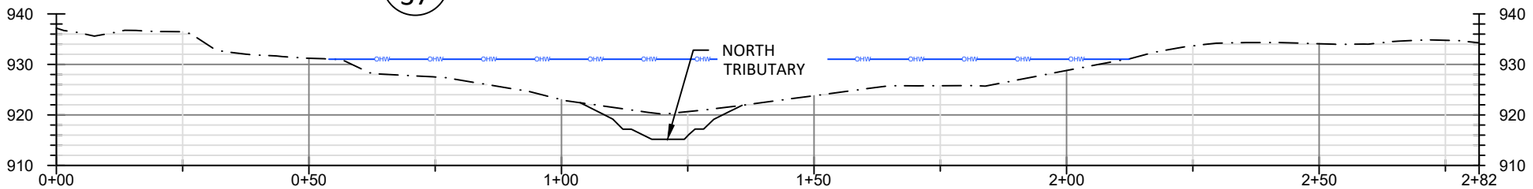
1/37 CROSS-SECTION STA. 45+43

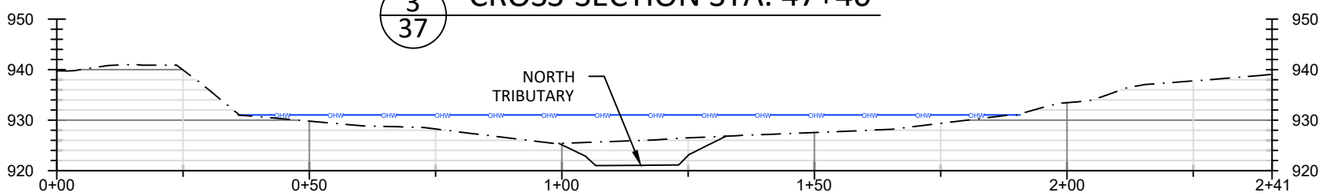




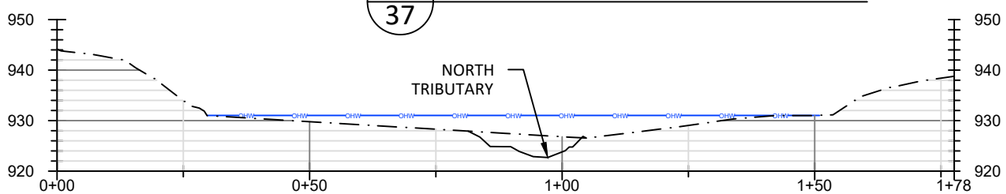
2/37 CROSS-SECTION STA. 46+42



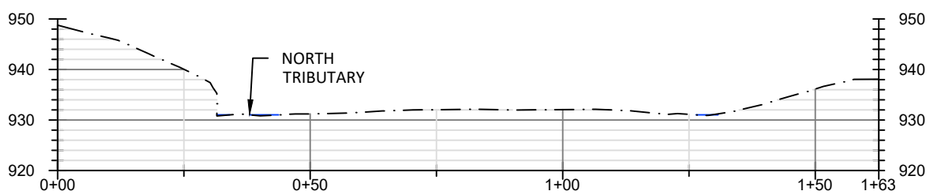
3/37 CROSS-SECTION STA. 47+40



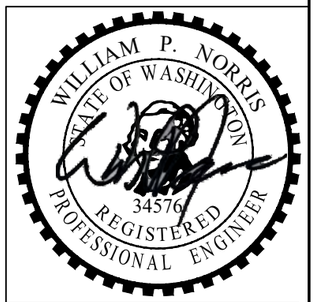
4/37 CROSS-SECTION STA. 48+36



5/37 CROSS-SECTION STA. 49+31



6/37 CROSS-SECTION STA. 50+30



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TITLE: KWONEESUM RESERVOIR – NORTH TRIB. GRADING CROSS-SECTIONS

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PLAN LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED POOLS
- PROPOSED GRADING
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)

NOTES:

1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.

2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

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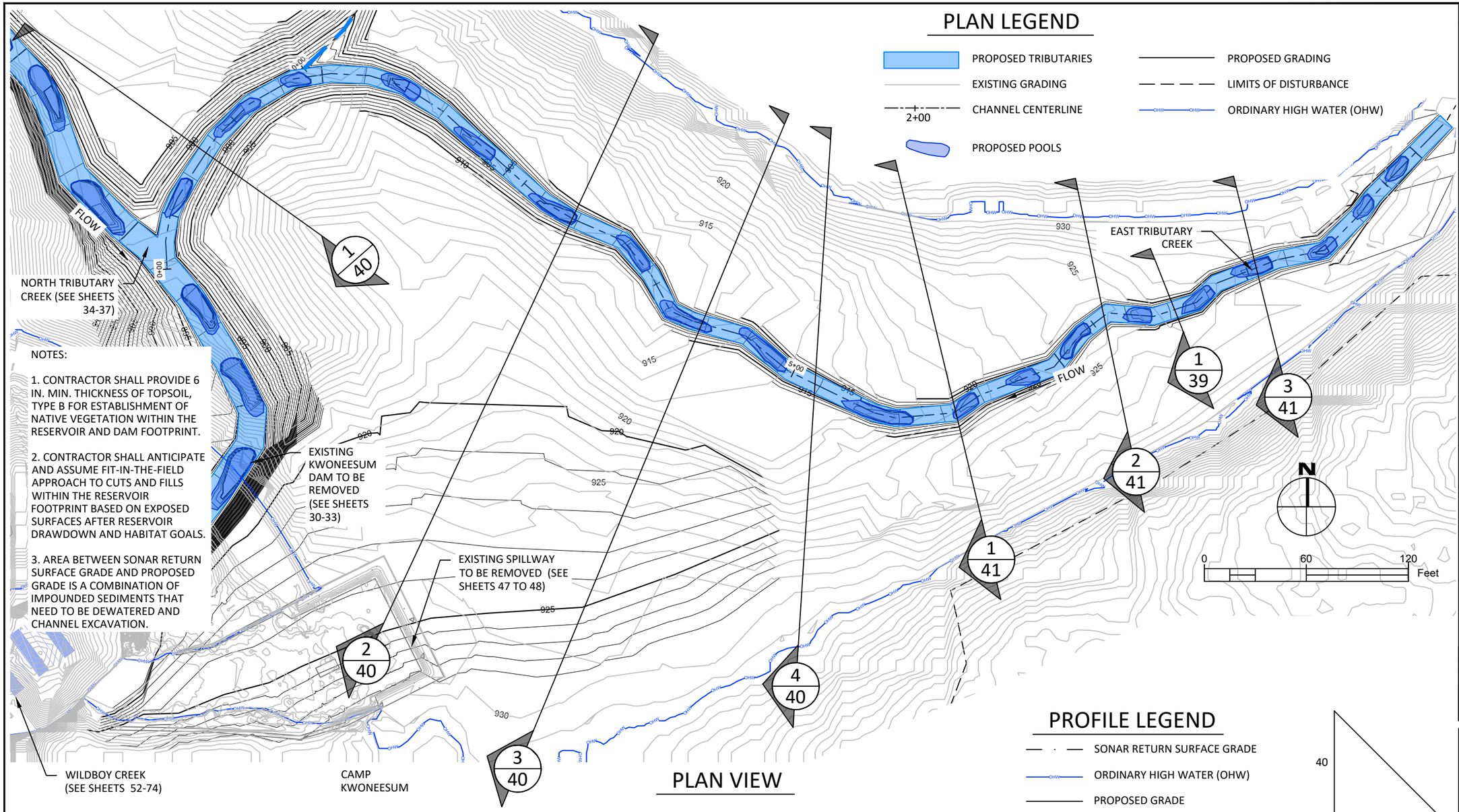
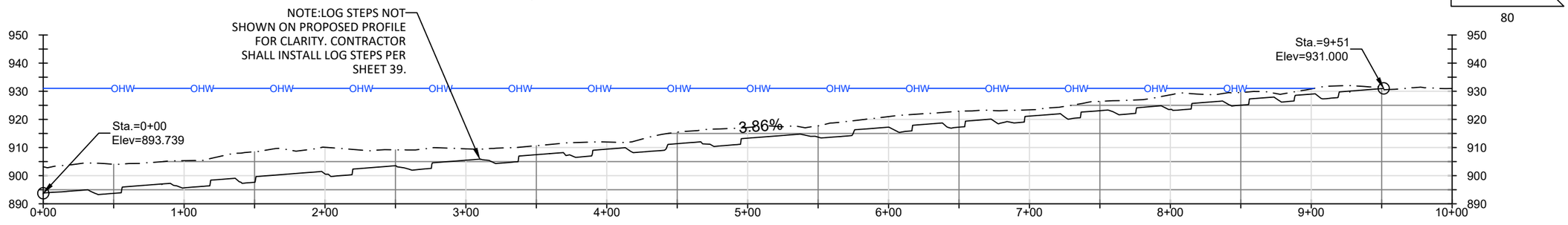


PLAN VIEW

PROFILE LEGEND

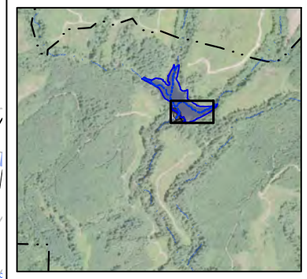
- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



PROFILE VIEW - EAST TRIBUTARY

40 / 80

Notes:



SHEET LOCATION

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – EAST TRIB. GRADING PLAN & PROFILE

SCALE:	DATE:	DRAWN:	CHECKED:
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PROJ. NO:	DRAWING NO:		Total Sheets:
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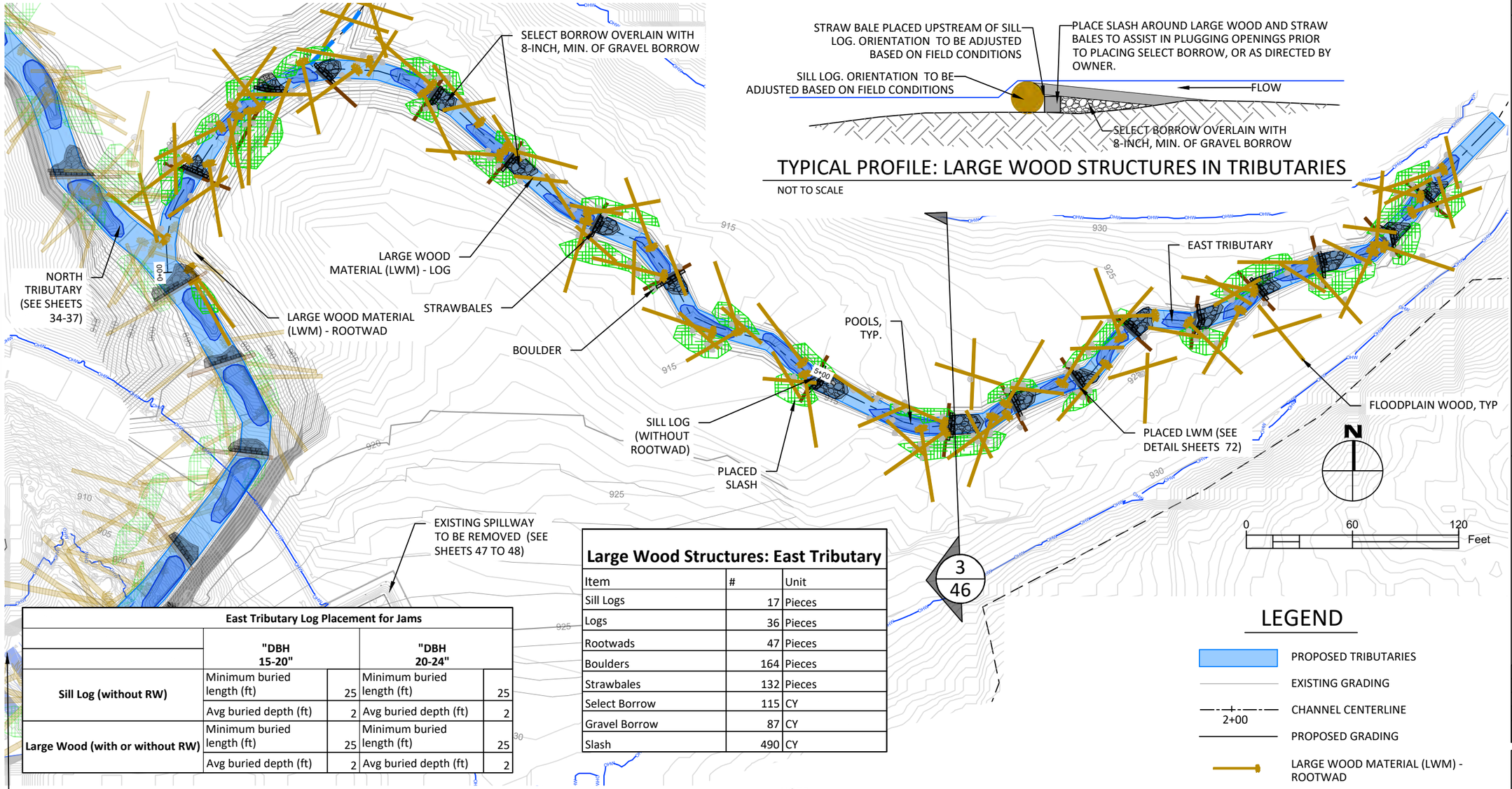


TYPICAL PROFILE: LARGE WOOD STRUCTURES IN TRIBUTARIES

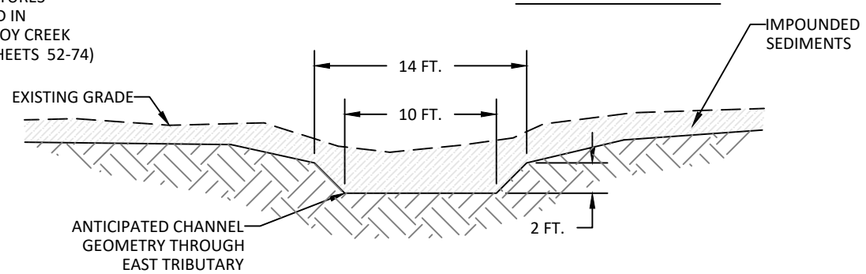
NOT TO SCALE

East Tributary Log Placement for Jams				
	"DBH 15-20"		"DBH 20-24"	
Sill Log (without RW)	Minimum buried length (ft)	25	Minimum buried length (ft)	25
	Avg buried depth (ft)	2	Avg buried depth (ft)	2
Large Wood (with or without RW)	Minimum buried length (ft)	25	Minimum buried length (ft)	25
	Avg buried depth (ft)	2	Avg buried depth (ft)	2

Large Wood Structures: East Tributary		
Item	#	Unit
Sill Logs	17	Pieces
Logs	36	Pieces
Rootwads	47	Pieces
Boulders	164	Pieces
Strawbales	132	Pieces
Select Borrow	115	CY
Gravel Borrow	87	CY
Slash	490	CY

LARGE WOOD STRUCTURES PLACED IN WILDBOY CREEK (SEE SHEETS 52-74)

PLAN VIEW



1/39 TYPICAL CROSS-SECTION: EAST TRIBUTARY CHANNEL GEOMETRY

NOT TO SCALE

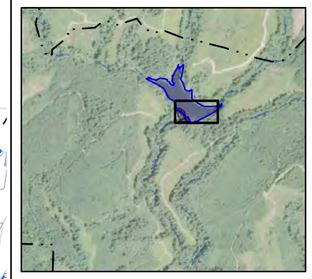
NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LOGS, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
3. IF DISCRETE BEDROCK DROPS ARE ENCOUNTERED IN RESERVOIR CHANNELS. LARGE WOOD QUANTITIES SHALL REMAIN THE SAME, BUT SOME LARGE WOOD LOCATIONS WILL CHANGE TO BACKWATER THE BEDROCK DROP WITH LOG AND ROCK STEPS THAT ARE LESS THAN 8 INCHES IN HEIGHT.
4. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

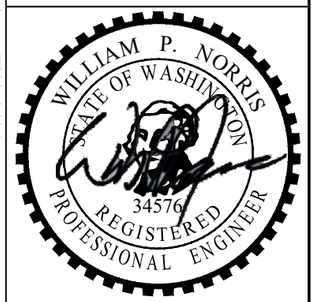
LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- BOULDER
- SELECT BORROW OVERLAIN WITH 8-INCH, MIN. OF GRAVEL BORROW
- PLACED SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- STRAWBALES
- PROPOSED POOLS

Notes:



SHEET LOCATION



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – EAST TRIB. LARGE WOOD

SCALE:	DATE:	DRAWN:	CHECKED:
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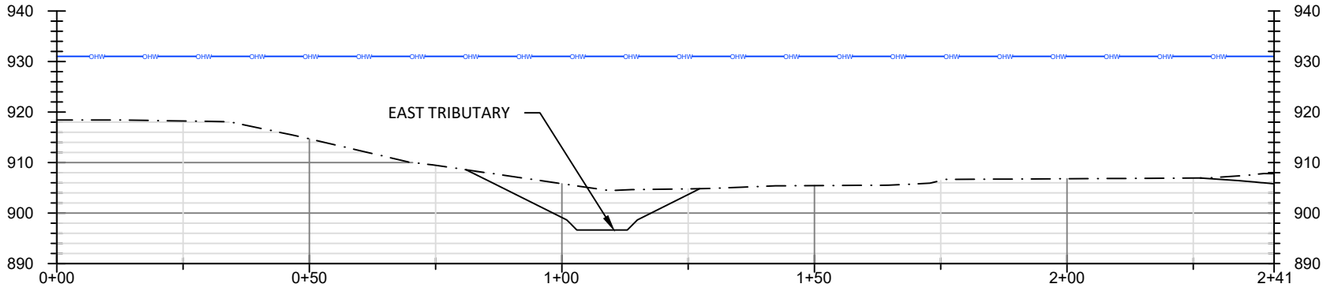
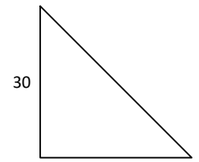
-	39	74



1/40 CROSS-SECTION STA. 0+75

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



NOTE:

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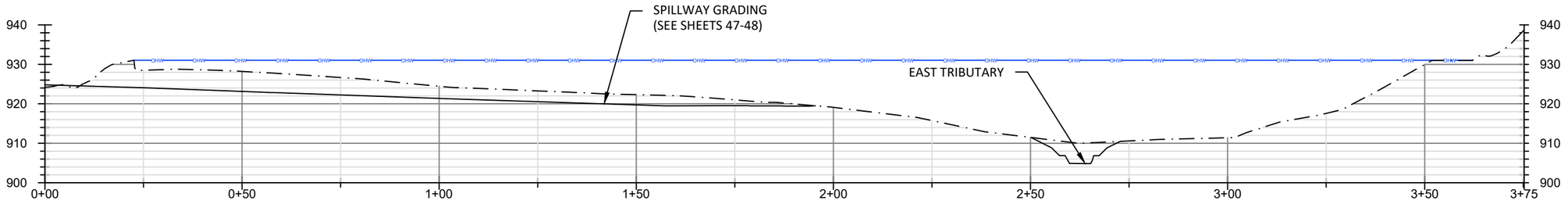
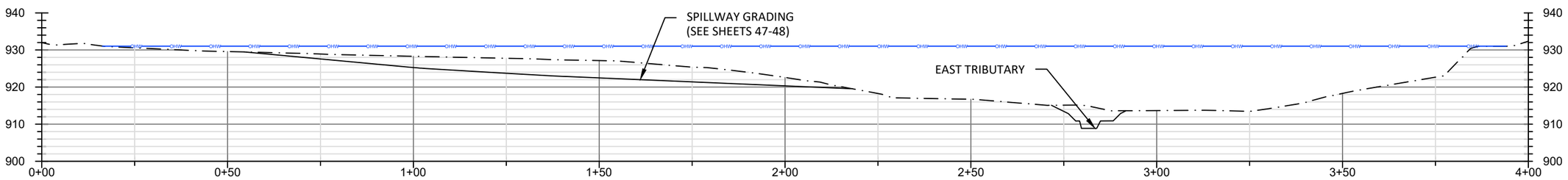
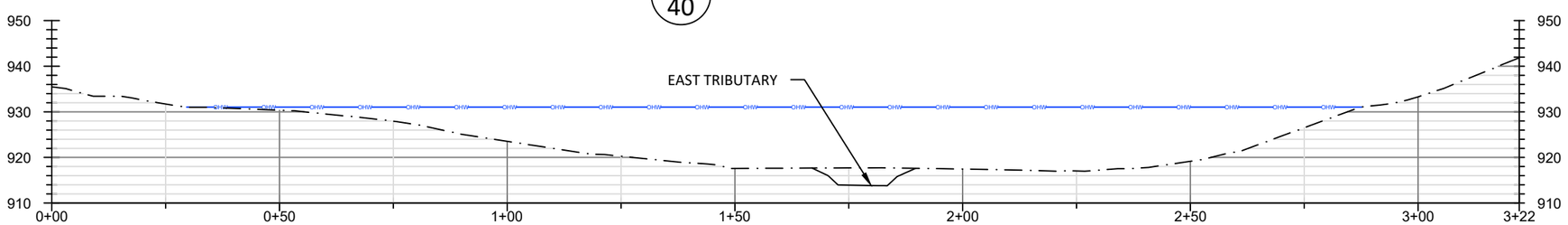


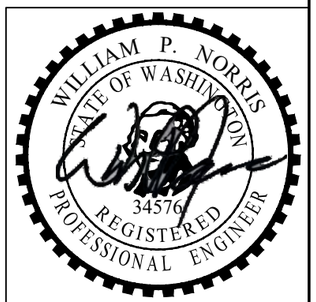
2/40 CROSS-SECTION STA. 3+35



3/40 CROSS-SECTION STA. 4+38



4/40 CROSS-SECTION STA. 5+15



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – EAST TRIB. GRADING CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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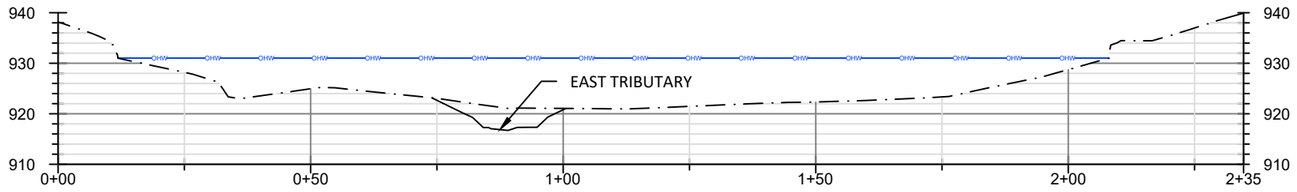
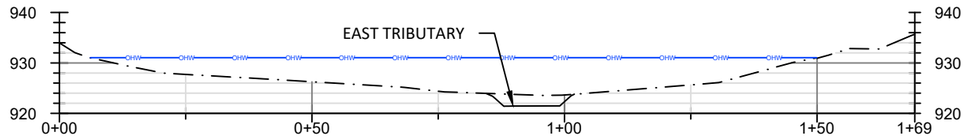
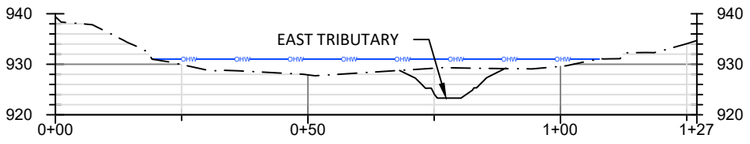


1/41 CROSS-SECTION STA. 6+02



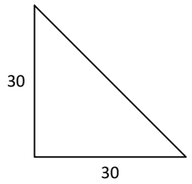
2/41 CROSS-SECTION STA. 7+08



3/41 CROSS-SECTION STA. 8+06

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



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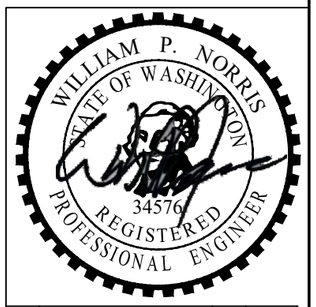

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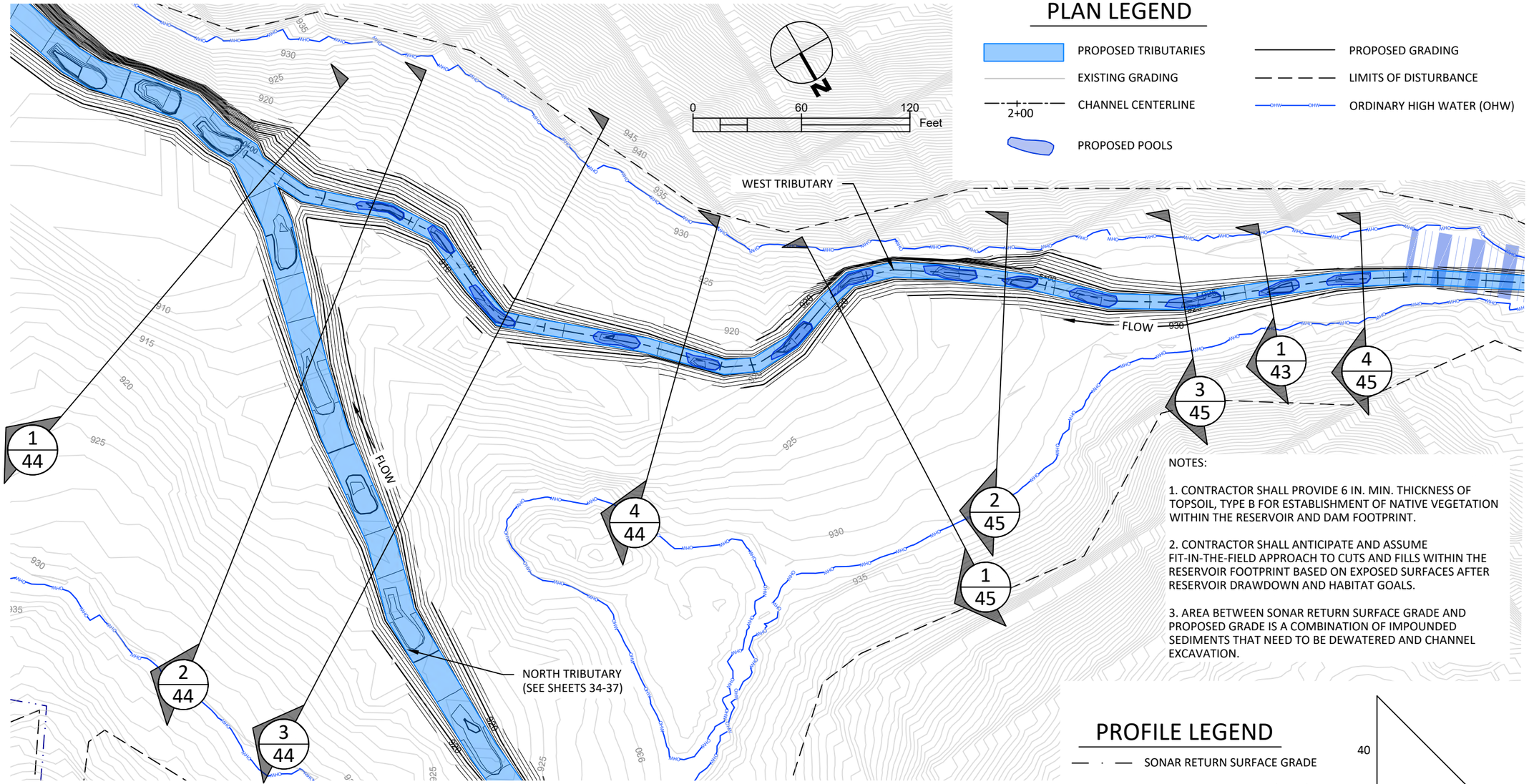

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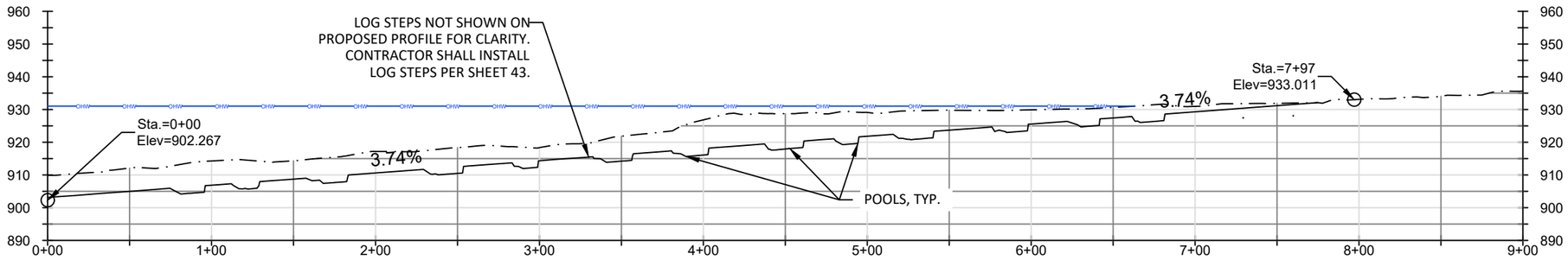
PLAN VIEW

PROFILE LEGEND

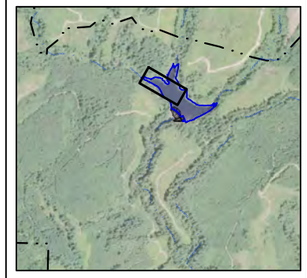
- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE

40 / 80



PROFILE VIEW - WEST TRIBUTARY

Notes:



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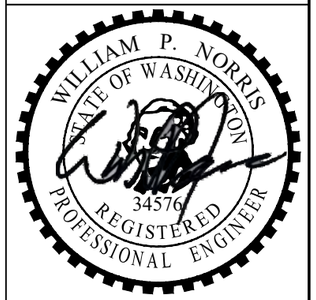

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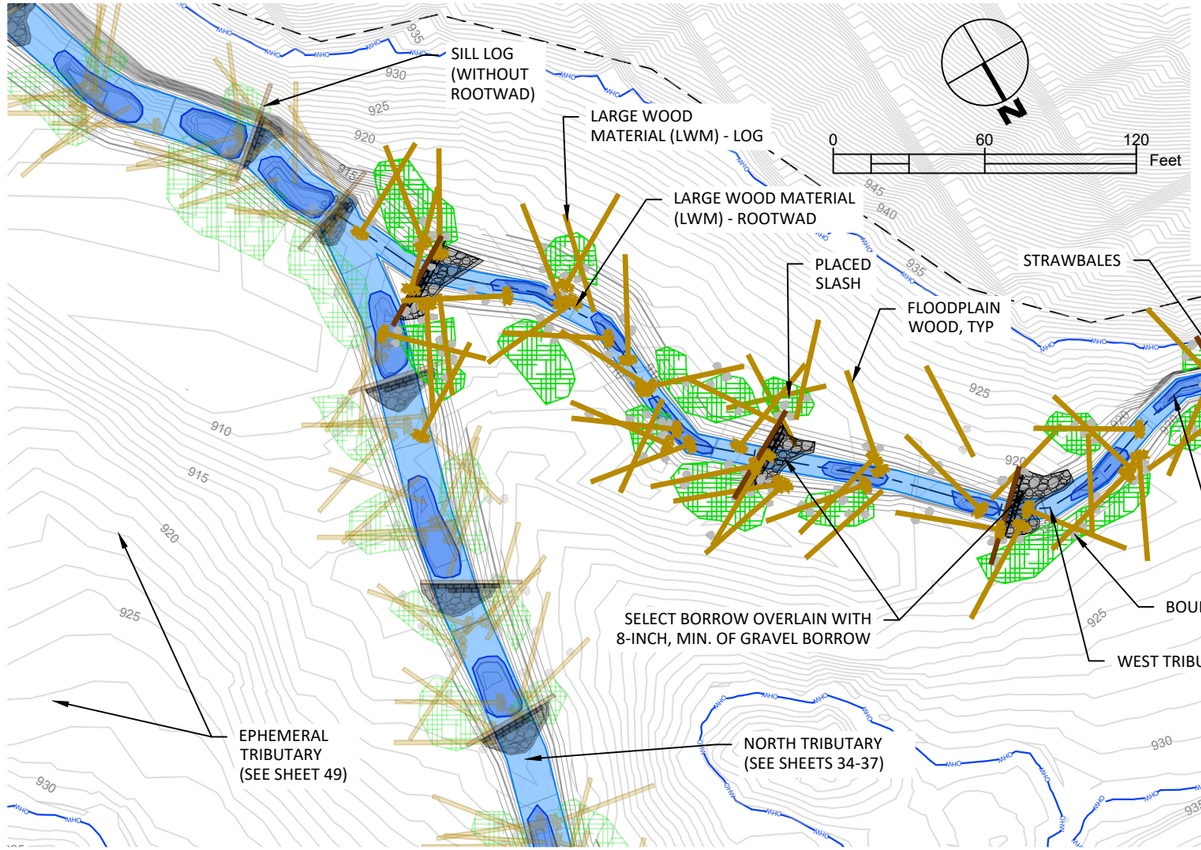
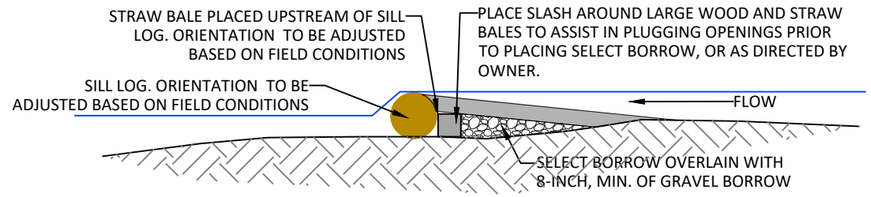




TYPICAL PROFILE: LARGE WOOD STRUCTURES IN TRIBUTARIES

NOT TO SCALE

Large Wood Structures: West Tributary		
Item	#	Unit
Sill Logs	7	Pieces
Logs	11	Pieces
Rootwads	58	Pieces
Boulders	138	Pieces
Strawbales	100	Pieces
Select Borrow	101	CY
Gravel Borrow	75	CY
Slash	450	CY

LEGEND

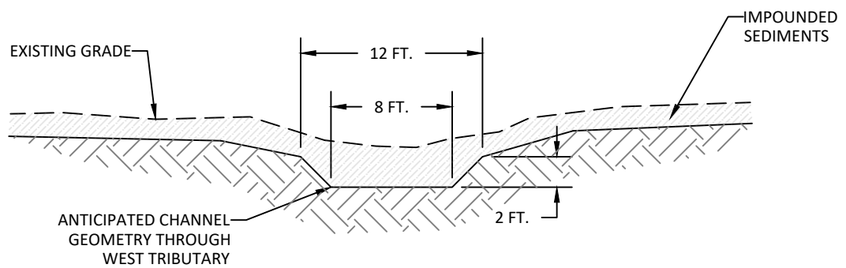
- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- BOULDER
- SELECT BORROW OVERLAIN WITH 8-INCH, MIN. OF GRAVEL BORROW
- PLACED SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- STRAWBALES
- PROPOSED POOLS

PLAN VIEW

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LOGS, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
3. IF DISCRETE BEDROCK DROPS ARE ENCOUNTERED IN RESERVOIR CHANNELS. LARGE WOOD QUANTITIES SHALL REMAIN THE SAME, BUT SOME LARGE WOOD LOCATIONS WILL CHANGE TO BACKWATER THE BEDROCK DROP WITH LOG AND ROCK STEPS THAT ARE LESS THAN 8 INCHES IN HEIGHT.
4. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

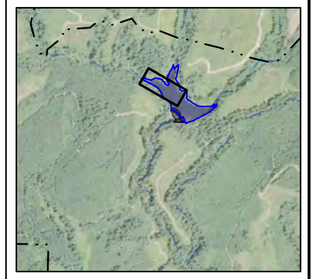
West Tributary Log Placement for Jams				
	"DBH 15-20"		"DBH 20-24"	
Sill Log (without RW)	Minimum buried length (ft)	20	Minimum buried length (ft)	20
	Avg buried depth (ft)	2	Avg buried depth (ft)	2
Large Wood (with or without RW)	Minimum buried length (ft)	28	Minimum buried length (ft)	30
	Avg buried depth (ft)	2	Avg buried depth (ft)	2



1/43 TYPICAL CROSS-SECTION: WEST TRIBUTARY CHANNEL GEOMETRY

NOT TO SCALE

Notes:



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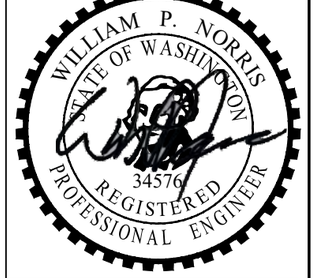

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STATUS: FINAL DESIGN

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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR - WEST TRIB. LARGE WOOD

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
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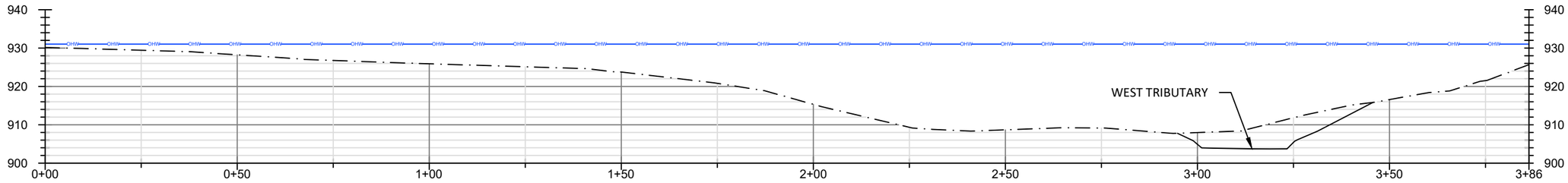
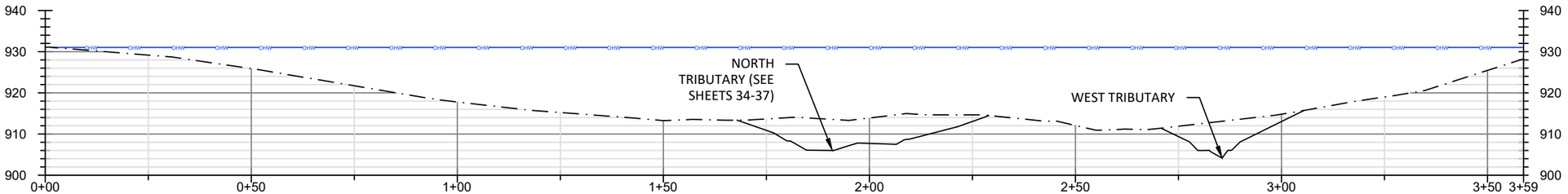
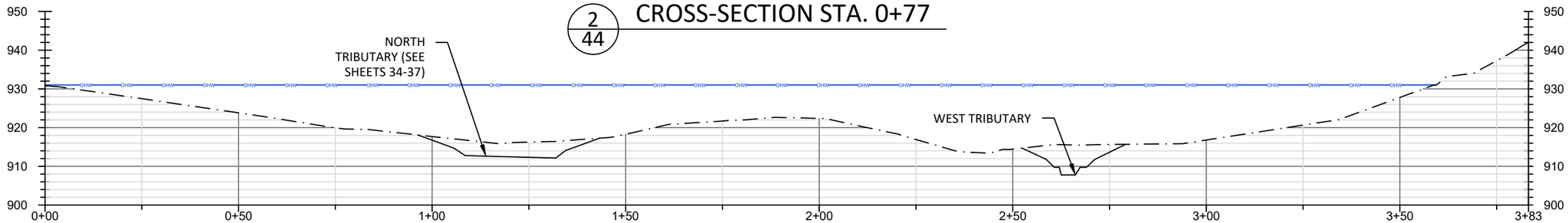


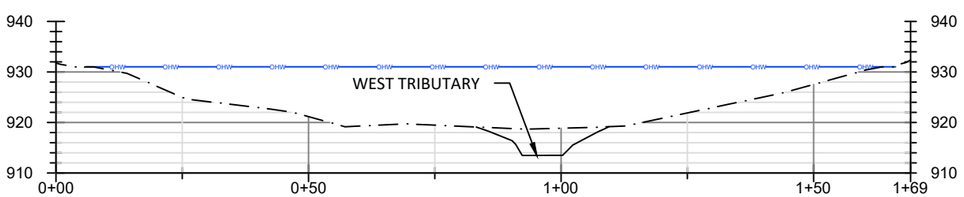
1/44 CROSS-SECTION STA. 0+17

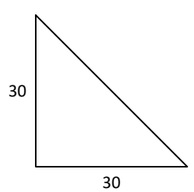


2/44 CROSS-SECTION STA. 0+77



3/44 CROSS-SECTION STA. 1+77





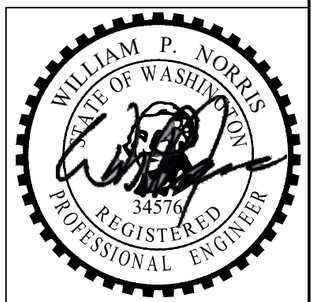
4/44 CROSS-SECTION STA. 2+77

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE

NOTE:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.
3. AREA BETWEEN SONAR RETURN SURFACE GRADE AND PROPOSED GRADE IS A COMBINATION OF IMPOUNDED SEDIMENTS THAT NEED TO BE DEWATERED AND CHANNEL EXCAVATION.



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – WEST TRIB. GRADING CROSS-SECTIONS

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	11/17/23	RP	BN

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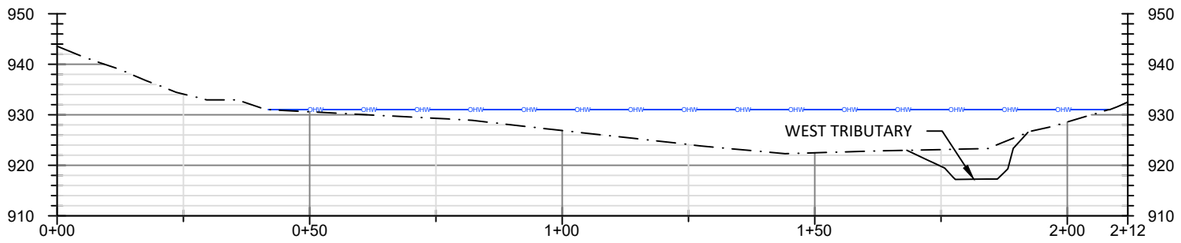
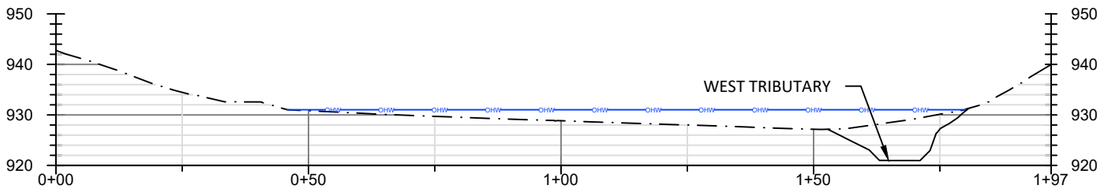
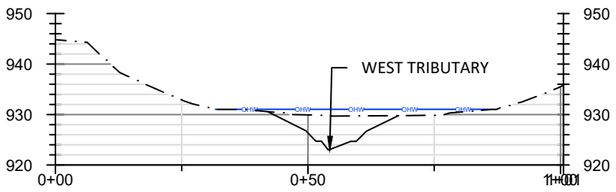


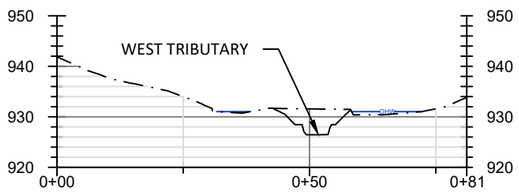
1/45 CROSS-SECTION STA. 3+77



2/45 CROSS-SECTION STA. 4+77



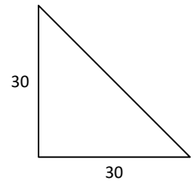
3/45 CROSS-SECTION STA. 5+77



4/45 CROSS-SECTION STA. 6+77

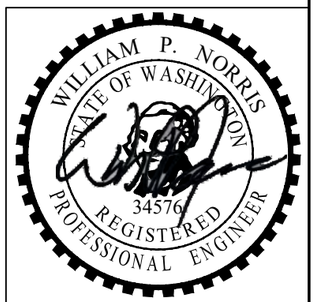
LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



NOTE:

1. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.
3. AREA BETWEEN SONAR RETURN SURFACE GRADE AND PROPOSED GRADE IS A COMBINATION OF IMPOUNDED SEDIMENTS THAT NEED TO BE DEWATERED AND CHANNEL EXCAVATION.



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR – WEST TRIB. GRADING CROSS-SECTIONS

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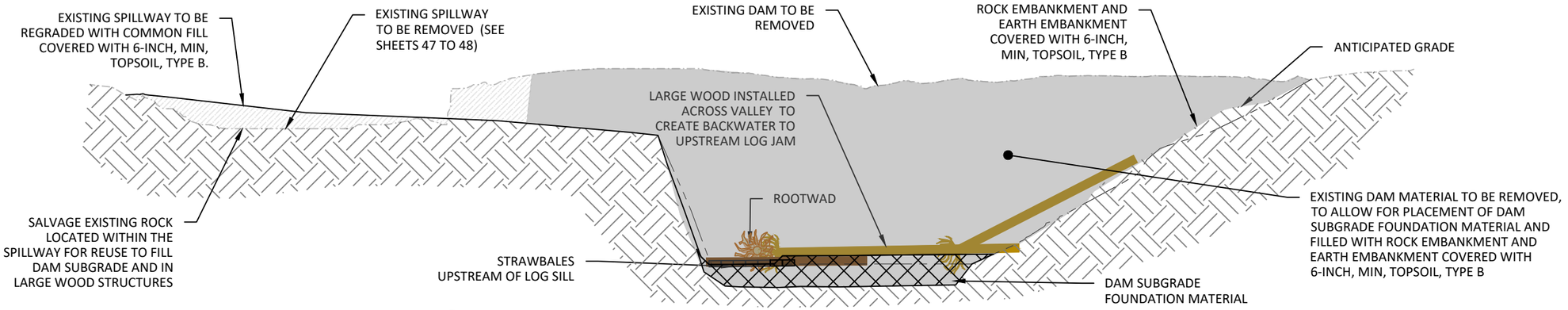
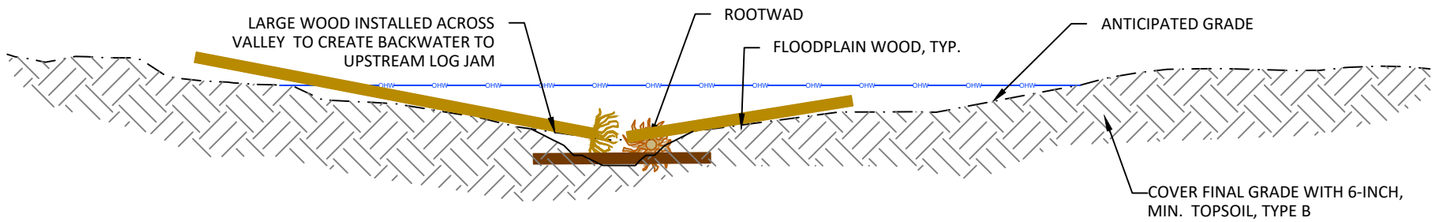
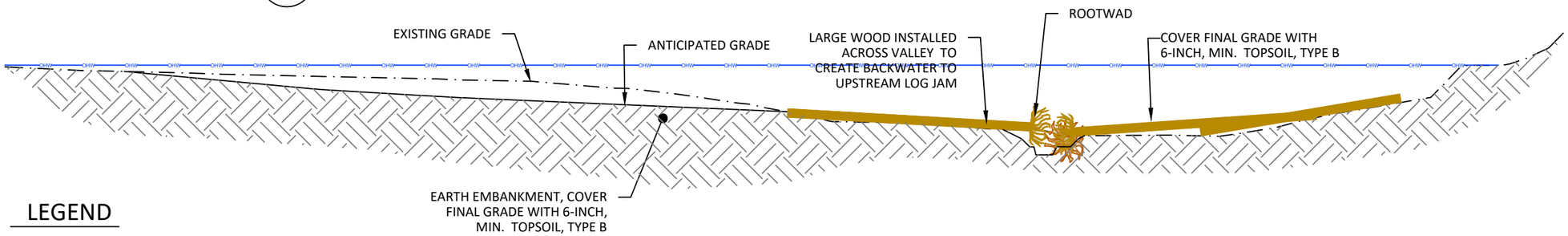


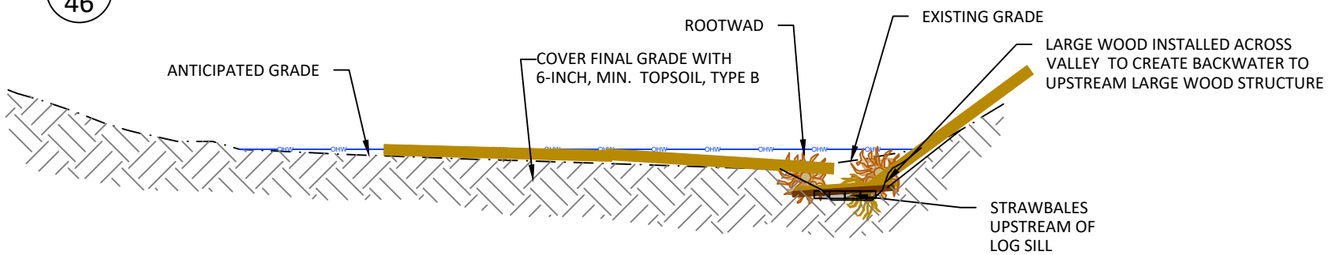
1/46 TYPICAL CROSS-SECTION THROUGH DAM AREA WITH LARGE WOOD



2/46 TYPICAL CROSS-SECTION THROUGH NORTH TRIBUTARY WITH LARGE WOOD



3/46 TYPICAL CROSS-SECTION THROUGH EAST TRIBUTARY WITH LARGE WOOD



4/46 TYPICAL CROSS-SECTION THROUGH WEST TRIBUTARY WITH LARGE WOOD

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE
- EXISTING DAM MATERIAL
- NATIVE MATERIAL
- DAM SUBGRADE FOUNDATION MATERIAL
- LOG (WITH OR WITHOUT ROOTWAD, AS SHOWN ON PREVIOUS SHEETS OR AS DIRECTED BY OWNER)
- SILL LOG
- STRAW BALES

NOTES:

1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR - TYPICAL LARGE WOOD CROSS-SECTIONS

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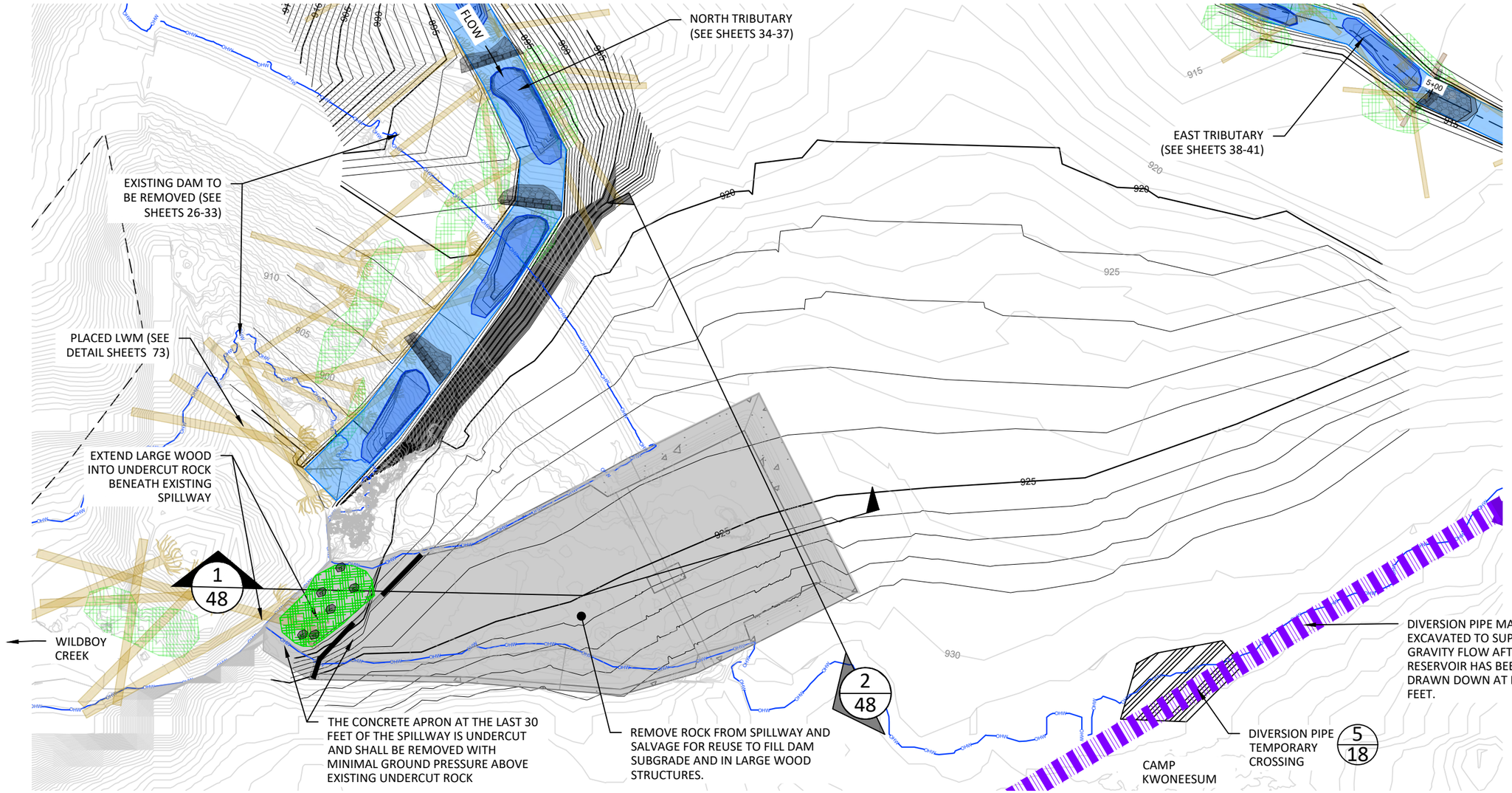


PLAN VIEW - REGRADED SPILLWAY

LEGEND

- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- PLACED TREES INTO LARGE WOOD JAMS (LWM)
- BOULDER
- EXISTING SPILLWAY FOOTPRINT
- SPILLWAY OUTLET CONCRETE (REMOVED)
- SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- HDPE WELDED JOINT SDR-17 DIVERSION PIPE (TRENCHED)
- DIVERSION PIPE TEMPORARY CROSSING

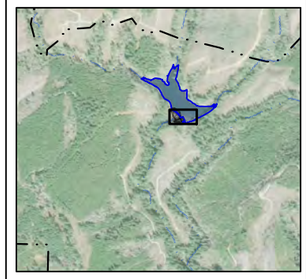
NOTES:

1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.
3. EXCAVATION SHOWN IS OUTSIDE JURISDICTIONAL BOUNDARIES.

N

0 40 80 Feet

Notes:



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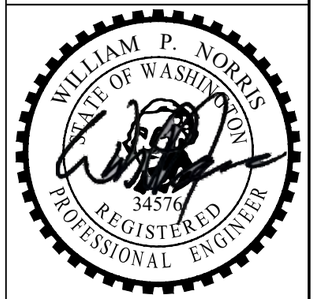

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM - SPILLWAY PLAN & PROFILE

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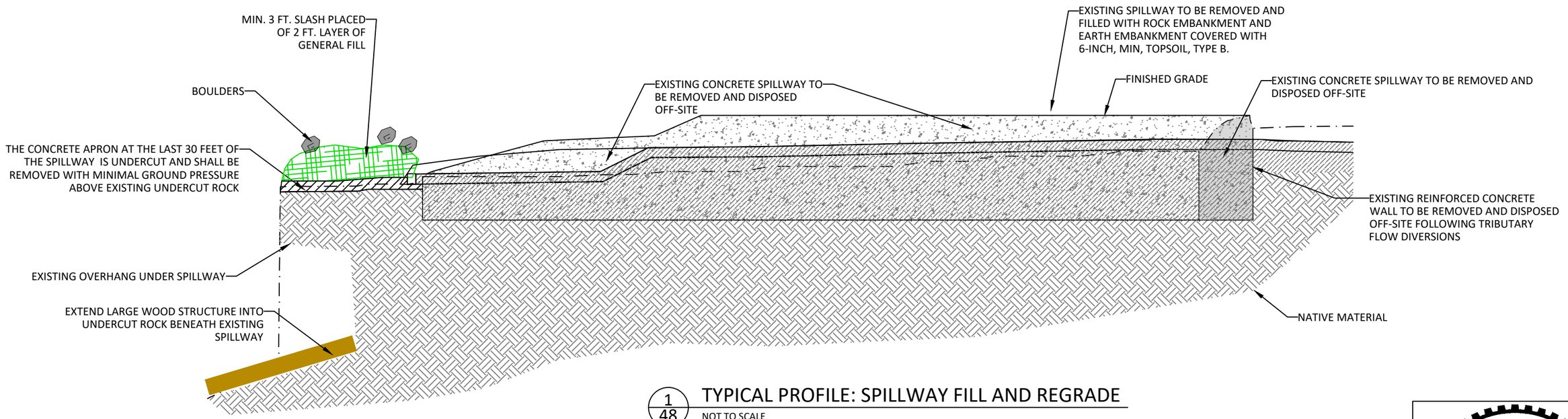
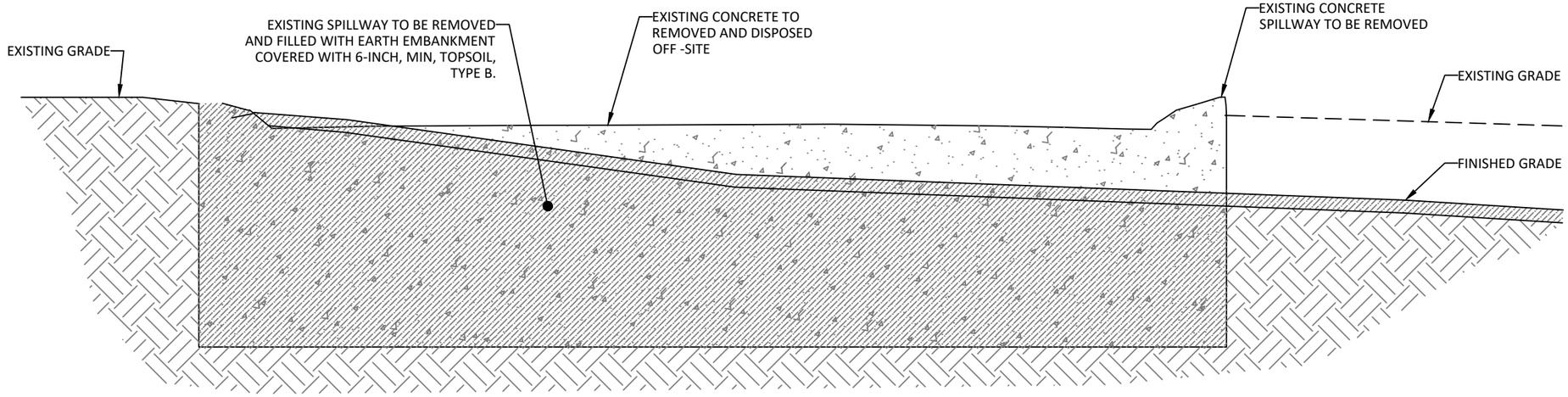


1/48 TYPICAL PROFILE: SPILLWAY FILL AND REGRADE

NOT TO SCALE



2/48 TYPICAL CROSS-SECTION: SPILLWAY FILL AND REGRADE

NOT TO SCALE

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER

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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM DAM - SPILLWAY CROSS-SECTIONS

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	11/17/23	RP	BN

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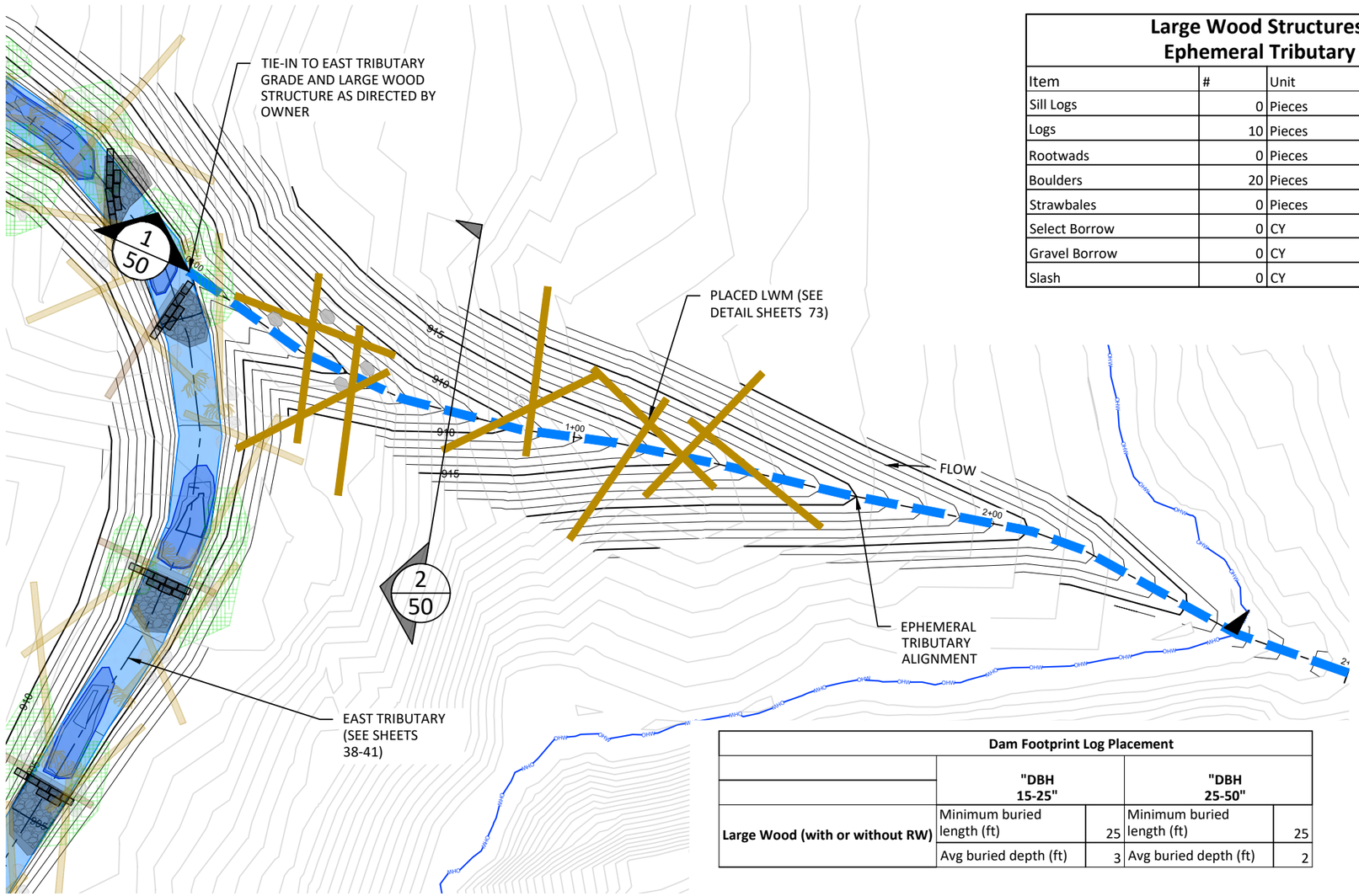


PLAN VIEW - EPHEMERAL TRIBUTARY

Large Wood Structures: Ephemeral Tributary		
Item	#	Unit
Sill Logs	0	Pieces
Logs	10	Pieces
Rootwads	0	Pieces
Boulders	20	Pieces
Strawbales	0	Pieces
Select Borrow	0	CY
Gravel Borrow	0	CY
Slash	0	CY

Dam Footprint Log Placement				
	"DBH 15-25"		"DBH 25-50"	
Large Wood (with or without RW)	Minimum buried length (ft)	25	Minimum buried length (ft)	25
	Avg buried depth (ft)	3	Avg buried depth (ft)	2

NOTES:

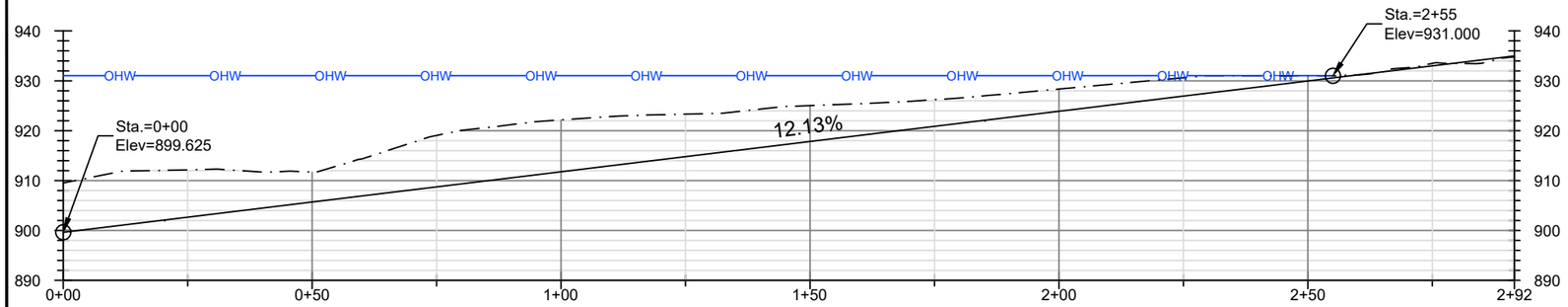
1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME FIT-IN-THE-FIELD APPROACH TO CUTS AND FILLS WITHIN THE RESERVOIR FOOTPRINT BASED ON EXPOSED SURFACES AFTER RESERVOIR DRAWDOWN AND HABITAT GOALS.

N

0 30 60 Feet

LEGEND

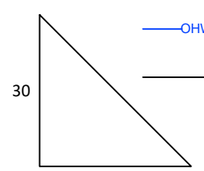
- PROPOSED TRIBUTARIES
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM)-LOG
- BOULDER
- SLASH
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)



PROFILE VIEW - EPHEMERAL TRIBUTARY

LEGEND

- SONAR RETURN SURFACE GRADE
- ORDINARY HIGH WATER (OHW)
- PROPOSED GRADE



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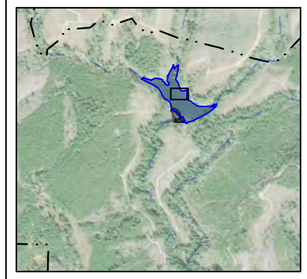
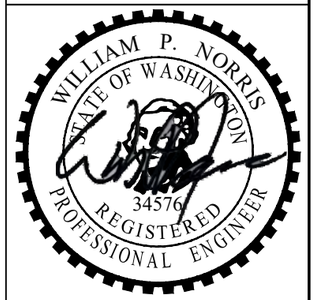


SHEET LOCATION



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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR - EPHEMERAL TRIB. PLAN VIEW

SCALE:	DATE:	DRAWN:	CHECKED:
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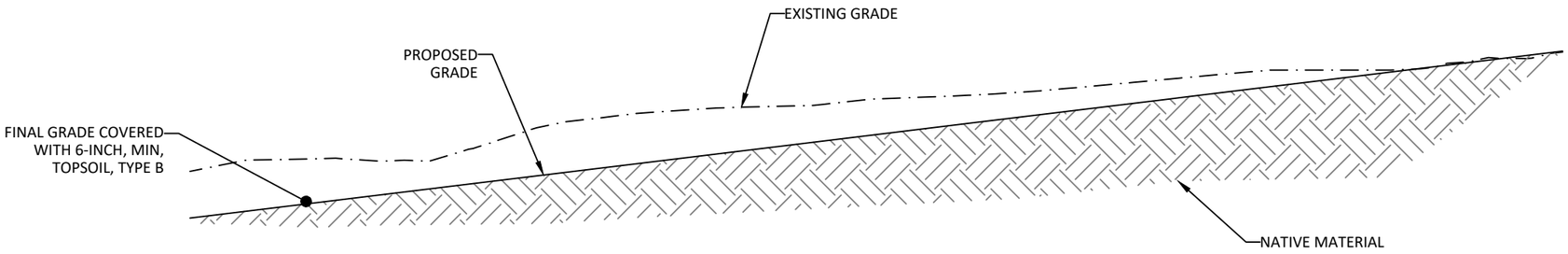
PROJ. NO:	DRAWING NO:	Total Sheets:
-	49	74

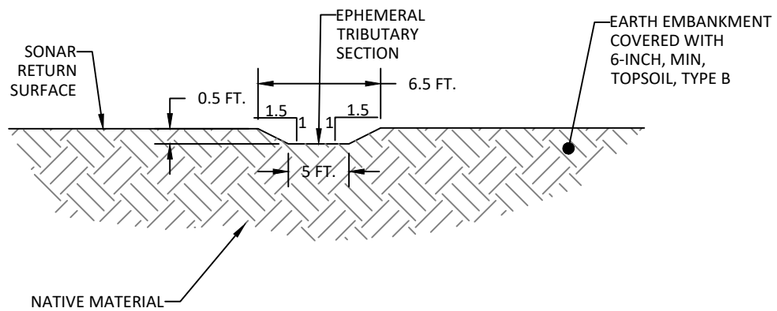


1/50 PROFILE VIEW: EPHEMERAL TRIBUTARY

NOT TO SCALE

NOTES:

1. CONTRACTOR SHALL PROVIDE 6 IN. MIN. THICKNESS OF TOPSOIL, TYPE B FOR ESTABLISHMENT OF NATIVE VEGETATION WITHIN THE RESERVOIR AND DAM FOOTPRINT.



2/50 TYPICAL CROSS-SECTION: EPHEMERAL TRIBUTARY

NOT TO SCALE

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

REV:	DESCRIPTION:	BY:	DATE:
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STATUS: FINAL DESIGN

PARR excellence
302 W. Steuben St. #6
Bingen, WA 98605
www.ers4life.com

CLIENT:
COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: KWONEESUM RESERVOIR - EPHEMERAL TRIB. CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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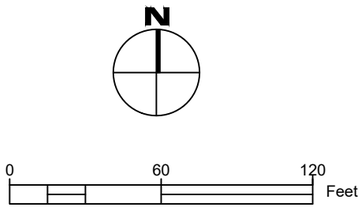
-	50	74

PLAN VIEW - ON-SITE STOCKPILE



LEGEND

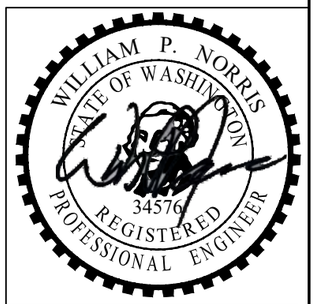
- EXISTING GRADING
- TEMPORARY ACCESS
- LIMITS OF DISTURBANCE

NOTE:

1. ALL VOLUMES OF ON-SITE MATERIALS ARE APPROXIMATE.
2. REUSE SORTED MATERIALS. CLASSIFIED AS COMMON FILL, SELECT BORROW, GRAVEL BORROW, AND BOULDERS. BOULDERS SHALL BE REUSED AS BALLAST FOR LARGE WOOD STRUCTURES. SELECT BORROW AND GRAVEL BORROW SHALL BE USED IN CHANNEL CONSTRUCTION. COMMON FILL SHALL BE MIXED WITH FINES EXCAVATED FROM THE BOTTOM OF THE RESERVOIR AND THEN SPREAD IN UPLAND AREAS OF THE FORMER RESERVOIR, DAM, AND SPILLWAY. SLASH SHALL BE INCORPORATED INTO LARGE WOOD STRUCTURES.

TABLE: ON-SITE STOCKPILE

#	NAME	APPROXIMATE VOLUME CY.
1	COMMON FILL	7250
2	SELECT BORROW (2"-6")	3900
3	GRAVEL BORROW (2"-MINUS)	2400
4	BOULDERS	300
5	SELECT BORROW (2"-6")	400
6	SELECT BORROW (6"-24")	830
7	SELECT BORROW (2"-6")	3107
8	SLASH	550
9	SLASH	350



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: ON-SITE STOCKPILE - PLAN VIEW AND QUANTITIES

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	11/17/23	RP	BN

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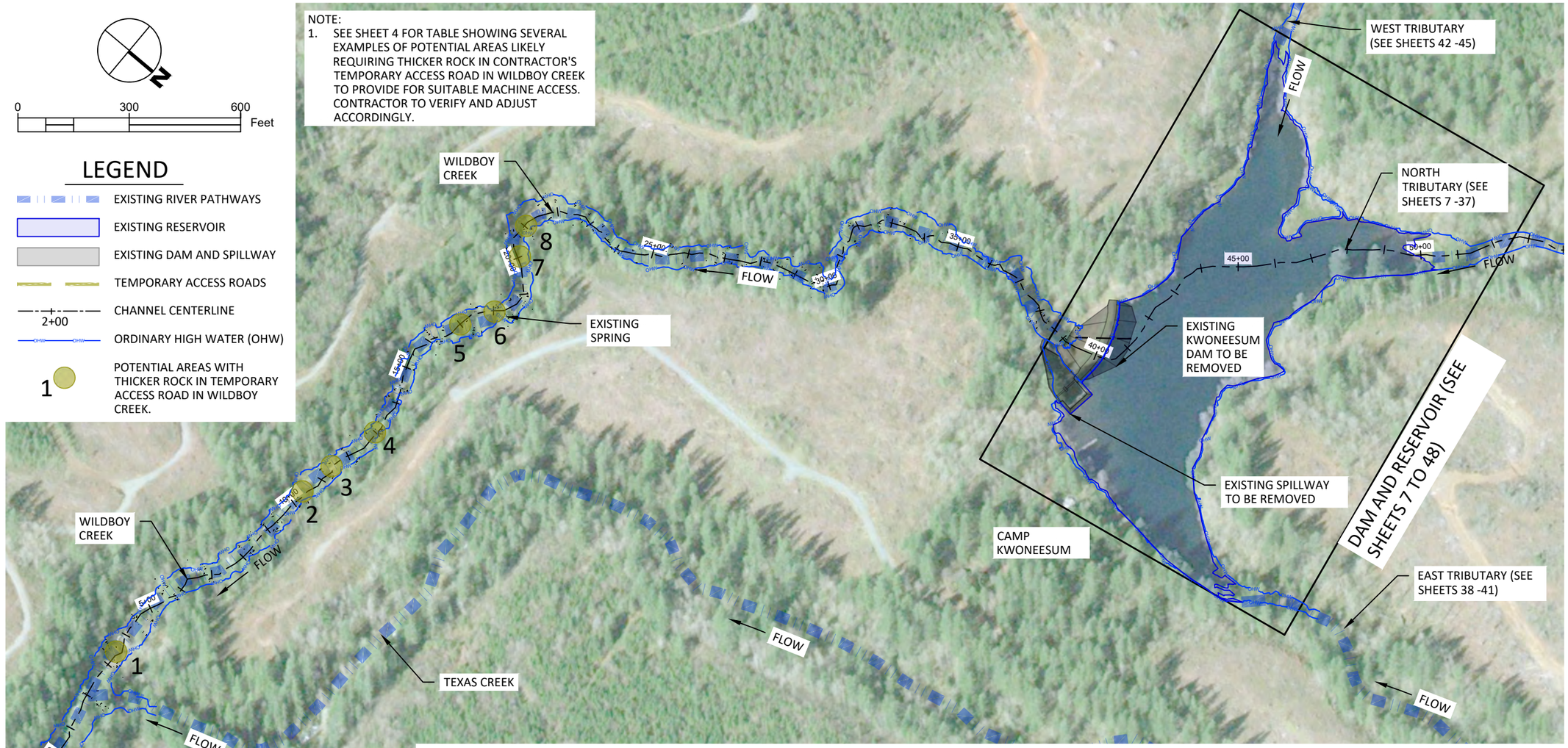
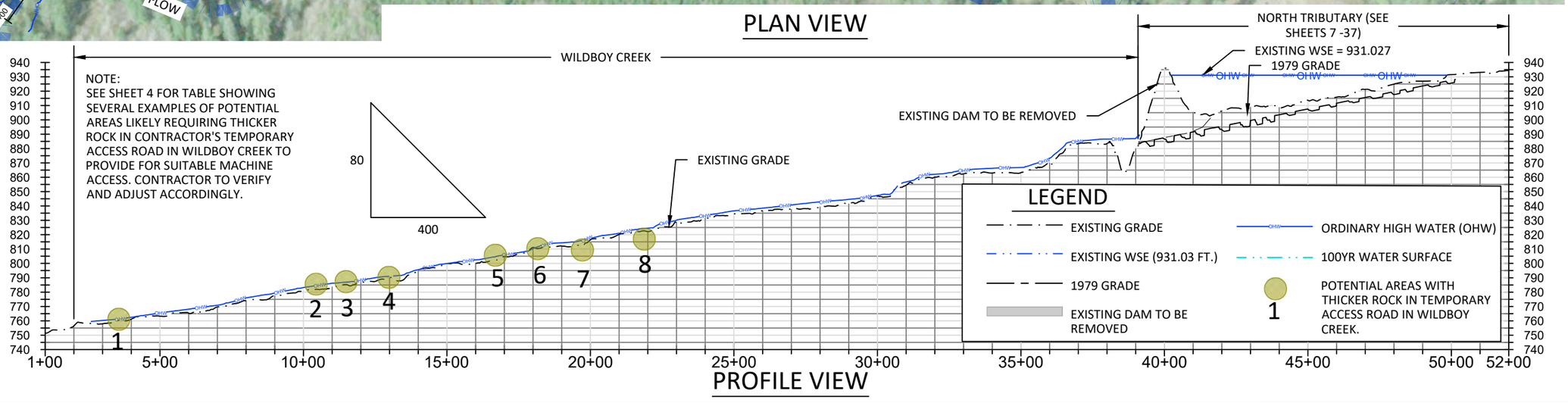
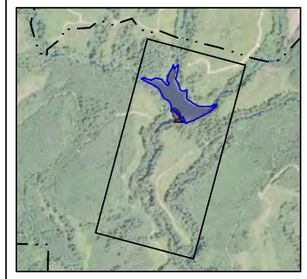


PLAN VIEW



PROFILE VIEW

Notes:



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WILLIAM P. NORRIS
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34576
REGISTERED PROFESSIONAL ENGINEER

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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - EXISTING CONDITIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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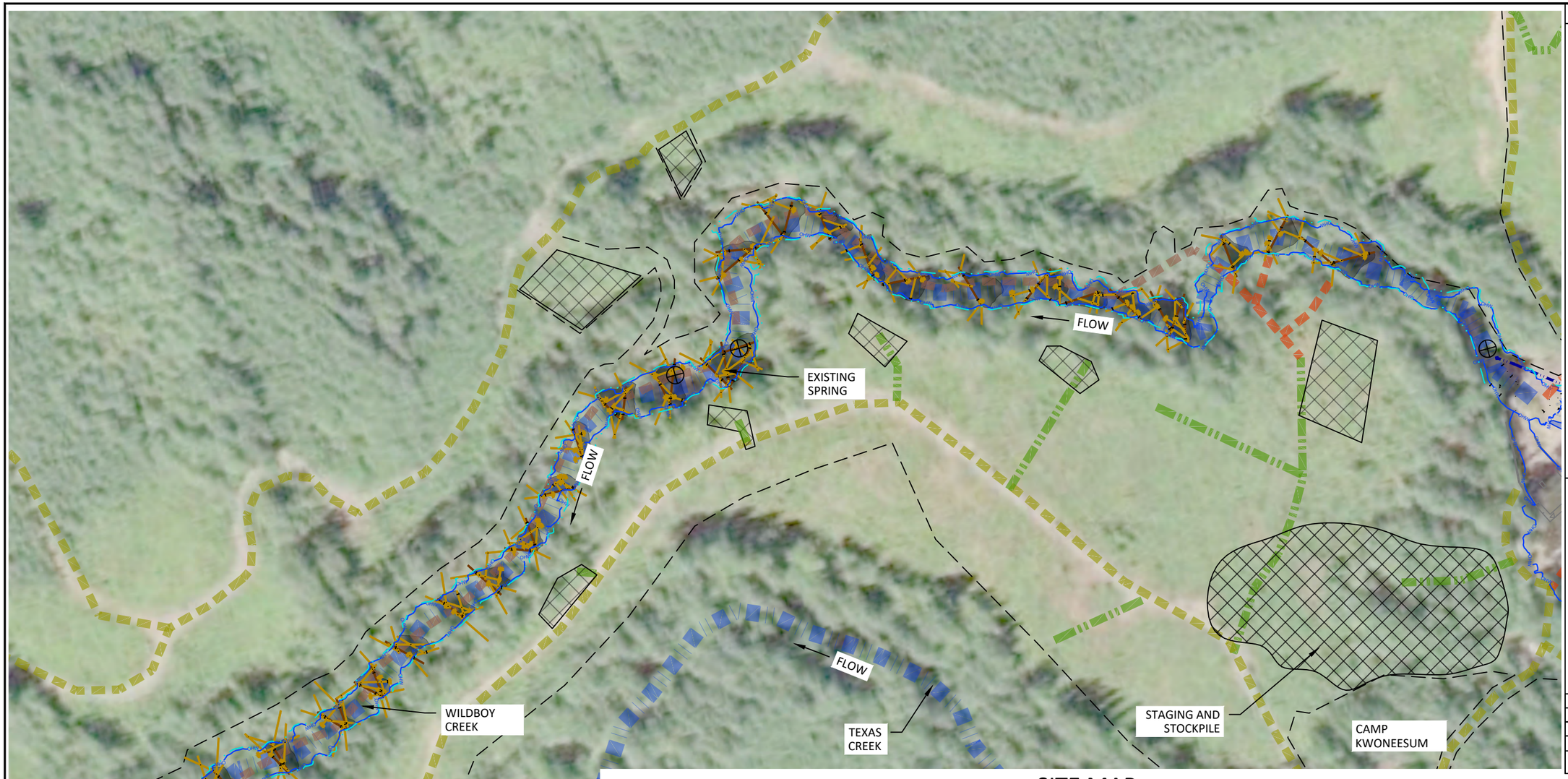
-	52		74



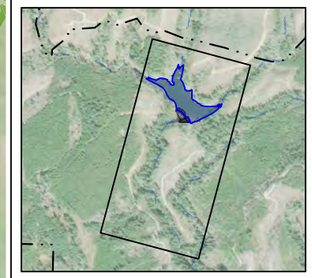
SITE MAP

LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- ORDINARY HIGH WATER (OHW)
- 100YR WATER SURFACE
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS
- PROPOSED GRADING
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE

0 200 400 Feet

Notes:



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - LARGE WOOD STRUCTURES

SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	53	74

SHEETS 59

SHEETS 60

SHEETS 61

SHEETS 58

SHEETS 57

SHEETS 56

SHEETS 55

LARGE WOOD STRUCTURES PLACED IN WILDBOY CREEK (SEE TYPICAL DETAILS SHEETS 67-71)

EXISTING SPRING

WILDBOY CREEK

STAGING AND STOCKPILE

CAMP KWONEESUM

TEXAS CREEK

FLOW

FLOW

FLOW

WILDBOY CREEK

930

N

0 200 400 Feet

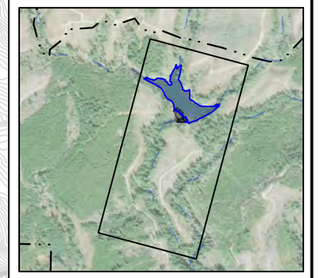
LEGEND

- EXISTING RIVER PATHWAYS
- EXISTING GRADE
- PROPOSED GRADING
- EXISTING FOREST ROADS
- PROPOSED TEMPORARY ACCESS ROADS (VEHICLES)
- PROPOSED TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- STAGING AND STOCKPILE
- WATER TURBIDITY MONITORS

SITEMAP

- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- PLACED SLASH
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE

Notes:



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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - PROPOSED CONDITIONS

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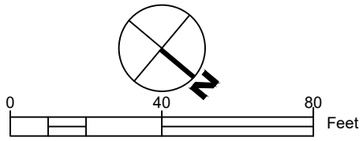
-	54	74



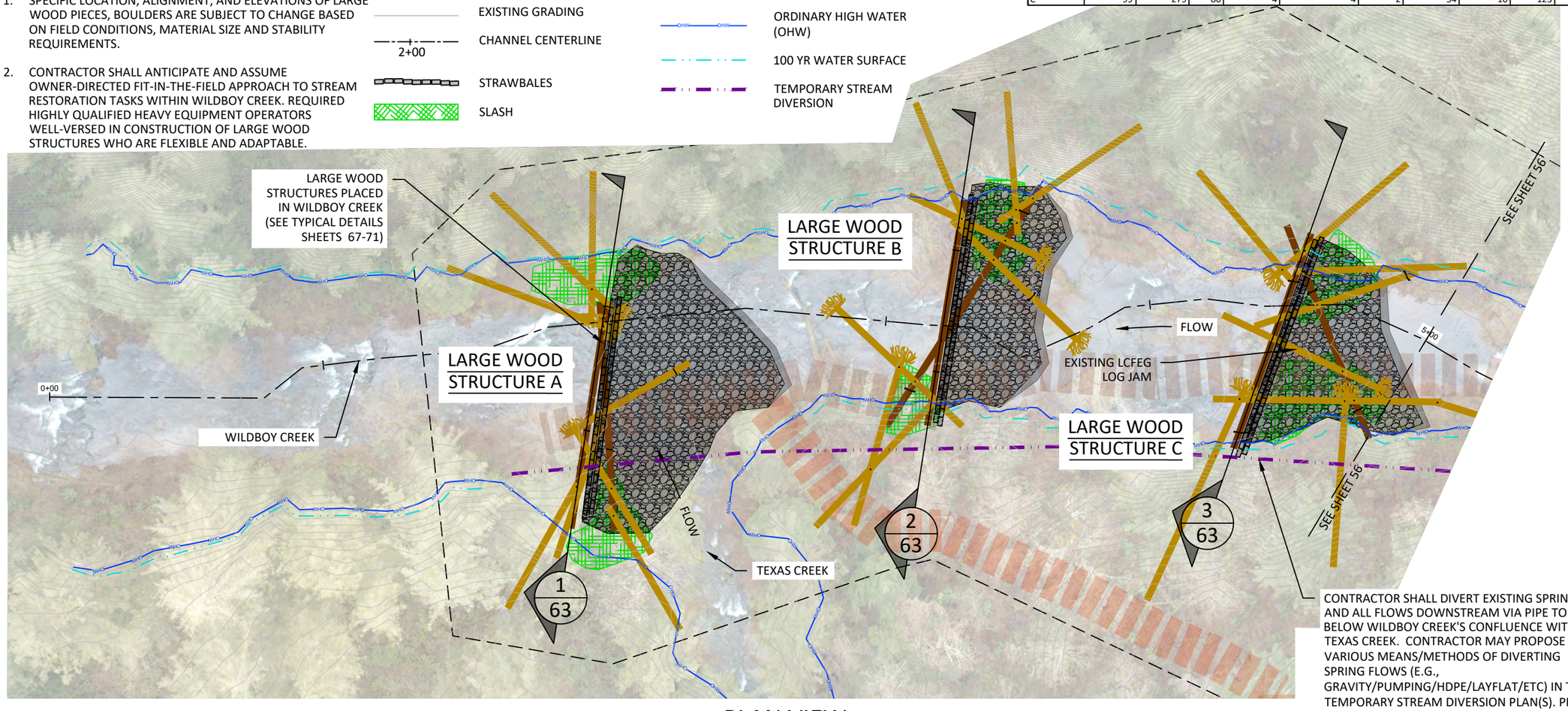
NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRED HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- SLASH
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE
- TEMPORARY STREAM DIVERSION

Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchor (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
A	163	472	70	4	4	2	52	10	106	40
B	96	266	50	4	4	2	54	10	125	40
C	99	279	80	4	4	2	54	10	123	40

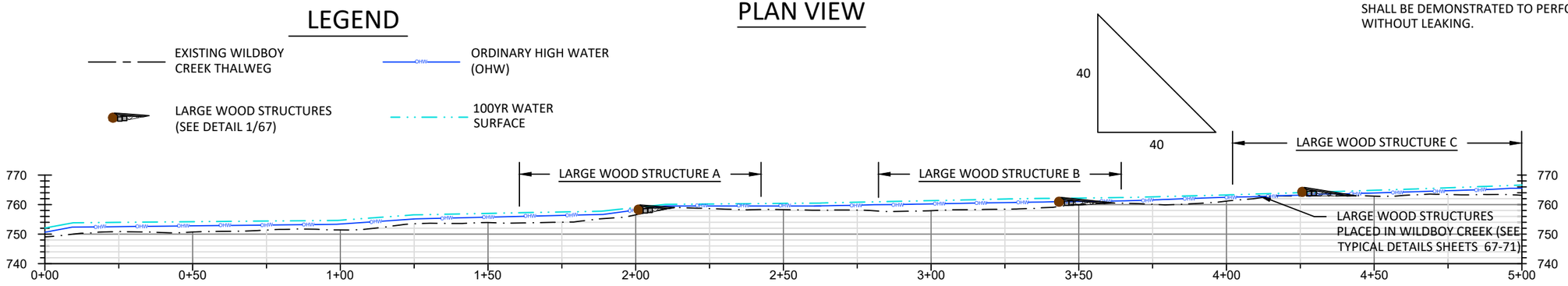


CONTRACTOR SHALL DIVERT EXISTING SPRING AND ALL FLOWS DOWNSTREAM VIA PIPE TO BELOW WILDBOY CREEK'S CONFLUENCE WITH TEXAS CREEK. CONTRACTOR MAY PROPOSE VARIOUS MEANS/METHODS OF DIVERTING SPRING FLOWS (E.G., GRAVITY/PUMPING/HDPE/LAYFLAT/ETC) IN THEIR TEMPORARY STREAM DIVERSION PLAN(S). PIPE SHALL BE DEMONSTRATED TO PERFORM WITHOUT LEAKING.

PLAN VIEW

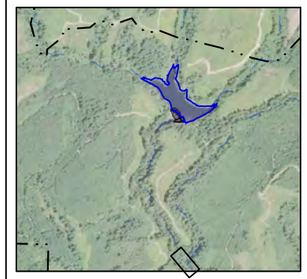
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE

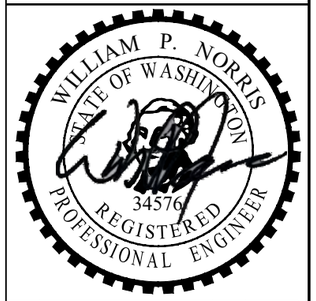


PROFILE VIEW - WILDBOY CREEK STA. 0+00 TO 5+00

Notes:



SHEET LOCATION



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VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - PLAN AND PROFILE STA. 0+00 TO 5+00

SCALE:	DATE:	DRAWN:	CHECKED:
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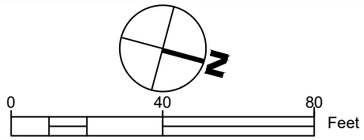


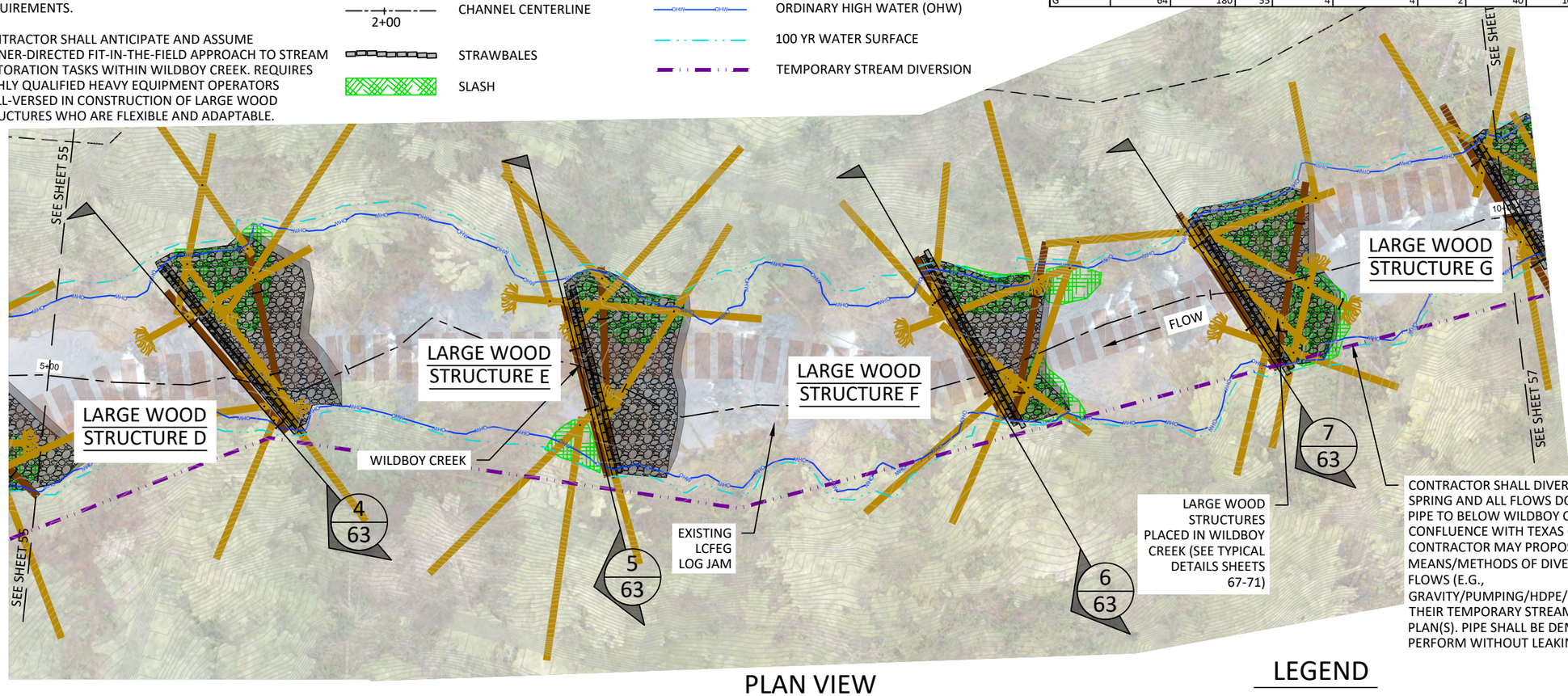
NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- SLASH
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE
- TEMPORARY STREAM DIVERSION

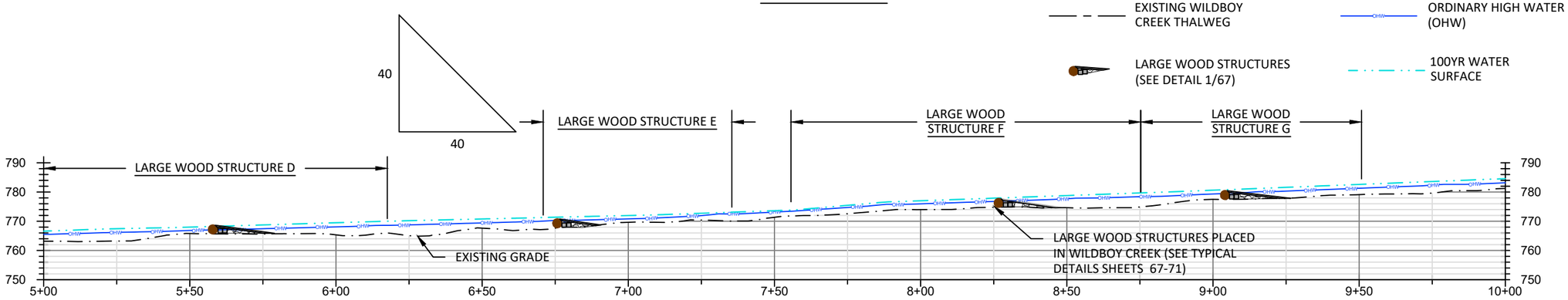
Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchor (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
D	73	198	38	4	4	2	47	8	100	32
E	72	199	40	5	3	2	42	8	96	32
F	48	134	45	5	3	2	43	8	96	32
G	64	180	55	4	4	2	40	10	117	40



PLAN VIEW

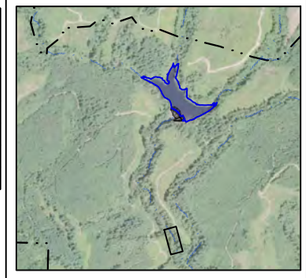
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE



PROFILE VIEW - WILDBOY CREEK STA. 5+00 TO 10+00

Notes:



SHEET LOCATION

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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - PLAN AND PROFILE STA. 5+00 TO 10+00

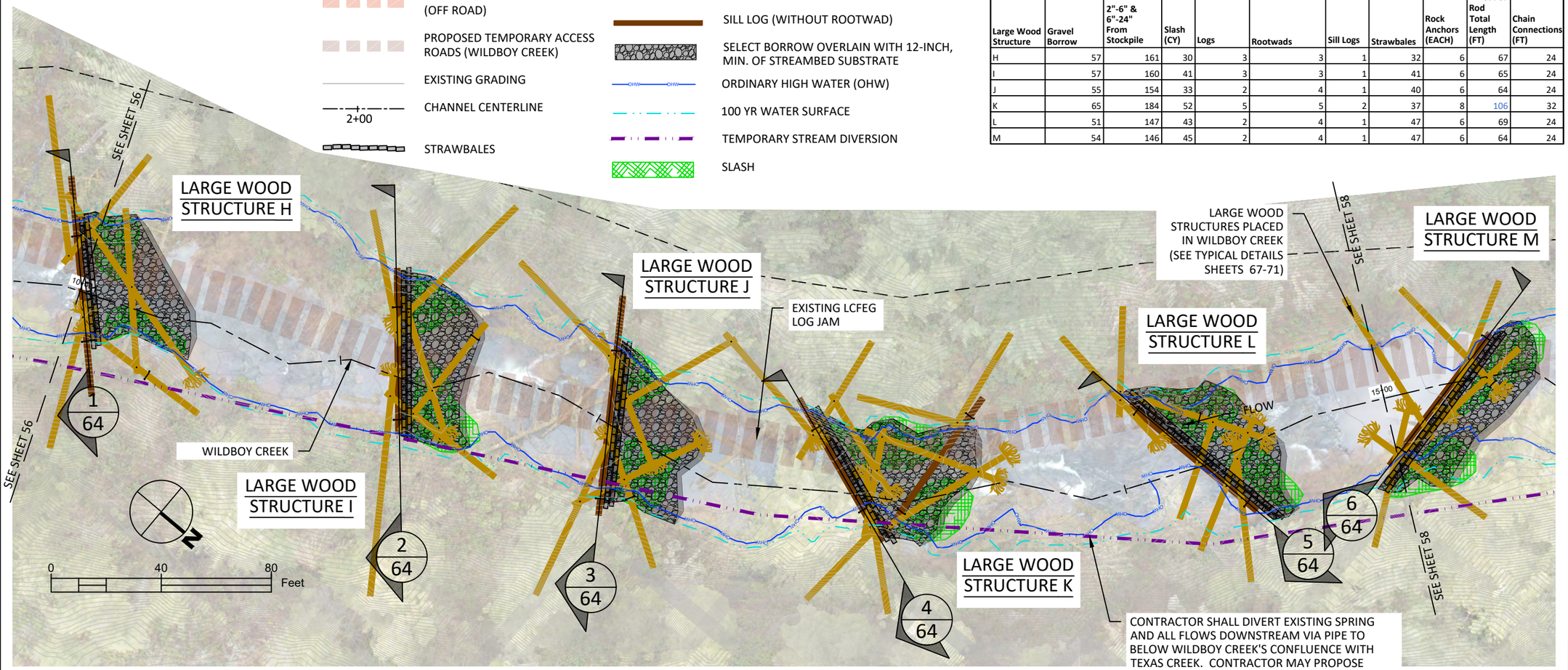
SCALE:	DATE:	DRAWN:	CHECKED:
	11/17/23	RP	BN

PROJ. NO:	DRAWING NO:	Total Sheets:
-	56	74

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE
- TEMPORARY STREAM DIVERSION
- SLASH

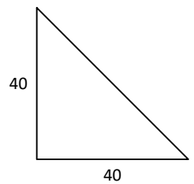
Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchors (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
H	57	161	30	3	3	1	32	6	67	24
I	57	160	41	3	3	1	41	6	65	24
J	55	154	33	2	4	1	40	6	64	24
K	65	184	52	5	5	2	37	8	106	32
L	51	147	43	2	4	1	47	6	69	24
M	54	146	45	2	4	1	47	6	64	24



PLAN VIEW

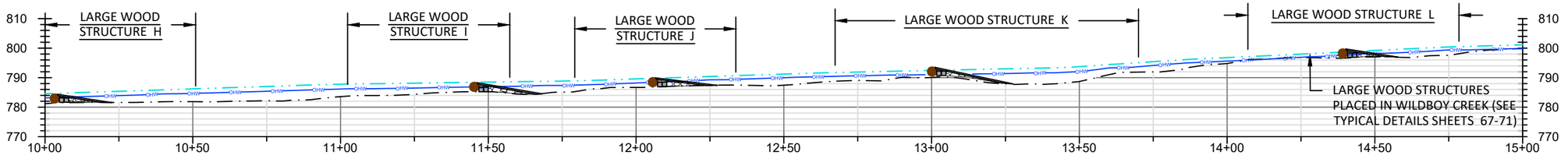
NOTE:
1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

CONTRACTOR SHALL DIVERT EXISTING SPRING AND ALL FLOWS DOWNSTREAM VIA PIPE TO BELOW WILDBOY CREEK'S CONFLUENCE WITH TEXAS CREEK. CONTRACTOR MAY PROPOSE VARIOUS MEANS/METHODS OF DIVERTING SPRING FLOWS (E.G., GRAVITY/PUMPING/HDPE/LAYFLAT/ETC) IN THEIR TEMPORARY STREAM DIVERSION PLAN(S). PIPE SHALL BE DEMONSTRATED TO PERFORM WITHOUT LEAKING.



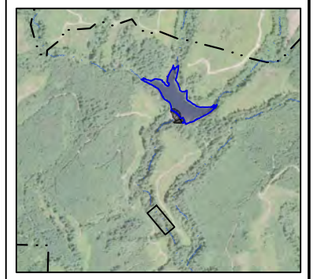
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE



PROFILE VIEW - WILDBOY CREEK STA. 10+00 TO 15+00

Notes:



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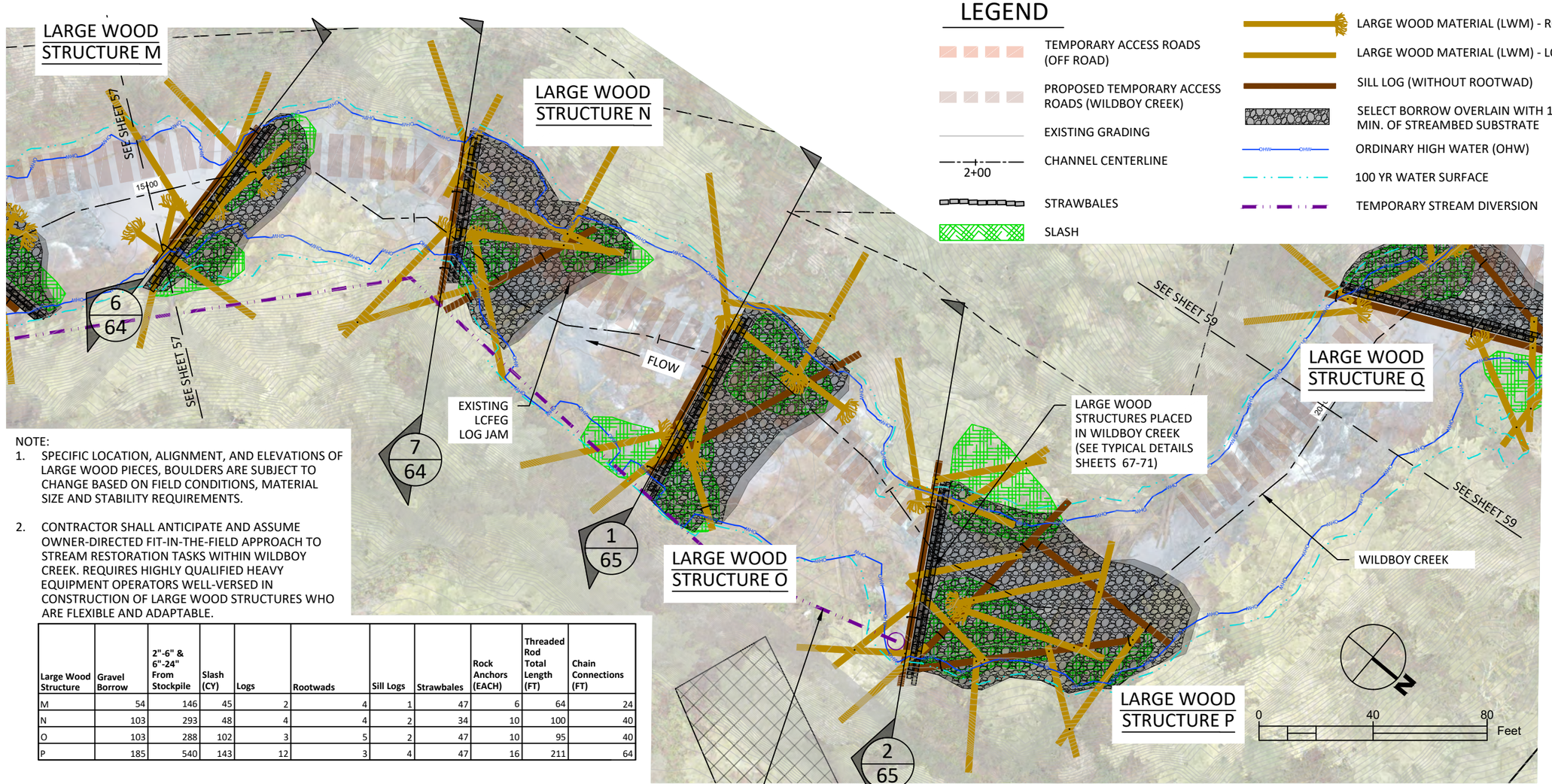


LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- SLASH
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE
- TEMPORARY STREAM DIVERSION

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

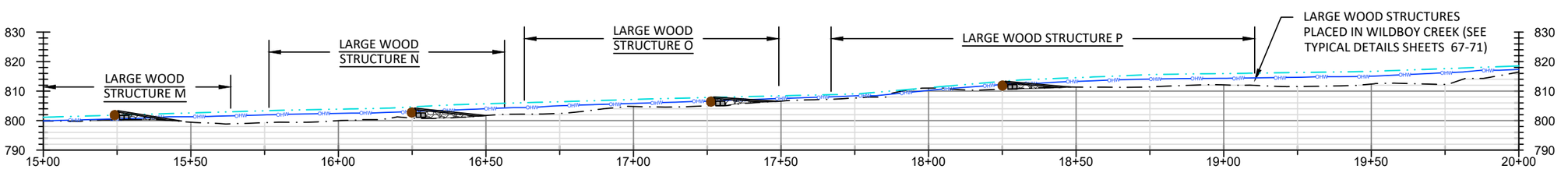
Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchors (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
M	54	146	45	2	4	1	47	6	64	24
N	103	293	48	4	4	2	34	10	100	40
O	103	288	102	3	5	2	47	10	95	40
P	185	540	143	12	3	4	47	16	211	64

PLAN VIEW

CONTRACTOR SHALL DIVERT EXISTING SPRING AND ALL FLOWS DOWNSTREAM VIA PIPE TO BELOW WILDBOY CREEK'S CONFLUENCE WITH TEXAS CREEK. CONTRACTOR MAY PROPOSE VARIOUS MEANS/METHODS OF DIVERTING SPRING FLOWS (E.G., GRAVITY/PUMPING/HDPE/LAYFLAT/ETC) IN THEIR TEMPORARY STREAM DIVERSION PLAN(S). PIPE SHALL BE DEMONSTRATED TO PERFORM WITHOUT LEAKING.

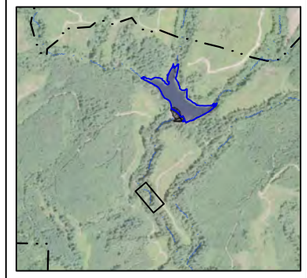
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE



PROFILE VIEW - WILDBOY CREEK STA. 15+00 TO 20+00

Notes:



SHEET LOCATION

REV:	DESCRIPTION:	BY:	DATE:
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STATUS: FINAL DESIGN

WILLIAM P. NORRIS STATE OF WASHINGTON 34576 REGISTERED PROFESSIONAL ENGINEER

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302 W. Steuben St. #6
Bingen, WA 98605
www.ers4life.com

CLIENT: COWLITZ INDIAN TRIBE
7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - PLAN AND PROFILE STA. 15+00 TO 20+00

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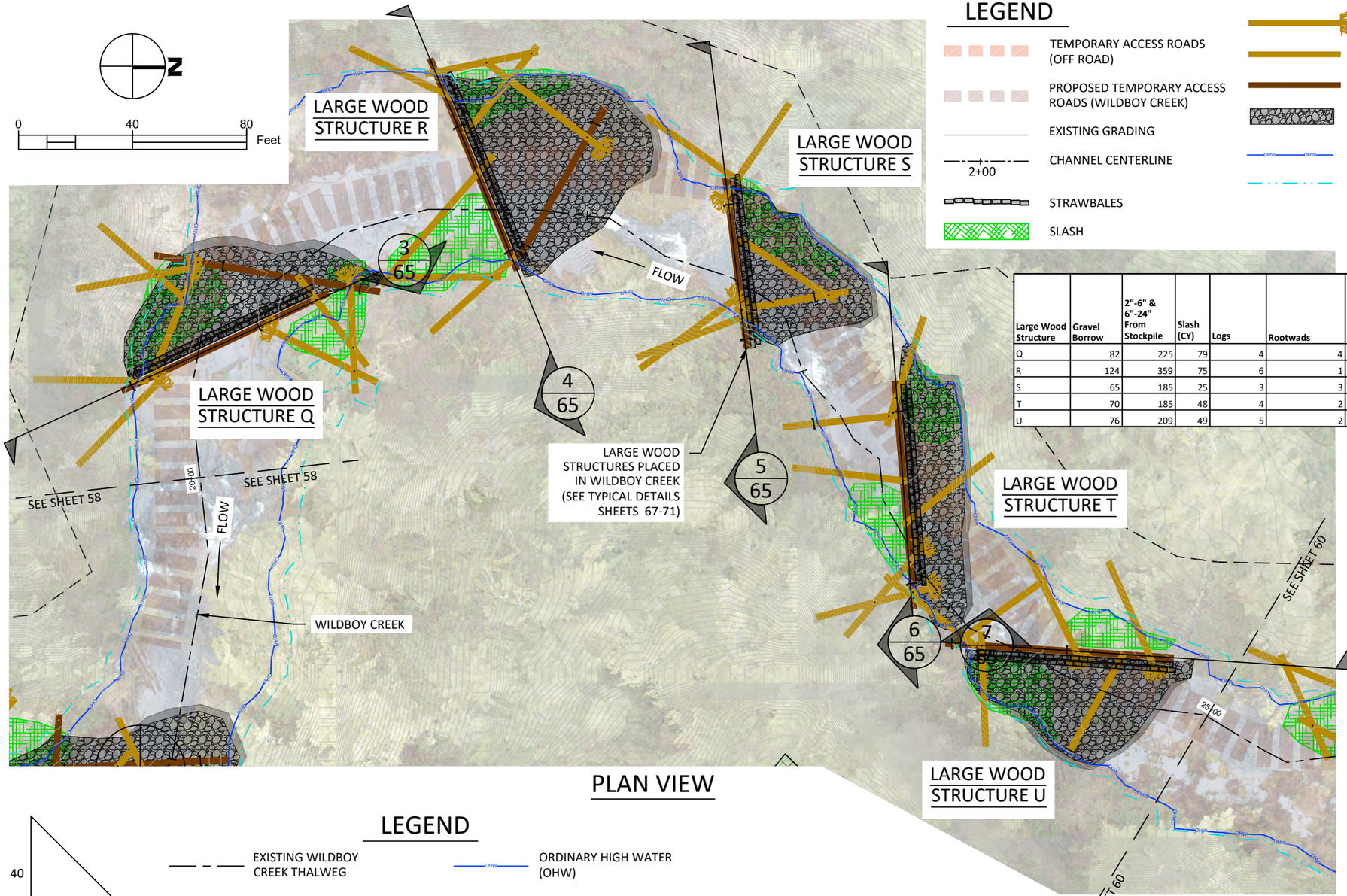


PLAN VIEW

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- SLASH
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE

Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchors (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
Q	82	225	79	4	4	2	47	8	91	32
R	124	359	75	6	1	2	47	8	97	32
S	65	185	25	3	3	1	40	6	58	24
T	70	185	48	4	2	1	47	6	67	24
U	76	209	49	5	2	1	47	6	65	24

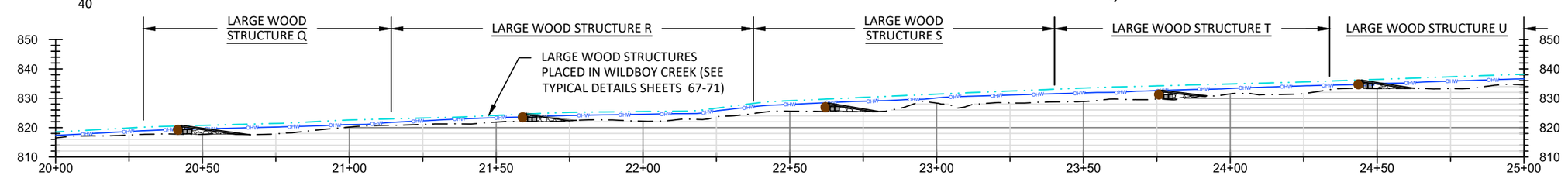
NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

LEGEND

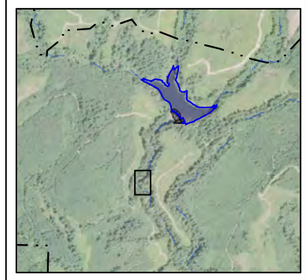
- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE

40 / 40

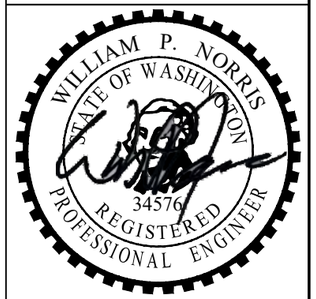


PROFILE VIEW - WILDBOY CREEK STA. 20+00 TO 25+00

Notes:



SHEET LOCATION



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7700 26TH AVE
VANCOUVER, WA, 98665

SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - PLAN AND PROFILE STA. 20+00 TO 25+00

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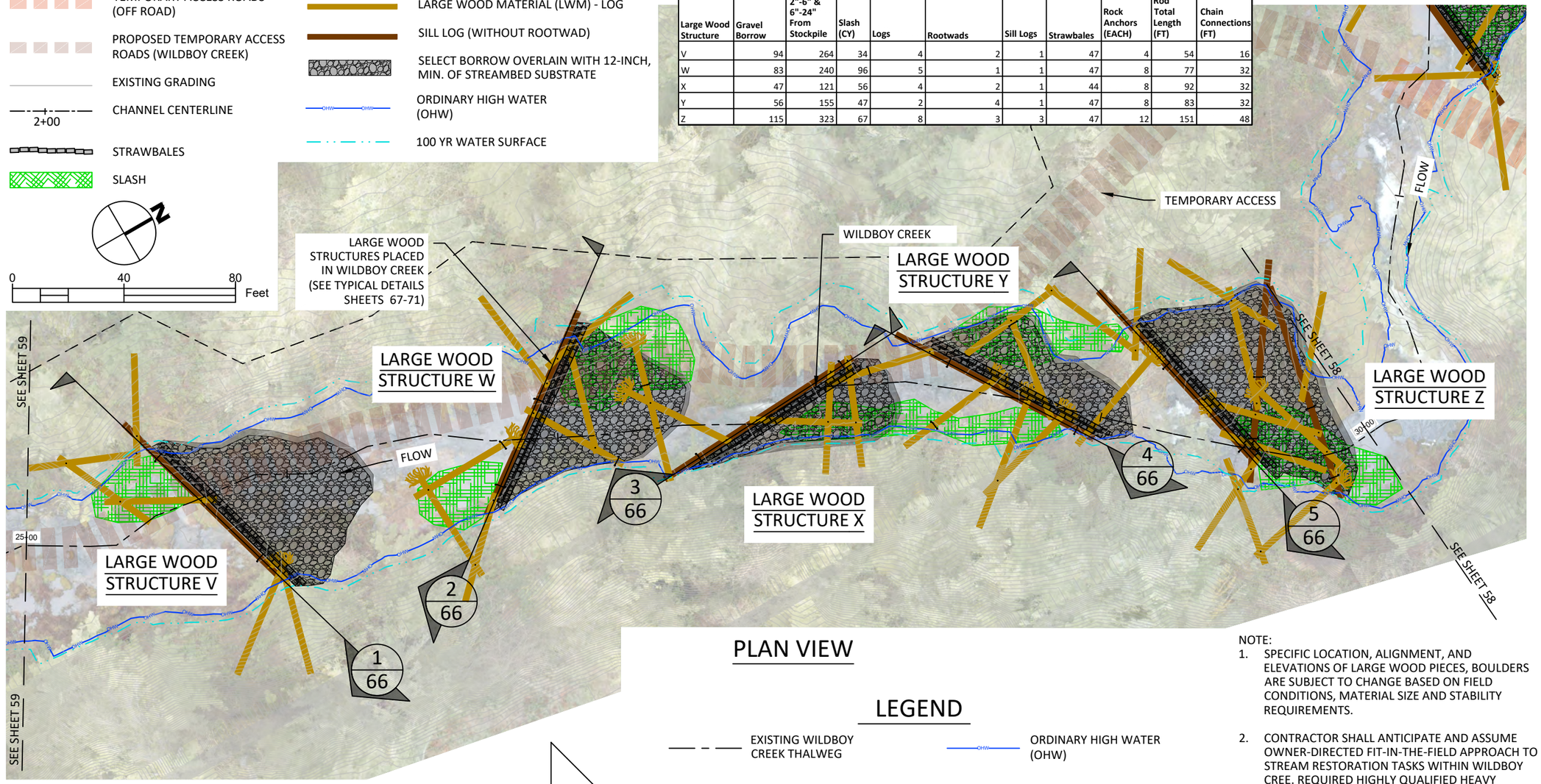
LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
- STRAWBALES
- SLASH
- LARGE WOOD MATERIAL (LWM) - ROOTWAD
- LARGE WOOD MATERIAL (LWM) - LOG
- SILL LOG (WITHOUT ROOTWAD)
- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE

Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchors (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
V	94	264	34	4	2	1	47	4	54	16
W	83	240	96	5	1	1	47	8	77	32
X	47	121	56	4	2	1	44	8	92	32
Y	56	155	47	2	4	1	47	8	83	32
Z	115	323	67	8	3	3	47	12	151	48



PLAN VIEW

NOTE:
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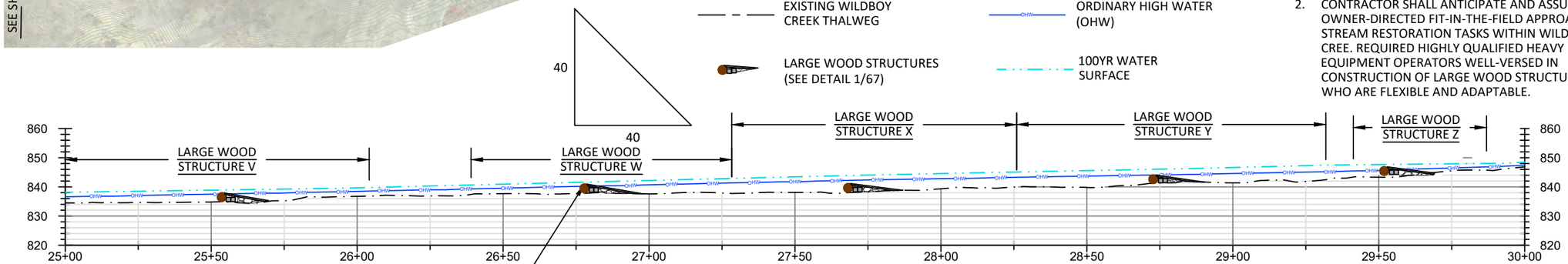
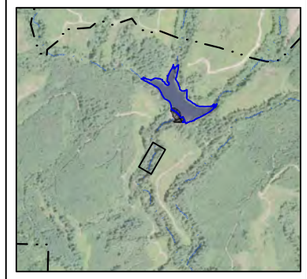
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- ORDINARY HIGH WATER (OHW)
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- 100YR WATER SURFACE



PROFILE VIEW - WILDBOY CREEK STA. 25+00 TO 30+00

Notes:



SHEET LOCATION

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

REV:	DESCRIPTION:	BY:	DATE:
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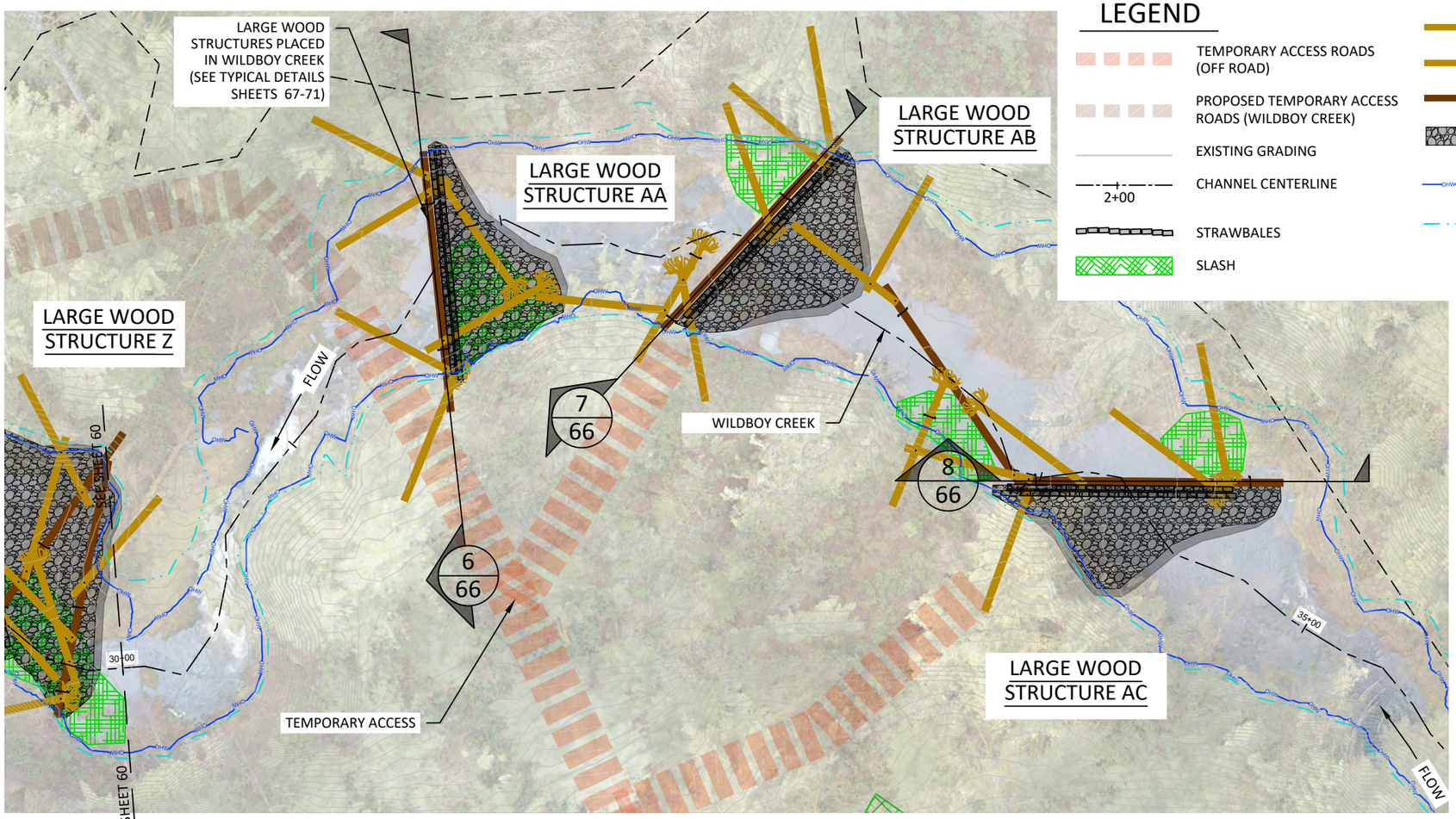

PLAN VIEW

LEGEND

- TEMPORARY ACCESS ROADS (OFF ROAD)
- PROPOSED TEMPORARY ACCESS ROADS (WILDBOY CREEK)
- EXISTING GRADING
- CHANNEL CENTERLINE (2+00)
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- LARGE WOOD MATERIAL (LWM) - ROOTWAD
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- SELECT BORROW OVERLAIN WITH 12-INCH, MIN. OF STREAMBED SUBSTRATE
- ORDINARY HIGH WATER (OHW)
- 100 YR WATER SURFACE

0 40 80 Feet

NOTE:
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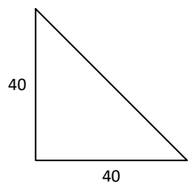
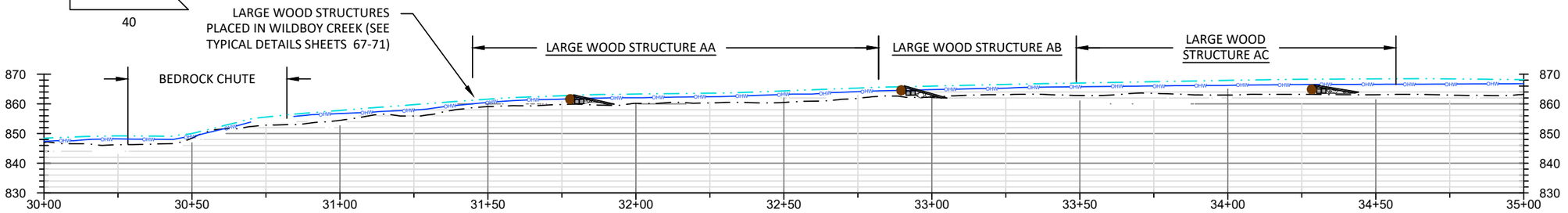
Large Wood Structure	Gravel Borrow	2"-6" & 6"-24" From Stockpile	Slash (CY)	Logs	Rootwads	Sill Logs	Strawbales	Rock Anchors (EACH)	Threaded Rod Total Length (FT)	Chain Connections (FT)
Z	115	323	67	8	3	3	47	12	151	48
AA	57	159	44	3	3	1	47	6	63	24
AB	63	170	24	3	3	1	47	6	62	24
AC	63	165	46	4	4	2	47	10	98	40



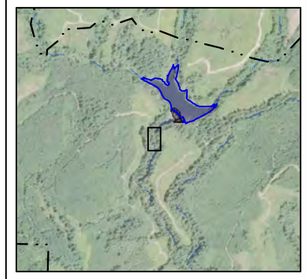
LEGEND

- EXISTING WILDBOY CREEK THALWEG
- LARGE WOOD STRUCTURES (SEE DETAIL 1/67)
- ORDINARY HIGH WATER (OHW)
- 100YR WATER SURFACE

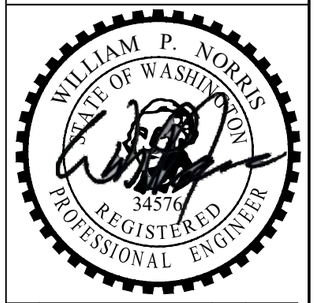


PROFILE VIEW - WILDBOY CREEK STA. 30+00 TO 35+00

Notes:



SHEET LOCATION



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SCALE:	DATE:	DRAWN:	CHECKED:
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PROJ. NO:	DRAWING NO:	Total Sheets:
-	61	74

WILDBOY CREEK LARGE WOOD STRUCTURE QUANTITIES

Log Wood Structure: A

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	106	FT
Chain Connections Length	40	FT
Nuts	42	Pieces
Washers	42	Pieces
Strawbales	52	Pieces
Select Borrow	472	CY
Streambed Substrate	163	CY
Slash	70	CY

Log Wood Structure: B

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	125	FT
Chain Connections Length	40	FT
Nuts	46	Pieces
Washers	46	Pieces
Strawbales	54	Pieces
Select Borrow	266	CY
Streambed Substrate	96	CY
Slash	50	CY

Log Wood Structure: C

	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	123	FT
Chain Connections Length	40	FT
Nuts	46	Pieces
Washers	46	Pieces
Strawbales	54	Pieces
Select Borrow	279	CY
Streambed Substrate	99	CY
Slash	80	CY

Log Wood Structure: D

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	100	FT
Chain Connections Length	32	FT
Nuts	40	Pieces
Washers	40	Pieces
Strawbales	47	Pieces
Select Borrow	198	CY
Streambed Substrate	73	CY
Slash	40	CY

Log Wood Structure: E

Item	#	Unit
Sill Logs	2	Pieces
Logs	5	Pieces
Rootwads	3	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	96	FT
Chain Connections Length	32	FT
Nuts	41	Pieces
Washers	40	Pieces
Strawbales	42	Pieces
Select Borrow	199	CY
Streambed Substrate	72	CY
Slash	40	CY

Log Wood Structure: F

Item	#	Unit
Sill Logs	2	Pieces
Logs	5	Pieces
Rootwads	3	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	96	FT
Chain Connections Length	32	FT
Nuts	38	Pieces
Washers	38	Pieces
Strawbales	43	Pieces
Select Borrow	134	CY
Streambed Substrate	48	CY
Slash	50	CY

Log Wood Structure: G

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	117	FT
Chain Connections Length	40	FT
Nuts	48	Pieces
Washers	49	Pieces
Strawbales	40	Pieces
Select Borrow	180	CY
Streambed Substrate	64	CY
Slash	60	CY

Log Wood Structure: H

Item	#	Unit
Sill Logs	1	Pieces
Logs	3	Pieces
Rootwads	3	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	67	FT
Chain Connections Length	24	FT
Nuts	26	Pieces
Washers	26	Pieces
Strawbales	32	Pieces
Select Borrow	161	CY
Streambed Substrate	57	CY
Slash	30	CY

Log Wood Structure: I

Item	#	Unit
Sill Logs	1	Pieces
Logs	3	Pieces
Rootwads	3	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	65	FT
Chain Connections Length	24	FT
Nuts	26	Pieces
Washers	26	Pieces
Strawbales	41	Pieces
Select Borrow	160	CY
Streambed Substrate	57	CY
Slash	40	CY

Log Wood Structure: J

Item	#	Unit
Sill Logs	1	Pieces
Logs	2	Pieces
Rootwads	4	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	64	FT
Chain Connections Length	24	FT
Nuts	26	Pieces
Washers	26	Pieces
Strawbales	40	Pieces
Select Borrow	154	CY
Streambed Substrate	55	CY
Slash	30	CY

Log Wood Structure: K

Item	#	Unit
Sill Logs	2	Pieces
Logs	5	Pieces
Rootwads	5	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	106	FT
Chain Connections Length	32	FT
Nuts	38	Pieces
Washers	38	Pieces
Strawbales	37	Pieces
Select Borrow	184	CY
Streambed Substrate	65	CY
Slash	50	CY

Log Wood Structure: L

Item	#	Unit
Sill Logs	1	Pieces
Logs	2	Pieces
Rootwads	4	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	69	FT
Chain Connections Length	24	FT
Nuts	28	Pieces
Washers	28	Pieces
Strawbales	47	Pieces
Select Borrow	147	CY
Streambed Substrate	51	CY
Slash	40	CY

Log Wood Structure: M

Item	#	Unit
Sill Logs	1	Pieces
Logs	2	Pieces
Rootwads	4	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	64	FT
Chain Connections Length	24	FT
Nuts	22	Pieces
Washers	22	Pieces
Strawbales	47	Pieces
Select Borrow	146	CY
Streambed Substrate	54	CY
Slash	40	CY

Log Wood Structure: N

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	99	FT
Chain Connections Length	40	FT
Nuts	40	Pieces
Washers	40	Pieces
Strawbales	34	Pieces
Select Borrow	293	CY
Streambed Substrate	103	CY
Slash	50	CY

Log Wood Structure: O

Item	#	Unit
Sill Logs	2	Pieces
Logs	3	Pieces
Rootwads	5	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	95	FT
Chain Connections Length	40	FT
Nuts	38	Pieces
Washers	38	Pieces
Strawbales	47	Pieces
Select Borrow	288	CY
Streambed Substrate	103	CY
Slash	100	CY

Log Wood Structure: P

Item	#	Unit
Sill Logs	4	Pieces
Logs	12	Pieces
Rootwads	3	Pieces
Rock Anchors	16	Connections
Threaded Rod Length	211	FT
Chain Connections Length	64	FT
Nuts	82	Pieces
Washers	82	Pieces
Strawbales	47	Pieces
Select Borrow	540	CY
Streambed Substrate	185	CY
Slash	140	CY

Log Wood Structure: Q

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	91	FT
Chain Connections Length	32	FT
Nuts	36	Pieces
Washers	36	Pieces
Strawbales	47	Pieces
Select Borrow	225	CY
Streambed Substrate	82	CY
Slash	80	CY

Log Wood Structure: R

Item	#	Unit
Sill Logs	2	Pieces
Logs	6	Pieces
Rootwads	1	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	97	FT
Chain Connections Length	32	FT
Nuts	38	Pieces
Washers	38	Pieces
Strawbales	47	Pieces
Select Borrow	359	CY
Streambed Substrate	124	CY
Slash	70	CY

Log Wood Structure: S

Item	#	Unit
Sill Logs	1	Pieces
Logs	3	Pieces
Rootwads	3	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	58	FT
Chain Connections Length	24	FT
Nuts	24	Pieces
Washers	24	Pieces
Strawbales	40	Pieces
Select Borrow	185	CY
Streambed Substrate	65	CY
Slash	20	CY

Log Wood Structure: T

Item	#	Unit
Sill Logs	1	Pieces
Logs	4	Pieces
Rootwads	2	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	67	FT
Chain Connections Length	24	FT
Nuts	26	Pieces
Washers	26	Pieces
Strawbales	47	Pieces
Select Borrow	185	CY
Streambed Substrate	70	CY
Slash	50	CY

Log Wood Structure: U

Item	#	Unit
Sill Logs	1	Pieces
Logs	5	Pieces
Rootwads	2	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	65	FT
Chain Connections Length	24	FT
Nuts	26	Pieces
Washers	26	Pieces
Strawbales	47	Pieces
Select Borrow	209	CY
Streambed Substrate	76	CY
Slash	50	CY

Log Wood Structure: V

Item	#	Unit
Sill Logs	1	Pieces
Logs	4	Pieces
Rootwads	2	Pieces
Rock Anchors	4	Connections
Threaded Rod Length	54	FT
Chain Connections Length	16	FT
Nuts	22	Pieces
Washers	22	Pieces
Strawbales	47	Pieces
Select Borrow	264	CY
Streambed Substrate	94	CY
Slash	30	CY

Log Wood Structure: W

Item	#	Unit
Sill Logs	1	Pieces
Logs	5	Pieces
Rootwads	1	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	77	FT
Chain Connections Length	32	FT
Nuts	36	Pieces
Washers	37	Pieces
Strawbales	47	Pieces
Select Borrow	240	CY
Streambed Substrate	83	CY
Slash	100	CY

Log Wood Structure: X

Item	#	Unit
Sill Logs	1	Pieces
Logs	4	Pieces
Rootwads	2	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	92	FT
Chain Connections Length	32	FT
Nuts	38	Pieces
Washers	38	Pieces
Strawbales	44	Pieces
Select Borrow	121	CY
Streambed Substrate	47	CY
Slash	60	CY

Log Wood Structure: Y

Item	#	Unit
Sill Logs	1	Pieces
Logs	2	Pieces
Rootwads	4	Pieces
Rock Anchors	8	Connections
Threaded Rod Length	83	FT
Chain Connections Length	32	FT
Nuts	34	Pieces
Washers	34	Pieces
Strawbales	47	Pieces
Select Borrow	155	CY
Streambed Substrate	56	CY
Slash	50	CY

Log Wood Structure: Z

Item	#	Unit
Sill Logs	3	Pieces
Logs	8	Pieces
Rootwads	3	Pieces
Rock Anchors	12	Connections
Threaded Rod Length	151	FT
Chain Connections Length	48	FT
Nuts	58	Pieces
Washers	58	Pieces
Strawbales	47	Pieces
Select Borrow	323	CY
Streambed Substrate	115	CY
Slash	70	CY

Log Wood Structure: AA

Item	#	Unit
Sill Logs	1	Pieces
Logs	3	Pieces
Rootwads	3	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	63	FT
Chain Connections Length	24	FT
Nuts	24	Pieces
Washers	24	Pieces
Strawbales	47	Pieces
Select Borrow	159	CY
Streambed Substrate	57	CY
Slash	40	CY

Log Wood Structure: AB

Item	#	Unit
Sill Logs	1	Pieces
Logs	3	Pieces
Rootwads	3	Pieces
Rock Anchors	6	Connections
Threaded Rod Length	62	FT
Chain Connections Length		FT
Nuts	24	Pieces
Washers	24	Pieces
Strawbales	47	Pieces
Select Borrow	170	CY
Streambed Substrate	63	CY
Slash	20	CY

Log Wood Structure: AC

Item	#	Unit
Sill Logs	2	Pieces
Logs	4	Pieces
Rootwads	4	Pieces
Rock Anchors	10	Connections
Threaded Rod Length	98	FT
Chain Connections Length	40	FT
Nuts	36	Pieces
Washers	36	Pieces
Strawbales	47	Pieces
Select Borrow	165	CY
Streambed Substrate	63	CY
Slash	50	CY

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER

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7700 26TH AVE
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SITE:
KWONEESUM DAM REMOVAL DESIGN

TITLE:
WILDBOY CREEK - LOG JAM QUANTITIES

SCALE:	DATE:	DRAWN:	CHECKED:
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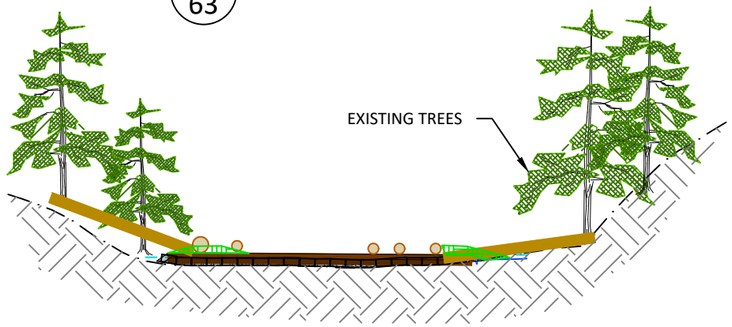
-	62	74

1/63 CROSS-SECTION

2/63 CROSS-SECTION



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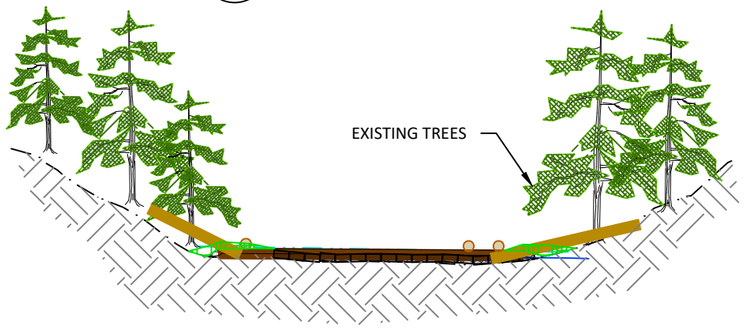

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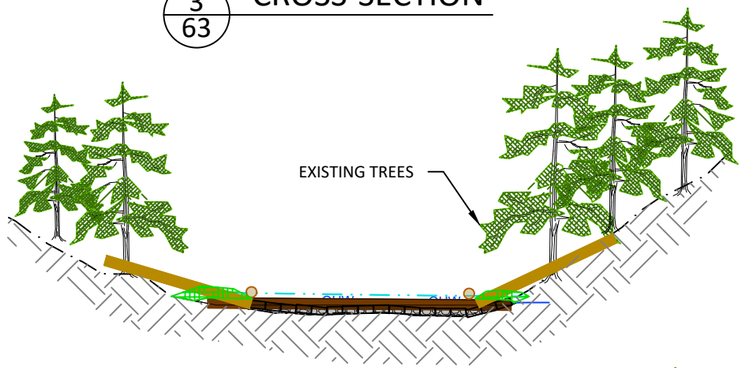

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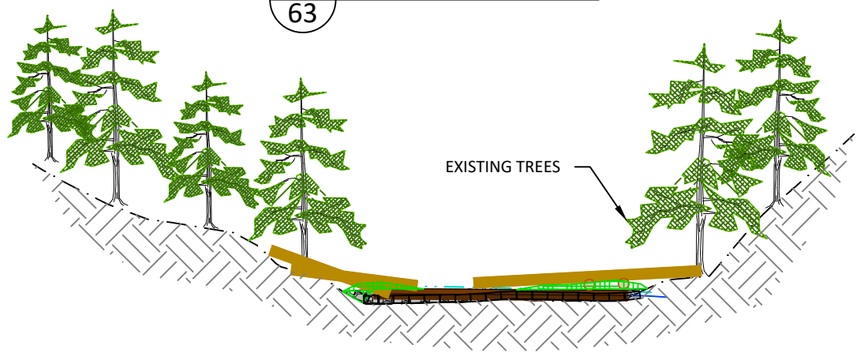

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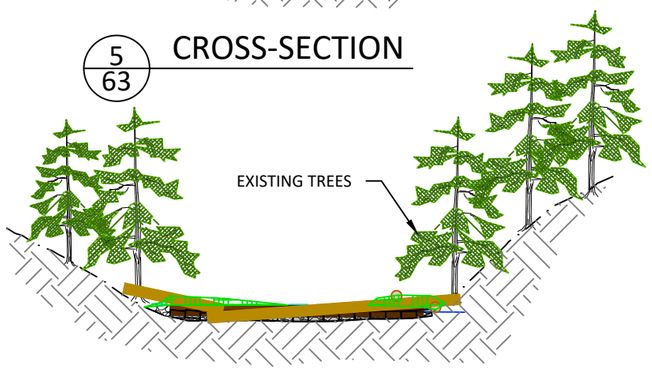


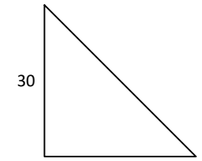
7/63 CROSS-SECTION

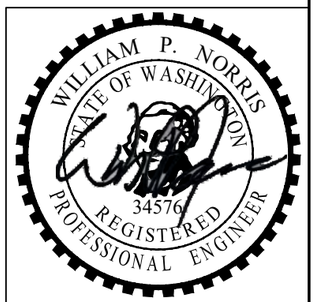
LEGEND

- EXISTING GROUND
- EXISTING NATIVE MATERIAL
- LOG (WITH OR WITHOUT ROOTWAD, AS SHOWN ON PREVIOUS SHEETS OR AS DIRECTED BY OWNER)
- SILL LOG
- STREAMBED SUBSTRATE
- SALVAGED TEMPORARY ACCESS ROAD MATERIAL
- PACKED SLASH
- STRAWBALES

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
2. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
3. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.





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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - TYPICAL LARGE WOOD CROSS-SECTIONS

SCALE:	DATE:	DRAWN:	CHECKED:
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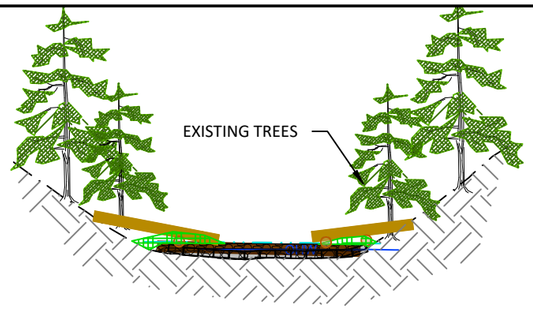

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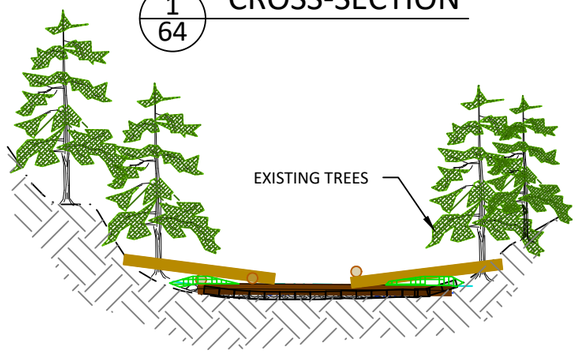

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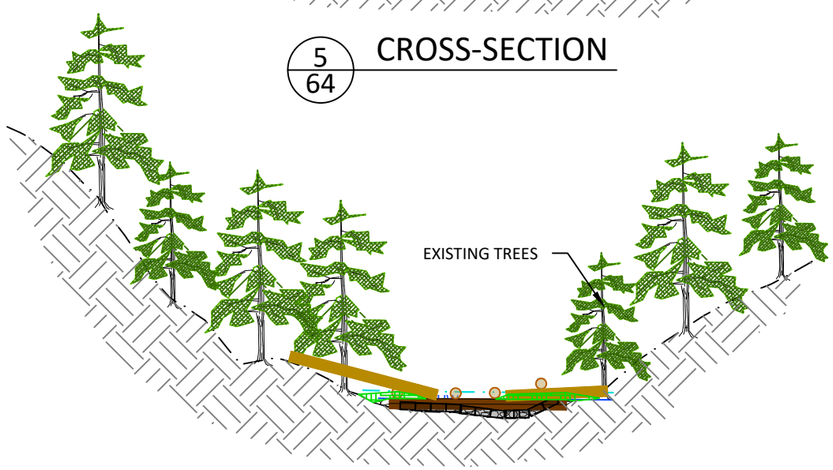
5/64 CROSS-SECTION



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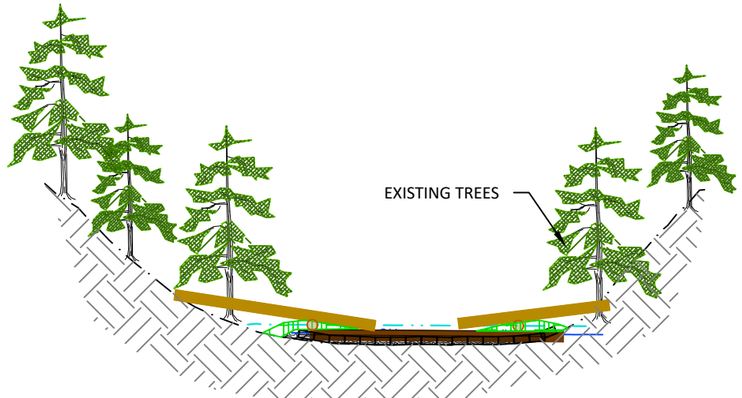

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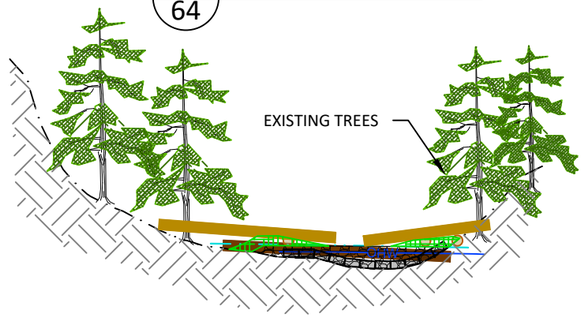

4/64 CROSS-SECTION

6/64 CROSS-SECTION

LEGEND

- EXISTING GROUND
- EXISTING NATIVE MATERIAL
- LOG (WITH OR WITHOUT ROOTWAD, AS SHOWN ON PREVIOUS SHEETS OR AS DIRECTED BY OWNER)
- SILL LOG
- STREAMBED SUBSTRATE
- SALVAGED TEMPORARY ACCESS ROAD MATERIAL
- PACKED SLASH
- STRAWBALES

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
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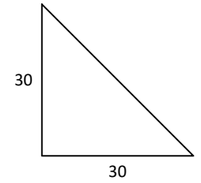
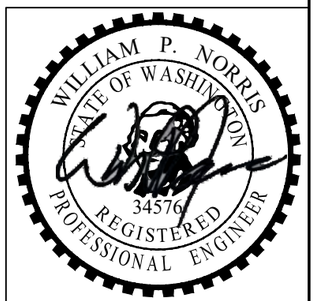
3. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.





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SITE: KWONEESUM DAM REMOVAL DESIGN

TITLE: WILDBOY CREEK - TYPICAL LARGE WOOD CROSS-SECTIONS

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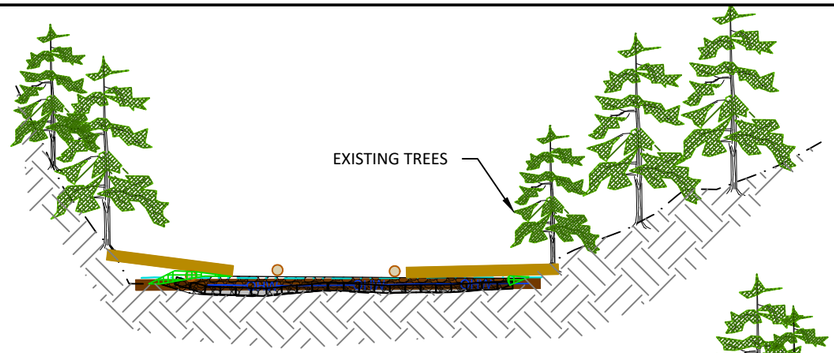

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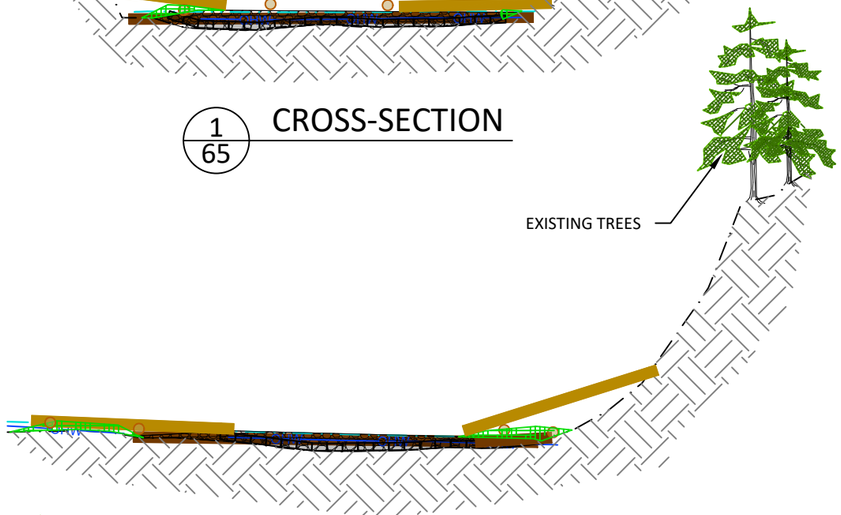

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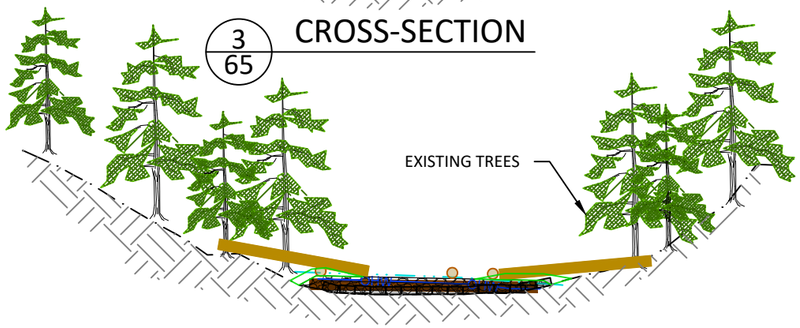
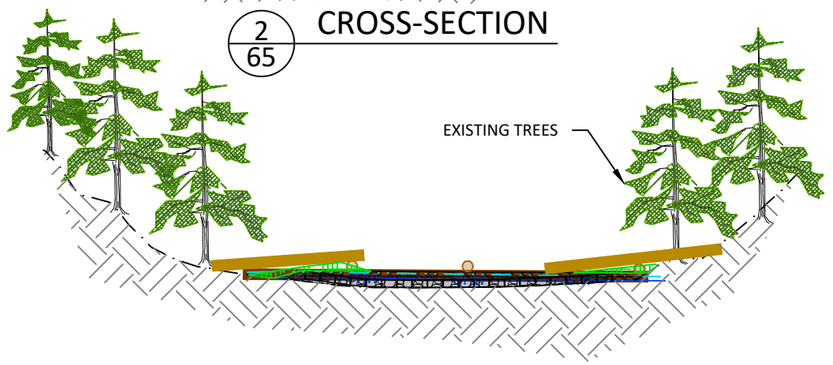


5/65 CROSS-SECTION

7/65 CROSS-SECTION

2/65 CROSS-SECTION



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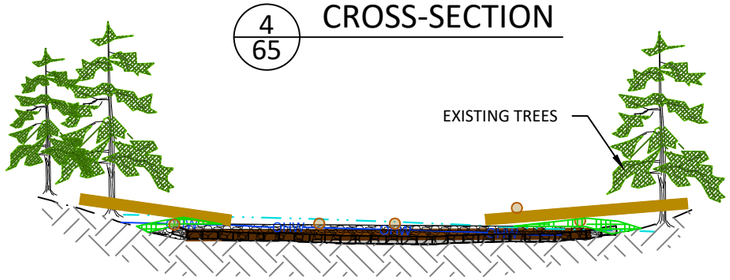

6/65 CROSS-SECTION

LEGEND

- EXISTING GROUND
- EXISTING NATIVE MATERIAL
- LOG (WITH OR WITHOUT ROOTWAD, AS SHOWN ON PREVIOUS SHEETS OR AS DIRECTED BY OWNER)
- SILL LOG
- STREAMBED SUBSTRATE
- SALVAGED TEMPORARY ACCESS ROAD MATERIAL
- PACKED SLASH
- STRAWBALES

NOTE:

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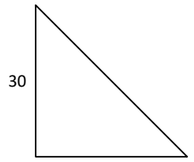
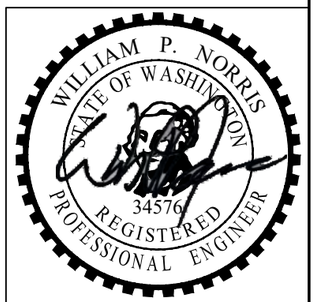
2. ALL CROSS-SECTIONS ARE ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
3. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.





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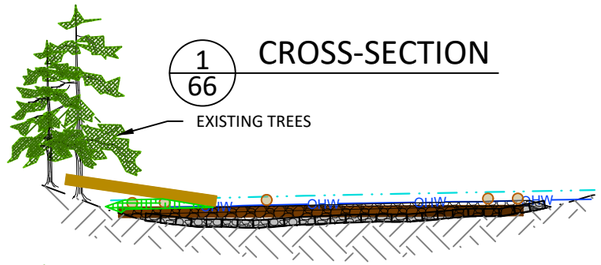
1/66 CROSS-SECTION



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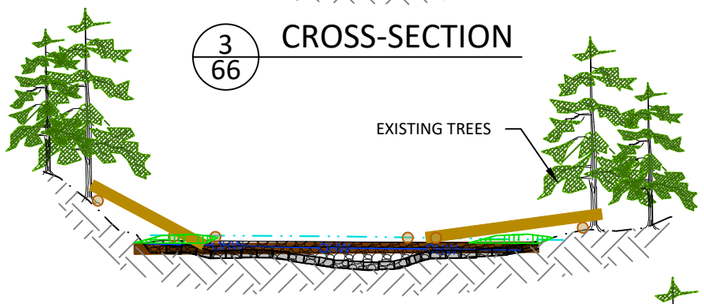

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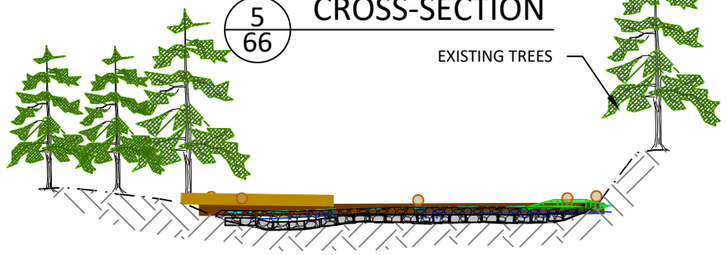
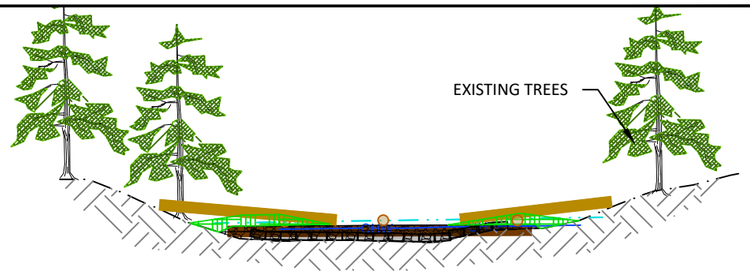


7/66 CROSS-SECTION

9/66 CROSS-SECTION



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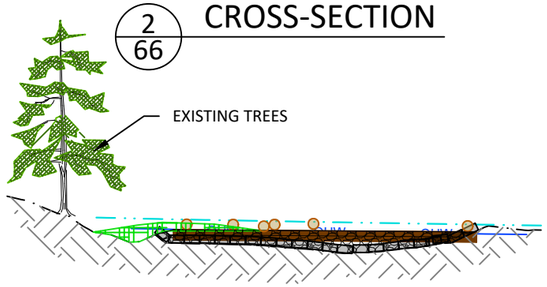

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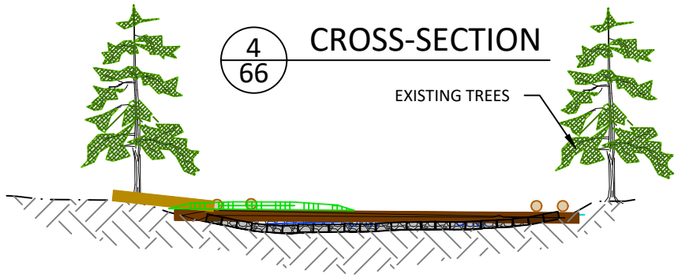
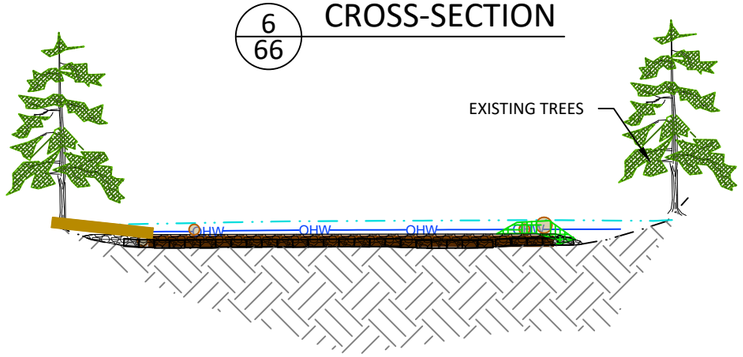


6/66 CROSS-SECTION



8/66 CROSS-SECTION

LEGEND

- EXISTING GROUND
- EXISTING NATIVE MATERIAL
- LOG (WITH OR WITHOUT ROOTWAD, AS SHOWN ON PREVIOUS SHEETS OR AS DIRECTED BY OWNER)
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- SALVAGED TEMPORARY ACCESS ROAD MATERIAL
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- STRAWBALES

NOTE:
1. SPECIFIC LOCATION, ALIGNMENT, AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS.
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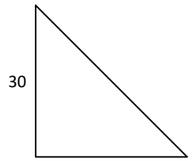
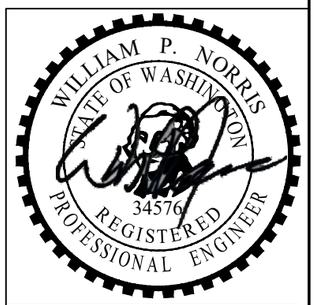
3. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.





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PROJ. NO:	DRAWING NO:	Total Sheets:
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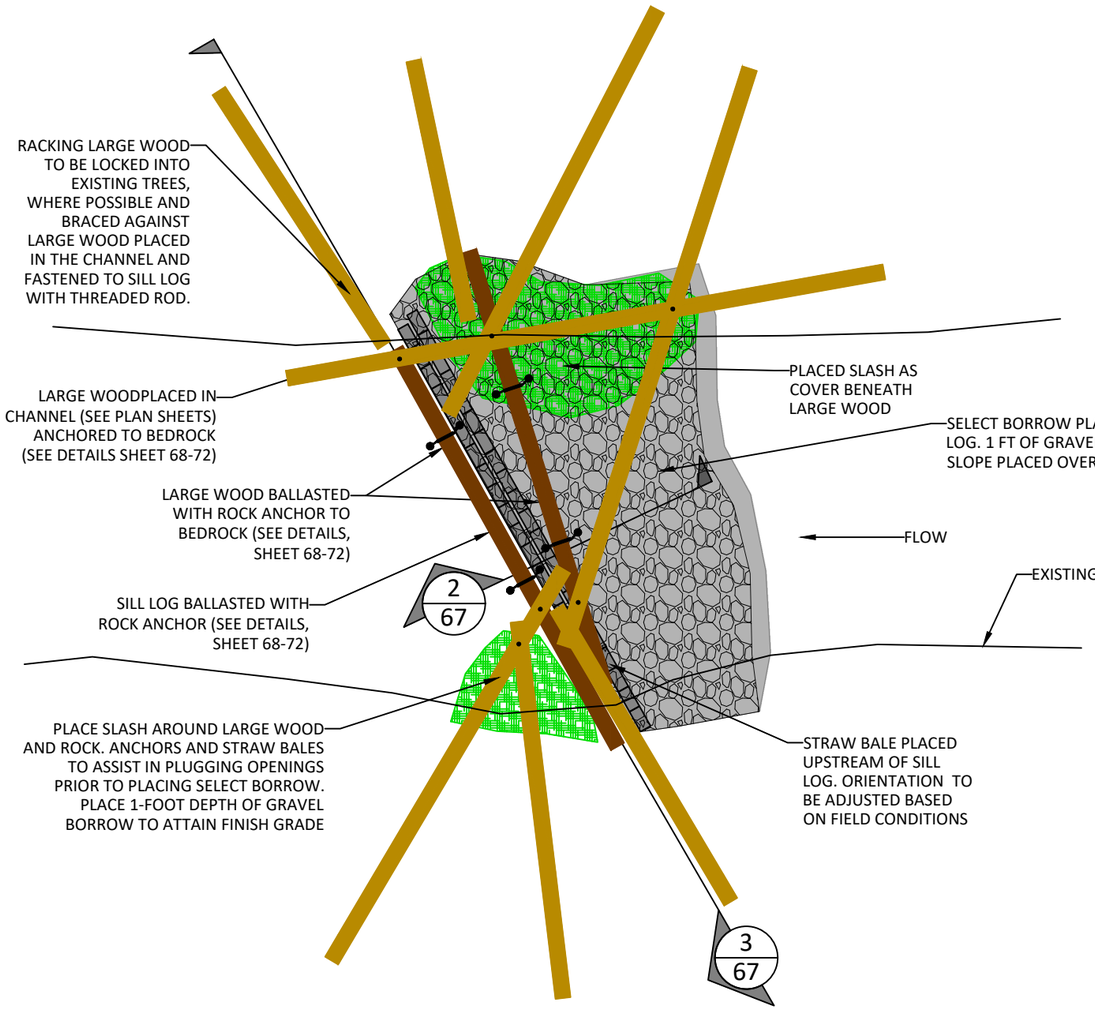


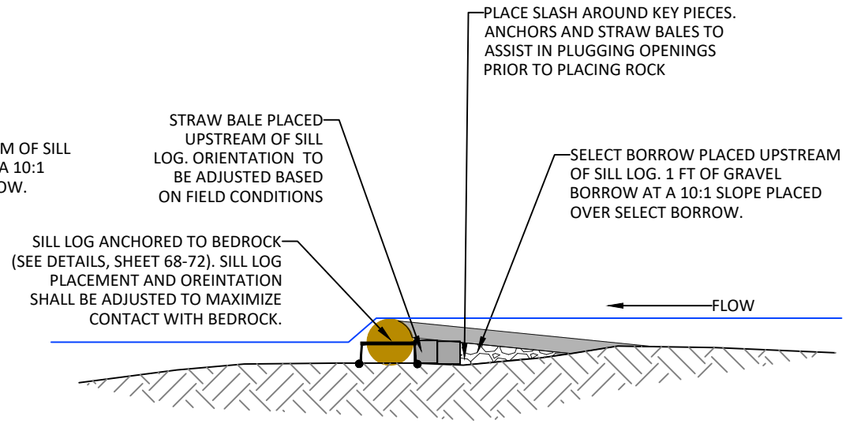
1 67 TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURESS

NOT TO SCALE

NOTE:

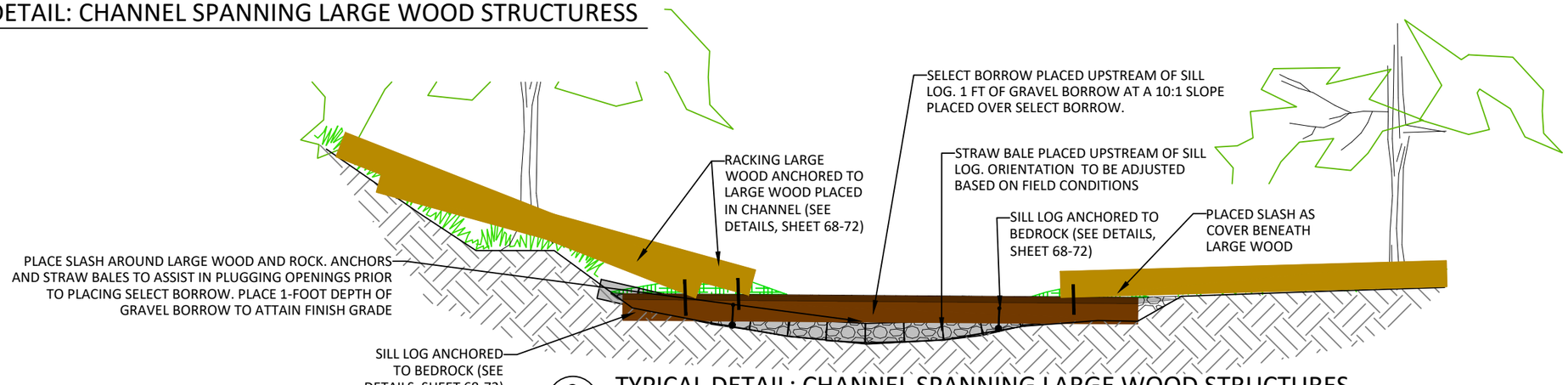
1. SPECIFIC LOCATION, ALIGNMENT AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS AND ASSOCIATED MATERIALS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

2. IF COMPETENT BEDROCK IS NOT PRESENT WHERE SILL LOG OR OTHER LOGS ARE TO BE INSTALLED, CONTRACTOR SHALL INSTALL LARGE WOOD SINGLE BOULDER BALLAST WITH CHAIN OR LARGE WOOD BOULDER BALLAST WITH CHAIN (E.G., BOULDER-PAIR) AND/OR LARGE WOOD BOULDER BALLAST AS DIRECTED BY OWNER. SEE DETAILS ON SHEET 71.



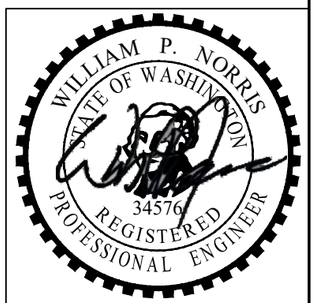
2 67 TYPICAL PROFILE: CHANNEL SPANNING LARGE WOOD STRUCTURES

NOT TO SCALE



3 67 TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES

NOT TO SCALE



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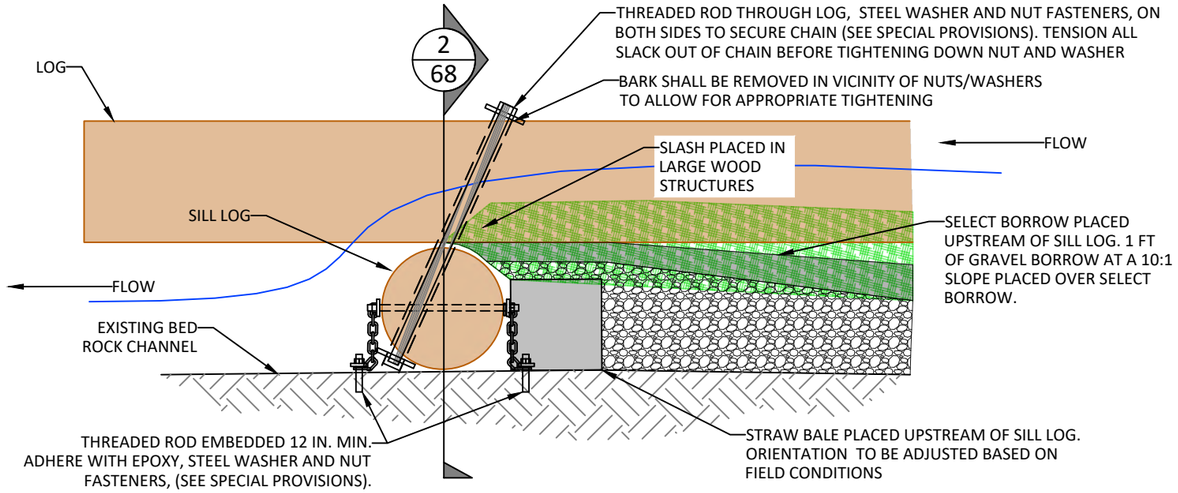
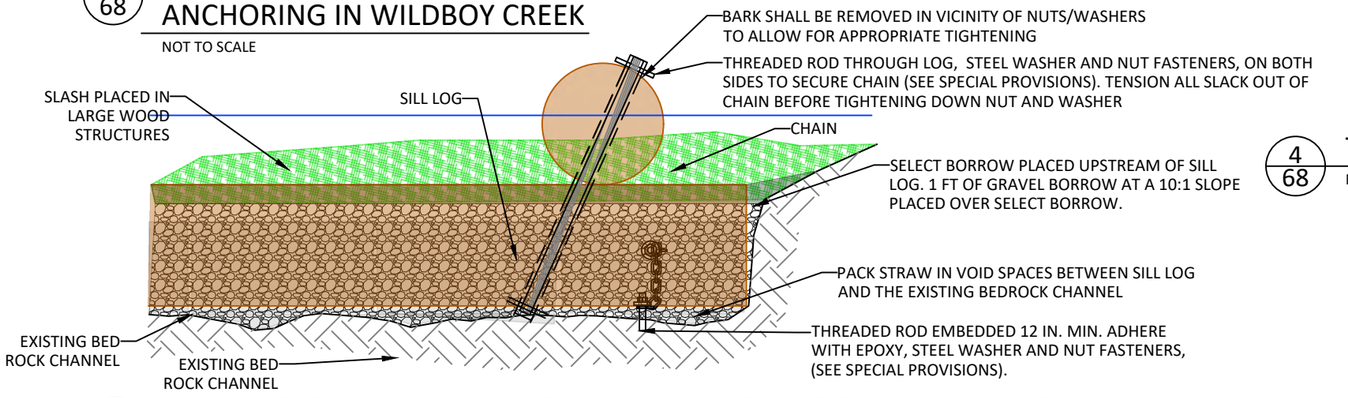


2/68

TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES ANCHORING IN WILDBOY CREEK

NOT TO SCALE



1/68

TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES ANCHORING IN WILDBOY CREEK

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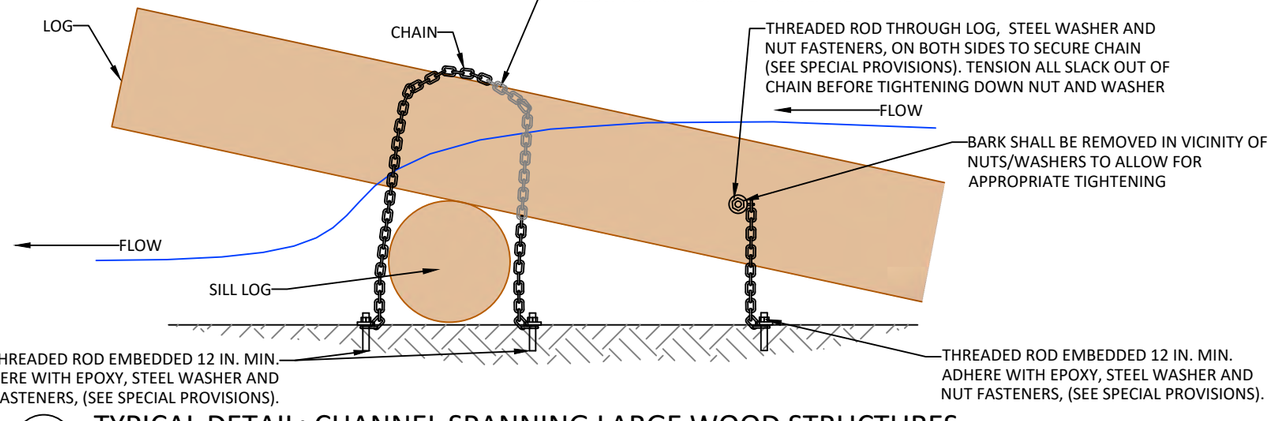
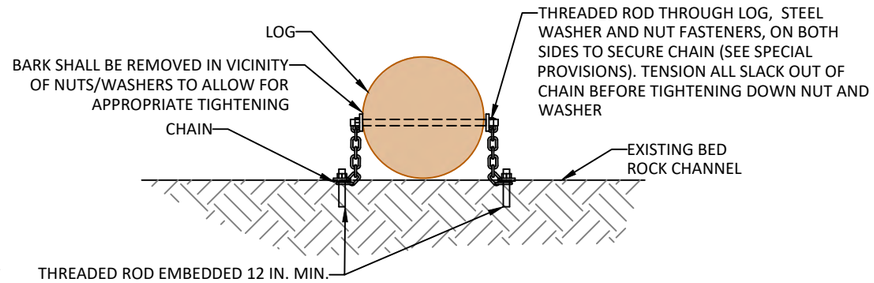


3/68

TYPICAL DETAIL: CHANNEL SPANNING LARGE WOOD STRUCTURES ANCHORING IN WILDBOY CREEK

NOT TO SCALE



4/68

TYPICAL DETAIL: LARGE WOOD ANCHOR CONNECTIONS

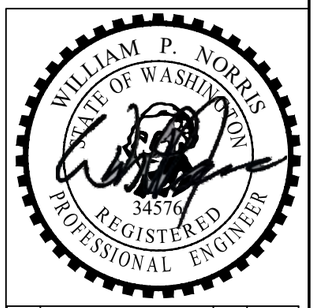
NOT TO SCALE

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS AND ASSOCIATED MATERIALS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN WILDBOY CREEK. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.

2. IF COMPETENT BEDROCK IS NOT PRESENT WHERE SILL LOG OR OTHER LOGS ARE TO BE INSTALLED, CONTRACTOR SHALL INSTALL LARGE WOOD SINGLE BOULDER BALLAST WITH CHAIN OR LARGE WOOD BOULDER BALLAST WITH CHAIN (E.G., BOULDER-PAIR) AND/OR LARGE WOOD BOULDER BALLAST AS DIRECTED BY OWNER. SEE DETAILS ON SHEET 71.

3. CONTRACTOR SHALL ANTICIPATE THE ORIENTATION OF THREADED RODS THROUGH LOGS WILL VARY. INTENT IS TO PROVIDE SUFFICIENT PURCHASE THROUGH LARGE WOOD. CONTRACTOR MAY PROPOSE SUBSTITUTING CHAIN FOR THREADED ROD SUBJECT TO OWNER APPROVAL.



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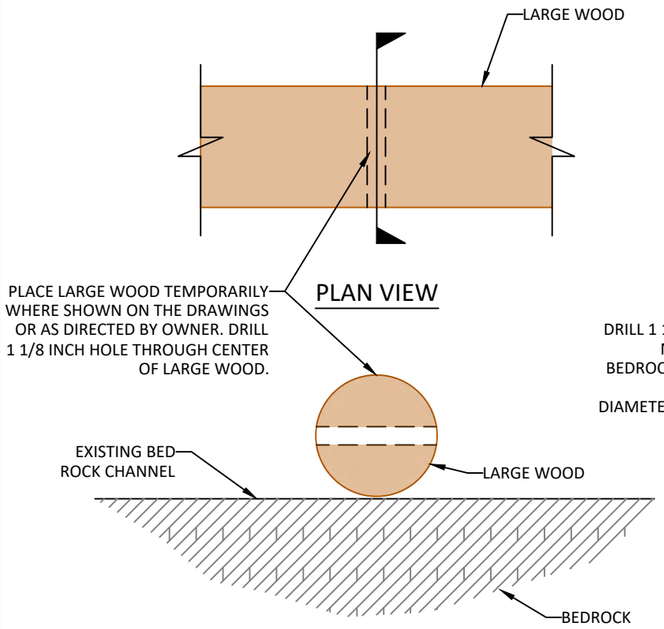
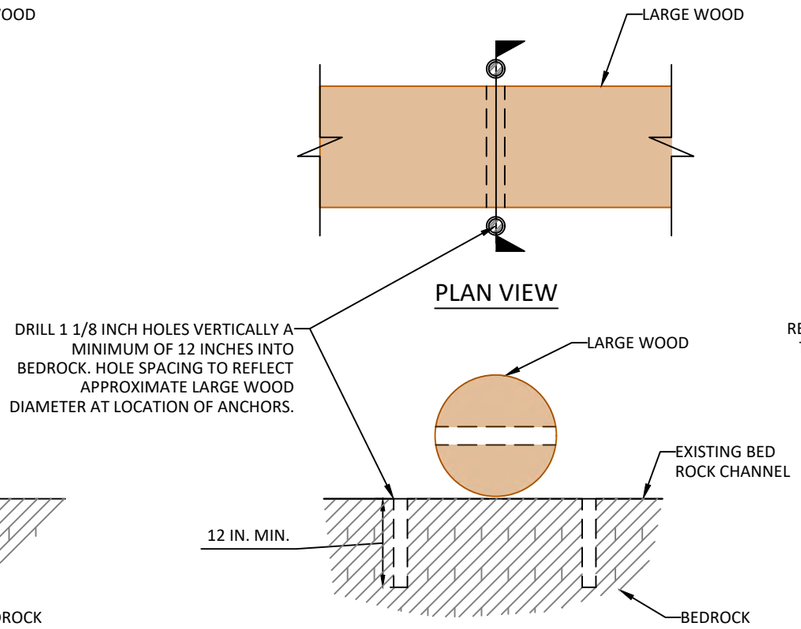
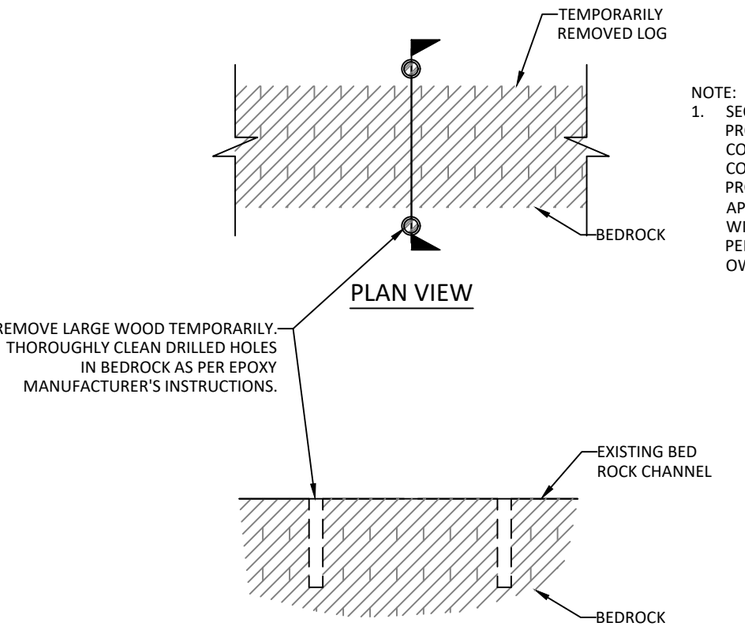


STEP 1. POSITION LOG AND DRILL HOLE

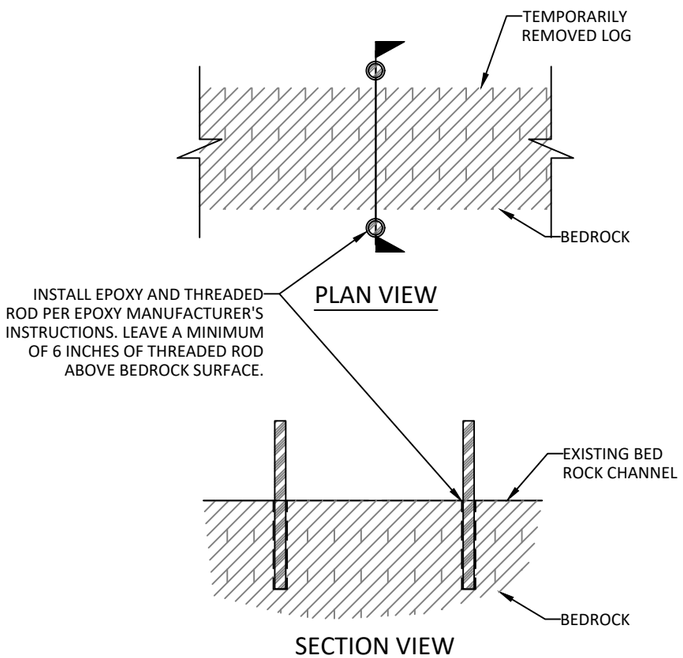


STEP 2. DRILL BEDROCK HOLE

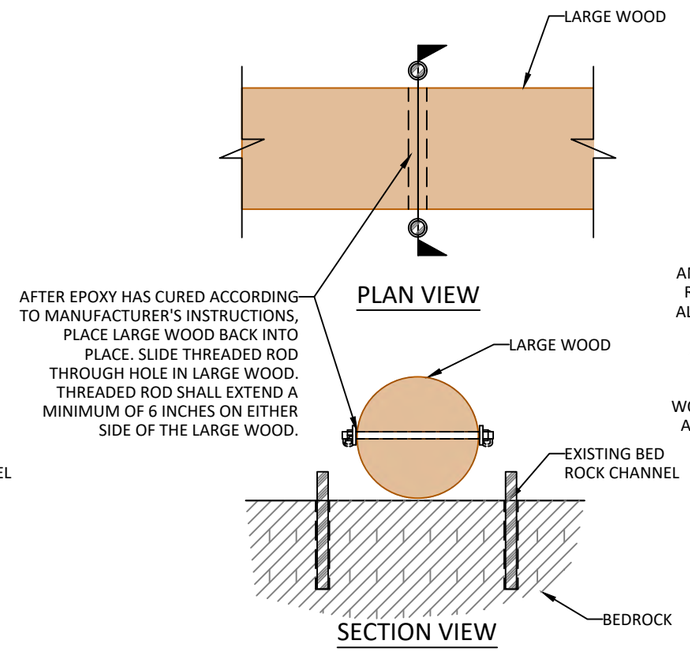


STEP 3. CLEAN BEDROCK HOLE

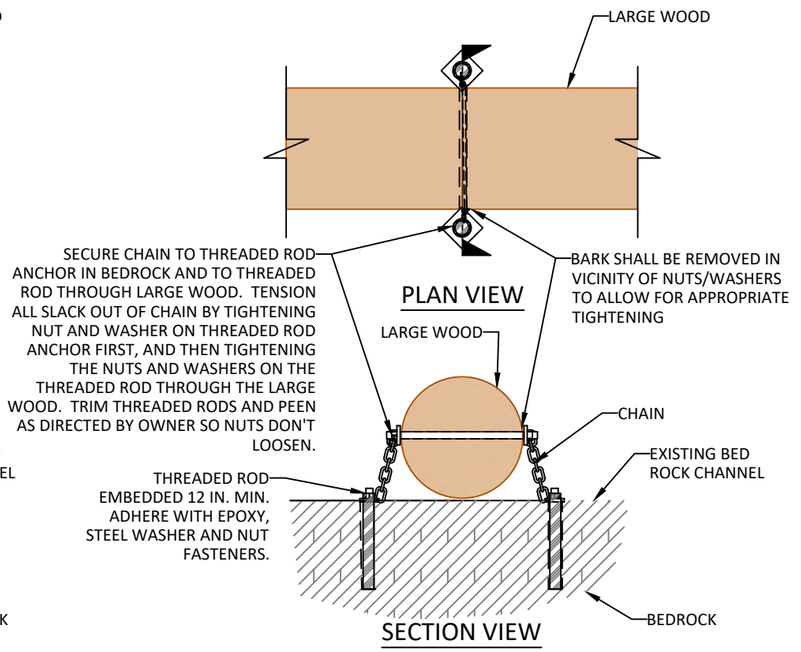
NOTE:
1. SEQUENCING PROPOSED IS CONCEPTUAL. CONTRACTOR MAY PROPOSE ALTERNATIVE APPROACH/SEQUENCE WITH EQUAL PERFORMANCE FOR OWNER REVIEW.



STEP 4. EPOXY THREADED ROD



STEP 5. POSITION LARGE WOOD ONTO THREADED ROD



STEP 6. SECURE LARGE WOOD WITH WASHER AND NUT ON THREADED ROD

1/69

TYPICAL DETAIL: LARGE WOOD ROCK ANCHORING

NOT TO SCALE

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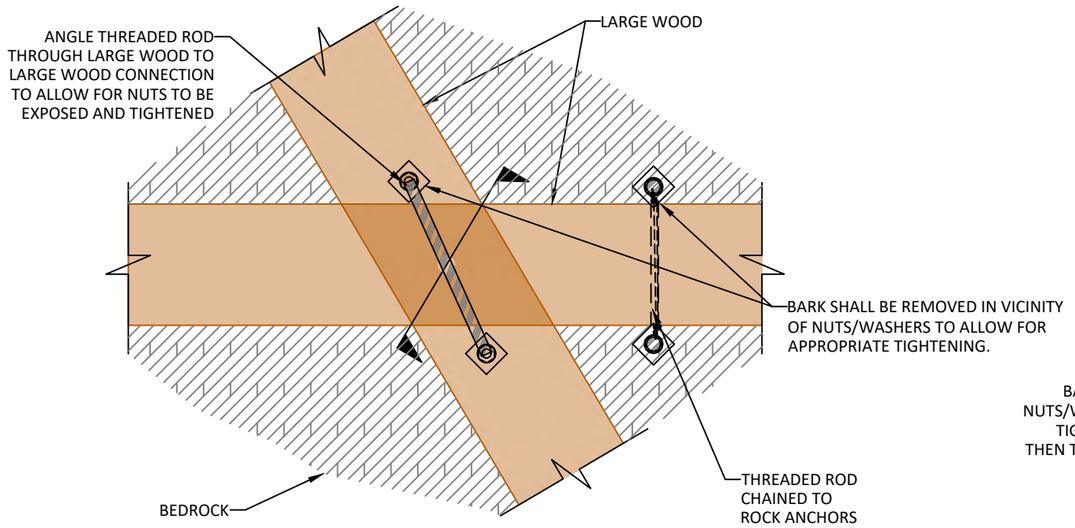
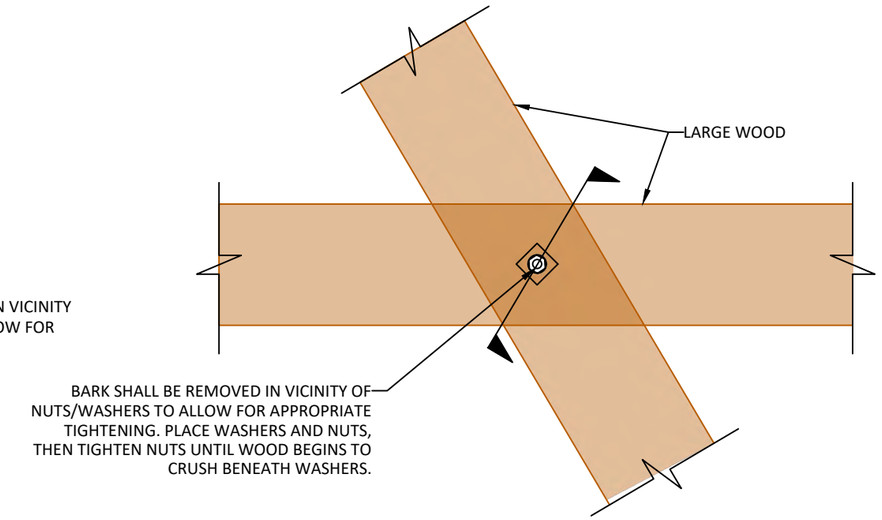
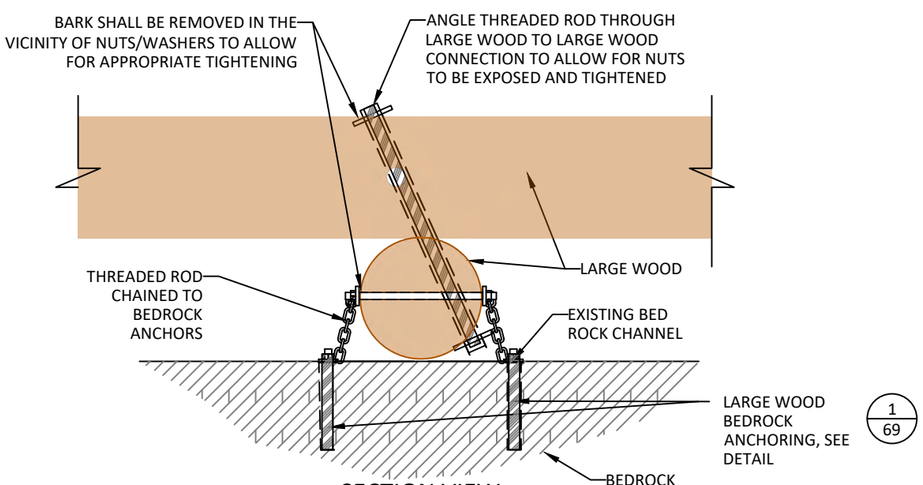


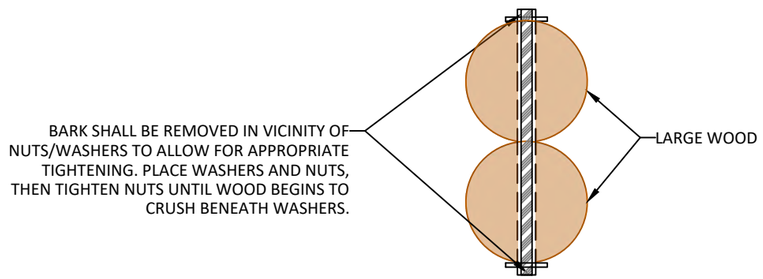
PLAN VIEW



PLAN VIEW



SECTION VIEW



SECTION VIEW

1/70 TYPICAL DETAIL: LARGE WOOD TO LARGE WOOD ANCHORING TO BEDROCK

NOT TO SCALE

2/70 TYPICAL DETAIL: LARGE WOOD TO LARGE WOOD ANCHORING

NOT TO SCALE

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED PROFESSIONAL ENGINEER

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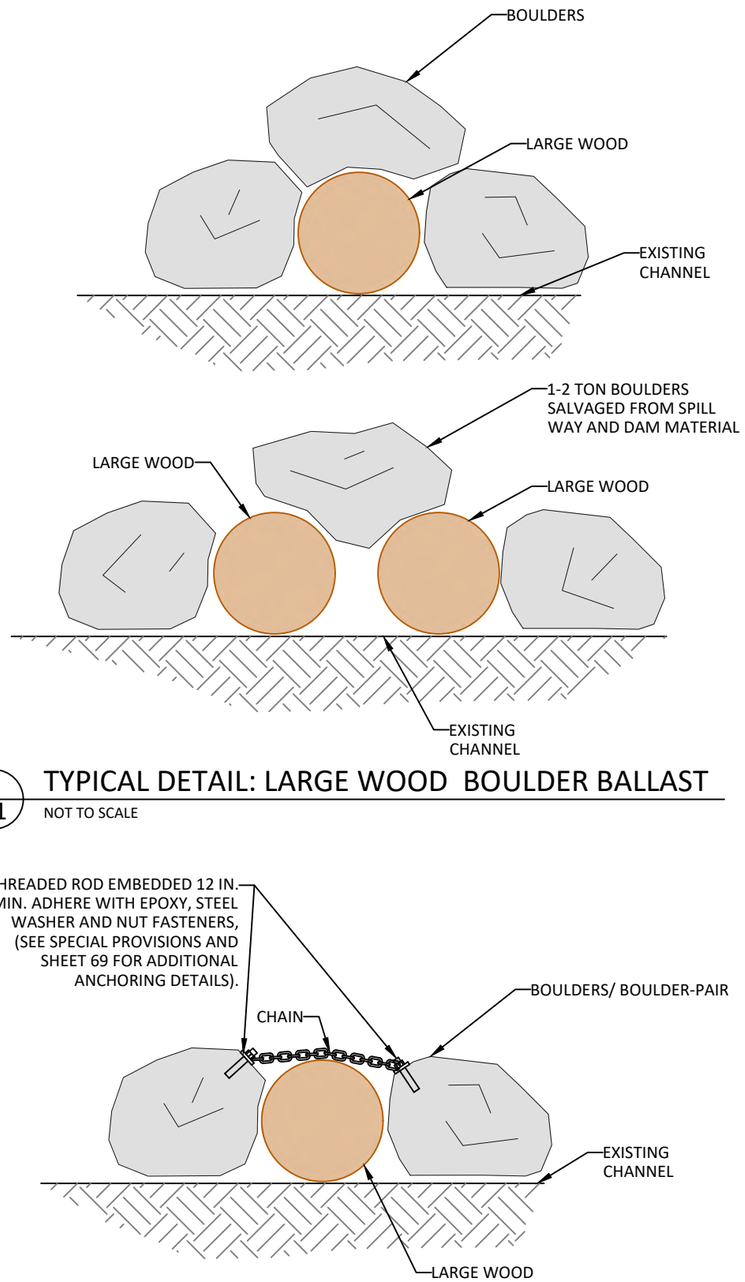
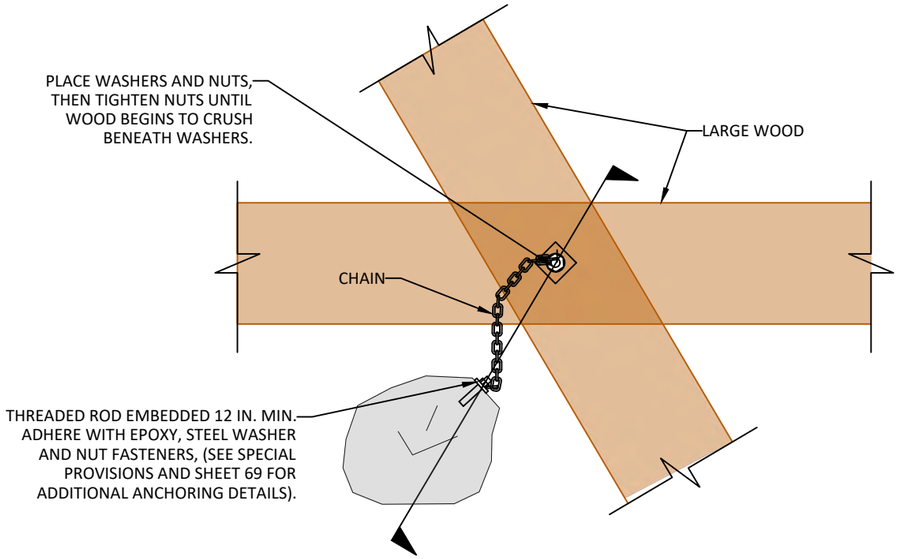


1/71 TYPICAL DETAIL: LARGE WOOD BOULDER BALLAST

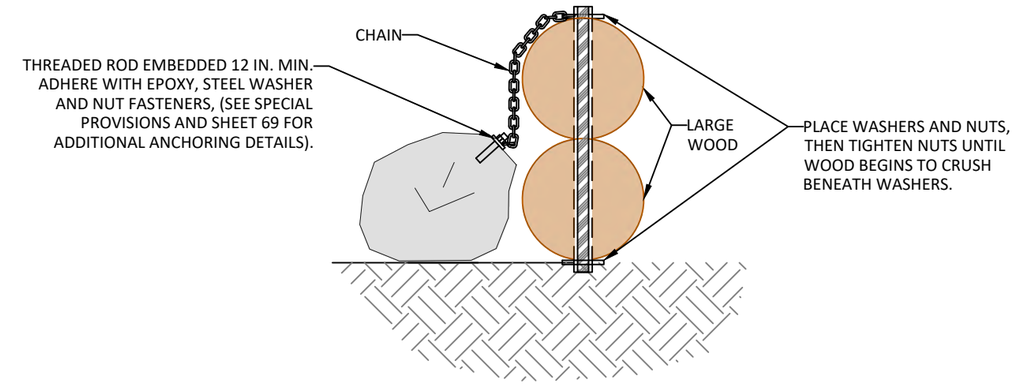
NOT TO SCALE

2/71 TYPICAL DETAIL: LARGE WOOD BOULDER BALLAST WITH CHAIN

NOT TO SCALE



PLAN VIEW



SECTION VIEW

3/71 TYPICAL DETAIL: LARGE WOOD SINGLE BOULDER BALLAST WITH CHAIN

NOT TO SCALE

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STATE OF WASHINGTON
34576
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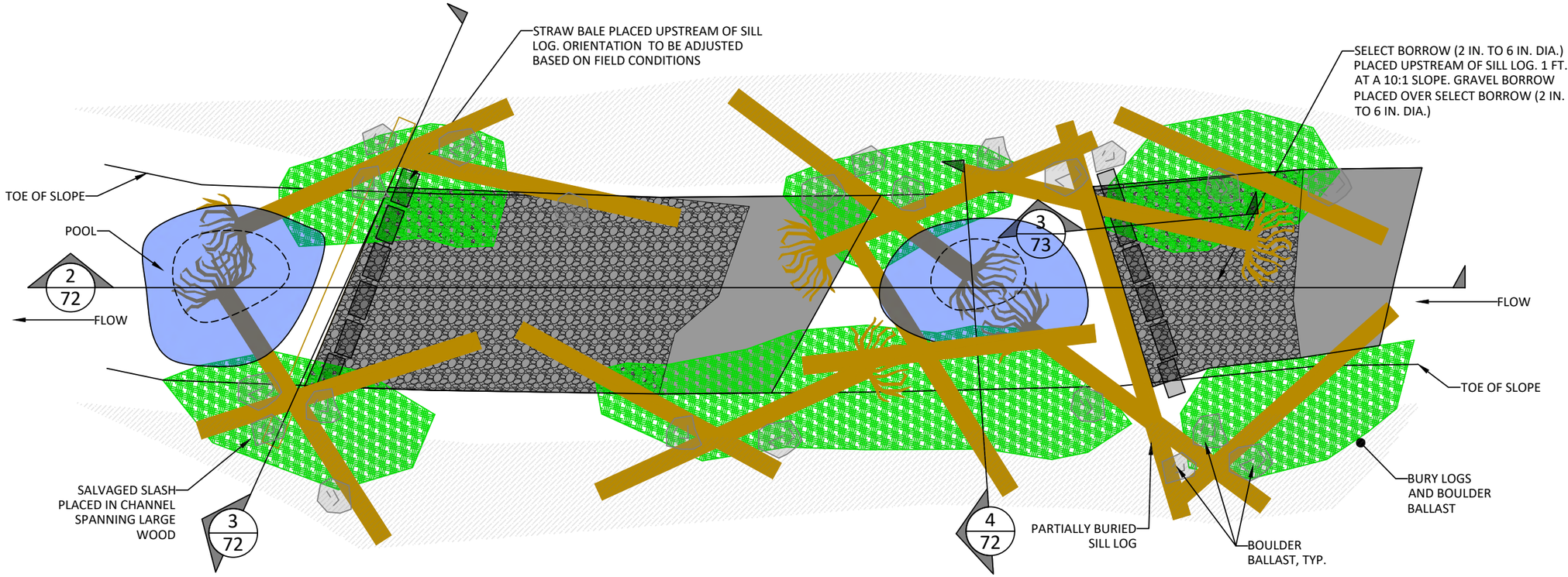
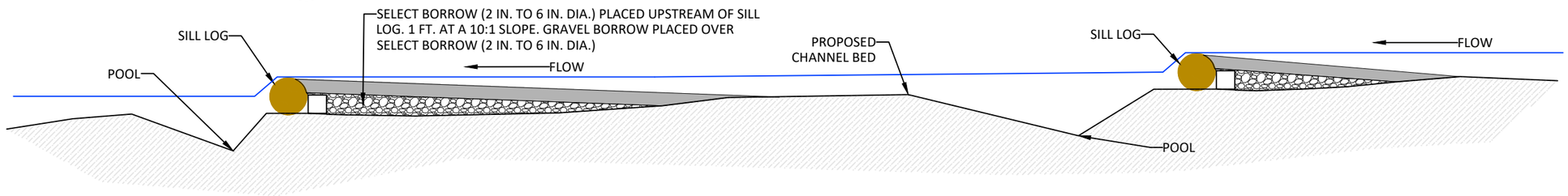


1/72 TYPICAL PLAN VIEW : CHANNEL SPANNING LARGE WOOD IN PROPOSED TRIBUTARIES

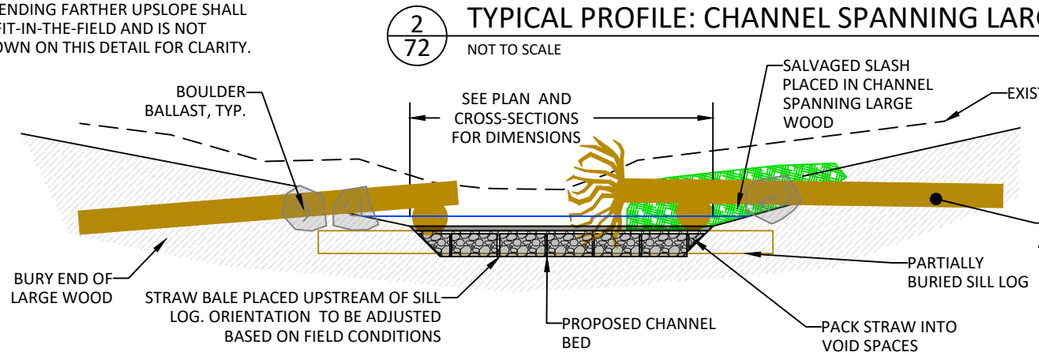
NOT TO SCALE



2/72 TYPICAL PROFILE: CHANNEL SPANNING LARGE WOOD IN PROPOSED TRIBUTARIES

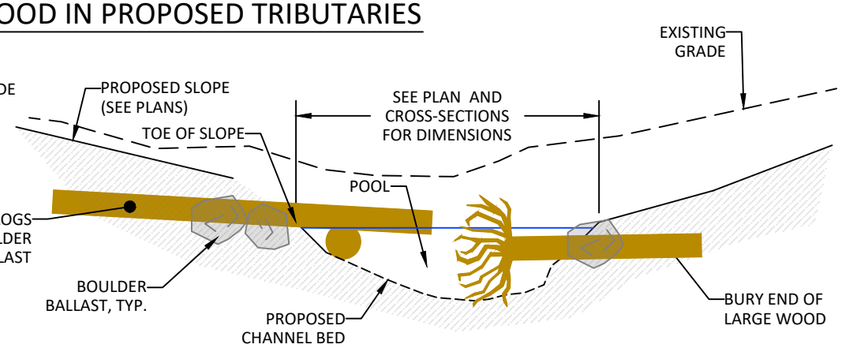
NOT TO SCALE

NOTE: ADDITIONAL FLOODPLAIN AND MARGIN WOOD, INCLUDING WOOD EXTENDING FARTHER UPSLOPE SHALL BE FIT-IN-THE-FIELD AND IS NOT SHOWN ON THIS DETAIL FOR CLARITY.



3/72 TYPICAL CROSS-SECTION: LARGE WOOD IN TRIBUTARY CHANNEL

NOT TO SCALE

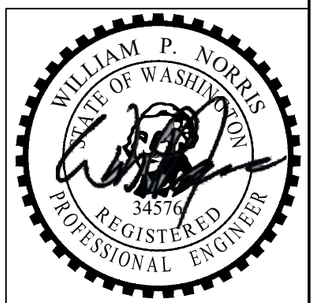


4/72 TYPICAL CROSS-SECTION: LARGE WOOD IN TRIBUTARY POOL

NOT TO SCALE

NOTE:

1. SPECIFIC LOCATION, ALIGNMENT AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS AND ASSOCIATED MATERIALS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN TRIBUTARIES. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.



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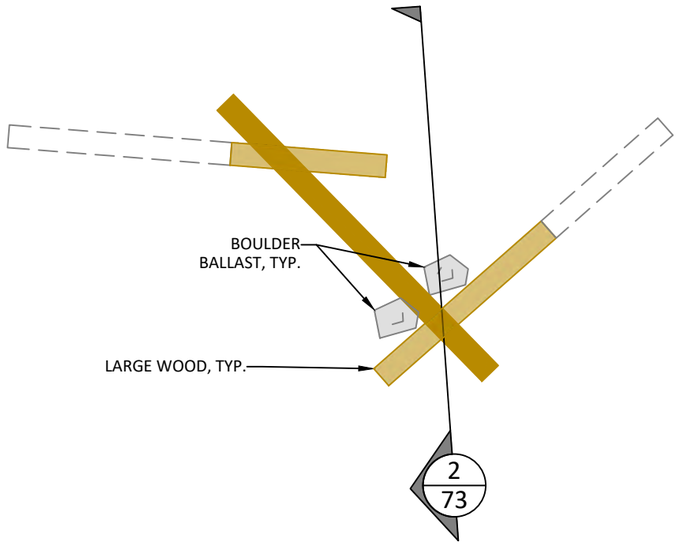
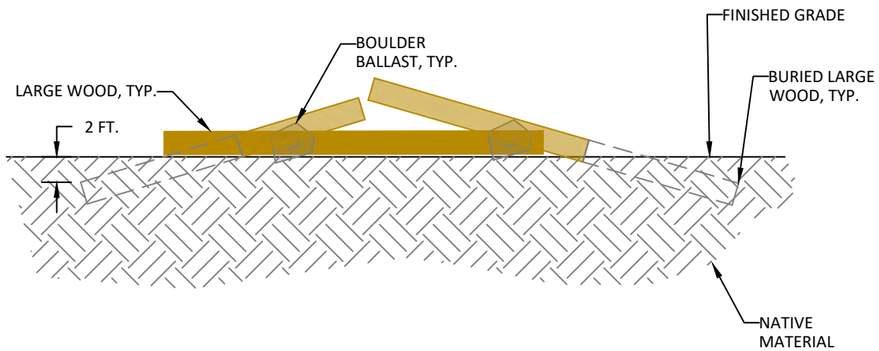


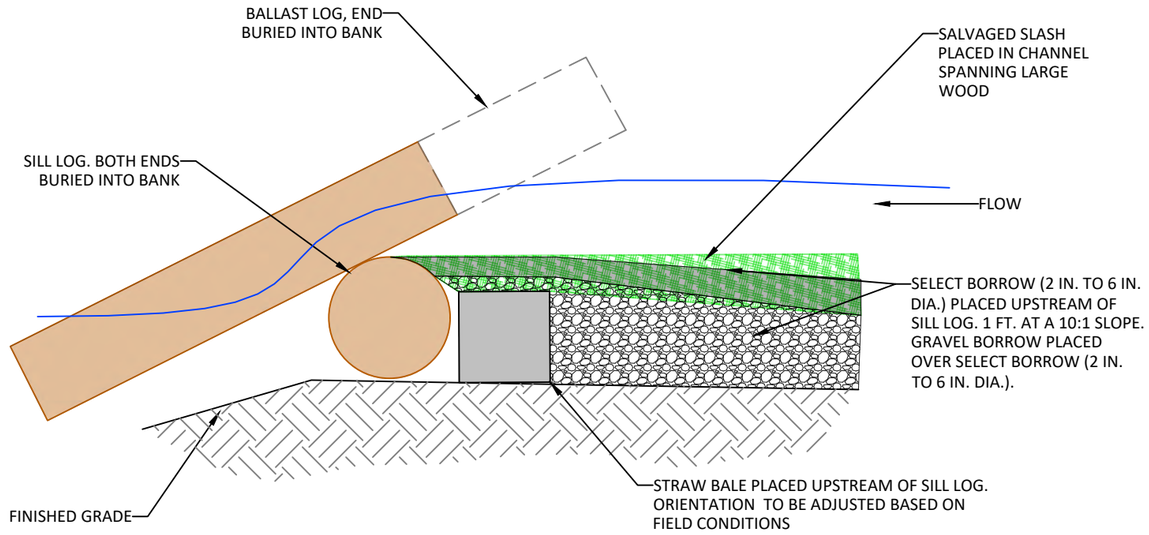
1/73 TYPICAL PLAN: FLOODPLAIN WOOD

NOT TO SCALE



2/73 TYPICAL SECTION FLOODPLAIN WOOD

NOT TO SCALE

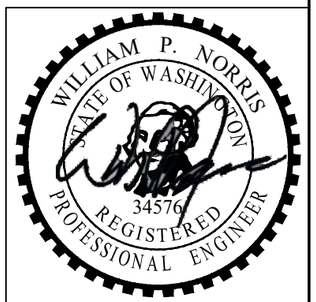


3/73 TYPICAL DETAIL: SILL LOGS IN TRIBUTARIES

NOT TO SCALE

NOTES:

1. SPECIFIC LOCATION, ALIGNMENT AND ELEVATIONS OF LARGE WOOD PIECES, BOULDERS AND ASSOCIATED MATERIALS ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, MATERIAL SIZE AND STABILITY REQUIREMENTS. CONTRACTOR SHALL ANTICIPATE AND ASSUME OWNER-DIRECTED FIT-IN-THE-FIELD APPROACH TO STREAM RESTORATION TASKS WITHIN TRIBUTARIES. REQUIRES HIGHLY QUALIFIED HEAVY EQUIPMENT OPERATORS WELL-VERSED IN CONSTRUCTION OF LARGE WOOD STRUCTURES WHO ARE FLEXIBLE AND ADAPTABLE.
2. FLOODPLAIN WOOD MAY HAVE ROOTWADS ATTACHED DEPENDING ON AVAILABILITY AND OWNER DIRECTION.



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NOTES:

1. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED. IF CONTRACTOR DISTURBS AREAS OUTSIDE THOSE DESIGNATED FOR SEED, THE CONTRACTOR SHALL APPLY APPROPRIATE SEED MIX FOR UPLAND OR RIPARIAN AREAS DISTURBED.
2. APPLY MULCH TO ALL SEEDED AREAS.
3. CONTRACTOR SHALL PLANT AREAS IMPACTED BY CHOSEN DEWATERING METHODS.
4. AREAS NOT SHOWN FOR DISTURBANCE THAT ARE TEMPORARILY DISTURBED BY CONTRACTOR SHALL BE FULLY RESTORED AND THEN SEEDED/MULCHED AND PLANTED WITH A MIX OF TREE/SHRUB SPECIES APPROVED BY OWNER.
5. ALL TEMPORARY ACCESS ROADS/ROUTES SHALL BE FULLY RESTORED AS PER THE SPECIFICATIONS, SEEDED WITH NATIVE EC MIX, AND MULCHED.

TABLES SHOWING SEED MIX

Native Riparian			1 acre = 43.40 lbs				
Common Name	**Scientific Name**	**% by Weight**	**Seeds per lb. of Mix**	**Seeds per lb.**	**Actual % by Seed Size**	**Lbs. Needed**	**Requested %**
Blue Wildrye	Elymus glaucus	60%	66,000	110,000	65.15%	26.1	25%
Meadow Barley	Hordeum brachyantherum	30%	25,500	85,000	25.17%	13	70%
California Brome	Bromus carinatus	10%	9,800	98,000	9.67%	4.3	5%
	Totals	**100%**	**101,300**		**100%**	**43.40**	**100%**

Native EC Mix			1 acre = 43.60 lbs				
Common Name	**Scientific Name**	**% by Weight**	**Seeds per lb. of Mix**	**Seeds per lb.**	**Actual % by Seed Size**	**Lbs. Needed**	**Requested %**
Meadow Barley	Hordeum brachyantherum	40%	34,000	85,000	10.51%	17.45	10%
California Brome	Bromus carinatus	35%	38,500	110,000	11.90%	15.27	10%
Native Red Fescue	Festuca rubra rubra	20%	100,000	500,000	30.91%	8.73	30%
Tufted Hairgrass	Deschampsia cespitosa	3%	75,000	2,500,000	23.18%	1.31	25%
Spike Bentgrass	Agrostis exerata	2%	76,000	3,800,000	23.49%	0.87	25%
	Totals	**100%**	**323,500**		**100%**	**43.63**	**100%**

N

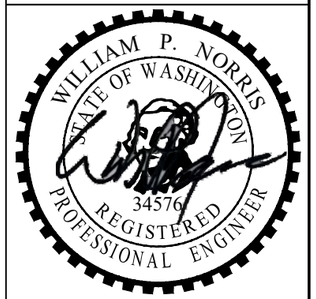
0 400 800 Feet

LEGEND

- TEMPORARY ACCESS ROADS
- TEMPORARY ACCESS (VEHICLES)
- TEMPORARY ACCESS (OFF ROAD)
- REVEGETATION - ACCESS ROADS
- REVEGETATION - RIPARIAN ZONE (1.7 ACRES)
- REVEGETATION - UPLAND ZONE (21.0 ACRES)

Notes:

SHEET LOCATION



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