



**CITY OF TACOMA**  
**Tacoma Power / Generation**

**ADDENDUM NO. 5**

**DATE:** March 16, 2021

**REVISIONS TO:**  
**Request for Bids Specification No. PG20-0314**  
**Cowlitz Falls Barrier Dam Repair Project**

**NOTICE TO ALL BIDDERS:**

This addendum is issued to clarify, revise, add to or delete from, the original specification documents for the above project. This addendum, as integrated with the original specification documents, shall form the specification documents. The noted revisions shall take precedence over previously issued specification documents and shall become part of this contract.

**REVISIONS TO THE SUBMITTAL DEADLINE:**

The submittal deadline has been changed to 11:00 a.m., Pacific Time, **Tuesday, March 23, 2021.**

**REVISIONS TO THE PLANS:**

Replace Schnabel Engineering "For Bidding" drawings with Revision 1 drawings provided:

<u>No.</u>	<u>Location</u>	<u>Name</u>
09	Cowlitz Barrier Dam	Spillway Upgrade Contractor Staging
10	Cowlitz Barrier Dam	Spillway Upgrade TESC Plan Left
11	Cowlitz Barrier Dam	Spillway Upgrade TESC Plan Right
12	Cowlitz Barrier Dam	Spillway Upgrade TESC Details
13	Cowlitz Barrier Dam	Spillway Upgrade TESC Details
14	Cowlitz Barrier Dam	Spillway Upgrade Stage 1 Control of Water
15	Cowlitz Barrier Dam	Spillway Upgrade Stage 2 Control of Water
16	Cowlitz Barrier Dam	Spillway Upgrade Stage 3 Control of Water
17	Cowlitz Barrier Dam	Spillway Upgrade Cofferdam Details
18	Cowlitz Barrier Dam	Spillway Upgrade Cofferdam Details

**REFERENCE DOCUMENTS:**

The following reference documents have been provided as part of this addendum:

- Water Quality Protection Plan (WQPP), Kleinschmidt, March 2021

Specification PG20-0314F

Addendum No. 5

March 16, 2021

NOTE: Acknowledge receipt of this addendum by initialing the corresponding space as indicated on the signature page. Vendors who have already submitted their bid/proposal may contact the Purchasing Division at 253-502-8468 and request return of their bid/proposal for acknowledgment and re-submittal.

Or, a letter acknowledging receipt of this addendum may be submitted in an envelope marked Request for Bids Specification No. PG20-0314F Addendum No. 5. The City reserves the right to reject any and all bids, including, in certain circumstances, for failure to appropriately acknowledge this addendum.

A handwritten signature in black ink, appearing to read "Patsy Best". The signature is fluid and cursive, with the first name "Patsy" written in a larger, more prominent script than the last name "Best".

Patsy Best, Procurement and Payables Manager  
Finance/Purchasing Division

Cc: Tim Nordstrom, Power Engineer IV, Tacoma Power / Generation  
Toby Brewer, Assistant Generation Manager, Tacoma Power / Generation



FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering\Inc\Workspace\Barrier Dam\08-CAD\DRAWINGS\05-FINAL DESIGN\08 CONTRACTOR STAGING.dwg    PLOTTED: 3/12/2021 12:42 PM    3/12/2021 12:41 PM    csnider    Corey Snider



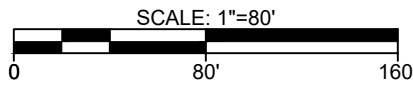
SUMMARY OF WORK AREAS	
DISTURBED AREA	AREA (AC)
WORK AREA L1	0.48
WORK AREA L2	0.21
WORK AREA L3	1.74
WORK AREA L4	0.67
WORK AREA R1	0.52
WORK AREA R2	2.77
WORK AREA R3	0.42
ACCESS ROAD & ATV TRAIL	0.66
GRAVEL AUGMENTATION AREA	2.05
IN-WATER WORK AREA	0.77

PROJECT LIMITS DISTURBED AREAS:

LEFT SIDE DISTURBED AREA = 7.47 AC  
RIGHT SIDE DISTURBED AREA = 6.04 AC

- GRAVEL ROAD
- WASHED STONE STORAGE
- GRAVEL AUGMENTATION AREA
- CONTRACTOR STAGING AREA

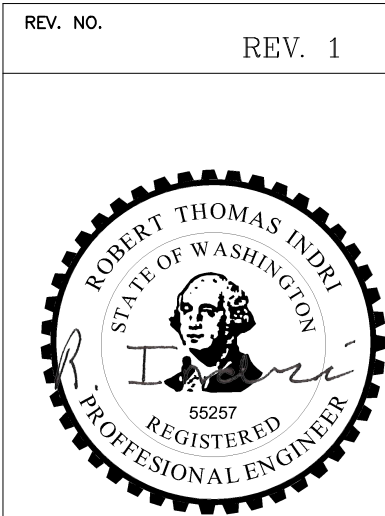
1 CONTRACTOR STAGING AREA - PLAN



NOTE:

- TREES ADJACENT TO RIVER TO BE PRESERVED.
- EXISTING TREES WITH TRUNKS GREATER THAN 6"Ø TO BE PRESERVED IN ALL RIGHT BANK WORK AREAS.
- APPROVAL BY OWNER OR ENGINEER IS REQUIRED FOR REMOVAL OF TREES WITH TRUNKS GREATER THAN 12"Ø FOR IMPROVING WORK AREAS ON LEFT SIDE BANK.
- GRAVEL AUGMENTATION AREA SHALL BE LOCATED 80' DOWNSTREAM OF THE END OF THE SPILLWAY APRON, AND 50' OFF THE SHORELINE. ANCHOR BLOCKS TO BE DESIGNED AND INSTALLED BY CONTRACTOR AND LOCATED ABOVE OHW.
- SEE SHEET 05 FOR RIGHT SIDE CONCRETE WASH OUT.
- GRAVEL AUGMENTATION WILL HAVE ADDITIONAL TURBIDITY MONITORING POINT 300 FT DOWNSTREAM FROM PLACEMENT.

WARNING  
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FOR BIDDING

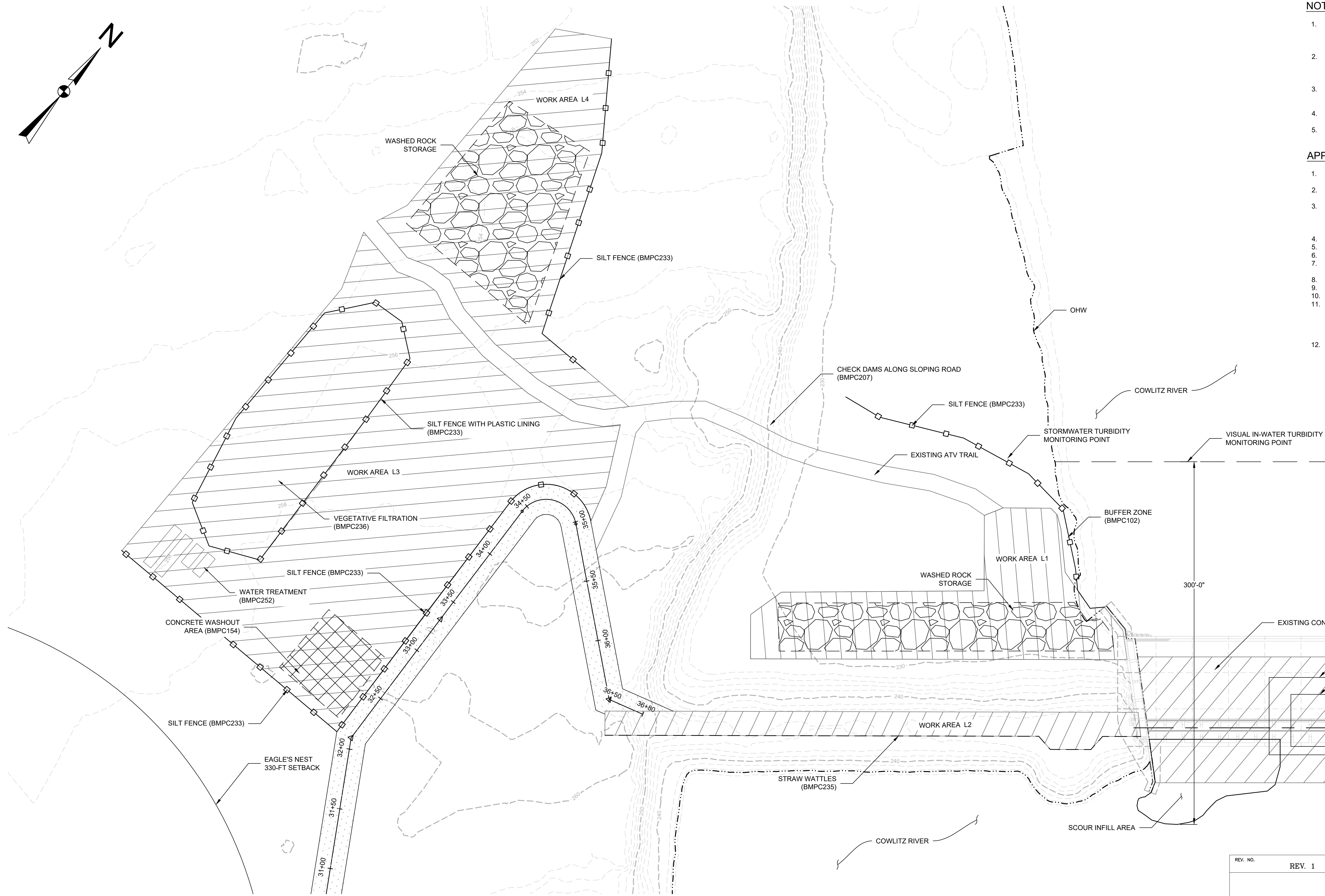
1	3/12/21	WATER QUALITY PROTECTION PLAN	CAS	
NO.	DATE	REVISION	DESCRIPTION	DRAWN
				APPROVED

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
CONTRACTOR STAGING

DESIGNED	RTI	DRAWN	CAS
3/12/2021		STAMPED	RTI
DATE			
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09			
SHEET NO. 09			OF 59





NOTES:

1. IN-WATER COMPLIANCE MONITORING WILL OCCUR 300 FEET DOWNSTREAM OF THE MOST UPSTREAM ACTIVITY. IF A VISUAL TURBIDITY PLUME IS PRESENT AT THIS LOCATION, THE ACTIVITY WILL CEASE UNTIL THE PLUME HAS DISSIPATED.
2. STORMWATER RUNOFF MONITORING FOR TURBIDITY TO OCCUR AT THE MONITORING POINT OR AT ANY OTHER POINT WHERE STORMWATER GENERATED CROSSES THE PERMITTED DISTURBED AREA.
3. OVERWINTER STORAGE STOCKPILES IN WORK AREAS 1.1, 1.3, AND L4 MUST BE STABILIZED WITH APPLICABLE BMP'S. SEE WQPP FOR MORE INFORMATION.
4. CONTRACTOR MAY ELECT TO USE SMALLER WORK AREAS AND WILL NEED TO ADJUST BMP'S ACCORDINGLY.
5. WASHINGTON STATE DEPARTMENT OF ECOLOGY CONTACT: CAROL SERDAR T/ (306) 742-9751 E/ CAROL.SERDAR@ECY.WA.GOV


### APPLICABLE BMP'S

1. BMPC101 - NATURAL VEGETATION SHOULD BE PRESERVED WHERE POSSIBLE IN WORK AREAS L1, L2, L3, AND L4.
2. BMPC107 - CONSTRUCTION ROADS AND PARKING AREAS TO BE STABILIZED.
3. BMPC120 - TEMPORARY STABILIZATION OF ALL WORK AREAS AFTER CONSTRUCTION IS COMPLETE. PERMANENT GROUND STABILIZATION AND RESTORATION WILL OCCUR FOR ALL WORK AREAS AFTER YEAR 3 CONSTRUCTION IS COMPLETE.
4. BMPC150 - EROSION MATERIALS TO BE KEPT ON-SITE.
5. BMPC151 - CONCRETE HANDLING
6. BMPC153 - MATERIALS WILL BE STORED IN A DESIGNATED AREA AND SECONDARY CONTAINMENT WILL BE USED FOR ANY HAZARDOUS MATERIALS.
8. BMPC160 - A CESL WILL BE ON-SITE.
9. BMPC162 - SCHEDULING
10. BMPC236 - VEGETATIVE FILTRATION
11. BMPC252 - WATER TREATMENT. PROCESS WATER WILL BE PUMPED INTO BAKER TANKS. WATER WILL BE TREATED FOR PH AND SAMPLED PRIOR TO OVERLAND FILTRATION. PUMPING FROM TANKS WILL ONLY OCCUR WHEN IT DOES NOT CAUSE RUNOFF OF ANY TREATED WATER DURING A STORM EVENT.
12. ADDITIONAL BMP'S (SILT FENCE AND STRAW WATTLES) MAY BE INSTALLED AROUND THE PERIMETER OF THE TEMPORARY INFILTRATION SITE AS NEEDED TO PREVENT DISCHARGE OF TURBID WATERS.

FOR BIDDING			
1	3/12/21	WATER QUALITY PROTECTION PLAN	CAS
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DEPARTMENT OF PUBLIC UTILITIES			
LIGHT DIVISION			
COWLITZ RIVER PROJECT			
COWLITZ BARRIER DAM			
SPILLWAY UPGRADE			
TESC PLAN LEFT			
REVIEWED		DESIGNED	DRAWN
		RTI	CAS
APPROVED		3/12/2021	STAMPED
		DATE	RTI
		DRAWING NO.	10
		SHEET NO.10 OF 59	

REV. NO. REV. 1

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A circular professional engineer seal for the State of Washington. The outer ring contains the text "ROBERT THOMAS INDRI" at the top and "PROFESSIONAL ENGINEER" at the bottom. Inside the ring, the text "STATE OF WASHINGTON" is at the top and "REGISTERED" is at the bottom. In the center is a portrait of a man, with the number "55257" below it. The seal has a gear-like border.



**Schnabel**  
ENGINEERING

**RESOURCE**  
CONSULTANTS  
INC.







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## SILT FENCE

### MATERIALS:

- USE A SYNTHETIC FILTER FABRIC OF AT LEAST 95% BY WEIGHT OF POLYOLEFINS OR POLYESTER, WHICH IS CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE REQUIREMENTS IN ASTM D 6461, WHICH IS SHOWN IN PART BELOW. SYNTHETIC FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0 TO 120°F.

TEMPORARY SILT FENCE MATERIAL PROPERTY REQUIREMENTS						
GEOTEXTILE PROPERTY	ASTM TEST METHOD	UNITS	SUPPORTED, SILT FENCE (B/W POSTS WITH WIRE OR POLYMERIC MESH)	UNSUPPORTED, SILT FENCE (B/W POSTS)	TYPE OF VALUE	
GRAB STRENGTH FAILURE STRAIN IN MACHINE AND X-MACHINE DIRECTION (ASTM D4632)	ASTM D 4632			30% MAX		
GRAB TENSILE STRENGTH IN MACHINE AND X-MACHINE DIRECTION (ASTM D4632)	ASTM D 4632	LBS	100 LB MIN.	180 LB MIN FOR EXTRA STRENGTH FABRIC 100 LBS MIN FOR STANDARD STRENGTH FABRIC	MARV	
POLYMERIC MESH AOS (ASTM D4751)	ASTM D 4751		0.60mm MAX FOR SLIT FILM WOVEN (#30 SIEVE), 0.30mm MAX FOR ALL OTHER GEOTEXTILES (#50 SIEVE) 0.15mm MIN FOR ALL FABRIC TYPES (#100 SIEVE)			
WATER PERMITTIVITY <sub>2</sub> (ASTM D4491)	ASTM D 4491	SEC-1 MIN.		0.02	MARV	
ULTRAVIOLET STABILITY (ASTM D4355)	ASTM D 4355	% RETAINED STRENGTH		70% MINIMUM	TYPICAL	
1 SILT FENCE SUPPORT SHALL CONSIST OF 14 GAUGE STEEL WIRE WITH A MESH SPACING OF 150 MM (6 INCHES), OR PREFABRICATED POLYMER MESH OF EQUIVALENT STRENGTH. 2 THESE DEFAULT VALUES ARE BASED ON EMPIRICAL EVIDENCE WITH A VARIETY OF SEDIMENT. FOR ENVIRONMENTALLY SENSITIVE AREAS, A REVIEW OF PREVIOUS EXPERIENCE AND/OR SITE OR REGIONALLY SPECIFIC GEOTEXTILE TESTS IN ACCORDANCE WITH ASTM D 5141 SHOULD BE PERFORMED TO CONFIRM SUITABILITY OF THESE REQUIREMENTS. 3 AS MEASURED IN ACCORDANCE WITH ASTM D 4632.						

- POSTS FOR SILT FENCES SHALL BE EITHER WOOD OR STEEL. WOOD POSTS SHALL HAVE MINIMUM DIMENSIONS OF 1½ BY 1½ INCHES BY THE MINIMUM LENGTH SHOWN IN THE DETAILS. POSTS SHALL HAVE PROJECTIONS TO FACILITATE FASTENING THE FABRIC.
- GEOTEXTILE PROPERTIES SHOWN IN ABOVE TABLE ARE MINIMUM AVERAGE ROLL VALUES (I.E.: TEST RESULTS FOR ANY SAMPLED ROLL IN A LOT SHALL MEET THE VALUES SHOWN IN THE TABLE).

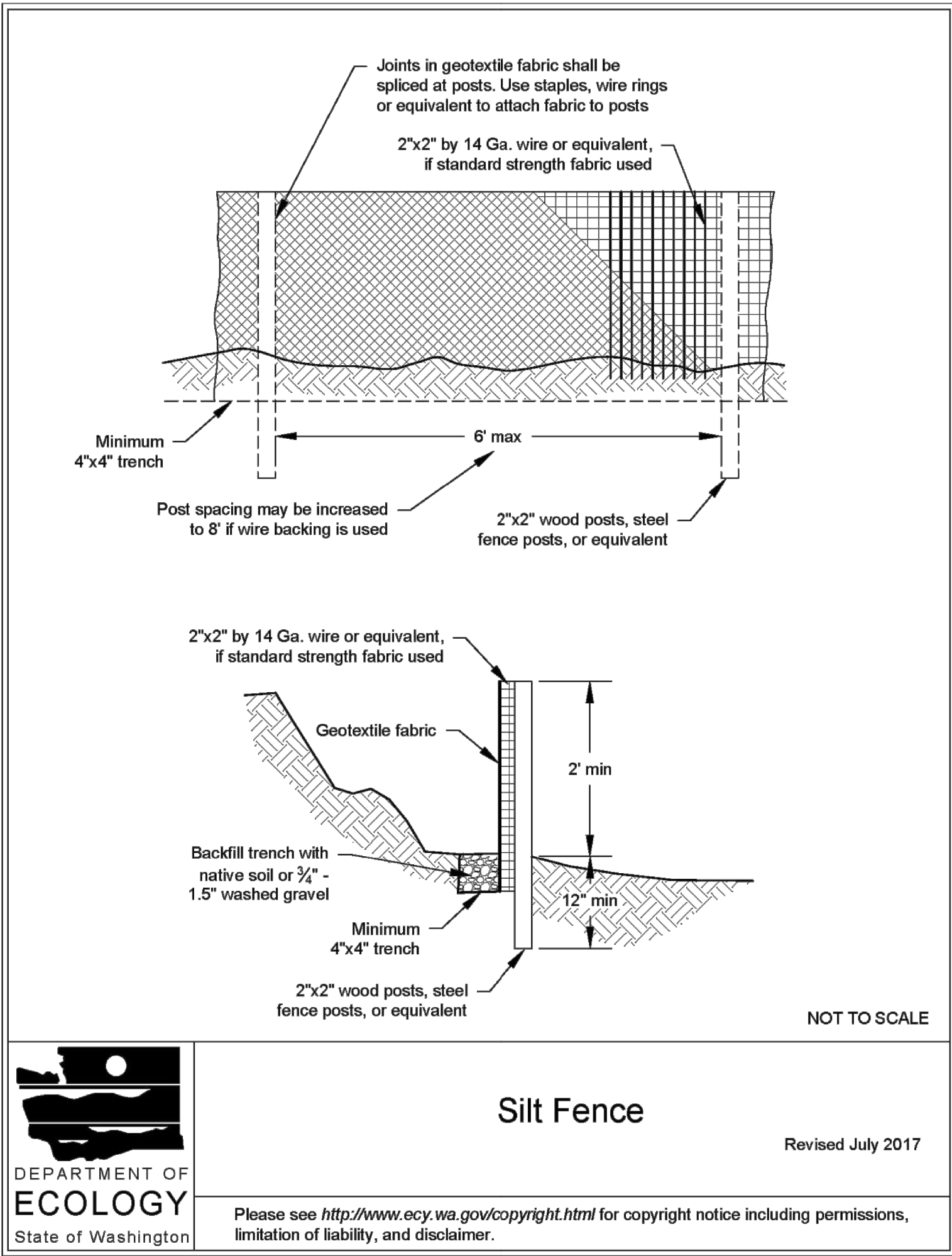
### CONSTRUCTION NOTES:

- THE CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY SILT FENCES AT THE LOCATIONS SHOWN IN THE PLANS.
- CONSTRUCT SILT FENCES IN AREAS OF CLEARING, GRADING, OR DRAINAGE PRIOR TO STARTING THOSE ACTIVITIES.
- THE SILT FENCE SHALL HAVE A 2-FEET MINIMUM AND A 2 ¾-FEET MAXIMUM HEIGHT ABOVE THE ORIGINAL GROUND SURFACE.
- THE GEOTEXTILE FABRIC SHALL BE SEWN TOGETHER AT THE POINT OF MANUFACTURE TO FORM FABRIC LENGTHS AS REQUIRED. LOCATE ALL SEWN SEAMS AT SUPPORT POSTS. ALTERNATIVELY, TWO SECTIONS OF SILT FENCE CAN BE OVERLAPPED, PROVIDED THAT THE OVERLAP IS LONG ENOUGH AND THAT THE ADJACENT SILT FENCE SECTIONS ARE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.
- ATTACH THE GEOTEXTILE FABRIC ON THE UP-SLOPE SIDE OF THE POSTS AND SECURE WITH STAPLES, WIRE, OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ATTACH THE GEOTEXTILE FABRIC TO THE POSTS IN A MANNER THAT REDUCES THE POTENTIAL FOR TEARING.
- SUPPORT THE GEOTEXTILE WITH WIRE OR PLASTIC MESH, DEPENDENT ON THE PROPERTIES OF THE GEOTEXTILE SELECTED FOR USE. IF WIRE OR PLASTIC MESH IS USED, FASTEN THE MESH SECURELY TO THE UP-SLOPE SIDE OF THE POSTS WITH THE GEOTEXTILE FABRIC UP-SLOPE OF THE MESH.
- MESH SUPPORT, IF USED, SHALL CONSIST OF STEEL WIRE WITH A MAXIMUM MESH SPACING OF 2-INCHES, OR A PRE-FABRICATED POLYMERIC MESH. THE STRENGTH OF THE WIRE OR POLYMERIC MESH SHALL BE EQUIVALENT TO OR GREATER THAN 180 LBS. GRAB TENSILE STRENGTH. THE POLYMERIC MESH MUST BE AS RESISTANT TO THE SAME LEVEL OF ULTRAVIOLET RADIATION AS THE GEOTEXTILE FABRIC IT SUPPORTS.
- BURY THE BOTTOM OF THE GEOTEXTILE FABRIC 4-INCHES MIN. BELOW THE GROUND SURFACE. BACKFILL AND TAMP SOIL IN PLACE OVER THE BURIED PORTION OF THE GEOTEXTILE FABRIC, SO THAT NO FLOW CAN PASS BENEATH THE SILT FENCE AND SCOURING CANNOT OCCUR. WHEN WIRE OR POLYMERIC BACK-UP SUPPORT MESH IS USED, THE WIRE OR POLYMERIC MESH SHALL EXTEND INTO THE GROUND 3-INCHES MIN.
- DRIVE OR PLACE THE SILT FENCE POSTS INTO THE GROUND 18-INCHES MIN. A 12-INCH MIN. DEPTH IS ALLOWED IF TOPSOIL OR OTHER SOFT SUBGRADE SOIL IS NOT PRESENT AND 18-INCHES CANNOT BE REACHED. INCREASE FENCE POST MIN. DEPTHS BY 6 INCHES IF THE FENCE IS ISOLATED ON SLOPES OF 3H:1V OR STEEPER AND THE SLOPE IS PERPENDICULAR TO THE FENCE. IF REQUIRED POST DEPTHS CANNOT BE OBTAINED, THE POSTS SHALL BE ADEQUATELY SECURED BY BRACING OR GUYING TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT LOADING.
- USE WOOD, STEEL OR EQUIVALENT POSTS. THE SPACING OF THE SUPPORT POSTS SHALL BE A MAXIMUM OF 6-FEET. POSTS SHALL CONSIST OF EITHER:  
WOOD WITH MINIMUM 2" BY 2" DIMENSIONAL LUMBER AT 3 FEET LENGTH. WOOD SHALL BE FREE OF DEFECTS SUCH AS KNOTS, SPLITS, OR GOUGES.  
NO. 6 STEEL REBAR OR LARGER.  
ASTM A 120 STEEL PIPE WITH A MINIMUM DIAMETER OF 1-INCH.  
U, T, L, OR C SHAPE STEEL POSTS WITH A MINIMUM WEIGHT OF 1.35 LBS./FT.  
OTHER STEEL POSTS HAVING EQUIVALENT STRENGTH AND BENDING RESISTANCE TO THE POST SIZES LISTED ABOVE.
- LOCATE SILT FENCES ON CONTOUR AS MUCH AS POSSIBLE, EXCEPT AT THE ENDS OF THE FENCE WHERE THE FENCE SHALL BE TURNED UPHILL SUCH THAT THE SILT FENCE CAPTURES THE RUNOFF WATER AND PREVENTS WATER FROM FLOWING AROUND THE END OF THE FENCE.
- IF THE FENCE MUST CROSS CONTOURS, WITH THE EXCEPTION OF THE ENDS OF THE FENCE, PLACE CHECK DAMS PERPENDICULAR TO THE BACK OF THE FENCE TO MINIMIZE CONCENTRATED FLOW AND EROSION. THE SLOPE OF THE FENCE LINE WHERE CONTOURS MUST BE CROSSED SHALL NOT BE STEEPER THAN 3H:1V.

### MAINTENANCE NOTES:

- INSPECT SILT FENCES AT LEAST ONCE A WEEK AND AFTER EACH SIGNIFICANT RAINFALL EVENT (1/2 INCH OR GREATER). REPAIR ANY DAMAGE IMMEDIATELY.
- SHOULD THE FABRIC OF A SILT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
- REPLACE THE GEOTEXTILE FABRIC THAT HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN.
- REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT. WHEN SEDIMENT DEPOSITS REACH APPROXIMATELY ⅓ THE HEIGHT OF THE SILT FENCE, OR 8 INCHES (WHICHEVER IS LOWER), OR INSTALL A SECOND SILT FENCE.
- CHECK THE UPHILL SIDE OF THE SILT FENCE FOR SIGNS OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND REMOVE THE TRAPPED SEDIMENT.

Figure II-3.22: Silt Fence



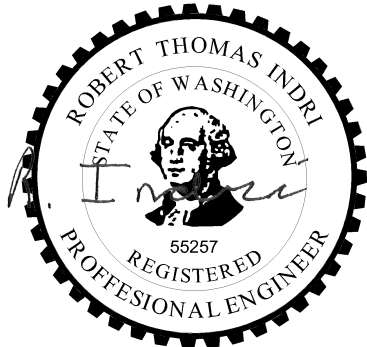
2019 Stormwater Management Manual for Western Washington

Volume II - Chapter 3 - Page 371

FOR BIDDING

1	3/12/21	WATER QUALITY PROTECTION PLAN	CAS	
NO.	DATE	REVISION DESCRIPTION	DRAWN	APPROVED
CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION				
COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE TESC DETAILS				
DESIGNED	RTI	DRAWN	CAS	
3/12/2021		STAMPED	RTI	
DATE		DRAWING NO.	12	
		SHEET No.12	of 59	

WARNING  
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GENERAL SEEDING NOTES:

- SEED OF THE TYPE SPECIFIED SHALL BE CERTIFIED IN ACCORDANCE WITH WAC 16-302. SEED MIXES SHALL BE COMMERCIALY PREPARED AND SUPPLIED IN SEALED CONTAINERS. THE LABELS SHALL SHOW:
  - COMMON AND BOTANICAL NAMES OF SEED,
  - LOT NUMBER
  - NET WEIGHT
  - POUNDS OF PURE LIVE SEED (PLS) IN THE MIX,
  - ORIGIN OF SEED.
- IF WORK IN DISTURBED AREAS STOPS FOR MORE THAN 7 WORKING DAYS ON THE EMBANKMENT SLOPES, TEMPORARY SEEDING SHALL BE APPLIED TO STABILIZE THE AREA.
- COMPLETE GRADING BEFORE PREPARING SEEDBEDS, AND INSTALL ALL NECESSARY EROSION CONTROL PRACTICES SUCH AS, DIKES, WATERWAYS, AND BASINS TO PREVENT SEEDS FROM WASHING AWAY. MINIMIZE STEEP SLOPES BECAUSE THEY MAKE SEEDBED PREPARATION DIFFICULT AND INCREASE THE EROSION HAZARD.
- TILL OR DISC THE PREPARED AREAS TO BE SEEDED TO A MINIMUM DEPTH OF FOUR (4) INCHES. REMOVE ALL STONES LARGER THAN THREE (3) INCHES ON ANY SIDE, STICKS, ROOTS, AND OTHER EXTRANEIOUS MATERIALS AT THE SURFACE DURING THE BED PREPARATION.
- SEED MAY BE INSTALLED BY HAND IF TEMPORARY AND COVERED BY STRAW, MULCH, OR TOPSOIL, OR IF PERMANENT IN SMALL AREAS (LESS THAN 1 ACRE) AND COVERED WITH MULCH, TOPSOIL, OR EROSION BLANKETS.
- REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE AND MULCH IMMEDIATELY FOLLOWING REPAIR OF EROSION DAMAGE.

**MAINTENANCE:**  
RE-FERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED AND MULCH AREAS WHERE SEEDLING EMERGENCE IS POOR (FAILING TO ESTABLISH AT LEAST 75 PERCENT COVER), OR WHERE EROSION OCCURS, AS SOON AS POSSIBLE. DO NOT MOW. PROTECT FROM TRAFFIC AS MUCH AS POSSIBLE.

IF RESEEDING IS INEFFECTIVE, USE AN ALTERNATE METHOD SUCH AS SODDING, MULCHING, NETS, OR BLANKETS.

SUPPLY SEEDED AREAS WITH ADEQUATE MOISTURE, BUT DO NOT WATER TO THE EXTENT THAT IT CAUSES RUNOFF. BETWEEN JULY 1 AND AUGUST 30, SEEDING REQUIRES IRRIGATION UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.

**MULCH:**  
TEMPORARY MULCH SHALL BE STRAW, WOOD STRAND, OR HECP MULCH AND SHALL BE USED FOR THE PURPOSE OF EROSION CONTROL BY PROTECTING BARE SOIL SURFACE FROM PARTICLE DISPLACEMENT. MULCH SHALL NOT BE APPLIED BELOW THE ANTICIPATED WATER LEVEL OF DITCH SLOPES, POND BOTTOMS, AND STREAM BANKS. HECP MULCH SHALL NOT BE USED WITHIN THE ORDINARY HIGH WATER MARK.

STRAW OR WOOD STRAND MULCH SHALL BE APPLIED AT A RATE TO ACHIEVE AT LEAST 95 PERCENT VISUAL BLOCKAGE OF THE SOIL SURFACE. STRAW MULCH SHALL BE SUITABLE FOR SPREADING WITH MULCH BLOWER EQUIPMENT.

SHORT TERM MULCH SHALL BE HYDRAULICALLY APPLIED AT A RATE OF 2500 LBS/ACRE, LONG AND MODERATE TERM MULCH SHALL BE HYDRAULICALLY APLIED AT 3500 LBS/ACRE WITH NO MORE THAN 2000 LBS APPLIED IN A SINGLE LIFT.

**MULCH APPLICATION RATES:**  
SHORT TERM MULCH = 2500 LBS/AC  
MODERATE TERM MULCH = 3500 LBS/AC (NO MORE THAN 2000 LBS APPLIED PER ONE LIFT (NOT TO BE USED WITH PERMANENT SEEDING))

TEMPORARY SEEDING:

TEMPORARY GRASS SEED SHALL BE A COMMERCIALY PREPARED MIX, MADE UP OF LOW-GROWING GRASS SPECIES THAT WILL GROW WITHOUT IRRIGATION AT THE PROJECT LOCATION, AND ACCEPTED BY THE ENGINEER. THE APPLICATION RATE SHALL BE 120 LBS/ACRE.

SEED MIX (FROM 2019 DEPT. OF ECOLOGY STORM WATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON AND COMMENTARY, TABLE II-3.4) USED FOR TEMPORARY EROSION CONTROL SHALL CONSIST OF ONE OF THE FOLLOWING:

TEMPORARY EROSION CONTROL SEED MIX				
COMMON NAME	LATIN NAME	% WEIGHT	% PURITY	% GERMINATION
CHEWINGS OR ANNUAL BLUE GRASS	<i>FESTUCA RUBRA</i> <i>VAR. COMMUTATA</i> <i>OR POA ANNA</i>	40	98	90
PERENNIAL RYE	<i>LOLIUM PERENNE</i>	50	98	90
REDTOP OR COLONNIAL BENTGRASS	<i>AGROSTIS ALBA</i> OR <i>AGROSTIS TENUIS</i>	5	92	85
WHITE DUTCH CLOVER	<i>TRIFOLIUM REPENS</i>	5	98	90

TEMPORARY SEEDING MAY BE SOWN AT ANY TIME ALLOWED BY THE ENGINEER. TEMPORARY SEEDING SHALL BE SOWN BY ONE OF THE FOLLOWING METHODS:

- A HYDRO SEEDER THAT UTILIZES WATER AS THE CARRYING AGENT, AND MAINTAINS CONTINUOUS AGITATION THROUGH PADDLE BLADES. HYDROSEED APPLICATIONS SHALL INCLUDE A MINIMUM OF 1,500 POUNDS PER ACRE OF MULCH WITH 3 PERCENT TACKIFIER.
- POWER-DRAWN DRILLS OR SEEDERS.
- AREAS IN WHICH THE ABOVE METHODS ARE IMPRACTICAL MAY BE SEEDED BY HAND. WHEN SEEDING BY HAND, THE SEED SHALL BE INCORPORATED INTO THE TOP 1/4 INCH OF SOIL OR COVERED BY STRAW, MULCH, OR TOPSOIL BY HAND RAKING OR OTHER METHOD THAT IS ALLOWED BY THE ENGINEER.

PERMANENT SEEDING:

PERMANENT GRASS SEED SHALL BE A COMMERCIALY PREPARED MIX, MADE UP OF LOW-GROWING TURF SEED MIX THAT WILL GROW WITH VERY LITTLE MAINTENANCE AT THE PROJECT LOCATION, AND ACCEPTED BY THE ENGINEER. THE APPLICATION RATE SHALL BE 120 LBS/ACRE.

SEED MIX (FROM 2019 DEPT. OF ECOLOGY STORM WATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON AND COMMENTARY, TABLE II-3.4) USED FOR TEMPORARY EROSION CONTROL SHALL CONSIST OF ONE OF THE FOLLOWING:

PERMANENT EROSION CONTROL SEED MIX				
COMMON NAME	LATIN NAME	% WEIGHT	% PURITY	% GERMINATION
DWARF TALL FESCUE (SEVERAL VARIETIES)	<i>FESTUCA ARUNDINACEA</i> VAR.	45	98	90
DWARF PERENNIAL RYE (BARCLAY)	<i>LOLIUM PERENNE</i> VAR. <i>BARCLAY</i>	30	98	90
RED FESCUE	<i>FESTUCA RUBRA</i>	20	98	90
COLONIAL BENTGRASS	<i>AGROSTIS TENUIS</i>	5	98	90

**FERTILIZER:** FERTILIZER SHALL BE A STANDARD COMMERCIAL GRADE OF ORGANIC OR INORGANIC FERTILIZER OF THE KIND AND QUALITY SPECIFIED. FERTILIZER SHALL BE SUPPLIED IN ONE OF THE FOLLOWING FORMS:

- ORGANIC MATTER IS THE MOST APPROPRIATE FORM OF FERTILIZER BECAUSE IT PROVIDES NUTRIENTS IN THE LEAST WATER-SOLUBLE FORM.
- USE 10-4-6 N-P-K (NITROGEN-PHOSPHOROUS-POTASSIUM) FERTILIZER AT A RATE OF 90 POUNDS PER ACRE. ALWAYS USE SLOW-RELEASE FERTILIZERS, SUCH AS COTTONSEED MEAL, BECAUSE THEY ARE MORE EFFICIENT AND HAVE FEWER ENVIRONMENTAL IMPACTS. DO NOT ADD FERTILIZER TO HYDROMULCH MACHINE, OR AGITATE, MORE THAN 20 MINUTES BEFORE USE.
- A HOMOGENEOUS PELLET, SUITABLE FOR APPLICATION THROUGH A FERTI-BLAST GUN.
- A TABLET OR OTHER FORM OF CONTROLLED RELEASE WITH A MINIMUM OF A 6 MONTH RELEASE PERIOD.
- A LIQUID SUITABLE FOR APPLICATION BY A POWER SPRAYER OR HYDROSEEDER.

WATTLES:

WATTLES ARE TYPICALLY 8 TO 10 INCHES IN DIAMETER AND 25 TO 30 FEET IN LENGTH.

INSTALL WATTLES PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE CONTOUR.

PLACE WATTLES IN SHALLOW TRENCHES, STAKED ALONG THE CONTOUR OF DISTURBED OR NEWLY CONSTRUCTED SLOPES.

DIG NARROW TRENCHES ACROSS THE SLOPE (ON CONTOUR TO A DEPTH OF 3- TO 5-INCHES ON CLAY SOILS AND SOILS WITH GRADUAL SLOPES. ON LOOSE SOILS, STEEP SLOPES, AND AREAS WITH HIGH RAINFALL, THE TRENCHES SHOULD BE DUG TO A DEPTH OF 6- TO 7- INCHES, OR 1/2 TO 2/3 OF THE THICKNESS OF THE WATTLE.

START BUILDING TRENCHES AND INSTALLING WATTLES FROM THE BASE OF THE SLOPE AND WORK UP. SPREAD EXCAVATED MATERIAL EVENLY ALONG THE UPHILL SLOPE AND COMPACT IT USING HAND TAMPING OR OTHER METHODS.

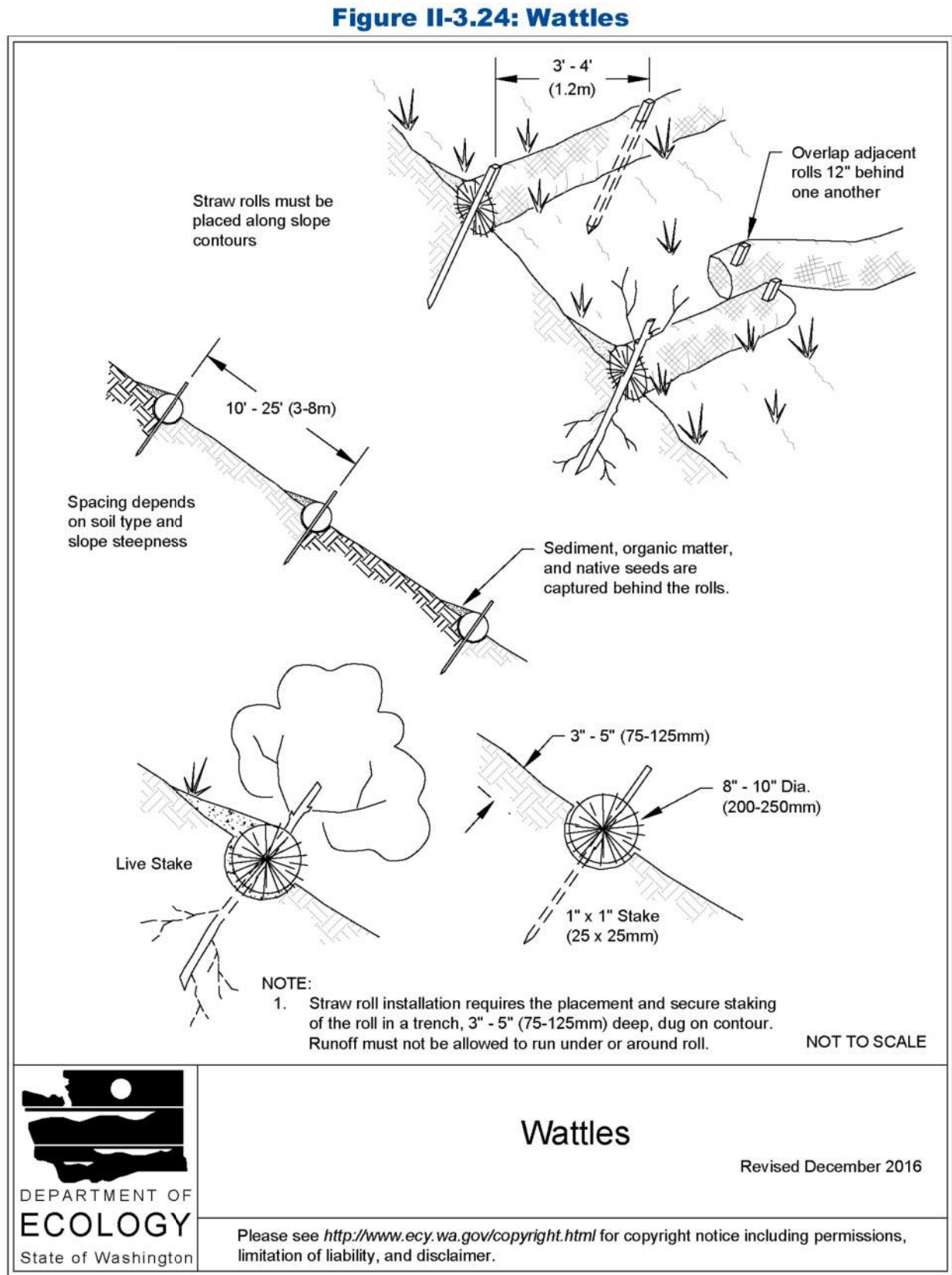
CONSTRUCT TRENCHES AT INTERVALS OF 10- TO 25-FEET DEPENDING ON THE STEEPNESS OF THE SLOPE, SOIL TYPE, AND RAINFALL. THE STEEPER THE SLOPE THE CLOSER TOGETHER THE TRENCHES.

INSTALL THE WATTLES SNUGLY INTO THE TRENCHES AND OVERLAP THE ENDS OF ADJACENT WATTLES 12 INCHES BEHIND ONE ANOTHER.

INSTALL STAKES AT EACH END OF THE WATTLE, AND AT 4-FOOT CENTERS ALONG ENTIRE LENGTH OF WATTLE. IF REQUIRED, INSTALL PILOT HOLES FOR THE STAKES USING A STRAIGHT BAR TO DRIVE HOLES THROUGH THE WATTLE AND INTO THE SOIL.

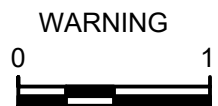
WOODEN STAKES SHOULD BE APPROXIMATELY 0.75 X 0.75 X 24 INCHES MIN. WILLOW CUTTINGS OR 3/8-INCH REBAR CAN ALSO BE USED FOR STAKES.

STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE, LEAVING 2 TO 3 INCHES OF THE STAKE PROTRUDING FROM THE WATTLE.



2019 Stormwater Management Manual for Western Washington

Volume II - Chapter 3 - Page 379



WARNING  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FOR BIDDING			
1	3/12/21	WATER QUALITY PROTECTION PLAN	CAS
NO.	DATE	REVISION DESCRIPTION	DRAWN APPROVED
CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION			
COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE TESC DETAILS			
DESIGNED	RTI	DRAWN	CAS
3/12/2021	DATE	STAMPED	RTI
APPROVED	DRAWING NO.	13	
SHEET NO.13		of 59	



NOTES:

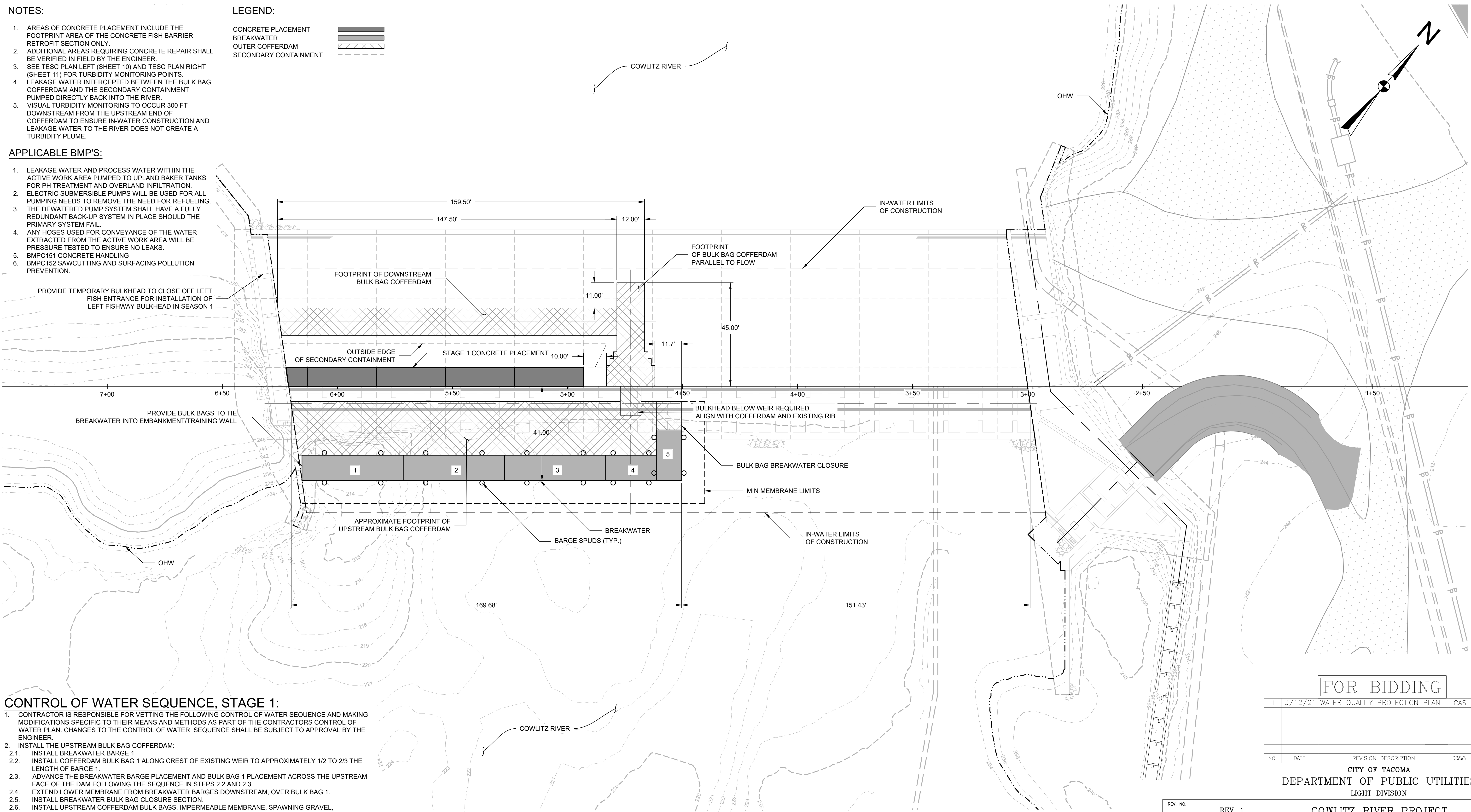
1. AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
2. ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
3. SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
4. LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
5. VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

APPLICABLE BMP'S:

1. LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
2. ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
3. THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
4. ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.



CONTROL OF WATER SEQUENCE, STAGE 1:

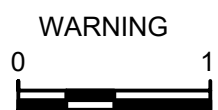
1. CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
2. INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - 2.1. INSTALL BREAKWATER BARGE 1
  - 2.2. INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGE 1.
  - 2.3. ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - 2.4. EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - 2.5. INSTALL BREAKWATER BULK BAG CLOSURE SECTION.
  - 2.6. INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
3. INSTALL THE BULK BAG COFFERDAM PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
4. INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW
5. INSTALL THE LEFT FISHWAY COFFERDAM AND THE BULKHEAD BELOW THE WEIR.
6. CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS.
7. PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
8. COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
9. PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



1

STAGE 1 CONTROL OF WATER - PLAN

SCALE: 1"=20'  
0 20' 40'



WARNING  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FOR BIDDING

1	3/12/21	WATER QUALITY PROTECTION PLAN	CAS	

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
STAGE 1 CONTROL OF WATER

REVIEWED	DESIGNED RTI	DRAWN CAS
	3/12/2021	STAMPED RTI
APPROVED	DATE	DRAWING NO.
		14
		SHEET No.14 of 59



NOTES:

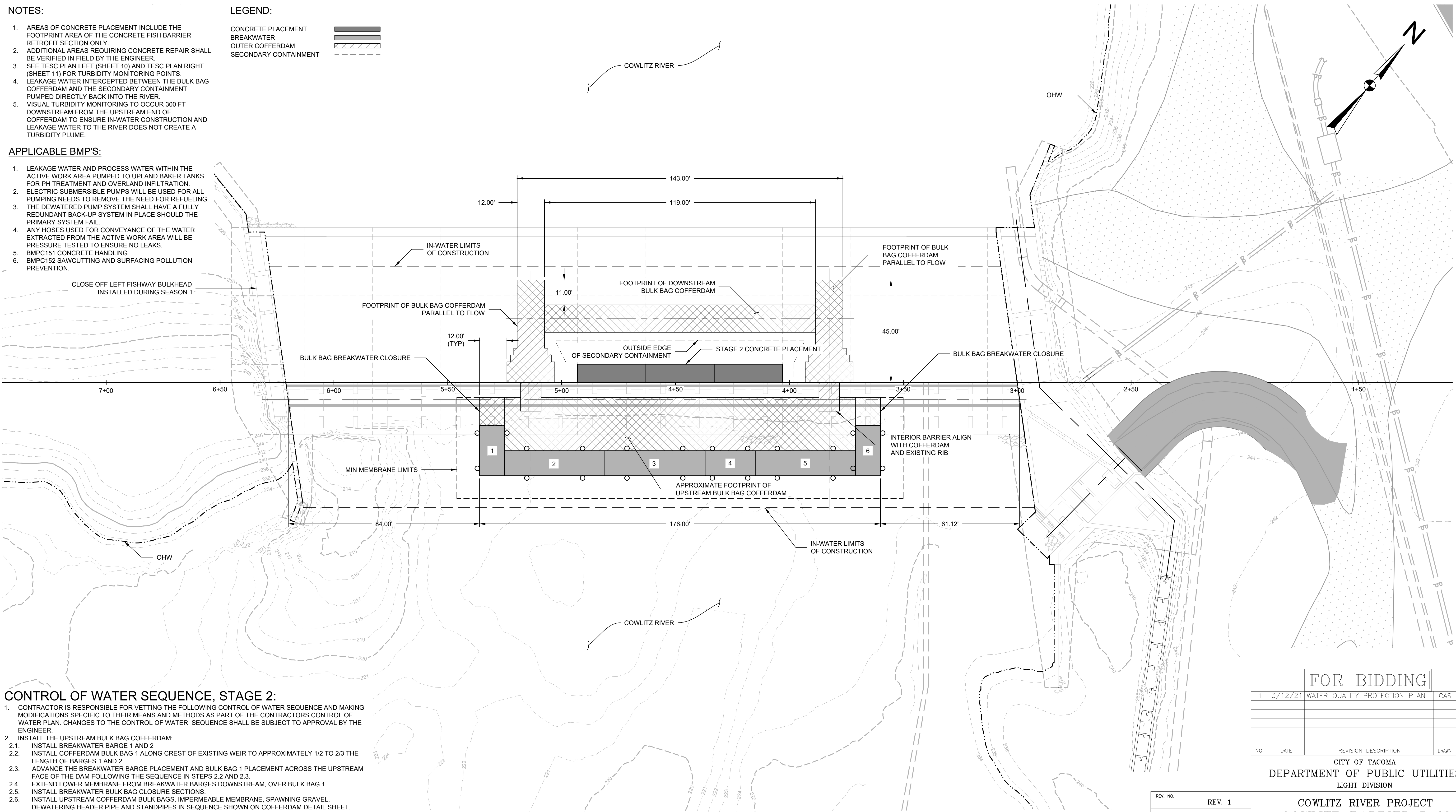
- AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
- ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
- SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
- LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
- VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

APPLICABLE BMP'S:

- LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
- ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
- THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
- ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
- BMPC151 CONCRETE HANDLING
- BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.



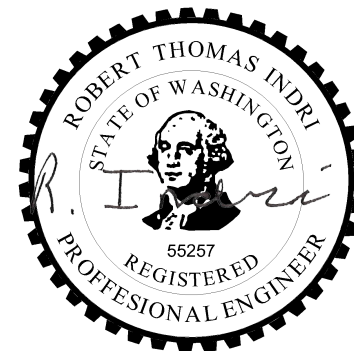
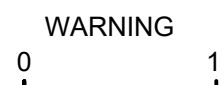
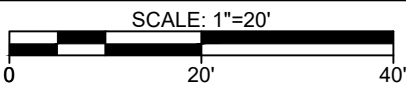
CONTROL OF WATER SEQUENCE, STAGE 2:

- CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
- INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - INSTALL BREAKWATER BARGE 1 AND 2
  - INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGES 1 AND 2.
  - ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - INSTALL BREAKWATER BULK BAG CLOSURE SECTIONS.
  - INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
- INSTALL THE BULK BAG COFFERDAMS PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
- INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW
- INSTALL THE BULKHEAD BELOW THE WEIR ON THE RIGHT SIDE.
- CLOSE OFF THE PERMANENT BULKHEAD INSTALLED IN THE LEFT FISHWAY DURING SEASON 1.
- CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS
- PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
- COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
- PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



1

STAGE 2 CONTROL OF WATER - PLAN



FOR BIDDING						
1	3/12/21	WATER QUALITY PROTECTION PLAN			CAS	
NO.	DATE	REVISION DESCRIPTION			DRAWN	APPROVED
CITY OF TACOMA						
DEPARTMENT OF PUBLIC UTILITIES						
LIGHT DIVISION						
COWLITZ RIVER PROJECT						
COWLITZ BARRIER DAM						
SPILLWAY UPGRADE						
STAGE 2 CONTROL OF WATER						
REVIEWED				DESIGNED		DRAWN
				RTI		CAS
APPROVED				3/12/2021		STAMPED
				DATE		RTI
				DRAWING NO.		15
				SHEET NO.15		OF 59



FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL DESIGN\15 STAGE 3 CONTROL OF WATER.dwg  
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PLOTTED: Corey Snider 3/12/2021 1:12 PM

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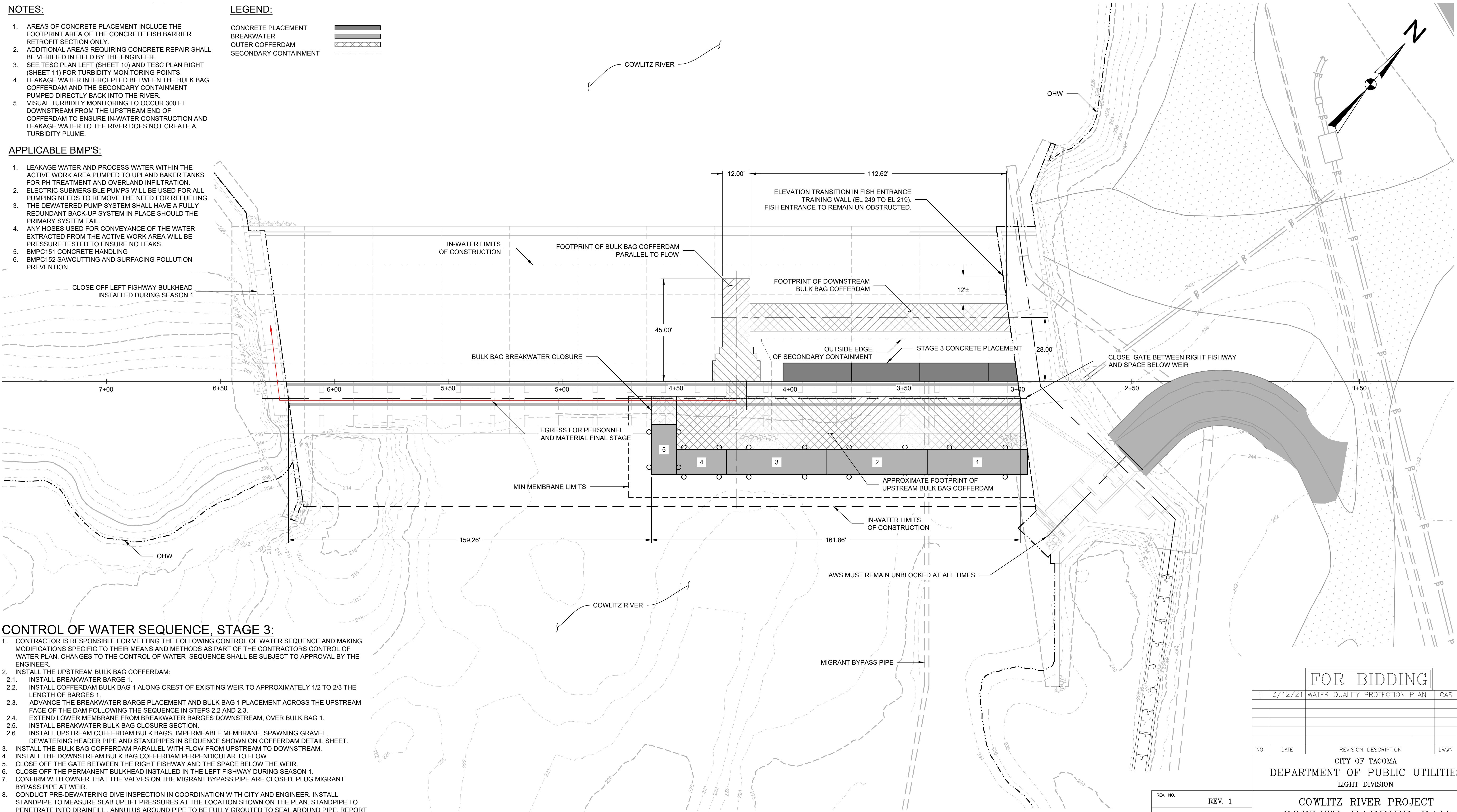
1. AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
2. ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
3. SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
4. LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
5. VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

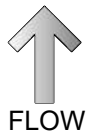
APPLICABLE BMP'S:

1. LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
2. ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
3. THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
4. ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.



CONTROL OF WATER SEQUENCE, STAGE 3:

1. CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
2. INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - 2.1. INSTALL BREAKWATER BARGE 1.
  - 2.2. INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGES 1.
  - 2.3. ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - 2.4. EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - 2.5. INSTALL BREAKWATER BULK BAG CLOSURE SECTION.
  - 2.6. INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
3. INSTALL THE BULK BAG COFFERDAM PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
4. INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW.
5. CLOSE OFF THE GATE BETWEEN THE RIGHT FISHWAY AND THE SPACE BELOW THE WEIR.
6. CLOSE OFF THE PERMANENT BULKHEAD INSTALLED IN THE LEFT FISHWAY DURING SEASON 1.
7. CONFIRM WITH OWNER THAT THE VALVES ON THE MIGRANT BYPASS PIPE ARE CLOSED. PLUG MIGRANT BYPASS PIPE AT WEIR.
8. CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS.
9. PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
10. COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
11. PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



1

STAGE 3 CONTROL OF WATER - PLAN

SCALE: 1"=20'  
0 20' 40'

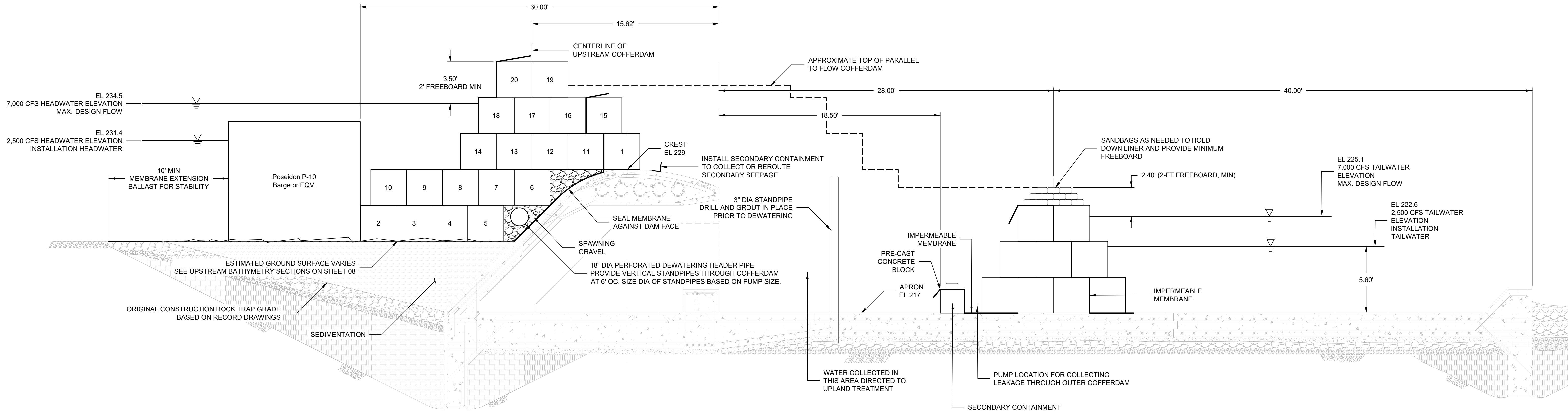
WARNING  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



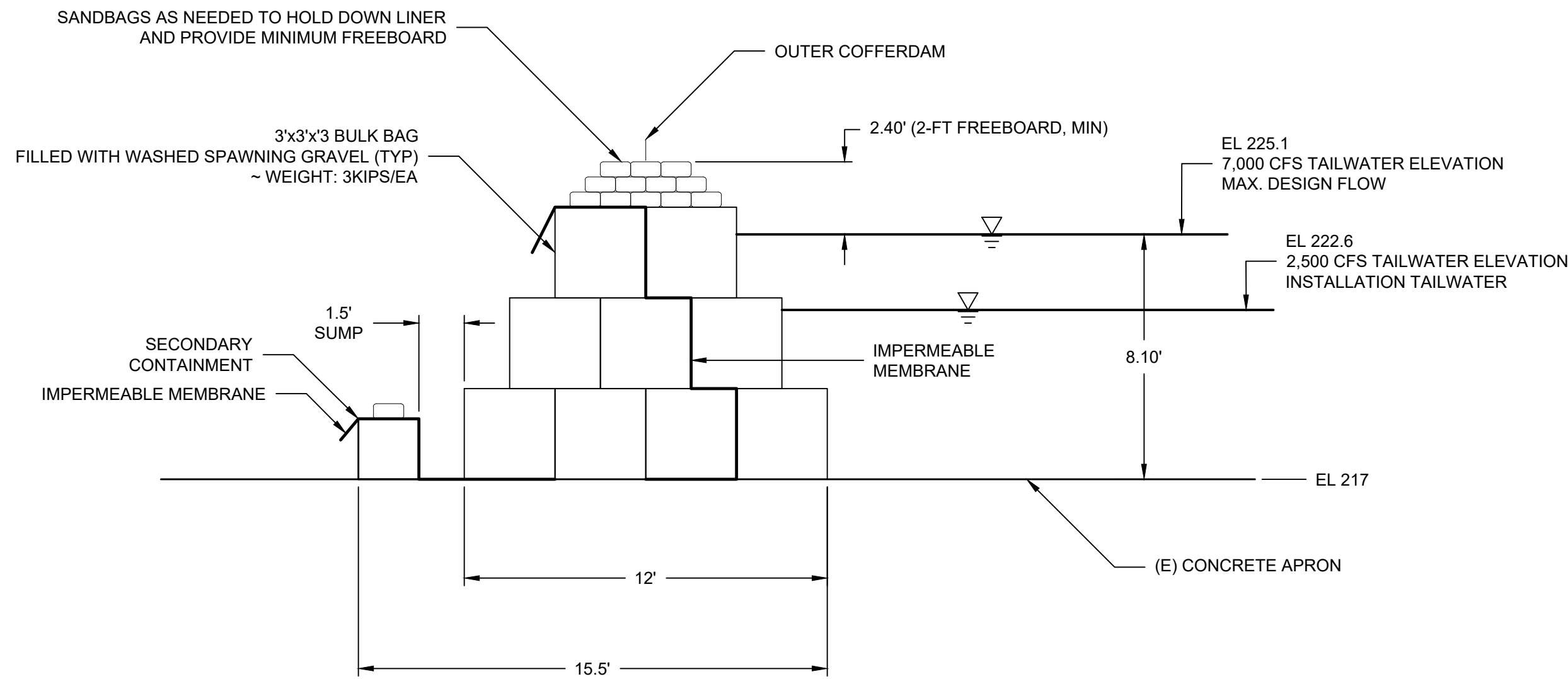
FOR BIDDING					
1	3/12/21	WATER QUALITY PROTECTION PLAN		CAS	
NO.	DATE	REVISION	DESCRIPTION	DRAWN	APPROVED
CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION					
COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE STAGE 3 CONTROL OF WATER					
REVIEWED		DESIGNED	RTI	DRAWN	CAS
		3/12/2021		STAMPED	RTI
APPROVED		DATE		DRAWING NO.	16
					SHEET No.16 of 59



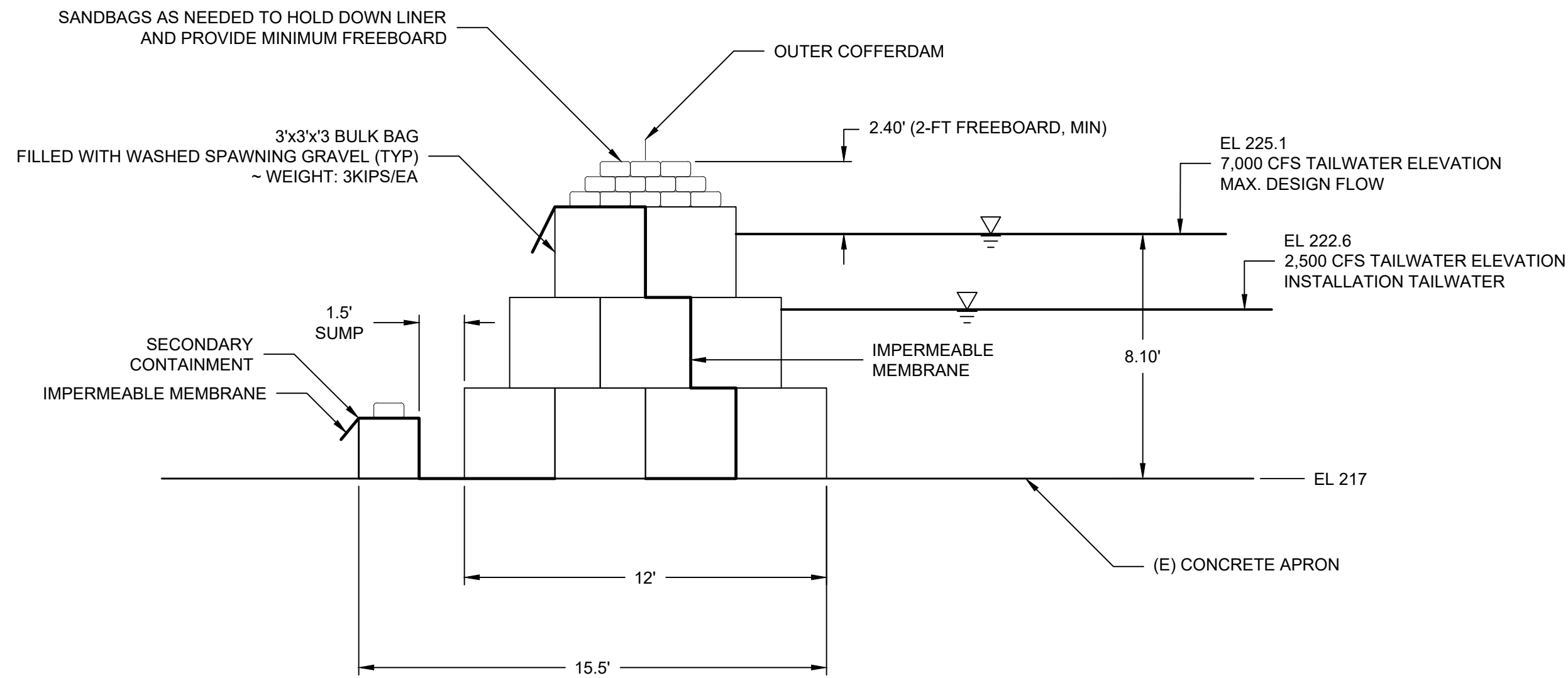
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PLOTTED: Corey Snider 3/12/2021 1:13 PM



1 COFFERDAM PERPENDICULAR TO FLOW - TYPICAL SECTION



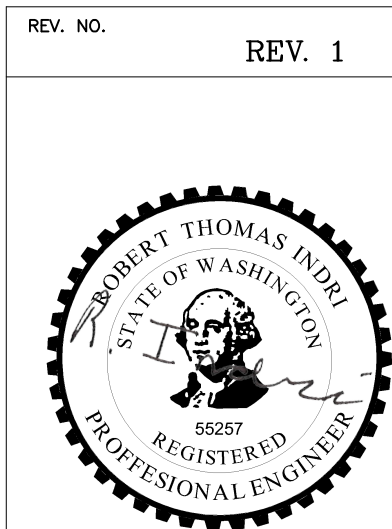
2 COFFERDAM PARALLEL TO FLOW - TYPICAL SECTION



3 DOWNSTREAM COFFERDAM PERPENDICULAR TO FLOW - TYPICAL SECTION

SCALE: 1/4"=1'-0"

WARNING  
0 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



APPLICABLE BMP'S:

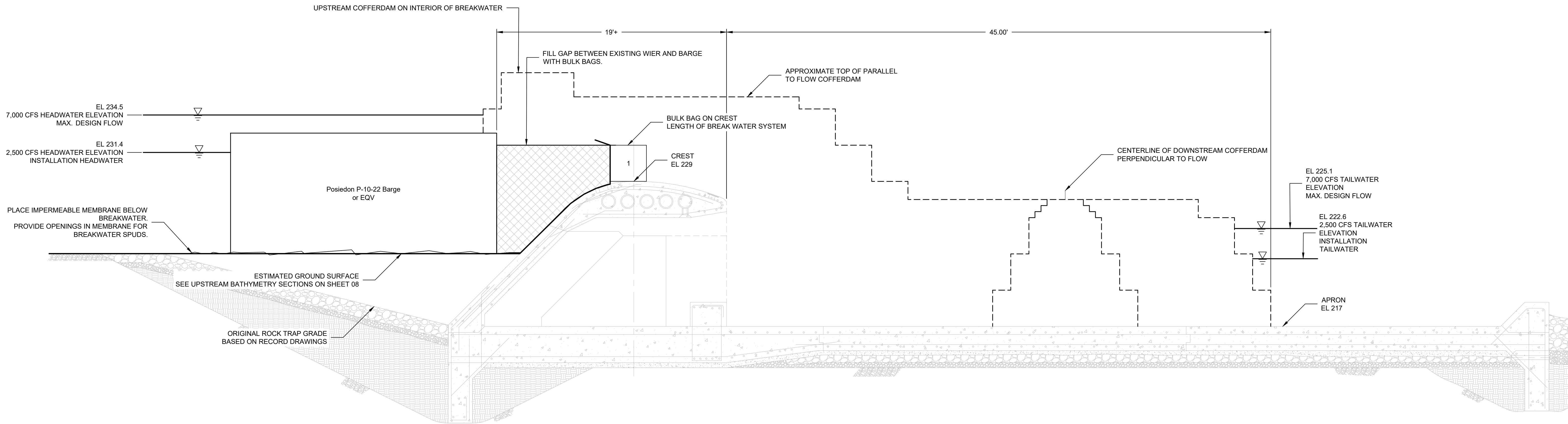
1. OUTER COFFERDAM CONSTRUCTED TO CONDUCT REPAIR IN THE DRY.
2. INNER SECONDARY CONTAINMENT CONSTRUCTED TO MINIMIZE LEAKAGE TO THE ACTIVE WORK AREA.
3. IMPERMEABLE MEMBRANE INSTALLED AROUND THE OUTER COFFERDAM AND WITHIN THE INNER SECONDARY CONTAINMENT STRUCTURE TO MINIMIZE WATER ENTERING THE ACTIVE WORK AREA.
4. ANY HOSES USED FOR CONVEYANCE OF WATER REMOVED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACE POLLUTION PREVENTION
7. BMPC252 TREATING AND DISPOSING OF HIGH PH WATER: WATER ENTERING THE ACTIVE WORK AREA WILL BE PUMPED TO AN UPLAND BAKER TANK FOR PH TREATMENT AND OVERLAND INFILTRATION.

FOR BIDDING

1	3/12/21	WATER QUALITY PROTECTION PLAN		CAS	
NO.	DATE	REVISION	DESCRIPTION	DRAWN	APPROVED
CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION					
COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE COFFERDAM DETAILS					
REVIEWED   					

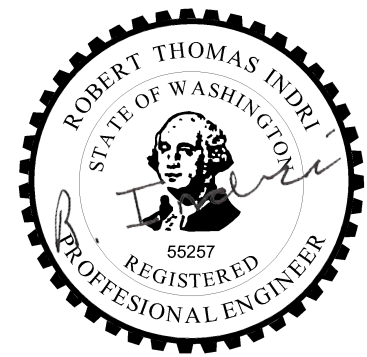


FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL\DESIGN\16 COFFERDAM DETAILS.dwg  
SAVED: csnider 3/12/2021 1:13 PM  
PLOTTED: Corey Snider 3/12/2021 1:14 PM



1 BREAKWATER END RETURN - TYPICAL SECTION

WARNING  
0 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FOR BIDDING					
1	3/12/21	WATER QUALITY PROTECTION PLAN		CAS	
NO.	DATE	REVISION	DESCRIPTION	DRAWN	APPROVED
CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION					
COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE COFFERDAM DETAILS					
REV. NO.		REV. 1			
DESIGNED		RTI		DRAWN CAS	
APPROVED		3/12/2021		STAMPED RTI	
		DATE		DRAWING NO.	
				18	
				SHEET NO.18 OF 59	



# Water Quality Protection Plan

## Cowlitz Barrier Dam Spillway Upgrade



**DRAFT**

Prepared for:

**Tacoma Power**

Prepared by



**15250 NE 95th Street  
Redmond, WA 98052**

**March 2021**



# **Water Quality Protection Plan**

## **Cowlitz Barrier Dam Spillway Upgrade**

**Prepared for:**

**Tacoma Power**

**Prepared by:**

**Kleinschmidt Associates, Inc.**

**15250 NE 95th Street**

**Redmond, WA 98052**

**March 2021**



# CONTENTS

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1	INTRODUCTION.....	1
1.1	GENERAL PURPOSE OF THE WATER QUALITY PROTECTION PLAN .....	1
1.2	EXISTING PERMITS AND REGULATIONS .....	1
2	PROJECT SUMMARY.....	1
3	PROJECT DESCRIPTION.....	2
4	PROJECT NARRATIVE.....	2
5	GENERAL WORK SEQUENCE .....	3
6	NEAR- AND/OR IN-WATER WORK.....	5
6.1	SPECIFIC NEAR- AND/OR IN-WATER WORK AREAS/ACTIVITIES .....	6
6.1.2	Channel Preparation .....	8
6.1.3	Installation of Temporary Cofferdam .....	9
6.1.4	Initial Dewatering of Work Area, Fish Salvage (as needed), and Leakage Management .....	11
6.1.5	Barrier Dam Repair Within Cofferdam .....	14
6.1.6	Left Bank Entrance Gate Modification .....	15
6.1.7	Cofferdam Removal .....	16
6.1.8	Gravel Augmentation.....	17
6.2	SUMMARY OF NEAR AND IN-WATER BMPs .....	18
6.2.1	General BMPs .....	18
6.2.2	Site-Specific BMPs.....	19
7	UPLAND WORK .....	20
7.1	SPECIFIC UPLAND WORK AREAS/ACTIVITIES.....	21
7.1.1	Scour Depression Repair.....	21
7.1.2	Installation of BMPs.....	23
7.1.3	Staging of Materials, Equipment, and Vehicles.....	24
7.1.4	Establishment/Reinforcement of Access Roads.....	26
7.1.5	Onsite Water Treatment.....	27
7.1.6	Demobilization of Construction Equipment and Materials, Site Restoration.....	28
7.2	SUMMARY OF UPLAND BMPs.....	29



8	WATER QUALITY MONITORING .....	31
8.1	APPLICABLE PROJECT CRITERIA AND INFORMATION.....	32
8.2	POINTS OF COMPLIANCE.....	32
8.2.1	pH Monitoring.....	32
8.2.2	Turbidity Monitoring .....	33
9	SITE INSPECTIONS .....	33
10	SITE MAPS .....	34
11	RELEVANT PROJECT CONTACTS .....	49
12	REFERENCES .....	50

## LIST OF FIGURES

---

Figure A.	Left side scour area infill site plan. ....	35
Figure B.	Contractor staging (scour hole repair). ....	36
Figure C.	TESC plan left (scour hole repair). ....	37
Figure 1.	Generalized location of staging and work areas. ....	38
Figure 2.	Left abutment access plan.....	39
Figure 3.	Left bank improvements.....	40
Figure 4.	Location and design of cofferdam and dewatering for Year 1.....	41
Figure 5.	Location and design of cofferdam and dewatering for Year 2.....	42
Figure 6.	Location and design of cofferdam and dewatering for Year 3.....	43
Figure 7.	Cofferdam details. ....	44
Figure 8.	Generalized location of actions and associated Best Management Practices (BMPs) on the left bank.....	45
Figure 9.	Generalized location of actions and associated Best Management Practices (BMPs) on the right bank. ....	46
Figure 10.	Silt fence details.....	47
Figure 11.	Seeding notes. ....	48



## LIST OF TABLES

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Table 1.	Project permits. ....	1
Table 2.	Summary of applicable project criteria and information. ....	32
Table 3.	Key contacts. ....	49

## LIST OF APPENDICES

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Appendix A – Hydraulic Project Approval

Appendix B – Technical Specification Section 01 57 60 Control of Water

Appendix C – Fish Salvage Plan



## ACRONYMS AND ABBREVIATIONS

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Acronym / Abbreviation	Explanation
AKART	All known, available and reasonable methods of prevention, control, and treatment
ATV	all-terrain vehicle
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CSWGP	Construction Stormwater General Permit
cfs	cubic feet per second
Ecology	Washington State Department of Ecology
gpm	gallons per minute
HPA	Hydraulic Project Approval
NTU	Nephelometric Turbidity Units
pH	Power of Hydrogen
WAC	Washington Administrative Code
WQC	Section 401 Water Quality Certification
WQPP	Water Quality Protection Plan



# 1 INTRODUCTION

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## 1.1 General Purpose of the Water Quality Protection Plan

The Water Quality Protection Plan (WQPP) is a compliance tool that provides the Washington State Department of Ecology (Ecology) with “reasonable assurance” of the protection of water quality.

## 1.2 Existing Permits and Regulations

The permits associated with this work are presented in Table 1.

**Table 1. Project permits.**

Permit	Number	Date(s)
401 Water Quality Certification	11-2001	1/15/2002
Construction Stormwater General Permit (CSWGP)	WAR309860	2/25/2021
HPA	2021-5-4+01	1/27/2021
USACE 404 Nationwide (Nationwide 3 and Nationwide 27)	NWS-2011-526-WRD	1/26/2021 - Barrier Dam Emergency Scour Hole Repair DATE TBD for Barrier Dam Spillway Upgrade

# 2 PROJECT SUMMARY

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Tacoma Power intends to perform required repair actions for the Cowlitz Barrier Dam Spillway Upgrade. Details include:

- Project/Site Name: Cowlitz Barrier Dam Spillway Upgrade
- Street/Location: 279 Barrier Dam Lane
- City: Salkum
- County: Lewis
- State: WA
- Zip code: 98582
- Parcel Numbers: 028099001001, 028105000000
- Location (latitude/longitude): 46.516204, -122.638104
- Waterbody: Cowlitz River
- FERC License Number: 2016 (FERC 2002)



This document presents the WQPP for activities related to the Cowlitz Barrier Dam Spillway Upgrade activity located in Lewis County, Washington. Activities performed under this WQPP are covered by Tacoma Power’s Hydraulic Project Approval (HPA), Cowlitz Barrier Dam Spillway Concrete Repairs (NWS-2011-526-WRD), issued by the Washington Department of Fish and Wildlife. The HPA covers the period 2/1/2021 through 9/30/2024 (see Appendix A).

This WQPP describes the project area, activities performed, water quality monitoring (turbidity and pH), and Best Management Practices (BMPs) utilized to prevent environmental degradation resulting from the actions. Ecology regulates hydroelectric projects as it relates to Section 401 Water Quality Certification (WQC) of the Federal Water Pollution Control Act (Clean Water Act 33) (U.S.C § 1341). Specific WQC conditions for the Cowlitz Hydroelectric Project (FERC No. 2016) are found in the WQCs dated 1/15/2002 (Order 11-2001, Ecology 2002), amended date 8/20/2002 (Amended Order No. DE02WQSR-4098A-01), and supplemental date 6/18/2003 (Supplemental Order in 01SEASR-3367). This construction activity and conditions are reflected in the WQC dated January 15, 2002, Section G. Construction Conditions 1 – 17. Tacoma Power, following Ecology’s guidance, has prepared this WQPP to comply with the above referenced documents. It is our intent to proceed with this work as soon as Ecology has provided written approval of this document and all required permits have been obtained, including an Ecology authorized Construction Stormwater General Permit.

### **3 PROJECT DESCRIPTION**

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Tacoma Power plans to repair and upgrade the Cowlitz Barrier Dam concrete spill weir and the stilling basin apron. In 2012, the Barrier Dam was inspected by Tacoma Power engineers, who discovered that the concrete apron slab immediately downstream of the apron curb is severely eroded, with the first layer of rebar fully exposed. Another inspection in 2017 again revealed significant scouring of the concrete apron and apron curb. A layout of the project area is shown in Figure 1. Access on the right bank is via existing paved roads constructed for the fish hatchery and boat launch. Access on the left bank is via a gravel road owned and operated by Washington Department of Natural Resources as shown in Figure 2.

### **4 PROJECT NARRATIVE**

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Approximately one third of the dam will be isolated by a cofferdam and repaired each season over three consecutive years starting in 2021. The left side (facing downstream) of the spillway will be repaired in the first year of construction, the middle section in year two, and the right section in the third year of construction. The repair of the spillway will involve placing a wedge of concrete at the downstream side of the existing weir. The concrete wedge will partially fill



the area beneath the weir and extend downstream of the upper lip of the existing weir with a fillet that will transition smoothly to a flat face at a 60-degree angle (from horizontal) and then transition through a lower return fillet to cover the horizontal surface of the damaged apron. This concrete wedge will eliminate the harmful vertical eddy and better pass bedload in addition to repairing the damaged slab and curb. Three other upgrades will be performed in addition to the basic concrete repair. Electrical conduits will be installed within the repair concrete which will span the dam for future use. A left bank bulkhead gate will be constructed at the downstream end of the left fishway (Figure 3). This bulkhead gate will allow the fishway and interior of the dam to be readily isolated from the river during the second and third construction seasons as well as for possible future improvements and maintenance within the interior of the dam and the left fishway. A removable flow deflector (stainless steel assembly) will be installed on the right side of the dam to improve flow conditions at the right fishway entrance.

Below is a description of each action addressed by this WQPP. Site maps included at the end of this document illustrate the locations of activities, compliance points and associated BMPs employed to minimize environmental impacts to the aquatic and terrestrial communities. Daily observation sheets will be completed by the CESCL or the field crew lead and submitted to Ecology via email. The email will summarize findings from the daily log sheets and any notable activities. The daily log sheets will be included as an attachment to the email. This communication will occur every two weeks. In addition, Tacoma Power will notify Ecology as soon as is practical for any emergency actions that have or need to occur.

## **5 GENERAL WORK SEQUENCE**

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The proposed project includes three years of seasonal work phases in 2021 to 2023. During each year, activities will include:

1. Installation of BMPs (effectiveness of BMPs will be monitored throughout the project and adaptive management employed to assure adequate protections are in place and functioning).
2. Upland staging of equipment and materials.
3. During the first year of construction, upland activities will include construction of a road from an existing all-terrain vehicle (ATV) trail for access to the left bank work areas.
4. Construction and placement of a cofferdam, including the following activities:
  - a. Channel preparation.



- b. Installation of anchors for breakwater restraint lines.
  - c. Deployment of modular float sections to form a breakwater.
  - d. Installation of 1 cubic yard bulk bags (up to 1,650 CY of material in each year) filled with washed rock in combination with an impermeable membrane (i.e., pvc coated polyester or similar) liner to form the primary cofferdam. Filling of bulk bags will occur within the identified work areas on the right and left bank.
5. Installation of temporary cofferdam panels at the left bank fishway entrance and at the southerly third point inside the dam during the first season and the northerly third point inside the dam during the second season to isolate the left fishway and interior of the dam.
6. Dewatering pumping and fish rescue.
7. Installation of a secondary interior barrier of sandbags and impermeable membrane (i.e., pvc coated polyester or similar) to intercept leakage through the primary cofferdam.
8. Installation of leakage pumping between the cofferdam and secondary barrier.
9. Installation of active construction area pumping, treatment, and upland dispersion system within the secondary interior barrier.
10. Work within the cofferdam to repair the Barrier Dam weir and apron including:
- a. Selective concrete cutting, core drilling, drilling, and other concrete demolition to prepare existing concrete for repair and upgrading,
  - b. Installation of reinforcing steel and electrical conduit,
  - c. Installing concrete forms,
  - d. Placing concrete,
  - e. Curing concrete,
  - f. Removing forms, and
  - g. Cleaning the work area.
11. During the first construction season, work will also include the installation of the left bank entrance gate. Following the implementation of dewatering and leakage systems this upgrade will include:
- a. Installation of the left bulkhead gate guide and hoist frames.



- b. Construction of the steel hoist maintenance platform and handrail over the fishway.
  - c. Construction of the walkway platform and handrail attached to the outside of the existing fishway concrete wall.
  - d. Construction of the cast-in-place concrete access stair leading from the top of the earth embankment down along the outside of the existing left fishway wall to the new steel access platform.
  - e. Installation of new 6-foot high chain link fencing and a gate along the top of the existing concrete fishway wall to replace the existing 3-foot high fencing to better restrict access to the left fishway.
12. During the 3<sup>rd</sup> and last construction season a removable stainless steel flow deflector assembly will be installed at the toe of the dam repair and adjacent to the right abutment wall.
13. Removal of the temporary cofferdam.
14. A portion of the material from the bulk bags may be reused in each construction year, then released into the Cowlitz River. The non-reused gravel may be released into the Cowlitz River to meet the requirements for the Gravel Augmentation Plan or stockpiled and released once the repair construction is complete. Fill from bulk bags will only be released if it meets the material specifications for the Gravel Augmentation Plan which requires ½-inch to 4-inch diameter uniformly graded washed rounded gravel.
15. Demobilization of construction equipment and materials, temporary site restoration in between construction seasons and final site restoration after the last construction season. Any stockpiled gravel meeting the Gravel Augmentation Plan specifications of ½-inch to 4-inch diameter uniformly graded washed rounded gravel may be augmented during the last construction season when repair is complete and the cofferdam is removed.

## **6 NEAR- AND/OR IN-WATER WORK**

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This section outlines the BMPs associated with the near or in-water work required for the Cowlitz Barrier Dam Repair project. Where appropriate, additional contingency measures are not limited to those mentioned. This plan recognizes the obligation to employ all known available and reasonable methods of prevention, control, and treatment (AKART) to prevent pollution of the waters of the State of Washington. Appropriate BMPs to prevent erosion and



sedimentation, and identify, reduce, eliminate or prevent water pollution associated with construction activities will be implemented. BMPs utilized for this project, and methodologies for their proper installation are found in the Department of Ecology 2019 Stormwater Management Manual for Western Washington (Ecology 2019).

Near- or in-water actions anticipated to occur as a component of the Cowlitz Barrier Dam Spillway Concrete Repair project include installation of a cofferdam to isolate portions of the barrier dam for repair including the installation of reinforcing steel and concrete pouring and curing and the construction of the left bank improvements. All activities involved in the construction of this project will be performed in the dry except for the installation of the cofferdam and associated fish exclusion techniques and gravel augmentation. Near- and/or in-water activities anticipated to occur include installation of cofferdam, dewatering of worksite including fish exclusion and salvage, and placement of gravels in accordance with the Gravel Augmentation Plan at the end of each construction season, or stockpiled for release at the end of the third season of activities. Below is a summary of specific near- or in-water work areas, activities/actions and associated BMPs that are anticipated to be utilized for the protection of water quality. Water quality monitoring of these actions is found in the subsections and in Section 8 below.

## **6.1 Specific Near- and/or In-Water Work Areas/Activities**

### **6.1.1 Scour Depression Repair**

#### ***Location of the Activities***

This work is located on the left side of the river channel that is adjacent to and approximately 50 feet upstream of the downstream lip of the dam weir structure. Work will occur during the first year of construction. Upland work in support of this activity is presented in Section 7.1.1 Scour Depression Repair.

See attached map (Figures A and B).

#### ***Description of Activities***

Bathymetric surveys conducted in September 2020 found a scour depression on the left side of the Cowlitz River channel bottom just upstream from the Cowlitz Barrier Dam. The scour extends down to an elevation near the upstream cutoff wall of the dam weir section and may undermine the footing of the left upstream abutment wall. The riverbed contours extend down to elevation 213 feet (ft) which is about 10 feet deeper than is typical across the majority of the dam. Repair of this scour depression is needed for two reasons:



1. To allow construction of the cofferdam (for the repair of the dam); and
2. To fill in the depression to ensure the long-term integrity of the dam by preventing additional scour that could undermine the left abutment wall footing and possibly lead to piping underneath the weir structure of the dam.

Design drawings for the scour area repair are provided in Figures A and B and include a site plan showing the bathymetry of the scour depression with the size of the material to be placed in each zone. Material will be placed via a land-based crane with bucket or grapple, excavator, or conveyor belt type gravel spreader. Material will be placed between the left training wall and station 0+60. The size of the material placed is dependent on identified zones of the scour depression.

Zone 1: Larger material (1.5 ft. to 4 ft. gradation) will be placed in Zone 1 which is the deepest part of the scour depression between elevation 213-221.5 ft.

Zone 2: Midsize material (0.3 ft. to 1.5 ft. gradation) will be placed in Zone 2 which is between elevation 217.5-221.5  $\pm$  1 ft. as well as placed against the dam.

Zone 3: Augmentation gravel (washed graded gravel 0.5 in to 4 in) is the top layer up to an elevation of 223 ft. Zone 3 is intended to establish a relatively flat surface for the breakwater structures and the upstream cofferdam.

Estimated quantities for the scour hole fill in each zone are provided in Figure A. The total area of the fill is 6,000 square feet with 3,600 square feet in the primary fill area and 2,400 square feet in the optional fill area. Material for the scour hole fill will be sourced from local quarries. No surface water withdrawals, surface water diversions, or discharge of waste materials to surface waters are associated with this effort.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.1 Scour Depression Repair, 7.1.2 Installation of BMPs, and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-Water BMPs include:

1. To minimize in-water work, material will be placed via a land-based crane with bucket or grapple, excavator, or conveyor belt type gravel spreader.
2. Visual turbidity monitoring will occur as described below. If a turbidity plume is observed at the point of compliance (300 feet downstream of in water work), placement of material will cease until the plume has dissipated.



## ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring by a Certified Erosion and Sediment Control Lead (CESCL). If a turbidity plume is present 300 feet downstream from where the material is being placed (or any other associated land based or in-water activity), actions outlined in Section 8.2.2 below will be followed.

### **6.1.2 Channel Preparation**

#### ***Location of the Activities***

This work is in the river channel that is adjacent to and approximately 50 feet upstream of the downstream lip of the dam weir structure. Work will occur sequentially in the left, middle, and right sections during years 1, 2, and 3. Upland work in support of this activity is presented in Section 7.

See attached maps (Figures 4 through 6).

#### ***Description of Activities***

Bathymetric surveys show the channel bottom to be uneven and unsuitable for installation of the temporary steel box needed to form a breakwater prior to placing the cofferdam and for the bulk gravel bags that form the cofferdam. A relatively level surface is required for construction of the cofferdam. The channel bottom surface will be leveled using placement of ½-inch to 4-inch diameter uniformly graded washed rounded gravel that is suitable for spawning gravel placed by a bucket and crane or other similar means depending on the location.

#### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-water BMPs include:

1. To minimize in-water work, material will be placed via a land-based crane with bucket or grapple, excavator, or conveyor belt type gravel spreader.
2. Visual turbidity monitoring will occur as described below. If a turbidity plume is observed at the point of compliance, placement of material will cease until the plume has dissipated.
3. The crane bucket will not linger above water and any removal of existing sediment will be done in a manner to prevent back wash from reentering the river. If sediment is



required to be placed in upland area, it will be done in a manner that will not allow dewatering water from reentering the river.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring by a Certified Erosion and Sediment Control Lead (CESCL). If a turbidity plume is present 300 feet downstream from where the channel preparation activity is occurring, actions outlined in Section 8.2.2 below will be followed.

## **6.1.3 Installation of Temporary Cofferdam**

### ***Location of the Activities***

This work is in the river channel that is adjacent to and approximately 50 feet upstream of the downstream lip of the dam weir structure and at breakwater anchor point locations that are specific small (approximately 10 feet by 10 feet) areas located up to several hundred feet upstream of the dam.

See attached maps (Figures 4 through 7).

### ***Description of Activities***

A temporary cofferdam will be installed around seasonal dam repair work areas to exclude waters from entering the work area prior to construction actions. The cofferdam will include a breakwater of sunken steel boxes that allow the installation and removal of an outer dam structure comprised of 1 cubic yard bulk bags filled with gravel and an impervious liner, and a secondary inner dam made up of an impervious liner and likely sandbags or temporary bulkheads. The steel boxes are large barge-like structures that will be floated into place, then filled with water and sunk end to end, and secured with steel rods or piles driven into the riverbed. Rope tethers will be used to maneuver the boxes into place and prevent them from being swept over the dam. The rope tethers will require anchors located at multiple points in upland areas adjacent to the river bank on both sides of the river (Figure 1). The anchors may be either concrete blocks cast into pits dug into the ground or steel rod and plate assemblies that are driven into the ground then pulled on to set the plate and verify the load capacity.

Bulk bags used for construction of the temporary cofferdam may be filled with ½-inch to 4-inch diameter uniformly graded washed rounded gravel that is suitable for spawning gravel. Some bulk bags may be filled with alternate material depending on the contractor's discretion based on the cofferdam construction to minimize leakage. Bags will be filled in the upland area then placed on an impervious membrane in the river and behind the breakwater to form the



cofferdam. The membrane will seal against the top of the concrete weir crest then weave back upstream through the bags to an elevation above the maximum anticipated water level during the in water work period. A perforated pipe will be installed just above the location where the membrane seals against the upstream portion of the dam to intercept leakage. Leakage collected in the pipe will be directed to a sump and pumped back into the river. Dewatering of the lower tailwater portion of the cofferdam is described in the next section (Section 6.1.3). Year 1 will include construction on the left bank section which will require approximately 1,100 bulk bags. Year 2 construction on the center section will require approximately 1,300 bulk bags. Construction on the right bank section in Year 3 will require approximately 1,000 bulk bags. Bulk bags will be placed from shore-based equipment or structures to the extent possible to minimize in-water equipment use. Shore-based equipment and structures for deploying the bags will be located above the ordinary high water mark. A crane positioned on a barge may be required to construct the more distant portions of the cofferdam, such as the mid-river location in Year 2.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs, 7.1.3 Staging of Materials, Equipment, and Vehicles, and 7.1.5 Onsite Water Treatment. In-water BMPs include:

1. A cofferdam will be constructed to conduct the repair within the dry (see hatched areas on Figures 4-6 Control of Water Stages 1, 2, and 3 and Figure 7 Cofferdam Details).
2. An impermeable seal membrane will be installed against the dam face, around the outer cofferdam, and within the inner secondary containment structure to minimize the water entering the active work zone (see Figure 7 Cofferdam Details).
3. A secondary containment structure will be constructed to minimize the amount of water in contact with the active construction area (Figure 7 Cofferdam Details).
4. Material in the bulk bags may consist of ½-inch to 4-inch diameter uniformly graded washed rounded gravel that is suitable for spawning gravel so that it can be released under the Gravel Augmentation Plan.
5. Water Treatment and infiltration system (Figure 8 work area L3 and Figure 9 work area R2) will be used to ensure water entering the active work zone will be treated for pH and land applied for infiltration. Water entering the active work area will be pumped upland into Baker Tanks located in the work area. Treatment will be performed in accordance with BMP C252: pH Control of High pH Water and as required in the technical specification Section 01 57 60 Control of Water Appendix B). The treated



water will be sampled to ensure it is between 8.5-6.5 pH before it is released for overland infiltration.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring by a Certified Erosion and Sediment Control Lead (CESCL). If a turbidity plume is present 300 feet downstream from the activity from where work on the temporary coffer dam is being constructed, actions outlined in Section 8.2.2 below will be followed.

## **6.1.4 Initial Dewatering of Work Area, Fish Salvage (as needed), and Leakage Management**

### ***Location of the Activities***

This work is in the dam structure that will be isolated by a given cofferdam for a particular season.

See attached maps (Figures 4 through 6).

### ***Description of Activities***

The area contained by the cofferdam on the downstream side of the dam (tailwater area) will be slowly dewatered through use of pumps over an approximately 6 hour period each construction season. Assuming no leakage, the volume of water within the cofferdam would require a dewatering flow of 700 gallons per minute (gpm) to dewater within a 6 hour duration. Self-cleaning, screened electric submersible water pumps will be used. Placement of the cofferdam is anticipated to occur when the river is flowing at about 2,500 cubic feet per second (cfs), resulting in a tailwater elevation of approximately 222.60-feet or a depth of 5.6 feet over the existing concrete tailwater apron. Technical specification 015760 – Control of Water requires a fish criterion screened dewatering system with a minimum capacity of 3,000 gpm along with a fully redundant backup system.

In addition to the main area over the dam apron, two other areas will need separate dewatering pumps. One area is the leakage upstream of the dam crest. This leakage will be collected in a perforated pipe located next to the dam crest and beneath the bulk gravel bags. At a minimum, this system will require 12 inch perforated pipe leading to a sump pump with a minimum capacity of 1,000 gpm. This system shall have a fully redundant backup system in place should the primary system fail. Another area is the space inside the dam that will be isolated when the water drops below the 2 foot high curb that separates it from the main dewatered area above the apron. A 50-gpm pump will likely be needed to do the final

dewatering of this area. Each dewatering pump intake will be outfitted with cylindrical screen with Number 12 stainless steel mesh (0.07-inch square openings) and with an area sized to limit the approach velocity to 0.4 feet per second at the rated flow to prevent entrainment or impingement of fish. The screens will be equipped with rotating spray bars to continuously clean the screen and prevent debris clogging. Details for fish salvage are outlined in the Fish Salvage Plan for the Tacoma Barrier Dam Repair (Appendix C).

Initially, the dewatering pumps will be placed in a stilling well, suspended from a floating pontoon platform. This approach will allow the pumps to be suspended near the water surface during the dewatering process. Initial dewatering is calculated to occur over roughly a 6 hour period before the pumps are placed on the channel bottom. Water levels in the project area will be dewatered to a depth that concentrates the water to the deepest section of each drawdown area such that the remaining salvage area can be waded. The water level will be maintained until capture efforts are no longer effective at catching fish. Dewatering will then resume until all remaining water has been removed from the project area. Surface water pulled from the isolated area will be pumped back directly to the river until a visual turbidity plume is observed 300 ft. downstream of the release point. If a visual turbidity plume is observed 300 feet downstream, then the remaining water will be routed upland to a vegetative area within one of the identified work areas (Figures 8 and 9) for filtration.

After initial dewatering is complete some leakage is anticipated through both the outer and inner coffer dams during the repair. Most of the cofferdam leakage will be intercepted in the sump formed by the outer and inner dams. The dams will be sealed to the existing concrete structure of the Barrier Dam with bulk bags and an impervious membrane which will minimize leakage. Leakage that passes the outer dam structure will be discharged directly back into the river. Leakage or precipitation that passes the inner dam and enters the active work area will be pumped to portable storage and treatment tanks and treated for pH. Treatment for pH will maintain discharged water to within a pH range of 6.5 to 8.5. Chemical treatment will require Ecology's approval. Treatment logs will be maintained on site and, at minimum will include the date/time, measured pH, method of treatment, volume of the sample size (tank size), and measured pH before discharge (to ensure it is within the 6.5-8.5 standard). Treated process water will be discharged via overland infiltration on site. Approximately 5,000 gallons per day (3.5 gpm) of leakage is anticipated through the secondary containment within the cofferdam and will be treated via the Baker tanks, and sampled prior to dispersion. A minimum capacity of 50 gpm will be a requirement for treatment and dispersion as described in the technical specification Section 01 57 60 Control of Water. Dispersion of the flow will take place in a relatively flat upland area using sprinklers such as two 1 inch impact sprinkler operating at 60



psi and distributing water over a radius of 65 feet resulting in an application rate of 0.18 inches per hour over an area of 0.6 acres to allow appropriate infiltration and minimal ponding (Figures 8 and 9). Pumping from tanks will only occur when it does not cause runoff of any treated water during storm events.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-water BMPs include:

1. A fish salvage plan (see Appendix C) has been prepared to capture and release fish within each cofferdam section once it is first constructed (R2 2020).
2. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day.
3. The dewatering pump system shall have a fully redundant backup system in place should the primary system fail. Multiple pumps will be maintained on site, and replaced as soon as one is not functioning.
4. Electric submersible pumps will be used to eliminate the need for refueling within the in-water work area.
5. Water Treatment and infiltration system (Figure 8 work area L3 and Figure 9 work area R2) will be used to ensure water entering the active work zone will be treated for pH and land applied for infiltration. Water entering the active work area will be pumped upland into Baker Tanks located in the work area. Treatment will be performed in accordance with BMP C252: pH Control of High pH Water and as required in the technical specification Section 01 57 60 Control of Water Appendix A). Chemical treatment will require Ecology's approval. The treated water will be sampled to ensure it is within the appropriate range (6.5-8.5) before it is released for overland infiltration.
6. Any hoses used for conveyance of the water extracted from the active work area will be pressure tested to ensure no leaks.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring by a Certified Erosion and Sediment Control Lead (CESCL). If a turbidity plume is present 300 feet downstream from the dewatering discharge, actions outlined in Section 8.2.2 below will be followed. pH monitoring will occur of the treated water stored in the Baker Tanks and will be sampled prior to release for overland infiltration to ensure it is between 6.5 and 8.5.

### **6.1.5 Barrier Dam Repair Within Cofferdam**

#### ***Location of the Activities***

The activities are located within the dam structure and the cofferdam that will be installed for a given season.

See attached maps (Figures 4 through 6).

#### ***Description of Activities***

Once initial dewatering is complete, repair of the barrier dam will begin. The repair will include removing rocks/debris and cleaning the weir/apron (no detergent), prepping the surface, drill and dowel the concrete, installation of the reinforcing steel, installation of the forms, pouring and curing of the concrete, and removal of the forms. Electrical conduit will also be installed and cast into the dam repair conduit for future use.

#### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles.

1. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day.
2. BMP C151: Concrete Handling.
3. BMP C152: Sawcutting and Surface Pollution Prevention.
4. The dewatering pump system shall have a fully redundant backup system in place should the primary system fail. Multiple pumps will be maintained on site, and replaced as soon as one is not functioning.
5. BMP C252: A Water Treatment and Infiltration System (Figure 8 work area L3 and Figure 9 work area R2) will be used to ensure water entering the active work zone will be treated for pH and land applied for infiltration. Water entering the active work area will be pumped upland into Baker Tanks located in the work area. Treatment will be performed in accordance with BMP C252: pH Control of High pH Water and as required in the technical specification Section 01 57 60 Control of Water Appendix A). Chemical treatment will require Ecology's approval. The treated water will be sampled for pH to ensure it is within the appropriate range (6.5-8.5) before it is released for overland infiltration.



6. Any hoses used for conveyance of the water extracted from the active work area will be pressure tested to ensure no leaks.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring. If a turbidity plume is present 300 feet downstream from the dewatering discharge, actions outlined in Section 8.2.2 below will be followed. pH monitoring will occur of the treated water stored in the Baker Tanks and will be sampled prior to release for overland infiltration to ensure it is between 6.5 and 8.5. Additional monitoring will occur in the upland around the treatment system and infiltration area through the CSWGP.

### **6.1.6 Left Bank Entrance Gate Modification**

#### ***Location of the Activities***

The activities are located within the south side of the dam structure and the cofferdam that will be installed on the left bank fishway opening to the river. The left bank (looking downstream) fishway entrance is a concrete channel between the weir structure of the dam and the earth embankment of the dam.

See attached schematic (Figure 3).

#### ***Description of Activities***

During the first year of the construction, improvements will be made at the left bank fishway by installing a bulkhead gate with access platform and walkway. The improvements will also include the installation of electrical conduit that extend from the left fishway channel, through a concrete wall and into the new dam repair concrete (eventually extending to the right bank fishway structure). The work area will be isolated from the river as part of the dam repair.

Installation of the bulkhead gate will include drilling and installing epoxy anchors in the existing concrete of the fishway channel to anchor the guide frame. After the guide frame is installed and aligned, grout will be packed between the frame assembly and the concrete wall and floor and the bulkhead gate will be lowered into place. Epoxy anchors will also be installed at the top of the existing concrete wall to fasten the bulkhead hoist frame and access platform to the top of the walls and after installation the mounting plates for these structures will be grouted to the concrete. A steel frame walkway with steel grating will be mounted to the outside (toward the land) of the concrete fishway wall with epoxy anchors. Cast in place concrete stairs will be constructed on the existing rip/rap grade from this walkway to the top of the earthen embankment. This work will be within a filter fence barrier detailed on the construction

drawings and described in the technical specification Section 31 25 13 Erosion and Sediment Control. The installation of the conduits will require cutting holes through an existing concrete wall, mounting conduit on the existing wall, and extending conduit into the space inside the existing weir portion of the dam that will be filled with repair concrete.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-water BMPs include:

1. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day.
2. BMP C151: Concrete Handling.
3. BMP C152: Sawcutting and Surface Pollution Prevention.
4. BMP C252: pH Control of High pH Water.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring. If a turbidity plume is present 300 feet downstream from the construction of the left bank entrance gate, actions outlined in Section 8.2.2 below will be followed. pH monitoring will occur of the treated water stored in the Baker Tanks and will be sampled prior to release for overland infiltration to ensure it is between 6.5 and 8.5 within the range of water quality standards.

## **6.1.7 Cofferdam Removal**

### ***Location of the Activities***

This work is in the river channel that is adjacent to and approximately 50 feet upstream of the downstream lip of the dam weir structure. Upland work in support of this activity is presented in Section 7.

See attached maps (Figures 4 through 6).

### ***Description of Activities***

After the repair, concrete will be given time to cure and the area will be cleaned of any potential pollutants and debris then rinsed with wash down water that will be treated and pumped, sampled for pH, and dispersed in an upland area. Once this is complete, the cofferdam system will be removed. Bags and membrane will be removed in a downstream to upstream progression. Divers will be required to rig bags for removal once the bags and former



work area becomes submerged. Gravel from the bags will either be stored for future use, emptied into trucks for offsite disposal, or transferred into the river to the predetermined gravel augmentation area (Figure 1) to serve as fish spawning gravel augmentation. Gravel augmentation will occur with ½-inch to 4-inch diameter uniformly graded washed rounded gravel. Once all the bags and membrane have been removed then the breakwater segments will be re-floated and removed from the river.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-water BMPs include:

1. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring. If a turbidity plume is present 300 feet downstream from the cofferdam removal point, actions outlined in Section 8.2.2 below will be followed.

## **6.1.8 Gravel Augmentation**

### ***Location of Activities and Associated BMPs***

This work is in the river channel downstream of the dam at the specified location for gravel augmentation placement and will be dispersed by the river during high flow events for fish spawning gravel augmentation. Upland work in support of this activity are presented in Section 7.

See attached maps (Figure 1).

### ***Description of Activities***

Bulk bags used for construction of the temporary coffer dam may be filled with ½-inch to 4-inch diameter uniformly graded washed rounded gravel that is suitable for spawning gravel. Gravel storage handling will take place at the contractor's discretion in one of the identified work areas. A portion of gravel from the bulk bags will be reused in each construction year. Any gravel not intended for reuse can either be released immediately or stockpiled and released into the Cowlitz River at the end of the construction project to meet the requirements for the Gravel Augmentation Plan. Gravel will be released from the bank to the Gravel Augmentation Area identified in Figure 1. All equipment stationed within the identified work areas using a

crane and bucket arrangement, long reach excavator, or a dump truck outfit with a conveyor belt system (gravel shooter). No in-water deployment of machinery or equipment will be required for release of the gravel.

### ***Associated BMPs***

Upland BMPs for this activity are outlined in Section 7.1.2 Installation of BMPs and 7.1.3 Staging of Materials, Equipment, and Vehicles. In-water BMPs include:

1. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day.
2. Material used for the gravel augmentation plan may consist of ½-inch to 4-inch diameter uniformly graded washed rounded gravel that will be used under the Gravel Augmentation Plan.
3. Gravel release will employ crane and bucket arrangement, long reach excavator, or a telebelt conveyor system such that no in-water work will be required.

### ***Monitoring***

Associated monitoring for this activity will include visual turbidity monitoring. If a turbidity plume is present 300 feet downstream from the point at which gravel augmentation is released, actions outlined in Section 8.2.2 below will be followed.

## **6.2 Summary of Near and In-water BMPs**

### **6.2.1 General BMPs**

1. All equipment will be staged within the identified work areas.
2. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day and recorded on the daily site log sheets.
3. Accumulations of soils or other debris will be removed from the drive mechanisms and undercarriage of utilized equipment prior to performing work.
4. Equipment will be checked for leaks and necessary repairs prior to commencing in- or near-water actions.
5. Equipment will be positioned to protect and minimize disturbance to riparian vegetation.



6. Equipment will remain on developed roadways and structures as practical.
7. Equipment will operate below ordinary high water but drive mechanisms (wheels, tires, tracks, etc.) will not enter the wetted perimeter.
8. Refueling activities will be performed a minimum of 50 ft. away from waters of the state, as provided in WQC condition.
9. Dump truck bed will be sealed or lined to prevent leakage of saturated spoils.
10. Spoils will not be stockpiled in or adjacent to waters of the state to prevent turbid backflow.
11. Water quality will be monitored as appropriate (see Water Quality Monitoring Section 8 below).
12. BMP C151: Concrete Handling.
13. BMP C152: Sawcutting and Surface Pollution Prevention.
14. BMP C153: Material Delivery Storage and Containment.
15. BMP C154: Concrete Washout Area.
16. BMP C251: Construction Stormwater Filtration.
17. BMP C252: pH Control of High pH Water.

### **6.2.2 Site-Specific BMPs**

The following near- and in-water BMPs may be utilized and are included in the attached site plans.

1. To minimize in-water work for the scour hole repair, material will be placed via a land-based crane with bucket or grapple, excavator, or conveyor belt type gravel spreader.
2. A cofferdam will be constructed to conduct the repair within the dry (see hatched areas on Figures 4-7 Control of Water Stages 1, 2, and 3 and Cofferdam Details).
3. A secondary containment structure will be constructed to minimize the amount of water in contact with the active construction area (Figure 7 Cofferdam Details).
4. Water Treatment and infiltration system (Figure 8 Work Area L3 and Figure 9 Work Area R2) will be used to ensure water entering the active work zone will be treated for pH and land applied for infiltration. Treatment will be performed in accordance with BMP C252: pH Control of High pH Water and as required in the technical specification Section

01 57 60 Control of Water. The treated water will be sampled to ensure it is between 6.5 and 8.5 before it is release for infiltration.

5. Pumping from the Baker tanks for dispersion via infiltration will only occur when it does not cause runoff of any treated water during storm events. The dewatering pump system shall have a fully redundant backup system in place should the primary system fail. Multiple pumps will be maintained on site, and replaced as soon as one becomes spent/dead/not functioning.
6. A fish salvage plan (see Appendix C) has been prepared to capture and release fish within each cofferdam section once it is first constructed (R2 2020).
7. An impermeable seal membrane will be installed above the “wedge” and around the outer cofferdam and within the inner secondary containment structure to minimize the water entering the active work zone (see Figure 7).
8. Material in the bulk bags may consist of ½-inch to 4-inch diameter uniformly graded washed rounded gravel that is suitable for spawning gravel and will be released under the Gravel Augmentation Plan.
9. Gravel release will employ crane and bucket arrangement, long reach excavator, or a telebelt conveyor system such that no in-water work will be required.

Any hoses used for conveyance of the water extracted from the active work area will be inspected daily to ensure no leaks. If any leaks are found, the hoses will be repaired or replaced if needed.

## **7 UPLAND WORK**

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This section outlines the BMPs associated with the upland work required for the Cowlitz Barrier Dam Repair project. Where appropriate, additional contingency measures are not limited to those mentioned. This plan recognizes the obligation to employ all known available and reasonable methods of prevention, control, and treatment (AKART) to prevent pollution of the waters of the State of Washington. Appropriate BMPs to prevent erosion and sedimentation, and identify, reduce, eliminate or prevent water pollution associated with construction activities will be implemented. BMPs utilized for this project, and methodologies for their proper installation are found in the Department of Ecology 2019 Stormwater Management Manual for Western Washington (Ecology 2019).

Upland work that will occur as a result of the Cowlitz Barrier Dam Spillway Concrete Repairs project includes mobilization and demobilization; transportation, staging of materials,



equipment, and vehicles; anchorage for breakwater tethering system; temporary storage of process water at an upland site with no connectivity to waters of the state; treatment of that water and dispersal for overland infiltration. Leakage or precipitation water removed from the inner coffer dam will be transported to Baker tanks located within the work area on either the right or left bank. While in the Baker tank, the water will be treated for pH using carbon dioxide sparging or food grade vinegar, no additional water will be added to the tank after treatment and sampling for pH, and then if between 6.5 and 8.5 pH, the water may be pumped to an area within one of the construction work areas for infiltration. The infiltration location will facilitate onsite cleaning of the process water by providing natural filtration through vegetation and substrate. Additional BMPs (silt fence with and without plastic and straw wattles) may be installed around the perimeter of the temporary infiltration site as needed to prevent or minimize discharge of turbid waters. Each of these activities are described in detail below.

## **7.1 Specific Upland Work Areas/Activities**

### **7.1.1 Scour Depression Repair**

#### ***Location of Activities***

Upland scour hole repair activities will occur within the identified work areas as shown in Figures A, B, and C.

#### ***Description of Activities***

Upland activities associated with the scour hole repair include: stabilization and maintenance of access roads; staging of materials, equipment, and vehicles; placement of rock in the scoured area from equipment located on the levee adjacent to the scour hole; demobilization of construction equipment; and site stabilization until phase 2 begins. Construction access will occur from the left bank (see Figure B). Material will be placed via a land-based crane with bucket or grapple. A crane which will be located in Work Area L2 will lift the rock material stored in Work Area L1 and place it in the river.

#### ***Associated BMPs***

Associated upland BMPs for the scour depression repair include:

1. All equipment will be staged within the identified work areas.
2. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day and recorded on the daily site log sheets.

3. Accumulations of soils or other debris will be removed from the drive mechanisms and undercarriage of utilized equipment prior to performing work.
4. Equipment will be checked for leaks and necessary repairs prior to commencing in- or near-water actions.
5. Equipment will be positioned to protect and minimize disturbance to riparian vegetation.
6. Equipment will remain on developed roadways and structures as practical.
7. Equipment will operate below ordinary high water but drive mechanisms (wheels, tires, tracks, etc.) will not enter the wetted perimeter.
8. Refueling activities will be performed a minimum of 50 ft. away from waters of the state, in a designated area as provided in WQC condition.
9. Dump truck bed will be sealed or lined to prevent leakage of saturated spoils.
10. Spoils will not be stockpiled in or adjacent to waters of the state to prevent turbid backflow.
11. Water quality will be monitored as appropriate (see Monitoring Section below).
12. BMP C101: Preserving Natural Vegetation.
13. BMP C102: Buffer Zones. A buffer zone will be maintained between the waters edge and any work areas.
14. BMP C107: Construction Road/Parking Area Stabilization. Construction road access will be maintained and parking areas stabilized to minimize erosion and sediment runoff.
15. BMP C120: Temporary and Permanent Seeding. Temporary ground stabilization of all work areas will be conducted after construction is complete prior to the beginning of Phase 2.
16. BMP C150: Materials on Hand. Erosion prevention and sediment control materials will be kept on the project site at all times to be used for regular maintenance and emergency situations.
17. BMP C153: Material Delivery, Storage and Containment. The contractor will minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.
18. BMP C160: Certified Erosion and Sediment Control Lead. A Certified Erosion and Sediment Control Lead will be on site.



19. BMP C162: Scheduling. Sequencing the of the project will be conducted to reduce the amount and duration of soil exposure and potential erosion.
20. BMP C207: Check Dams. Check dams will be installed along the edge of the road on the left bank toward Work Area L1.
21. BMP C233: Silt Fence. Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figure C) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
22. BMP C235: Wattles.

BMPs can be found in the 2019 Stormwater Management Manual for Western Washington (Ecology 2019).

### ***Monitoring***

Monitoring of turbidity will occur for any stormwater generated in the upland construction work area on the left bank that flows off the construction site into waters of the state. A stormwater monitoring point is identified on the left bank on Figure C, but monitoring must also occur for any other stormwater generated on site that crosses the permitted disturbed construction boundary. In addition, as identified in Section 6, scour depression repair activities will also include visual in-water monitoring 300 feet downstream from the activity.

### **7.1.2 Installation of BMPs**

#### ***Location of Activities***

See attached maps (Figures 1, 8, and 9).

#### ***Description of Activities***

BMPs installed for upland work.

#### ***Associated BMPs***

1. BMP C233: Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figures 8-10) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
2. BMP C107: Construction Road/Parking Area Stabilization.
3. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.

4. BMP C160: Certified Erosion and Sediment Control Lead.
5. BMP C162: Scheduling.
6. BMP C236: Vegetative Filtration.
7. BMP C251: Construction Stormwater Filtration.
8. BMP C235: Wattles.

### ***Monitoring***

Monitoring of pH and turbidity will occur for any stormwater generated in the upland construction work area that will be discharged to waters of the state.

## **7.1.3 Staging of Materials, Equipment, and Vehicles**

### ***Location of Activities***

See attached maps (Figures 1, 8, and 9).

### ***Description of Activities***

Staging of equipment utilized for the concrete repair work and associated coffer dam installation. The first year will use left bank work areas L1-L4. The second season may use both left and right bank staging areas. The third season will use right bank work areas R1, R2, and R3.

### ***Associated BMPs***

1. All equipment will be staged within the identified work areas.
2. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day and recorded on the daily site log sheets.
3. Accumulations of soils or other debris will be removed from the drive mechanisms and undercarriage of utilized equipment prior to performing work.
4. Equipment will be checked for leaks and necessary repairs prior to commencing in- or near-water actions.
5. Equipment will be positioned to protect and minimize disturbance to riparian vegetation.
6. Equipment will remain on developed roadways and structures as practical.
7. Equipment will operate below ordinary high water but drive mechanisms (wheels, tires, tracks, etc.) will not enter the wetted perimeter.



8. Refueling activities will be performed a minimum of 50 ft. away from waters of the state, as provided in WQC condition.
9. Dump truck bed will be sealed or lined to prevent leakage of saturated spoils.
10. Spoils will not be stockpiled in or adjacent to waters of the state to prevent turbid backflow.
11. Water quality will be monitored as appropriate (see Water Quality Monitoring Section 8 below).
12. Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figures 8-10) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
13. BMP C102: Buffer Zones.
14. BMP C107: Construction Road/Parking Area Stabilization.
15. BMP C120: Temporary and Permanent Seeding.
16. BMP C150: Materials on Hand.
17. BMP C151: Concrete Handling.
18. BMP C152: Saw cutting and Surfacing Pollution Prevention.
19. BMP C153: Material Delivery, Storage and Containment.
20. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.
21. BMP C160: Certified Erosion and Sediment Control Lead.
22. BMP C162: Scheduling.
23. BMP C233: Silt Fence.
24. BMP C235: Wattles.
25. BMP C236: Vegetative Filtration.
26. BMP C251: Construction Stormwater Filtration.
27. BMP C252: pH Control for High pH Water.
28. Water quality will be monitored as appropriate (see Water Quality Monitoring Section 8 below).

## ***Monitoring***

Monitoring of pH and turbidity will occur for any stormwater generated in the upland construction work area that will be discharged to waters of the state.

### **7.1.4 Establishment/Reinforcement of Access Roads**

#### ***Location of Activities and Associated BMPs***

See attached maps (Figures 1 and 2).

#### ***Description of Activities***

An ATV trail will be converted to a short roadway segment to allow the contractor access to work area L1. This roadway segments will be capped with 1.5-inch angular aggregate rock and established with a width of approximately 14 feet. Prior to installing the aggregate rock, the roadway will be lightly graded. The thickness of the aggregate rock cap will be between 6 and 12 inches, depending on what is necessary to smooth the roadway surface. A geogrid fabric will be installed below the aggregate rock cap to stabilize the rock, reduce the overall thickness of aggregate rock needed, and reduce migration of the aggregate and subgrade that could occur from general use and from winter and spring runoff. These access improvements will use heavy trucks, bulldozers and excavators to place, grade and compact gravel surfacing for the existing ATV trail to provide contractor access to work area L1. The main access road on the left bank may require minimal maintenance and surfacing.

#### ***Associated BMPs***

Associated BMPs include:

1. Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figures 8-10) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
2. Permanent ground stabilization and restoration will occur for all work areas after year 3 construction is complete (see Figures 8-11).
3. BMP C102: Buffer Zones.
4. BMP C107: Construction Road/Parking Area Stabilization.
5. BMP C120: Temporary and Permanent Seeding.
6. BMP C150: Materials on Hand.
7. BMP C151: Concrete Handling.



8. BMP C152: Saw cutting and Surfacing Pollution Prevention.
9. BMP C153: Material Delivery, Storage and Containment.
10. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.
11. BMP C160: Certified Erosion and Sediment Control Lead.
12. BMP C162: Scheduling.
13. BMP C233: Silt Fence.
14. BMP C236: Vegetative Filtration.
15. BMP C251: Construction Stormwater Filtration.

### ***Monitoring***

Monitoring of pH and turbidity will occur for any stormwater generated in the upland construction work areas (L1-L4 and R1-R3) that will be discharged to waters of the state.

## **7.1.5 Onsite Water Treatment**

### ***Location of Activities***

See attached maps (Figures 8 and 9). The onsite water treatment tanks will be located within the identified work areas as shown on Figure 8 (L3 on the left bank) and Figure 9 (R2 on the right bank). Dispersal of water will occur within an identified area located within the work area.

### ***Description of Activities***

Leakage, precipitation that passes the inner dam and enters the work area, and process water used for concrete cutting and cleaning will be pumped to a portable storage and treatment tanks and treated for pH using either carbon dioxide sparging or food grade vinegar. Any chemical treatment requires Ecology approval. Treatment will occur in the tanks and only discharged after sampling records a pH between 6.5-8.5. Treated process water will be discharged via overland infiltration in work areas on either bank.

### ***Associated BMPs***

1. Pumping from tanks will only occur when it does not cause runoff of any treated water during storm events.
2. Additional BMPs (silt fence and straw wattles) may be installed around the perimeter of the temporary infiltration site as needed to prevent discharge of turbid waters.

3. BMP C151: Concrete Handling.
4. BMP C152: Saw cutting and Surfacing Pollution Prevention.
5. BMP C153: Material Delivery, Storage and Containment.
6. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.
7. BMP C160: Certified Erosion and Sediment Control Lead.
8. BMP C162: Scheduling.
9. BMP C233: Silt Fence.
10. BMP C236: Vegetative Filtration.
11. BMP C252: pH Control for High pH Water.

### ***Monitoring***

Monitoring of the treated process water will occur prior to discharge to ensure it meets the standard of between 6.5-8.5.

## **7.1.6 Demobilization of Construction Equipment and Materials, Site Restoration**

### ***Location of Activities***

See attached maps (Figures 1, 8-11).

### ***Description of Activities***

Upland work will continue up to two months after in-water work has ceased. Activities mostly include demobilization of construction equipment and materials, temporary or permanent ground stabilization of work areas between construction seasons and final site restoration after the last construction season.

### ***Associated BMPs***

1. BMP C102: Buffer Zones.
2. BMP C107: Construction Road/Parking Area Stabilization.
3. BMP C120: Temporary ground stabilization of all work areas will be conducted after year 1 and year 2 construction is complete.

4. BMP C120: Permanent ground stabilization and restoration will occur for all work areas after year 3 construction is complete (see Figures 8-11).
5. BMP C150: Materials on Hand.
6. BMP C151: Concrete Handling.
7. BMP C152: Saw cutting and Surfacing Pollution Prevention.
8. BMP C153: Material Delivery, Storage and Containment.
9. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.
10. BMP C160: Certified Erosion and Sediment Control Lead.
11. BMP C162: Scheduling.
12. BMP C233: Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figures 8-10) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
13. BMP C236: Vegetative Filtration.
14. BMP C251: Construction Stormwater Filtration.
15. BMP C252: pH Control for High pH Water.

### ***Monitoring***

Monitoring of pH and turbidity will occur for any stormwater generated in the upland construction work areas (L1-L4 and R1-R3) that will be discharged to waters of the state.

## **7.2 Summary of Upland BMPs**

This WQPP includes adaptive management employing AKART which is expected at all locations. The following upland BMPs may be utilized and are included in the attached site plans.

1. All equipment will be staged within the identified work areas.
2. Equipment utilized will be free of external petroleum based products while working in- or near-water. An external examination of the equipment will occur at the beginning and end of each day and recorded on the daily site log sheets.
3. Accumulations of soils or other debris will be removed from the drive mechanisms and undercarriage of utilized equipment prior to performing work.



4. Equipment will be checked for leaks and necessary repairs prior to commencing in- or near-water actions.
5. Equipment will be positioned to protect and minimize disturbance to riparian vegetation.
6. Equipment will remain on developed roadways and structures as practical.
7. Equipment will operate below ordinary high water but drive mechanisms (wheels, tires, tracks, etc.) will not enter the wetted perimeter.
8. Refueling activities will be performed a minimum of 50 ft. away from waters of the state, as provided in WQC condition.
9. Dump truck bed will be sealed or lined to prevent leakage of saturated spoils.
10. Spoils will not be stockpiled in or adjacent to waters of the state to prevent turbid backflow.
11. Water quality will be monitored as appropriate (see Water Quality Monitoring Section 8 below).
12. Silt Fences will be installed around all work areas and will be maintained over the duration of the project (see Figures 8-10) and in accordance with the technical specification Section 31 25 13 Erosion and Sedimentation Control.
13. Pumping from tanks will only occur when it does not cause runoff of any treated water during storm events.
14. Additional BMPs (silt fence and straw wattles) may be installed around the perimeter of the temporary infiltration site as needed to prevent discharge of turbid waters.
15. Temporary ground stabilization of all work areas will be conducted after year 1 and year 2 construction is complete (BMP C120).
16. Permanent ground stabilization and restoration will occur for all work areas after year 3 construction is complete (see Figures 8-11).
17. BMP C101: Preserving Natural Vegetation.
18. BMP C102: Buffer Zones.
19. BMP C107: Construction Road/Parking Area Stabilization.
20. BMP C120: Temporary and Permanent Seeding.
21. BMP C150: Materials on Hand.

22. BMP C151: Concrete Handling.
23. BMP C152: Saw cutting and Surfacing Pollution Prevention.
24. BMP C153: Material Delivery, Storage and Containment.
25. BMP C154: Concrete Washout Area. The washout area must be lined and may not include any discharge to ground or waters of the state. Any process water must be pumped to the Baker Tanks and treated for pH.
26. BMP C160: Certified Erosion and Sediment Control Lead.
27. BMP C162: Scheduling.
28. BMP C233: Silt Fence.
29. BMP C235: Wattles.
30. BMP C236: Vegetative Filtration.
31. BMP C251: Construction Stormwater Filtration.
32. BMP C252: pH Control for High pH Water.

BMPs can be found in the 2019 Stormwater Management Manual for Western Washington (Ecology 2019).

## **8 WATER QUALITY MONITORING**

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Visual turbidity monitoring will be employed during in-water work periods. Per Washington Administrative Code 173-201A-200 (1)(e)(i)(D), a temporary area of mixing shall be as follows:

- For projects within or along waters above 100 cfs flow at the time of actions, the point of compliance shall be three hundred feet (300 feet) downstream of the activity causing the turbidity exceedance. If multiple activities are occurring in the river at the same time, the compliance point is measured from the most upstream activity.

## 8.1 Applicable Project Criteria and Information

A summary of applicable project criteria and information is provided in Table 2.

**Table 2. Summary of applicable project criteria and information.**

Criteria	Narrative
Aquatic Life Use Category	Core Summer Salmonid Habitat
Temporary Area of Mixing for Turbidity	(A) For waters up to 10 cfs flow at the time of actions, the point of compliance shall be one hundred feet downstream of the activity causing the turbidity exceedance. (B) For waters above 10 cfs up to 100 cfs flow at the time of actions, the point of compliance shall be two hundred feet downstream of the activity causing the turbidity exceedance. (C) For waters above 100 cfs flow at the time of actions, the <b>point of compliance shall be three hundred feet</b> downstream of the activity causing the turbidity exceedance.
Aquatic Life pH Criteria in Freshwater	pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

## 8.2 Points of Compliance

### 8.2.1 pH Monitoring

**Compliance Point 1:** In the Baker Tanks prior to discharge for overland infiltration.

Process water generated from inside the secondary cofferdam construction area or from the concrete washout area will be pumped to the upland baker tanks. Once a tank is full or ready for discharge, it will be sampled for pH utilizing strip technology or similar. Any water with a pH outside the 6.5-8.5 standard will be treated for pH using either carbon dioxide sparging or food grade vinegar. Once the water is treated, it will be discharged via overland infiltration to areas identified in work area L3 and work area R2.

**Compliance Point 2:** At any discharge from the permitted disturbed boundary must be sampled for pH.

Stormwater generated onsite will be monitored (as needed depending on weather conditions) for pH utilizing strip technology or similar. Stormwater with a pH of 6.5 to 8.5 are acceptable to be discharged directly to the Cowlitz River or the upland infiltration location. No process water will be discharged to waters of the state. Project discharge outside of the 6.5-8.5 pH range may



be pumped to temporary storage tanks stored in the upland area and disposed of via overland infiltration once elevated pH values (above 8.5) are treated. Results of monitoring will be recorded in a logbook (discussed below) that will be kept on site.

### **8.2.2 Turbidity Monitoring**

**Compliance Point 1:** 300 foot radius from the in-water activity.

Visual turbidity monitoring will be performed throughout construction and dewatering actions. If a visible turbidity plume is observed at a point of compliance (300 feet from the location of the action taking place), it will be documented on a site inspection form/logbook, actions will be suspended and Ecology's Environmental Report Tracking System (ERTS) will be reported. ERTS phone number is 360.407.6300. Additionally, Ecology's Southwest Regional Office Federal Permit Coordinator, Carol Serdar (360-742-9751) will be notified. If multiple in-water activities are occurring, the compliance point is 300 feet from the most upstream activity. Work stoppage will continue until the turbidity plume has completely dissipated and no visual difference in turbidity is perceived between the area outside of the actions influence and the area adjacent to the action.

**Compliance Point 2:** Any discharge location from the permitted disturbed boundary must be sampled for turbidity, where it discharges from the CSWGP disturbed boundary.

Stormwater generated onsite will be monitored for turbidity using a turbidity meter. Turbidity monitoring will be documented on a site inspection form/logbook.

## **9 SITE INSPECTIONS**

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Daily site monitoring/inspections and any other required monitoring will be led by a Certified Erosion and Sediment Control Lead (CESCL). A site monitoring/inspections log containing date/time, monitoring/inspection data (including tables) and comments will be kept on site at all times along with this WQPP. The comments section of the log sheet should include what activity was occurring in the river, and the visual turbidity observations from that in-water activity. The CESCL will examine discharge for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They will evaluate and document in the monitoring/inspection log the effectiveness of the installed BMPs and determine if repair or replacement of any BMP is warranted to improve the quality of project discharge. Any major changes to the WQPP and associated BMPs will be approved by Ecology prior to the use, unless it is deemed an emergency. See attached list of contacts below.

## **10 SITE MAPS**

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**Figure A. Left side scour area infill site plan.**

**Figure B. Contractor staging (scour hole repair).**

**Figure C. TESC plan left (scour hole repair).**

**Figure 1. Generalized location of staging and work areas.**

**Figure 2. Left abutment access plan.**

**Figure 3. Left bank improvements.**

**Figure 4. Location and design of cofferdam and dewatering for Year 1.**

**Figure 5. Location and design of cofferdam and dewatering for Year 2.**

**Figure 6. Location and design of cofferdam and dewatering for Year 3.**

**Figure 7. Cofferdam details.**

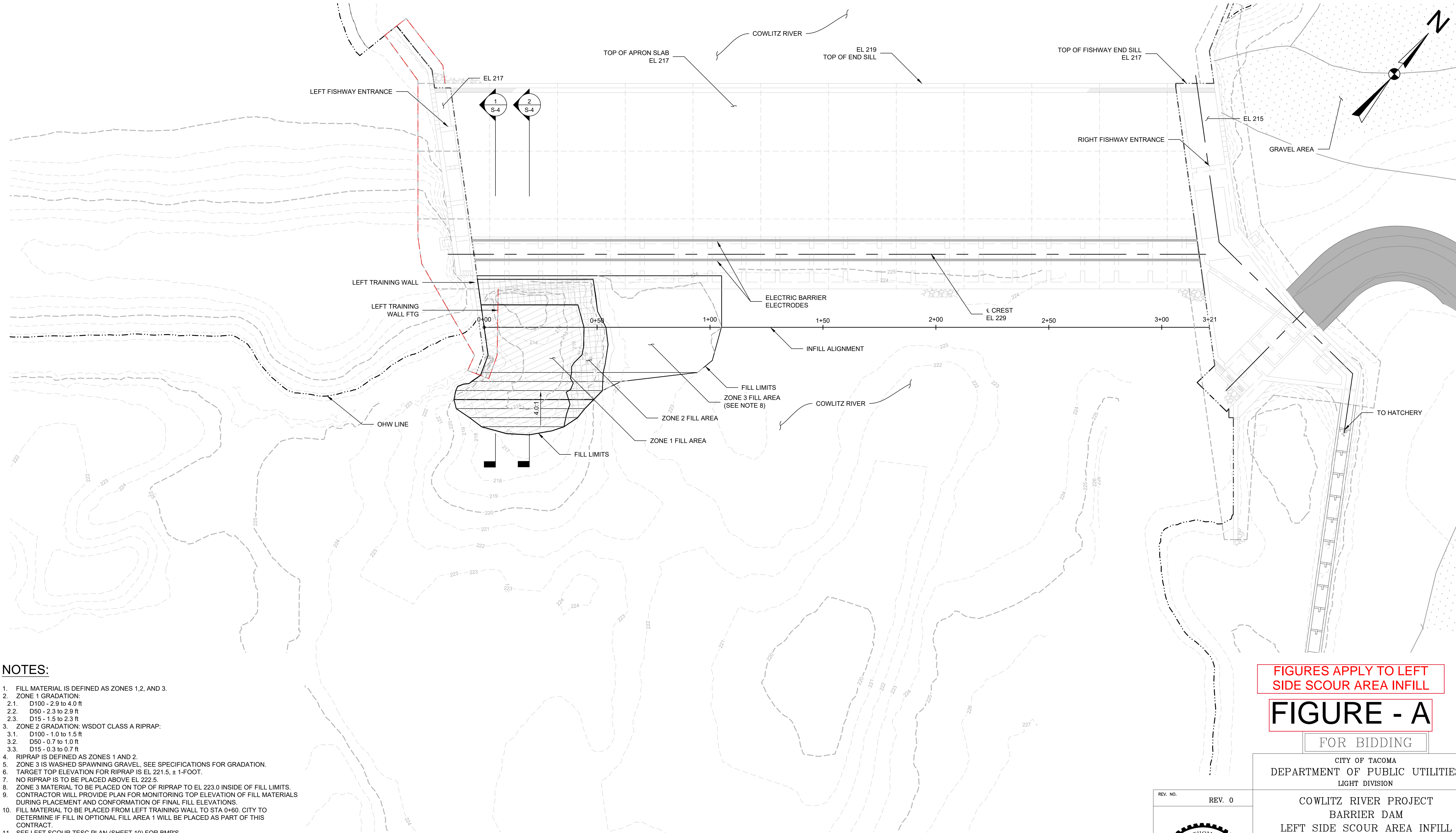
**Figure 8. Generalized location of actions and associated Best Management Practices (BMPs) on the left bank.**

**Figure 9. Generalized location of actions and associated Best Management Practices (BMPs) on the right bank.**

**Figure 10. Silt fence details.**

**Figure 11. Seeding notes.**

FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL\_DESIGN\Left\_Scour\_WOPP\Figures Project\Figures ABC\4 FILL PLACEMENT PLAN-V3\_FigureA.dwg  
SAVED: csnider 3/9/2021 12:17 AM  
PLOTTED: Corey Snider 3/9/2021 12:20 AM



NOTES:

1. FILL MATERIAL IS DEFINED AS ZONES 1, 2, AND 3.
2. ZONE 1 GRADATION:
  - 2.1. D100 - 2.9 to 4.0 ft
  - 2.2. D50 - 2.3 to 2.9 ft
  - 2.3. D15 - 1.5 to 2.3 ft
3. ZONE 2 GRADATION: WSDOT CLASS A RIPRAP:
  - 3.1. D100 - 1.0 to 1.5 ft
  - 3.2. D50 - 0.7 to 1.0 ft
  - 3.3. D15 - 0.3 to 0.7 ft
4. RIPRAP IS DEFINED AS ZONES 1 AND 2.
5. ZONE 3 IS WASHED SPAWNING GRAVEL, SEE SPECIFICATIONS FOR GRADATION.
6. TARGET TOP ELEVATION FOR RIPRAP IS EL 221.5, ± 1-FOOT.
7. NO RIPRAP IS TO BE PLACED ABOVE EL 222.5.
8. ZONE 3 MATERIAL TO BE PLACED ON TOP OF RIPRAP TO EL 223.0 INSIDE OF FILL LIMITS.
9. CONTRACTOR WILL PROVIDE PLAN FOR MONITORING TOP ELEVATION OF FILL MATERIALS DURING PLACEMENT AND CONFORMATION OF FINAL FILL ELEVATIONS.
10. FILL MATERIAL TO BE PLACED FROM LEFT TRAINING WALL TO STA 0+60. CITY TO DETERMINE IF FILL IN OPTIONAL FILL AREA 1 WILL BE PLACED AS PART OF THIS CONTRACT.
11. SEE LEFT SCOUR TESC PLAN (SHEET 10) FOR BMP'S.

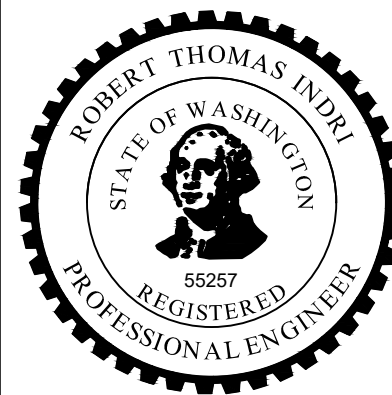
ESTIMATED QUANTITIES:

- |  |                     |
|--|---------------------|
| 1. AREA OF FILL TOTAL:                       | 6,000 SF / 666.7 SY |
| 2. AREA OF FILL AREA (PRIMARY):              | 3,600 SF / 400 SY   |
| 3. AREA OF FILL AREA (OPTIONAL FILL AREA 1): | 2,400 SF / 266.7 SY |
| 4. ZONE 1:                                   | 340 CY              |
| 5. ZONE 2:                                   | 220 CY              |
| 6. ZONE 3 (PRIMARY):                         | 190 CY              |
| 7. ZONE 3 (OPTIONAL FILL AREA 1):            | 60 CY               |
| 8. TOTAL FILL (ALL AREAS):                   | 810 CY              |

--- EXISTING FOOTING



WARNING  
0 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FIGURES APPLY TO LEFT SIDE SCOUR AREA INFILL

FIGURE - A

FOR BIDDING

CITY OF TACOMA DEPARTMENT OF PUBLIC UTILITIES LIGHT DIVISION			
COWLITZ RIVER PROJECT BARRIER DAM LEFT SIDE SCOUR AREA INFILL SITE PLAN			
REVIEWED	DESIGNED	DRAWN	
	RTI	RTI	
	12/10/2020	STAMPED	
	DATE	RTI	
APPROVED	DRAWING NO.	S-2	
		SHEET NO. 2 OF 5	



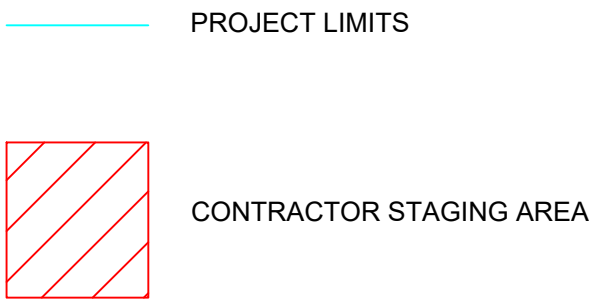
FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL\_DESIGN\Left\_Scour\_WOPP\WOPP\_Figures Project\Figures ABC\08 CONTRACTOR STAGING\_FigureB.dwg      SAVED: csnider    3/8/2021 11:04 PM      PLOTTED: Corey Snider    3/8/2021 11:55 PM



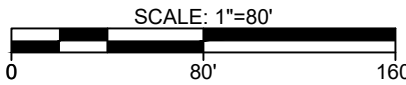
SUMMARY OF WORK AREAS	
DISTURBED AREA	AREA (AC)
WORK AREA L1	0.48
WORK AREA L2	0.21
WORK AREA L3	1.74
WORK AREA L4	0.67
WORK AREA R1	0.52
WORK AREA R2	2.77
WORK AREA R3	0.42
ACCESS ROAD & ATV TRAIL	0.66
GRAVEL AUGMENTATION AREA	2.05
IN-WATER WORK AREA	0.77

PROJECT LIMITS DISTURBED AREAS:

LEFT SIDE DISTURBED AREA = 7.47 AC  
RIGHT SIDE DISTURBED AREA = 6.04 AC

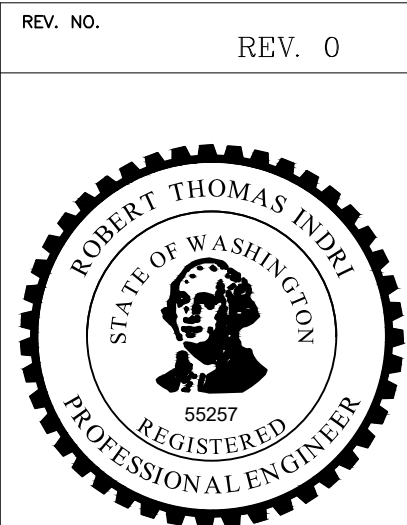


1 CONTRACTOR STAGING AREA - PLAN



NOTE:

- TREES ADJACENT TO RIVER TO BE PRESERVED.
- EXISTING TREES WITH TRUNKS GREATER THAN 6"Ø TO BE PRESERVED IN ALL RIGHT BANK WORK AREAS.
- APPROVAL BY OWNER OR ENGINEER IS REQUIRED FOR REMOVAL OF TREES WITH TRUNKS GREATER THAN 12"Ø FOR IMPROVING WORK AREAS ON LEFT SIDE BANK.
- GRAVEL AUGMENTATION AREA SHALL BE LOCATED 80' DOWNSTREAM OF THE END OF THE SPILLWAY APRON, AND 50' OFF THE SHORELINE.
- ANCHOR BLOCKS TO BE DESIGNED AND INSTALLED BY CONTRACTOR AND LOCATED ABOVE OHW.
- SEE SHEET 05 FOR RIGHT SIDE CONCRETE WASH OUT.
- GRAVEL AUGMENTATION WILL HAVE ADDITIONAL TURBIDITY MONITORING POINT 300 FT DOWNSTREAM FROM PLACEMENT.



FIGURES APPLY TO LEFT SIDE SCOUR AREA INFILL

FIGURE - B

FOR BIDDING

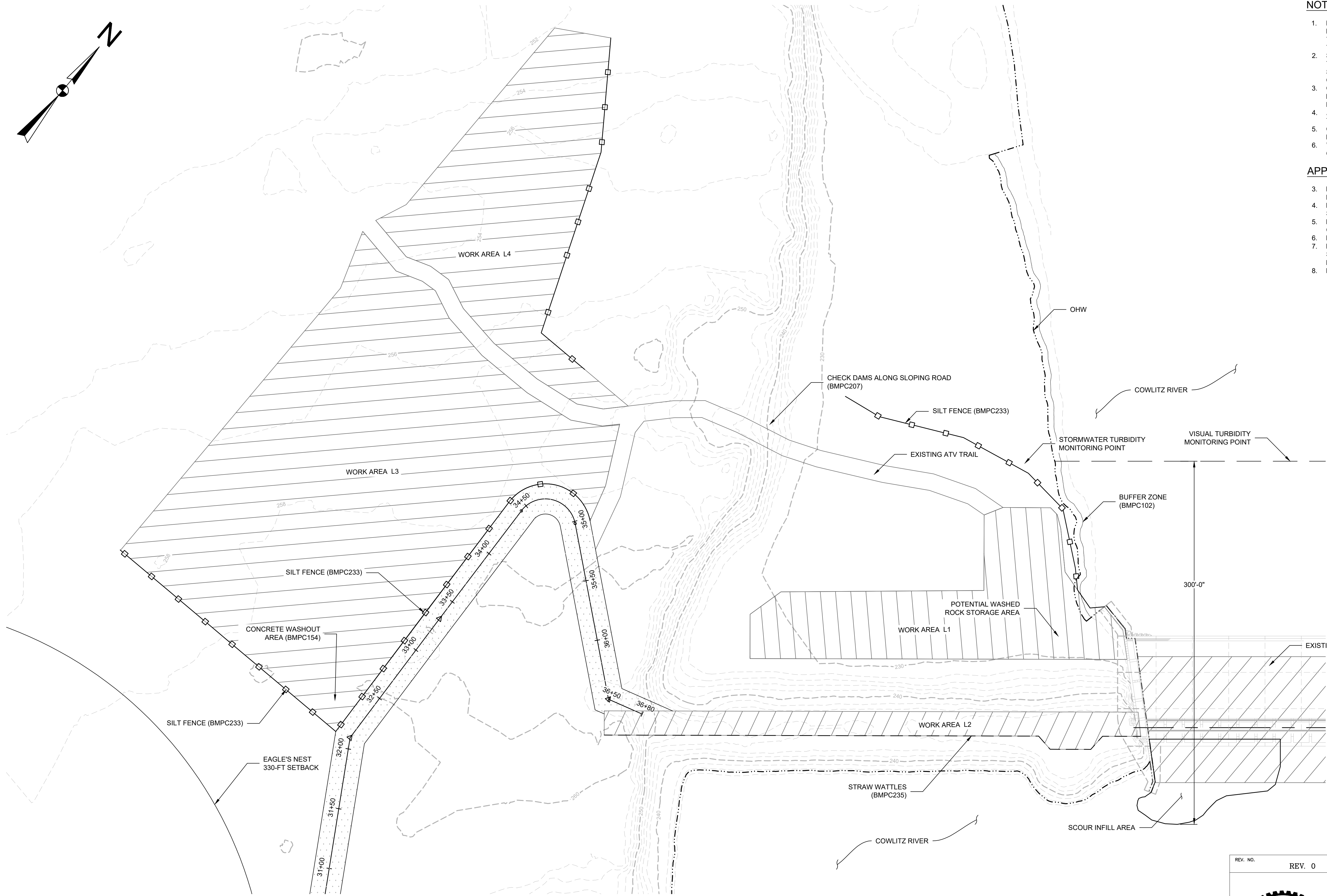
CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
CONTRACTOR STAGING

REVIEWED	DESIGNED RTI	DRAWN CAS
APPROVED	DATE 12/21/2020	STAMPED RTI
	DRAWING NO. 09	
	SHEET NO. 09	OF 59



FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL DESIGN\Left Scour\WOPP\Figures\Project\Figures ABC\09 TESC Plan Left and Right Left Scour\FigureC.dwg  
SAVED: csnider 3/9/2021 12:27 AM  
PLOTTED: Corey Snider 3/9/2021 1:11 AM



NOTES:

1. IN-WATER COMPLIANCE MONITORING WILL OCCUR 300 FEET DOWNSTREAM OF THE MOST UPSTREAM ACTIVITY. IF A VISUAL TURBIDITY PLUME IS PRESENT AT THIS LOCATION, PLACEMENT OF THE MATERIAL WILL CEASE UNTIL THE PLUME HAS DISSIPATED.
2. STORMWATER RUNOFF MONITORING FOR TURBIDITY TO OCCUR AT THE MONITORING POINT OR AT ANY OTHER POINT WHERE STORMWATER GENERATED CROSSES THE PERMITTED DISTURBED CONSTRUCTION BOUNDARY.
3. OVERWINTER STORAGE STOCKPILES IN WORK AREAS L1, L3, AND L4 MUST BE STABILIZED WITH APPLICABLE BMP'S. SEE WOPP FOR MORE INFORMATION.
4. ANY DISCHARGE FROM WORK AREAS MUST BE MONITORED FOR TURBIDITY.
5. CONTRACTOR MAY ELECT TO USE SMALLER WORK AREAS AND WILL NEED TO ADJUST BMP'S ACCORDINGLY.
6. WASHINGTON STATE DEPARTMENT OF ECOLOGY CONTACT: CAROL SERDAR T/ (306) 742-9751 E/ CAROL.SERDAR@ECY.WA.GOV

APPLICABLE BMP'S:

3. BMPC101 - NATURAL VEGETATION SHOULD BE PRESERVED WHERE POSSIBLE IN WORK AREAS L1, L2, L3, AND L4.
4. BMPC107 - CONSTRUCTION ROADS AND PARKING AREAS TO BE STABILIZED.
5. BMPC120 - TEMPORARY STABILIZATION OF ALL WORK AREAS AFTER CONSTRUCTION IS COMPLETE.
6. BMPC150 - EROSION MATERIALS TO BE KEPT ON-SITE.
7. BMPC153 - MATERIALS WILL BE STORED IN A DESIGNATED AREA AND SECONDARY CONTAINMENT WILL BE USED FOR ANY HAZARDOUS MATERIALS.
8. BMPC160 - A CESL WILL BE ON-SITE.

FIGURES APPLY TO LEFT  
SIDE SCOUR AREA INFILL

FIGURE - C

FOR BIDDING

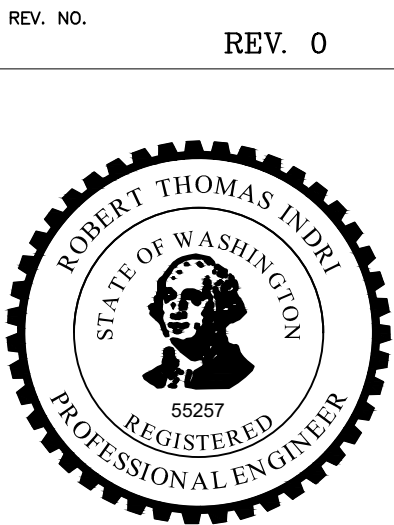
CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
TESC PLAN LEFT

DESIGNED	RTI	DRAWN	CAS
DATE	12/21/2020	STAMPED	RTI
DRAWING NO.	10	SHEET NO.10	OF 59

1 TESC PLAN - LEFT ABUTMENT  
SCALE: 1"=40'  
0 40' 80'

WARNING  
0 1  
IF THIS BAR DOES  
NOT MEASURE 1"  
THEN DRAWING IS  
NOT TO SCALE





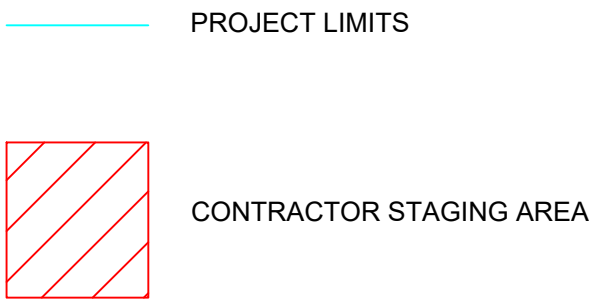
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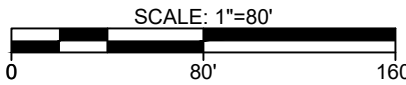
SUMMARY OF WORK AREAS	
DISTURBED AREA	AREA (AC)
WORK AREA L1	0.48
WORK AREA L2	0.21
WORK AREA L3	1.74
WORK AREA L4	0.67
WORK AREA R1	0.52
WORK AREA R2	2.77
WORK AREA R3	0.42
ACCESS ROAD & ATV TRAIL	0.66
GRAVEL AUGMENTATION AREA	2.05
IN-WATER WORK AREA	0.77

PROJECT LIMITS DISTURBED AREAS:

LEFT SIDE DISTURBED AREA = 7.47 AC  
RIGHT SIDE DISTURBED AREA = 6.04 AC



1 CONTRACTOR STAGING AREA - PLAN



NOTE:

- TREES ADJACENT TO RIVER TO BE PRESERVED.
- EXISTING TREES WITH TRUNKS GREATER THAN 6"Ø TO BE PRESERVED IN ALL RIGHT BANK WORK AREAS.
- APPROVAL BY OWNER OR ENGINEER IS REQUIRED FOR REMOVAL OF TREES WITH TRUNKS GREATER THAN 12"Ø FOR IMPROVING WORK AREAS ON LEFT SIDE BANK.
- GRAVEL AUGMENTATION AREA SHALL BE LOCATED 80' DOWNSTREAM OF THE END OF THE SPILLWAY APRON, AND 50' OFF THE SHORELINE.
- ANCHOR BLOCKS TO BE DESIGNED AND INSTALLED BY CONTRACTOR AND LOCATED ABOVE OHW.
- SEE SHEET 05 FOR RIGHT SIDE CONCRETE WASH OUT.
- GRAVEL AUGMENTATION WILL HAVE ADDITIONAL TURBIDITY MONITORING POINT 300 FT DOWNSTREAM FROM PLACEMENT.

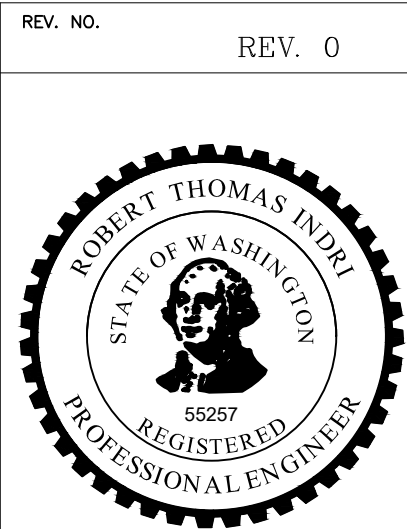
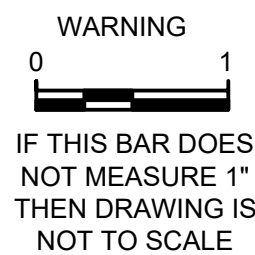


FIGURE - 1

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
CONTRACTOR STAGING

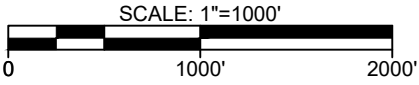
REVIEWED	DESIGNED RTI	DRAWN CAS
APPROVED	DATE 12/21/2020	STAMPED RTI
DRAWING NO. 09		SHEET NO. 09 OF 59



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SAVED: rindri 11/10/2020 11:43 AM  
PLOTTED: Corey Snider 2/4/2021 1:34 AM



1 LEFT ABUTMENT ACCESS - PLAN



WARNING  
0 1  
IF THIS BAR DOES  
NOT MEASURE 1"  
THEN DRAWING IS  
NOT TO SCALE



# FIGURE - 2

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

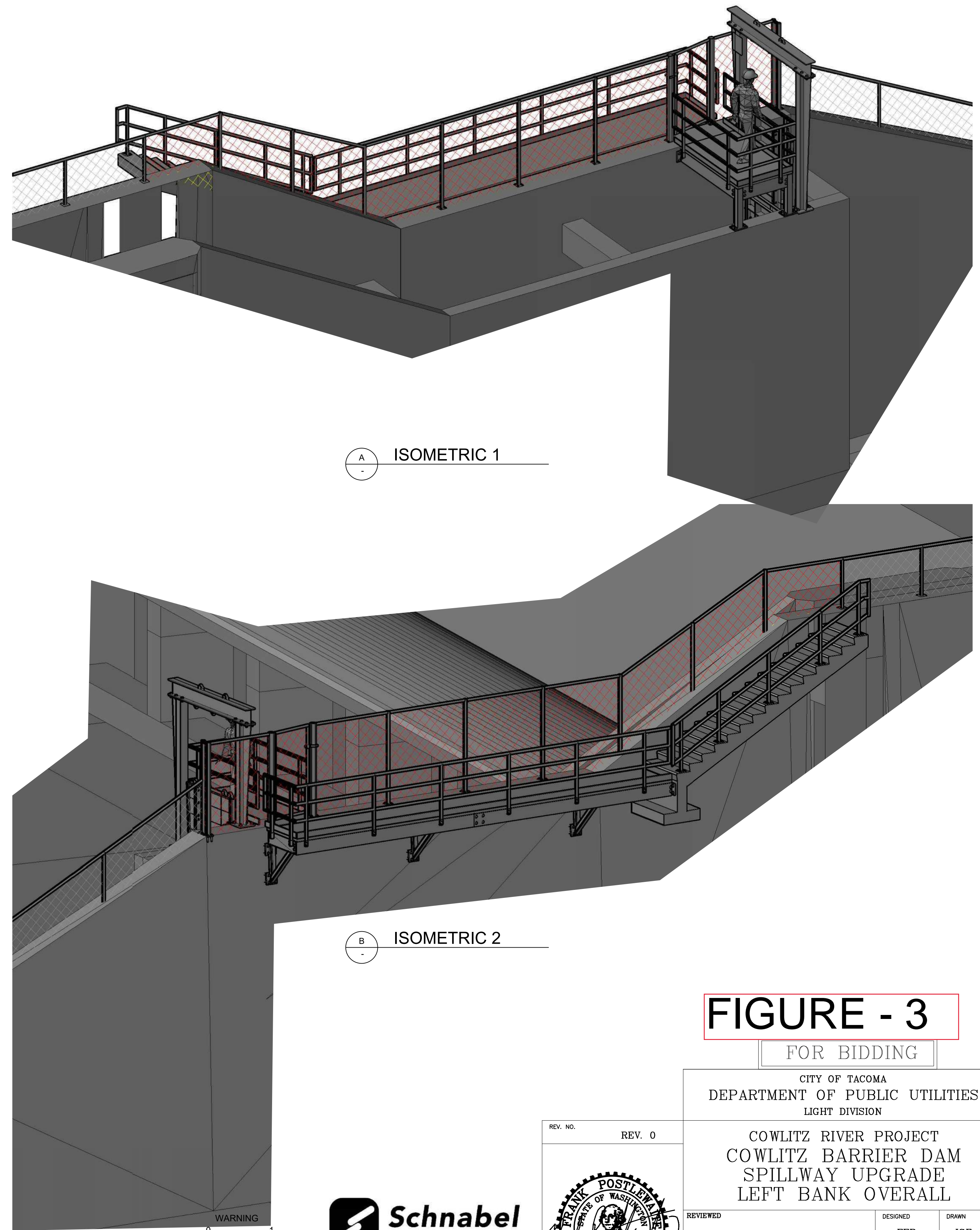
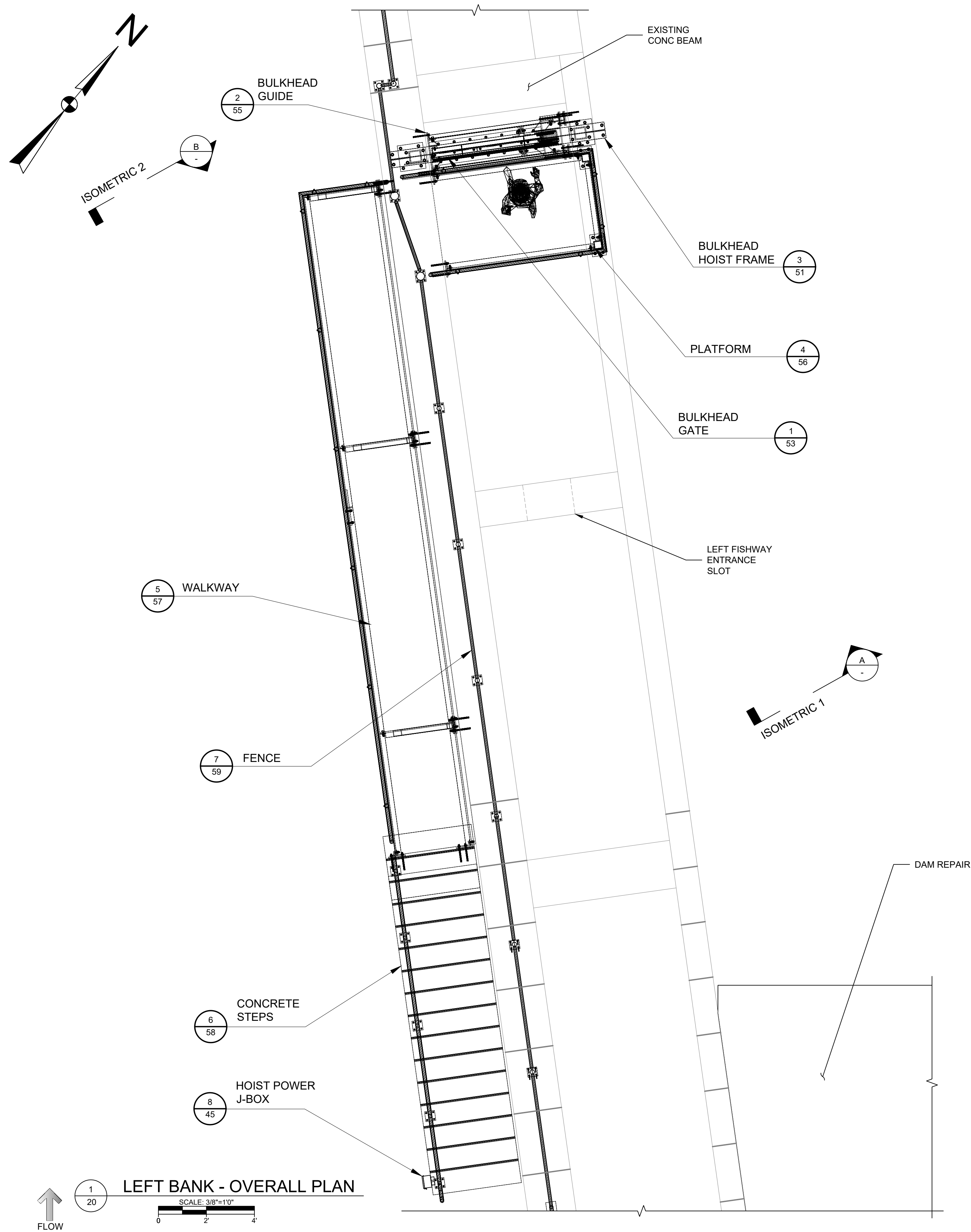
## COWLITZ RIVER PROJECT COWLITZ BARRIER DAM SPILLWAY UPGRADE LEFT ABUTMENT ACCESS PLAN

REV. NO.	REV. 0
DESIGNED	RTI
DRAWN	CAS
DATE	12/21/2020
STAMPED	RTI
DRAWING NO.	06
SHEET NO.	06 OF 59

REVIEWED	DESIGNED	DRAWN
	RTI	CAS
APPROVED	DATE	STAMPED
		RTI
	DRAWING NO.	06
	SHEET NO.	06 OF 59



FILED IN: K:\2288 Cowlitz River Barrier Dam Repair\Drawings\Design Drawings\50 LEFT BANK OVERALL.dwg    SAVED: jschulz    12/17/2020 1:26 PM    PLOTTED: Jim Schulz    1/11/2021 9:46 AM



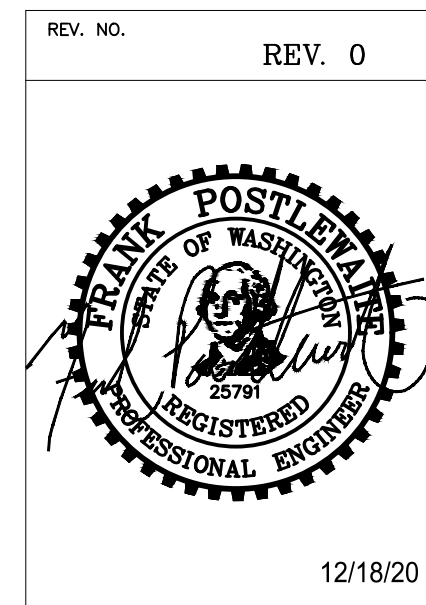
**FIGURE - 3**

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
LEFT BANK OVERALL

REV. NO.	REV. 0
DESIGNED	DRAWN
FEP	JGE
12/21/2020	STAMPED
DATE	FEP
DRAWING NO.	50
SHEET NO. 50	OF 59





FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL DESIGN\15 STAGE 3 CONTROL OF WATER.dwg  
SAVED: csnider 2/3/2021 7:41 AM  
PLOTTED: Corey Snider 2/3/2021 7:45 AM

NOTES:

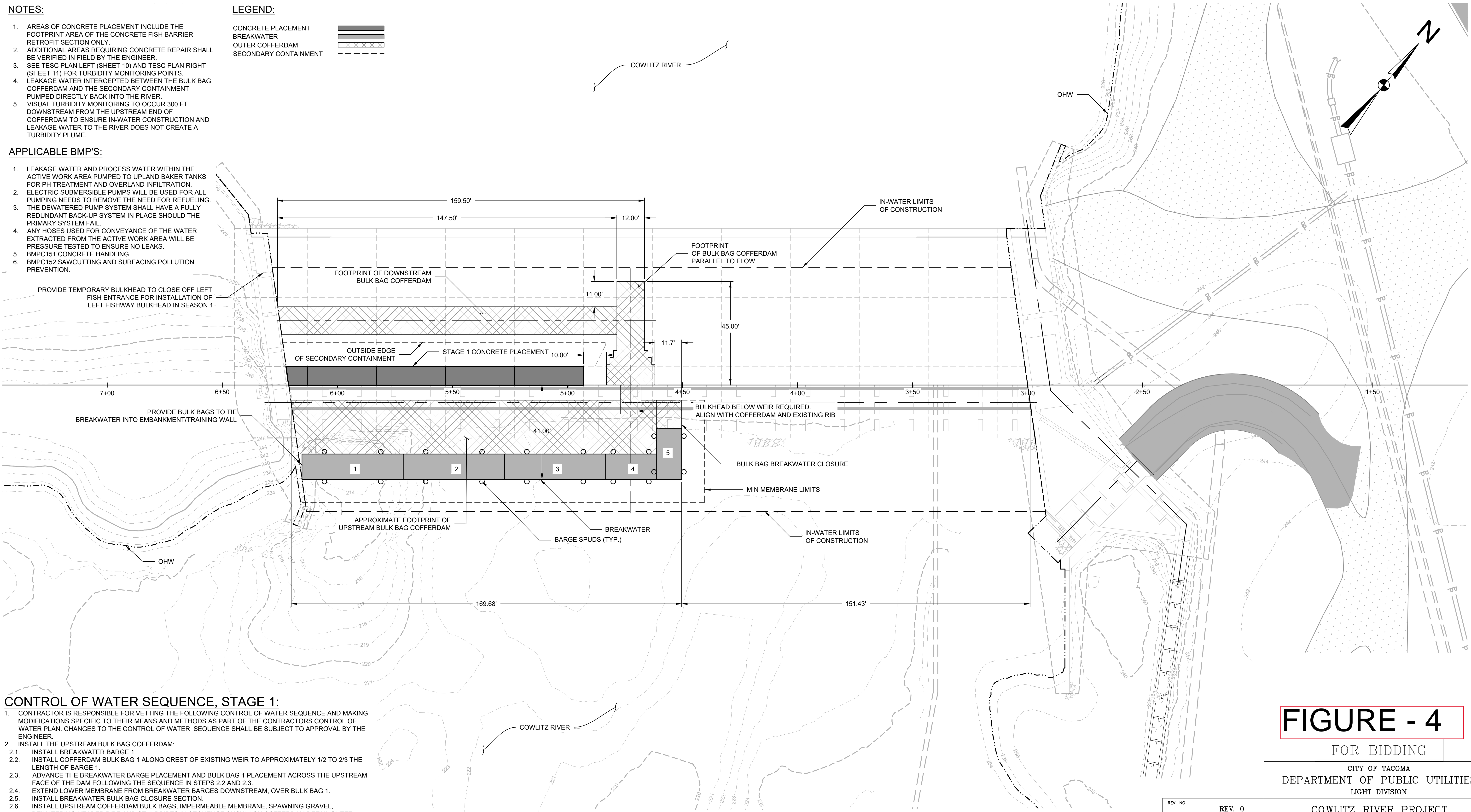
1. AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
2. ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
3. SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
4. LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
5. VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

APPLICABLE BMP'S:

1. LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
2. ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
3. THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
4. ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.



CONTROL OF WATER SEQUENCE, STAGE 1:

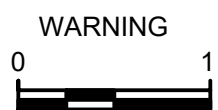
1. CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
2. INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - 2.1. INSTALL BREAKWATER BARGE 1
  - 2.2. INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGE 1.
  - 2.3. ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - 2.4. EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - 2.5. INSTALL BREAKWATER BULK BAG CLOSURE SECTION.
  - 2.6. INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
3. INSTALL THE BULK BAG COFFERDAM PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
4. INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW.
5. INSTALL THE LEFT FISHWAY COFFERDAM AND THE BULKHEAD BELOW THE WEIR.
6. CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS.
7. PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
8. COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
9. PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



1

STAGE 1 CONTROL OF WATER - PLAN

SCALE: 1"=20'  
0 20' 40'



IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

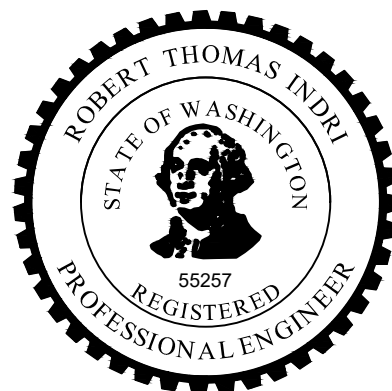


FIGURE - 4

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
STAGE 1 CONTROL OF WATER

DESIGNED RTI	DRAWN CAS
12/21/2020 DATE	STAMPED RTI
DRAWING NO. 14	SHEET No.14 of 59



FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL DESIGN\15 STAGE 3 CONTROL OF WATER.dwg  
SAVED: csnider 2/3/2021 7:41 AM  
PLOTTED: Corey Snider 2/3/2021 7:46 AM

NOTES:

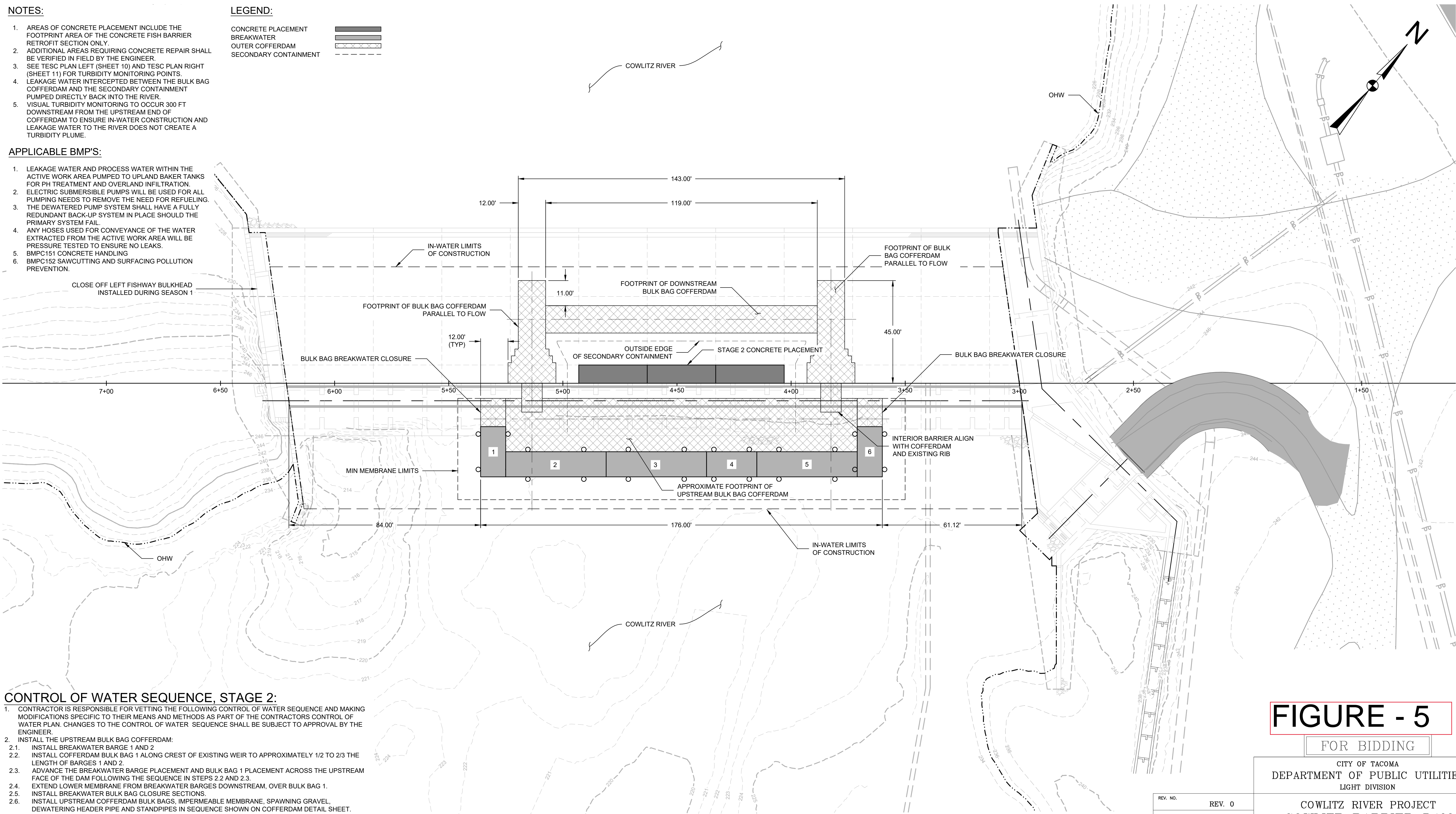
1. AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
2. ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
3. SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
4. LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
5. VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

APPLICABLE BMP'S:

1. LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
2. ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
3. THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
4. ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.



CONTROL OF WATER SEQUENCE, STAGE 2:

1. CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
2. INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - 2.1. INSTALL BREAKWATER BARGE 1 AND 2
  - 2.2. INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGES 1 AND 2.
  - 2.3. ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - 2.4. EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - 2.5. INSTALL BREAKWATER BULK BAG CLOSURE SECTIONS.
  - 2.6. INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
3. INSTALL THE BULK BAG COFFERDAMS PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
4. INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW
5. INSTALL THE BULKHEAD BELOW THE WEIR ON THE RIGHT SIDE.
6. CLOSE OFF THE PERMANENT BULKHEAD INSTALLED IN THE LEFT FISHWAY DURING SEASON 1.
7. CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS
8. PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
9. COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
10. PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



STAGE 2 CONTROL OF WATER - PLAN

SCALE: 1"=20'

WARNING  
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

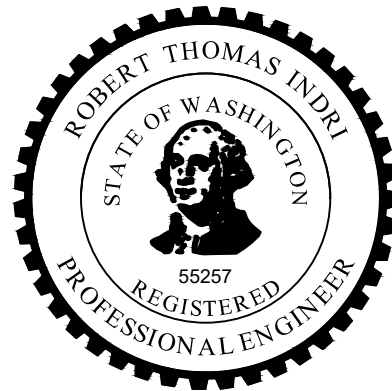


FIGURE - 5

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
STAGE 2 CONTROL OF WATER

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SHEET No.15	of 59



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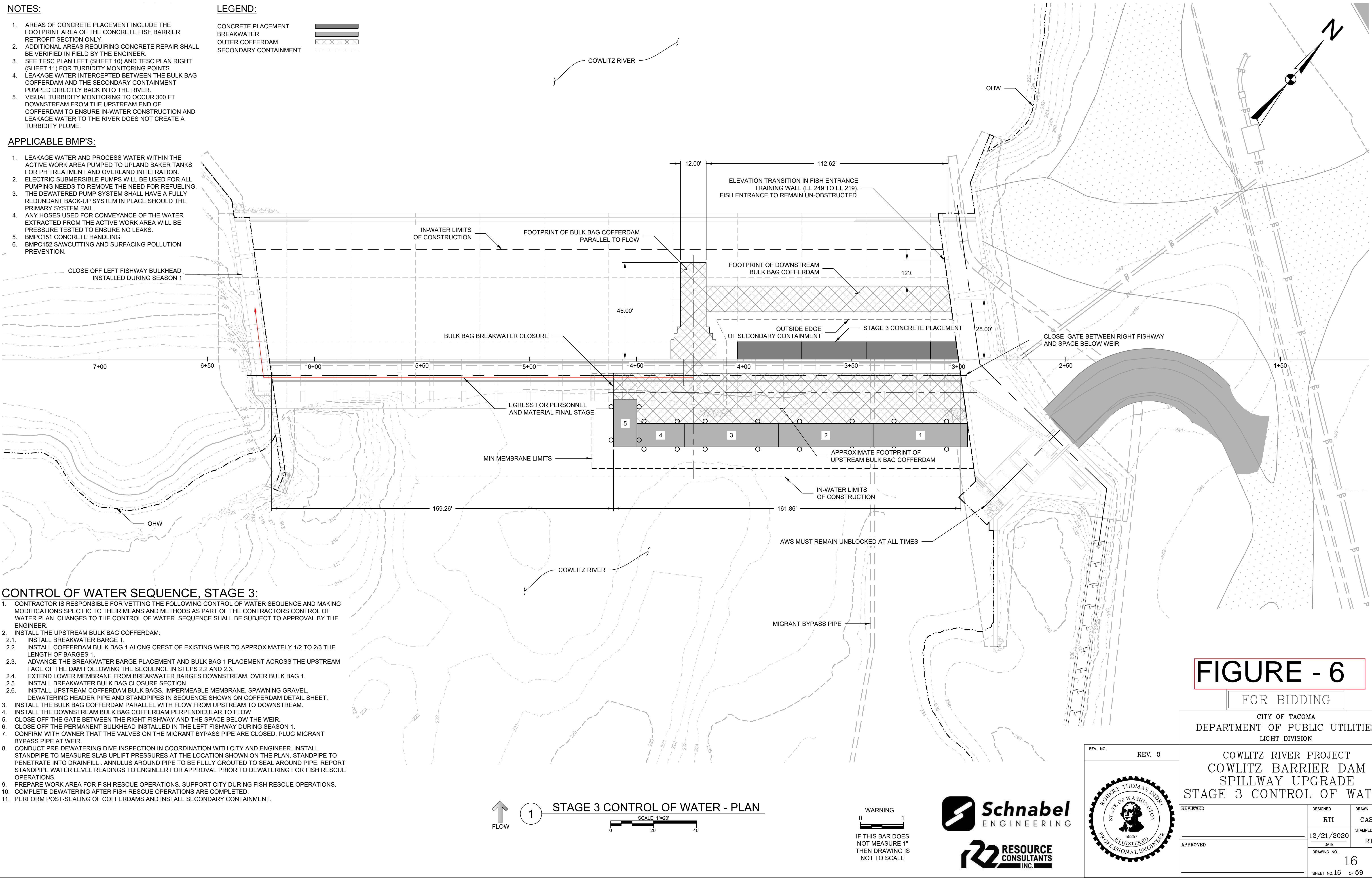
1. AREAS OF CONCRETE PLACEMENT INCLUDE THE FOOTPRINT AREA OF THE CONCRETE FISH BARRIER RETROFIT SECTION ONLY.
2. ADDITIONAL AREAS REQUIRING CONCRETE REPAIR SHALL BE VERIFIED IN FIELD BY THE ENGINEER.
3. SEE TESC PLAN LEFT (SHEET 10) AND TESC PLAN RIGHT (SHEET 11) FOR TURBIDITY MONITORING POINTS.
4. LEAKAGE WATER INTERCEPTED BETWEEN THE BULK BAG COFFERDAM AND THE SECONDARY CONTAINMENT PUMPED DIRECTLY BACK INTO THE RIVER.
5. VISUAL TURBIDITY MONITORING TO OCCUR 300 FT DOWNSTREAM FROM THE UPSTREAM END OF COFFERDAM TO ENSURE IN-WATER CONSTRUCTION AND LEAKAGE WATER TO THE RIVER DOES NOT CREATE A TURBIDITY PLUME.

LEGEND:

- CONCRETE PLACEMENT  
BREAKWATER  
OUTER COFFERDAM  
SECONDARY CONTAINMENT

APPLICABLE BMP'S:

1. LEAKAGE WATER AND PROCESS WATER WITHIN THE ACTIVE WORK AREA PUMPED TO UPLAND BAKER TANKS FOR PH TREATMENT AND OVERLAND INFILTRATION.
2. ELECTRIC SUBMERSIBLE PUMPS WILL BE USED FOR ALL PUMPING NEEDS TO REMOVE THE NEED FOR REFUELING.
3. THE DEWATERED PUMP SYSTEM SHALL HAVE A FULLY REDUNDANT BACK-UP SYSTEM IN PLACE SHOULD THE PRIMARY SYSTEM FAIL.
4. ANY HOSES USED FOR CONVEYANCE OF THE WATER EXTRACTED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACING POLLUTION PREVENTION.

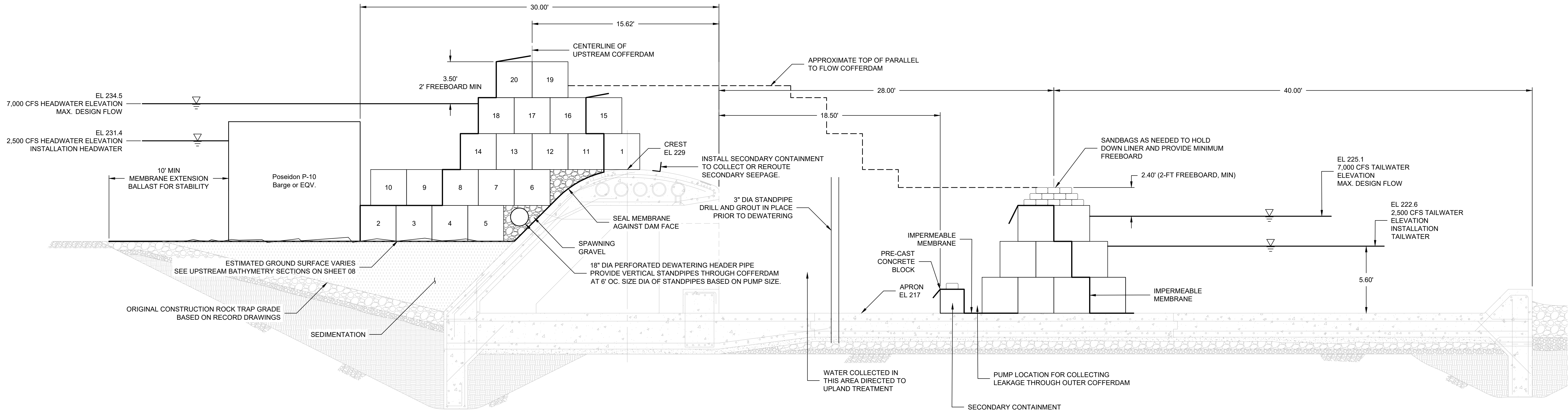


CONTROL OF WATER SEQUENCE, STAGE 3:

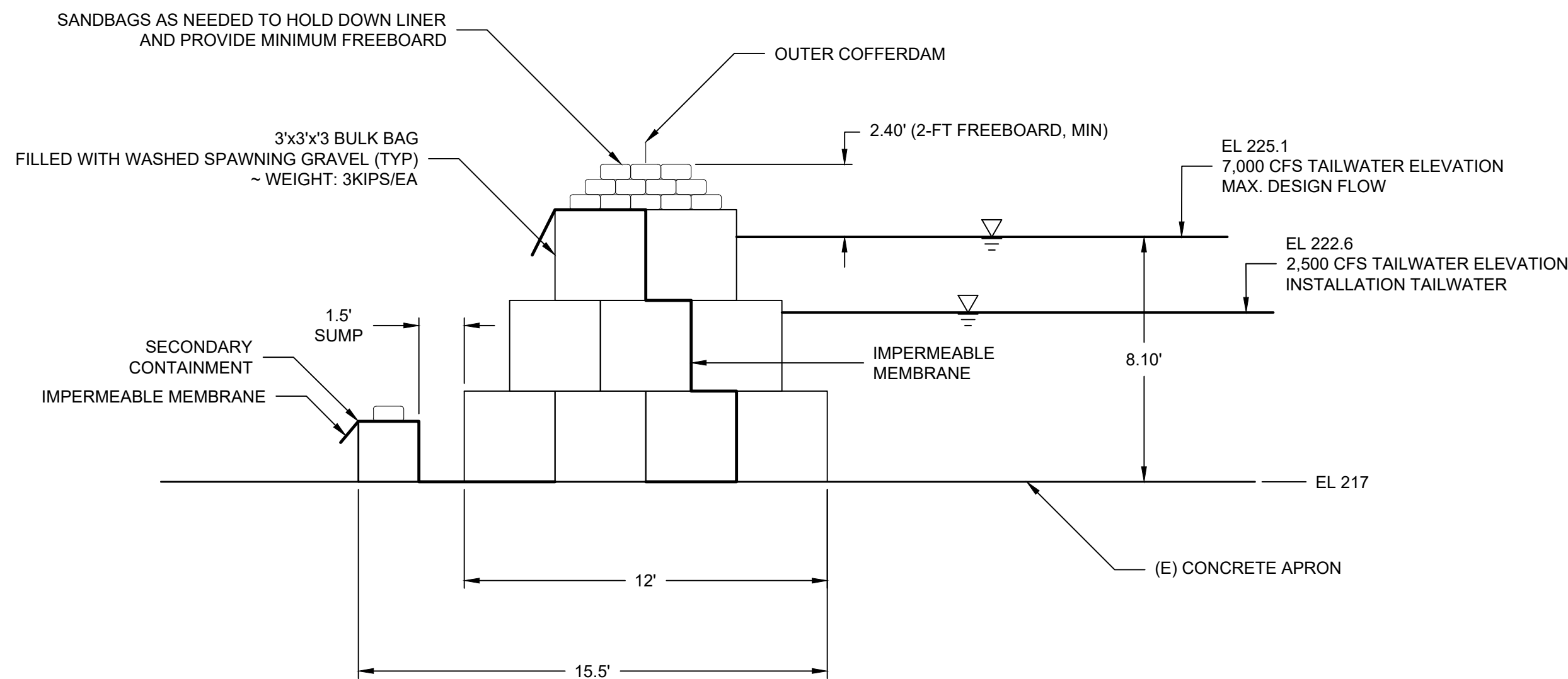
1. CONTRACTOR IS RESPONSIBLE FOR VETTING THE FOLLOWING CONTROL OF WATER SEQUENCE AND MAKING MODIFICATIONS SPECIFIC TO THEIR MEANS AND METHODS AS PART OF THE CONTRACTORS CONTROL OF WATER PLAN. CHANGES TO THE CONTROL OF WATER SEQUENCE SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
2. INSTALL THE UPSTREAM BULK BAG COFFERDAM:
  - 2.1. INSTALL BREAKWATER BARGE 1.
  - 2.2. INSTALL COFFERDAM BULK BAG 1 ALONG CREST OF EXISTING WEIR TO APPROXIMATELY 1/2 TO 2/3 THE LENGTH OF BARGES 1.
  - 2.3. ADVANCE THE BREAKWATER BARGE PLACEMENT AND BULK BAG 1 PLACEMENT ACROSS THE UPSTREAM FACE OF THE DAM FOLLOWING THE SEQUENCE IN STEPS 2.2 AND 2.3.
  - 2.4. EXTEND LOWER MEMBRANE FROM BREAKWATER BARGES DOWNSTREAM, OVER BULK BAG 1.
  - 2.5. INSTALL BREAKWATER BULK BAG CLOSURE SECTION.
  - 2.6. INSTALL UPSTREAM COFFERDAM BULK BAGS, IMPERMEABLE MEMBRANE, SPAWNING GRAVEL, DEWATERING HEADER PIPE AND STANDPIPES IN SEQUENCE SHOWN ON COFFERDAM DETAIL SHEET.
3. INSTALL THE BULK BAG COFFERDAM PARALLEL WITH FLOW FROM UPSTREAM TO DOWNSTREAM.
4. INSTALL THE DOWNSTREAM BULK BAG COFFERDAM PERPENDICULAR TO FLOW.
5. CLOSE OFF THE GATE BETWEEN THE RIGHT FISHWAY AND THE SPACE BELOW THE WEIR.
6. CLOSE OFF THE PERMANENT BULKHEAD INSTALLED IN THE LEFT FISHWAY DURING SEASON 1.
7. CONFIRM WITH OWNER THAT THE VALVES ON THE MIGRANT BYPASS PIPE ARE CLOSED. PLUG MIGRANT BYPASS PIPE AT WEIR.
8. CONDUCT PRE-DEWATERING DIVE INSPECTION IN COORDINATION WITH CITY AND ENGINEER. INSTALL STANDPIPE TO MEASURE SLAB UPLIFT PRESSURES AT THE LOCATION SHOWN ON THE PLAN. STANDPIPE TO PENETRATE INTO DRAINFILL. ANNULUS AROUND PIPE TO BE FULLY GROUTED TO SEAL AROUND PIPE. REPORT STANDPIPE WATER LEVEL READINGS TO ENGINEER FOR APPROVAL PRIOR TO DEWATERING FOR FISH RESCUE OPERATIONS.
9. PREPARE WORK AREA FOR FISH RESCUE OPERATIONS. SUPPORT CITY DURING FISH RESCUE OPERATIONS.
10. COMPLETE DEWATERING AFTER FISH RESCUE OPERATIONS ARE COMPLETED.
11. PERFORM POST-SEALING OF COFFERDAMS AND INSTALL SECONDARY CONTAINMENT.



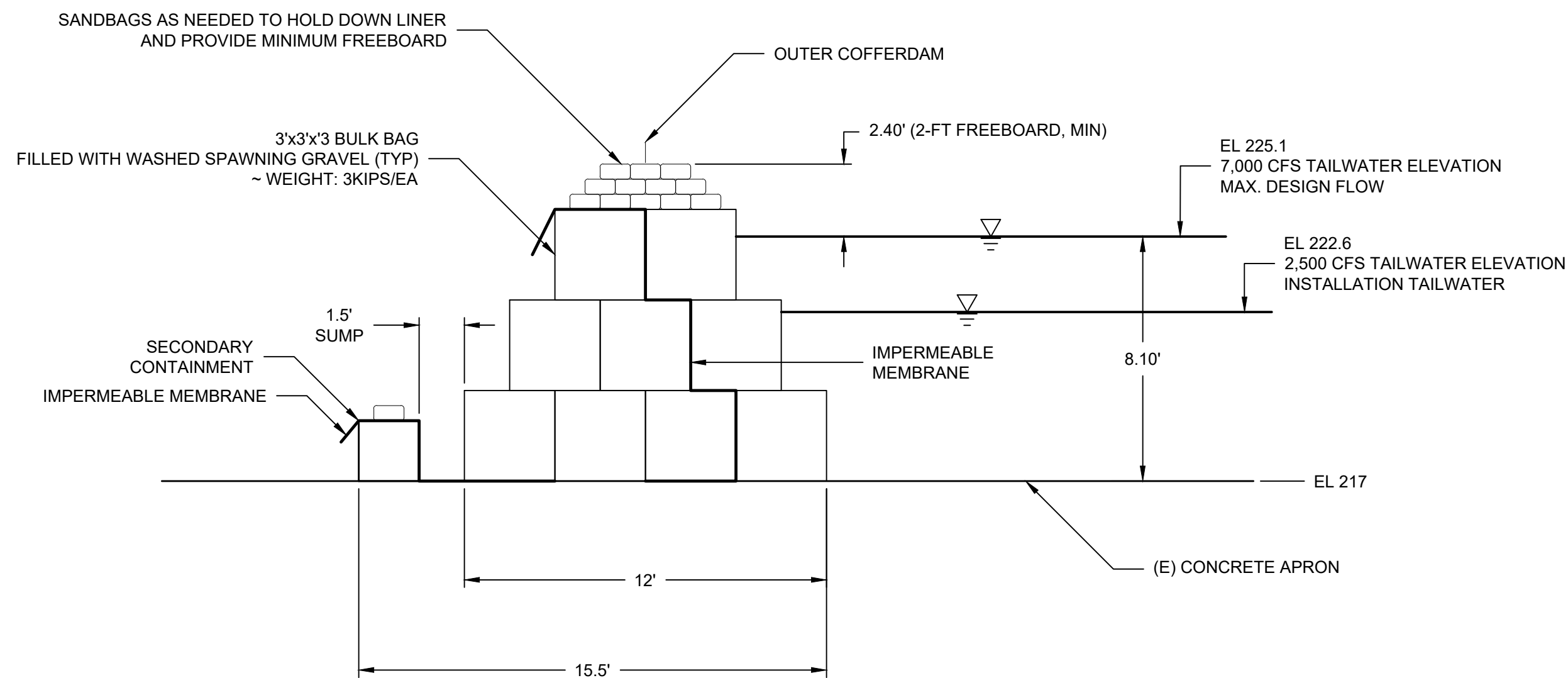
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1 COFFERDAM PERPENDICULAR TO FLOW - TYPICAL SECTION



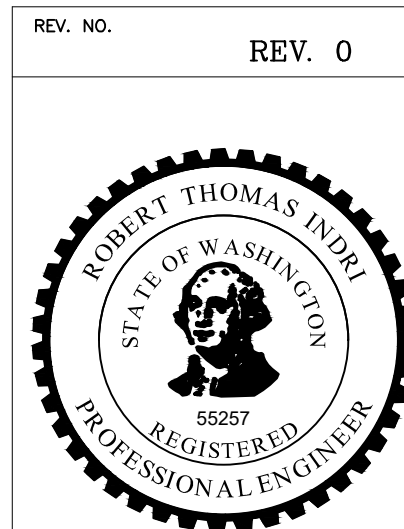
2 COFFERDAM PARALLEL TO FLOW - TYPICAL SECTION



3 DOWNSTREAM COFFERDAM PERPENDICULAR TO FLOW - TYPICAL SECTION

SCALE: 1/4"=1'0"

WARNING  
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



APPLICABLE BMP'S:

1. OUTER COFFERDAM CONSTRUCTED TO CONDUCT REPAIR IN THE DRY.
2. INNER SECONDARY CONTAINMENT CONSTRUCTED TO MINIMIZE LEAKAGE TO THE ACTIVE WORK AREA.
3. IMPERMEABLE MEMBRANE INSTALLED AROUND THE OUTER COFFERDAM AND WITHIN THE INNER SECONDARY CONTAINMENT STRUCTURE TO MINIMIZE WATER ENTERING THE ACTIVE WORK AREA.
4. ANY HOSES USED FOR CONVEYANCE OF WATER REMOVED FROM THE ACTIVE WORK AREA WILL BE PRESSURE TESTED TO ENSURE NO LEAKS.
5. BMPC151 CONCRETE HANDLING
6. BMPC152 SAWCUTTING AND SURFACE POLLUTION PREVENTION
7. BMPC252 TREATING AND DISPOSING OF HIGH PH WATER: WATER ENTERING THE ACTIVE WORK AREA WILL BE PUMPED TO AN UPLAND BAKER TANK FOR PH TREATMENT AND OVERLAND INFILTRATION.

FIGURE - 7

FOR BIDDING

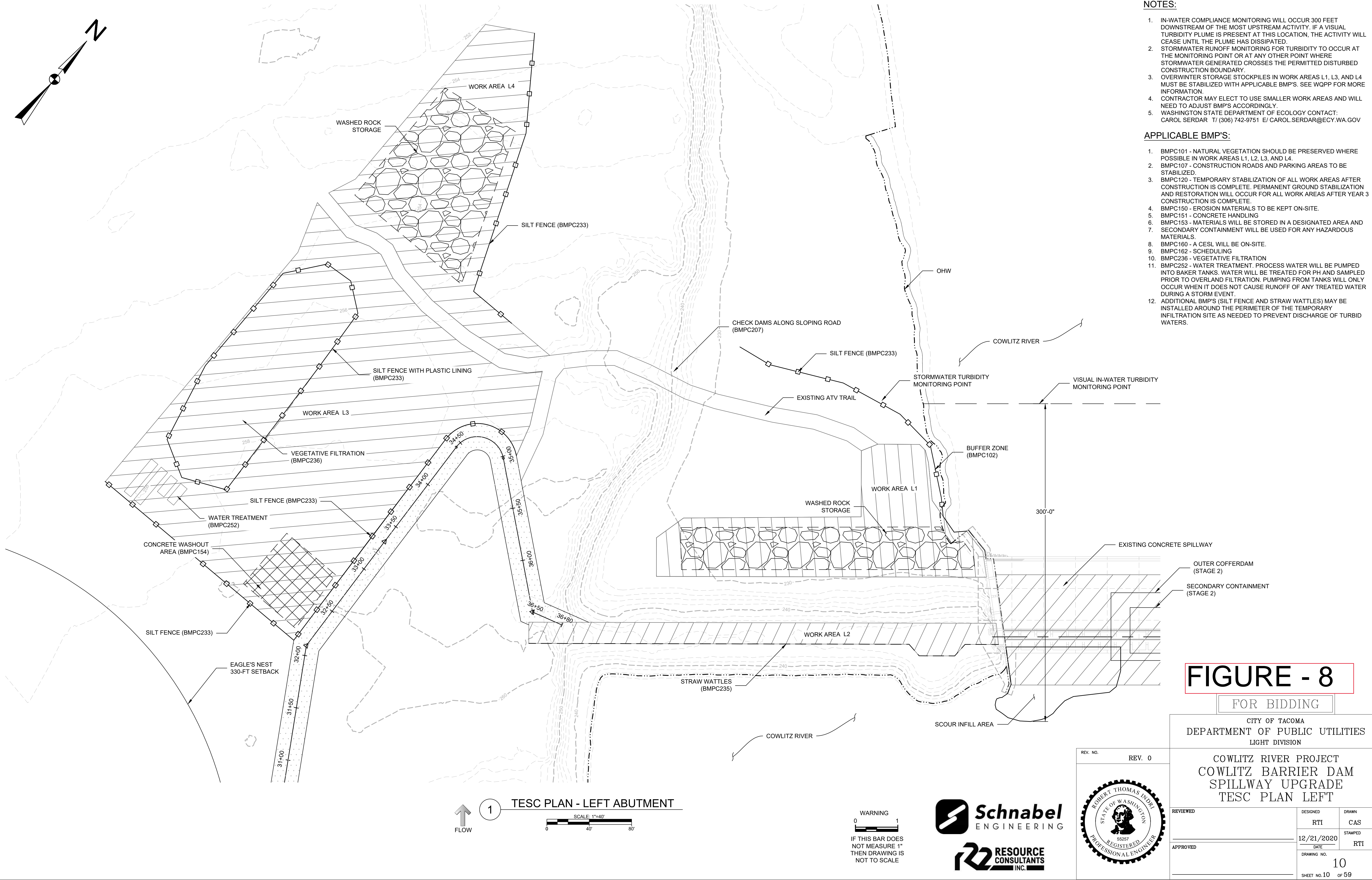
CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
COFFERDAM DETAILS

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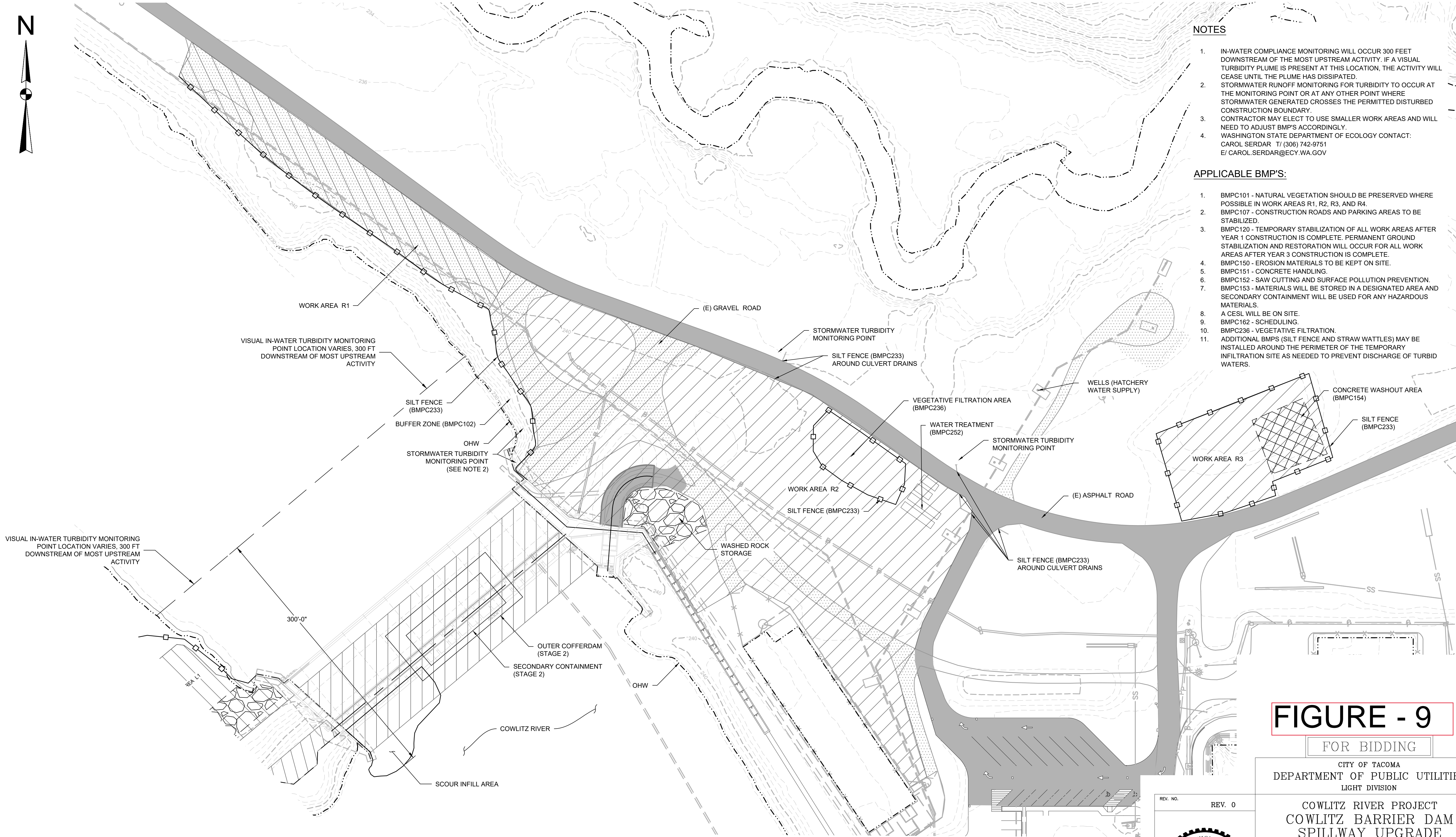
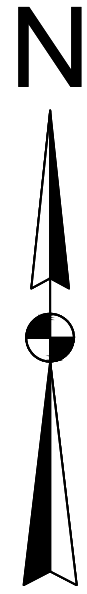


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NOTES

1. IN-WATER COMPLIANCE MONITORING WILL OCCUR 300 FEET DOWNSTREAM OF THE MOST UPSTREAM ACTIVITY. IF A VISUAL TURBIDITY PLUME IS PRESENT AT THIS LOCATION, THE ACTIVITY WILL CEASE UNTIL THE PLUME HAS DISSIPATED.
2. STORMWATER RUNOFF MONITORING FOR TURBIDITY TO OCCUR AT THE MONITORING POINT OR AT ANY OTHER POINT WHERE STORMWATER GENERATED CROSSES THE PERMITTED DISTURBED CONSTRUCTION BOUNDARY.
3. CONTRACTOR MAY ELECT TO USE SMALLER WORK AREAS AND WILL NEED TO ADJUST BMP'S ACCORDINGLY.
4. WASHINGTON STATE DEPARTMENT OF ECOLOGY CONTACT: CAROL SERDAR T/ (306) 742-9751 E/ CAROL.SERDAR@ECY.WA.GOV

APPLICABLE BMP'S:

1. BMPC101 - NATURAL VEGETATION SHOULD BE PRESERVED WHERE POSSIBLE IN WORK AREAS R1, R2, R3, AND R4.
2. BMPC107 - CONSTRUCTION ROADS AND PARKING AREAS TO BE STABILIZED.
3. BMPC120 - TEMPORARY STABILIZATION OF ALL WORK AREAS AFTER YEAR 1 CONSTRUCTION IS COMPLETE. PERMANENT GROUND STABILIZATION AND RESTORATION WILL OCCUR FOR ALL WORK AREAS AFTER YEAR 3 CONSTRUCTION IS COMPLETE.
4. BMPC150 - EROSION MATERIALS TO BE KEPT ON SITE.
5. BMPC151 - CONCRETE HANDLING.
6. BMPC152 - SAW CUTTING AND SURFACE POLLUTION PREVENTION.
7. BMPC153 - MATERIALS WILL BE STORED IN A DESIGNATED AREA AND SECONDARY CONTAINMENT WILL BE USED FOR ANY HAZARDOUS MATERIALS.
8. A CESL WILL BE ON SITE.
9. BMPC162 - SCHEDULING.
10. BMPC236 - VEGETATIVE FILTRATION.
11. ADDITIONAL BMP'S (SILT FENCE AND STRAW WATTLES) MAY BE INSTALLED AROUND THE PERIMETER OF THE TEMPORARY INFILTRATION SITE AS NEEDED TO PREVENT DISCHARGE OF TURBID WATERS.

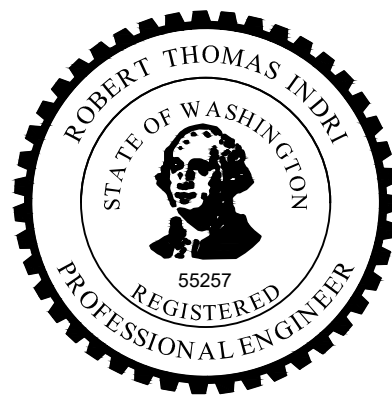
FIGURE - 9

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
TESC PLAN RIGHT

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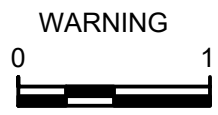
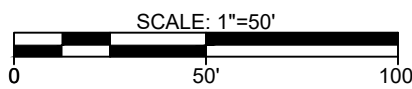


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TESC PLAN - RIGHT ABUTMENT



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SILT FENCE

MATERIALS:

1. USE A SYNTHETIC FILTER FABRIC OF AT LEAST 95% BY WEIGHT OF POLYOLEFINS OR POLYESTER, WHICH IS CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE REQUIREMENTS IN ASTM D 6461, WHICH IS SHOWN IN PART BELOW. SYNTHETIC FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0 TO 120°F.

TEMPORARY SILT FENCE MATERIAL PROPERTY REQUIREMENTS						
GEOTEXTILE PROPERTY	ASTM TEST METHOD	UNITS	SUPPORTED, SILT FENCE (B/W POSTS WITH WIRE OR POLYMERIC MESH)	UNSUPPORTED, SILT FENCE (B/W POSTS)	TYPE OF VALUE	
GRAB STRENGTH FAILURE STRAIN IN MACHINE AND X-MACHINE DIRECTION (ASTM D4632)	ASTM D 4632			30% MAX		
GRAB TENSILE STRENGTH IN MACHINE AND X-MACHINE DIRECTION (ASTM D4632)	ASTM D 4632	LBS	100 LB MIN.	180 LB MIN FOR EXTRA STRENGTH FABRIC 100 LBS MIN FOR STANDARD STRENGTH FABRIC	MARV	
POLYMERIC MESH AOS (ASTM D4751)	ASTM D 4751		0.60mm MAX FOR SLIT FILM WOVEN (#30 SIEVE), 0.30mm MAX FOR ALL OTHER GEOTEXTILES (#50 SIEVE) 0.15mm MIN FOR ALL FABRIC TYPES (#100 SIEVE)			
WATER PERMITTIVITY <sub>2</sub> (ASTM D4491)	ASTM D 4491	SEC-1 MIN.		0.02	MARV	
ULTRAVIOLET STABILITY (ASTM D4355)	ASTM D 4355	% RETAINED STRENGTH		70% MINIMUM	TYPICAL	
1 SILT FENCE SUPPORT SHALL CONSIST OF 14 GAUGE STEEL WIRE WITH A MESH SPACING OF 150 MM (6 INCHES), OR PREFABRICATED POLYMER MESH OF EQUIVALENT STRENGTH. 2 THESE DEFAULT VALUES ARE BASED ON EMPIRICAL EVIDENCE WITH A VARIETY OF SEDIMENT. FOR ENVIRONMENTALLY SENSITIVE AREAS, A REVIEW OF PREVIOUS EXPERIENCE AND/OR SITE OR REGIONALLY SPECIFIC GEOTEXTILE TESTS IN ACCORDANCE WITH ASTM D 5141 SHOULD BE PERFORMED TO CONFIRM SUITABILITY OF THESE REQUIREMENTS. 3 AS MEASURED IN ACCORDANCE WITH ASTM D 4632.						

2. POSTS FOR SILT FENCES SHALL BE EITHER WOOD OR STEEL. WOOD POSTS SHALL HAVE MINIMUM DIMENSIONS OF 1½ BY 1½ INCHES BY THE MINIMUM LENGTH SHOWN IN THE DETAILS. POSTS SHALL HAVE PROJECTIONS TO FACILITATE FASTENING THE FABRIC.
3. GEOTEXTILE PROPERTIES SHOWN IN ABOVE TABLE ARE MINIMUM AVERAGE ROLL VALUES (I.E.: TEST RESULTS FOR ANY SAMPLED ROLL IN A LOT SHALL MEET THE VALUES SHOWN IN THE TABLE).

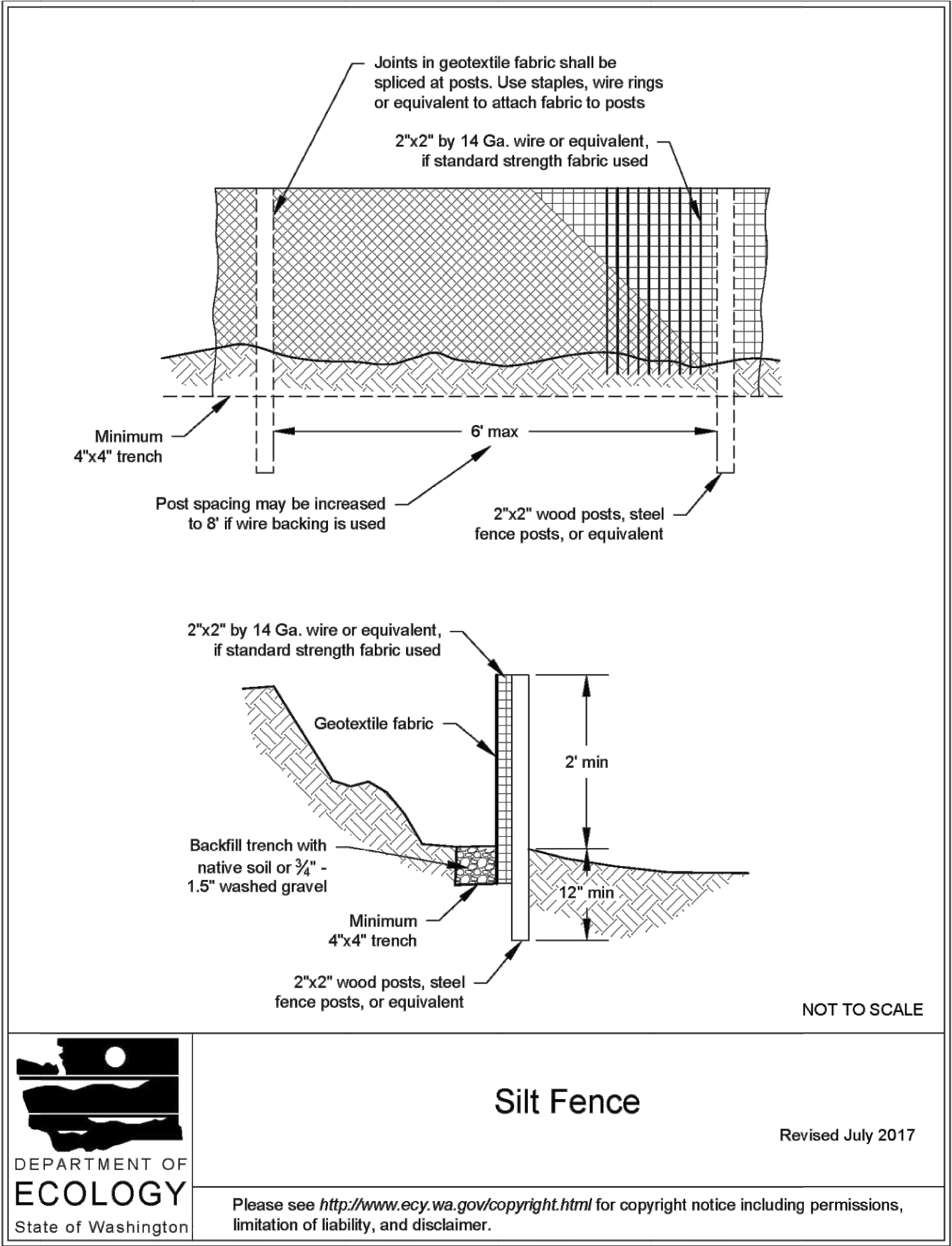
CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY SILT FENCES AT THE LOCATIONS SHOWN IN THE PLANS.
2. CONSTRUCT SILT FENCES IN AREAS OF CLEARING, GRADING, OR DRAINAGE PRIOR TO STARTING THOSE ACTIVITIES.
3. THE SILT FENCE SHALL HAVE A 2-FEET MINIMUM AND A 2 ¾-FEET MAXIMUM HEIGHT ABOVE THE ORIGINAL GROUND SURFACE.
4. THE GEOTEXTILE FABRIC SHALL BE SEWN TOGETHER AT THE POINT OF MANUFACTURE TO FORM FABRIC LENGTHS AS REQUIRED. LOCATE ALL SEWN SEAMS AT SUPPORT POSTS. ALTERNATIVELY, TWO SECTIONS OF SILT FENCE CAN BE OVERLAPPED, PROVIDED THAT THE OVERLAP IS LONG ENOUGH AND THAT THE ADJACENT SILT FENCE SECTIONS ARE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.
5. ATTACH THE GEOTEXTILE FABRIC ON THE UP-SLOPE SIDE OF THE POSTS AND SECURE WITH STAPLES, WIRE, OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ATTACH THE GEOTEXTILE FABRIC TO THE POSTS IN A MANNER THAT REDUCES THE POTENTIAL FOR TEARING.
6. SUPPORT THE GEOTEXTILE WITH WIRE OR PLASTIC MESH, DEPENDENT ON THE PROPERTIES OF THE GEOTEXTILE SELECTED FOR USE. IF WIRE OR PLASTIC MESH IS USED, FASTEN THE MESH SECURELY TO THE UP-SLOPE SIDE OF THE POSTS WITH THE GEOTEXTILE FABRIC UP-SLOPE OF THE MESH.
7. MESH SUPPORT, IF USED, SHALL CONSIST OF STEEL WIRE WITH A MAXIMUM MESH SPACING OF 2-INCHES, OR A PRE-FABRICATED POLYMERIC MESH. THE STRENGH OF THE WIRE OR POLYMERIC MESH SHALL BE EQUIVALENT TO OR GREATER THAN 180 LBS. GRAB TENSILE STRENGTH. THE POLYMERIC MESH MUST BE AS RESISTANT TO THE SAME LEVEL OF ULTRAVIOLET RADIATION AS THE GEOTEXTILE FABRIC IT SUPPORTS.
8. BURY THE BOTTOM OF THE GEOTEXTILE FABRIC 4-INCHES MIN. BELOW THE GROUND SURFACE. BACKFILL AND TAMP SOIL IN PLACE OVER THE BURIED PORTION OF THE GEOTEXTILE FABRIC, SO THAT NO FLOW CAN PASS BENEATH THE SILT FENCE AND SCOURING CANNOT OCCUR. WHEN WIRE OR POLYMERIC BACK-UP SUPPORT MESH IS USED, THE WIRE OR POLYMERIC MESH SHALL EXTEND INTO THE GROUND 3-INCHES MIN.
9. DRIVE OR PLACE THE SILT FENCE POSTS INTO THE GROUND 18-INCHES MIN. A 12-INCH MIN. DEPTH IS ALLOWED IF TOPSOIL OR OTHER SOFT SUBGRADE SOIL IS NOT PRESENT AND 18-INCHES CANNOT BE REACHED. INCREASE FENCE POST MIN. DEPTHS BY 6 INCHES IF THE FENCE IS ISOLATED ON SLOPES OF 3H:1V OR STEEPER AND THE SLOPE IS PERPENDICULAR TO THE FENCE. IF REQUIRED POST DEPTHS CANNOT BE OBTAINED, THE POSTS SHALL BE ADEQUATELY SECURED BY BRACING OR GUYING TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT LOADING.
10. USE WOOD, STEEL OR EQUIVALENT POSTS. THE SPACING OF THE SUPPORT POSTS SHALL BE A MAXIMUM OF 6-FEET. POSTS SHALL CONSIST OF EITHER:
- WOOD WITH MINIMUM 2" BY 2" DIMENSIONAL LUMBER AT 3 FEET LENGTH. WOOD SHALL BE FREE OF DEFECTS SUCH AS KNOTS, SPLITS, OR GOUGES.  
NO. 6 STEEL REBAR OR LARGER.  
ASTM A 120 STEEL PIPE WITH A MINIMUM DIAMETER OF 1-INCH.  
U, T, L, OR C SHAPE STEEL POSTS WITH A MINIMUM WEIGHT OF 1.35 LBS./FT.  
OTHER STEEL POSTS HAVING EQUIVALENT STRENGTH AND BENDING RESISTANCE TO THE POST SIZES LISTED ABOVE.
11. LOCATE SILT FENCES ON CONTOUR AS MUCH AS POSSIBLE, EXCEPT AT THE ENDS OF THE FENCE WHERE THE FENCE SHALL BE TURNED UPHILL SUCH THAT THE SILT FENCE CAPTURES THE RUNOFF WATER AND PREVENTS WATER FROM FLOWING AROUND THE END OF THE FENCE.
12. IF THE FENCE MUST CROSS CONTOURS, WITH THE EXCEPTION OF THE ENDS OF THE FENCE, PLACE CHECK DAMS PERPENDICULAR TO THE BACK OF THE FENCE TO MINIMIZE CONCENTRATED FLOW AND EROSION. THE SLOPE OF THE FENCE LINE WHERE CONTOURS MUST BE CROSSED SHALL NOT BE STEEPER THAN 3H:1V.

MAINTENANCE NOTES:

1. INSPECT SILT FENCES AT LEAST ONCE A WEEK AND AFTER EACH SIGNIFICANT RAINFALL EVENT (1/2 INCH OR GREATER). REPAIR ANY DAMAGE IMMEDIATELY.
2. SHOULD THE FABRIC OF A SILT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REPLACE THE GEOTEXTILE FABRIC THAT HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN.
4. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT. WHEN SEDIMENT DEPOSITS REACH APPROXIMATELY ¾ THE HEIGHT OF THE SILT FENCE, OR 8 INCHES (WHICHEVER IS LOWER), OR INSTALL A SECOND SILT FENCE.
5. CHECK THE UPHILL SIDE OF THE SILT FENCE FOR SIGNS OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND REMOVE THE TRAPPED SEDIMENT.

Figure II-3.22: Silt Fence



2019 Stormwater Management Manual for Western Washington

Volume II - Chapter 3 - Page 371

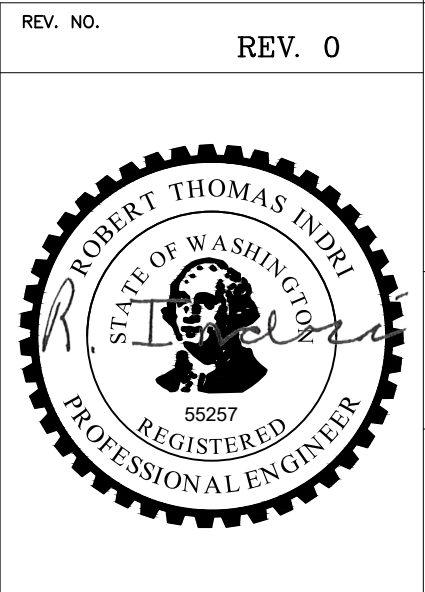
FIGURE - 10

FOR BIDDING

CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
TESC DETAILS

DESIGNED RTI	DRAWN CAS
12/21/2020 DATE	STAMPED RTI
DRAWING NO.	12
SHEET No.12	of 59



WARNING  
0 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FILED IN: C:\Users\csnider\OneDrive - Schnabel Engineering Inc\Desktop\Barrier Dam\08-CAD\DRAWINGS\05-FINAL\_DESIGN\12\_TESC\_DETAILS.dwg  
SAVED: csnider 2/3/2021 9:20 AM  
PLOTTED: Corey Snider 2/3/2021 9:20 AM

GENERAL SEEDING NOTES:

- SEED OF THE TYPE SPECIFIED SHALL BE CERTIFIED IN ACCORDANCE WITH WAC 16-302. SEED MIXES SHALL BE COMMERCIALY PREPARED AND SUPPLIED IN SEALED CONTAINERS. THE LABELS SHALL SHOW:
  - COMMON AND BOTANICAL NAMES OF SEED,
  - LOT NUMBER
  - NET WEIGHT
  - POUNDS OF PURE LIVE SEED (PLS) IN THE MIX,
  - ORIGIN OF SEED.
- IF WORK IN DISTURBED AREAS STOPS FOR MORE THAN 7 WORKING DAYS ON THE EMBANKMENT SLOPES, TEMPORARY SEEDING SHALL BE APPLIED TO STABILIZE THE AREA.
- COMPLETE GRADING BEFORE PREPARING SEEDBEDS, AND INSTALL ALL NECESSARY EROSION CONTROL PRACTICES SUCH AS, DIKES, WATERWAYS, AND BASINS TO PREVENT SEEDS FROM WASHING AWAY. MINIMIZE STEEP SLOPES BECAUSE THEY MAKE SEEDBED PREPARATION DIFFICULT AND INCREASE THE EROSION HAZARD.
- TILL OR DISC THE PREPARED AREAS TO BE SEEDED TO A MINIMUM DEPTH OF FOUR (4) INCHES. REMOVE ALL STONES LARGER THAN THREE (3) INCHES ON ANY SIDE, STICKS, ROOTS, AND OTHER EXTRANEIOUS MATERIALS AT THE SURFACE DURING THE BED PREPARATION.
- SEED MAY BE INSTALLED BY HAND IF TEMPORARY AND COVERED BY STRAW, MULCH, OR TOPSOIL, OR IF PERMANENT IN SMALL AREAS (LESS THAN 1 ACRE) AND COVERED WITH MULCH, TOPSOIL, OR EROSION BLANKETS.
- REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE AND MULCH IMMEDIATELY FOLLOWING REPAIR OF EROSION DAMAGE.

**MAINTENANCE:**  
RE-FERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED AND MULCH AREAS WHERE SEEDLING EMERGENCE IS POOR (FAILING TO ESTABLISH AT LEAST 75 PERCENT COVER), OR WHERE EROSION OCCURS, AS SOON AS POSSIBLE. DO NOT MOW. PROTECT FROM TRAFFIC AS MUCH AS POSSIBLE.

IF RESEEDING IS INEFFECTIVE, USE AN ALTERNATE METHOD SUCH AS SODDING, MULCHING, NETS, OR BLANKETS.

SUPPLY SEEDED AREAS WITH ADEQUATE MOISTURE, BUT DO NOT WATER TO THE EXTENT THAT IT CAUSES RUNOFF. BETWEEN JULY 1 AND AUGUST 30, SEEDING REQUIRES IRRIGATION UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.

**MULCH:**  
TEMPORARY MULCH SHALL BE STRAW, WOOD STRAND, OR HECP MULCH AND SHALL BE USED FOR THE PURPOSE OF EROSION CONTROL BY PROTECTING BARE SOIL SURFACE FROM PARTICLE DISPLACEMENT. MULCH SHALL NOT BE APPLIED BELOW THE ANTICIPATED WATER LEVEL OF DITCH SLOPES, POND BOTTOMS, AND STREAM BANKS. HECP MULCH SHALL NOT BE USED WITHIN THE ORDINARY HIGH WATER MARK.

STRAW OR WOOD STRAND MULCH SHALL BE APPLIED AT A RATE TO ACHIEVE AT LEAST 95 PERCENT VISUAL BLOCKAGE OF THE SOIL SURFACE. STRAW MULCH SHALL BE SUITABLE FOR SPREADING WITH MULCH BLOWER EQUIPMENT.

SHORT TERM MULCH SHALL BE HYDRAULICALLY APPLIED AT A RATE OF 2500 LBS/ACRE, LONG AND MODERATE TERM MULCH SHALL BE HYDRAULICALLY APLIED AT 3500 LBS/ACRE WITH NO MORE THAN 2000 LBS APPLIED IN A SINGLE LIFT.

**MULCH APPLICATION RATES:**  
SHORT TERM MULCH = 2500 LBS/AC  
MODERATE TERM MULCH = 3500 LBS/AC (NO MORE THAN 2000 LBS APPLIED PER ONE LIFT (NOT TO BE USED WITH PERMANENT SEEDING)

TEMPORARY SEEDING:

TEMPORARY GRASS SEED SHALL BE A COMMERCIALY PREPARED MIX, MADE UP OF LOW-GROWING GRASS SPECIES THAT WILL GROW WITHOUT IRRIGATION AT THE PROJECT LOCATION, AND ACCEPTED BY THE ENGINEER. THE APPLICATION RATE SHALL BE 120 LBS/ACRE.

SEED MIX (FROM 2019 DEPT. OF ECOLOGY STORM WATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON AND COMMENTARY, TABLE II-3.4) USED FOR TEMPORARY EROSION CONTROL SHALL CONSIST OF ONE OF THE FOLLOWING:

TEMPORARY EROSION CONTROL SEED MIX				
COMMON NAME	LATIN NAME	% WEIGHT	% PURITY	% GERMINATION
CHEWINGS OR ANNUAL BLUE GRASS	<i>FESTUCA RUBRA</i> <i>VAR. COMMUTATA</i> <i>OR POA ANNA</i>	40	98	90
PERENNIAL RYE	<i>LOLIUM PERENNE</i>	50	98	90
REDTOP OR COLONNIAL BENTGRASS	<i>AGROSTIS ALBA</i> OR <i>AGROSTIS TENUIS</i>	5	92	85
WHITE DUTCH CLOVER	<i>TRIFOLIUM REPENS</i>	5	98	90

TEMPORARY SEEDING MAY BE SOWN AT ANY TIME ALLOWED BY THE ENGINEER. TEMPORARY SEEDING SHALL BE SOWN BY ONE OF THE FOLLOWING METHODS:

- A HYDRO SEEDER THAT UTILIZES WATER AS THE CARRYING AGENT, AND MAINTAINS CONTINUOUS AGITATION THROUGH PADDLE BLADES. HYDROSEED APPLICATIONS SHALL INCLUDE A MINIMUM OF 1,500 POUNDS PER ACRE OF MULCH WITH 3 PERCENT TACKIFIER.
- POWER-DRAWN DRILLS OR SEEDERS.
- AREAS IN WHICH THE ABOVE METHODS ARE IMPRACTICAL MAY BE SEEDED BY HAND. WHEN SEEDING BY HAND, THE SEED SHALL BE INCORPORATED INTO THE TOP 1/4 INCH OF SOIL OR COVERED BY STRAW, MULCH, OR TOPSOIL BY HAND RAKING OR OTHER METHOD THAT IS ALLOWED BY THE ENGINEER.

PERMANENT SEEDING:

PERMANENT GRASS SEED SHALL BE A COMMERCIALY PREPARED MIX, MADE UP OF LOW-GROWING TURF SEED MIX THAT WILL GROW WITH VERY LITTLE MAINTENANCE AT THE PROJECT LOCATION, AND ACCEPTED BY THE ENGINEER. THE APPLICATION RATE SHALL BE 120 LBS/ACRE.

SEED MIX (FROM 2019 DEPT. OF ECOLOGY STORM WATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON AND COMMENTARY, TABLE II-3.4) USED FOR TEMPORARY EROSION CONTROL SHALL CONSIST OF ONE OF THE FOLLOWING:

PERMANENT EROSION CONTROL SEED MIX				
COMMON NAME	LATIN NAME	% WEIGHT	% PURITY	% GERMINATION
DWARF TALL FESCUE (SEVERAL VARIETIES)	<i>FESTUCA ARUNDINACEA</i> VAR.	45	98	90
DWARF PERENNIAL RYE (BARCLAY)	<i>LOLIUM PERENNE</i> VAR. <i>BARCLAY</i>	30	98	90
RED FESCUE	<i>FESTUCA RUBRA</i>	20	98	90
COLONIAL BENTGRASS	<i>AGROSTIS TENUIS</i>	5	98	90

**FERTILIZER:** FERTILIZER SHALL BE A STANDARD COMMERCIAL GRADE OF ORGANIC OR INORGANIC FERTILIZER OF THE KIND AND QUALITY SPECIFIED. FERTILIZER SHALL BE SUPPLIED IN ONE OF THE FOLLOWING FORMS:

- ORGANIC MATTER IS THE MOST APPROPRIATE FORM OF FERTILIZER BECAUSE IT PROVIDES NUTRIENTS IN THE LEAST WATER-SOLUBLE FORM.
- USE 10-4-6 N-P-K (NITROGEN-PHOSPHOROUS-POTASSIUM) FERTILIZER AT A RATE OF 90 POUNDS PER ACRE. ALWAYS USE SLOW-RELEASE FERTILIZERS, SUCH AS COTTONSEED MEAL, BECAUSE THEY ARE MORE EFFICIENT AND HAVE FEWER ENVIRONMENTAL IMPACTS. DO NOT ADD FERTILIZER TO HYDROMULCH MACHINE, OR AGITATE, MORE THAN 20 MINUTES BEFORE USE.
- A HOMOGENEOUS PELLET, SUITABLE FOR APPLICATION THROUGH A FERTI-BLAST GUN.
- A TABLET OR OTHER FORM OF CONTROLLED RELEASE WITH A MINIMUM OF A 6 MONTH RELEASE PERIOD.
- A LIQUID SUITABLE FOR APPLICATION BY A POWER SPRAYER OR HYDROSEEDER.

WATTLES:

WATTLES ARE TYPICALLY 8 TO 10 INCHES IN DIAMETER AND 25 TO 30 FEET IN LENGTH.

INSTALL WATTLES PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE CONTOUR.

PLACE WATTLES IN SHALLOW TRENCHES, STAKED ALONG THE CONTOUR OF DISTURBED OR NEWLY CONSTRUCTED SLOPES.

DIG NARROW TRENCHES ACROSS THE SLOPE (ON CONTOUR TO A DEPTH OF 3- TO 5-INCHES ON CLAY SOILS AND SOILS WITH GRADUAL SLOPES. ON LOOSE SOILS, STEEP SLOPES, AND AREAS WITH HIGH RAINFALL, THE TRENCHES SHOULD BE DUG TO A DEPTH OF 6- TO 7- INCHES, OR 1/2 TO 2/3 OF THE THICKNESS OF THE WATTLE.

START BUILDING TRENCHES AND INSTALLING WATTLES FROM THE BASE OF THE SLOPE AND WORK UP. SPREAD EXCAVATED MATERIAL EVENLY ALONG THE UPHILL SLOPE AND COMPACT IT USING HAND TAMPING OR OTHER METHODS.

CONSTRUCT TRENCHES AT INTERVALS OF 10- TO 25-FEET DEPENDING ON THE STEEPNESS OF THE SLOPE, SOIL TYPE, AND RAINFALL. THE STEEPER THE SLOPE THE CLOSER TOGETHER THE TRENCHES.

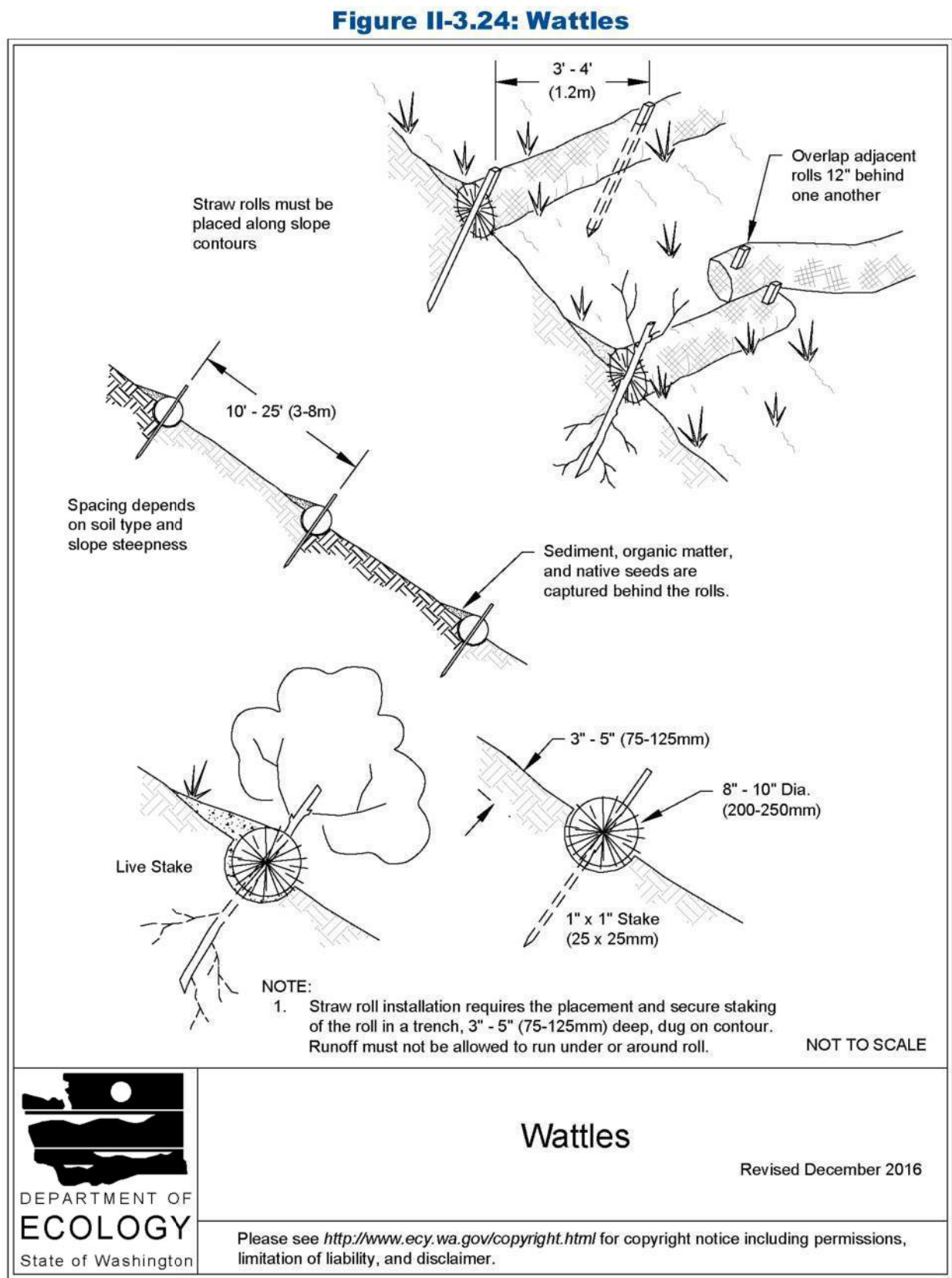
INSTALL THE WATTLES SNUGLY INTO THE TRENCHES AND OVERLAP THE ENDS OF ADJACENT WATTLES 12 INCHES BEHIND ONE ANOTHER.

INSTALL STAKES AT EACH END OF THE WATTLE, AND AT 4-FOOT CENTERS ALONG ENTIRE LENGTH OF WATTLE.

IF REQUIRED, INSTALL PILOT HOLES FOR THE STAKES USING A STRAIGHT BAR TO DRIVE HOLES THROUGH THE WATTLE AND INTO THE SOIL.

WOODEN STAKES SHOULD BE APPROXIMATELY 0.75 X 0.75 X 24 INCHES MIN. WILLOW CUTTINGS OR 3/8-INCH REBAR CAN ALSO BE USED FOR STAKES.

STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE, LEAVING 2 TO 3 INCHES OF THE STAKE PROTRUDING FROM THE WATTLE.



2019 Stormwater Management Manual for Western Washington

Volume II - Chapter 3 - Page 379

FIGURE - 11

FOR BIDDING

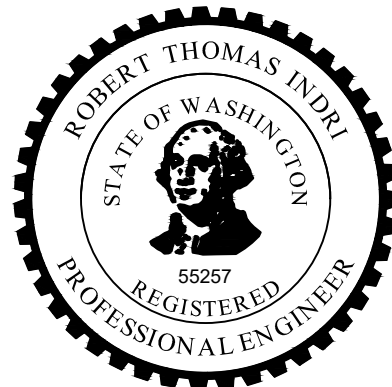
CITY OF TACOMA  
DEPARTMENT OF PUBLIC UTILITIES  
LIGHT DIVISION

COWLITZ RIVER PROJECT  
COWLITZ BARRIER DAM  
SPILLWAY UPGRADE  
TESC DETAILS

DESIGNED	RTI	DRAWN	CAS
12/21/2020	DATE	STAMPED	RTI
DRAWING NO.	13		
SHEET No.13	of 59		



WARNING  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE





## 11 RELEVANT PROJECT CONTACTS

This WQPP describes BMPs associated with the Cowlitz Barrier Dam Spillway Concrete Repairs. Personnel noted in the Key Contacts Table below will ensure proper implementation and effectiveness of the WQPP. Should the measures initially installed prove to be inadequate; the personnel identified in this table will immediately implement additional measures to protect receiving waters. Communication is an important aspect to successfully protecting the water quality of the Cowlitz River while performing this work. When a Contractor is selected to perform this work the information listed in Table 3 will be completed and distributed.

**Table 3. Key contacts.**

Title	Name	Phone Contact	Email Contact
Tacoma Power Environmental Compliance Oversight	Donna Ebi		donna.ebi@cityoftacoma.org
Field Crew Lead	Field Crew Office	Office: Cell:	
Field Project Manager	TBD	Office: Cell:	
Ecology Water Quality Contact	Carol Serdar	Office: <del>360-407-6269</del> Cell: 360-742-9751	Cser461@ecy.wa.gov
Emergency Owner Contact	TBD	Office: Cell:	
Monitoring Personnel	Field Crew Office	Office: Cell:	



## 12 REFERENCES

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Federal Energy Regulatory Commission. 98 FERC ¶ 61, 274. March 13, 2002. Order Approving Settlement and Issuing New License, Project No. 2016-044.

R2 Resource Consultants, Inc. (R2). 2020. Fish Salvage Plan for the Tacoma Barrier Dam Repair. Prepared for Tacoma Power.

Washington State Department of Ecology, Shorelands and Environmental Assistance Program, Olympia, WA. January 15, 2002. Letter to Debbie Young, Tacoma Power.

Washington State Department of Ecology (Ecology). 2019. Stormwater Management Manual for Western Washington. Publication No. 19-10-021. Available at:  
<https://fortress.wa.gov/ecy/ezshare/wq/Permits/Flare/2019SWMMWW/2019SWMMWW.htm>



# **APPENDIX A**

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## *Hydraulic Project Approval*





# HYDRAULIC PROJECT APPROVAL

Washington Department of  
Fish & Wildlife  
PO Box 43234  
Olympia, WA 98504-3234  
(360) 902-2200

Issued Date: January 27, 2021  
Project End Date: September 30, 2024

Permit Number: 2021-5-4+01  
FPA/Public Notice Number: N/A  
Application ID: 23308

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Tacoma Power ATTENTION: Tim Nordstrom 3628 South 35th St Tacoma, WA 98409-3192	

**Project Name:** Cowlitz Barrier Dam Spillway Concrete Repairs (NWS-2011-526-WRD)

**Project Description:** The Barrier Dam requires repair to the concrete apron and slab as a result of spalling and ball milling. The repair of the spillway will involve placing a wedge of concrete at the downstream side of the existing weir. The concrete wedge will partially fill the area beneath the weir and extend downstream of the upper lip of the existing weir at a 60-degree angle and cover the damaged apron. The concrete wedge will repair the damaged apron, as well as eliminate the harmful vertical eddy that caused the ball milling. The repair portion of the project does not require a permit, however, in order to conduct this repair, the project will require construction of a temporary cofferdam around portions of the Barrier Dam. Construction of the cofferdam will require grading and placement of material on the channel bottom to create a stable base where the cofferdam will be constructed. The cofferdam will consist of an outer cofferdam constructed of bulk bags and an inner secondary containment dam. Approximately one third of the Barrier Dam will be isolated by a cofferdam and repaired each season over three consecutive years starting in 2021. The left side of the spillway will be repaired in the first year of construction, the middle section in year 2, and the right section in the last year of construction. The temporary cofferdam will be constructed out of bulk bags that will be filled with gravel that will meet the FERC approved gravel augmentation specifications. This gravel will then be removed from the site or released into the Cowlitz River for gravel augmentation when it is no longer needed for control of water. The inner secondary structure is a small one-foot high barrier made of sandbags.

## PROVISIONS

### TIMING - PLANS

1. TIMING LIMITATION: You may begin the project on February 1, 2021 and you must complete the project by September 30, 2024.
2. TIMING LIMITATION: Phase 1 Construction: Upstream Filling Action in water work is limited to February 1 to March 15, 2021
3. TIMING LIMITATION: Overall work for remaining phases of construction in the wetted channel must only occur between July 1 and September 30 based on the following schedule:
  - Season 1: July 1 - July 10 and September 21 - September 30, 2021 (left side of spillway)
  - Season 2: July 1 - July 10 and September 21 - September 30, 2022 (middle of spillway)
  - Season 3: July 15 - July 24 and September 21 - September 30, 2023 (right side of spillway)
4. TIMING LIMITATION: Work below the ordinary high water line, but outside of the wetted channel, may occur between June 15 and October 15 for project staging.





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5. **APPROVED PLANS:** You must accomplish the work per plans and specifications submitted with the application and approved by the Washington Department of Fish and Wildlife, except as modified by this Hydraulic Project Approval. You must have a copy of these plans available on site during all phases of the project construction.

### NOTIFICATION REQUIREMENTS

6. **PRE- AND POST-CONSTRUCTION NOTIFICATION:** You, your agent, or contractor must contact the Washington Department of Fish and Wildlife by e-mail at [HPAapplications@dfw.wa.gov](mailto:HPAapplications@dfw.wa.gov); mail to Post Office Box 43234, Olympia, Washington 98504-3234; or fax to (360) 902-2946 at least three business days before starting work, and again within seven days after completing the work. The notification must include the permittee's name, project location, starting date for work or date the work was completed, and the permit number. The Washington Department of Fish and Wildlife may conduct inspections during and after construction; however, the Washington Department of Fish and Wildlife will notify you or your agent before conducting the inspection.

7. **FISH KILL/ WATER QUALITY PROBLEM NOTIFICATION:** If a fish kill occurs or fish are observed in distress at the job site, immediately stop all activities causing harm. Immediately notify the Washington Department of Fish and Wildlife of the problem. If the likely cause of the fish kill or fish distress is related to water quality, also notify the Washington Military Department Emergency Management Division at 1-800-258-5990. Activities related to the fish kill or fish distress must not resume until the Washington Department of Fish and Wildlife gives approval. The Washington Department of Fish and Wildlife may require additional measures to mitigate impacts.

### STAGING, JOB SITE ACCESS, AND EQUIPMENT

8. Establish staging areas (used for equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) in a location and manner that will prevent contaminants such as petroleum products, hydraulic fluid, fresh concrete, sediments, sediment-laden water, chemicals, or any other toxic or harmful materials from entering waters of the state.

9. Design and locate new temporary access roads to prevent erosion and sediment delivery to waters of the state.

10. Clearly mark boundaries to establish the limit of work associated with site access and construction.

11. Check equipment daily for leaks and complete any required repairs in an upland location before using the equipment in or near the water.

12. Use environmentally acceptable lubricants composed of biodegradable base oils such as vegetable oils, synthetic esters, and polyalkylene glycols in equipment operated in or near the water.

### CONSTRUCTION MATERIALS

13. Store all construction and deconstruction material in a location and manner that will prevent contaminants such as petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or harmful materials from entering waters of the state.

14. To prevent leaching, construct forms to contain any wet concrete. Place impervious material over wet concrete that will come in contact with waters of the state. Forms and impervious materials must remain in place until the concrete is cured.

### IN-WATER WORK AREA ISOLATION USING A COFFERDAM STRUCTURE

15. Use a cofferdam as detailed in the project plans to exclude water from the work area. Rock material from the cofferdam bags may be released into the channel.

16. Maintain water quality standards per your Department of Ecology Water Quality Protection Plan when installing and removing the cofferdam.

17. Install the cofferdam and remove fish prior to the start of other work in the wetted perimeter.

### FISH LIFE REMOVAL





## HYDRAULIC PROJECT APPROVAL

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Fish & Wildlife  
PO Box 43234  
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18. All persons removing fish life from a job site must follow the protocol entitled Cowlitz Dam Fish Salvage Plan and dated December 2020.

### STREAM BANK PROTECTION

19. Use clean angular rock to construct the spillway and dam protection. The rock must be large enough and installed to withstand the 100-year peak flow.
20. Bury the base of the structure repairs deep enough to prevent undermining.
21. Complete all bank protection work and allow for proper concrete curing time prior to releasing the water flow to the project area.

LOCATION #1:	279 Barrier Dam Lane, Salkum, WA 98582					
WORK START:	January 1, 1900			WORK END:	November 15, 2023	
<u>WRIA</u>		<u>Waterbody:</u>			<u>Tributary to:</u>	
26 - Cowlitz		Cowlitz River			Columbia River	
<u>1/4 SEC:</u>	<u>Section:</u>	<u>Township:</u>	<u>Range:</u>	<u>Latitude:</u>	<u>Longitude:</u>	<u>County:</u>
NW 1/4	24	12 N	01 E	46.516204	-122.638104	Lewis
<u>Location #1 Driving Directions</u>						
From Interstate 5, take Highway 12 East about 12 miles. Turn right on Fuller Road. Continue to the T intersection and turn left on Spencer Road. Stay right at the Y in the road. Take the second left into the Cowlitz Salmon Hatchery visitor center parking lot, or drive straight to get to the Barrier Dam boat launch and fishing area.						

### APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW. Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.





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Failure to comply with the provisions of this Hydraulic Project Approval could result in civil action against you, including, but not limited to, a stop work order or notice to comply, and/or a gross misdemeanor criminal charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

**MINOR MODIFICATIONS TO THIS HPA:** You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA unless this is a General HPA. If this is a General HPA you must use the Major Modification process described below. Any approved minor modification will require issuance of a letter documenting the approval. A minor modification to the required work timing means any change to the work start or end dates of the current work season to enable project or work phase completion. Minor modifications will be approved only if spawning or incubating fish are not present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a minor modification through APPS. A link to APPS is at <http://wdfw.wa.gov/licensing/hpa/>. If you did not use APPS you must submit a written request that clearly indicates you are seeking a minor modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to [HPAapplications@dfw.wa.gov](mailto:HPAapplications@dfw.wa.gov). You should allow up to 45 days for the department to process your request.

**MAJOR MODIFICATIONS TO THIS HPA:** You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you originally applied for your HPA through the online Aquatic Protection Permitting System (APPS), you may request a major modification through APPS. A link to APPS is at <http://wdfw.wa.gov/licensing/hpa/>. If you did not use APPS you must submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Written requests must include the name of the applicant, the name of the authorized agent if one is acting for the applicant, the APP ID number of the HPA, the date issued, the permitting biologist, the requested changes to the HPA, the reason for the requested change, the date of the request, and the requestor's signature. Send your written request by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. You may email your request for a major modification to [HPAapplications@dfw.wa.gov](mailto:HPAapplications@dfw.wa.gov). You should allow up to 45 days for the department to process your request.

## APPEALS INFORMATION





## HYDRAULIC PROJECT APPROVAL

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If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

**A. INFORMAL APPEALS:** WAC 220-660-460 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to [HPAapplications@dfw.wa.gov](mailto:HPAapplications@dfw.wa.gov); fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee may conduct an informal hearing or review and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

**B. FORMAL APPEALS:** WAC 220-660-470 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the HPA Appeals Coordinator, Department of Fish and Wildlife, Habitat Program, PO Box 43234, Olympia, Washington 98504-3234; e-mail to [HPAapplications@dfw.wa.gov](mailto:HPAapplications@dfw.wa.gov); fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

**C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS:** If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

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## HYDRAULIC PROJECT APPROVAL

Washington Department of  
Fish & Wildlife  
PO Box 43234  
Olympia, WA 98504-3234  
(360) 902-2200

Issued Date: January 27, 2021  
Project End Date: September 30, 2024

Permit Number: 2021-5-4+01  
FPA/Public Notice Number: N/A  
Application ID: 23308

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Habitat Biologist	Scott.Brummer@dfw.wa.gov
Scott Brummer	360-785-0472

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	for Director
	WDFW

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# **APPENDIX B**

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## *Technical Specification Section 01 57 60 Control of Water*



## **SECTION 01 57 60 – CONTROL OF WATER**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

Establishment of control of water in a timely manner is critical to the success of the spillway repair work. Cofferdam will be installed under flow conditions. City will maintain minimum base flows as required by project licensing during installation of the cofferdam (Minimum Rule Flow). As soon as the cofferdam is complete the City may ramp up flows to 2 units at Mayfield Dam to generate power and revenue (Maximum Design Flow).

- A. This Section includes the control of surface and ground water as needed to perform the required construction, including:
  - 1. Preparation and submission of a Water Control Plan.
  - 2. Designing, building, and maintaining all necessary temporary and permanent diversion works required.
  - 3. Furnishing, installing and operating all necessary pumps, piping, treatment, and other facilities and equipment.
  - 4. Removing all temporary works and equipment after they have served their purpose.
- H. This Section does not include Erosion and Sedimentation Control (Section 31 25 13).
- I. The Drawings present a concept for control of water but the Contractor shall be required to develop and submit their own plan in accordance with this specification.

#### **1.2 REFERENCE STANDARDS**

- A. Stormwater Management Manual for Western Washington, Washington State Department of Ecology Water Quality Program, 2019.
- B. Contractors' Handbook for Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (Projects) Synthesis of Programmatic Endangered Species Section 7 Consultation. USFWS and NOAA Restoration Center 2016.
- C. Water Quality Protection Plan Cowlitz Barrier Dam Spillway Upgrade. Prepared by R2 Resource Consultants for Tacoma Power. In Progress.
- D. Fish Salvage Plan for the Tacoma Barrier Dam Spillway Upgrade. Prepared by R2 Resource Consultants for Tacoma Power. In Progress.

#### **1.3 SUBMITTALS**

- A. Meet the applicable requirements of Section 01 33 00 - Submittal Procedures.
- B. Prepare and submit a Water Control Plan to the Engineer for review and approval prior to submitting the Water Control Plan to the FERC for approval:
  - 1. Procedure and schedule to perform work during In-water Work Window.
  - 2. A narrative describing the approach to dewatering the work area. This includes construction and diversion sequencing, a description of the diversion structures and facilities, coordination with other affected construction activities, operational considerations, and proposed approach for installation and removal of facilities.
  - 3. Daily inspection procedure and notification procedure for evacuation of personnel from cofferdam area in the event the integrity of the cofferdam is compromised.



4. Plan shall include:
  - a. Method to access the work area
  - b. Evacuation routes
  - c. Means to evacuate an injured worker
5. A hydraulic analysis of the Contractor's proposed cofferdam system showing how it will meet Maximum Design Flow for the Cowlitz River during the In-water Work window.
6. The Water Control Plan shall include design calculations, shop drawings and material specifications for:
  - a. Stage I Left Bank Work Area Cofferdam including Left Bank Fishway Bulkhead
  - b. Stage II Middle River Work Area.
  - c. Stage III Right Bank Work Area Cofferdam
  - d. Dam Interior Bulkheads
  - e. Upstream Anchors
  - f. Other structures required for diversion or control of water not shown on the Drawings.
  - g. The dewatering systems arrangements for: the initial drawdown with fish rescue, pumping for capturing leakage from the primary cofferdam, pumping within the work area, pumping from the interior of the dam (and Left Fishway area during the first season), and pumping from the area upstream of the dam crest. Calculations shall include pumping duration, fish screen sizing, anticipated leakage rates, pump system curves relative to the piping system requirement (static and dynamic pressures and pressure loss resulting from friction).
  - h. Water treatment and dispersion system to handle water pumped from the work area of the cofferdam that may contain high turbidity, high pH, and other pollutants that require treatment prior to being distributed to a designated upland area.
- C. Include with the Water Control Plan, calculations and Shop Drawings to support the design(s) of diversion works.
- D. The Water Control Plan shall be signed and sealed by a Professional Engineer licensed to practice in Washington State.
- E. Approval by the Engineer of Contractor submittals shall not alleviate the Contractor's responsibilities for completing the work as specified.
- F. City will submit the Engineer approved Water Control Plan to FERC as stipulated in the FERC permit. Written approval from FERC is required prior to implementation of the Water Control Plan. Anticipated FERC review is 30 days.
- G. Submit the source and gradation of the Augmentation Gravel used for filling of bulk bags. Augmentation Gravel shall meet the requirements of the City's Gravel augmentation plan and shall be the following: Washed graded gravel: ½" to 4". The typical product used for this purpose (and commercially available) is 1½" to 3" round drain rock.
- H. Submit as-built of Gravel Augmentation documented with map showing disposal areas and quantities where Augmentation Gravel was placed.
- I. Submit pre-dewater dive inspection of the apron slab.



## 1.4 WATER CONTROL REQUIREMENTS

- A. The Water Control Plan shall consider the following project requirements and constraints:
1. The cofferdam will be designed for Maximum Design Flow. This design flow takes into account City's maximum anticipated discharge from Mayfield during the work window.
  2. City takes responsibility for maintaining flows at or below the Maximum Design Flow and bears responsibility for damages resulting from flows greater than the Maximum Design Flow.
  3. The cofferdams will be covered by a geotextile or other non-erodible material to prevent sedimentation of the area downstream of the work
  4. Temporary diversion and cofferdam works will be required to divert streamflow through and around the work areas. Design of the system to protect the work areas during the Maximum Design Flow will be required.
  5. Lower flows for installation of the cofferdam will be coordinated with the City. It is expected that the Minimum Rule Flow will be maintained for 20 days during cofferdam installation. Flows will not go below what is required by the Minimum Rule Flow.
  6. The Contractor shall plan and sequence work activities taking into consideration the potential for the Cowlitz River flow to increase or decrease based on local weather and tributaries between the project and Mayfield Dam.
  7. During removal of the cofferdam in September it is unlikely the Minimum Rule Flow will be met due to flow regulations on the Cowlitz River.
  8. Construction of the weir infill repair does not need to be staged as described in the Drawings; however, approval from the City, Engineer, and FERC is required for deviations of the seasonal staging as shown on the Drawings.
  9. The Stage I, II and III cofferdams are shown on the plans as a concept. The Contractor is responsible for the design of the cofferdams to have the capacity to pass the Maximum Design Flow without damage to ongoing construction work.
  10. Engineer's concept is based on blocking a maximum of 172ft of the weir. If additional weir is blocked off contractor will be responsible for submitting revised calculations for headwater elevation.
  11. Headwater and Tailwater Elevations at 7,000 CFS Flow:

	Cofferdam Width (ft)	Headwater Elev.	Tailwater Elev.
Stage 1	170	234.4	225.1
Stage 2	176	234.6	225.1
Stage 3	162	234.2	225.1

- B. Cofferdam must be installed within 10 calendar days of the start of the in-water work period. Work area must be dewatered within 20 calendar days of the beginning of the in-water work period.
1. See Section 01010 Summary of Work, Paragraph 1.4 Commencement, Prosecution and Completion for Liquidated Damages associated with failure to complete the dewatering in 20 days.



2. Contractor to submit a recovery schedule if installation extends beyond 20 days. The City and Engineer will assess the viability of continuing with the work for that season.
- C. The Contractor may elect to construct cofferdams, diversion walls, etc. to a higher flow rate than shown on the Drawings to provide an added level of protection against overtopping. As long as the river is held at or below the Maximum Design Flow by the City, the Contractor shall be solely responsible for damages, clean-up and repair resulting from failure of cofferdams and diversion works, whether such failure is caused by overtopping, sliding, internal erosion, or any other mechanism.
- D. Access to the dewatered area shall consist of walkways, bridges, stair towers, or floating docks such that the work area can be accessed at all times. Access only by work-skiff or man-basket is prohibited. Access requiring fall protection such as an extra tall ladder is also prohibited.
- E. Interior of the Dam will require a Contractor designed bulkhead.
- F. The Right Slot Gate feeds water from the Right Fishway to the interior of the dam and will need to be closed off to perform the work. This type of gate is not a watertight seal. It is the responsibility of the Contractor to modify or supplement this gate to allow the interior to be completely dewatered during Stage 3.
- G. Design of the cofferdam system shall consider the global stability and structural capacity of the existing structure.
- H. Contractor shall perform bathymetry upstream of the weir prior to the start of the in-water work window to verify upstream conditions.
- I. Cofferdam may be designed assuming bathymetry shown on the plans with a minimum elevation of 223 ft.
  1. The upstream left depression is planned to be filled by emergency repairs prior to the first season.
  2. Additional fill may be needed prior to placement of bulk bags depending on the details of the Contractor's proposed Water Control Plan.
  3. Additional fill may also be required if the Contractor's bathymetry shows areas within the cofferdam footprint below elevation 223 feet.
  4. See Measurement and Payment for placement of fill below elevation 223 feet. The material will meet the same requirements as Augmentation Gravel.
  5. If in-water fill placement is required for installation of the Contractor's control of water system, Contractor shall include a fill placement plan in the Water Control Plan.
- J. A dive inspection of the Apron Slab shall be performed prior to dewatering of the apron slab. Stability of the dam in a dewatered condition depends on some integrity of the apron slab and must be verified prior to dewatering. Engineer shall be notified one week before the dive inspection and will be present for the dive inspection. Video from the pre-dewater dive inspection shall be submitted by the Contractor.
- K. Upstream Anchors will be needed to secure elements of the Water Control Plan. Location for upstream anchors are suggested in the Drawings, but design and location of the anchors are the responsibility of the contractor. Upstream anchor locations and design capacity calculations will need to be submitted for approval by the Engineer and City.



## **1.5 QUALITY REQUIREMENTS**

- A. Permeability and elevations of the bedload upstream of the dam and dam foundation, condition of the apron slab, and other site conditions may be highly variable and difficult to accurately predict.
- B. It is solely the Contractor's responsibility to evaluate the applicability of the available information and to obtain or develop additional information as a basis for development of the Water Control Plan.
- C. The Contractor shall be responsible for calculation of the required volume and quantities of each material needed based on Drawings, the approved Water Control Plan and associated Shop Drawings, and other factors as identified by the Contractor.
- D. The Contractor shall be responsible for all costs associated with delays or material quantity shortfalls due to volume or quantity miscalculations or required rework resulting from not meeting the requirements of this specification and the approved Water Control Plan.

## **1.6 DEFINITIONS**

- A. Maximum Design Flow: The maximum flow Tacoma Power intends to discharge from Mayfield Dam during the In-water Work Window. 7,000 cfs.
- B. Minimum Rule Flow: The minimum flow of the Cowlitz River per reservoir management practices and constraints is 2,500 cfs.
- C. In-water Work Window(s): See Specification 01 10 00 Summary.

## **PART 2 PRODUCTS**

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**NOT USED**

## **PART 3 EXECUTION**

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### **3.1 PREPARATION**

- A. Complete field activities required in preparation for construction of cofferdams and diversion works.
- B. Submit plans for and make preparations for seepage or penetrations in slab per Section 03 81 14 - Concrete Repair.
- C. At least 7 days prior to beginning in-water work, a half-day meeting shall be held to review possible scenarios for water leaks.
  - 1. Meeting will be attended by City, Engineer, Contractor, Contractor's Superintendent, and major relevant Subcontractors.
  - 2. Meeting will review Apron Penetration Plan and Apron Leak Plan.

### **3.2 PROTECTION**

- A. Follow guidelines as outlined in the Water Quality Protection Plan and Stormwater Pollution Prevention Plan.



This plan identifies BMPs to be implemented in order to minimize impact to water quality and follows guidelines outlined in the stormwater management manual for *Western Washington and the general conservation measures outlined in the Contractors' Handbook for Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (Projects) Synthesis of Programmatic Endangered Species Section 7 Consultation* (USFWS and NOAA Restoration Center 2016).

- B. Protect river, creek and wetlands from any and all materials used or disturbed during the water control activities, including soils and sediment, fill, admixtures, oil and grease, loose debris, and chemicals.
- C. The Contractor shall be solely responsible for any and all damage to the Work caused by cofferdam failure, dewatering device failure and/or floating debris and shall take every precaution to prevent any damage to the Work from these items.
- D. The Contractor shall be responsible to repair, restoration and clean up to the satisfaction of the Engineer of any damages caused to the Work or adjacent property resulting from the Contractor's failure to provide adequate control of water.
- E. In the event of flooding and consequent possibility of cofferdam or diversion structure overtopping or dewatering device failure, the Contractor shall implement measures to minimize damage to construction work.
- F. Should overtopping occur, the Contractor shall dewater and clean out the affected areas and undertake all repairs to the construction work. This work shall be completed expeditiously after the event has passed.

### **3.3 FIELD QUALITY CONTROL**

- A. Contractor is solely responsible to ensure installation of the cofferdam is in compliance with the approved Water Control Plan.

### **3.4 STAGE I, II, III COFFERDAMS**

- A. The Stage I, II, and III cofferdams include the following major components, as shown on the Drawings.
  - 1. A system of prefabricated steel box structures that are designed for floating and submerging in waterways shall be deployed to serve as a breakwater to allow the deployment and retrieval of bulk-bags filled with gravel and the impermeable membrane that serves as the primary water retaining elements of the cofferdam. The breakwater elements shall be anchored in place with spuds or piles that are driven into the river bed to stabilize the structure. Wire or synthetic rope tether lines shall secure the breakwater elements while they are being deployed and retrieved. The rope tethers shall be fastened to anchor points on the shoreline with sufficient capacity to restrain the breakwater with a safety factor of 2. Confirm location of downstream migrant pipe to ensure migrant pipe not damaged by breakwater anchorage.
  - 2. Upstream gravel filled bulk-bags and impermeable membrane cofferdam.
  - 3. An upstream cofferdam to protect Stage I, II, and III repair areas from headwater has been developed as a concept by the Engineer as part of the construction diversion as shown on the Drawings. Design and detailing of this structure is the responsibility of the Contractor.
  - 4. Parallel to flow gravel filled bulk-bag and impermeable membrane cofferdam.
  - 5. A parallel to flow cofferdam to protect Stage I, II, and III repair areas from transverse water flow from the crest to the apron has been developed as a concept by the Engineer as part of the construction diversion as shown on the Drawings. Design and detailing of this structure is the responsibility of the Contractor.



6. The Left Fish Entrance and the interior of the dam will need a temporary bulkhead to dewater the interior of the dam. Design and detailing of this structure is the responsibility of the Contractor.
7. A downstream cofferdam to protect Stage I, II, and III repair areas from tailwater has been developed as a concept by the Engineer as part of the construction diversion as shown on the Drawings. Design and detailing of this structure is the responsibility of the Contractor.
- B. Sequencing of the Stage I, II, III control of water activities and coordination with other construction activities on site shall be the responsibility of the Contractor and detailed in the Water Control Plan.

### **3.5 REMOVAL AND GRAVEL AUGMENTATION**

- A. All components of the Stage I, II, and III water control program will be removed completely between construction stages and at the completion of the project.
- B. The basis for measurement and payment is provided in Section 01 22 00 – Measurement and Payment.
- C. If Augmentation Gravel is used for filling bulk bags, it may be disposed of by placement in the river. Material meeting the gravel augmentation requirements may be placed at disposal locations shown in the Drawings. Placement shall be by land based machines and equipment only. Machines and equipment shall not enter the water or be driven below the ordinary high water level.
- D. Augmentation Gravel shall be placed in piles within the river. It is not intended to be evenly spread over a wide area. Consideration must be taken to not place gravel in such a way to increase tail-water at the Barrier Dam. Gravel cannot be placed directly adjacent to the existing river bank, as gravel has not previously mobilized from bank locations.
- E. Locations for disposal in order of priority and coordinated with the Engineer are:
  1. Downstream of the Apron in the area shown in the Drawings.
  2. Temporary upland stockpile within Contractor work areas may be considered if placement of gravel in identified areas is found to negatively impact tailwater or fish recruitment to the ladder and if approved by Engineer.
- F. Removal includes stockpiling, spoiling, re-use or disposal of materials used in the Control of Water program. Under no conditions shall the Contractor be allowed to dispose of any such materials on City or DNR property without prior approval of the Engineer.
- G. On-site disposal shall be limited to placement in the approved disposal areas.
- H. Non-Augmentation Gravel materials to be disposed of may be stockpiled on site at locations approved by the Engineer. Any aggregate or fill not meeting the requirements of augmentation gravel must be removed before completion of the project.

### **3.6 DEWATERING AND FISH HANDLING**

- A. A fish handling meeting will be held prior to in-water work with City, Engineer, Contractor, and lead fish biologist.
- B. City will conduct the fish handling as outlined in the Fish Salvage Plan for the Tacoma Barrier Dam Spillway Upgrade (R2, In Progress).



- C. Sufficient pump capacity, including backup pumps, will be supplied to ensure dewatering of the enclosed area can be accomplished in less than 2 hours.
  - 1. Anticipated leakage from cofferdam or voids in the apron slab when sizing pumps shall be performed.
  - 2. The maximum time for drawdown is 6 hours to reduce fish mortality.
  - 3. Pumps will be screened with #12 Mesh and flowrate through screens kept below .4ft/s with continuous cleaning during the initial dewatering event (or in the event of the cofferdam is flooded while work is taking place) for each season when dewatering is taking place with the fish rescue.

After fish rescue has been performed the pumping can be screened at the Contractor's discretion unless the cofferdam becomes flooded. If the cofferdam becomes flooded, then the screened pumping and fish rescue process shall be repeated.

- 4. Minimum pumping capacity shall be 3,000 gpm with an additional 3,000 gpm backup pumping which shall be maintained on site
- 5. Areas that become isolated from the main work area, but within the interior of the cofferdam (such as the area upstream of the dam crest and inside the dam) shall include dewatering to prevent water from pooling and flowing into the work area.
- 6. The leakage intercepted upstream of the dam shall be handled with a minimum 18 inch diameter perforated pipe leading to a sump or sumps with pumping capacity of a minimum 1,000 gpm with full redundant pumps installed.
- 7. A minimum pumping capacity of 50 gpm shall be provided within the interior of the dam and as applicable within the left bank fishway.
- D. Leakage from the cofferdam shall be removed in a staged manner. Leakage from the primary cofferdam shall be intercepted with a secondary containment and pumping system.
  - 1. Once this flow can be demonstrated to have a neutral pH, turbidity that is less than or equal to that of the river, and free of pollutants then this flow can be pumped directly to the river.
  - 2. Water collected within the active work area (such as leakage, construction flow from demolition or other work activities, or rainfall) shall be pumped from the work area and discharged into tanks located above the ordinary high-water level. This water shall be treated by settling, pH adjustment, or by other means necessary to remove pollutants then dispersed over an upland area with impact sprinklers such that the application rate does not exceed 170 gpm per acre of area.
  - 3. If at any time the water dispersed on the upland area begins to develop into surface flow back to the river, then the dispersion system shall be modified to prevent this from occurring.
  - 4. The discharge piping from the pumping of water collected directly from the active work area shall be enclosed in a secondary pipe up to the treatment tanks.
  - 5. The containment tanks, treatment process, and dispersion system shall at a minimum be sized to convey 50 gpm and included fully redundant and installed: pumps, piping, tanks, booster pump, and dispersion system. The tanks shall have a minimum capacity of 5,000 gallons. The treatment process shall at a minimum comply with the best management practice (BMP) number C252 – pH Control of High pH Water (Stormwater Management Manual for Western Washington).



- E. Contractor shall supply access, crane support, lighting, and power for fish salvage operation as coordinated with lead biologist.

**END OF SECTION**



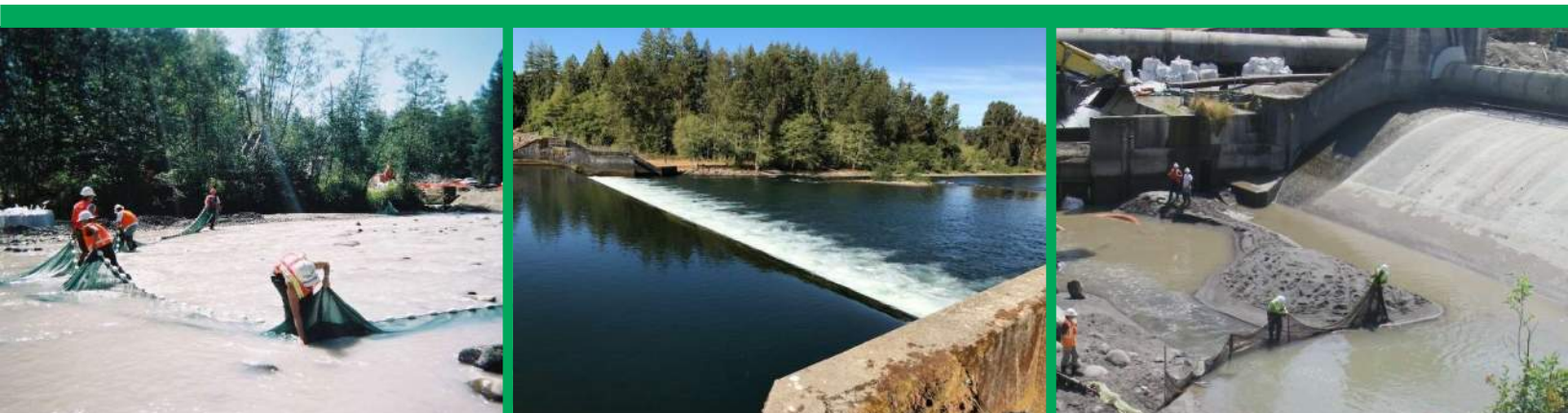
# **APPENDIX C**

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## *Fish Salvage Plan*



# Fish Salvage Plan for the Tacoma Barrier Dam Repair



**Prepared for:**

**Tacoma Power**

**Prepared by:**



**15250 NE 95th Street  
Redmond, WA 98052**

**December 2020**



# **Fish Salvage Plan for the Tacoma Barrier Dam Repair**

**Prepared for:**

**Tacoma Power**

**Prepared by:**

**R2 Resource Consultants, Inc.**

**15250 NE 95th Street**

**Redmond, WA 98052**

**December 2020**



## CONTENTS

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1	PROJECT DESCRIPTION.....	1
2	PROJECT LOCATION .....	1
3	PERMIT REQUIREMENTS.....	1
3.1	BIOLOGICAL OPINION TERMS AND CONDITIONS.....	1
4	SPECIES POTENTIALLY AFFECTED.....	2
4.1	ESA LISTED SPECIES.....	2
4.2	SPECIES OF CONCERN .....	2
4.3	OTHER FISHES.....	2
5	METHODS.....	3
5.1	FISH SALVAGE TIMING.....	3
6	FISH HANDLING/TRANSPORT/RELEASE METHODS .....	5
7	STRESS RESPONSE PLAN .....	7
8	SALVAGE PERSONNEL .....	7
9	REPORTING .....	7
10	REFERENCES CITED.....	8

## LIST OF TABLES

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Table 1.	Species listed under ESA that could occur near the Barrier Dam, Washington.....	2
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# **1 PROJECT DESCRIPTION**

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Tacoma Power is conducting a Barrier Dam Spillway Concrete Repair Project to address structural repair needs of the Barrier Dam. This salvage effort will minimize impacts to fishes while the work area is dewatered for each of the three seasons of repair work on the Barrier Dam.

## **2 PROJECT LOCATION**

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The Cowlitz Project (FERC No. 2016) is located on the Cowlitz River, Lewis County, Washington between river mile (RM) 49.5 and RM 88.0. The project consists of Mossyrock Dam (RM 65.5), Mayfield Dam (RM 52.0), Riffe Lake reservoir, Mayfield Lake reservoir, two hydroelectric powerhouses, the transmission facilities associated with the dams, the Cowlitz Salmon Hatchery (RM 50.0), the Barrier Dam (RM 49.5) where the repair work is being performed, the Cowlitz Trout Hatchery (RM 42.0), recreational facilities at the reservoirs, and lands within the Project boundary.

## **3 PERMIT REQUIREMENTS**

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### **3.1 Biological Opinion Terms and Conditions**

In accordance with the National Marine Fisheries Service (NMFS) Biological Opinions (NMFS 1999, 2004), Endangered Species Act (ESA) Section 10(a)(1)(A) scientific collection permits will not be required because fish salvage take is addressed in the Opinions. The Biological Opinion for the Operation of the Cowlitz River Hydroelectric Project (FERC No. 2016) through 2038 was issued in March 2004. The Barrier Dam is included as part of the Cowlitz Hatchery Complex. NMFS consulted on the operations of all the artificial propagation activities at these facilities as part of a Columbia River basin-wide hatchery biological opinion in 1999 (NMFS 1999). However, that biological opinion covered only those evolutionarily significant units (ESUs) listed prior to 1998. Consultation was reinitiated to cover those salmon and steelhead species that were listed after March 1999. Although these Biological Opinions anticipated construction and maintenance activities, it will be necessary to obtain an authorization letter from NMFS confirming that these specific construction activities fall under the previously authorized anticipated take.

NMFS provided Reasonable and Prudent Measures (RPMs) for the protection of fish including conducting in-water work during seasons that will minimize impacts to fish, maintaining fish passage during construction, minimizing impacts to riparian areas, and preventing or controlling



erosion and pollution input to streams. The RPMs relevant to dewatering and fish handling are incorporated into the methods section of this plan.

## 4 SPECIES POTENTIALLY AFFECTED

### 4.1 ESA Listed Species

Listed species in the action area include Chinook Salmon (spring and fall), steelhead, and Chum Salmon as well as Eulachon. The status of the respective fish species that could be encountered at the Barrier Dam are summarized in Table 1.

**Table 1. Species listed under ESA that could occur near the Barrier Dam, Washington.**

Species	ESU Status	Status	Protective Regulations
Chinook Salmon <i>Oncorhynchus tshawytscha</i> (fall and spring)	Lower Columbia River	Threatened	64 FR 143086 March 24, 1999 65 FR 42422 July 10, 2000
Steelhead <i>Oncorhynchus mykiss</i>	Lower Columbia River	Threatened	63 FR 13347 March 19, 1998 65 FR 42422 July 10, 2000
Chum Salmon <i>Oncorhynchus keta</i>	Columbia River	Threatened	64 FR 14508 March 25, 1999
Coho Salmon <i>Oncorhynchus kisutch</i>	Lower Columbia River/ Southwest Washington	Candidate	60 FR 38011 July 25, 1995
Eulachon <i>Thaleichthys pacificus</i>	Southern DPS	Threatened	75 FR 13012 March 18, 2010

### 4.2 Species of Concern

Additional species identified by Washington Department of Fish and Wildlife's (WDFW) Priority Habitats and Species map include the following:

- Resident Rainbow Trout (*Oncorhynchus mykiss*) – Occurrence/Migration; and
- Resident Coastal Cutthroat (*Oncorhynchus clarkii*) – Occurrence/Migration.

### 4.3 Other Fishes

Other resident fish species have the potential to occur in dewatered work areas. The supervising fish biologist will provide estimates of potential fish capture as a required



component of the WDFW fish collection permit application; a reasonable over-estimate is considered acceptable for permitting purposes.

## **5 METHODS**

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### **5.1 Fish Salvage Timing**

Predominant fish salvage operations are scheduled to occur between July 1st and July 30th with potential other salvage activities extending through October 31 if they become necessary. The most significant salvage efforts will occur when Eulachon, adult Coho and fall Chinook salmon, and Cutthroat Trout are unlikely to be present in the project area. This work window coincides with the downstream migration period for juvenile Spring Chinook Salmon, Coho Salmon, and steelhead that are collected at the Cowlitz Falls fish facility before being placed in stress relief ponds at the Cowlitz Salmon Hatchery and released into the river downstream of the Barrier Dam (near the right bank entrance). Additional downstream migrants may arrive at the Barrier Dam after passing Mayfield Dam including spring Chinook Salmon, Coho Salmon, steelhead, and Cutthroat Trout.

Due to the large areas that will be de-watered, some level of mortality is expected to occur; however, it is anticipated that most fish captured will survive with suitable capture, holding, and transfer methods and equipment. Efforts are directed at a “no loss” action; however, if there are a few fish lost during collection, such loss is not anticipated to have an effect on the abundance, distribution, diversity or productivity of these species at the population level.

### **5.2 Fish Collection Techniques**

In general, beach seines will be used as the primary fish capture technique. Beach seines will be used once the remaining water depth permits wading throughout the project area. Once the area has been sufficiently seined to ensure removal of the majority of fish, the remaining water will be pumped from the area. As the area is dewatered, fish collection crews will carefully collect any remaining fish with aquarium nets from depressions in the dewatered area to make sure that all stranded fish are removed before leaving the project area for the day.

### **5.3 Reasonable and Prudent Measures for Isolation of In-Water Work Areas: Capture and Release (NMFS 2004)**

Item 5s in Section 9.3.1 Terms and Conditions of the Reasonable and Prudent Measures of the Biological Opinion dictates the RPMs for capture and release and states “Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release



fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.” Specific measures applicable to seining include:

- i) The entire capture and release operation will be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.
- ii) Do not use seining if water temperatures exceed 18°C.
- iii) Handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures, to prevent the added stress of out-of-water handling.
- iv) Transport fish in aerated buckets or tanks. Release fish into a safe release site as quickly as possible, and as near as possible to capture sites.
- v) If a listed fish is injured or killed at any point during the salvage operation, the National Oceanic and Atmospheric Administration (NOAA) Fisheries Law Enforcement Office will be contacted (360-418-4248).
- vi) Do not transfer ESA-listed fish to anyone except NOAA Fisheries or U.S. Fish and Wildlife Service (USFWS) personnel, unless otherwise approved in writing by them.
- vii) Obtain all other Federal, State, and local permits necessary to conduct the capture and release activity.
- viii) Allow NOAA Fisheries or USFWS or its designated representative to accompany the capture team during the capture and release activity, and to inspect the team's capture and release records and facilities.

## **5.4 Salvage Operations**

Dewatering will occur in isolated areas within cofferdams. The salvage approach will involve drawing down the water with one or more pumps over approximately a 6 hour period. To meet ESA and WDFW requirements, self-cleaning, screened submersible water pumps will be used. Placement of the cofferdam is anticipated to occur when the river is flowing at about 2,500-cfs to 3,500-cfs (river is regulated by the Mayfield hydro and 2,500-cfs is the minimum flow before recreational boating is impacted downstream). These flow conditions result in tailwater elevations between of 222.60-feet and 223.3 or depths of 5.6 feet to 6.3 over the existing concrete apron. The second construction season will result in the largest dewatered area which is approximately 50-feet by 120 feet inside the cofferdam. During this season, a total of 34,000 to 38,000 cubic feet of water will need to be removed, which will take 6 hours at a rate of 700-780 gallons per minute (gpm). Two pumping systems (one active and one standby) rated for 3,000-gpm (at a minimum) will be used. This system will allow at least 2,300 gpm for leakage and to dewater the area within a 6 hour duration. In addition to the main area over the dam apron, two other areas will need separate dewatering pumps. These areas include the area



upstream of the dam crest and the interior area inside the weir of the dam. The leakage intercepted upstream of the dam shall be handled with a minimum 18 inch diameter perforated pipe leading to a sump or sumps with pumping capacity of a minimum 1,000 gpm with full redundant pumps installed. Another area is the space inside the dam that will be isolated when the water drops below the 2 foot high curb that separates it from the main dewatered area above the apron. A 50-gpm pump will likely be needed to do the final dewatering of this area. Each dewatering pump intake will be outfitted with cylindrical screen with Number 12 stainless steel mesh (0.07-inch square openings) and with an area sized to limit the approach velocity to 0.4 fps at the rated flow to prevent entrainment or impingement of fish. The screens will be equipped with rotating spray bars to continuously clean the screen and prevent debris clogging. The screens will be designed to meet agency screen criteria; manufacturer specifications will be provided to the agencies as documentation.

The selected contractor will be responsible for dewatering and the pumps. Initial dewatering is calculated to occur over roughly a 6 hour period. The dewatering pump rates will be reduced to maintain a water level such that the remaining salvage area can be waded. The water level will be maintained until capture efforts are no longer effective at catching fish. Dewatering will then resume until all remaining water has been removed from the project area. Water levels in the project area will be dewatered to a depth that concentrates the water to the deepest section of each drawdown area. The designated salvage crew will continuously observe newly exposed riverbed and depressions during pumping operations and to locate stranded fish. Crews will visually inspect the dewatered area to make sure that all trapped and stranded fish are removed from the substrate and any isolated pools or depressions. All stranded fish collected during the dewatering process will be placed in temporary holding containers where they will be immediately identified and enumerated and then released downstream. Any fish that show signs of stress shall be held in aerated holding buckets before released downstream after given time to recover.

## **6 FISH HANDLING/TRANSPORT/RELEASE METHODS**

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Handling and release methods are intended to minimize stress to all fish, including ESA listed species per Reasonable and Prudent Measures guidelines set forth in ESA consultation. Extreme care will be given to ESA listed species and efforts will be made to minimize handling and exposure time out of the water during capture and transfer operations. Priority will be given to immediately transfer all adult fish to the release location. In addition, because of concerns that technicians may not always be able to immediately differentiate between juvenile ESA listed and native salmonid species, all captured juvenile salmonids will be treated



the same during the salvage operation. Captured adults will have immediate priority of removal from the project area followed by sub-adult and juveniles. If a listed fish is injured or killed at any point during the salvage operation, the appropriate NMFS representative identified in the collection permits will be contacted immediately. Captured fish will be monitored for signs of stress and a response plan will be employed in the event fish stress is detected (described in Section 8 of this plan).

Captured fish will be transferred immediately to temporary, portable holding containers with aerated, clean water. Captured fish will be identified and enumerated and immediately released downstream to minimize holding. Any salmonid smolts that are collected will be transferred using small aquarium or sanctuary hand dip nets. Container types may include buckets, adult fish totes, and coolers of various sizes to hold and move fish during capture operations. If fish are not immediately released downstream, they will be placed in temporary holding containers which will be equipped with aeration stones fed by battery powered aerators and/or compressed air tanks, and water temperature will be continuously monitored. Distilled water ice will be available to help keep holding water cool if necessary. Fish will generally be held in temporary containers for no longer than 30 minutes, with the exception of ESA-listed fish and adult resident trout, which will be transferred directly to the release location soon after their collection. Fish  $\leq 40$  cm fork length will be held in 5-gallon buckets while fish  $>40$  cm will be placed in totes or coolers. Water for temporary holding containers will be drawn directly from the river edge and refreshed as needed by the supervising biologist.

Other native fish species captured during the project will be transferred to temporary holding containers where they will be immediately identified and enumerated and released downstream. If fish cannot be immediately identified and enumerated, they will be held in containers that are continuously monitored for water temperature and dissolved oxygen throughout the entire holding period to ensure adequate water quality. Holding pens or containers will be equipped with supplemental aeration equipment to ensure provision of adequate dissolved oxygen levels if needed.

The primary release location will be located below the downstream cofferdam. The exact location will be identified during an onsite visit within seven days prior to initiation of salvage operations, and will reflect access, safety, shading availability, and water quality considerations. Some releases may occur along either bank depending on access, time to transport, condition of fish, and safety. Captured non-native fish species will be euthanized and disposed of off-site at the direction of WDFW.



## **7 STRESS RESPONSE PLAN**

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Fish will be continuously monitored for indicators of stress. Fish capture and transport will be halted if it is determined that fish are becoming temperature stressed. Although not expected, fish capture and transport will be halted if river temperatures exceed 18°C. Water temperatures will be monitored in transport buckets/vessels to ensure that the water does not become significantly warmer than instream water supply.

## **8 SALVAGE PERSONNEL**

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Instream fish salvage activities will be conducted under the supervision of Tacoma's designated lead fish biologist who will have demonstrated experience in coordinating and conducting large-scale fish salvage operations. The lead biologist will confer with construction management personnel and agency biologists prior to instream sampling work to ensure appropriate procedures are followed to ensure both human and fish safety. Designated agency representatives will be invited to observe and participate in fish salvage operations, and to inspect the Tacoma team's capture and release records and facilities.

## **9 REPORTING**

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A summary technical memorandum will be prepared to satisfy the anticipated requirements of the Biological Opinion.

The Biological Opinion requires the following monitoring reporting related to fish salvage efforts for any projects undertaken by Tacoma Power. Tacoma Power will be responsible for submission of the monitoring report to the Federal Regulatory Energy Commission and NOAA Fisheries within 120 days of the project completion date. The report shall describe the results of RPMs and associated Terms and Conditions set forth in the Biological Opinion, including but not limited to the following metrics:

- 5.t.iii.5 Isolation of in-water work area, capture, and release.
  - (a) Supervisory fish biologist's name and address.
  - (b) Methods of work area isolation and take minimization.
  - (c) Stream conditions before, during, and within one week after completion of work area isolation.
  - (d) Means of fish capture.
  - (e) Number of fish captured by species.
  - (f) Location and condition of all fish released.
  - (g) Any incidence of observed injury or mortality of listed species.



## 10 REFERENCES CITED

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National Marine Fisheries Service (NMFS). 1999. Endangered Species Act - Section 7 Consultation Biological Opinion on Artificial Propagation in the Columbia River Basin - Incidental Take of Listed Salmon and Steelhead from Federal and Non-Federal Hatchery Programs that Collect, Rear and Release Unlisted Fish Species. Issued March 29, 1999. NMFS, Northwest Region, Portland, Oregon.

National Marine Fisheries Service (NMFS). 2004. Endangered Species Act – Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation on operation of the Cowlitz River Hydroelectric Project (FERC No. 2016) through 2038. NMFS, Northwest Region, Portland, Oregon.