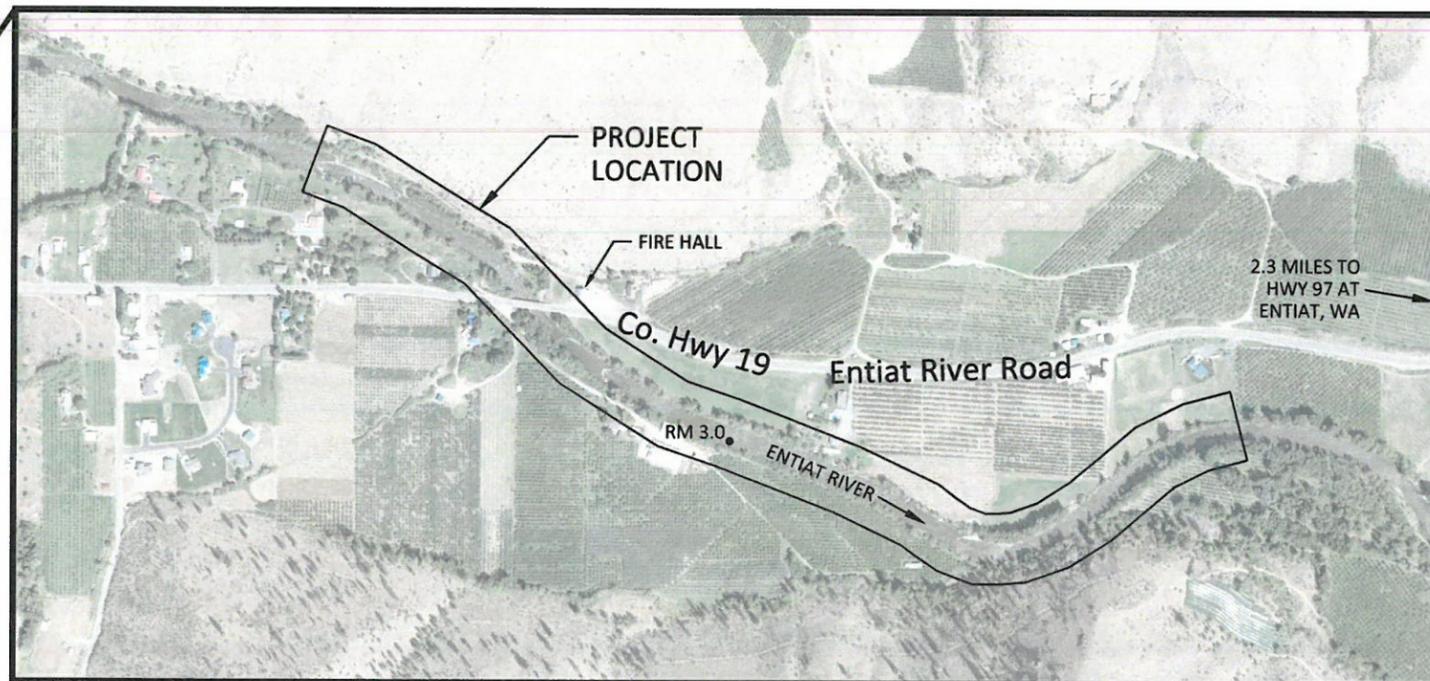


# ENTIAT RIVER RM 2.6-3.5 HABITAT ENHANCEMENT PROJECT

ENTIAT, WASHINGTON

FEBRUARY 27, 2014



**SITE MAP**  
NOT TO SCALE



## SHEET INDEX

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- 11 - PLAN VIEW STATION 28+73 - 33+85
- 12 - PLAN VIEW STATION 34+41 - 38+13
- 13 - PLAN VIEW STATION 38+24 - 43+27
- 14 - PLAN VIEW STATION 45+30 - 50+44
- 15 - TYPICAL DETAILS
- 16 - TYPICAL DETAILS
- 17 - TYPICAL DETAILS
- 18 - TYPICAL DETAILS

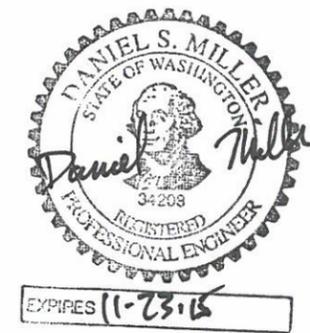
## COORDINATES

DOWNSTREAM END:  
LATITUDE 47°39'57.46" N  
LONGITUDE 120°16'8.57" W

UPSTREAM END:  
LATITUDE 47°40'9.24" N  
LONGITUDE 120°17'8.39" W

WATERBODY:  
ENTIAT RIVER - RM 2.6-3.5  
TRIBUTARY OF:  
COLUMBIA RIVER

NE1/4 SECTION 14, TOWNSHIP  
25N, RANGE 20E  
CHELAN COUNTY



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NO.	BY	DATE	REVISION DESCRIPTION

MJ/DF	DM	DM
DRAWN	DESIGNED	CHECKED
DM	2/27/2014	120249
APPROVED	DATE	PROJECT

CONFEDERATED TRIBES AND  
BANDS OF THE YAKAMA NATION  
ENTIAT RIVER - RM 2.6-3.5



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Hood River, OR 97031  
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COVER, SHEET INDEX  
AND VICINITY MAP

SHEET  
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THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID SITE MEETING.

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH OWNER AND OWNER'S REPRESENTATIVE PRIOR TO BEGINNING CONSTRUCTION.

ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT), AND LOCAL STANDARDS UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL.

**WDFW IN-WATER WORK PERIODS**

WORK SHALL OCCUR DURING THE PERMITTED IN-WATER WORK PERIOD STATED IN THE HYDRAULIC PROJECT APPROVAL.

**EXISTING DATA**

SURVEY COLLECTED BY INTER-FLUVE, INC. BY RTK DECEMBER 13-14, 2012 REFERENCED TO NAD83 WASHINGTON STATE PLANE, NORTH ZONE US FEET.

**SOILS**

NO SUBSURFACE SOILS INVESTIGATIONS HAVE BEEN COMPLETED. CONTRACTOR SHALL CONDUCT OWN INVESTIGATIONS.

**UTILITIES**

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL CALL (800-424-5555) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE EFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.

THE CONTRACTOR SHALL PROVIDE EQUIPMENT OR LABOR TO AID THE EFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST.

**CONSTRUCTION STAKING**

OWNER'S REPRESENTATIVE WILL PROVIDE STAKING OF PROJECT LIMITS, GRADE STAKES, AND ELEVATION CONTROL POINTS. SOME FIELD ADJUSTMENTS TO THE LINES AND GRADES ARE TO BE EXPECTED.

CONTRACTOR SHALL MEET WITH THE OWNER AND OWNER'S REPRESENTATIVE TO DEFINE AND MARK LIMITS OF DISTURBANCE PRIOR TO MOBILIZATION OF EQUIPMENT OR MATERIALS ONTO THE SITE.

THE CONTRACTOR SHALL REPLACE DAMAGED OR DESTROYED CONSTRUCTION STAKES AT NO ADDITIONAL COST.

**CONSTRUCTION MATERIALS**

ESTIMATED MATERIAL VOLUMES ARE APPROXIMATE IN-PLACE QUANTITY AND NOT FACTORED FOR EXPANSION OF EXCAVATED MATERIAL OR COMPACTION OF PLACED MATERIAL. MEASUREMENT AND PAYMENT SHALL NOT BE BASED ON WEIGHT TICKETS OR TRUCK MEASURE WITHOUT PRIOR WRITTEN APPROVAL.

LOCATION, ALIGNMENT, AND ELEVATION OF LOGS AND LOGS WITH ROOT WADS ARE SUBJECT TO ADJUSTMENT BASED ON FIELD CONDITIONS, AND MATERIAL SIZE.

ANY EXCESS MATERIAL SHALL BE STOCKPILED NEATLY IN AN APPROVED LOCATION OF THE STOCKPILE AND STAGING AREA. AT COMPLETION OF WORK, THE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR OBTAINING ANY PERMITS AND FEES REQUIRED FOR LEGAL DISPOSAL.

**EQUIPMENT**

EXCAVATORS SHALL BE FITTED WITH NON-TOXIC HYDRAULIC FLUIDS AT NO ADDITIONAL COST.

AN EXCAVATOR WITH A LONG REACH BOOM SHALL BE USED FOR PLACEMENT OF BOULDER CLUSTERS WITHOUT EQUIPMENT ENTERING WATER.

**CONSTRUCTION ACCESS/TRAFFIC CONTROL**

CONTRACTOR SHALL SUBMIT AN ACCESS, STAGING, AND STOCKPILE PLAN TO THE OWNER'S REPRESENTATIVE FOR APPROVAL.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR OBTAINING ANY REQUIRED TRAFFIC CONTROL OR ACCESS PERMITS.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS.

ALL SAPLINGS AND TREES TO BE TRANSPLANTED OR REMOVED SHALL BE CLEARLY MARKED AND APPROVED BY THE OWNER AND OWNER'S REPRESENTATIVE.

ALL EQUIPMENT, MATERIALS AND PERSONNEL SHALL REMAIN WITHIN THE LIMITS OF DISTURBANCE.

THE CONTRACTOR SHALL KEEP THE WORK AREAS IN A NEAT AND SIGHTLY CONDITION FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.

ALL DISTURBED AREAS INCLUDING BUT NOT LIMITED TO ROADS, DRIVEWAYS, ACCESS ROUTES, FENCES, AND IRRIGATION SYSTEMS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER AND RE-VEGETATED PER PLANS.

AT PROJECT COMPLETION, PAVEMENT SHALL BE CLEANED OF CONSTRUCTION DEBRIS AND RESTORED TO PRE-PROJECT CONDITION OR BETTER.

ALL DISTURBED AREAS OUTSIDE THE LIMITS OF DISTURBANCE SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER AT NO ADDITIONAL COST.

**EROSION CONTROL**

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

**EROSION/SEDIMENTATION CONTROL (ESC) PLAN**

THE EROSION AND SEDIMENT CONTROL (ESC) PLAN PROVIDED IS FOR INFORMATIONAL PURPOSES ONLY, THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING EROSION CONTROL MEASURES TO COMPLY WITH APPLICABLE REGULATIONS.

THE RECOMMENDATIONS FOR AN ESC PLAN INCLUDED HEREIN WILL PROVIDE A GUIDELINE FOR THE CONTRACTOR TO DEVELOP AND IMPLEMENT AN ESC PLAN.

- A. THE IMPLEMENTATION OF AN ESC PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
- B. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
- C. ESC FACILITIES AS APPROXIMATELY SHOWN ON THIS PLAN ARE TO BE CONSTRUCTED PRIOR TO CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, OR VIOLATE APPLICABLE WATER STANDARDS.
- D. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED AT NO ADDITIONAL COST FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
- E. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
- F. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 24 HOURS FOLLOWING A STORM EVENT.
- G. STABILIZED CONSTRUCTION ENTRANCES AND ADDITIONAL MEASURES MAY BE REQUIRED AND SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT.

**INSPECTION AND MAINTENANCE**

ALL ESC FACILITIES SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL ESC FACILITIES SHALL BE INSPECTED DAILY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD AND AFTER EVENTS EXCEEDING 2 HOURS DURATION.

**CONTRACTOR'S ESC RECORD**

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

- 1. WHEN MAJOR GRADING ACTIVITIES OCCUR,
- 2. DATES OF RAINFALL EVENTS EITHER EXCEEDING 2 HOURS DURATION OR MORE THAN 0.5 INCHES/24 HOURS,
- 3. WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON SITE, OR ON A PORTION OF THE SITE,
- 4. WHEN STABILIZATION MEASURES ARE INITIATED FOR PORTIONS OF THE SITE. ESC RECORDS SHALL BE MADE AVAILABLE TO THE OWNER AND OWNER'S REPRESENTATIVE ON REQUEST AND SHALL BE PROVIDED FOR REVIEW AND APPROVAL PRIOR TO APPLICATION FOR PAYMENT.

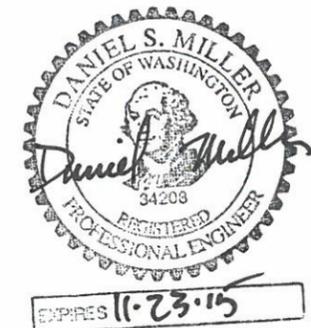
**STABILIZE SOILS AND PROTECT SLOPES**

FROM MAY 1 THROUGH SEPTEMBER 30, ALL EXPOSED SOILS SHALL BE PROTECTED FROM EROSION BY MULCHING, PLASTIC SHEETING, HYDROSEED COVERING, OR OTHER APPROVED MEASURES WITHIN THREE DAYS OF GRADING. FROM OCTOBER 1 THROUGH APRIL 30, ALL EXPOSED SOILS MUST BE PROTECTED WITHIN 2 DAYS OF GRADING. SOILS SHALL BE STABILIZED BEFORE A WORK SHUTDOWN, HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES. HYDROSEED AS SOON AS PRACTICAL ALL DISTURBED AREAS NOT INDICATED IN THE CONTRACT DOCUMENTS FOR OTHER PERMANENT STABILIZATION MEASURES.

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

**AFTER FINAL SITE STABILIZATION**

ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED FROM THE SITE OR INCORPORATED INTO FINISHED GRADING. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.



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**CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION  
ENTIAT RIVER - RM 2.6-3.5**



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**GENERAL NOTES**

SHEET  
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## RIVER DIVERSION

DIVERSION SHALL BYPASS THE RIVER AROUND WORK AREAS.

## FISH RESCUE

DEWATERING OF IN-CHANNEL WORK AREA(S) SHALL OCCUR CONCURRENT WITH FISH RESCUE. CONTRACTOR SHALL COORDINATE WITH THE YAKAMA NATION FISHERIES FOR FISH RESCUE. CONTRACTOR SHALL PROVIDE YAKAMA FISHERIES AMPLE TIME TO SCHEDULE FISH RESCUE. IF DIVERSION FAILS DUE TO CONTRACTOR NEGLIGENCE, FISH RESCUE SHALL BE REPEATED BY YAKAMA FISHERIES CREWS AT CONTRACTOR'S EXPENSE.

ALL FISH RESCUE EFFORTS SHALL BE SUPERVISED BY A YAKAMA NATION FISHERIES/AQUATIC BIOLOGIST EXPERIENCED WITH THE COLLECTION AND HANDLING OF SALMONID FISHES FROM CONSTRUCTION SITES.

ALL FISH TRAPPED IN RESIDUAL POOLS WITHIN THE PROJECT AREA WILL BE CAREFULLY COLLECTED BY SEINE AND/OR DIP NETS AND PLACED IN CLEAN TRANSFER CONTAINERS WITH ADEQUATE VOLUME OF FRESH RIVER WATER.

CAPTURED FISHES SHALL BE IMMEDIATELY RELEASED INTO ENTIAT RIVER.

## CONSTRUCTION DEWATERING

CONTRACTOR SHALL PERFORM CONSTRUCTION DEWATERING IN SUCH A MANNER AS TO AVOID THE RELEASE OF TURBID OR SEDIMENT-LADEN WATER IN ORDER TO PREVENT CONTAMINATION OR INCREASE TURBIDITY OF SURFACE WATERS. EXCAVATION OF DEWATERING SUMPS BEYOND LIMITS SHOWN SHALL BE AT NO ADDITIONAL COST. SEDIMENT LADEN WATER MAY BE PUMPED TO AN UPLAND DISCHARGE LOCATION AND ALLOWED TO SHEET FLOW THROUGH EXISTING VEGETATION BEFORE INFILTRATING INTO THE GROUND. IF THIS METHOD IS NOT SUFFICIENT TO PREVENT RETURN OF TURBID WATER TO ENTIAT RIVER, A 'DIRT-BAG' OR SEDIMENT RETENTION STRUCTURE MAY BE REQUIRED AS NECESSARY TO COMPLY WITH LAWS AND PERMIT REQUIREMENTS AT NO ADDITIONAL COST.

OWNER'S REPRESENTATIVE SHALL APPROVE DEWATERING DISCHARGE LOCATION PRIOR TO IMPLEMENTATION.

## TREE SALVAGE

ANY REMOVED VEGETATION GREATER THAN 6 INCHES DIAMETER AND 15 FEET LONG SHALL BE INCORPORATED INTO LOG STRUCTURES. CONTRACTOR IS RESPONSIBLE FOR REMOVING SMALLER CLEARING AND GRUBBING DEBRIS FROM THE SITE AND DISPOSING AT A LEGAL LOCATION UNLESS DIRECTED BY THE OWNER'S REPRESENTATIVE.

ALL TREES REMOVED WITHIN CLEARING LIMITS SHALL BE REMOVED WHOLE WITH ROOT WAD AND UTILIZED IN THE STREAM CONSTRUCTION AS DIRECTED BY OWNER'S REPRESENTATIVE.

## LIVE TREES

ALL TREES NOT MARKED FOR REMOVAL SHALL BE LEFT STANDING UNDISTURBED. CONSTRUCTION ACTIVITY SHALL NOT DEBARK OR DAMAGE LIVE TREES.

KEEP OUT OF DRIP LINE OF EXISTING TREES TO REMAIN.

## SUMMARY OF QUANTITIES ESTIMATE

Materials quantities per each structure			Materials quantities per total structures on each property					Total
<b>Boulder Clusters</b>			Milne	Milne/Small	Asher/Small	Scoville	Whitehall	Total
Item	quantity	per unit	13	6	15	6	3	43
Boulders per unit	3	ea	39	18	45	18	9	129
Excavation (as needed)	0.25	cy	1.6	0.8	1.9	0.8	0.4	5.4

### Margin LWD

Item	quantity	per unit	Milne		Small		Asher	Scoville	Whitehall	Total
			low bank	high bank'	low bank	high bank	low bank	low bank	low bank	
			2	5	2	4	4	2	2	
<b>All - toe of bank/instream elements</b>										
18" dbh, 25' total, RW	2	ea	4	10	4	8	8	4	4	42
18" dbh, 30', no-RW	1	ea	2	5	2	4	4	2	2	21
3.5' boulders	2	ea	4	10	4	8	8	4	4	42
<b>Low Bank LWM - bank elements</b>										
excavation	6.8	cy	13.6		13.6		27.2	13.6	13.6	82
backfill	5.2	cy	10.4		10.3		20.7	10.3	10.3	62
disposal	1.6	cy	3.2		3.2		6.5	3.2	3.2	19
<b>High Bank LWM - bank elements</b>										
3' boulders	3	ea		15		12				27
excavation	2	cy		10		8				18
backfill	0.5	cy		2.5		2				5
disposal	2.0	cy		10		8				18

### Bank Wood Treatment

Item	quantity	per unit	Milne	Small	Asher	Scoville	Whitehall
			0	0	0	1	0
Slash (a)	92	cy				92	
15" dbh, 30', RW	15	ea				15	
12-15" dbh, 20', no-RW	14	ea				14	
3.5' boulders	30	ea				30	
excavation	18.0	cy				18	

Notes:

a) Slash/live brush/topsoil-gravel layer: 18" th x 330ft L x 5ft high - installed

ea = each  
cy = cubic yard  
sf = square feet  
RW = Rootwad

NOTES:

- ALL MATERIALS QUANTITIES ARE BASED ON IN-PLACE CONDITION DETERMINED BY A PRE-PROJECT CONDITION SURVEY COMPARED AGAINST A WITH-PROJECT CONDITION SURVEY.
- CONTRACTOR SHALL ALLOW FOR BULKING OF EXCAVATED MATERIAL AND COMPACTION OF PLACED MATERIAL AT NO ADDITIONAL MEASURE OR COST.
- MEASUREMENTS BY WEIGHT OR TRUCK MEASUREMENT SHALL NOT BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL.

CY = CUBIC YARDS  
EA = EACH  
LF = LINEAL FEET  
LS = LUMP SUM  
MSF = 1,000-SQUARE FEET  
SY = SQUARE YARDS



EXPIRES 11-23-15

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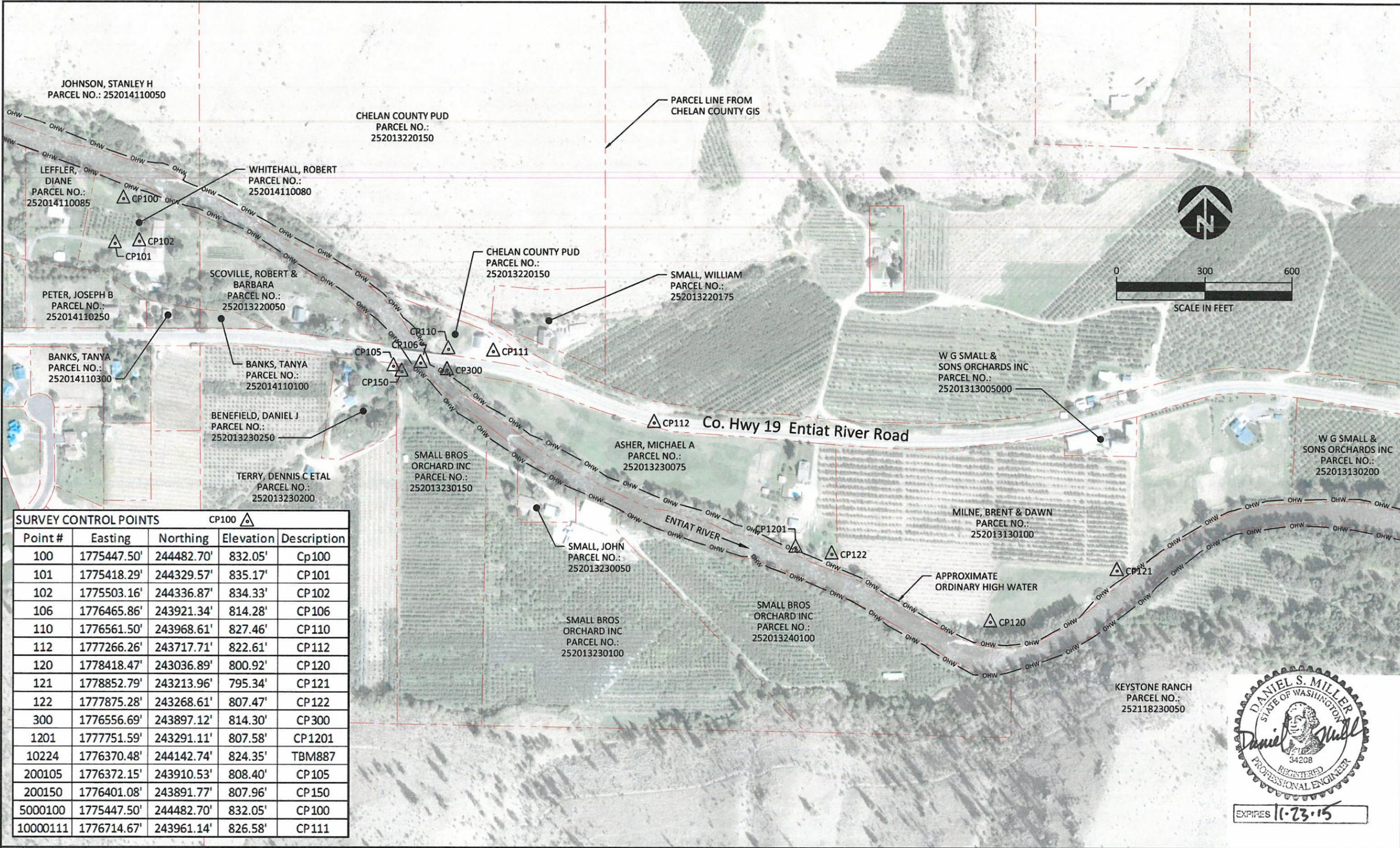
GENERAL NOTES AND  
ESTIMATED QUANTITIES

SHEET

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SURVEY CONTROL POINTS CP100				
Point #	Easting	Northing	Elevation	Description
100	1775447.50'	244482.70'	832.05'	Cp100
101	1775418.29'	244329.57'	835.17'	CP101
102	1775503.16'	244336.87'	834.33'	CP102
106	1776465.86'	243921.34'	814.28'	CP106
110	1776561.50'	243968.61'	827.46'	CP110
112	1777266.26'	243717.71'	822.61'	CP112
120	1778418.47'	243036.89'	800.92'	CP120
121	1778852.79'	243213.96'	795.34'	CP121
122	1777875.28'	243268.61'	807.47'	CP122
300	1776556.69'	243897.12'	814.30'	CP300
1201	1777751.59'	243291.11'	807.58'	CP1201
10224	1776370.48'	244142.74'	824.35'	TBM887
200105	1776372.15'	243910.53'	808.40'	CP105
200150	1776401.08'	243891.77'	807.96'	CP150
5000100	1775447.50'	244482.70'	832.05'	CP100
10000111	1776714.67'	243961.14'	826.58'	CP111

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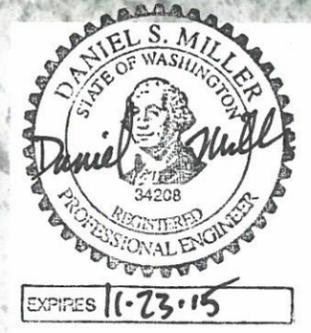
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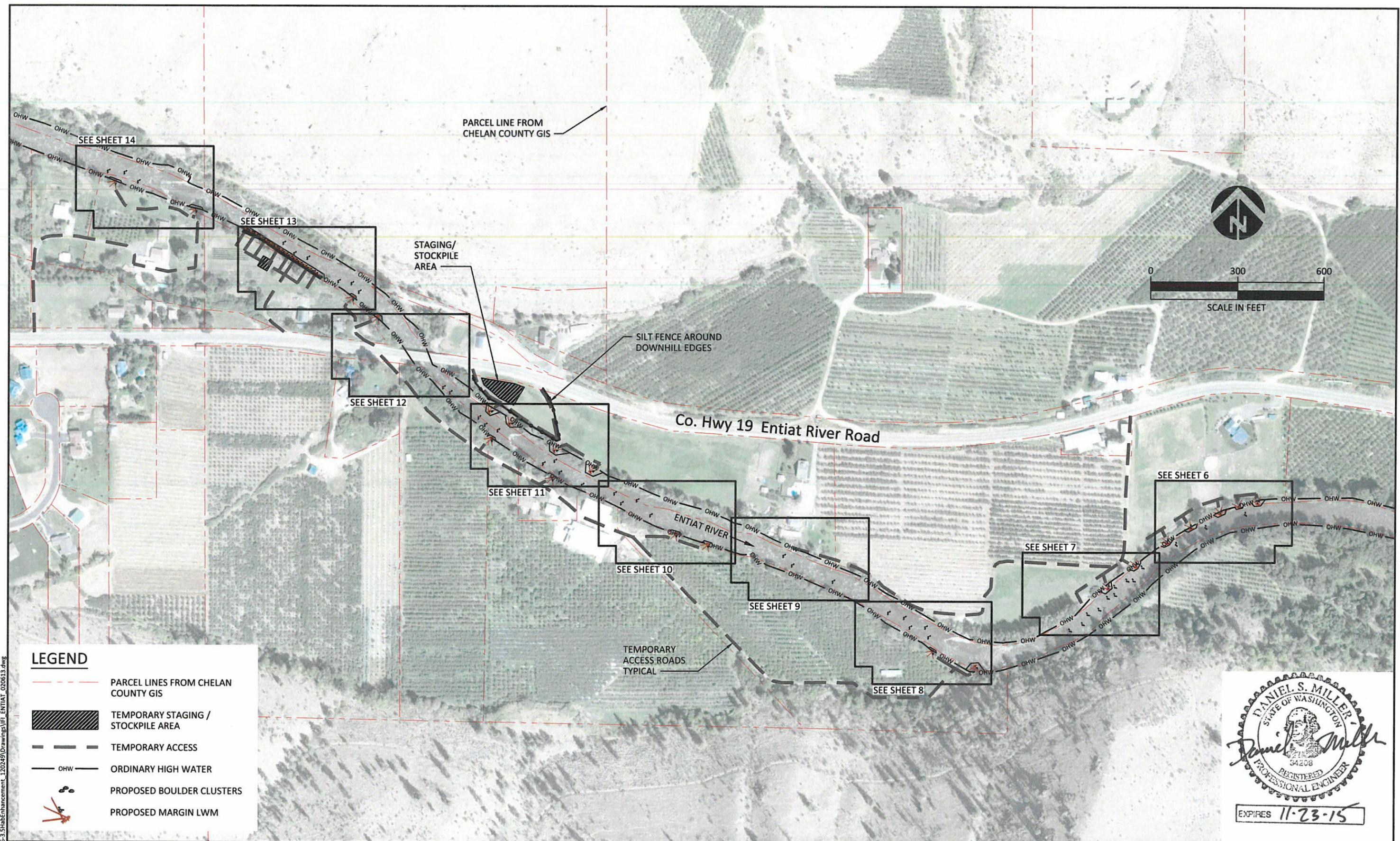
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**ENTIAT RIVER - RM 2.6-3.5**



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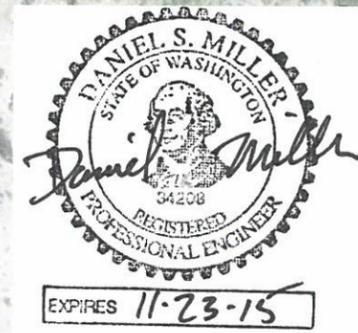
**EXISTING CONDITIONS,  
 OWNERSHIP AND SURVEY  
 CONTROL**





**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY STAGING / STOCKPILE AREA
- TEMPORARY ACCESS
- OHW
- PROPOSED BOULDER CLUSTERS
- PROPOSED MARGIN LWM



NO.	BY	DATE	REVISION DESCRIPTION

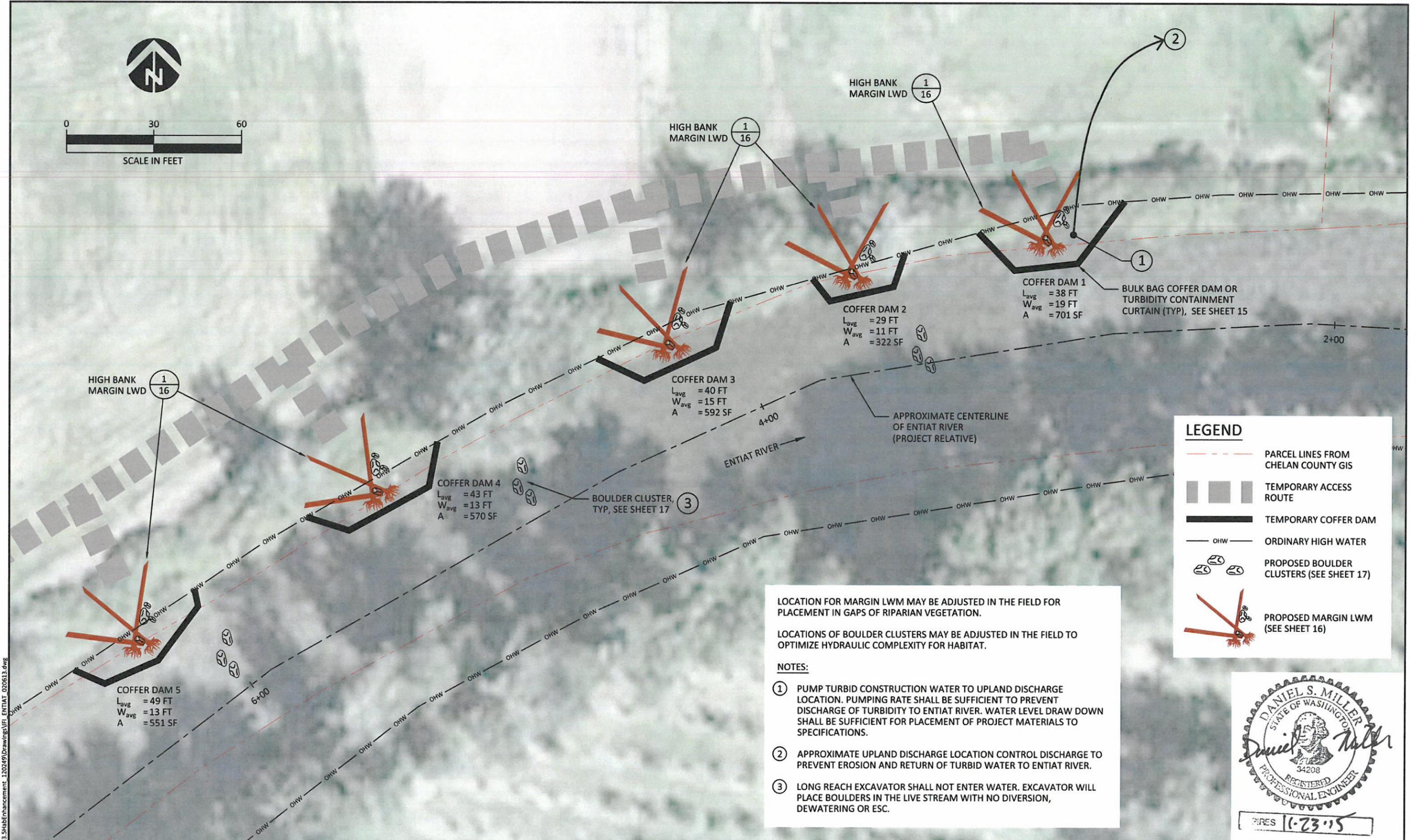
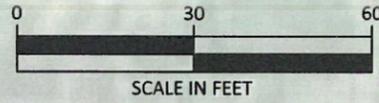
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**PROPOSED CONDITIONS, ACCESS,  
STAGING AND STOCKPILE**

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**LEGEND**

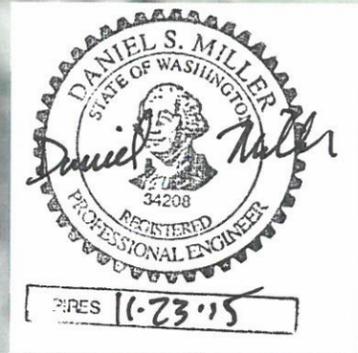
- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)

LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

**NOTES:**

- ① PUMP TURBID CONSTRUCTION WATER TO UPLAND DISCHARGE LOCATION. PUMPING RATE SHALL BE SUFFICIENT TO PREVENT DISCHARGE OF TURBIDITY TO ENTIAT RIVER. WATER LEVEL DRAW DOWN SHALL BE SUFFICIENT FOR PLACEMENT OF PROJECT MATERIALS TO SPECIFICATIONS.
- ② APPROXIMATE UPLAND DISCHARGE LOCATION CONTROL DISCHARGE TO PREVENT EROSION AND RETURN OF TURBID WATER TO ENTIAT RIVER.
- ③ LONG REACH EXCAVATOR SHALL NOT ENTER WATER. EXCAVATOR WILL PLACE BOULDERS IN THE LIVE STREAM WITH NO DIVERSION, DEWATERING OR ESC.



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**PLAN VIEW STATION**  
**1+79 - 6+85**

LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

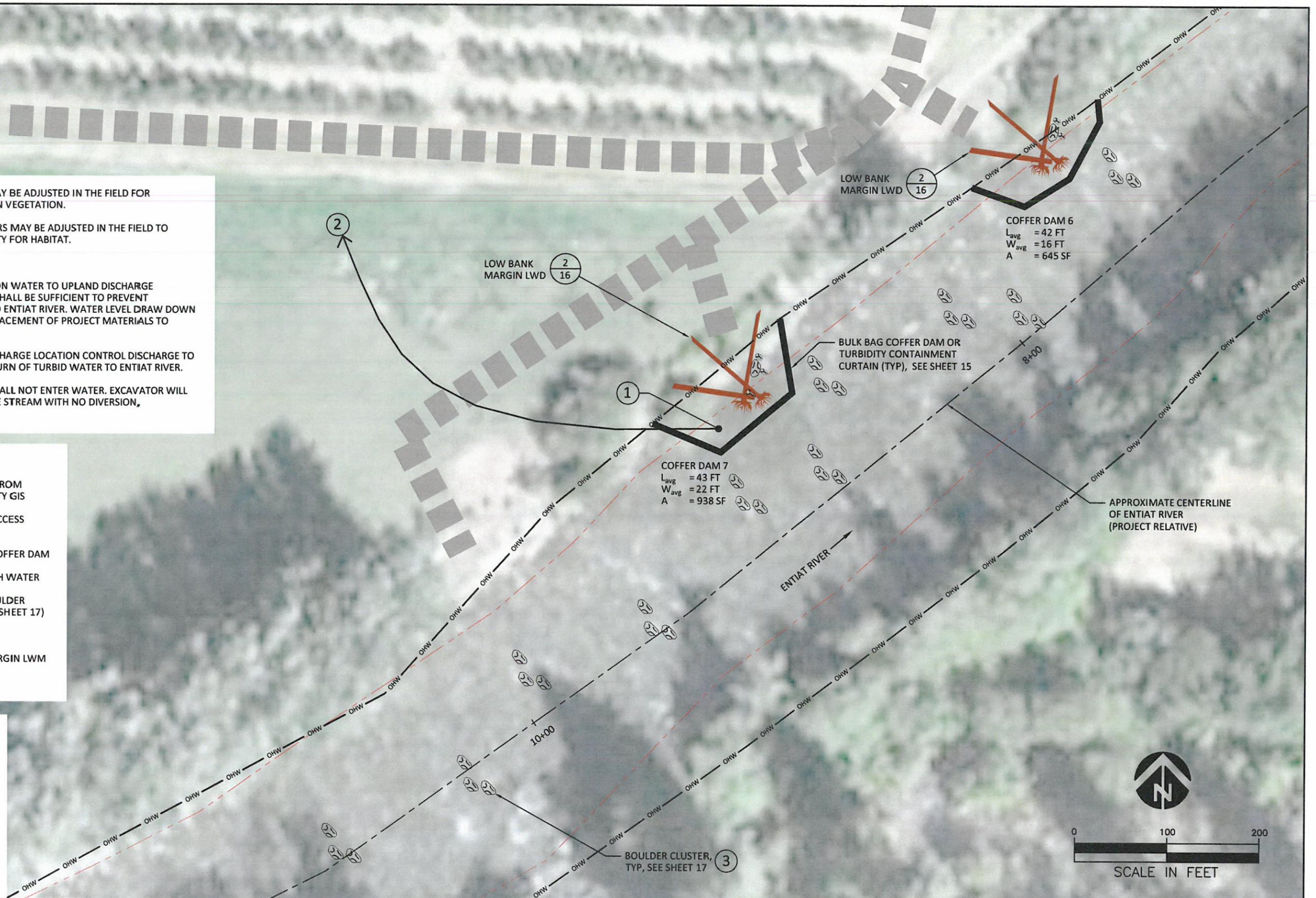
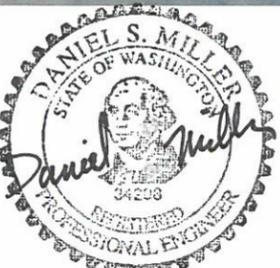
LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

**NOTES:**

- ① PUMP TURBID CONSTRUCTION WATER TO UPLAND DISCHARGE LOCATION. PUMPING RATE SHALL BE SUFFICIENT TO PREVENT DISCHARGE OF TURBIDITY TO ENTIAT RIVER. WATER LEVEL DRAW DOWN SHALL BE SUFFICIENT FOR PLACEMENT OF PROJECT MATERIALS TO SPECIFICATIONS.
- ② APPROXIMATE UPLAND DISCHARGE LOCATION CONTROL DISCHARGE TO PREVENT EROSION AND RETURN OF TURBID WATER TO ENTIAT RIVER.
- ③ LONG REACH EXCAVATOR SHALL NOT ENTER WATER. EXCAVATOR WILL PLACE BOULDERS IN THE LIVE STREAM WITH NO DIVERSION, DEWATERING OR ESC.

**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)



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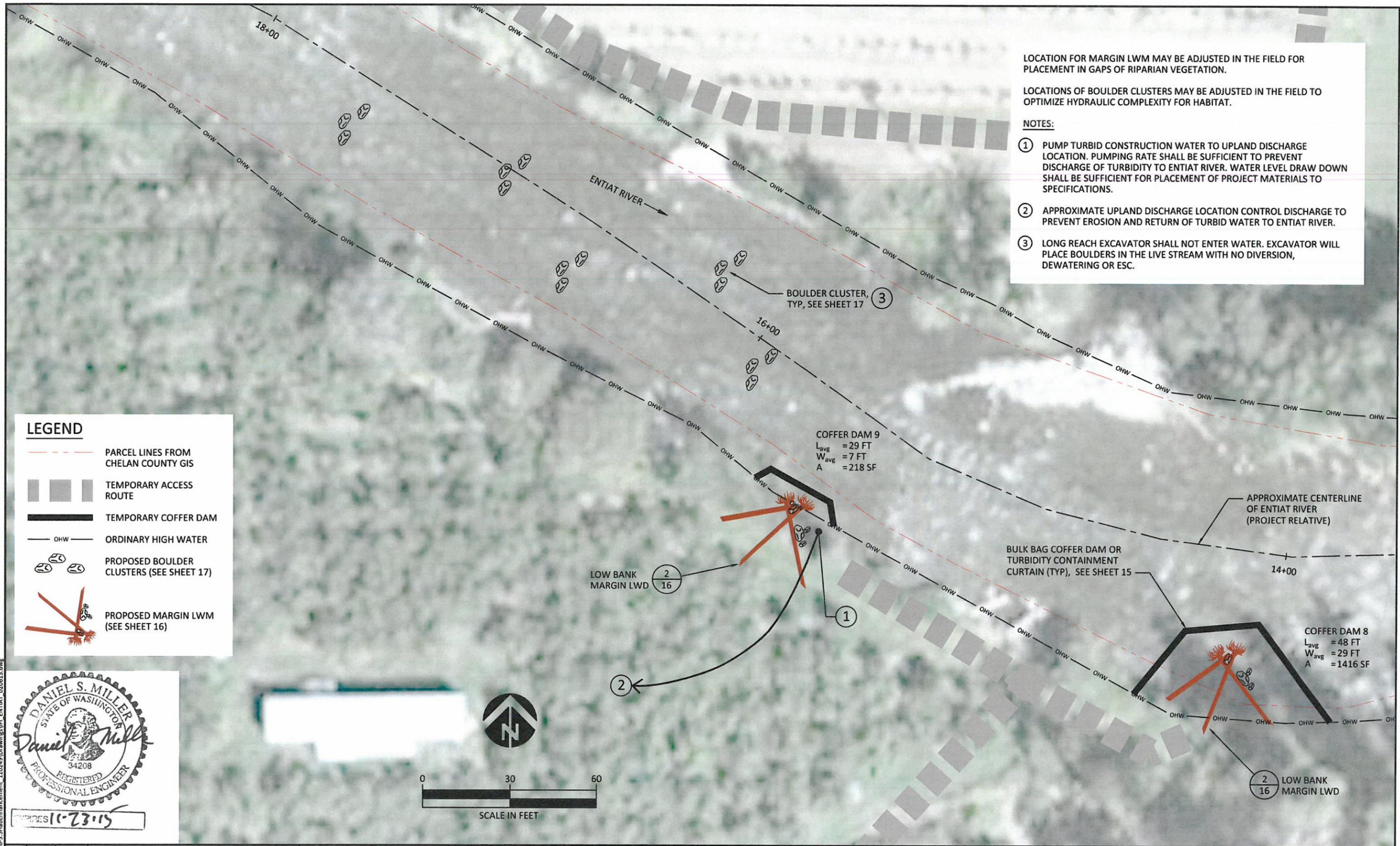
**CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION**  
**ENTIAT RIVER - RM 2.6-3.5**



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SHEET  
**7 OF 18**



LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

**NOTES:**

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**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- OHW ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)

DANIEL S. MILLER  
STATE OF WASHINGTON  
REGISTERED PROFESSIONAL ENGINEER  
34208

11-23-15

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**13+65 - 18+08**

SHEET  
**8 OF 18**

LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

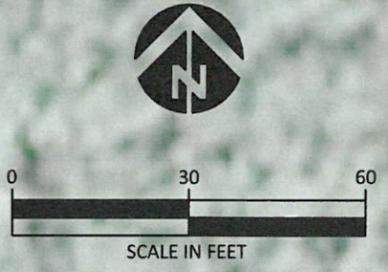
**NOTES:**

① LONG REACH EXCAVATOR SHALL NOT ENTER WATER. EXCAVATOR WILL PLACE BOULDERS IN THE LIVE STREAM WITH NO DIVERSION, DEWATERING OR ESC.



**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)



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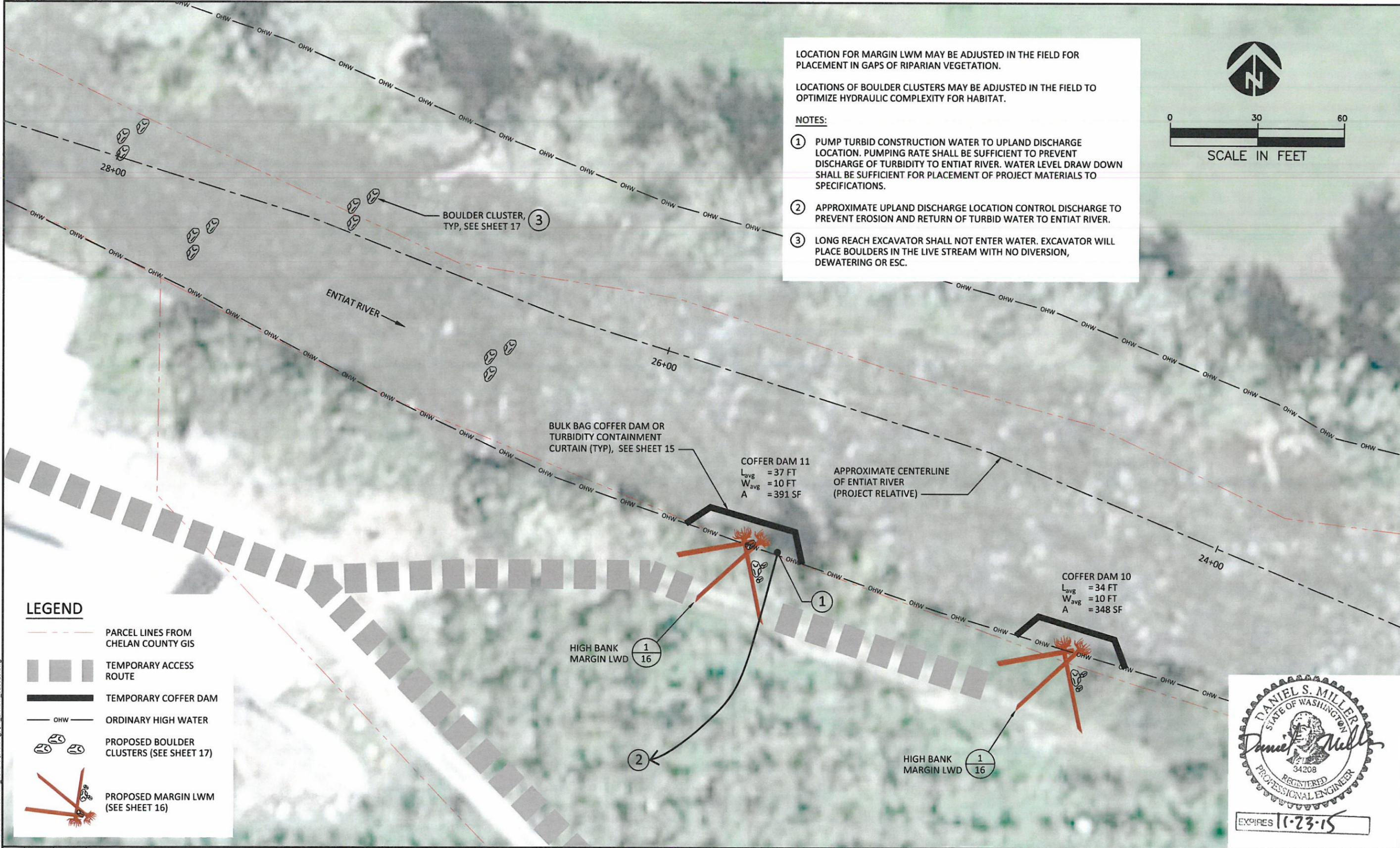
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**PLAN VIEW STATION**  
**18+47 - 23+65**

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**9 of 18**

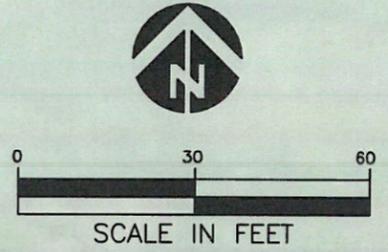


LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

LOCATIONS OF BOLDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

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**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOLDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)



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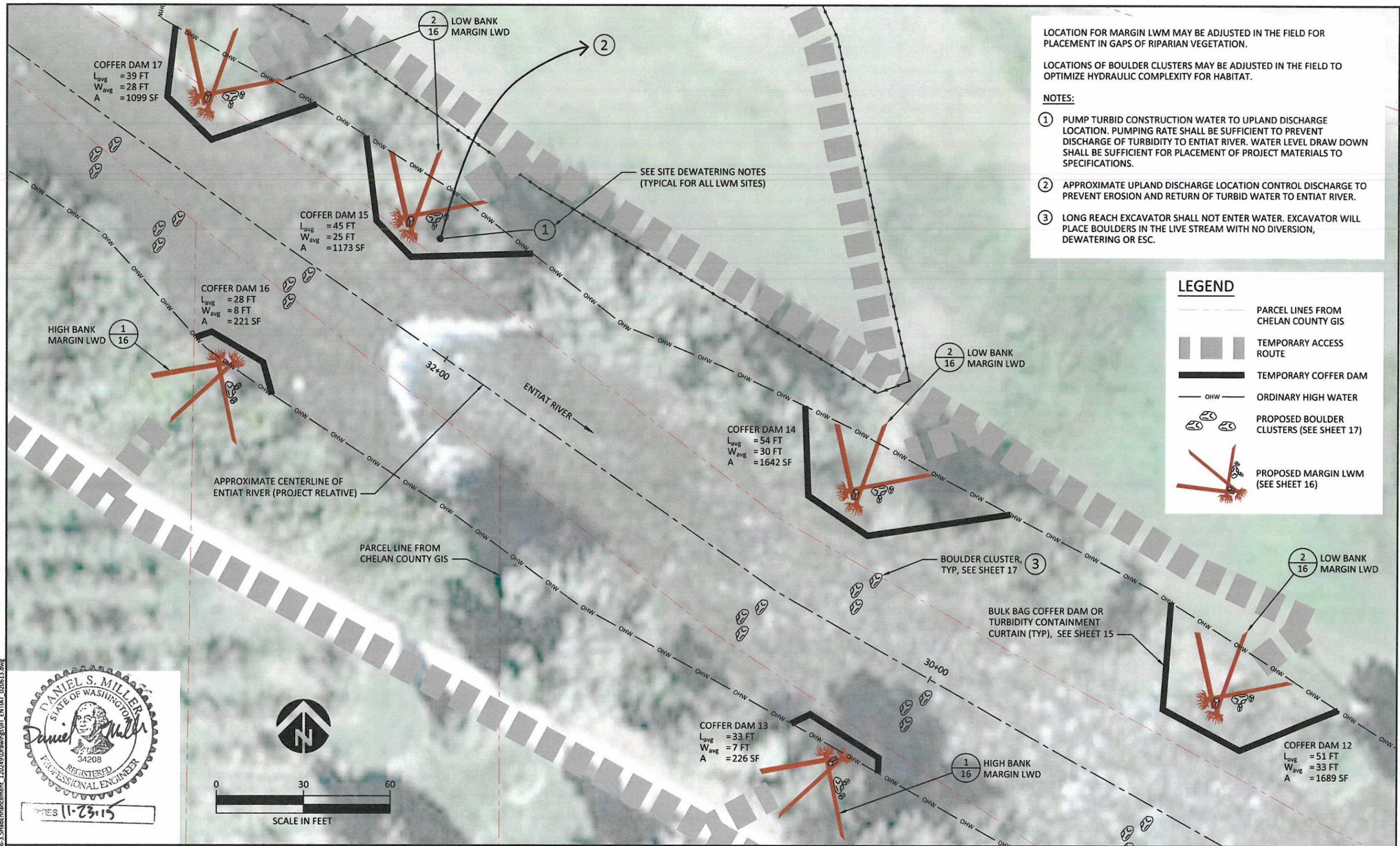
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**10 of 18**



LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

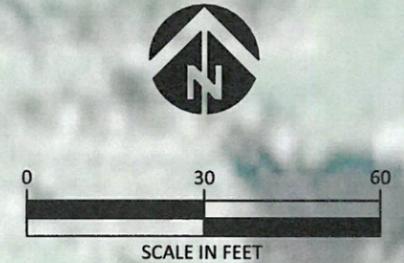
LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

**NOTES:**

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**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)



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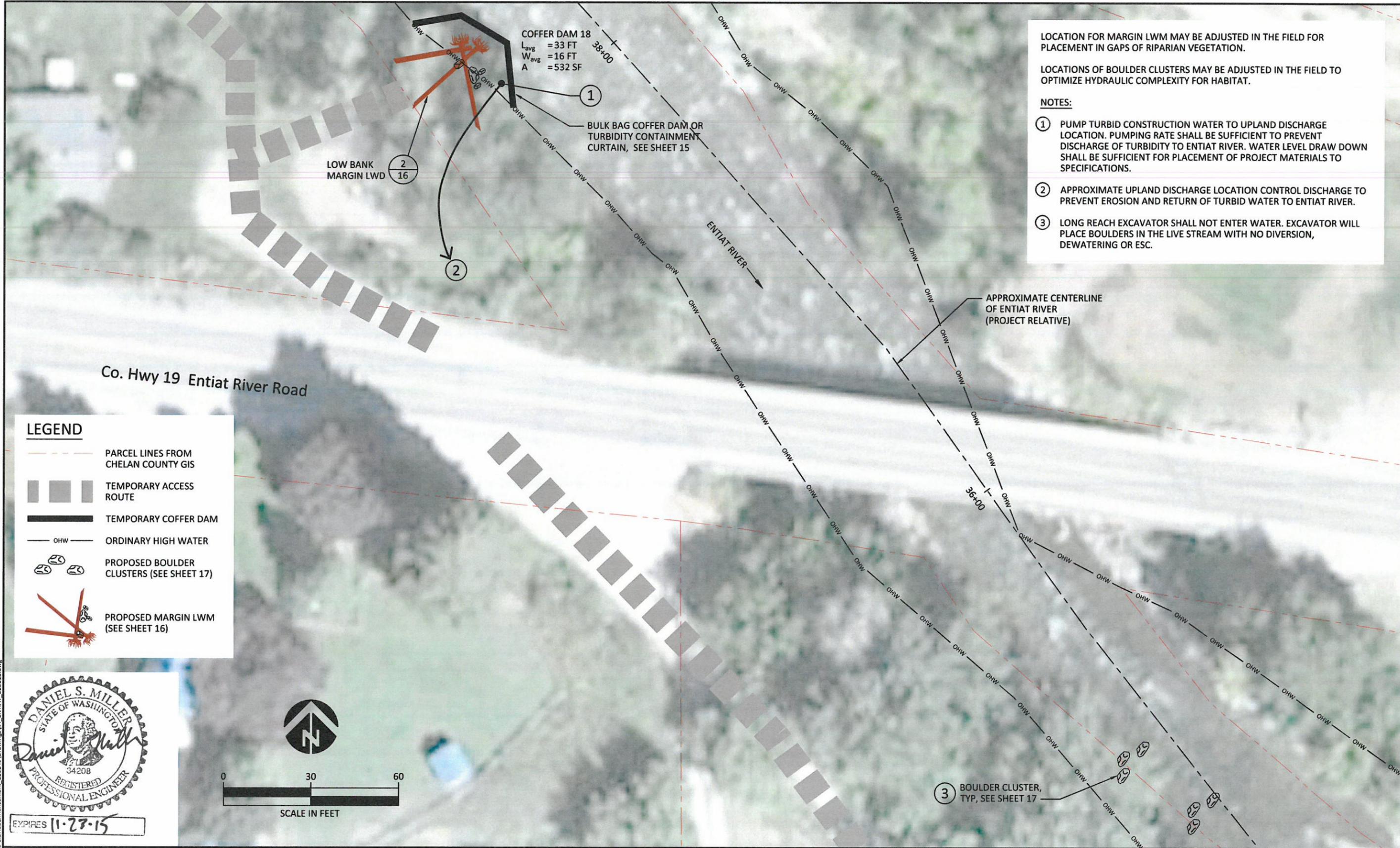
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APPROVED	DATE	PROJECT

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SHEET  
**11 of 18**



LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

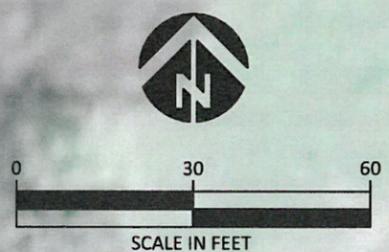
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**NOTES:**

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**LEGEND**

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- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)



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DM	2/27/2014	120249
APPROVED	DATE	PROJECT

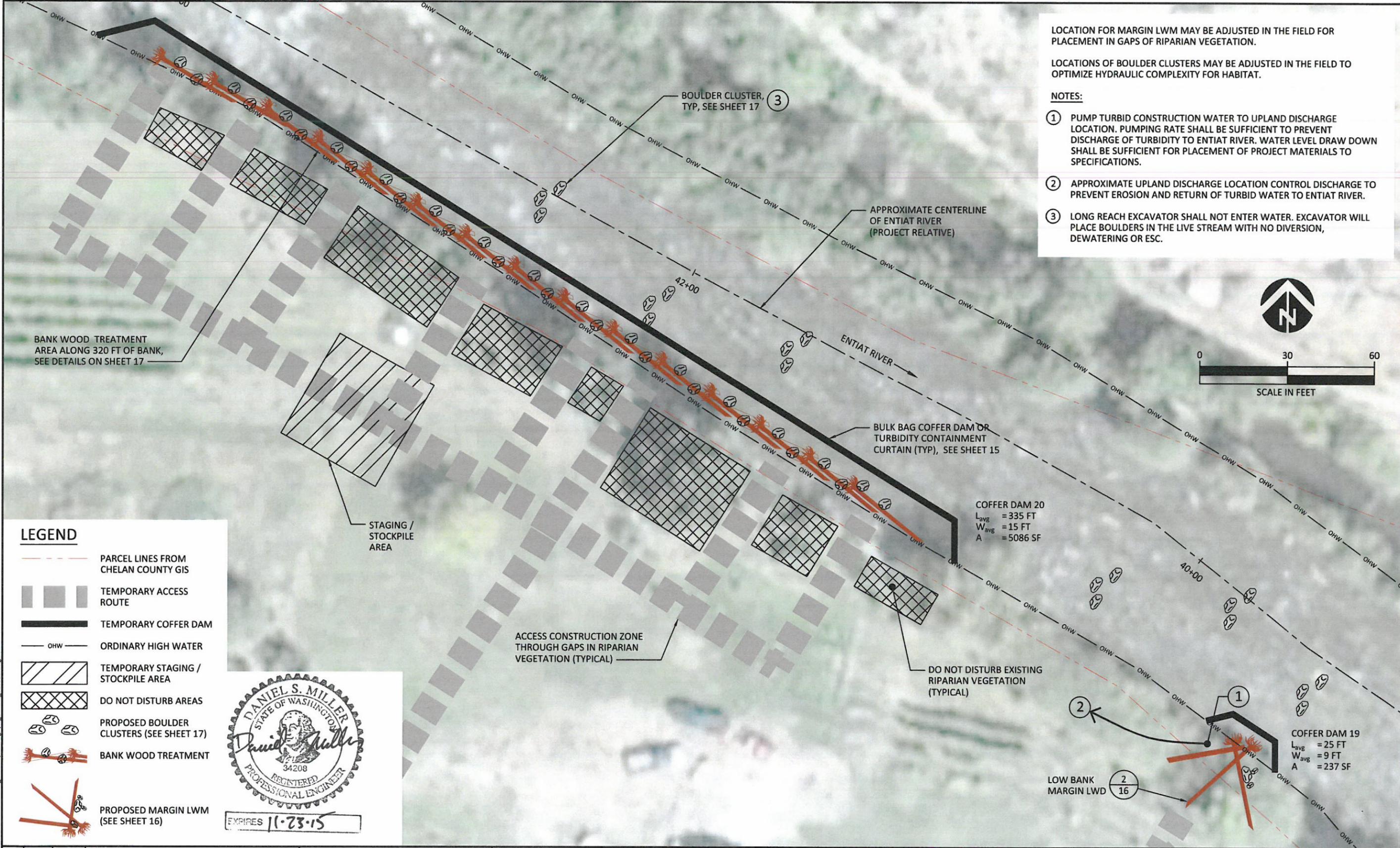
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LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

LOCATIONS OF BOULDER CLUSTERS MAY BE ADJUSTED IN THE FIELD TO OPTIMIZE HYDRAULIC COMPLEXITY FOR HABITAT.

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**LEGEND**

- PARCEL LINES FROM CHELAN COUNTY GIS
- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- TEMPORARY STAGING / STOCKPILE AREA
- DO NOT DISTURB AREAS
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- BANK WOOD TREATMENT
- PROPOSED MARGIN LWM (SEE SHEET 16)



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**ENTIAT RIVER - RM 2.6-3.5**

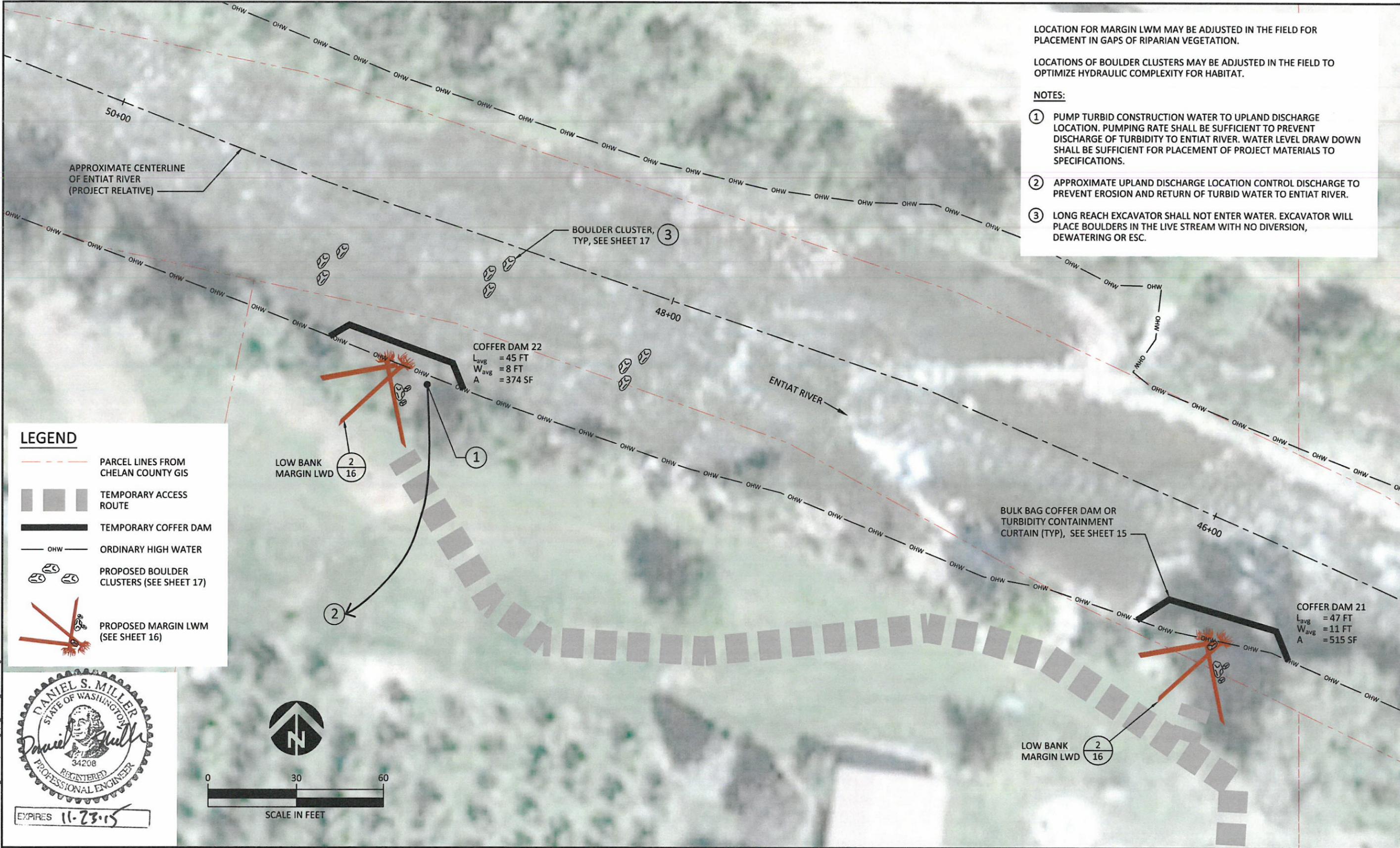


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**38+24 - 43+27**

SHEET  
**13 of 18**

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LOCATION FOR MARGIN LWM MAY BE ADJUSTED IN THE FIELD FOR PLACEMENT IN GAPS OF RIPARIAN VEGETATION.

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- TEMPORARY ACCESS ROUTE
- TEMPORARY COFFER DAM
- ORDINARY HIGH WATER
- PROPOSED BOULDER CLUSTERS (SEE SHEET 17)
- PROPOSED MARGIN LWM (SEE SHEET 16)

SCALE IN FEET

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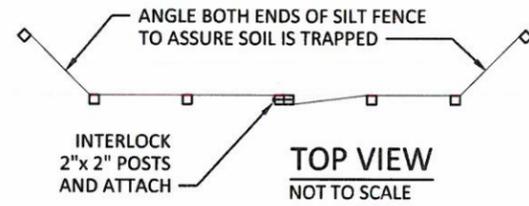
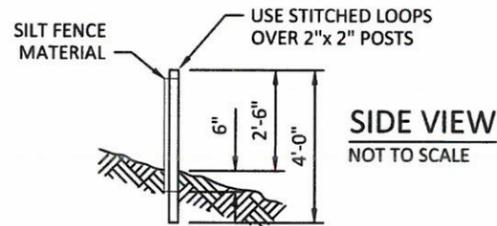
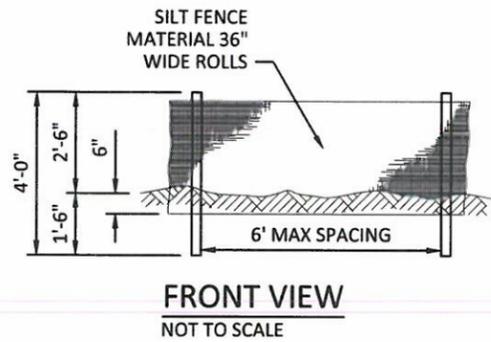
**CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION**  
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**PLAN VIEW STATION**  
**45+30 - 50+44**

SHEET  
**14 of 18**

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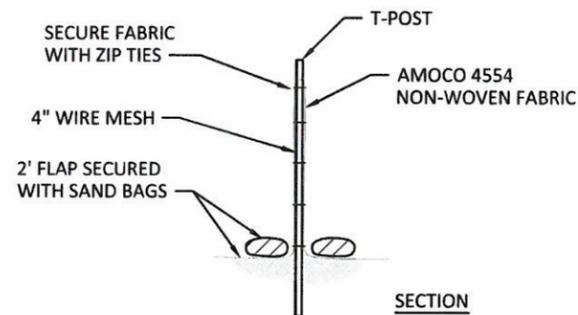
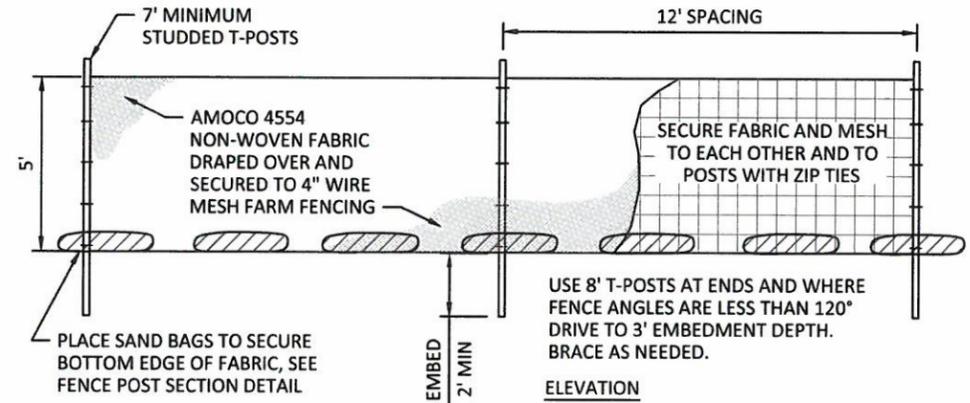
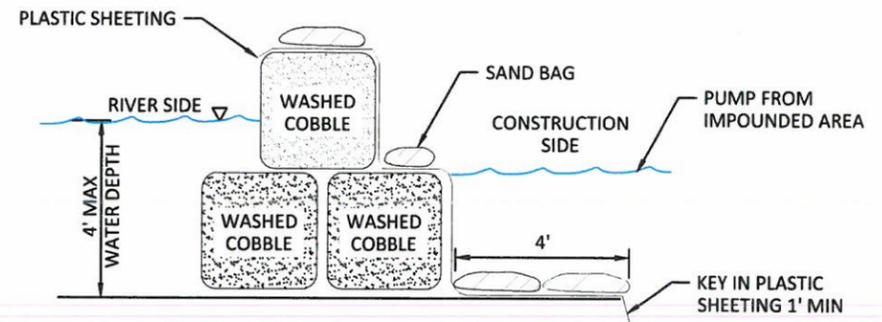
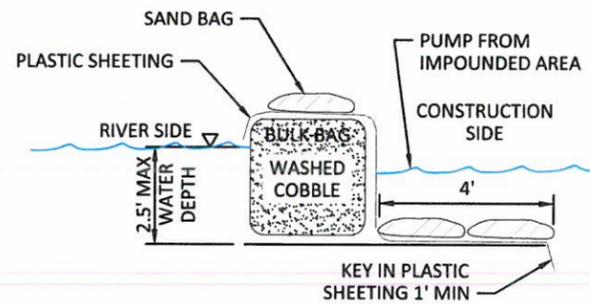
**TYPICAL SILT FENCE DETAIL**  
NOT TO SCALE

**SILT FENCES:**

1. THE SILT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST. ALTERNATIVELY, OVERLAP AND INTERLOCK TWO POSTS WITH ATTACHED FABRIC AS REQUIRED TO MEET APPLICABLE REGULATIONS.
2. THE SILT FENCE IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLAN ALONG THE DOWNHILL PERIMETER OF CONSTRUCTION AREAS. THE FENCE POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 24 INCHES.
3. THE SILT FENCE SHALL HAVE A MINIMUM VERTICAL BURIAL OF 6 INCHES. ALL EXCAVATED MATERIAL FROM SILT FENCE INSTALLATION SHALL BE BACK-FILLED AND COMPACTED ALONG THE ENTIRE DISTURBED AREA.
4. STANDARD OR HEAVY DUTY SILT FENCE SHALL HAVE MANUFACTURED STITCHED LOOPS FOR 2 INCHES X 2 INCHES POST INSTALLATION.
5. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY PROTECTED AND STABILIZED, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.

**BULK BAG NOTES:**

1. BULK BAG COFFERDAM SHALL BE CONSTRUCTED OF SEVERAL UNITS OF BULK BAGS FILLED WITH WASHED GRAVEL, AND ABUTTED SIDE BY SIDE TO CREATE A ROW THAT ISOLATES THE CONSTRUCTION SITE.
2. IF WATER DEPTH EXCEEDS 85% OF THE BULK BAG HEIGHT, AN ADDITIONAL TOP ROW OF BULK BAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULK BAGS. BULK BAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM.
3. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON BOTH SIDES OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4-Feet FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF STANDARD SANDBAGS.
4. THE CONSTRUCTION SIDE EDGE OF PLASTIC SHEETING SHALL BE TOED INTO THE CHANNEL BED MINIMUM 1-FT. TOEING IN THE OUTWARD EDGE OF PLASTIC SHEETING SHALL OCCUR AFTER THE COFFERDAM IS CLOSED TO PREVENT TURBIDITY RELEASE TO THE WATERWAY.
5. THE TERMINAL ENDS OF BULK BAG COFFERDAM, WHERE IT CONNECTS TO CHANNEL BANK OR HIGH GROUND, SHALL BE SEALED WITH PLASTIC SHEETING AND STANDARD SANDBAGS.
6. BULK BAGS SHALL BE CUBE-SHAPED POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
7. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL BE LONG ENOUGH TO ENSURE THAT ENTIRE LENGTH OF COFFERDAM WILL BE COVERED WITHOUT A SEAM. MINIMUM 12-FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16-FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULK BAG COFFERDAM.
8. BULK BAG COFFERDAM SHALL BE COMPLETELY REMOVED AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED.
9. MEASUREMENT AND PAYMENT FOR BULK BAG COFFERDAM, SAND BAGS, PLASTIC SHEETING, WASHED GRAVEL PLACEMENT, MAINTENANCE AND REMOVAL OF ALL MATERIALS SHALL BE INCIDENTAL TO THE LUMP SUM ALL INCLUSIVE COST FOR DIVERSION AND DEWATERING.
10. ALTERNATE COFFERDAM MATERIALS AND CONFIGURATIONS MAY BE ALLOWED BUT SHALL NOT BE IMPLEMENTED WITHOUT REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR VENDOR CUT SHEETS FOR SUBSTITUTIONS.



**TURBIDITY CURTAIN TYPICAL DETAILS**  
NOT TO SCALE

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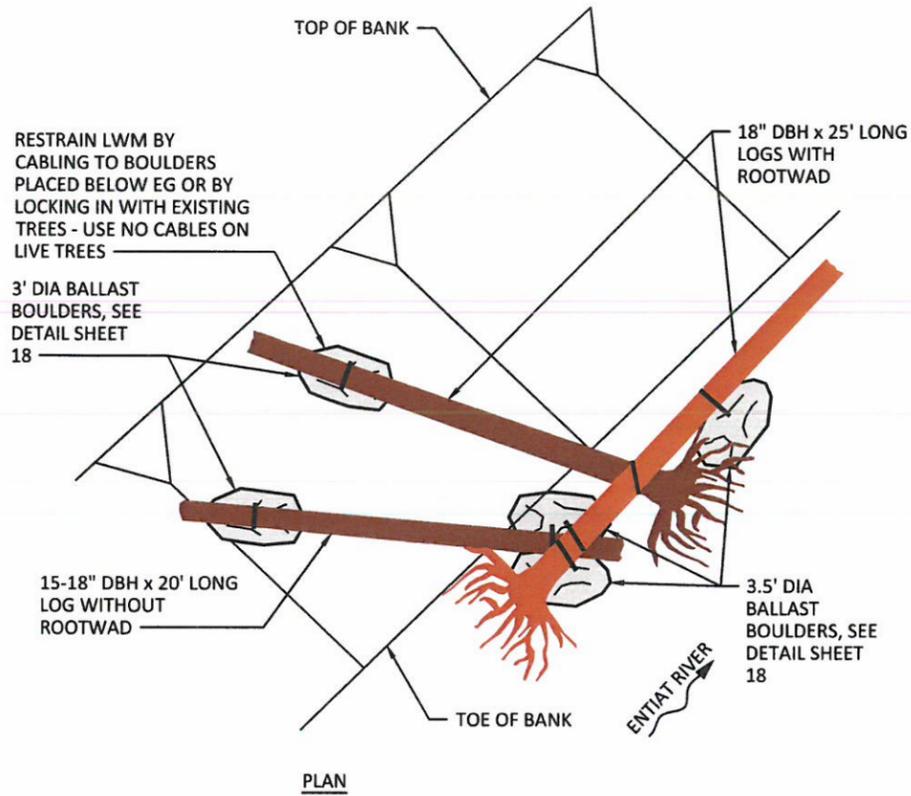
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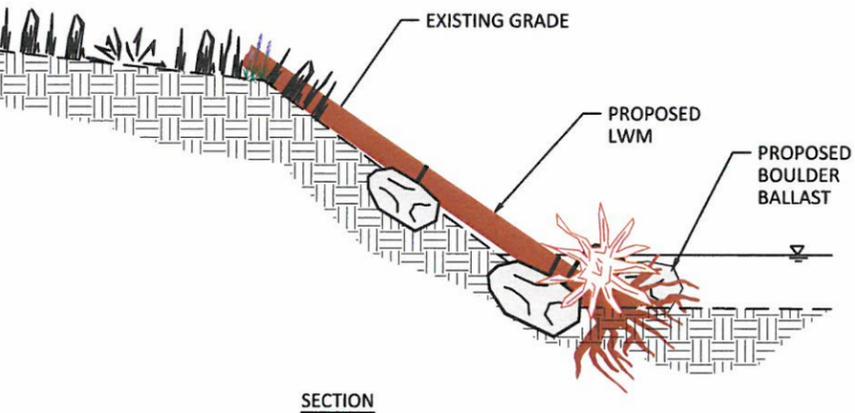
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TYPICAL DETAILS

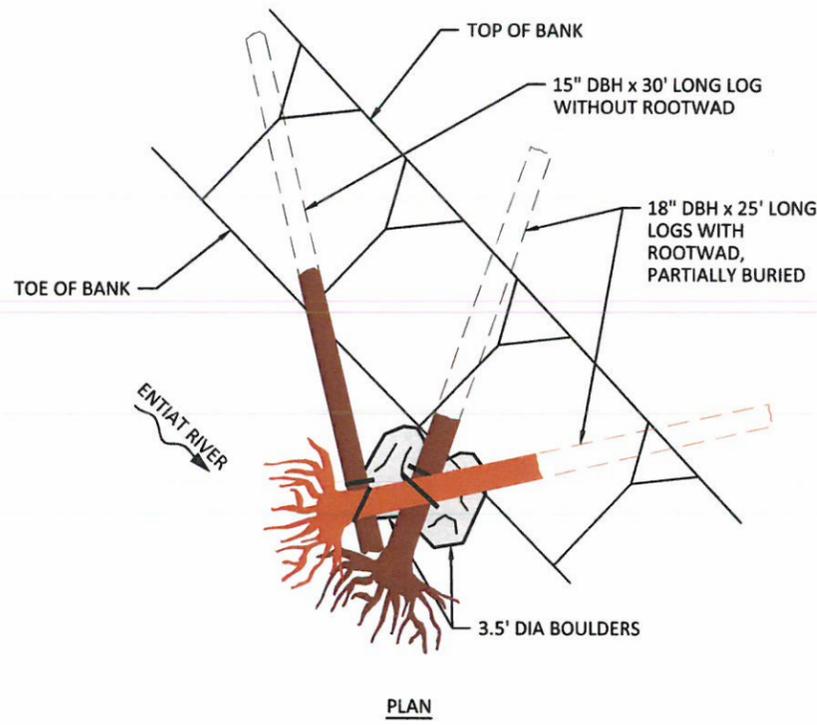


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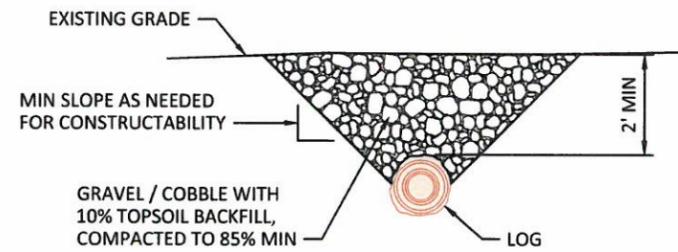


SECTION

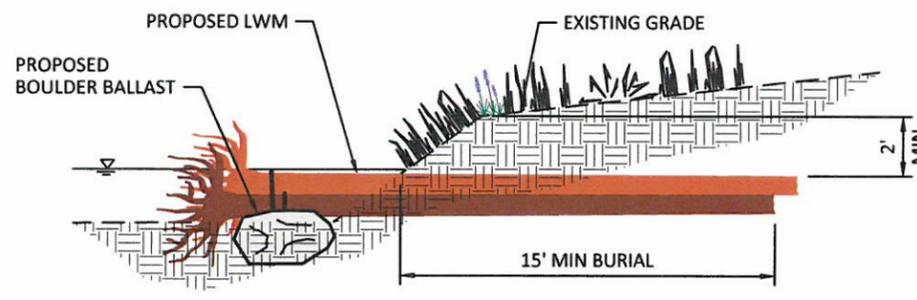
**1**  
**16** HIGH BANK MARGIN LWM  
NOT TO SCALE  
PLACE ON BANKS HIGHER THAN 6FT



PLAN



LOG BURIAL

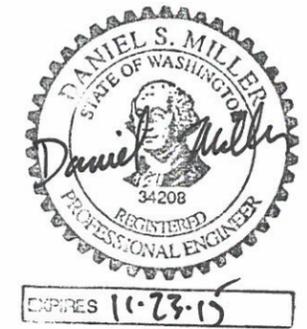


SECTION

**2**  
**16** LOW BANK MARGIN LWM  
NOT TO SCALE  
PLACE ON BANKS LOWER THAN 6FT



MARGIN LWM ANALOG



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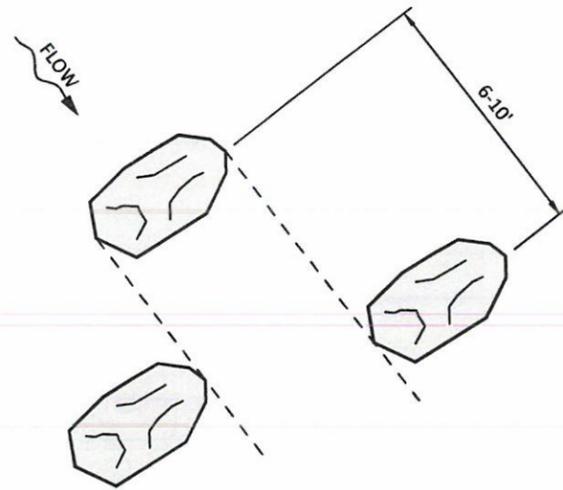
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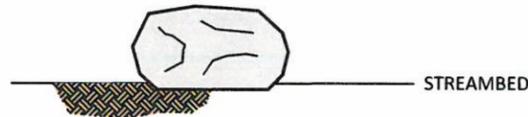
TYPICAL DETAILS

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**PLAN VIEW BOULDER CLUSTER**

NOT TO SCALE



**SECTION VIEW BOULDER CLUSTER**

NOT TO SCALE

**NOTES:**

BOULDERS: APPROXIMATELY 3-4' HIGH X 3' LONG X 4' WIDE, PLACED IN A TRIANGULAR PATTERN, AND SPACED 6-10' APART.

BOULDERS SHALL BE INSTALLED BY LONG REACH EXCAVATOR REACHING FROM THE BANKS TO PLACE BOULDERS IN LIVE STREAM WITH NO DIVERSION, DEWATERING, OR ESC. EXCAVATORS SHALL BE FITTED WITH BIODEGRADABLE HYDRAULIC FLUIDS. EXCAVATOR SHALL NOT ENTER WATER.

INSTALLATION SHALL INCLUDE PLACEMENT OF INDIVIDUAL BOULDERS USING EXCAVATOR FITTED WITH A THUMB TO SET IN PLACE BY SHIFTING, ROTATION AND BUCKET TAMPING OF BOULDER INTO EXISTING STREAM BED WITH MINIMAL EXCAVATION IF NECESSARY TO ACHIEVE A SOLID PLACEMENT.

SOME SHIFTING OF BOULDER POSITION IS TO BE EXPECTED DURING INITIAL FLOOD EVENTS.

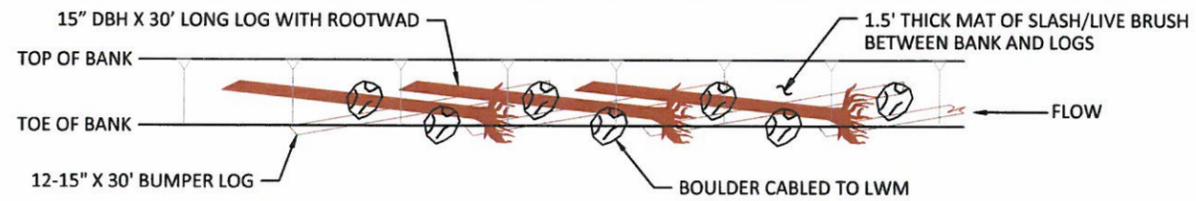


BOULDER CLUSTER ANALOG



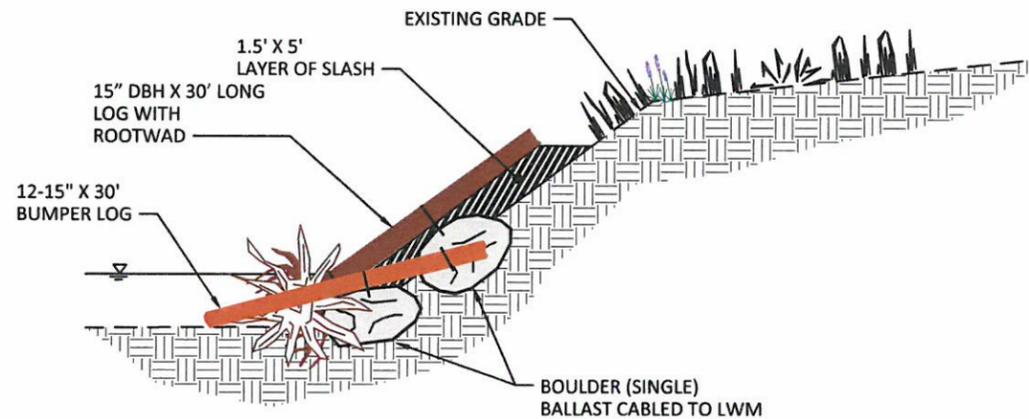
**ELEVATION VIEW - FULL TREATMENT**

SCALE: 1" = 40'



**ELEVATION AND PLAN VIEW - DETAIL**

SCALE: 1" = 20'

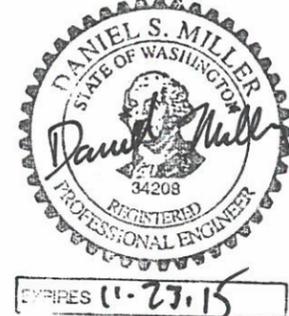


**SECTION VIEW BANK WOOD TREATMENT**

NOT TO SCALE

**BANK WOOD TREATMENT**

1. ACCESS BANK CONSTRUCTION ZONE THROUGH GAPS IN RIPARIAN VEGETATION.
2. PLACE 1.5' THICK BY 5' HIGH LAYER OF SLASH (LIVE BRUSH AND LIMBS).
3. SET BALLAST BOULDERS INTO EXISTING GRADE 1/2 TO 2/3 OF BOULDER HEIGHT.
4. PLACE LOGS WITH ROOTWADS - DO NOT EXCAVATE INTO BANK.
5. PLACE BUMPER LOGS - DO NOT EXCAVATE INTO BANK.
6. CABLE LOGS TO BALLAST BOULDERS - SEE SHEET 18.



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DRAWN	DESIGNED	CHECKED
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**TYPICAL DETAILS**

SHEET  
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**NOTES**

**DESCRIPTION**

THIS WORK CONSISTS OF BALLASTING LARGE WOOD WITH BOULDERS AND CABLE AS REQUIRED TO PROVIDE ADEQUATE BALLAST FOR STRUCTURAL STABILITY.

**MATERIALS**

BOULDERS SHALL BE NON-FRACTURED BASALT OR GRANITE WITH A MINIMUM SPECIFIC GRAVITY OF 2.65.

CABLE USED FOR LOG TO BOULDER BALLAST CONNECTION SHALL BE GALVANIZED, STEEL CORE, AND SHALL HAVE A MINIMUM DIAMETER OF 1/2 INCH.

CABLE USED FOR LOG TO LOG CONNECTION SHALL BE GALVANIZED, STEEL CORE, AND SHALL HAVE A MINIMUM DIAMETER OF 3/8 INCH.

CLAMPS SHALL BE CROSBY CLIPS, G-450, OR APPROVED EQUAL. MINIMUM OF 2 CLAMPS PER CONNECTION.

EPOXY FOR ANCHORING SHALL BE HILTI HIT RE 500 ADHESIVE OR APPROVED EQUAL.

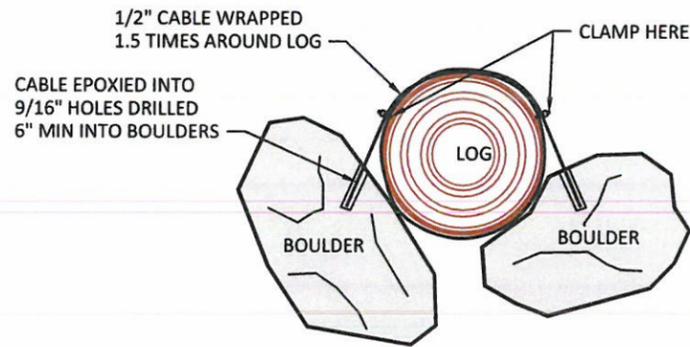
**CONSTRUCTION**

FINAL POSITIONING OF THE ANCHORED STRUCTURES SHALL BE IN THE APPROXIMATE LOCATION AS SHOWN ON THE DRAWINGS, AS APPROVED IN THE FIELD BY THE OWNERS REPRESENTATIVE, AND AS REQUIRED TO MEET BALLASTING REQUIREMENTS.

ANCHORED OR BOULDER BALLASTED LOG STRUCTURES SHALL BE SECURED AS SHOWN ON THE DRAWINGS. DRILL HOLES IN SOLID ROCK AND AVOID ANY CRACKS OR FRACTURES. HOLES SHALL BE 9/16 INCH IN DIAMETER. HOLES MUST BE DRILLED 6 INCHES, MINIMUM, INTO ROCK. HOLES MUST BE CLEANED OF LOOSE ROCK FRAGMENTS AND POWDER IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. HOLES MUST BE CLEAN OF ALL DUST, DEBRIS, OIL, AND SOAP RESIDUES. THE HOLES MUST FLUSH CLEAR TO INSURE NO MATERIAL EXISTS BETWEEN THE CABLE, EPOXY, AND ROCK SURFACE. INSTALL EPOXY PER MANUFACTURER'S RECOMMENDATIONS.

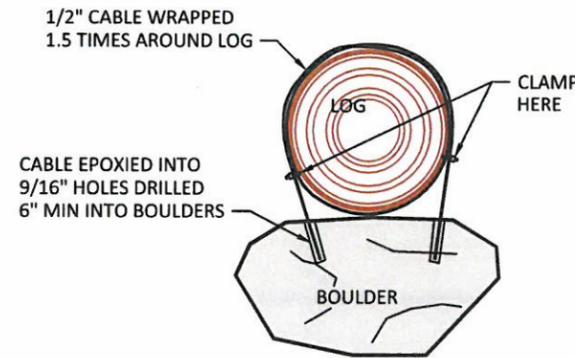
CABLE SHALL BE WRAPPED AS SHOWN FOR BOULDER BALLAST AROUND LOG BEFORE ENDS ARE INSERTED INTO THE DRILLED HOLES FILLED WITH EPOXY. WIPE CABLE WITH CLEAN RAG SOAKED IN ACETONE TO REMOVE OILS AND GREASES PRIOR TO INSERTION INTO EPOXY FILLED HOLE. FILL DRILL HOLES ENOUGH TO ENSURE COMPLETE COVERAGE WITH EPOXY. INSERT CABLE INTO HOLE SO THAT END OF CABLE HITS THE BOTTOM OF THE HOLE. EXCESS EPOXY SHOULD COME OUT OF THE TOP OF THE HOLE AS CABLE IS SEATED IN DRILL HOLE.

MINIMUM 2 CLAMPS PER CONNECTION. CLAMPS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED CLAMP SIZE AND SPACING FOR THE SIZE AND LOAD RATING OF THE CABLE BEING USED.



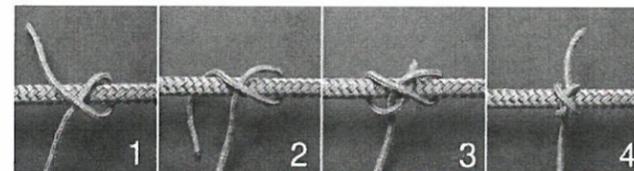
**BOULDER (DOUBLE) BALLAST**

NOT TO SCALE



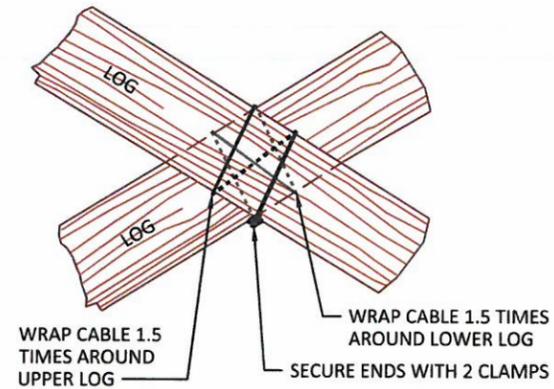
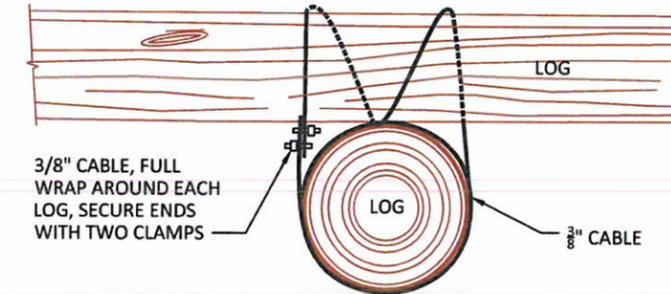
**BOULDER (SINGLE) BALLAST**

NOT TO SCALE



**CONSTRUCTOR HITCH**

NOT TO SCALE



**NOTES**

- USE 3/8 INCH GALVANIZED CABLE.
- CABLE SHALL BE SECURED BY EITHER:
  - CONSTRUCTOR HITCH
  - 1.5 WRAPS AROUND LOG AND SECURE TAG END WITH 2 CABLE CLAMPS
- THERE SHALL BE NO SLACK IN THE CABLE AFTER IT IS FASTENED.

**TYPICAL LOG CABLING**

NOT TO SCALE



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