

# SNAKE CREEK HABITAT ENHANCEMENT

## SNAKE CREEK HABITAT ENHANCEMENT

### MILL CITY, OR

#### PROJECT PARTNERS



#### PROJECT DESCRIPTION

THIS PROJECT INTENDS TO RECONSTRUCT AND VEGETATE A PORTION OF ERODED STREAMBANK ON SNAKE CREEK, NEAR THE CONFLUENCE WITH THE NORTH SANTIAM RIVER. THIS PROJECT USES BIOENGINEERING TECHNIQUES USING A COMBINATION OF LARGE WOOD AND RIPARIAN PLANTINGS TO RECONSTRUCT THE STREAM BANK. WOOD IS INTENDED TO INTERACT WITH FLOW OVER A RANGE OF DISCHARGES ON SNAKE CREEK. THE PROJECT INTENDS TO RE-ESTABLISH WOODY VEGETATION ALONG THE BANK OF SNAKE CREEK WHERE IT HAS BEEN HISTORICALLY CLEARED FOR PASTURE TO PROVIDE LONG-TERM BANK STABILITY AND RIPARIAN BENEFITS TO THE STREAM CORRIDOR.

#### BENCHMARK

SURVEY CONTROL USED FOR THE PROJECT IS PROVIDED ON DRAWING 2.0. THE HORIZONTAL DATUM IS NAD 83, STATE PLANE COORDINATES, OREGON NORTH, AND THE VERTICAL DATUM IS NAVD 88. THE BENCHMARK COORDINATES CORRESPOND TO THE TOP CENTER OF CONTROL MARKERS LISTED ON DRAWING.

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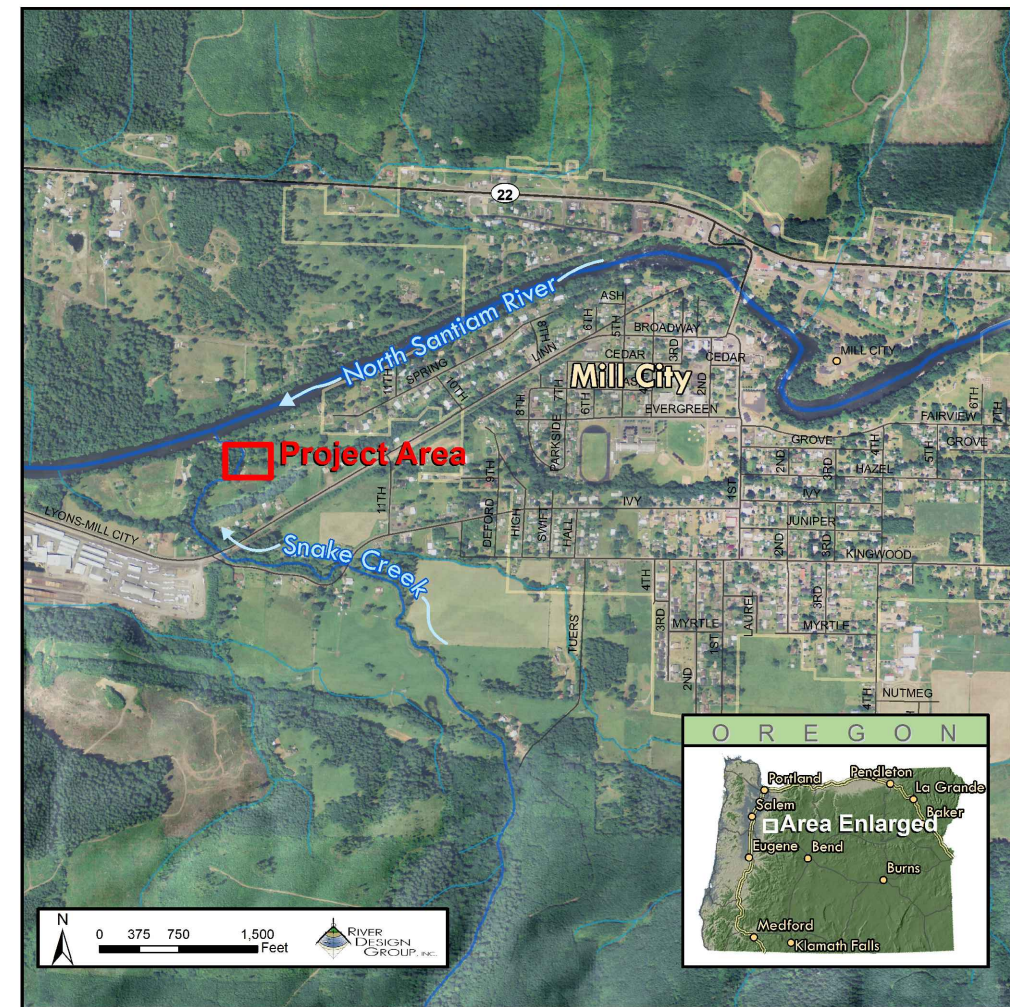
#### ESTIMATED PROJECT QUANTITIES

PROJECT QUANTITIES ARE BASED ON ENGINEERS ESTIMATE FROM TOPOGRAPHIC SURVEY AND DESIGN DRAWINGS. CONTRACTOR SHALL REVIEW THE DRAWINGS AND SPECIFICATIONS TO CONFIRM QUANTITIES BEFORE ENTERING INTO A PROJECT CONTRACT.

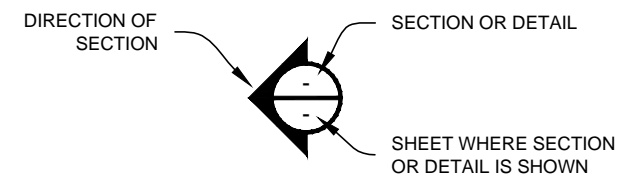
##### NEAT-LINE QUANTITIES PER SITE

WOOD AND BIOENGINEERING MATERIALS:	
25' STEM, 18"-24" DIA, W/ ROOTWAD	10 EA
20' STEM, 12"-20" DIA, NO ROOTWAD	30 EA
STEMS AND TOPS WITH BRANCHES AND LIMBS, 8"-12" DIAMETER, 15'-20' LONG	20 EA
2.5'-4' DIA BOULDERS	50 EA
SLASH: BRANCHES AND LIMBS 2"-8" DIA, PACKED	60 CY
10'-15' LONG MICROPILES, 8"-12"-DIA	45 EA
WILLOW CLUMP TRANSPLANTS, HEDGED, INTACT ROOTS	26 EA
SITE WORK VOLUMES:	
BULK EXCAVATION	120 CY
BULK BACKFILL	100 CY

#### PROJECT VICINITY MAP



NW 1/4 OF THE NW 1/4 OF SECTION 31,  
 T.9S., R.3E., WILLAMETTE MERIDIAN  
 LINN COUNTY, OREGON  
 USGS QUADRANGLE: MILL CITY SOUTH, OR



CROSS-SECTION SHEET REFERENCE

**DRAFT**

### COVER PAGE AND NOTES

SNAKE CREEK HABITAT ENHANCEMENT  
 MILL CITY, OR

NO.	DATE	BY	DESCRIPTION	CHK
*	07/11/14	TF	DRAFT	CS

PROJECT NUMBER  
 RDG-14-036

DRAWING NUMBER

**1.0**

Drawing 1 of 9



**GENERAL NOTES TO CONTRACTOR**

1. THE CONSTRUCTION SPECIFICATIONS AND MATERIAL SPECIFICATIONS DESCRIBE MINIMUM ACCEPTABLE QUALITY OF WORK AND MATERIALS FOR THE PROJECT. IF A CONFLICT ARISES BETWEEN THE DRAWINGS AND SPECIFICATIONS, THE SPECIFICATION GOVERNS THE WORK AND/OR MATERIAL. THE DRAWINGS ARE A VISUAL REPRESENTATION TO COMPLEMENT CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE DRAWINGS INCLUDE LOCATION, PROFILES, SECTIONS, DETAILS AND NOTES NECESSARY TO DESCRIBE THE WORK. IF SITE CONDITIONS WARRANT CHANGES TO THE PLANS, THE PROJECT INSPECTOR RESERVES THE RIGHT TO DIRECT THE CONTRACTOR TO MAKE THESE MODIFICATIONS. NO CHANGES SHALL BE MADE TO THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR WRITTEN APPROVAL OF THE PROJECT INSPECTOR.
2. IN THE EVENT THAT A PERMIT CONDITION CONFLICTS WITH THE DRAWINGS AND SPECIFICATIONS, THE ISSUE SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT INSPECTOR FOR CLARIFICATION PRIOR TO PROCEEDING WITH WORK.
3. THE PROJECT SHALL BE CONSTRUCTED ACCORDING TO THE PROJECT DRAWINGS. THE CONTRACTOR SHALL NOTIFY THE PROJECT INSPECTOR OF ANY CHANGES PRIOR TO IMPLEMENTATION. THE PROJECT INSPECTOR FOR THIS PROJECT SHALL BE RIVER DESIGN GROUP, INC.
4. RIVER DESIGN GROUP MAKES NO REPRESENTATION OF THE EXISTENCE OR NONEXISTENCE OF UTILITIES. CONTRACTOR IS RESPONSIBLE FOR CALLING THE OREGON UTILITY NOTIFICATION CENTER (800-332-2344) PRIOR TO DIGGING.
5. COSTS INCURRED DUE TO PROJECT DELAYS RESULTING FROM FAILURE OF THE CONTRACTOR TO MEET THE REQUIREMENTS OF THE GENERAL NOTES TO CONTRACTOR, SAFETY, CONTRACTOR QUALIFICATIONS, MATERIAL SPECIFICATIONS, EQUIPMENT SPECIFICATIONS, CONSTRUCTION SPECIFICATIONS, AND PLAN SET SHALL BE THE EXPENSE OF THE CONTRACTOR.

**SAFETY**

1. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL STATE AND LOCAL LAWS, ORDINANCES, CODES, AND/OR REGULATIONS APPLICABLE FOR THE PROJECT INSTALLATION. THE PROJECT INSPECTOR WILL DOCUMENT ANY SAFETY VIOLATIONS WITNESSED.

**CONTRACTOR QUALIFICATIONS**

1. THE CONTRACTOR SHALL HAVE AT LEAST TWO (2) YEARS OF RIVER RESTORATION CONSTRUCTION EXPERIENCE AND SHALL HAVE COMPLETED AT LEAST FIVE (5) RIVER RESTORATION PROJECTS. SIMILAR EXPERIENCE WILL BE EVALUATED ON A CASE BY CASE SCENARIO.
2. IF THE CONTRACTOR CHOOSES TO DESIGNATE AN EMPLOYEE WITHOUT QUALIFIED STREAM RESTORATION EXPERIENCE, THE CONTRACTOR SHALL BE ON-SITE AT ALL TIMES WHEN THE EMPLOYEE IS PERFORMING RIVER RESTORATION WORK. FAILURE TO ABIDE BY THIS CONDITION WITHOUT PREVIOUS AGREEMENT WITH THE PROJECT INSPECTOR WOULD BE GROUNDS FOR TERMINATION.
3. THE CONTRACTOR SHALL MAINTAIN AT LEAST \$1,000,000 IN LIABILITY INSURANCE AND HAVE PROOF OF LIABILITY INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.
4. THE CONTRACTOR SHALL HAVE PROOF OF WORKER'S COMPENSATION INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.
5. COPIES OF ALL PROJECT PERMITS SHALL BE POSTED ON-SITE IN A VISIBLE LOCATION. THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF THE PERMITS. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY KNOWN CHANGES OR ACTIVITIES THAT COULD VIOLATE PERMIT REQUIREMENTS PRIOR TO IMPLEMENTATION.

**MATERIALS SPECIFICATIONS**

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS NECESSARY TO CONSTRUCT THE PROJECT UNLESS OTHER PROVISIONS HAVE BEEN AGREED UPON PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL DELIVER ALL MATERIALS TO THE DESIGNATED STOCKPILE LOCATIONS LABELED ON THE PLAN SET OR TO A LOCATION SPECIFIED BY THE PROJECT INSPECTOR. IF A MATERIAL SOURCE HAS BEEN PRE-DETERMINED, THE PROJECT INSPECTOR SHALL PROVIDE DIRECTIONS TO THE CONTRACTOR.
2. MATERIAL QUANTITIES, DIMENSIONS AND SIZES SHALL CONFORM TO THE NOTES AND SPECIFICATIONS PROVIDED ON THE PROJECT DRAWINGS OR ON THE MATERIALS LIST.
3. THE PROJECT INSPECTOR SHALL INSPECT AND APPROVE ALL MATERIALS PRIOR TO CONSTRUCTION. IF MATERIALS DO NOT MEET THE MINIMUM REQUIREMENTS SPECIFIED IN THE PROJECT DRAWINGS OR MATERIAL LIST, THE PROJECT INSPECTOR SHALL REJECT THE MATERIALS.

**EQUIPMENT SPECIFICATIONS**

1. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT NECESSARY TO CONSTRUCT THE PROJECT. AT A MINIMUM, THE CONTRACTOR SHALL PROVIDE THE FOLLOWING EQUIPMENT FOR THIS PROJECT:

**EXCAVATOR** - THE EQUIPMENT SHALL BE CAPABLE OF MOVING LARGE WOOD (20 FOOT STEMS, WITH A 6 FOOT ATTACHED ROOTWAD WITH A MINIMUM TRUNK DIAMETER OF 2 FEET). THE EQUIPMENT MUST ALSO BE ABLE TO RAISE AND PLACE A 4 FOOT DIAMETER ROCK AT A WEIGHT OF 11,000 LBS. MINIMUM BUCKET VOLUME SHALL BE ONE (1) CUBIC YARD(S). THE BUCKET SHALL BE EQUIPPED WITH A HYDRAULIC THUMB FOR GRASPING LOGS, ROCKS, AND OTHER MATERIALS. THE EQUIPMENT MUST BE CAPABLE OF CROSSING WATER AND WORKING ON OR ADJACENT TO STEEP SLOPES. A CHAIN SHALL BE AVAILABLE FOR ATTACHING CULVERTS, PUMPS AND OTHER EQUIPMENT OR MATERIALS TO THE BUCKET FOR TRANSPORT ON-SITE.

**DUMP TRUCK** - ONE (1) DUMP TRUCK(S) SHALL BE REQUIRED FOR THIS PROJECT. TRUCK(S) SHALL HAVE A MINIMUM BED VOLUME OF TWELVE (12) CUBIC YARDS. THE TRUCK(S) SHALL BE CAPABLE OF DRIVING ON BOTH PAVED AND ON NON-ASPHALT SURFACES AND OFF-ROAD SURFACES.

**TRASH PUMP** - DISCHARGE CAPACITY SHALL BE AT LEAST 450 GPM (1 CFS). TOTAL HEAD LIFT SHALL BE AT LEAST 95 FT. PUMPS SHALL BE EQUIPPED WITH AT LEAST 100 FEET OF 4" DIAMETER OUTLET HOSE. A PIPE WRENCH SHALL BE AVAILABLE FOR ATTACHING HOSES. FUEL AND OIL SHALL BE SUPPLIED FOR THE TRASH PUMPS.

**CHAINSAW** - THE CHAINSAW MUST BE CAPABLE OF COMPLETELY SAWING LOGS OF THE DIAMETER SPECIFIED IN THE MATERIAL SPECIFICATIONS. ALSO, THE CHAINSAW MUST BE CAPABLE OF SAWING HDPE OR PVC CULVERTS OR PIPES AS NOTED IN THE MATERIAL SPECIFICATIONS.

3. ALL EQUIPMENT SHALL BE WASHED PRIOR TO MOBILIZATION TO THE SITE TO MINIMIZE THE INTRODUCTION OF FOREIGN MATERIALS AND FLUIDS TO THE PROJECT SITE. ALL EQUIPMENT SHALL BE FREE OF OIL, HYDRAULIC FLUID, AND DIESEL FUEL LEAKS. TO PREVENT INVASION OF NOXIOUS WEEDS OR THE SPREAD OF WHIRLING DISEASE SPORES, ALL EQUIPMENT SHALL BE POWER WASHED OR CLEANED TO REMOVE MUD AND SOIL PRIOR TO MOBILIZATION INTO THE PROJECT AREA. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ADEQUATE MEASURES HAVE BEEN TAKEN.

4. EQUIPMENT SHALL BE IN A WELL-MAINTAINED CONDITION TO MINIMIZE THE LIKELIHOOD OF A FLUID LEAK. IF A FLUID LEAK DOES OCCUR, THE PROJECT INSPECTOR SHALL BE NOTIFIED IMMEDIATELY, AND ALL WORK CEASED UNTIL THE LEAK HAS BEEN RECTIFIED. AT ALL TIMES DURING THE CONSTRUCTION PHASE, FLUID SPILL CONTAINMENT EQUIPMENT SHALL BE PRESENT ON-SITE AND READY FOR DEPLOYMENT SHOULD AN ACCIDENTAL SPILL OCCUR. PROJECT INSPECTOR RESERVES THE RIGHT TO REFUSE EQUIPMENT THAT DOES NOT MEET THE PREVIOUS CRITERIA.

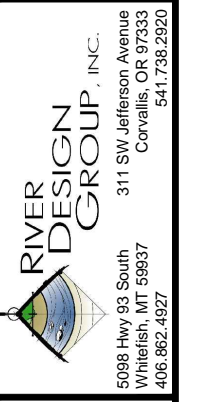
5. THE CONTRACTOR SHALL MAINTAIN A COMPLETE TOOL SET WITH COMMONLY REPLACED PARTS (E.G. O-RINGS) TO MINIMIZE DOWNTIME IN THE EVENT OF EQUIPMENT MALFUNCTION. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ON SITE DURING THE PROJECT.

**MOBILIZATION SPECIFICATIONS**

1. ALL MOBILIZATION AND DEMOBILIZATION WILL BE PERFORMED IN A SAFE AND ORDERLY MANNER WITH PARTICULAR CARE NOT TO DAMAGE EXISTING VEGETATION OR UNDUE DISTURBANCE TO THE INGRESS-EGRESS ROUTE.
2. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE INCURRED TO PROPERTY RESOURCES DURING MOBILIZATION AND DE-MOBILIZATION. VEGETATION THAT MAY BE CAUSE FOR CONCERN DURING MOBILIZATION SHALL BE IDENTIFIED BY THE CONTRACTOR AND FLAGGED BY THE PROJECT INSPECTOR AT THE TIME OF THE PROJECT "WALK THROUGH".
3. INGRESS AND EGRESS ROUTES TO THE PROJECT SITE WILL BE IDENTIFIED DURING THE PROJECT "WALK THROUGH".
4. UPON COMPLETION OF CONSTRUCTION AND DEMOBILIZATION ACTIVITIES THE CONTRACTOR SHALL PERFORM SITE RESTORATION. ALL COMPACTED SURFACES ARE TO BE RIPPED TO A MINIMUM DEPTH OF 4 INCHES FOR SEEDING PREPARATION. ORGANIC CONSTRUCTION DEBRIS SHALL BE PLACED AT THE DIRECTION OF THE PROJECT INSPECTOR ON SURFACES EXPOSED DURING CONSTRUCTION. SITE RESTORATION SHALL BE CERTIFIED COMPLETE IN WRITING BY THE PROJECT INSPECTOR UPON COMPLETION OF CONSTRUCTION ACTIVITIES.

**CONSTRUCTION SPECIFICATIONS**

1. CONSTRUCTION SHALL OCCUR IN ACCORDANCE WITH THE PROJECT DRAWINGS, CONSTRUCTION SPECIFICATIONS, EQUIPMENT SPECIFICATIONS, MATERIAL SPECIFICATIONS, REVEGETATION SPECIFICATIONS AND GENERAL SPECIFICATIONS.
2. PRIOR TO CONSTRUCTION, CONSTRUCTION AREAS WILL BE STAKED OUT USING A SURVEY GRADE GLOBAL POSITIONING SYSTEM (GPS), TOTAL STATION, OR SURVEY LASER. THE PROJECT INSPECTOR SHALL STAKE THE LOCATIONS OF THE CONSTRUCTION ACCESS, STOCKPILE LOCATIONS, LIMITS OF DISTURBANCE, TEMPORARY DIVERSION CHANNELS, TEMPORARY CULVERTS, PROPOSED CHANNEL CENTERLINE, PROPOSED CHANNEL MARGINS, CHANNEL BED FEATURES, FLOODPLAIN EXTENTS, WETLANDS AND ALL STRUCTURES ACCORDING TO THE PROJECT DRAWINGS. AT A MINIMUM, STAKING OF FEATURES SHALL OCCUR EVERY 25 FEET ALONG THE ALIGNMENT. THE CONTRACTOR SHALL MINIMIZE DISTURBANCE TO GRADE STAKES. IF EXCESSIVE DISTURBANCE TO GRADE STAKES BY THE CONTRACTOR OCCURS, IT SHALL BE THE CONTRACTOR'S EXPENSE TO RE-STAKE THE PROJECT.
3. CONSTRUCTION ACCESS SHALL BE DETERMINED BY THE PROJECT INSPECTOR. CONSTRUCTION EQUIPMENT SHALL NOT CROSS PRIVATE LAND UNLESS PERMISSION IS OBTAINED FROM THE LANDOWNER. THE CONTRACTOR SHALL LEAVE ALL GATES, WHETHER OPEN OR CLOSED, AS FOUND.
4. STREAM CROSSINGS SHALL BE MINIMIZED DURING CONSTRUCTION. IF MULTIPLE CROSSINGS (10 OR MORE) ARE EXPECTED, THE CONTRACTOR SHALL PROVIDE AND INSTALL TEMPORARY CULVERTS SO THAT EQUIPMENT CAN CROSS THE STREAM WITHOUT GENERATING EXCESS TURBIDITY. TEMPORARY CULVERT SIZES SHALL ACCOMMODATE 150% OF EXPECTED BASE FLOW DURING CONSTRUCTION. THE PROJECT INSPECTOR SHALL SPECIFY THE SIZES AND LOCATIONS OF THE TEMPORARY CULVERTS.
5. PRIOR TO CONSTRUCTION, TEMPORARY DIVERSION CHANNELS SHALL BE CONSTRUCTED TO DIVERT WATER AWAY FROM CONSTRUCTION AREAS. TEMPORARY DIVERSION CHANNELS SHALL BE LOCATED AND CONSTRUCTED ACCORDING TO THE DESIGN REPORT OR PLAN SET. TEMPORARY DIVERSION CHANNELS CONSTRUCTED IN FINE SOILS SUCH AS SAND, SILT, OR ORGANIC MATERIAL SHALL BE COMPLETELY LINED WITH FABRIC TO PREVENT EROSION. THE CONTRACTOR SHALL USE "ECO BLOCKS", OR AN APPROVED EQUAL, FOR CONSTRUCTING COFFERDAMS FOR TEMPORARY DIVERSION CHANNELS. THE CONTRACTOR SHALL DIVERT WATER INCREMENTALLY INTO THE TEMPORARY DIVERSION CHANNEL TO MINIMIZE TURBIDITY AND PERMIT FISH TO MOVE OUT OF THE DEWATERED CHANNEL SEGMENTS. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER PRIOR TO DEWATERING CHANNEL SEGMENTS. THE PROJECT INSPECTOR SHALL NOTIFY A QUALIFIED FISH BIOLOGIST OF POSSIBLE FISH RESCUE NEEDS.
6. STRAW BALES AND SILT FENCING SHALL BE AVAILABLE AND INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE PROJECT INSPECTOR. CONSTRUCTION FENCING (LIMITS OF DISTURBANCE) SHALL BE INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE PROJECT INSPECTOR.
7. EXCAVATION SHALL COMPLY WITH CONSTRUCTION STAKES, TERRAIN SURFACES, AND THE PLAN SET. EXCAVATION SHALL ESTABLISH CHANNEL ELEVATIONS WITHIN 0.2 FEET OF FINAL ELEVATIONS. THE PROJECT INSPECTOR SHALL INSPECT THE CHANNEL EXCAVATION FOR COMPLIANCE WITH THE PLAN SET. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED ON-SITE, ABOVE THE BANKFULL CHANNEL UNTIL HAULED OFF-SITE OR USED ON-SITE. DISTURBANCE TO RIPARIAN VEGETATION, CHANNEL BANKS AND SOD SHALL BE MINIMIZED. EXCAVATED SOD AND RIPARIAN SHRUB TRANSPLANTS SHALL BE CAREFULLY STOCKPILED AND REUSED FOR PLANTING FLOODPLAINS OR STREAM BANKS.
8. AFTER EXCAVATING THE CHANNEL, THE CONTRACTOR SHALL INSTALL THE GRADE CONTROL, BANK STABILIZATION AND HABITAT STRUCTURES USING THE EXCAVATOR. EACH STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LOCATIONS AND SPECIFICATIONS PROVIDED IN THE PLAN SET. THE PROJECT INSPECTOR SHALL INSPECT AND APPROVE ALL STRUCTURES PRIOR TO BACKFILLING.
9. AFTER ALL STRUCTURES ARE INSTALLED, THE CHANNEL WILL BE SHAPED TO WITHIN 0.2 FEET OF THE FINAL ELEVATIONS SPECIFIED ON THE PLAN SET. THE PROJECT INSPECTOR SHALL CHECK THE FINAL ELEVATIONS FOR COMPLIANCE WITH THE PLAN SET. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED AT A LOCATION IDENTIFIED BY THE PROJECT INSPECTOR. DISTURBANCE TO RIPARIAN VEGETATION, CHANNEL BANKS AND SOD SHALL BE MINIMIZED.
10. UPON NOTIFICATION FROM THE PROJECT INSPECTOR, THE CONTRACTOR SHALL DIVERT WATER INCREMENTALLY INTO THE NEW CHANNEL. EFFORTS SHALL BE MADE TO MINIMIZE TURBIDITY AND PERMIT FISH TO MOVE OUT OF THE DEWATERED CHANNEL SEGMENTS.
11. THE CONTRACTOR SHALL REMOVE EXCESS MATERIALS, TEMPORARY CULVERTS AND EQUIPMENT FROM THE SITE. THE CONTRACTOR SHALL REGRADE DISTURBED AREAS AND CONSTRUCTION ACCESS ROADS TO THEIR ORIGINAL GRADES. THE CONTRACTOR SHALL TREAT COMPACTED SOIL AREAS INCLUDING ACCESS ROADS AND MATERIAL STOCKPILE AREAS. THE CONTRACTOR SHALL REMOVE SOIL FROM THE PROJECT SITE IF THE SOIL IS TAINTED WITH PETROLEUM-BASED FLUIDS.



**PROJECT SPECIFICATIONS**  
**SNAKE CREEK HABITAT ENHANCEMENT**  
 MILL CITY, OR

NO.	DATE	BY	DESCRIPTION	CHK
*	07/11/14	TF	DRAFT	CS

PROJECT NUMBER  
RDG-14-036

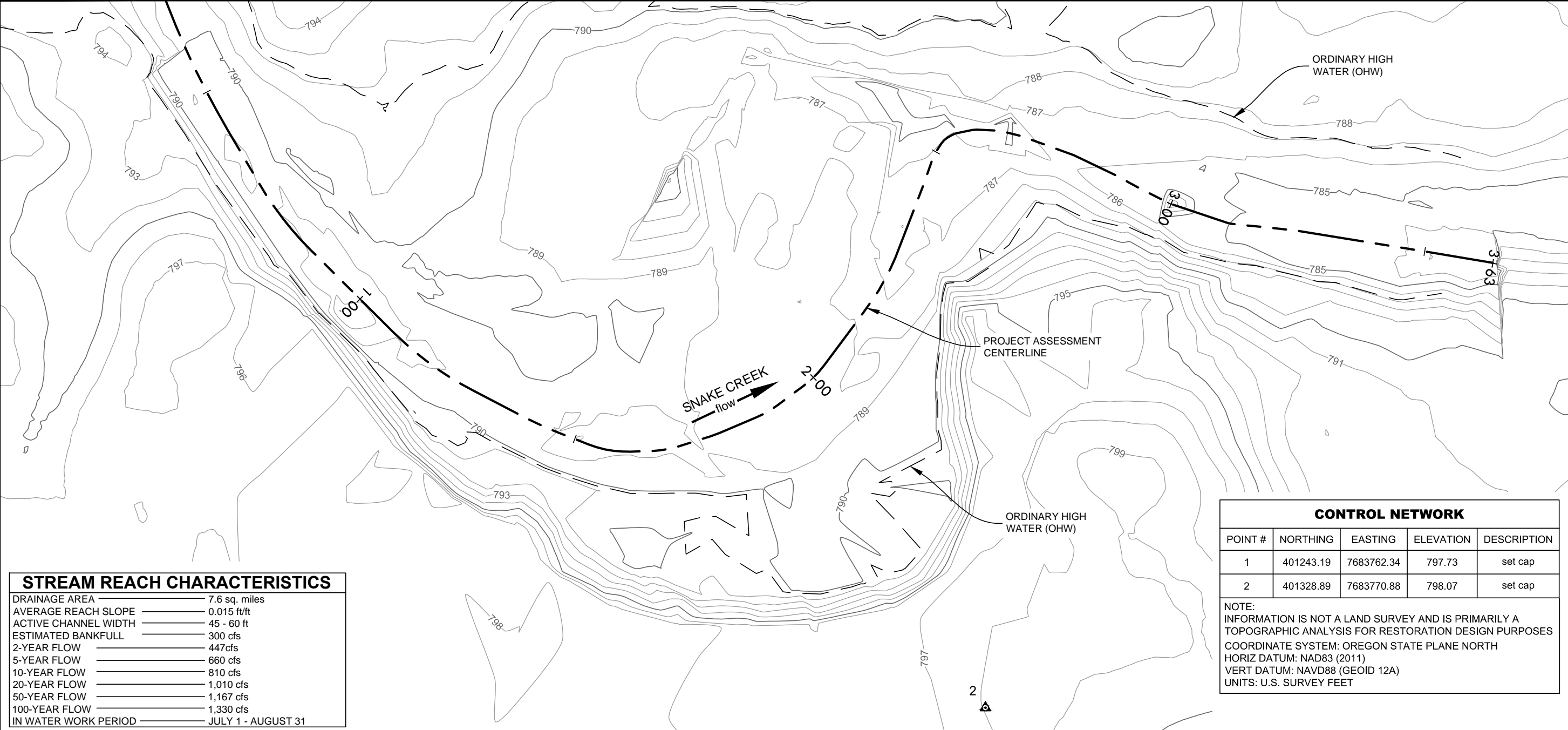
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Drawing 2 of 9



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**EXISTING CONDITIONS**  
**SNAKE CREEK HABITAT ENHANCEMENT**  
 MILL CITY, OR



**STREAM REACH CHARACTERISTICS**

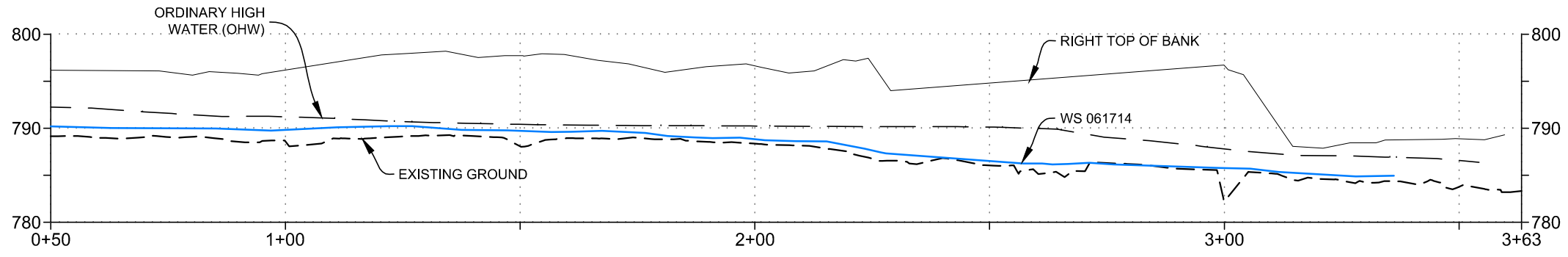
DRAINAGE AREA	7.6 sq. miles
AVERAGE REACH SLOPE	0.015 ft/ft
ACTIVE CHANNEL WIDTH	45 - 60 ft
ESTIMATED BANKFULL	300 cfs
2-YEAR FLOW	447cfs
5-YEAR FLOW	660 cfs
10-YEAR FLOW	810 cfs
20-YEAR FLOW	1,010 cfs
50-YEAR FLOW	1,167 cfs
100-YEAR FLOW	1,330 cfs
IN WATER WORK PERIOD	JULY 1 - AUGUST 31

**CONTROL NETWORK**

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	401243.19	7683762.34	797.73	set cap
2	401328.89	7683770.88	798.07	set cap

NOTE:  
 INFORMATION IS NOT A LAND SURVEY AND IS PRIMARILY A TOPOGRAPHIC ANALYSIS FOR RESTORATION DESIGN PURPOSES  
 COORDINATE SYSTEM: OREGON STATE PLANE NORTH  
 HORIZ DATUM: NAD83 (2011)  
 VERT DATUM: NAVD88 (GEOID 12A)  
 UNITS: U.S. SURVEY FEET

**1 EXISTING CONDITIONS**  
 1" = 20'



**2 EXISTING LONG PROFILE**  
 HORIZ 1" = 30'  
 VERT 1" = 15'

**DRAFT**

NO.	DATE	BY	DESCRIPTION	CHK
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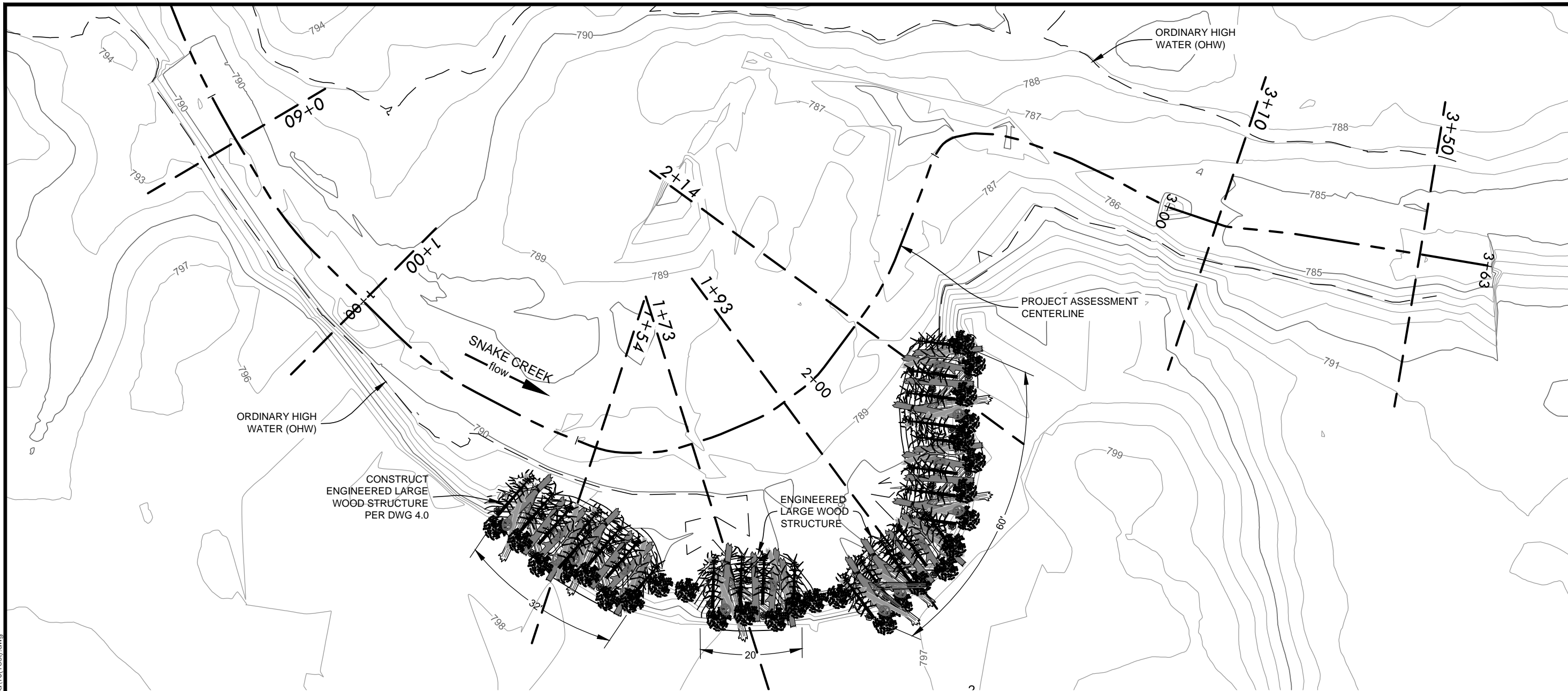
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Drawing 3 of 9

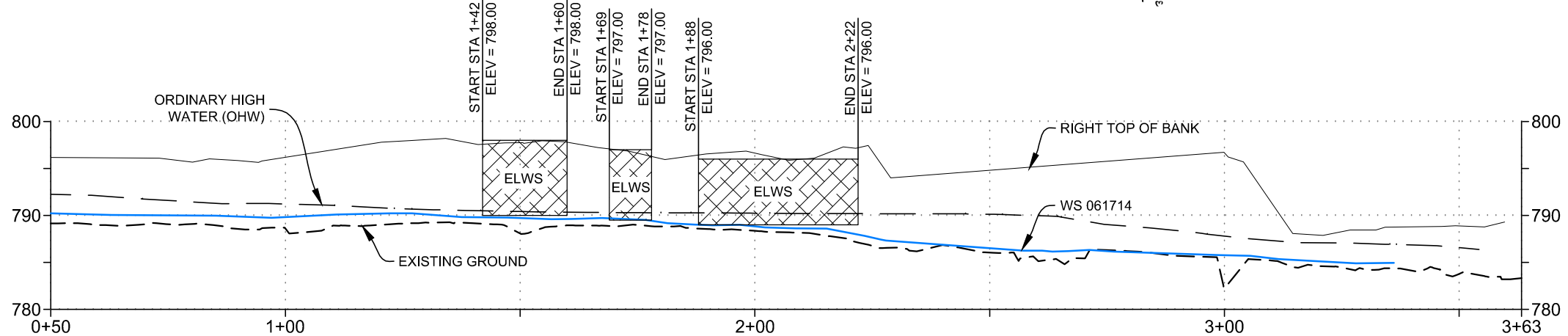
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**1 PROPOSED BANK TREATMENT LAYOUT**  
1" = 20'



**2 PROPOSED BANK TREATMENT PROFILE**  
HORIZ 1" = 30'  
VERT 1" = 15'

NOTE: STRUCTURE STATIONING IS PROJECTED TO CENTERLINE

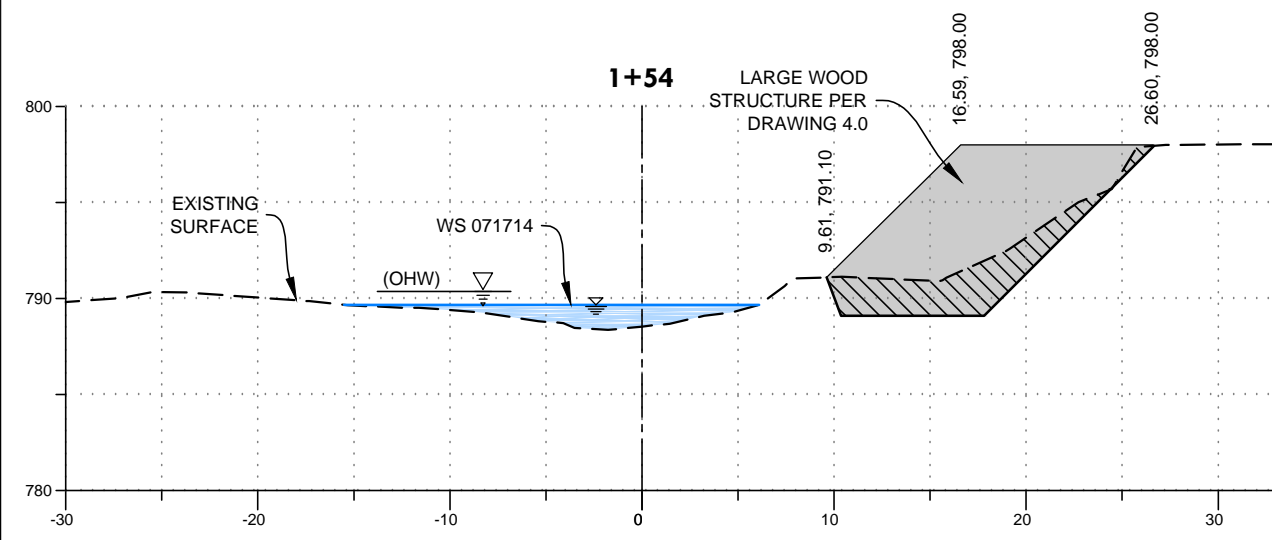
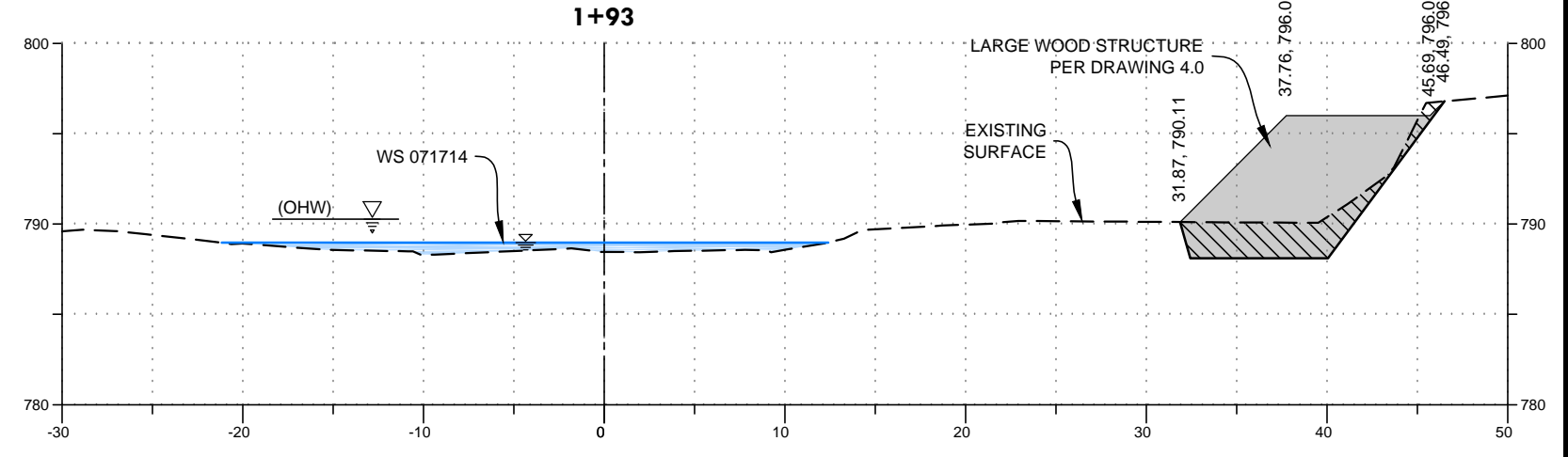
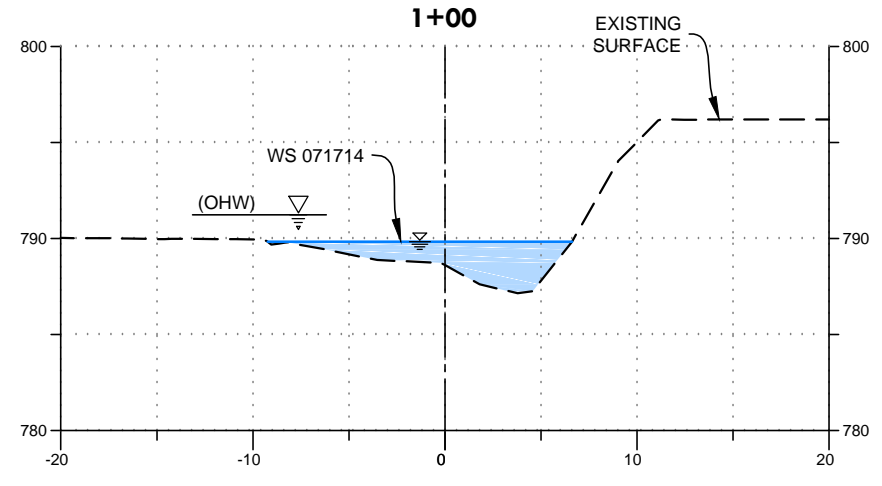
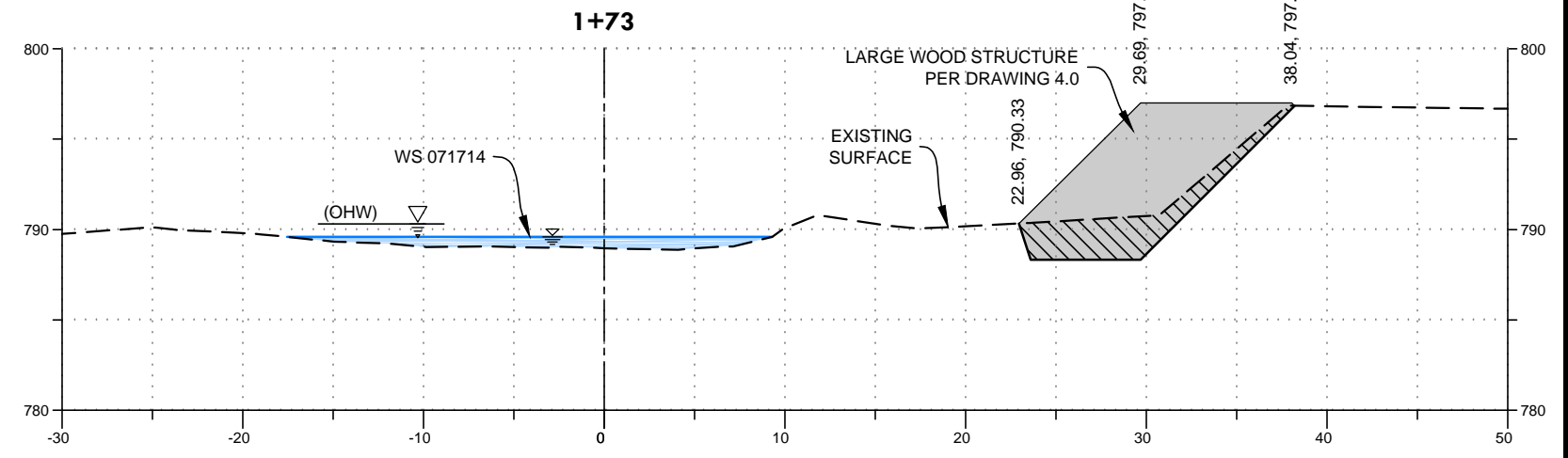
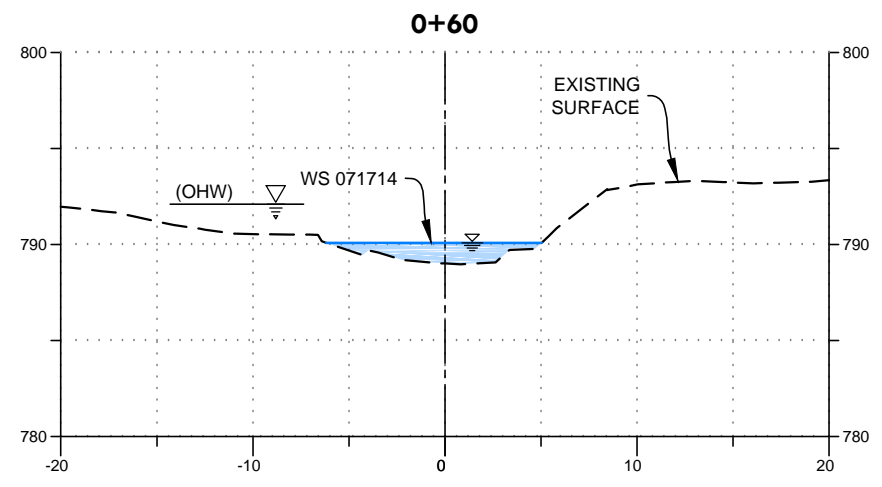
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**FLOODPLAIN AND BANK  
TREATMENT  
SNAKE CREEK HABITAT ENHANCEMENT  
MILL CITY, OR**

NO.	DATE	BY	DESCRIPTION	CHK
*	07/11/14	TF	DRAFT	CS

PROJECT NUMBER  
RDG-14-036  
DRAWING NUMBER  
**3.0**  
Drawing 4 of 9

**CROSS SECTIONS**  
 SNAKE CREEK HABITAT ENHANCEMENT  
 MILL CITY, OR



**LEGEND**

- WATER SURFACE ON JUNE 17, 2014
- ORDINARY HIGH WATER (OHW)
- EXISTING GROUND
- PROPOSED BANK RESTORATION SURFACE
- SUBGRADE SURFACE

STN 0 ON CROSS-SECTION GRIDS IS CREEK CENTERLINE ALIGNMENT

**2 CROSS SECTIONS**

HORIZ 1" = 10'  
 VERT 1" = 10'

**DRAFT**

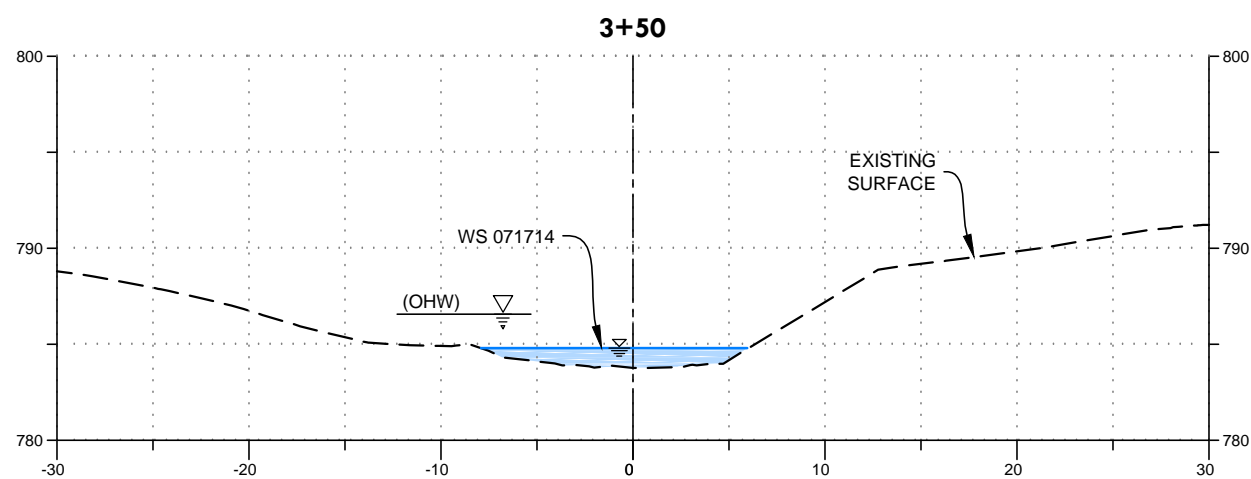
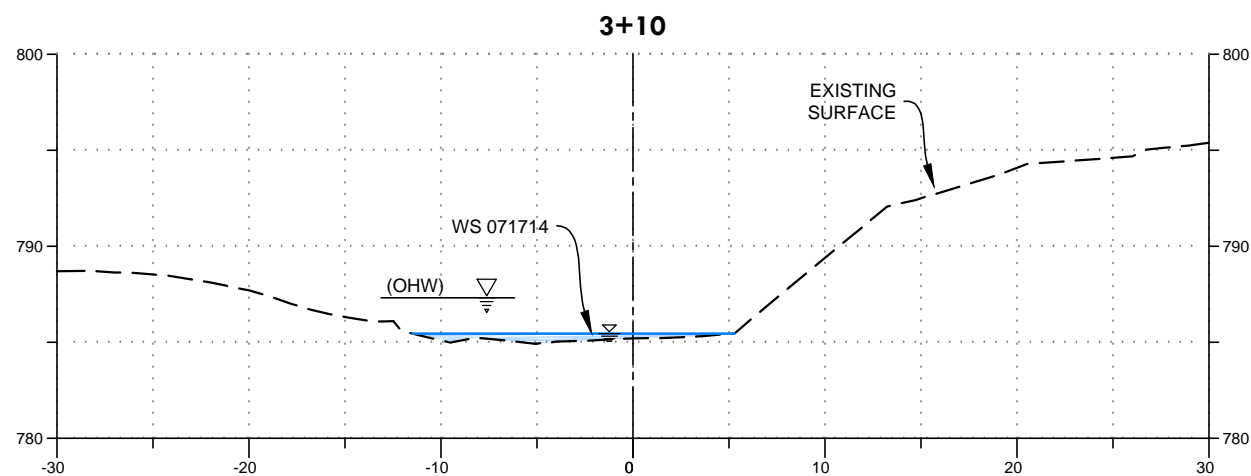
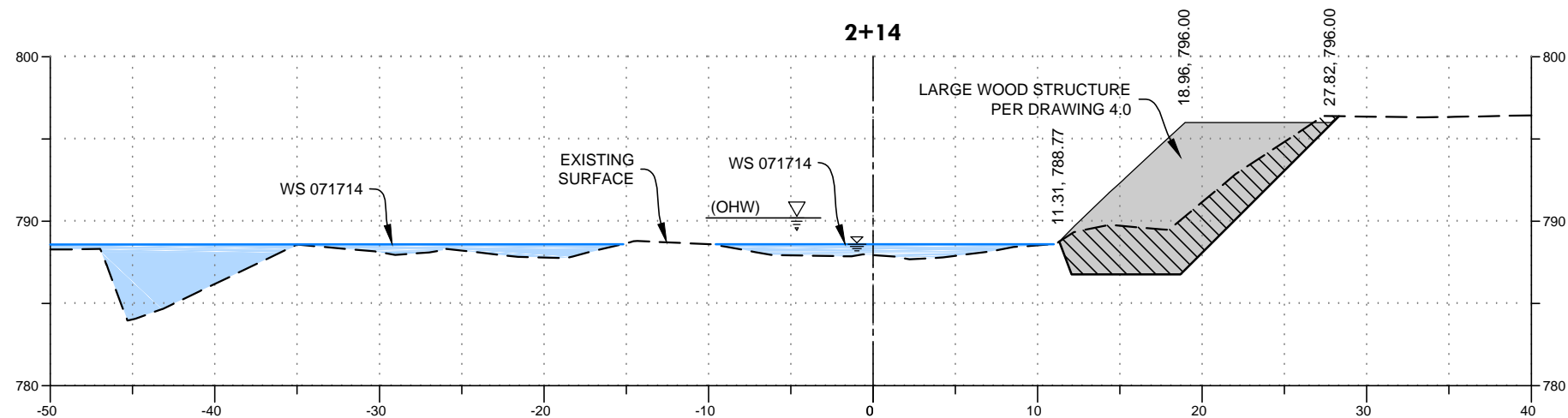
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PROJECT NUMBER  
RDG-14-036

DRAWING NUMBER  
**3.1**

Drawing 5 of 9

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**LEGEND**

	WATER SURFACE ON JUNE 17, 2014
	ORDINARY HIGH WATER (OHW)
	EXISTING GROUND
	PROPOSED BANK RESTORATION SURFACE
	SUBGRADE SURFACE

STN 0 ON CROSS-SECTION GRIDS IS CREEK CENTERLINE ALIGNMENT

**2 CROSS SECTIONS**

HORIZ 1" = 10'  
VERT 1" = 10'

**DRAFT**

**CROSS SECTIONS**  
SNAKE CREEK HABITAT ENHANCEMENT  
MILL CITY, OR

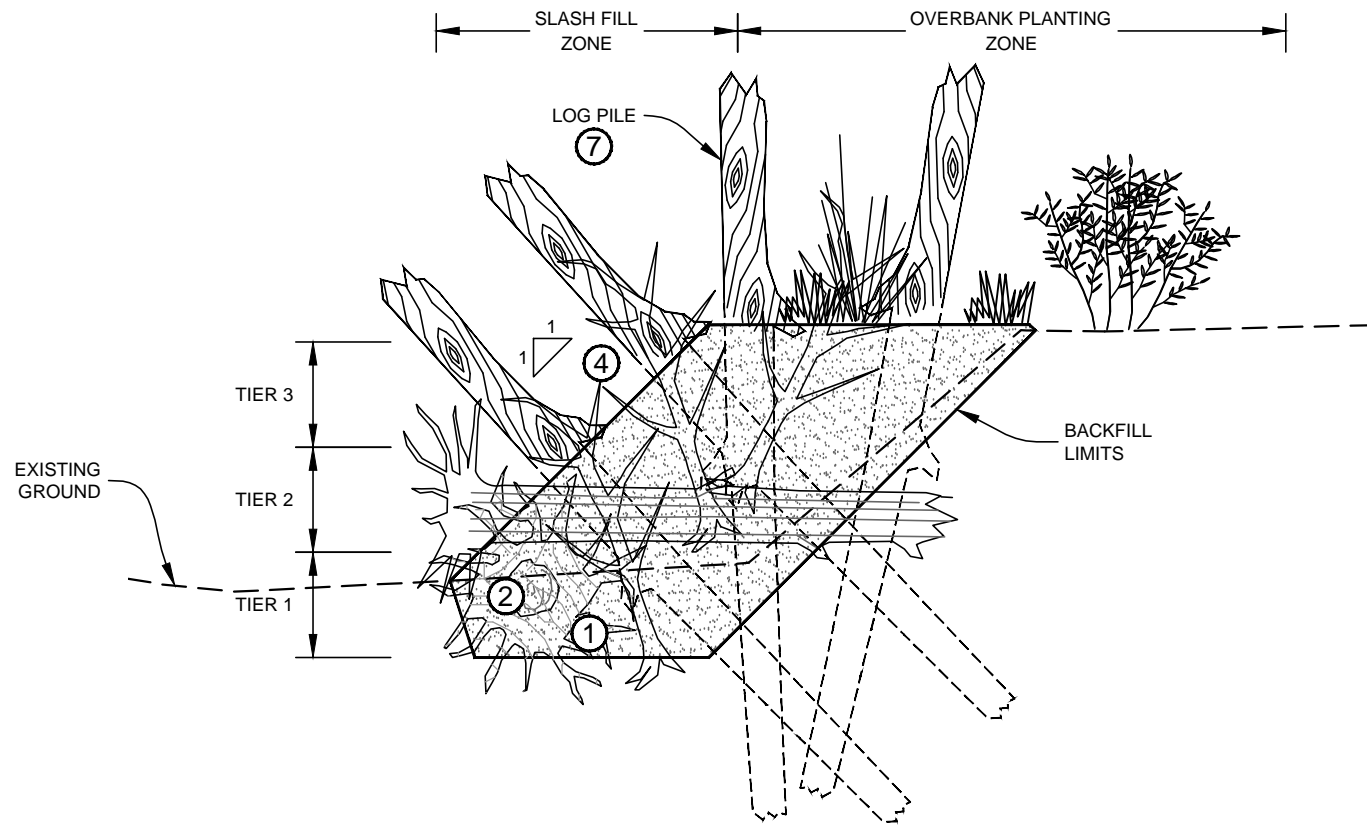
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PROJECT NUMBER  
RDG-14-036

DRAWING NUMBER  
**3.2**

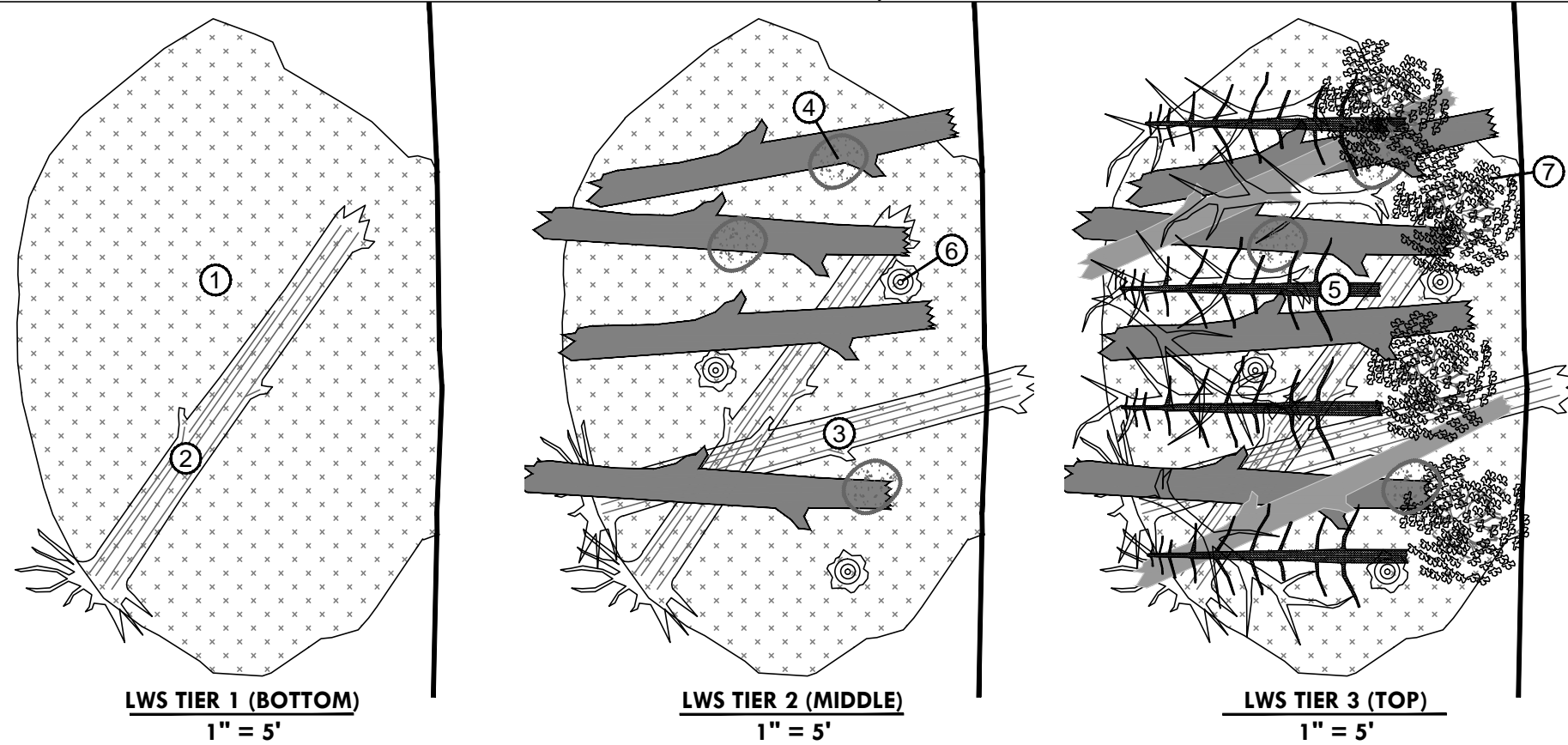
Drawing 6 of 9

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**1 SECTION - WOOD BANK TREATMENT**  
 HORIZ 1" = 5'  
 VERT 1" = 5'

**STRUCTURE SEQUENCE**



**MATERIAL SCHEDULE (PER 20-FT LENGTH)**

TIER	BASE MEMBERS ± 25' LONG TREE STEM WITH ROOTWAD, MIN 4"-DIA ROOTWAD, 18"-24" DIA STEM	KEY MEMBERS ± 25' LONG TREE STEM WITH BROKEN ENDS, 12"-20" DIA, ROOTWAD OPTIONAL	TREE TOPS WITH INTACT LIMBS AND BRANCHES, DOUG FIR, 8"-12" DIA, 15-25' LONG	BALLAST BOULDERS 2.5'-4' DIA	SLASH, BRANCHES, LIMBS 2"-8"-DIA, PACKED, (CY)	MICROPILES (VERTICAL OR SLANTED) DOUG FIR 10'-15', 8"-12" DIA	WILLOW CLUMP TRANSPLANTS
TIER 1 (BOTTOM)	1	0	0	0	0	0	2
TIER 2 (MIDDLE)	1	4	0	10	0	0	2
TIER 3 (TOP)	0	2	4	0	15	9	0

**CONSTRUCTION NOTES**

- ① EXCAVATE LOG STRUCTURE FOOTPRINT TO SPECIFIED DESIGN ELEVATIONS. STAGE EXCAVATED BOULDERS AND MATERIAL NEARBY AND OUTSIDE OF MOVING WATER. EXCAVATED MATERIAL WILL BE USED TO BACKFILL STRUCTURE AND AS BALLAST FOR LARGE WOOD.
- ② PLACE LONGITUDINAL LARGE WOOD BASE MEMBERS (TIER 1) IN STRUCTURE FOUNDATION FOOTPRINT.
- ③ PLACE KEY MEMBERS (TIER 2) WITH ROOTWADS. PLACE KEY MEMBERS W/O ROOTWADS.
- ④ PLACE BALLAST BOULDERS WITHIN STRUCTURE. PLACE A MINIMUM OF 2 BOULDERS PER PIECE OF LARGE WOOD EXCLUDING SMALL DIAMETER WOOD PIECES. BACKFILL IN AND AROUND STRUCTURE WITH GRAVELS AND COBBLES EXCAVATED FROM THE STRUCTURE FOOTPRINT. BACKFILL SHALL BE WASHED INTO THE LARGE WOOD OPENING TO ENSURE ADEQUATE BALLAST.
- ⑤ WEAVE TREE TOPS INTO BASE MEMBERS AND KEY MEMBERS AT VARIABLE VERTICAL ANGLES AND EXTEND TO TOP OF LOG STRUCTURE. WOOD TO BE PUSHED INTO UNDISTURBED GROUND BELOW EXCAVATED FOOTPRINT. WOOD TO BE CUT IF NECESSARY SO AS TO NOT EXTEND MORE THAN 5' ABOVE TOP OF STRUCTURE. ALL SAWED ENDS SHALL BE ROUGHENED AND/OR BROKEN.
- ⑥ PLACE VERTICAL WOOD POSTS AT A MINIMUM OF 1 POST PER 10 LINEAL FEET OF BANK. POSTS CONSIST OF 15-20' LONG TREE STEMS 8"-12" IN DIAMETER, STRAIGHT AND LIMBED. MINIMUM POST EMBEDMENT 6 FEET INTO UNDISTURBED GROUND. PLACE POSTS IN CENTER OF STRUCTURE SURROUNDED BY HORIZONTAL WOOD MEMBERS.
- ⑦ NEARBY CLUMP PLANTINGS OF WILLOW AND OTHER RIPARIAN PLANTS SHALL BE SECURED AND PLACED WITHIN THE BACKFILL AREAS AT A MINIMUM OF 1 CLUMP PLANT EVERY 10 FEET THROUGHOUT THE STRUCTURE. BURY ROOTS OF CLUMPS INTO MOIST SOIL. INSTALL PER DETAIL ON 4.1.

**LARGE WOOD HABITAT  
 STRUCTURE**  
 SNAKE CREEK HABITAT ENHANCEMENT  
 MILL CITY, OR

NO.	DATE	BY	DESCRIPTION	CHK
*	07/11/14	TF	DRAFT	CS

PROJECT NUMBER  
RDG-14-036

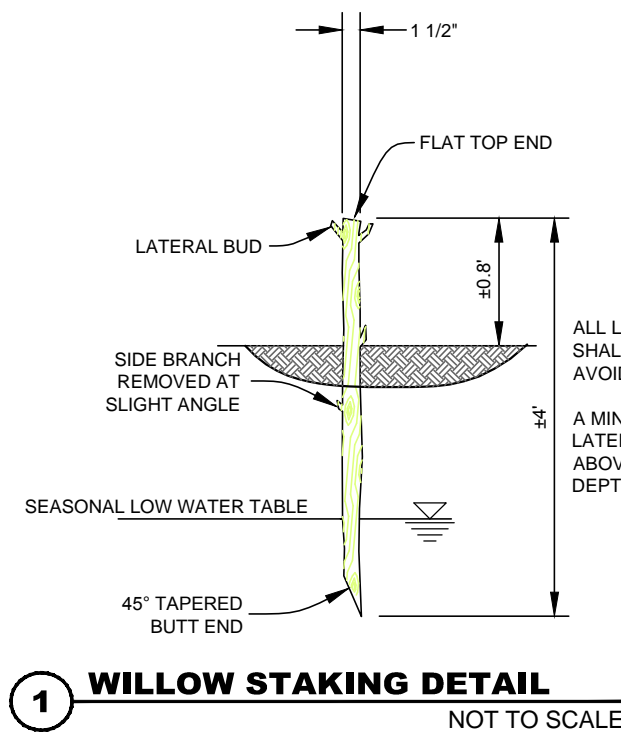
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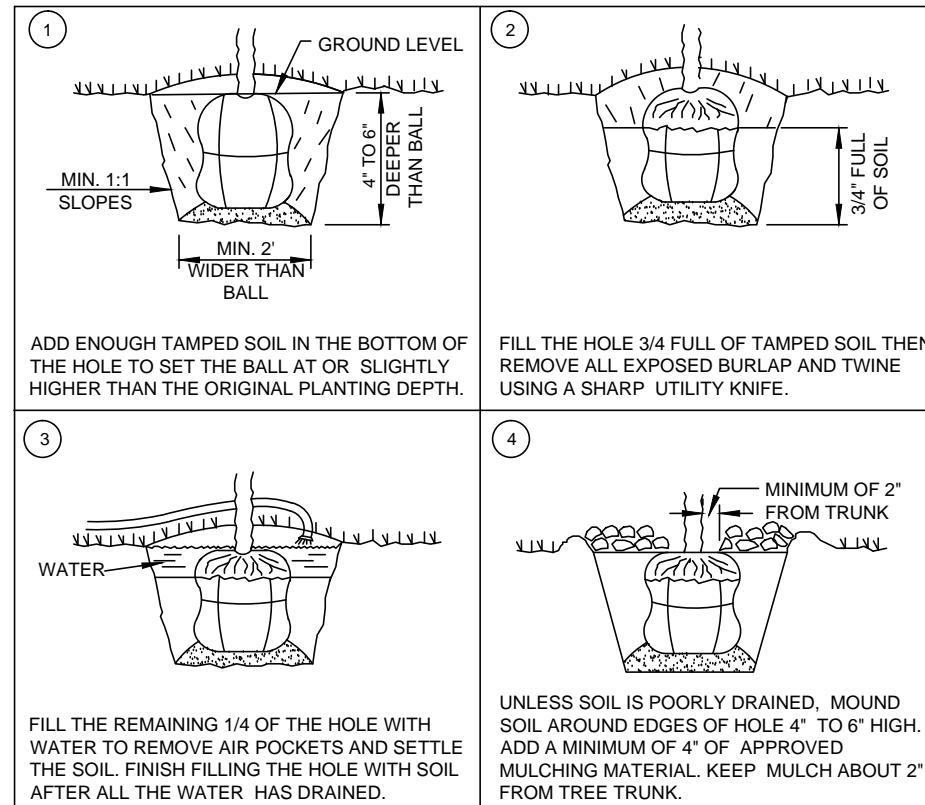
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**1** **WILLOW STAKING DETAIL**  
NOT TO SCALE



**2** **WILLOW CLUMP/SHRUB PLANTING DETAIL**  
NOT TO SCALE

**SITE RECLAMATION NOTES**

**GENERAL NOTES**

- ALL NATIVE PLANT MATERIAL TO BE USED IN PLANTING AREAS TO ORIGINATE FROM PARENT SOURCES WITHIN 50 MILES OF SITE. SEED SOURCE MUST BE AS LOCAL AS POSSIBLE.
- INSTALL TREE AND SHRUB SPECIES IN RANDOM GROUPINGS, AVOIDING LINEAR ROWS OR AS DIRECTED IN FIELD, WITHIN CLOSE PROXIMITY OF EXISTING PLANTINGS OR NEWLY PLANTED MATERIAL. THE INTENT IS TO REPLICATE NATURAL PLANT COMMUNITIES BY PROVIDING A LAYERED UNDERSTORY CANOPY WITH A MIXTURE OF TREES.
- THOROUGHLY WATER ALL PLANTS IMMEDIATELY FOLLOWING INSTALLATION TO PROVIDE MAXIMUM SOIL CONTACT AND TO ELIMINATE AIR POCKETS. AFTER PLANTING EACH PLANT, PROVIDE A TWO (2) INCH LAYER OF MULCH AROUND DISTURBED AREA.

**WILLOW STAKE PLANTING**

- WILLOW STAKES SHALL HAVE MINIMUM DIAMETER OF 1.5" AND MINIMUM LENGTH 5'. THE STAKES SHALL BE CUT FROM NEARBY PLANTS TO ENSURE COMPATIBILITY IF POSSIBLE, OR LOCAL 'ECOTYPES'. STAKES SHALL HAVE SIDE BRANCHES CLEANLY REMOVED WITH BARK INTACT, BASAL ENDS CUT AT AN ANGLE AND TOPS CUT SQUARE.
- STAKES SHALL BE CUT AND INSTALLED ON THE SAME DAY AND SHALL BE COMPLETED AFTER THE ONSET OF WILLOW DORMANCY. STAKING IS TO TAKE PLACE BETWEEN NOVEMBER AND MARCH. STAKES SHOULD BE DEEP ENOUGH TO CONTACT THE LOW SUMMER WATER LEVEL.
- STAKES SHALL BE INSTALLED TWO PER HOLE WITH THREE TO FIVE HOLES PLACED IN A CLUSTER. CLUSTERS SHALL BE PLACED 10' ON CENTER. STAKES ARE TO BE SET WITH 80% OF THE STAKE LENGTH INSTALLED INTO THE GROUND WITH FIRM SOIL IN CONTACT WITH THE WILLOW STAKE. A PIECE OF REBAR OR POWERED AUGER SHOULD BE USED AS A PILOT HOLE FOR THE STAKE.
- TAMP STAKES INTO GROUND WITH A DEAD BLOW HAMMER IF NECESSARY.
- WILLOW CLUMPS ARE PREFERRED TO LIVE STAKES ON THE LOWER HALF OF THE STREAMBANK. INSTALL PER SALVAGED CLUMP PLANTING DETAIL.
- ALTERNATE INSTALLATION PROCEDURES MAY BE USED UPON CONSULTATION WITH RIVER DESIGN GROUP PROJECT INSPECTOR.

**SALVAGED CLUMP PLANTING**

- WILLOW CLUMPS WILL BE SALVAGED FROM THE RIVER-LEFT FLOODPLAIN ACROSS FROM THE ERODING BANK 1 AND ERODING BANK 2 SITES. THE WILLOW CLUMP IS TO BE EXCAVATED BY AN EXCAVATOR SO THAT A MINIMUM OF 75% OF THE ROOTMASS IS RETAINED. CLUMPS ARE TO BE IMMEDIATELY PLANTED FOLLOWING EXCAVATION.
- CLUMPS ARE TO BE HEGGED TO 2/3 HEIGHT TO REMOVE LEAFY MATERIAL AND IRRIGATED.
- WILLOW CLUMPS ARE TO BE PLANTED SO THAT THE ROOTS WILL BE IN CONTACT WITH THE BASEFLOW WATER TABLE. THIS MAY REQUIRE THAT CLUMPS ARE BURIED BELOW GRADE BUT WILL REQUIRE THAT A PORTION OF THE CLUMPS REMAIN ABOVE GROUND. SOIL IS TO BE WASHED INTO THE PLANTING HOLE TO ENSURE SUFFICIENT SOIL-ROOT CONTACT.

**EROSION CONTROL SEEDING**

ALL DISTURBED AREAS SHALL BE BROADCAST SEEDING WITH AN EROSION CONTROL SEED MIX CONTAINING NATIVE SEED AND STERILE CEREAL RYES. THE MINIMUM APPLICATION RATE WILL BE THE MANUFACTURER'S RATE OR 30 LBS PER ACRE. CONTRACTOR WILL PROVIDE SEED MIX CONSTITUENTS TO CONSTRUCTION MANAGER FOR APPROVAL. AFTER BROADCAST SEEDING, ONE PASS OF THE AREA SHALL BE COMPLETED WITH A 5,000 POUND OR LESS TRACKED VEHICLE AND COVER THE AREA WITH STERILE STRAW.

**MATERIAL SALVAGE**

BOULDERS, ROCK, WOODY MATERIALS AND OTHER NATURAL CONSTRUCTION MATERIALS USED FOR THE PROJECT SHALL BE OBTAINED BEYOND THE BANKFULL ELEVATION AND AT LEAST 150 FEET FROM ANY WATERS OF THE STATE, EXCEPT FOR NATIVE MATERIALS OBTAINED FROM WITHIN THE PROJECT FOOTPRINT TO BE STOCKPILED AND REUSED ON SITE. LEAVE NATIVE MATERIALS, E.G., DOWN WOOD, WHERE THEY ARE FOUND, IF POSSIBLE. IF NATIVE MATERIALS (E.G., DOWNED WOOD) ARE DESTROYED, REPLACE THEM WITH A FUNCTIONAL EQUIVALENT DURING SITE RESTORATION.

STOCKPILE ALL WOODY MATERIAL, NATIVE VEGETATION, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION, AND USE AS APPROPRIATE FOR SITE RESTORATION ACTIVITIES. THE RESTORED SITE SHOULD SHOW THE FOLLOWING FEATURES, AS APPROPRIATE, AT THE END OF THE MONITORING PERIOD: BARE SOIL SPACES SHOULD APPROXIMATE THE SIZE AND DISPERSAL PATTERN OF PRE-EXISTING CONDITIONS; SOIL MOVEMENT, SUCH AS ACTIVE RILLS OR GULLIES AND SOIL DEPOSITION AROUND PLANTS OR IN SMALL BASINS, SHOULD BE ABSENT OR SLIGHT AND LOCAL.

**RIPARIAN AREAS RECLAMATION SCHEDULE**

	COMMON NAME	SIZE	INSTALLATION
SHRUBS	RED-OSIER DOGWOOD	2 TO 5 GALLON	±60/ACRE
	SNOW BERRY	2 TO 5 GALLON	±60/ACRE
	ROSE	1 GALLON	±60/ACRE
COVER SEED	CRESTED WHEATGRASS BLUE WILDRYE	SEED SEED	7 LBS/ACRE 15 LBS/ACRE
	WILLOW (VARIOUS SPECIES)	4' LENGTH	± 200/ACRE

**DRAFT**

**OVERBANK PLANTING**  
SNAKE CREEK HABITAT ENHANCEMENT  
MILL CITY, OR



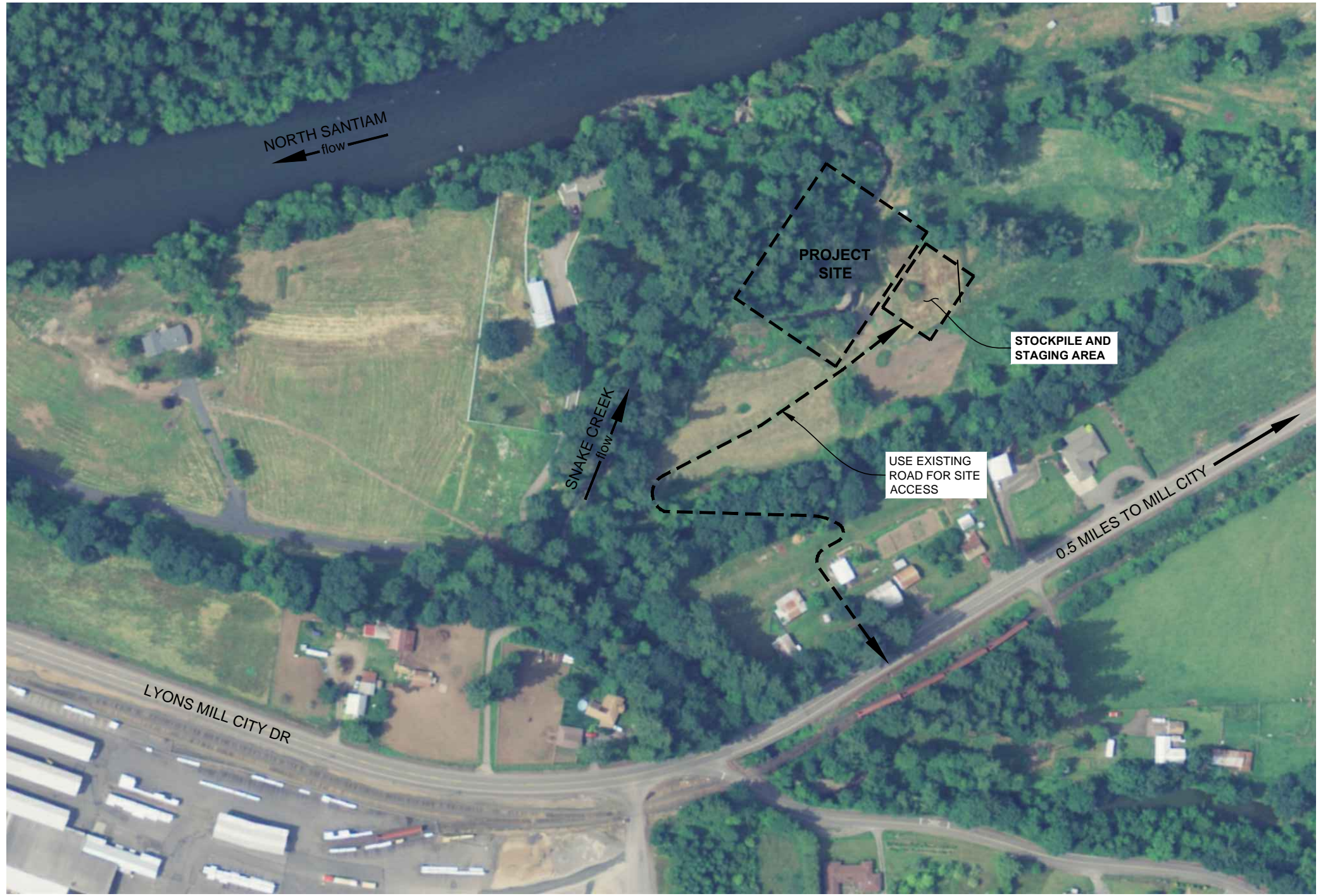
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**1 SITE ACCESS AND STAGING**  
1" = 200'



**WORK AREA ISOLATION**

CONTRACTOR SHALL SUBMIT A DEWATERING AND WORK AREA ISOLATION PLAN TO RIVER DESIGN GROUP FOR APPROVAL PRIOR TO BEGINNING CONSTRUCTION.

THE PREFERRED WORK AREA ISOLATION TECHNIQUE SHALL INCORPORATE SILT CURTAINS AND TEMPORARY DIVERSION (SEE DETAILS SHEET 5.0).

STATIONARY POWER EQUIPMENT, SUCH AS GENERATORS, WITHIN 150-FEET OF THE WATER SHALL BE DIAPERED TO PREVENT LEAKS.

ALL POWER EQUIPMENT WITHIN 150-FEET OF THE WATER SHALL BE INSPECTED DAILY FOR FLUID LEAKS AND REPAIRED, PRIOR TO USE WITHIN 150-FEET, IF A LEAK IS DETECTED. THE CONTRACTOR MUST KEEP DAILY INSPECTION REPORTS IN A DIARY.

PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS. PUMPED TURBID WATER IS TO BE CLEAR PRIOR TO DISCHARGING TO WATERS OF THE STATE.

CONTRACTOR SHALL COORDINATE WITH RIVER DESIGN GROUP OR OTHER QUALIFIED ENTITY TO REMOVE AND/OR CONFIRM ABSENCE OF EXISTING FISH AT THE PROJECT SITE PRIOR TO CONSTRUCTION WITHIN ISOLATED AREA.

**STAGING**

UTILIZE THE EXISTING MULTI-USE PATH AND IMMEDIATE UPLAND AREAS TO THE EXTENT POSSIBLE FOR MATERIAL STOCKPILING AND STAGING.

ANY AREAS OFF OF ROADWAY THAT AREA DISTURBED DUE TO STOCKPILING AND STAGING MUST BE RESTORED TO PRE- PROJECT CONDITION. SEE EROSION CONTROL NOTES BELOW.

**EROSION CONTROL NOTES**

VEGETATION WITHIN THE CONSTRUCTION SITE SHALL BE PRESERVED AND PROTECTED TO THE FULLEST EXTENT PRACTICAL. VEGETATION TO BE REMOVED WILL BE CLEARLY MARKED WITH RIBBON OR RIBBING.

EXCAVATED AREAS AND EXCAVATED MATERIAL SHALL BE PROTECTED FROM EROSION BY PLACING A PROTECTIVE COVER OVER THE MATERIAL (SUCH AS PLASTIC) AND PROVIDING STRAW MULCH OVER EXCAVATED SLOPES AND DISTURBED AREAS. HAY BALES SHALL BE PLACED DOWNSTREAM OF WORK AREA IN THE STREAM TO REDUCE TURBIDITY. CONTRACTOR SHALL SUBMIT AN EROSION CONTROL WORK PLAN TO THE ENGINEER OF RECORD, FOR APPROVAL, PRIOR TO BEGINNING CONSTRUCTION.

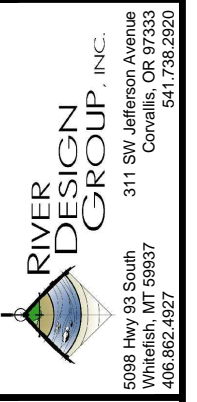
CONTRACTOR SHALL PREPARE AND HAVE ON-SITE A SPILL CONTAINMENT AND CONTROL PLAN WITH NOTIFICATION PROCEDURES, SPECIFIC CLEANUP AND DISPOSAL INSTRUCTIONS FOR ALL PRODUCTS USED ON-SITE. THE PLAN MUST INCLUDE 24-HOUR EMERGENCY CONTACT NUMBERS FOR THE CONTRACTOR.

AT A MINIMUM, EROSION CONTROL MEASURES SHOWN ON THIS PLAN SHALL BE IN PLACE PRIOR TO COMMENCING CONSTRUCTION AND SHALL BE INSPECTED WEEKLY BY PROJECT ENGINEER. BASED ON INSPECTIONS, WORK CREWS SHALL MOBILIZE IMMEDIATELY TO MAKE REPAIRS OR INSTALL ADDITIONAL MEASURES, IF NECESSARY.

CONTRACTOR SHALL HAVE AN EMERGENCY SUPPLY OF SEDIMENT CONTROL MATERIALS ON HAND (SILT FENCE, STRAW BALES, WATTLES, ETC.), AN OIL ABSORBING FLOATING BOOM, AND A SPILL KIT.

**EROSION CONTROL SEEDING**

ALL DISTURBED AREAS SHALL BE BROADCAST SEEDED WITH AN "EROSION CONTROL" SEED MIX PER DWG 4.1. AFTER SEEDING, MULCH AREAS WITH STERILE STRAW MULCH PER DWG 4.1.



**SITE ACCESS AND STAGING**  
SNAKE CREEK HABITAT ENHANCEMENT  
MILL CITY, OR

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