

## Forest Aquatic Restoration Project NEPA Compliance and Implementation Checklist

**Project Number:** 01052017

**Date:** 3/13/2017

**Title & Category:** **Big Creek Reach 4 Restoration Project** Category 2: large wood placement, including tree removal for large wood placement; Category 5: side-channel habitat restoration; Category 7: removal of existing berms, dikes, and levees; Category 14: riparian vegetation planting; Category 16: beaver habitat restoration

**Location:** T. 9 S., R. 33 E., sec. 19

**Project Description:** The project will authorize restoration activities to restore the floodplain topography from mining related waste rock piles and levees, connecting the floodplain and braided channel network.

**Heritage**

- Specific PDC for Heritage addressed (Heritage Surveys; Avoidance areas).

**Botany**

- Specific PDC for Botany addressed (Sensitive Plant Surveys).

- Specific PDC for Nox. Weeds addressed.

**Land Management Consistency**

- |                                  |                        |                             |   |
|----------------------------------|------------------------|-----------------------------|---|
| <input type="checkbox"/> 4A      | Big Game Winter range  | <input type="checkbox"/> 9  | Research Natural Areas                        |
| <input type="checkbox"/> 6A & 6B | Wilderness             | <input type="checkbox"/> 10 | Semi-Primitive Non-Motorized Recreation Areas |
| <input type="checkbox"/> 7       | Scenic Area            | <input type="checkbox"/> 22 | Wild and Scenic River                         |
| <input type="checkbox"/> 8       | Special Interest Areas | <input type="checkbox"/>    | Inventoried Roadless Areas                    |

**Comments:**

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Table 1. Projects Design Criteria and Forest Plan compliance checklist.

I have reviewed this project and have determined it is within the Project Design Criteria identified for my resource.			
Resource	Signature	Date	Comments
Heritage	<i>Kate Miller</i>	03/27/17	See SHPO report - R 201600201011
Botany	<i>Joe Kamm</i>	3/24/17	Consult Botany Dept. prior to implementation.
Wildlife	<i>Scott Hellewell</i>	3/20/17	Project will be beneficial for wildlife. No known concerns.
Fish*	<i>Roxanne Dancy</i>	3/21/17	Project will benefit aquatic organisms & habitat. IS consistent with PACFISH & ARBOIT.
Hydrology*	<i>Bob</i>	3/17/17	will improve water condition indicators and have beneficial impacts to lotic.
Range	<i>NRS</i>	4-3-17	Coordinate w/ Reg program
Soils	<i>Wrona</i>	3/23/17	Project should benefit riparian soils; adjacent upland soils disturbed <sup>by machinery should recover within 1-5 yrs.</sup> No issues.
Recreation	<i>Justin Dixon</i>	3/27/2017	Project may effect no. access during implementation, but long term will be beneficial to rec. + visuals
Lands and Special Uses	<i>Shelley</i>	3/22/17	No lands SUP issues identified. No current claims. Hamill 4/26/17
Engineering	<i>John LaFollette</i>	4-17-17	Install CMP as design by eng contact.
Fuels / Fire	<i>[Signature]</i>	4/13/17	no known concerns
Silviculture	<i>Amanda Swinney</i>	3/22/17	No known concerns

\* Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by Aquatic Restoration Biological Opinion II. The experience should be commensurate with technical requirements of a project.

Line Officer Signature: *Daniel Helmer*

Date: 5-8-17

# Implementation Description:

## Big Creek Reach 4 Restoration Project

<u>Category 2</u> : Large Wood Placement, including tree removal for large wood placement <u>Category 5</u> : Side-Channel Habitat Restoration <u>Category 7</u> : Removal of Existing Berms, Dikes and Levees <u>Category 14</u> : Riparian Vegetation Planting <u>Category 16</u> : Beaver Habitat Restoration	Lead Preparer: Bob Hassmiller
Applicant: Blue Mountain Hydrology (Aquatics)	NEPA Reference: DN For Aquatic Restoration EA <a href="http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&amp;width=full">http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&amp;width=full</a>
Location: T. 9 S., R. 33 E., sec. 19 USGS Quad: Sharp Ridge	Lease/ /Case File/ Serial #: N/A (Reference #): N/A
Begin Date: 3/01/17	Due Date: 5/01/17

### Purpose/Need:

The purpose of Big Creek R4 Restoration Project is to restore: instream and floodplain complexity; water tables to expand riparian vegetation; hydraulics to provide for spawning and life cycle stages; fish, wildlife and beaver habitat that has been missing since the reach was impacted by mining. The levee has caused the channel to be disconnected from the floodplain through human activities.

Big Creek Reach 4 was historically a depositional valley (valley gradient less than 3 percent slope) with a wide, unconfined broad valley and was critical for providing steelhead spawning and rearing, bull trout overwintering and chinook rearing habitats in the Big Creek Subwatershed. Due to its depositional behavior, beaver dams likely flourished within the reach and gold from the granite intrusions upstream fell out of suspension and was buried in the channel and floodplain. As settlers moved westward searching for beaver pelts and gold, they exploited the abundant resources that were once present on this reach. Prior to the 1900s, Chinese and white settlers developed ditches and impoundments to sluice the floodplain, searching for gold. Highly intact Chinese mine tailings created rows of stacked rock from the cobble materials and much of the gravels were transported downstream.

Recent mining (1980s) was also done on a significant section of the reach. Large ponds and levees (6-8 feet in elevation) line this section of Reach 4 and disconnect significant portions of the floodplain from being accessible by the stream. Large wood is present in very low volumes instream within the reach. As a result, channel complexity (defined as number of channel units per length) has been extremely simplified and the dominant channel type is one long riffle (channel units are 92 percent riffle and 8 percent pool; compared to 60/40 desired conditions) that has incised into its valley to an armored cobble layer. Pool habitats are sparse and gravels are not being deposited, but transported through the reach. Lateral bank erosion is not occurring and has negatively impacted large woody debris recruitment processes over time. Due to the increased stream power in the reach, biological integrity has been compromised and the ecosystem functions of habitat maintenance are not being provided for listed ESA fish species.

Generally, the goal of this project is to restore geomorphic processes to provide for biotic and hydrologic functions. Specifically, the goals are:

- To increase the area for spawning and juvenile rearing for MCR Steelhead, Bull trout, and Chinook salmon thus increasing carrying capacity (egg to fry, fry to smolt).
- To increase the duration and frequency of floodplain inundation.
- To increase the amount and diversity of instream and floodplain wood supply. Also, to increase the condition of the riparian forest for large wood recruitment and stand health.
- To restore depositional processes for fine sediment and gravels and decrease the grain size of the streambed.
- To increase the quality and quantity of pool habitats.
- To restore the cold water spring confluence and influence of Reynolds spring to Big Creek
- To increase the area of hyporheic exchange.
- To increase water storage within the floodplain.
- To provide suitable geomorphic features for establishment of riparian hardwoods in particular cottonwood and willow which are preferred by beaver (beaver are currently in reach 1 of Big Creek).
- To diversify the riparian hardwood component and increase shade (cottonwood, willow).
- Reduce stream energy within the reach.

Big Creek Reach 4 is the second step of several phases of aquatic restoration within the Big Mosquito Project Area. General project location maps and specific maps of the project area are located in appendix.

**Land Use Plan Conformance:**

The project falls under Management Area (MA) 3B “Anadromous Riparian Areas” of the Malheur National Forest Land and Resource Management Plan (LRMP). The goal of MA3B is to “Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat and water quality... Design and conduct management in all riparian areas to maintain or improve water quality and beneficial uses” (USDA Forest Service, 1990). Big Creek Reach 4 is within a Category 1 riparian habitat conservation areas (fish-bearing stream) as designated by PACFISH and listed as designated critical habitat for Mid-Columbia River steelhead by the National Marine Fisheries Service (NMFS) and bull trout by the United States Fish and Wildlife Services (USFWS). Juvenile chinook also use the reach for rearing habitat.

**Proposed Action:**

The Malheur National Forest proposes to restore the floodplain topography from mining related waste rock piles and levees. The goal is to provide for a connected floodplain and braided channel network that was once present, prior to mining starting in the 1860s. Levees and ponds on the north side of Big Creek reach 4 have been recently mined and would be contoured to the appropriate floodplain elevation, expanding wetland habitats. To accomplish this task, the Malheur National Forest proposes to:

- Regrade approximately 6,300 cubic yards of mining levee and waste rock piles on approximately 1,300 feet of linear stream bank. This material will be regraded on the

floodplain to create over ½ mile of new side channel habitats. Recent mining sluice ponds will be filled to an elevation that would create wet meadow habitats. Side channels would be activated at frequent flood events and would provide refugia for ESA listed fish species.

- Large woody debris would be added to the stream channel at a level of Forest Plan Riparian Management Objectives (250-400 trees per mile). Wood would be placed near side channel entrances to facilitate scour and activation of side channels at varying flood levels.
- Approximately 30 post baffle or picket baffle structures would be used to direct stream flow and facilitate fine material deposition on point bars. Approximately 5-10 beaver dam analogue structures will be used on side channels to aid floodplain connectivity and maintaining elevated water tables.
- Approximately 3,000 riparian hardwoods (willows, dogwoods and alder) will be hand planted with a planting spade approximately 1-2 feet into the soil on the floodplain along the mainstem and side channels. Heavy equipment may be used in areas that are disturbed by wood placement and levee removal.
- Install a 72-inch bottomless arch culvert in USFS 4560 road to provide for flood relief on a side channel during peak flows.
- Disturbed areas will be reseeded with native grasses and noxious weeds will be surveyed and treated by our partners at the Grant Weed Control.

The estimated time to achieve a response is 1-5 years. There is a high likelihood of long-term success associated with these restoration actions in conjunction with the other treatments identified in the Big Mosquito Cumulative Analysis.

### **Implementation Plan:**

#### **Floodplain Connectivity: Levee Removal – Floodplain Regrade – Side Channel Development**

The purpose of floodplain connectivity work is to increase within channel and floodplain roughness, thus increasing fish habitat and geomorphic complexity. Levees would be removed and the floodplain re-contoured to allow the stream power to be in balance with sediment transport and to activate secondary channels. The floodplain connection and activation of secondary channels would alleviate shear stress during high flow events and will allow spawning gravels to be deposited naturally. Floodplain and instream channel roughness is essential within Big Creek Reach 4. Over a half mile of side channels will be developed on the northern floodplain of reach 4 to provide for refugia habitat during high flows.

Heavy equipment will be used to regrade the floodplain features and design the side channels.

#### **Large and coarse woody debris placement**

Large and coarse woody debris will be placed into the stream to meet Forest Plan Riparian Management Objectives (RMOs; 250-400 trees per mile), desired conditions or until adequate trees of sufficient size are placed as deemed by the Hydrologist/Fish Biologist. Wood would be placed with heavy equipment to the stream channel and floodplain to facilitate scour and activation of side channels at varying flood levels. The wood is also intended to improve channel complexity and provide more quality, channel spanning pools throughout the reach.

### **Beaver Dam Analogs**

Heavy equipment will be used to insert the beaver dam analogs (BDAs) into the stream bed and onto portions of the floodplain, where half of the pole length will extend up from the ground surface. Willow will be woven within the posts and packed with silty-gravelly loam from the streambed. The top of the BDAs will extend to be level with the floodplain and the shape of the feature will be convex or concave, depending on the site. The purpose of these structures is to elevate the water table upstream of the BDAs.

BDAs are built with 2 meter long, 7 to 10 centimeters in diameter, untreated lodge pole pine (*pinus contorta*) posts. Using a chainsaw, a point is made at one end of the post. Posts are spaced one half to one meter apart and driven into the active channel and inset floodplain with a handheld hydraulic post pounder or a hydraulic post pounder mounted on a mini-excavator. A series of these structures, up to 3, are often located together to prevent under scour in upstream structures.

### **Post Vanes**

Post vanes are straight edged structures protruding from the streambank into the oncoming current at an angle from the streambank not exceeding 20 degrees. The top edge of the vane dips downward at an angle from horizontal, beginning at the bankfull level ending at bed elevation mid channel. Vanes consist of straight posts 4 to 7 inches in diameter at the butt end and 4 to 6 feet in length. Posts are pounded into the stream bed 3 to 5 feet and spaced about 12 inches apart. Post Vanes would be constructed using mid-size excavator with modified compactor head.

A string is run from the bankfull elevation to the stream bed and posts marked to delineated proper level for cutting. Post vanes will be utilized to facilitate point bar formation. Ecologically, vanes facilitate the establishment of streambank vegetation by providing optimum seedbed conditions and sheltering newly established plants from flood forces until they become well established.

### **Riparian Hardwood Planting and Reseeding**

Riparian hardwood planting may occur with a stinger, excavator bucket or be placed by hand. Tree shelters may be placed around approximately 3,000 saplings and an additional 2,000 willow would be interwoven by hand (laborers) into the BDAs and post vanes. Willow plantings would be strategically located within tipped conifers on the floodplain and adjacent to the stream channel and planted in clusters of up to 10 stems per hole. Extensive planting would occur in conjunction with levee removal/floodplain regrading where exposed soil is prevalent. Disturbed areas of ground cover will be reseeded with native grasses. Noxious weeds will be surveyed and treated. Our partners at Grant Weed Control will assist in reseeded and noxious weed treatments.

### **Side Channel Conveyance through Roads**

A 72-inch bottomless arch culvert would be placed onto Big Creek Reach 4's floodplain across the 4560 road. This culvert will provide floodplain relief and ensure biological connectivity is present in multiple areas on Big Creek. The existing culvert will be removed and replaced with this 72-inch culvert.

**Appendix to the Aquatic Restoration EA  
Implementation Description**

Project Title: Big Creek Reach 4 Restoration Project  
Project Number: 01052017

- Category 2:** Large Wood, Boulder and Gravel Placement, including tree removal for large wood placement.  
**Category 5:** Side-Channel Habitat Restoration  
**Category 7:** Removal of Existing Berms, Dikes and Levees  
**Category 14:** Riparian Vegetative Planting  
**Category 16:** Beaver Habitat Restoration

The following information will guide actions for this project that is taking place within the bounds of the Decision Notice for the 2014 Malheur National Forest Aquatic Restoration Environmental Analysis to maintain that all conservation measures, guidelines and project design criteria (PDCs) are met under this guiding document.

**Program Administration**

1. Integration of project design criteria and conservation measures and terms and conditions into project design and contract language
  - a. This document is to outline the conservation measures and PDCs that will be used during project implementation to remain compliant with the aquatic restoration BA as well as ARBO II.
2. Project notification: The following information will be provided to the NMFS Level 1 Aquatics members 30 days prior to implementation as a Project Notification Form 7.
  - a. Action identifier – 01052017
  - b. Project name – Big Creek Reach 4 Project
  - c. Location –

Project	Big Creek Reach 4 Project
Stream Name	Big Creek
6 <sup>th</sup> field HUC	170702030302
EF Beech Creek Reach 1	
Latitude (Decimal Degrees)	Downstream:-118.792 Top: -118.784
Longitude (Decimal Degrees)	Downstream:44.768 Top: 44.769

- d. Agency contact –Bob Hassmiller, [rjhassmiller@fs.fed.us](mailto:rjhassmiller@fs.fed.us), (541)575-3433.
- e. Timing – Work will occur when ground conditions allow for excavation while maintain a minimal impact to the surrounding resources. All instream work with equipment would occur from July 15-August 15, 2017.
- f. Activity category –
  - Category 2: Large Wood, Boulder and Gravel Placement, including tree removal for large wood placement.
  - Category 5: Side-Channel Habitat Restoration
  - Category 7: Removal of Existing Berms, Dikes and Levees
  - Category 14: Riparian Vegetative Planting
  - Category 16: Beaver Habitat Restoration
- g. Project description – Project description is available in the Implementation Description under the section “Implementation Plan” above.

- h. Work will occur within Big Creek Reach 4 within the Middle Fork John Day Watershed along FS 4560
  - i. Species affected –
    - i. Listed species: Mid-Columbia River Steelhead
    - ii. Critical Habitat: Mid -Columbia River Steelhead
    - iii. Regionally Sensitive species and MIS Species: Mid-Columbia Steelhead, Spring Chinook, Interior Columbia Redband Trout
  - j. Date of submittal – To be completed in Spring of 2017, at least 30 day prior to implementation
  - k. Site assessments – Assessment for contaminants is not required at this location.
  - l. Review – NMFS fish passage review and Restoration Review Team review are not required.
  - m. Verification – \_\_\_\_\_
  - n. SOD project notification – \_\_\_\_\_
3. Minor Variance: No variances from the criteria specified in the aquatic restoration document are being considered.
  4. NMFS Fish Passage Review and Approval: This work does not require review by the NFMS level 1 team member.
  5. Restoration Review Team: This work does not require review by the restoration review team.
  6. Project Completion Report: To be completed after implementation
  7. Annual Program Report: This project will be completed within one year, completion and annual reporting will occur in the winter of FY18 before February 15<sup>th</sup>.

### **General Aquatic Conservation Measures**

8. Technical Skill and Planning Requirements:
  - a. An appropriately qualified fisheries biologist or hydrologist will be involved in the design of this project.
  - b. The scope of this project is limited in both space and context. Field evaluations and site-specific surveys will require little work. Appropriate time will be allotted for these actions, prior to implementation. Planning and design will involve appropriate expertise.
  - c. The assigned fisheries biologist or hydrologist will make sure that any applicable conservation measures and project design criteria are met through the contracting process.
9. Climate Change: due to the small scale of this work, future climate changes impacts will not have dramatic effects on this work
10. In-Water Work Period: July 15-August 15.
11. Fish passage: Not applicable.
12. Site Assessment For Contaminants: In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of >20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:
  - a. Review of readily available records, such as former site use, building plans, records of any prior contamination events.
  - b. Site visit to observe the areas used for various industrial processes and the condition of the property.

- c. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.
  - d. Report that
13. Pollution and Erosion Control Measures: Implement the following pollution and erosion control measures:
- a. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
  - b. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
  - c. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
  - d. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
  - e. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).
  - f. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.
  - g. No uncured concrete or form materials will be allowed to enter the active stream channel.
  - h. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.
14. Site Preparation
- a. Flagging sensitive areas –Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
  - b. Staging area –Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
    - i. No Topographical Restrictions –place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
    - ii. Topographical Restrictions –place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
  - c. Temporary erosion controls –Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.
  - d. Stockpile materials –Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native

channel material displaced by construction will be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.

- e. Hazard trees –Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

#### 15. Heavy Equipment Use

- a. Choice of equipment – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).
- b. Fueling and cleaning and inspection for petroleum products and invasive weeds
  - i. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five gallons.
  - ii. Store and fuel equipment in staging areas after daily use.
  - iii. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
  - iv. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.
- c. Temporary access roads – Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.
- d. Stream crossings – Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream
- e. Work from top of bank – To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.
- f. Timely completion – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

#### 16. Site Restoration

- a. Initiate rehabilitation – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through

- removal of project related waste, spreading of stockpiled materials (soil, large wood, trees, etc.) seeding, or planting with local native seed mixes or plants.
- b. Short-term stabilization – Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.
- c. Revegetation – Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
- d. Planting manuals – All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.
- e. Decompact soils – Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

#### 17. Monitoring

Monitoring will be conducted by Action Agency staff, as appropriate for that project, during and after a project to track effects and compliance with this opinion.

- a. Implementation
  - i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.
  - ii. Fix any problems that arise during project implementation.
  - iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.
- b. 401 Certification – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).
- c. Post project – A post-project review shall be conducted after winter and spring high flows.
  - i. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:

- ii. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
  - iii. Revegetation – For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.
  - iv. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.
- 18. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release –Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition will typically apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation.
  - a. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.
  - b. Capture and release – Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.
  - c. Electrofishing – Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing will be used to capture fish for salvage, NMFS’s electrofishing guidelines will be followed (NMFS 2000).
    - i. Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the fish capture.

- ii. If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning fish or active redds.
  - iii. Only Direct Current (DC) or Pulsed Direct Current shall be used.
  - iv. Conductivity <100, use voltage ranges from 900 to 1100. Conductivity from 100 to 300, use voltage ranges from 500 to 800. Conductivity greater than 300, use voltage to 400.
  - v. Begin electrofishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
  - vi. Do not allow fish to come into contact with anode. Do not electrofish an area for an extended period of time. Remove fish immediately from water and handle as described above (PDC 20b). Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
  - vi. If mortality is occurring during salvage, immediately discontinue salvage operations (unless this would result in additional fish mortality), reevaluate the current procedures, and adjust or postpone procedures to reduce mortality.
- d. Dewater construction site –When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.
- e. Surface water withdrawals
  - i. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS’s fish screen criteria (NMFS 2011e).
  - ii. For the dewatering of a work site to remove or install culverts, bridge abutments etc., if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the Action Agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum

approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

- f. Stream re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

### **Applicable Project Design Criteria**

#### Project Design Criteria for Aquatic Restoration Activity Categories

2. **Large Wood, Boulder, and Gravel Placement** includes **large wood** and boulder placement, engineered log jams, porous boulder structures and **vanes**, gravel placement, and tree removal for large wood projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (large wood removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

#### **a. Large Wood and Boulder Projects**

- i. Place large wood and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low gradient meadow streams.
- ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.
- iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.
- iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.
- v. The partial burial of large wood and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
- vi. large wood includes whole conifer and hardwood trees, logs, and rootwads. large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0x bankfull width.
- vii. Structures may partially or completely span stream channels or be positioned along stream banks.
- viii. Stabilizing or key pieces of large wood must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish.

Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability

- ix. Anchoring large wood –Anchoring alternatives may be used in preferential order:
1. Use of adequate sized wood sufficient for stability
  2. Orient and place wood in such a way that movement is limited
  3. Ballast (gravel or rock) to increase the mass of the structure to resist movement
  4. Use of large boulders as anchor points for the large wood
  5. Pin large wood with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (<12) an additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.

b. **Engineered Logjams** are structures designed to redirect flow and change scour and deposition patterns. To the extent practical, they are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravel bar.

- i. **NMFS fish passage review and approve** –For engineered log jams that occupy >25% of the bankfull area, the Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).
- ii. Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams.
- iii. Grade control engineered log jams are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.
- iv. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire large wood with untrimmed rootwads to provide functional refugia habitat for fish.
- v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.
- vi. The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the stream bank or channel
- vii. Angle and Offset –The large wood portions of engineered log jam structures should be oriented such that the force of water upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.
- viii. If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the large wood.

c. **Porous Boulder Structures and Vanes**

- i. Full channel spanning boulder structures are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern, or where private landowners will not allow log placements due to concerns about damage to their streambanks or property.
- ii. Install boulder structures low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).
- iii. Boulder step structures are to be placed diagonally across the channel or in more traditional upstream pointing “V” or “U” configurations with the apex oriented upstream.
- iv. Boulder step structures are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept less than 6 inches in height.
- v. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder step structure is not allowed.
- vi. Rock for boulder step structures shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
- vii. The project designer or an inspector experienced in these structures should be present during installation.
- viii. Full spanning boulder step structure placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of large wood.

**e. Tree Removal for Large Wood Projects**

- i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995; USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (e.g., late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel LW placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.
- ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.
- iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.
- iv. Trees may be felled or pushed/pulled directly into a stream or floodplain.
- v. Trees may be stock piled for future instream restoration projects.
- vi. The project manager for an aquatic restoration action will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

5. **Side-Channel Habitat Restoration** projects will be implemented to reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that will accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. These project types will increase habitat diversity and complexity,

improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refuge for fish during high flows. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

- a. **Review and approve** –When a proposed side channel will contain >20% of the bankfull flow,<sup>16</sup> the Action Agencies will ensure that the action is reviewed by the Restoration Review Team and reviewed and approved by NMFS for consistency with criteria in NMFS (2011e).
- b. **Data requirements** –Data requirements and analysis for off-and side-channel habitat restoration include evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.
- c. **Allowable excavation** –Off-and side-channel improvements can include minor excavation (< 10% of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field or aerial photographs. Excavation depth will not exceed the maximum thalweg depth in the main channel. Excavated material removed from off-or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

**7. Set-back or Removal of Existing Berms, Dikes, and Levees** will be conducted to reconnect historic fresh-water deltas to inundation, stream channels with floodplains, and historic estuaries to tidal influence as a means to increase habitat diversity and complexity, moderate flow disturbances, and provide refuge for fish during high flows. Other restored ecological functions include overland flow during flood events, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels and alcoves. Such projects will take place where estuaries and floodplains have been disconnected from adjacent rivers through drain pipes and anthropogenic fill. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

**a. Floodplains**

- i. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
- ii. Remove drain pipes, fences, and other capital projects to the extent possible.
- iii. To the extent possible, remove nonnative fill material from the floodplain to an upland site.
- iv. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches. Breaches shall be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project or at the lowest

elevation of the floodplain to ensure the flows will naturally recede back into the main channel thus minimizing fish entrapment.

- v. Elevations of dike/levee setbacks shall not exceed the elevation of removed structures
- vi. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that floodplain function is not impeded.

14. **Riparian Vegetation Planting** includes the planting of native riparian species that would occur under natural disturbance regimes. Activities may include the following: planting conifers, deciduous trees and shrubs; placement of sedge and or rush mats; gathering and planting willow cuttings. The resulting benefits to the aquatic system can include desired levels of stream shade, bank stability, stream nutrients, large wood inputs, increased grasses, forbs, and shrubs, and reduced soil erosion. Equipment may include excavators, backhoes, dump trucks, power augers, chainsaws, and manual tools.

- d. Experienced silviculturists, botanists, ecologists, or associated technicians shall be involved in designing vegetation treatments.
- e. Species to be planted will be of the same species that naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible.
- f. Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in terraces (abandoned flood plains), or where such plants are abundant.
- g. Sedge and rush mats should be sized to prevent their movement during high flow events.
- h. Concentrate plantings above the bankfull elevation.
- i. Removal of native and non-native vegetation that will compete with plantings is permitted.
- j. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

16. **Beaver Habitat Restoration** includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain.

a. **In-channel Structures**

- vii. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2012).
- viii. Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.
- ix. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.

**b. Habitat Restoration**

- x. Beaver Restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established (Malheur National Forest and the Keystone Project 2007).
- xi. Maintain or develop grazing plans that will ensure the success of beaver habitat restoration objectives.
- xii. As a means to restore desired vegetation (e.g., aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

**Project Design Criteria by Resource**

Fisheries and Hydrology

Fisheries and Hydrology resources will follow all mitigation measures and project design criteria for aquatic restoration activities as shown in the ‘Aquatic Restoration Project Categories, Program Administration, General Aquatic Conservation Measures, and Project Design Criteria for Aquatic Restoration Activity Categories on the Malheur National Forest.’

Additional Aquatic project design criteria were developed for the following elements: Tree Tipping and Felling, Juniper Treatments, Tree Hauling, and Prescribed Burning. In the Camp Creek Headwaters Restoration Project design criteria for tree tipping and felling apply.

*General For Inside Riparian Habitat Conservation Areas*

All snags will be maintained within the RHCA unless deemed a hazard to the restoration activity.

*Tree Tipping and Tree Felling for Large Wood Projects*

Source trees being extracted (either by tipping or falling) as part of this project for instream restoration will not be harvested from within the primary shade zone.

**Table 1 Primary shade zone width, based on adjacent hill slope.**

	<b>Hill Slope less than 30%</b>	<b>Hill Slope 30% to 60%</b>	<b>Hill Slope greater than 30%</b>
Primary Shade Zone Width (slope distance)	50 ft.	55 ft.	60ft.

The Temperature Implementation Strategies allow the distances in the above table to be less (but not less than 25 ft.) if any of the following conditions applies:

The trees are located on the south facing slope (175-185 degree azimuth) and therefore do not provide stream shade; an appropriate level of analysis is completed and documented, such as shade modelling, using site specific characteristics to determine the primary shade tree width; and  
or

Field monitoring or measurements are completed to determine the width where optimum Angular Canopy Density (65% or greater) is achieved (see TMDL Implementation Strategies).

If trees are being felled for safety reasons they can be felled towards the stream.

Source trees should come from but are not limited to: over or fully stocked upland and riparian stands, hazard trees, trees generated from administrative sites (maintenance, expansion, or new construction), and hardwood restoration.

*There is no DBH (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees.*

### Diameter

The key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called “key pieces,” and serve as the anchors for the logjam structure. Wood can improve fish habitat only if the wood is large enough to stay, influence flow patterns, and sediment sorting. Larger diameter wood retains its size longer as abrasion and decay occurs over the years. Larger diameter wood is more effective in creating pools and complex channels that improve fish populations. The minimum diameter required for a key piece of wood depends on the bankfull width of the stream is found in the following table.

**Table 2 Bankfull widths and minimum diameter of logs to be considered key pieces.**

<b>Bankfull Width* Feet</b>	<b>Minimum Diameter* Inches</b>
0 to 10	10
10 to 20	16
20 to 30	18
Over 30	22

\*This table was taken from '1995 A Guide to Placement of Large Wood in Streams.'

### Length

The length of wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the streams bankfull width. As the best fish habitat is formed around jams composed of 3 to 7 logs, at least 2 key pieces should be used at each structure.

Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large wood recruitment

Tailholds as part of tree tipping operations are permitted across perennial, intermittent and ephemeral streams but the use of protective straps will be required to prevent tree damage.

### Wildlife

#### *Threatened, Endangered or Sensitive Species*

- If wolves become established (denning) while project implementation is occurring, measures will be taken to avoid activity in that vicinity
- If any evidence of wolverines is discovered during project implementation, measures will be taken to provide protection. If a den is found we would protect it from human disturbance.

#### *Raptors*

- No activities will occur within currently known goshawk or other raptor nest stands. To conserve nesting habitat and to minimize disturbance to nesting individuals, restrictions would be executed according to the requirements of the species involved.
- With all newly discovered raptor nests, a buffer zone would be established by the wildlife biologist to restrict activities near the nest area during occupancy.
- Where possible, retain trees with inactive nests that may be important to secondary nesters (e.g. Great Gray Owl).
- Any snags in riparian areas or uplands will be protected from disturbance, removal, or use in stream restoration activities unless deemed a safety hazard at a specific work site.

### Botany

Note: Pre-implementation planning project design criteria are identified.

#### *Rare and Sensitive Plants and Habitats*

- *Pre-Implementation:* Proposed restoration projects shall be completely surveyed early in the implementation planning process by a qualified botanist or rare plant technician, to identify and assess any sensitive or rare plant populations or habitats.
- *Pre-Implementation:* Proposed restoration projects shall develop restoration plans for degraded sensitive species habitats and/or mitigation plans in areas where sensitive plant populations are documented. This shall be accomplished by a journey-level Forest Service botanist in collaboration with the interdisciplinary team and other stakeholders.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not be allowed in any documented sensitive plant sites unless it is for the demonstrated benefit or protection of the site. All sensitive plant populations should be buffered 100 ft. from all operational activities where topography does not restrict such a distance. Sensitive plant sites and associated buffers shall be identified as Areas to Protect.

#### *Sensitive and Unique Habitats*

- The integrity of unique habitats shall be maintained. Unique habitats [may] include meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).
- Cutting of old-growth juniper shall be prohibited. Old-growth characteristics include: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches.

#### *Groundwater-Dependent Ecosystems*

- The integrity of groundwater-dependent ecosystems shall be maintained. Spring developments shall not dewater Groundwater dependent ecosystems. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where histic soils are present. These sites should be buffered 100 ft. from all operational activities where topography does not restrict such a distance, and be identified as Areas to Protect.

- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other groundwater dependent ecosystem, unless it is for the benefit or protection of the groundwater dependent ecosystems or development of the spring.
- Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the groundwater dependent ecosystems. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.
- When necessary, construct fenced enclosures around spring developments to prevent damage from wild ungulates and livestock.
- Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the groundwater dependent ecosystems.
- When developing springs, place troughs far enough away from Groundwater dependent ecosystems, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

#### *Invasive Plant Species*

- *Pre-Implementation:* Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.
- *Pre-Implementation:* For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.
- All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.
- Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.
- Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.
- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and/or rock that are judged to be weed free by District or Forest weed specialists.
- Prohibit heavy equipment operation, vehicle travel, staging areas, fire-control lines, and any other operational activities in invasive plant infestations, unless the activities are for the express purpose of eradicating the infestation or INV1 and INV2 have been completed.

- Conduct post-implementation monitoring for invasive plants. Continue monitoring, treating, and removing invasive plants until all infestations are eradicated and native plant species are well established.

#### *Soils*

- For projects involving heavy machinery off roads, the project proponents shall inspect the site for existing impacts to the soil. If existing impacts appear to be heavy on the Malheur or moderate on the Ochoco, they shall contact a soil scientist, who shall determine what site specific project design criteria are necessary to meet Forest Plan and Forest Service Manual standards and guidelines. (If a soil scientist is not available, a silviculturist or hydrologist can do the work.) If standards and guidelines cannot be met, heavy machinery shall not be used.
- Erosion would be minimized by following General Aquatic Conservation Measures and by implementing the appropriate project design criteria based on the type of activity (see appendix A).
- Erosion from heavy machinery use would be minimized; by minimizing compaction and puddling, rutting would be minimized.

#### *Heritage Resources*

- Compliance with Section 106 of the National Historic Preservation Act for activities authorized under this analysis will be completed and concurred with by the Oregon State Historic Preservation Office before any ground disturbing action takes place. For each potential activity the District or Zone archaeologist<sup>1</sup> will determine which of the criteria in the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office best fit the particular project. This will vary somewhat project to project based on the scale of the particular activity, the location on the landscape, and the nature of associated cultural resources, if any.
- The District or Zone archaeologist will document their findings on a Programmatic Agreement form with a project description, rationale and location map which will be attached to the Forest Service Heritage Event database. The Forest archaeologist will review and sign off on the Programmatic Review form if concurred with. For appendices A, B and C projects as defined in the 2004 Programmatic Agreement, the Forest will retain the documentation and provide the Oregon State Historic Preservation Office with the annual summary of projects as described in the Preservation Act.
- For full inventories the District or Zone archaeologist will complete an inventory report meeting current Oregon State Historic Preservation Office standards which will be reviewed by the Forest archaeologist. The Forest archaeologist will forward the completed inventory report to the Oregon State Historic Preservation Office for review and concurrence signature or further discussion as appropriate.
- Consultation with Native American tribes is conducted under the terms of the Memorandums of Understanding the Forest has with each individual tribe. The Forest regularly consults with the Burns Paiute Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of Warm Springs Reservation.
- For work requiring a full inventory under the terms of the 2004 Programmatic Agreement any identified cultural resources sites will generally be avoided. For cases where site avoidance is impractical mitigation procedures will be developed in consultation with the Oregon SHPO before project work begins.

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<sup>1</sup> Archaeology field work may be done by the Oregon Department of Fish and Wildlife per the approval of the Forest Archaeologist.

- If any previously unidentified cultural resources are located during project implementation, ground disturbing work will be halted until the resources are evaluated by the District or Zone archaeologist. If the cultural resources are determined to be potentially eligible for listing on the National Register of Historic Places work will either be permanently halted or a mitigation plan will be developed in consultation with the Oregon SHPO before work continues.

### *Grazing*

#### *Protection of Government and Permittee Investments*

- All existing structural range improvements (fences, gates, spring developments, etc) and permanent ecological plots would be contractually protected.
- Maintain structural integrity of range improvements.
- If structural improvements are damaged during project operations they would be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage. Repairs would be required of the purchaser if damage were done during thinning or fuel treatment contractors or by force account where appropriate.
- Three or more splices to a single wire within a distance of 20 feet will be replaced with a single splice.
- Fence right of ways (6ft either side of fence), trails, other developments and access to them would be cleared of slash produced by project activities.

### *Notification*

- During planning stage of each individual project all potentially impacted grazing permittees will have notice of action and opportunity to provide input that may lessen impacts to their livestock operation well in advance of implementation.
- Prior to implementation all potentially impacted grazing permittees will be given notice of dates when work will start.



**Straight and over-widened channel composed of large substrate Big Creek Reach 4 (mined area)**



**Mine tailing waste on historic floodplain Big Creek Reach 4**



**5-6 foot high mine tailing berm Big Creek Reach 4**



**Mine tailing levee river left (Northside) Big Creek Reach 4**



**Mining levee river right looking west Big Creek Reach 4**



**Ponds located on historic floodplain river right (North side) standing on mine tailing levee**



**Confluence of Deadwood Creek (bottom of project area) channel is straight and between two mine tailing berms**



**Quality habitat located immediately above project area**



**Woody debris jam located immediately above Big Creek Reach 4 project area**



**Big Creek Reach 4 immediately above the project area**



**Side channel and woody debris Big Creek Reach 4 immediately above project site.**



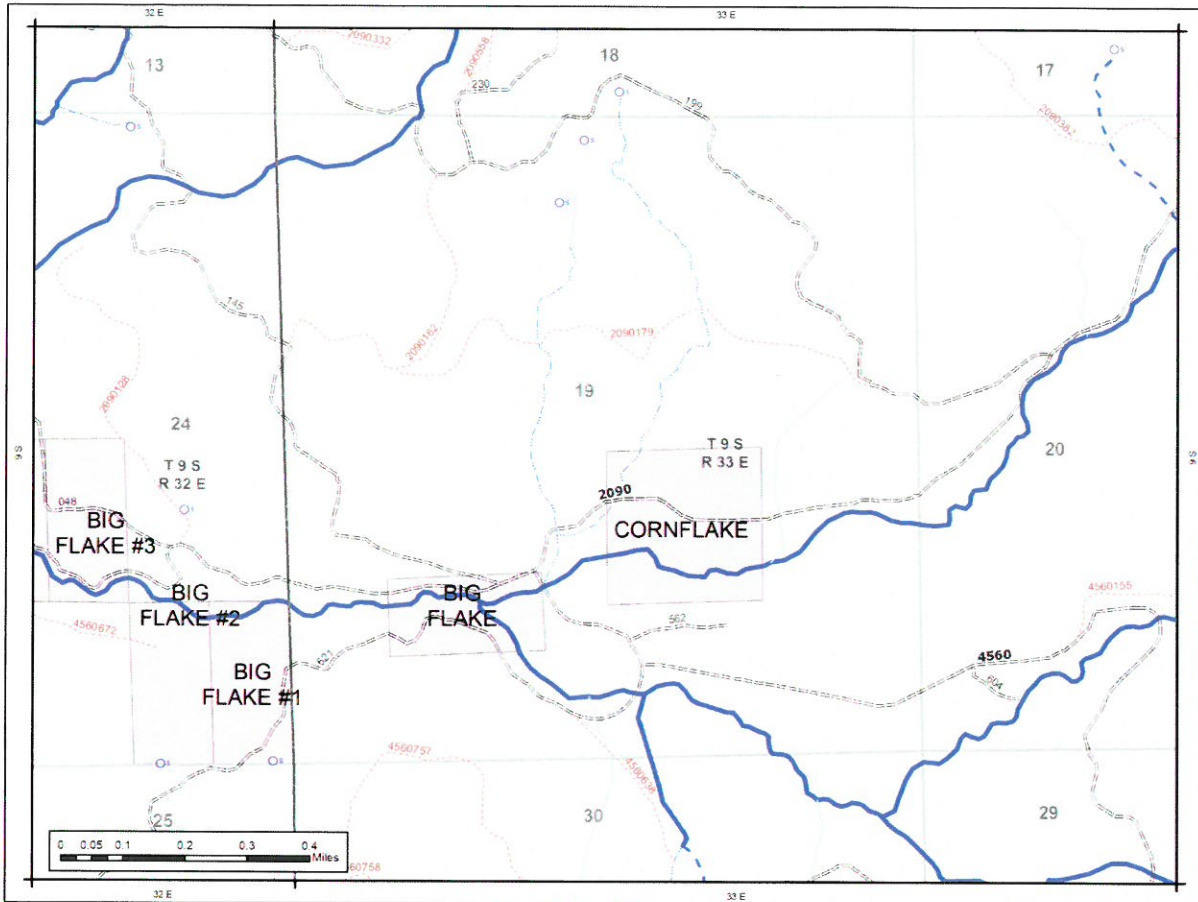
**Large woody debris and undercut bank immediately above project site**



**Evidence of old beaver activity within project area**

## Big Creek Reach 4 Restoration Project Mining Claims

3/27/2017



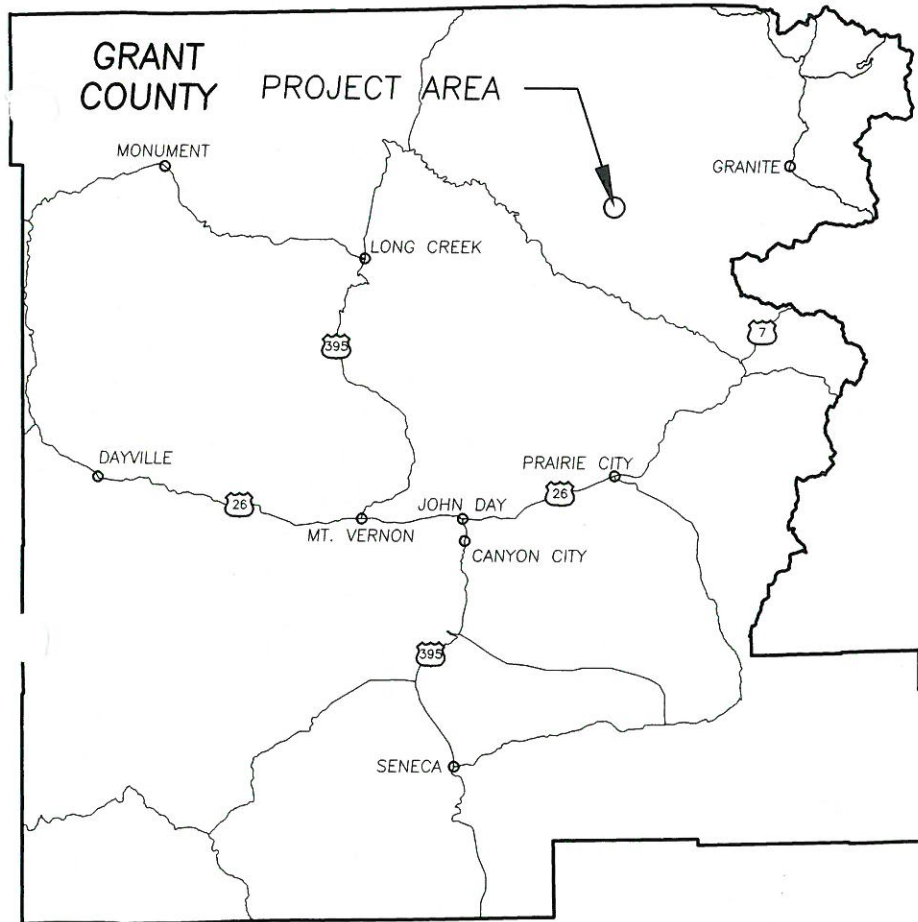
Two placer mine claims are present in the project area, and appear to overlap with the proposed disturbance areas. The claimant, George Yielding, and associates have previously performed suction dredging in the stream within the claims. Our records show that in July 2016 the claimant called prior to the instream work window and was informed by a FS representative of the state moratorium on suction dredging. In response the claimant said they would not be coming. Site inspections did not show any activity occurring last summer. The state moratorium on dredging is still in effect for 2017.

Prepared by: Hannah Grist

# BIG CREEK RESTORATION PROJECT

## Malheur National Forest

VICINITY MAP  
GRANT



VICINITY MAP  
BIG CREEK RESTORATION



- INDEX:
- CD1 - COVER SHEET
  - CD2 - SITE PLAN
  - CD3 - CROSS SECTIONS
  - CD4 - STREAM PROFILE
  - CD5 - CONCEPT DESIGN CUT/FILL SUMMARY PAGE



RENEWS:6/30/2018

 GRANT SOIL AND WATER  
CONSERVATION DISTRICT

721 S. CANYON BLVD.  
JOHN DAY, OREGON 97845  
(541) 575-0135  
DRAWING: BIG-CREEK-DESIGN.dwg

BIG CREEK RESTORATION

GRANT COUNTY, OREGON

COVER PAGE

NOTE:

DATE: SEPT 2016

SCALE: NOTED

DRAWN: LV

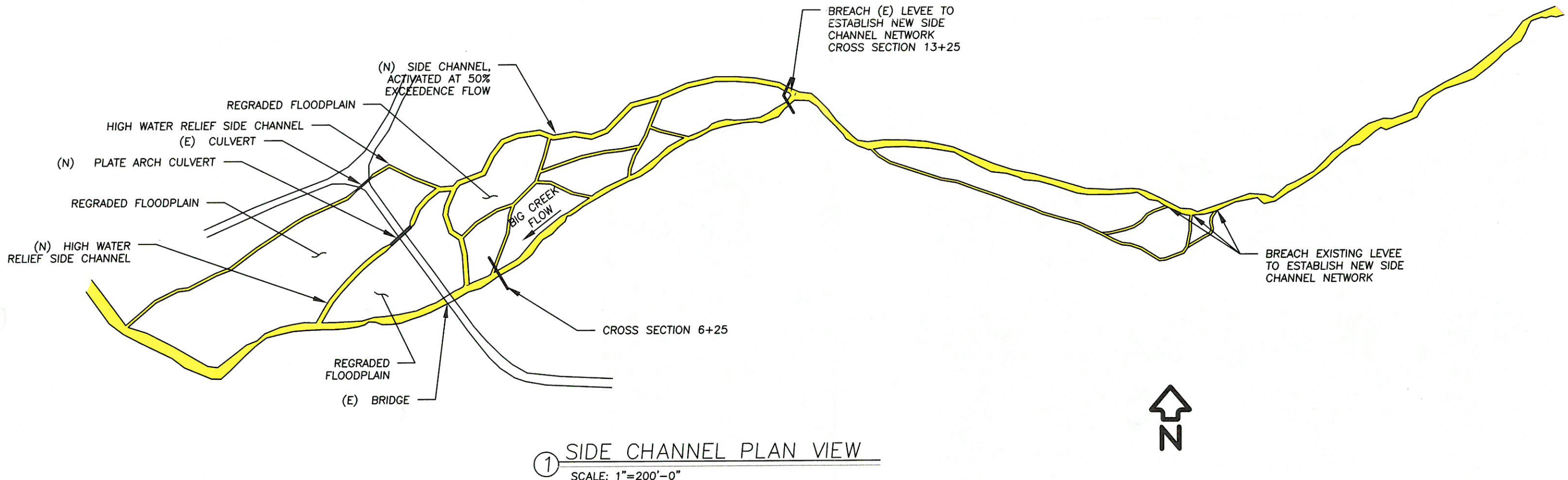
CHECKED: LV

SHEET

CD1

OF 8

SHEETS



① SIDE CHANNEL PLAN VIEW  
SCALE: 1"=200'-0"

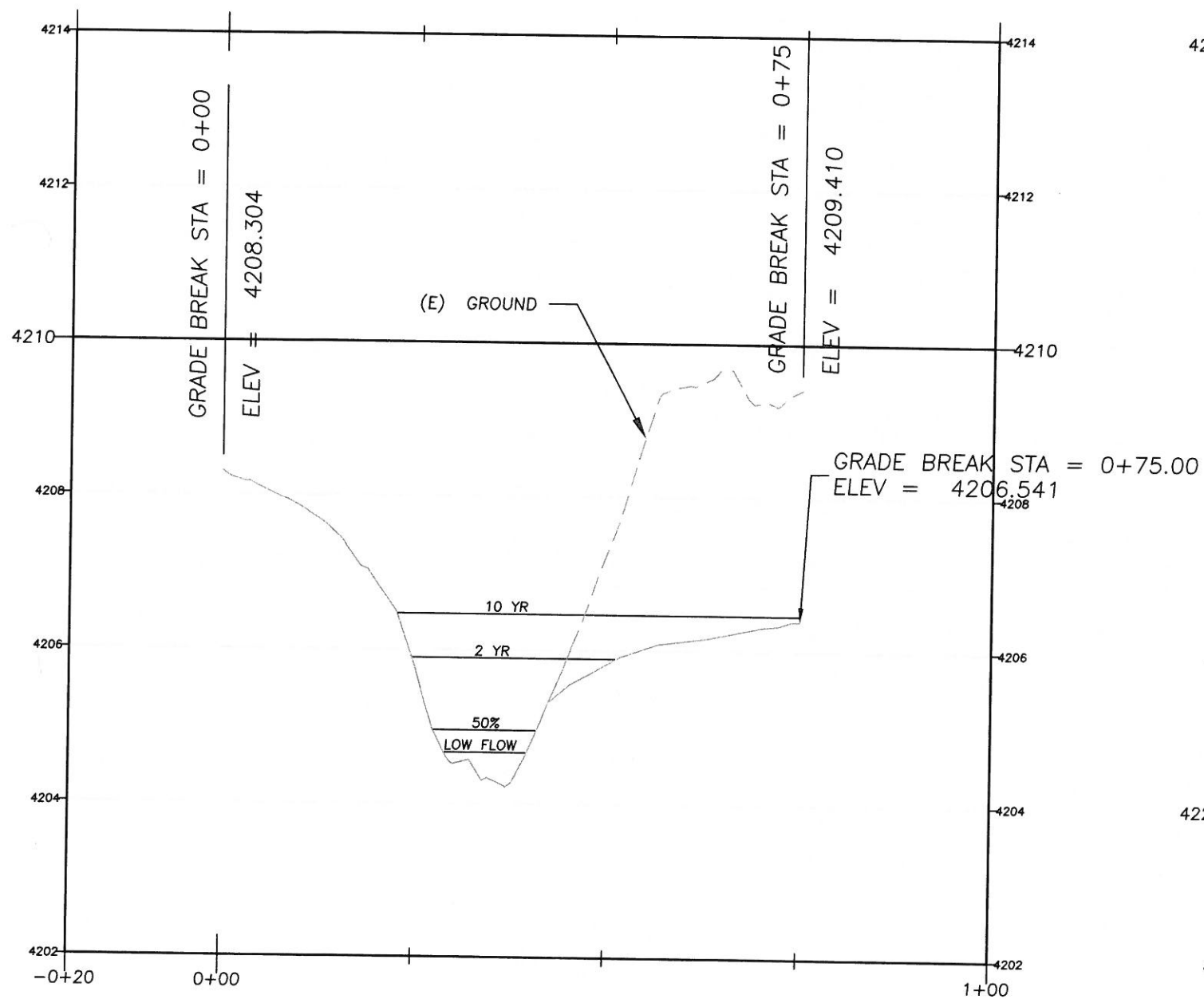


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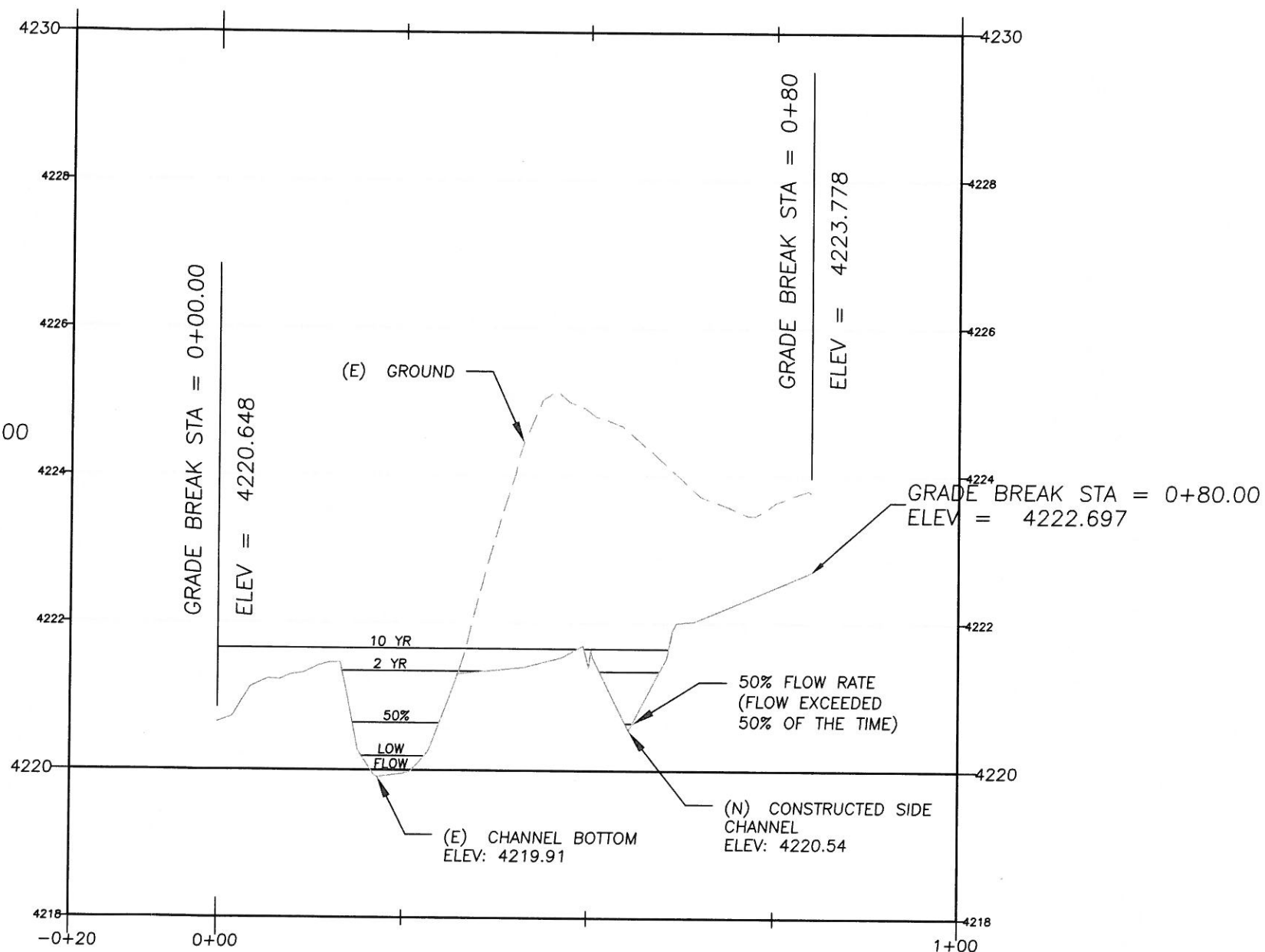
BIG CREEK RESTORATION  
GRANT COUNTY, OREGON

SITE PLAN

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	CD2
	OF 8 SHEETS



① CROSS SECTION  
STATION 6+25  
SCALE: H: 1:20 V: 1:10



② SIDE CHANNEL ENTRANCE  
STATION 13+25  
SCALE: H: 1:20 V: 1:10



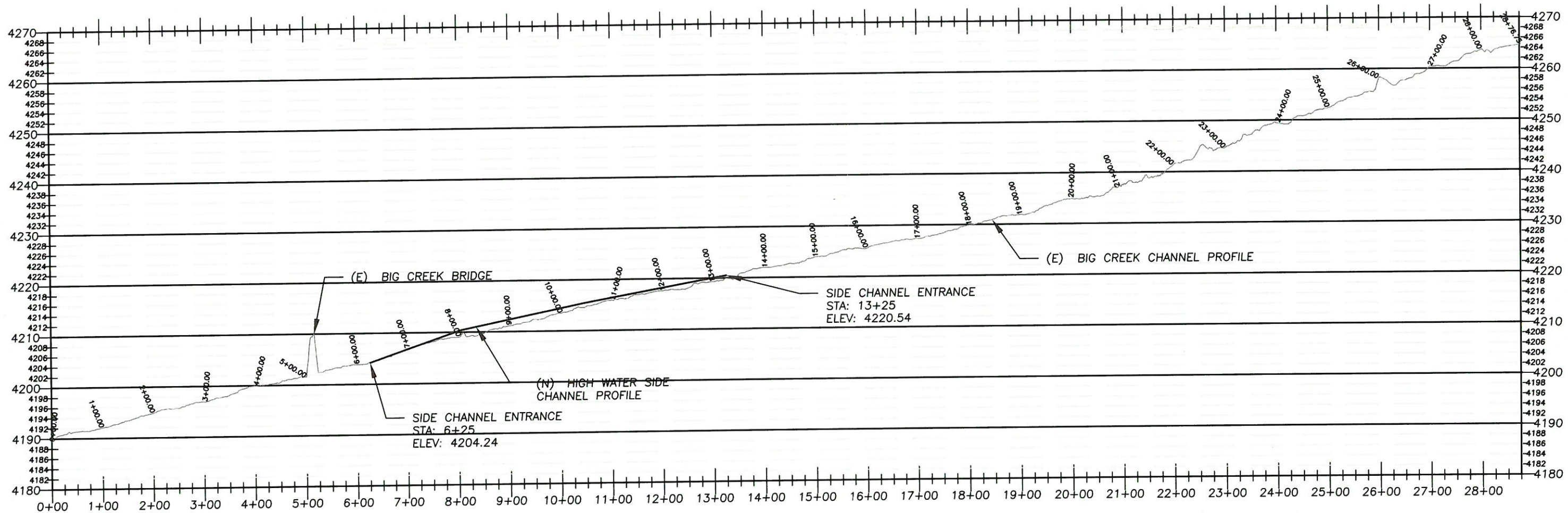
RENEWS:6/30/2016

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	CD3
	OF 8 SHEETS

**GRANT SOIL AND WATER CONSERVATION DISTRICT**  
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**BIG CREEK RESTORATION**  
GRANT COUNTY, OREGON

**CONCEPT DESIGN  
CROSS SECTIONS**



① CHANNEL PROFILE  
SCALE: 1"=200'-0"

REGISTERED PROFESSIONAL  
ENGINEER  
84,988  
FOR DESIGN  
REVIEW ONLY  
OREGON  
MAY 22, 2015  
LEVI R. VOIGT  
RENEWS: 6/30/2018

 GRANT SOIL AND WATER  
CONSERVATION DISTRICT  
721 S. CANYON BLVD.  
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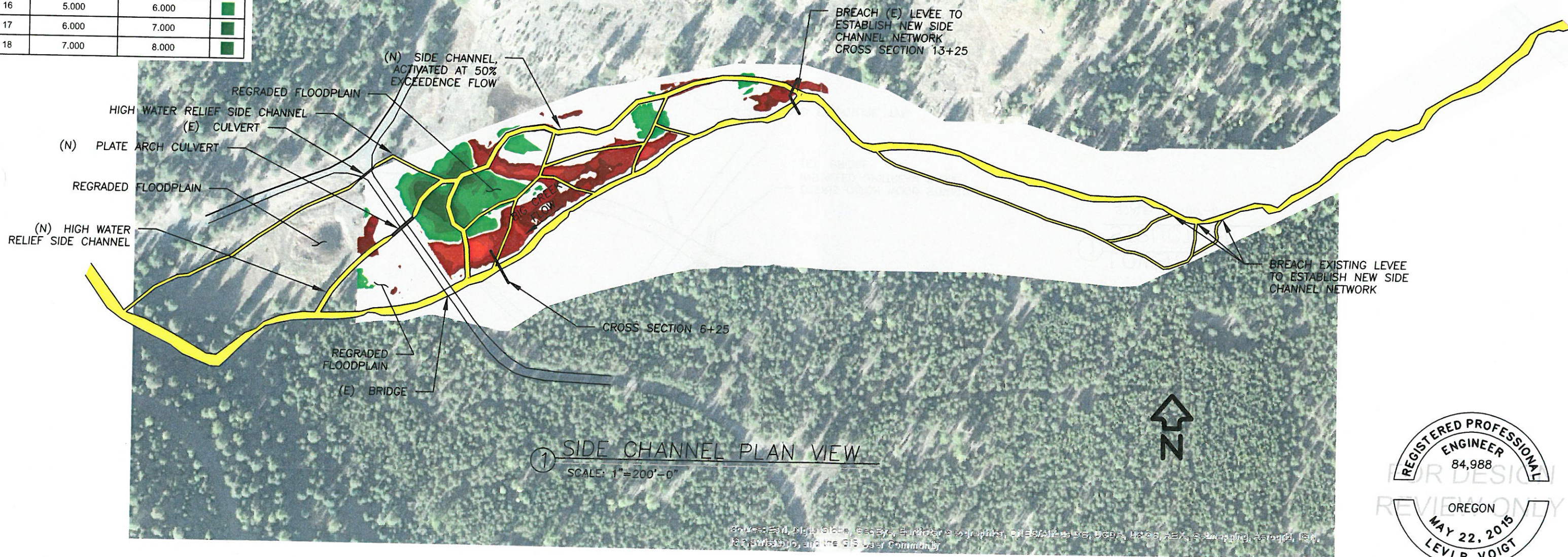
BIG CREEK RESTORATION  
GRANT COUNTY, OREGON

STREAM PROFILE

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	CD4
	OF 8 SHEETS

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-10.000	-9.000	Red
2	-9.000	-8.000	Red
3	-8.000	-7.000	Red
4	-7.000	-6.000	Red
5	-6.000	-5.000	Red
6	-5.000	-4.000	Red
7	-4.000	-3.000	Red
8	-3.000	-2.000	Red
9	-2.000	-1.000	Red
10	-1.000	0.000	Red
11	0.000	1.000	Red
12	1.000	2.000	Green
13	2.000	3.000	Green
14	3.000	4.000	Green
15	4.000	5.000	Green
16	5.000	6.000	Green
17	6.000	7.000	Green
18	7.000	8.000	Green



① SIDE CHANNEL PLAN VIEW  
SCALE: 1"=200'-0"



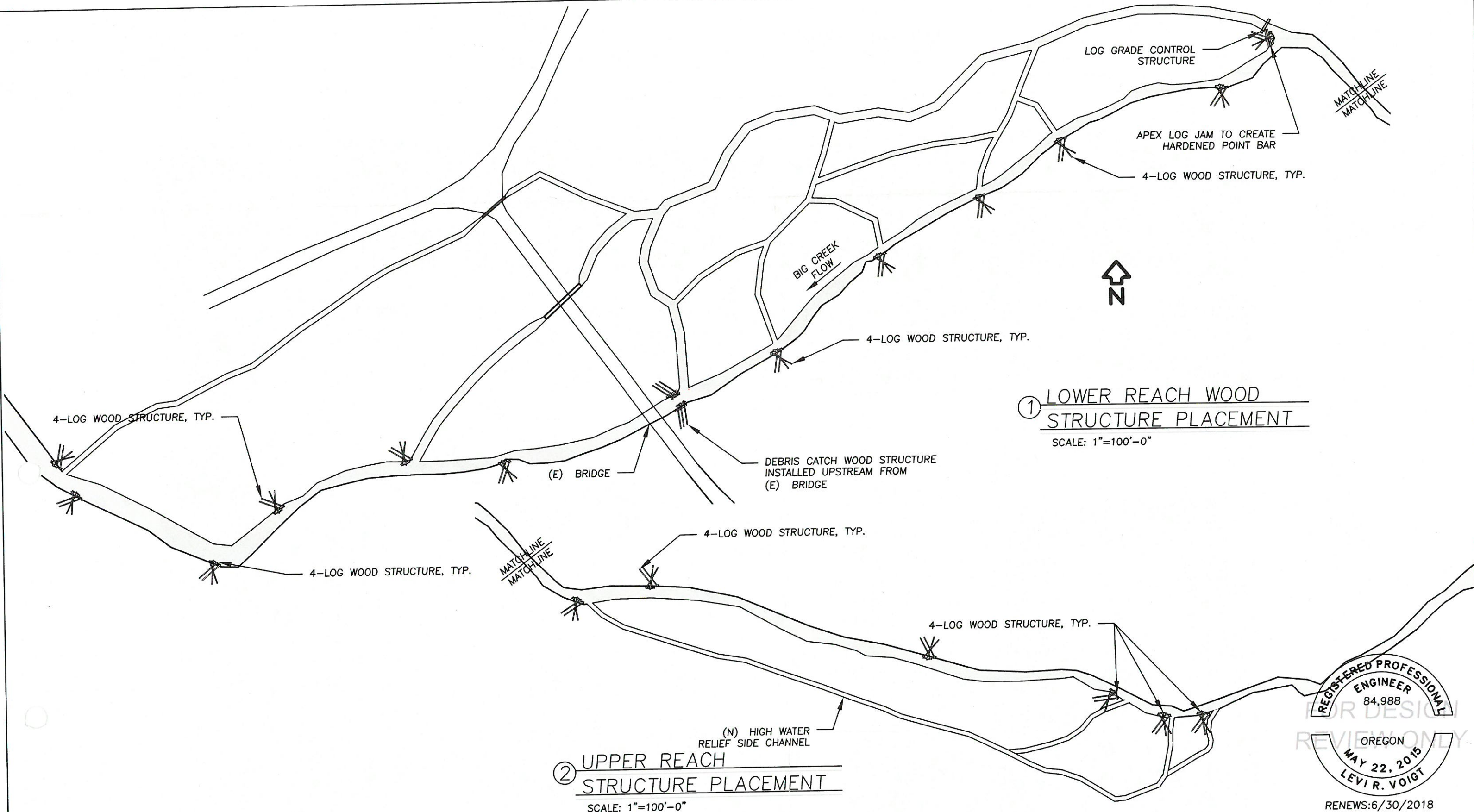
RENEWS:6/30/2018

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**BIG CREEK RESTORATION**  
GRANT COUNTY, OREGON

**CONCEPT DESIGN CUT/FILL SUMMARY**

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	<b>CD5</b>
	OF 8 SHEETS



① LOWER REACH WOOD STRUCTURE PLACEMENT  
SCALE: 1"=100'-0"

② UPPER REACH WOOD STRUCTURE PLACEMENT  
SCALE: 1"=100'-0"



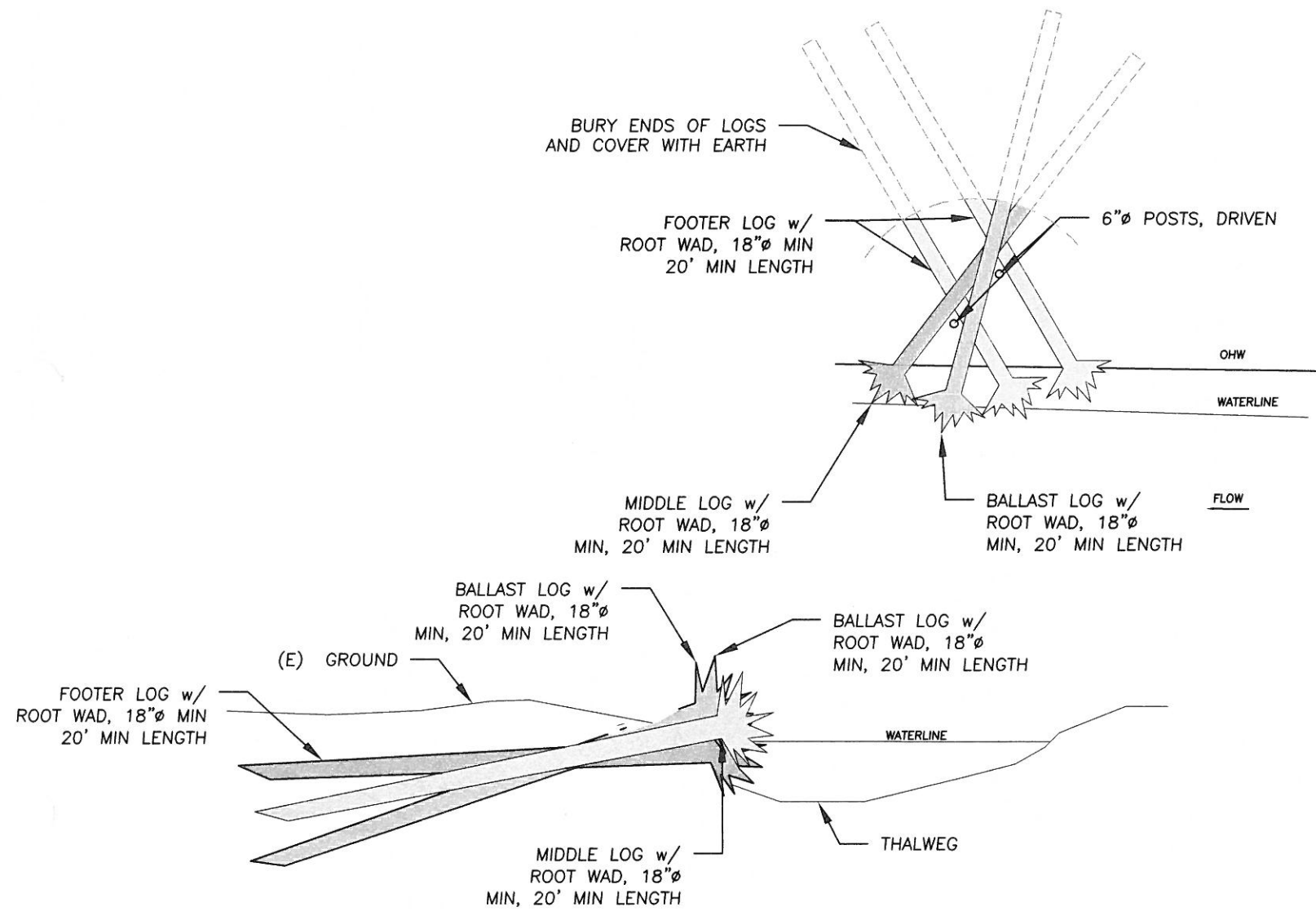
RENEWS: 6/30/2018

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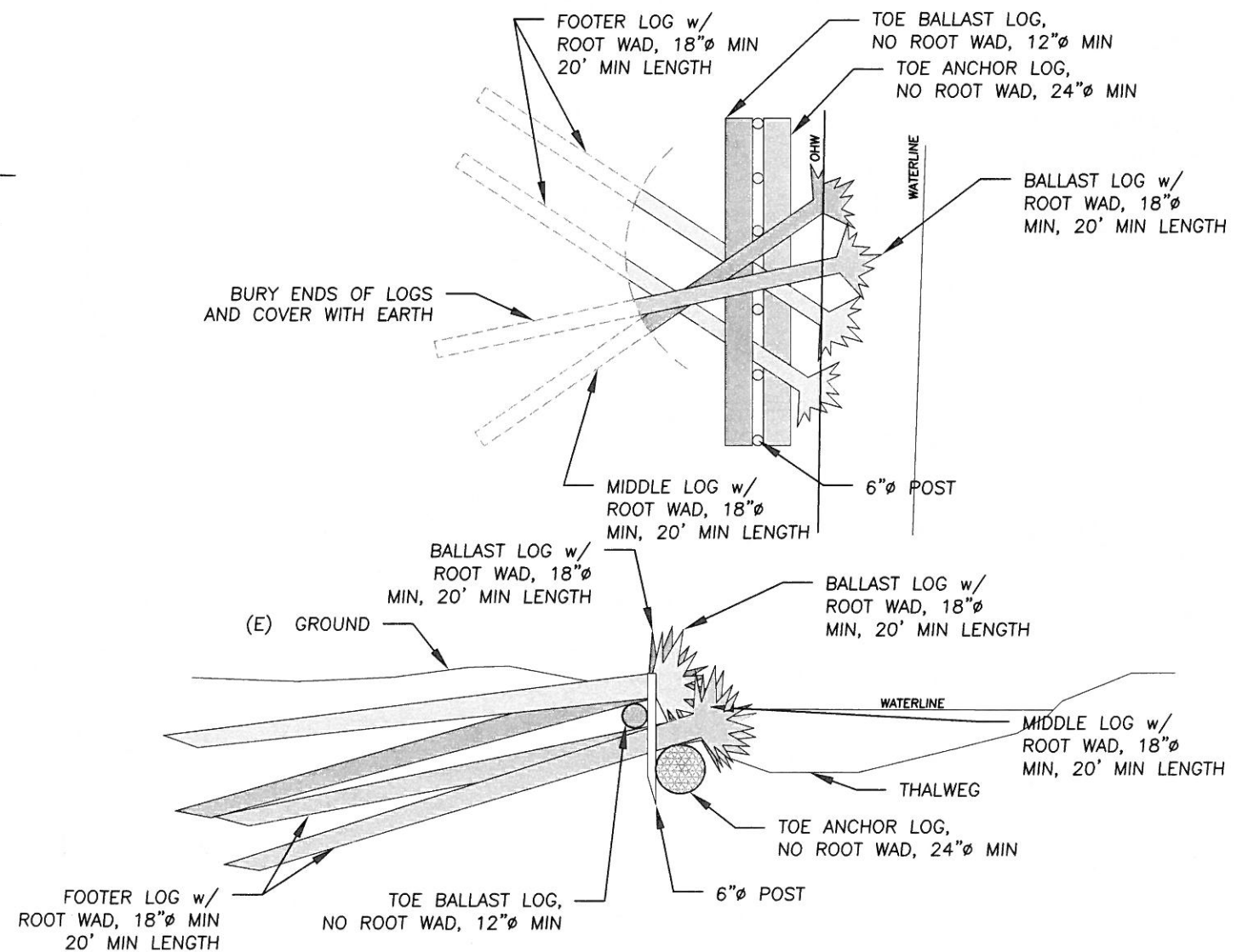
**BIG CREEK RESTORATION**  
GRANT COUNTY, OREGON

**WOOD PLACEMENT PLAN VIEW**

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	<b>CD6</b>
	OF 8 SHEETS



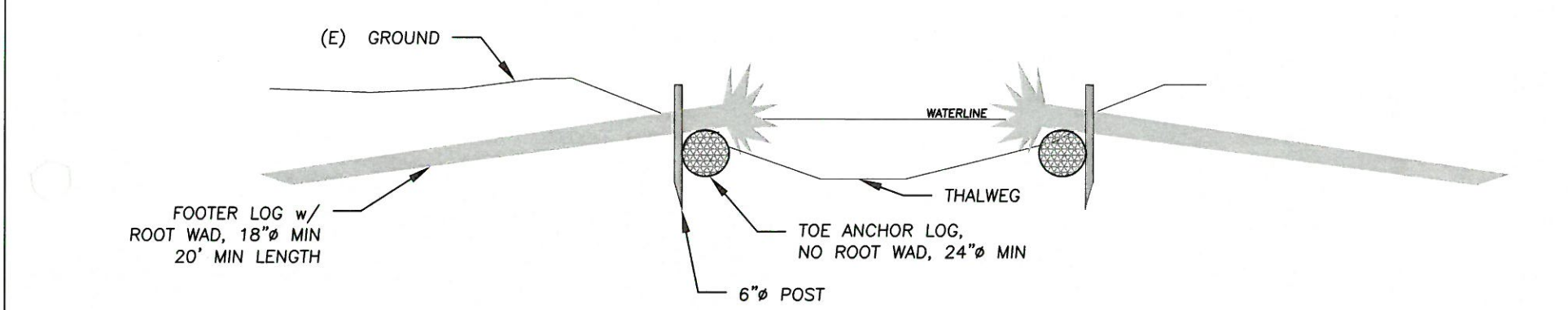
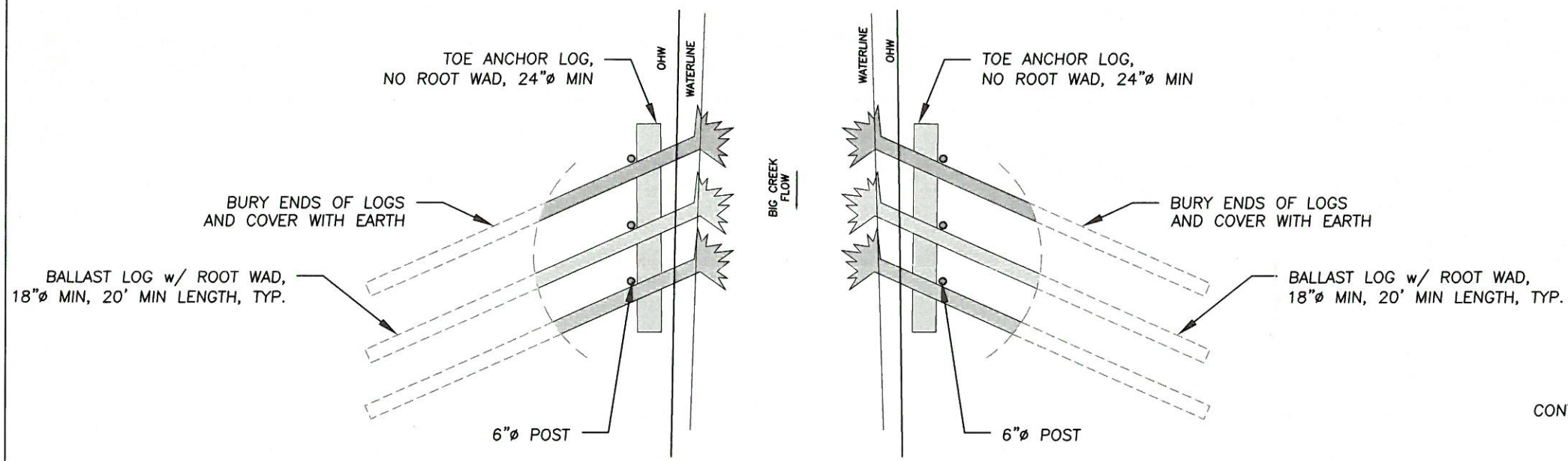
① 4-LOG WOOD STRUCTURE PLAN & PROFILE  
SCALE: N.T.S.



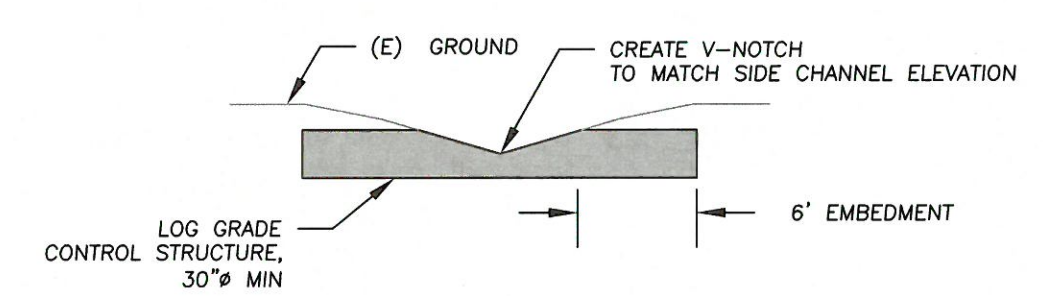
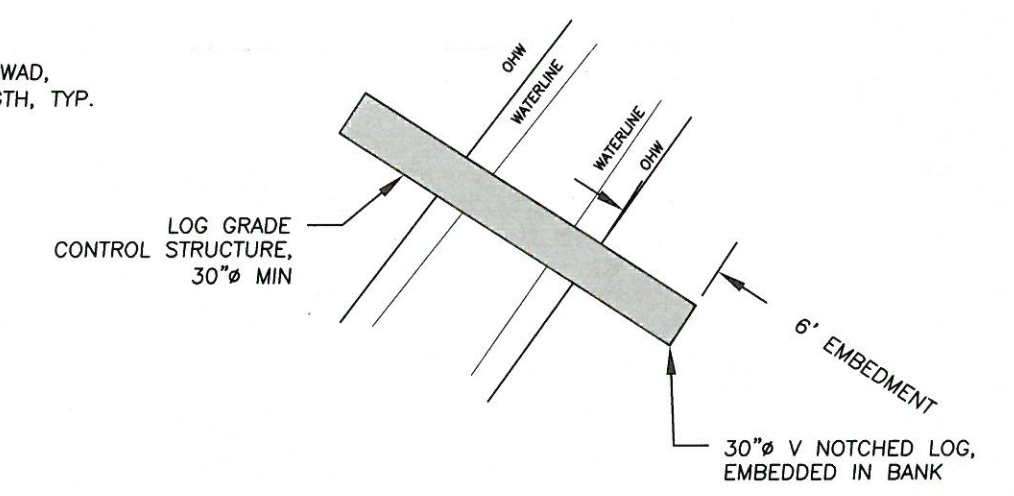
② APEX LOG JAM DETAILS  
SCALE: N.T.S.



RENEWS:6/30/2018



① DEBRIS CATCH STRUCTURE DETAILS  
SCALE: N.T.S.



② LOG GRADE CONTROL DETAILS  
SCALE: N.T.S.

REGISTERED PROFESSIONAL  
ENGINEER  
84,988  
OREGON  
MAY 22, 2015  
LEVI R. VOIGT  
RENEWS: 6/30/2018

 GRANT SOIL AND WATER  
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BIG CREEK RESTORATION  
GRANT COUNTY, OREGON

STRUCTURE DETAILS

NOTE:	DATE: SEPT 2016
	SCALE: NOTED
	DRAWN: LV
	CHECKED: LV
	SHEET
	CD8
	OF 8 SHEETS