

Department of State Lands  
775 Summer Street NE, Suite 100  
Salem, OR 97301-1279  
☎ 503-986-5200

PUBLIC WORKS  
Receiver

Permit No.: 57663-RF  
Permit Type: Removal/Fill  
Waterway: Dixon Creek  
County: Benton  
Expiration Date: June 18, 2016

PN 655467

F

**CITY OF CORVALLIS**

**IS AUTHORIZED IN ACCORDANCE WITH ORS 196.800 TO 196.990 TO PERFORM THE OPERATIONS DESCRIBED IN THE ATTACHED COPY OF THE APPLICATION, SUBJECT TO THE SPECIAL CONDITIONS LISTED ON ATTACHMENT A AND TO THE FOLLOWING GENERAL CONDITIONS:**

1. This permit does not authorize trespass on the lands of others. The permit holder shall obtain all necessary access permits or rights-of-way before entering lands owned by another. For new linear facility projects, the removal-fill activity cannot occur until the permit holder obtains either the landowner's consent, a right, title or interest with respect to the property that is sufficient to undertake the removal or fill activity, or a court order or judgment authorizing the use of the property.
2. This permit does not authorize any work that is not in compliance with local zoning or other local, state, or federal regulation pertaining to the operations authorized by this permit. The permit holder is responsible for obtaining the necessary approvals and permits before proceeding under this permit.
3. All work done under this permit must comply with Oregon Administrative Rules, Chapter 340; Standards of Quality for Public Waters of Oregon. Specific water quality provisions for this project are set forth on Attachment A.
4. Violations of the terms and conditions of this permit are subject to administrative and/or legal action, which may result in revocation of the permit or damages. The permit holder is responsible for the activities of all contractors or other operators involved in work done at the site or under this permit.
5. Employees of the Department of State Lands and all duly authorized representatives of the Director shall be permitted access to the project area at all reasonable times for the purpose of inspecting work performed under this permit.
6. Any permit holder who objects to the conditions of this permit may request a hearing from the Director, in writing, within twenty-one (21) calendar days of the date this permit was issued.
7. In issuing this permit, the Department of State Lands makes no representation regarding the quality or adequacy of the permitted project design, materials, construction, or maintenance, except to approve the project's design and materials, as set forth in the permit application, as satisfying the resource protection, scenic, safety, recreation, and public access requirements of ORS Chapters 196, 390, and related administrative rules.
8. Permittee shall defend and hold harmless the State of Oregon, and its officers, agents, and employees from any claim, suit, or action for property damage or personal injury or death arising out of the design, material, construction, or maintenance of the permitted improvements.
9. Authorization from the U.S. Army Corps of Engineers may also be required.

**NOTICE:** If removal is from state-owned submerged and submersible land, the applicant must comply with leasing and royalty provisions of ORS 274.530. If the project involves creation of new lands by filling on state-owned submerged or submersible lands, you must comply with ORS 274.905 to 274.940. This permit does not relieve the permittee of an obligation to secure appropriate leases from the Department of State Lands, to conduct activities on state-owned submerged or submersible lands. Failure to comply with these requirements may result in civil or criminal liability. For more information about these requirements, please contact the Department of State Lands at 503-986-5200.

Lori Warner-Dickason, Aquatic Resource Manager  
Aquatic Resource Management  
Oregon Department of State Lands

  
Authorized Signature

June 18, 2015  
Date Issued

## ATTACHMENT A

Permittee: City of Corvallis

Project Name: Dixon Creek Log Crib Replacement

Special Conditions for Removal/Fill Permit No. 57663-RF

### READ AND BECOME FAMILIAR WITH CONDITIONS OF YOUR PERMIT.

The project site may be inspected by the Department of State Lands (DSL) as part of our monitoring program. DSL has the right to stop or modify the project at any time if you are not in compliance with these conditions. A copy of this permit shall be available at the work site whenever authorized operations are being conducted.

1. **Responsible Party:** By signature on the application, Joshua Tacchini is acting as the representative of City of Corvallis. By proceeding under this permit, City of Corvallis agrees to comply with and fulfill all terms and conditions of this permit, unless the permit is officially transferred to another party as approved by DSL.
2. **Authorization to Conduct Removal and/or Fill:** This permit authorizes the placement of up to 471 cubic yards and removal of up to 505 cubic yards of material in T11S R5W Section 27, within Dixon Creek in Benton County, as described in the attached permit application, map and drawings, received March 23, 2015. In the event information in the application conflicts with the permit conditions, the permit conditions prevail. See Attachment B for project location(s).
3. **Work Period in Jurisdictional Areas:** Fill or removal activities below the ordinary high water elevation of Dixon Creek shall be conducted between July 1 and October 15, unless otherwise coordinated with Oregon Department of Fish and Wildlife and approved in writing by DSL.
4. **Changes to the Project or Inconsistent Requirements from Other Permits:** It is the permittee's responsibility to ensure that all state, federal and local permits are consistent and compatible with the final approved project plans and the project as executed. Any changes made in project design, implementation and/or operating conditions to comply with conditions imposed by other permits must be approved by DSL prior to implementation.
5. **DSL May Halt or Modify:** DSL retains the authority to temporarily halt or modify the project in case of unforeseen damage to natural resources.
6. **DSL May Modify Conditions Upon Permit Renewal:** DSL retains the authority to modify conditions upon renewal, as appropriate, pursuant to the applicable rules in effect at the time of the request for renewal or to protect waters of this state.

### Pre-Construction

7. **Local Government Approval Required Before Beginning Work:** Issuance of this permit is contingent upon acquisition of an Erosion/Excavation permit from the City of Corvallis.

8. **Stormwater Management Approval Required Before Beginning Work:** Issuance of the permit is contingent upon acquisition of a National Pollution Discharge Elimination System (NPDES) permit from the Oregon Department of Environmental Quality (DEQ), if one is required by DEQ.
9. **Authorization to Use Property.** For linear facility projects, the removal-fill activity cannot occur until the person obtains:
  - a. The landowner's consent;
  - b. A right, title or interest with respect to the property, that is sufficient to undertake the removal or fill activity; or
  - c. A court order or judgment authorizing the use of the property

### **General Construction Conditions**

10. **Water Quality Certification:** The Department of Environmental Quality (DEQ) may evaluate this project for a Clean Water Act Section 401 Water Quality Certification (WQC). If the evaluation results in issuance of a Section 401 WQC, that turbidity condition will govern any allowable turbidity exceedance and monitoring requirements.
11. **Erosion Control Methods:** The following erosion control measures (and others as appropriate) shall be installed prior to construction and maintained during and after construction as appropriate, to prevent erosion and minimize movement of soil into waters of this state.
  - a. All exposed soils shall be stabilized during and after construction in order to prevent erosion and sedimentation.
  - b. Filter bags, sediment fences, sediment traps or catch basins, leave strips or berms, or other measures shall be used to prevent movement of soil into waterways and wetlands.
  - c. To prevent erosion, use of compost berms, impervious materials or other equally effective methods, shall be used to protect soil stockpiled during rain events or when the stockpile site is not moved or reshaped for more than 48 hours.
  - d. Unless part of the authorized permanent fill, all construction access points through, and staging areas in, riparian and wetland areas shall use removable pads or mats to prevent soil compaction. However, in some wetland areas under dry summer conditions, this requirement may be waived upon approval by DSL. At project completion, disturbed areas with soil exposed by construction activities shall be stabilized by mulching and native vegetative plantings/seeding. Sterile grass may be used instead of native vegetation for temporary sediment control. If soils are to remain exposed more than seven days after completion of the permitted work, they shall be covered with erosion control pads, mats or similar erosion control devices until vegetative stabilization is installed.
  - e. Where vegetation is used for erosion control on slopes steeper than 2:1, tackified seed mulch shall be used so the seed does not wash away before germination and rooting.
  - f. Dredged or other excavated material shall be placed on upland areas having stable slopes and shall be prevented from eroding back into waterways and wetlands.
  - g. Erosion control measures shall be inspected and maintained as necessary to ensure their continued effectiveness until soils become stabilized.
  - h. All erosion control structures shall be removed when the project is complete and soils are stabilized and vegetated.

12. **Hazardous, Toxic, and Waste Material Handling:** Petroleum products, chemicals, fresh cement, sandblasted material and chipped paint, wood treated with leachable preservatives or other deleterious waste materials shall not be allowed to enter waters of this state. Machinery refueling is to occur at least 150 feet from waters of this state and confined in a designated area to prevent spillage into waters of this state. Barges shall have containment system to effectively prevent petroleum products or other deleterious material from entering waters of this state. Project-related spills into waters of this state or onto land with a potential to enter waters of this state shall be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311.
13. **Federally Listed Endangered or Threatened Species:** When listed species are present, the authorization holder must comply with the Federal Endangered Species Act. If previously unknown listed species are encountered during construction, all construction activity shall immediately cease and the permit holder must contact DSL.
14. **Archaeological Resources:** If any archaeological resources and/or artifacts are encountered during construction, all construction activity shall immediately cease. The State Historic Preservation Office shall be contacted at (503) 986-0674.
15. **Hazards to Recreation, Navigation or Fishing:** The activity shall be timed so as not to interfere with or create a hazard to recreational or commercial navigation or fishing.
16. **Construction Corridor:** There shall be no removal of vegetation or heavy equipment operating or traversing outside the designated construction corridor or footprint (Figure 2.1).
17. **Work Area Isolation:** The work area shall be isolated from the water during construction according to the Work Area Isolation Plan contained in the application. All structures and materials used to isolate the work area shall be removed immediately following construction and water flow returned to pre-construction conditions.
18. **Stream Diversion Prohibited:** The stream shall not be diverted from the natural bed.
19. **Temporary Ground Disturbances:** All temporarily disturbed areas shall be returned to original ground contours at project completion, as proposed in Figure 2.1 in the application.
20. **Operation of Equipment in the Water:** Work must be conducted from top of bank. Heavy equipment may not be positioned on or traverse areas below ordinary high water at any time.
21. **Fish Passage Required:** The project shall meet Oregon Department of Fish and Wildlife requirements for fish passage.
22. **Woody Vegetation Planting Required:** Planting of native woody vegetation shall be completed before the next growing season after re-establishment of the pre-construction contours.
23. **Timing of Seeding and Planting:** Seeding of the soil lifts must occur immediately following establishment of final contours. Planting of native woody vegetation shall be completed during the time of year that provides the optimal chances of survival immediately following construction (often late fall through early spring).

## Monitoring and Reporting Requirements

- 24. Post-Construction Report Required:** A post-construction report demonstrating as-built conditions and discussing any variation from the approved plan shall be provided to the Department with the first year monitoring report. The post-construction report shall include:
- a. A scaled drawing, accurate to 1-foot elevation, clearly showing the following:
    1. Finished contours of the site
    2. Photo point locations
  - b. Photos from fixed photo points. This should clearly show the site conditions.
  - c. A narrative that describes any deviation from the approved plan.
- 25. Term of Monitoring; Annual Monitoring Reports Required:** The permittee shall monitor the project site to determine whether it is meeting performance standards for a minimum period of 3 years growing seasons after completion of all the initial plantings. Annual monitoring reports are required.
- 26. Annual Monitoring Report Due Date:** Annual monitoring reports are due by December 31<sup>st</sup> of each year.
- 27. Extension of the Monitoring Period:** The monitoring period may be extended, at the discretion of the Department, for failure to provide monitoring reports, failure of the site to meet performance standards for two consecutive years or when needed to evaluate re-planting or other corrective or remedial actions.
- 28. Release of Monitoring Obligation:** monitoring is required until DSL has officially released the site from further monitoring.
- 29. Failure to Submit Monitoring Reports:** Failure to submit the required monitoring report by the due date may result in an extension of the monitoring period and/or enforcement action.
- 30. Contents of the Annual Monitoring Report:** The annual monitoring report shall include the following information:
- a. Completed Monitoring Report Cover Sheet, which includes permit number, permit holder name, monitoring date, report year, performance standards, and a determination of whether the site is meeting performance standards.
  - b. Site location map(s) that clearly shows the impact site and mitigation site boundaries.
  - c. Site Plan that clearly shows at least the following.
    1. The area seeded, with the square foot area listed.
    2. The area planted with trees and shrubs, with the square foot area listed.
    3. Current tax lot and right-of-way boundaries.
    4. Permanent monitoring plot locations that correspond to the data collected and fixed photo-points. These points should be overlaid on the as-built map.
  - d. A brief narrative that describes maintenance activities and recommendations to meet success criteria. This includes when irrigation occurred and when the above ground portion of the irrigation system was removed from the site.

- e. Data collected to support the conclusions related to the status of the site relative to the performance standards listed in this permit (include summary/analysis in the report and raw data in the appendix).
- f. Photos from fixed photo points (include in the appendix).
- g. Other information necessary or required to document compliance with the performance standards listed in this permit.

31. **Corrective Action May Be Required:** The Department retains the authority to require corrective action in the event the performance standards are not accomplished at any time within the monitoring period.

### Performance Standards

To be deemed successful the riprap placement area shall meet the following performance standards, as determined by DSL:

32. **Establishment of Permanent Monitoring Locations Required:** Permanent plot locations must be established during the first annual monitoring in sufficient number and locations to be representative of the site.

### Shrub-dominated and Forested

33. **Native Species Cover:** The cover of native species, as defined in the USDA Plants Database, in the herbaceous stratum is at least 60%.

34. **Invasive Species Cover:** The cover of invasive species is no more than 10%. A plant species should automatically be labeled as invasive if it appears on the current Oregon Department of Agriculture noxious weed list, plus known problem species including *Phalaris arundinacea*, *Mentha pulegium*, *Holcus lanatus*, *Anthoxanthum odoratum*.

35. **Bare Substrate Cover:** Bare substrate represents no more than 20% cover.

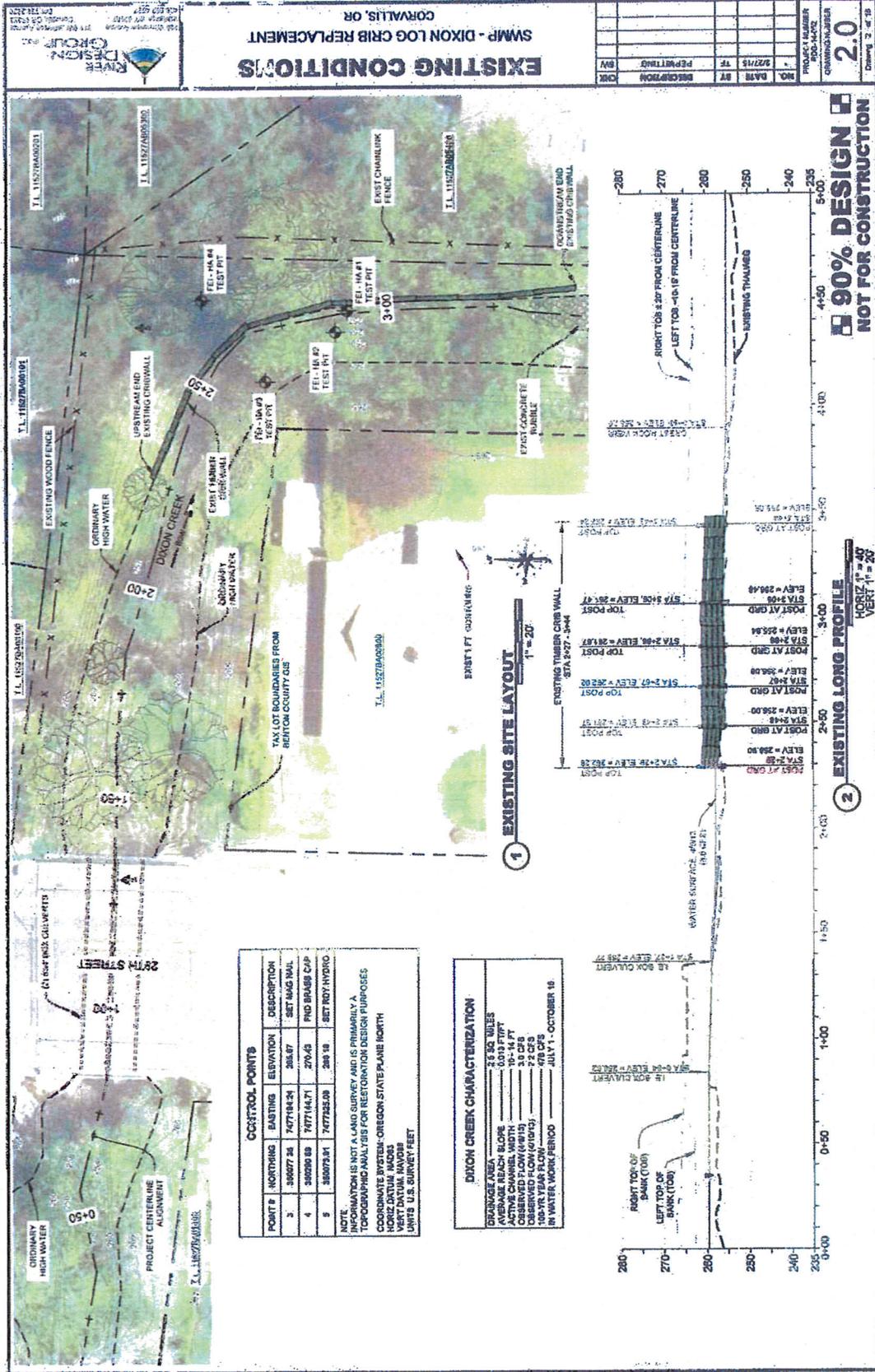
36. **Woody Vegetation:** The density of woody vegetation is at least 1 live native plant (shrubs) and/or stem (trees) every 6' throughout the slope where construction or disturbance has occurred from the project. Native species volunteering on the site may be included, dead plants do not count, and the standard must be achieved for 2 years without irrigation.

### Monitoring and Reporting Schedule

<i>Report</i>	<i>Requirements</i>	<i>Schedule</i>
First Annual report	Post-construction report Establishment of permanent monitoring locations Vegetation performance standards	After one growing season of all proposed plantings
Second Annual report	Vegetation performance standards	After two growing seasons
Third Annual report (or final report if the monitoring period has been extended)	Vegetation performance standards	After three growing seasons

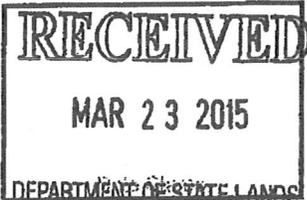
**Issued:** June 18, 2015





# Joint Permit Application

This is a joint application, and must be sent to both agencies, who administer separate permit programs. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.



 <b>U.S. Army Corps of Engineers Portland District</b>	 <b>Oregon Department of State Lands</b>
Corps Action ID Number	DSL Number <b>57663</b>

## (1) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) <input type="checkbox"/> Consultant <input type="checkbox"/> Contractor
Contact Name	Joshua B. Tacchini, P.E.		
Business Name	City of Corvallis		
Mailing Address 1	PO Box 1083		
Mailing Address 2	1245 NE third street		
City, State, Zip	Corvallis, OR, 97339-1083		
Business Phone	(541) 766-6731 ext 5262		
Cell Phone	(541) 740-0071		
Fax	(541) 766-6951		
Email	Joshua.tacchini@corvallisoregon.gov		

## (2) PROJECT INFORMATION

**A. Provide the project location.**

Project Name SWMP-Dixon Log Crib Repl.	Tax Lot #	Latitude & Longitude* 44.5926 , -123.2828
Project Address / Location 2515 NW 29 <sup>th</sup> Street	City (nearest) Corvallis	County Benton
Township 11s	Range 5w	Section 27 
Quarter/Quarter		

Brief Directions to the Site  
Located within the City of Corvallis, South of Walnut Drive, East of 29<sup>th</sup> Street (100') downstream of 29<sup>th</sup> street crossing.

**B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)**

<input type="checkbox"/> River / Stream	<input type="checkbox"/> Non-Tidal Wetland	<input type="checkbox"/> Lake / Reservoir / Pond
<input type="checkbox"/> Estuary or Tidal Wetland	<input type="checkbox"/> Other	<input type="checkbox"/> Pacific Ocean

Waterbody or Wetland Name** Dixon Creek	River Mile 2.3	6 <sup>th</sup> Field HUC Name Lower Luckiamute River	6 <sup>th</sup> Field HUC (12 digits) 170900030609
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**C. Indicate the project category. (Check all that apply.)**

<input type="checkbox"/> Commercial Development	<input type="checkbox"/> Industrial Development	<input type="checkbox"/> Residential Development
<input type="checkbox"/> Institutional Development	<input type="checkbox"/> Agricultural	<input type="checkbox"/> Recreational
<input type="checkbox"/> Transportation	<input checked="" type="checkbox"/> Restoration	<input checked="" type="checkbox"/> Bank Stabilization
<input type="checkbox"/> Dredging	<input type="checkbox"/> Utility lines	<input type="checkbox"/> Survey or Sampling
<input checked="" type="checkbox"/> In- or Over-Water Structure	<input checked="" type="checkbox"/> Maintenance	<input type="checkbox"/> Other:

\* In decimal format (e.g., 44.9399, -123.0283)

## **(2) PROJECT INFORMATION**

\*\* If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A").

## **(3) PROJECT PURPOSE AND NEED**

**Provide a statement of the purpose and need for the overall project.**

The project will replace an existing creosote treated wood pole bank stabilization structure that is failing. Current conditions of the log crib structure show it has been undermined in places throughout its length. Erosion and general condition are worsened at the downstream portion of the wall. The downstream approximate third of the structure is deflecting inward towards the channel. Material behind this portion of the wall has been eroded, creating a void behind the wall at the streambank toe. The log structure will be replaced by large interlocking boulders with large wood placed strategically to recruit gravels and provide habitat. A vegetated geogrid will be used above the boulders to resist further erosion of the bank and to protect adjacent homes.

## **(4) DESCRIPTION OF RESOURCES IN PROJECT AREA**

**A. Describe the existing physical and biological characteristics of each wetland or waterway. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.**

The 2,712 acre Dixon Creek watershed is located in the northwest portion of Corvallis. Formed by the North Fork which originates in the hills near Chip Ross Park, and the South Fork originating on Dimple Hill, Dixon Creek flows 2.6 miles before emptying into the Willamette River near the Corvallis Wastewater Reclamation Plant. While the upper watershed remains largely in a natural state, the middle and lower portions of the watershed have been developed for residential and commercial use. The stream is channelized, deeply entrenched, and highly confined by residential development. Significant sections of lower bank have been revetted with stacked demolition debris (broken up concrete pieces). Non-protected banks appear generally stable because of cohesive bank materials, although significant bare upper bank areas occur which are subject to chronic but apparently low levels of erosion by scour or surface wash. Overhead canopy coverage is moderate, although some of these trees are rooted along the low-flow channel, creating a potential conveyance issue. Overall instream and riparian habitat quality is low. Substrate is largely gravel and bedrock. Fish passage is hampered at the 29th Street box culverts.

Dixon Creek has the characteristics of a highly urbanized stream with increased channel widths and depths related to accelerated channel erosion caused by channel modifications, increased runoff rates, and simplified riparian vegetation and stream processes. In the reconnaissance reach, the channel is tightly constrained between encroaching houses and ancillary structures. Encroachment is facilitated by historical channel straightening and filling the historical stream corridor. Channel encroachment has contributed to flooding, erosion problems, and habitat loss. The channel was relocated and straightened at the subject site to facilitate residential development and the build-out of the transportation network. The project site is within the 100-yr floodplain of Dixon Creek where the floodplain is generally contained within the banks of the drainageway.

Like other Corvallis streams, Dixon Creek likely supports a fishery that includes native and introduced fish species. Native species include cutthroat trout, northern pikeminnow, largescale sucker, peamouth, sculpin, dace, chiselmouth, and whitefish. Upper Willamette River spring Chinook salmon, currently listed as threatened under the federal Endangered Species Act, may use the lower portions of Dixon Creek for juvenile rearing. Fluvial cutthroat trout and other species with a migratory life history travel between Dixon Creek and the Willamette River to complete their lifecycle. Wildlife that potentially use the reconnaissance reach as a migration corridor include deer, cougars, coyotes, beavers, mink, otter, and nutria. Defined wildlife trails in the upstream portion of the reach suggest moderate wildlife use.

**B. Describe the existing navigation, fishing and recreational use of the waterway or wetland.**

The stream currently functions as part of the stormwater conveyance system for the City. It receives urban runoff and discharges throughout the middle and lower portions of the stream and provides limited recreational value.

## **(5) PROJECT SPECIFIC CRITERIA AND ALTERNATIVES ANALYSIS**

**Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterway or wetland.**

The use of natural materials and native vegetation has been selected to return the area to a less developed state. Removal of the creosote wood poles will be done with minimal disturbance to the adjacent substrate to minimize the release of any chemicals which may have leached from the poles.

Three design alternatives were considered. The engineered log jam was determined to require more area than is available, but provided the best habitat restoration. The stand alone rock wall didn't provide the minimal level of habitat restoration, but provided the best bank stabilization. The final design is a mix of large wood and large rock. This design provides the bank stabilization required for the very confined treatment area and the structure required to enhance the habitat and encourage in-stream recruitment of gravels.

The project area is limited to the area of the existing log structure. Access to the site has been negotiated with an adjacent land owner to avoid additional disturbance of the streambed. All work will be performed from above the OHW and in stream work will be limited to habitat improvement.

Through volumetric exchange, the base flood elevation will not be raised and all work within the floodplain will result in a net removal of material.

## **(6) PROJECT DESCRIPTION**

**A. Briefly summarize the overall project including work in areas both in and outside of waters or wetlands.**

Mobilization and stream flow isolation will establish the work area. With flow bypass in place, the existing treated pole structure will be removed. Excavation for the boulder/large wood placement and removal of unstable materials will follow. A medium size tracked excavator will work from the west bank to reach removal and fill materials for the stabilization structure on the east bank. Then Large wood and boulders will be placed as the new stabilization measures are constructed. Finally, fish passage and channel reconstruction will complete the 'in water' work. The geogrid will be constructed above the boulders. Finally the site will be replanted with native trees and vegetation to promote long term stability.

**B. Describe work within waters and wetlands.**

- Flow bypass & fish rescue: Flow isolation will occur upstream of the work area and be piped around the work area and discharged back into the natural channel below the work area.
- Removal of the treated pole structure: Existing timbers will be pulled vertically or cut below grade to be removed.
- Construction of the new stabilization structure: Placement from above the OHW by an excavator of sufficient size to reach the work area.
- Construction of fish passage and channel reconstruction. Riffle and streambed construction and grading will be done from the same place and manner construction of the rock and wood stabilization structure.
- The remainder of the work can be conducted without impacting the wet area of the stream.

**(6) PROJECT DESCRIPTION**

**C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.**

If the existing pole structure will not come out by vertical extraction without disturbing excessive amounts of the streambed, the poles will be cut below grade. Excavator placement is expected to be in a location on the west bank, above OHW. The excavator will be required to reach across the stream to excavate and place new material.

**D. Describe source of fill material and disposal locations if known.**

Material sources are unknown at this time. However all materials will be specified and submittals approved prior to incorporation to the work.

**(6) PROJECT DESCRIPTION**

**E. Construction timeline.**

**What is the estimated project start date?**

July 1, 2015

**What is the estimated project completion date?**

October 15, 2015

**Is any of the work underway or already complete?**

Yes  No

**If yes, describe.**

**F. Fill Volumes and Dimensions (if more than 4 impact sites, include a summary table as an attachment)**  
See attached summary table.

Wetland / Waterbody Name *	Fill Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		

G. Total Fill Volumes and Dimensions							
Fill Impacts to Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)				
Total Fill to Wetlands	0	0	0				
Total Fill Below Ordinary High Water			See attached table				
Total Fill Below <u>Highest Measured Tide</u>			0				
Total Fill Below <u>High Tide Line</u>			0				
Total Fill Below <u>Mean High Water Tidal Elevation</u>			0				
H. Removal Volumes and Dimensions (if more than 4 impact sites, include a summary table as an attachment) See attached summary table.							
Wetland / Waterbody Name*	Removal Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
I. Total Removal Volumes and Dimensions							
Removal Impacts to Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)				
Total Removal to Wetlands	0	0	0				
Total Removal Below Ordinary High Water			See attached table				
Total Removal Below <u>Highest Measured Tide</u>			0				
Total Removal Below <u>High Tide Line</u>			0				
Total Removal Below <u>Mean High Water Tidal Elevation</u>			0				
* If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A"). ** Indicate the days, months or years the fill or removal will remain. Enter "permanent" if applicable. For DSL, permanent removal or fill is defined as being in place for 24 months or longer. *** Example: soil, gravel, wood, concrete, pilings, rock etc.							

(7) ADDITIONAL INFORMATION			
Are there any <u>state</u> or <u>federally</u> listed species on the project site?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Unknown
Is the project site within designated or proposed critical habitat?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Unknown
Is the project site within a national <u>Wild and Scenic River</u> ?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
Is the project site within the <u>100-year floodplain</u> ?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
* If yes to any of the above, explain in Block 4 and describe measures to minimize adverse effects to these resources in Block 5.			
Is the project site within the <u>Territorial Sea Plan (TSP) Area</u> ?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
* If yes, attach TSP review as a separate document for DSL.			
Is the project site within a designated <u>Marine Reserve</u> ?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
* If yes, certain additional DSL restrictions will apply.			
Will the overall project involve construction dewatering or ground disturbance of one acre or more?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown
* If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).			
Is the fill or dredged material a carrier of contaminants from on-site or off- site spills?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unknown

**(7) ADDITIONAL INFORMATION**

Has the fill or dredged material been physically and/or chemically tested?  Yes  No  Unknown

\*If yes, explain in Block 4 and provide references to any physical/chemical testing report(s).

Has a cultural resource (archaeological) survey been performed on the project area?  Yes  No  Unknown

\* If yes, provide a copy of the survey with this application. Do not describe any resources in this document.

Identify any other federal agency that is funding, authorizing or implementing the project.

Agency Name	Contact Name	Phone Number	Most Recent Date of Contact

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application. For example, certain activities that require a Corps permit also require 401 Water Quality Certification from Oregon DEQ.

Approving Agency	Certificate/ approval / denial description	Date Applied
City of Corvallis	Floodplain Permit	3/12/15

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

- Work proposed on or over lands owned by or leased from the Corps
- State owned waterway DSL Waterway Lease #
- Other Corps or DSL Permits Corps # DSL #
- Violation for Unauthorized Activity Corps # DSL #
- Wetland and Waters Delineation Corps # DSL #
  - A wetland / waters delineation has been completed (if so, provide a copy with the application)
  - The Corps has approved the wetland / waters delineation within the last 5 years
  - DSL has approved the wetland / waters delineation within the last 5 years

**(8) IMPACTS, RESTORATION/REHABILITATION, COMPENSATORY MITIGATION**

**A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.**

Temporary bypass of the entire flow around the project site will be in place through construction. 3 large cottonwood trees will be permanently removed and replaced with Ash or Maple varieties suitable for the location. Local wildlife is likely to be displaced during construction, but is expected to return quickly upon completion. A temporary silt plume is expected to develop upon removal of the flow bypass measures, but is expected to dissipate quickly because ground disturbance will be complete.

**B. For temporary removal or fill or disturbance of vegetation in waterways, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction.**

**(8) IMPACTS, RESTORATION/REHABILITATION, COMPENSATORY MITIGATION**

The site will be planted with a dense mix of native vegetation suitable for the location. The construction plans will include a site restoration plan detailing varieties and spacing. City of Corvallis Parks dept. staff will assist with plant selection and placement.

**Compensatory Mitigation**

**C. Proposed mitigation approach. Check all that apply:**

- Permittee-responsible Onsite Mitigation     
  Permittee-responsible Offsite mitigation     
  Mitigation Bank or in-lieu fee program     
  Payment to Provide (not approved for use with Corps permits)

**D. Provide a brief description of mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.**

All negative impacts will be temporary and mitigated by the removal of invasive species during site preparation and replanting & enhancement of native trees, shrubs, and ground cover with site restoration as directed by City staff.

**Mitigation Bank / In-Lieu Fee Information:**

Name of mitigation bank or in-lieu fee project:

Type of credits to be purchased:

- If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?
- Yes. Submit the plan with this application and complete the remainder of this section.  
 No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete application).

**Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)**

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
County	City	Latitude & Longitude (in DD.DDDD format)
Township	Range	Section
		Quarter/Quarter

**(9) ADJACENT PROPERTY OWNERS FOR PROJECT AND MITIGATION SITE**

<p>Pre-printed mailing labels <input checked="" type="checkbox"/> of adjacent property owners attached</p>	<p>Project Site Adjacent Property Owners</p>	<p>Mitigation Site Adjacent Property Owners</p>
--	--	---

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

Contact Name  
Address 1  
Address 2  
City, ST ZIP Code

BEARDSLEY AMY  
OR CURRENT RESIDENT  
2520 NW 27TH ST  
CORVALLIS OR 97330-1268

HENDRICKSON ANGELA C  
4725 SHORTRIDGE ST SE  
ALBANY OR 97322

ALEXIS KATHY K  
OR CURRENT RESIDENT  
2550 NW 27TH ST  
CORVALLIS OR 97330-1268

CURRENT RESIDENT  
2585 NW 29TH ST  
CORVALLIS OR 97330

OLIVER BEVERLY ANN  
OR CURRENT RESIDENT  
2570 NW 27TH ST  
CORVALLIS OR 97330-1268

SILVERSTEIN ALAN NATHAN  
25151 PLEASANT VIEW DR  
PHILOMATH OR 97370

CURRENT RESIDENT  
2583 NW 29TH ST  
CORVALLIS OR 97330

JOHNSON MELINDA JILL, TR  
OR CURRENT RESIDENT  
2445 NW 29TH ST  
CORVALLIS OR 97330

SCHOLL PEGGY  
OR CURRENT RESIDENT  
2515 NW 29TH ST  
CORVALLIS OR 97330-1249

DURANT DEVON  
OR CURRENT RESIDENT  
2580 NW 29TH ST  
CORVALLIS OR 97330-1250

R & M STARK TRUST  
OR CURRENT RESIDENT  
2905 NW TAFT AVE  
CORVALLIS OR 97330-1173

ROWLAND LLOYD E  
OR CURRENT RESIDENT  
2587 NW 29TH ST  
CORVALLIS OR 97330-1249

**(10) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT  
(TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)**

I have reviewed the project described in this application and have determined that:

- This project is not regulated by the comprehensive plan and land use regulations.
- This project is consistent with the comprehensive plan and land use regulations.
- This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained:
  - Conditional Use Approval
  - Development Permit
  - Other Permit (see comment section)
- This project is not consistent with the comprehensive plan. Consistency requires:
  - Plan Amendment
  - Zone Change
  - Other Approval or Review (see comment section)

An application  has  has not been filed for local approvals checked above.

Local planning official name (print) <i>KEVIN RUSSELL</i>	Title <i>PROJECT MANAGER</i>	City/County (circle one) <i>CORVALLIS</i>
--	---------------------------------	--

Signature 	Date <i>3/18/15</i>
---------------	------------------------

Comments:  
*EXEMPT ACTIVITY IN RIPARIAN CORRIDOR PER LDL SECTION 4.13.50.b.1. APPLICANT SHALL APPLY FOR AN EXCAVATION PERMIT IF DISTURBANCE TRIGGERS REQUIRED PERMIT. ADDITIONALLY, TREE PROTECTION MAY BE REQUIRED IF EQUIPMENT ENVELOPES WITHIN THE 'URLE OF PROTECTION' AS DEFINED IN 4.12 OF THE LDL.*

**(11) COASTAL ZONE CERTIFICATION**

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. A public notice will be issued with the certification statement, which will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050.

**CERTIFICATION STATEMENT**

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Name	Title
Signature	Date

**(12) SIGNATURES**

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance. To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

**Fee Amount Enclosed**

\$ 720

**Applicant Signature****Print Name**

Joshua B. Tacchini, P.E.

**Title**

Project Manager, City of Corvallis Public Works

**Date**

3/18/15

**Authorized Agent Signature****Print Name****Title****Signature****Date****Landowner Signature(s)****Landowner of the Project Site (if different from applicant)****Print Name****Title****Signature****Date****Landowner of the Mitigation Site (if different from applicant)****Print Name****Title****Signature****Date****Department of State Lands, Property Manager (to be completed by DSL)**

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

**Print Name****Title****Signature****Date**

## (13) ATTACHMENTS

- Drawings (items in bold are required)
  - Location map with roads identified
  - U.S.G.S topographic map
  - Tax lot map
  - Site plan(s)
  - Cross section drawing(s)
  - Recent aerial photo
  - Project photos
  - Erosion and Pollution Control Plan(s), if applicable
  - DSL/Corps Wetland Concurrence letter and map, if approved and applicable
- Pre-printed labels for adjacent property owners (Required if more than 5)
- Restoration plan or rehabilitation plan for temporary impacts
- Mitigation plan
- Wetland functional assessment and/or stream functional assessment
- Alternatives analysis
- Biological assessment (if requested by Corps project manager during pre-application coordination.)
- Stormwater management plan (may be required by the Corps or DEQ)
- Other:
  - Removal-Fill Quantities Table
  - SHPO Letter

### Send Completed form to:

**U.S. Army Corps of Engineers**  
**ATTN: CENWP-OD-GP**  
**PO Box 2946**  
**Portland, OR 97208-2946**  
**Phone: 503-808-4373**

**Counties:**  
**Baker, Clackamas,**  
**Clatsop, Columbia,**  
**Gilliam, Grant, Hood**  
**River, Jefferson, Lincoln,**  
**Malheur, Marion, Morrow,**  
**Multnomah, Polk,**  
**Sherman, Tillamook,**  
**Umatilla, Union,**  
**Wallowa, Wasco,**  
**Washington, Wheeler,**  
**Yamhill**

OR

**U.S. Army Corps of Engineers**  
**ATTN: CENWP-OD-GE**  
**211 E. 7<sup>th</sup> AVE, Suite 105**  
**Eugene, OR 97401-2722**  
**Phone: 541-465-6868**

**Counties:**  
**Benton, Coos, Crook,**  
**Curry, Deschutes,**  
**Douglas Jackson,**  
**Josephine, Harney,**  
**Klamath, Lake, Lane,**  
**Linn**

### Send Completed form to:

#### DSL - West of the Cascades:

**Department of State Lands**  
**775 Summer Street NE, Suite 100**  
**Salem, OR 97301-1279**  
**Phone: 503-986-5200**

OR

#### DSL - East of the Cascades:

**Department of State Lands**  
**1645 NE Forbes Road, Suite 112**  
**Bend, Oregon 97701**  
**Phone: 541-388-6112**

#### Send all Fees to:

**Department of State Lands**  
**775 Summer Street NE, Suite 100**  
**Salem, OR 97301-1279**  
**Pay by Credit Card by Calling 503-986-5253**



Dixon Creek Projects  
Removal-Fill Quantities for Permit Application

Activity	Location	Length <sup>1</sup>	Width <sup>4</sup>	Depth <sup>5</sup>	Volume	Material	Notes			
Excavation & Offsite Disposal	Waters	150	110	10	4.7	-	erosion timbers, soil, rock			
Excavation & Offsite Disposal	Above OHW	285	110	12	5.8	-	erosion timbers, soil, rock			
Fill - Rocks	Waters	-	-	-	135	385	110	8	4.1	large rocks
Fill - Rocks	Above OHW	-	-	-	90	385	110	8	2.8	large rocks
Fill - Habitat Wood	Waters	-	-	-	10	105	35	3	2.6	tree logs for habitat
Fill - Bank Material	Waters	-	-	-	120	1,100	110	10	2.9	bank fill
Fill - Bank material	Above OHW	-	-	-	80	1,100	110	10	2.0	bank fill
Excavation & Offsite Disposal	Waters	30	630	45	1.3	-	-	-	-	gravels
Streambed Gravels and Cobbles	Waters	-	-	-	32	630	45	12	1.6	gravels, cobbles, habitat boulders
Habitat boulders and steel baffle	Waters	-	-	-	2	32	16	2	1.8	habitat boulders, low-flow baffle
Water Control	Waters	-	-	-	2	40	20	2	1.4	materials to control water during construction

<sup>1</sup>Permanent fill/removal is defined as being in place for 24 months or longer

<sup>2</sup>Locations: Wetland, Waters (below OHW), Above OHW

<sup>3</sup>Length = Impacted linear length

<sup>4</sup>Width = Impacted width

<sup>5</sup>Depth = Volume/ (Length \* Width)

655467

Received

FEB 11 2015



# Oregon

John A. Kitzhaber, MD, Governor

**Parks and Recreation Department**  
State Historic Preservation Office  
725 Summer St NE, Ste C  
Salem, OR 97301-1266  
(503) 986-0690  
Fax (503) 986-0793  
[www.oregonheritage.org](http://www.oregonheritage.org)

February 3, 2015

Mr. Joshua Tacchini  
City of Corvallis Engineering Div  
1245 NE 3rd Street  
Corvallis, OR 97330



RE: SHPO Case No. 15-0142  
City of Corvallis, Dixon Creek Bank Stabilization Project  
11S 5W 27, Corvallis, Benton County

Dear Mr. Tacchini:

Our office recently received a request to review your application for the project referenced above. In checking our statewide archaeological database, it appears that there have been no previous surveys completed near the proposed project area. However, the project area lies within an area generally perceived to have a high probability for possessing archaeological sites and/or buried human remains.

In the absence of sufficient knowledge to predict the location of cultural resources within the project area, extreme caution is recommended during project related ground disturbing activities. Under state law (ORS 358.905 and ORS 97.74) archaeological sites, objects and human remains are protected on both state public and private lands in Oregon. If archaeological objects or sites are discovered during construction, all activities should cease immediately until a professional archaeologist can evaluate the discovery. If you have not already done so, be sure to consult with all appropriate Indian tribes regarding your proposed project. If the project has a federal nexus (i.e., federal funding, permitting, or oversight) please coordinate with the appropriate lead federal agency representative regarding compliance with Section 106 of the National Historic Preservation Act (NHPA).

If you have any questions about the above comments or would like additional information, please feel free to contact our office at your convenience. In order to help us track your project accurately, please reference the SHPO case number above in all correspondence.

Sincerely,

  
Dennis Griffin, Ph.D., RPA  
State Archaeologist  
(503) 986-0674  
[dennis.griffin@oregon.gov](mailto:dennis.griffin@oregon.gov)





## Dixon Creek Crib Wall Project Considerations for Replacement

**DATE:** May 8, 2014

**TO:** Josh Tacchini, P.E. – City of Corvallis

**FROM:** Chris Smith, P.E. - River Design Group, Inc.

**SUBJECT:** Recommendations for log crib wall replacement and streambank stabilization on Dixon Creek.



### 1 INTRODUCTION

The City of Corvallis (City) contracted with River Design Group, Inc. (RDG) to evaluate the conditions of an aging crib wall on the left streambank of Dixon Creek near NW 29<sup>th</sup> Street in Corvallis. The City also requested recommendations for replacing the crib wall to promote long-term bank stability, focusing on recommendations that are constructible and accepted by regulatory agencies. This memo presents considerations for designing the bank stabilization to replace the crib wall and considerations for implementing a project at this location. It also presents three types of bank treatments that could replace the crib wall with bioengineering techniques and outlines regulatory criteria and permitting requirements for the project.

Dixon Creek flows through Corvallis, originating on the slope of Timberhill and discharging to the Willamette River. The project site is located near the intersection of NW 29<sup>th</sup> Street and NW Walnut Boulevard as illustrated in Figure 1-1.

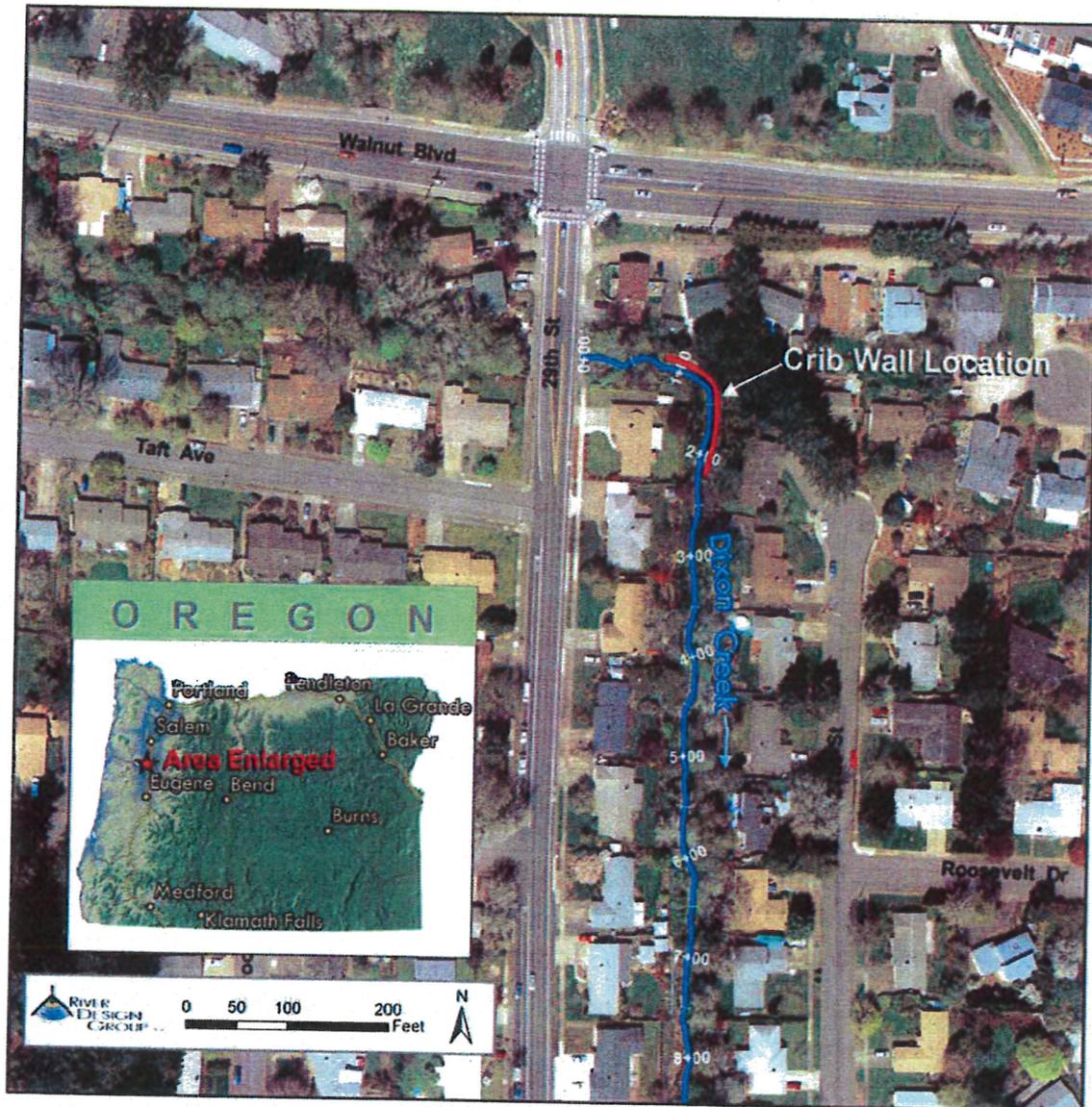


Figure 1-1. Location map for Dixon Creek showing crib wall location.

## 2 SITE EVALUATION

### 2.1 Dixon Creek Crib Wall

The Dixon Creek crib wall is located downstream from the NW 29<sup>th</sup> Street Dixon Creek crossing. With project stationing starting at the NW 29<sup>th</sup> Street crossing outlet, the crib wall starts at STA 0+93 and ends at STA 2+09. The wall is between 4 and 5 ft high, 116 feet long, and conforms to an approximate 90-degree bend in Dixon Creek. The crib wall is constructed from creosote-impregnated telephone poles held by concrete-stabilized piers, also constructed from wooden telephone poles. The crib structure appears to have been installed to steady the toe of Dixon Creek to prevent lateral erosion and to stabilize the streambank and slope above the wall. The height of bank varies along the length of the

wall from approximately 12 to 20 ft. The age of the wall and subsurface conditions are unknown based on our visual observations.

The log crib wall has been previously studied, and its condition and presence were noted in the City of Corvallis Stormwater Master Plan in 2000 (Brown and Caldwell 2000). The plan noted the structure was being undermined and recommended a preemptive replacement with an “environmentally-appropriate structure associated with upper bank riparian revegetation”. Current conditions of the log crib structure are shown in Figure 2-1.



**Figure 2-1.** An overview of the Dixon Creek crib wall. On left, looking upstream at wall near apex of bend and right photo is looking downstream at wall

The structure has been undermined in places throughout its length, and erosion and condition of the wall are worse at the downstream portion of the wall. The downstream approximate third of the structure is deflecting inward towards the channel. Material behind this portion of the wall has been eroded, creating a void behind the wall at the streambank toe, as seen in Figure 2-2.



**Figure 2-2.** View of undermined portion of crib wall deflecting into channel.

Channel planform can influence hydraulic forces within the channel and the treatment along the bend in Dixon Creek was likely in response to forces arising from the 90-degree bend. Forces acting to displace the structure, especially at the downstream third of the wall, are also likely due to the geometry of the channel bend. Channel bends can increase in-channel stresses along a ratio of channel width (W) to the radius of curvature of the bend (Rc). This bend is characterized as a forced/entrenched bend, with a radius of curvature to width ratio of ~1.5-2.5 (FHWA 2001). These types of bends create local scour in the channel bed and along the toe of slope of the revetted bank. Shear stresses in bends can be approximated by adjusting straight-section shear stress ( $\tau$ ) for the geometry of the bend:

$$\tau_{max} = 2.65\tau \left[ \frac{Rc}{W} \right]^{-0.5} \quad \text{(Eqn 2-1) (USACE 2001)}$$

Channel substrate near the crib wall is a mixture of gravels, cobbles, small boulders and concrete rubble. The origin of bed material is likely a mixture of gravels and cobbles transported by the stream, along with larger imported material introduced for erosion control efforts.

Peak flows for this reach of Dixon Creek were previously determined and have been used by the City for stormwater planning. Flows are summarized below by recurrence interval in Table 2-1. The channel is entrenched and peak flows are completely contained within channel with no flooding onto the surrounding floodplain area.

**Table 2-1. Peak flows for Dixon Creek from Corvallis Stormwater Master Plan (Brown and Caldwell 2000).**

Max Channel Capacity	2-yr	5-yr	10-yr	25-yr	10-yr
7,400 cfs	239 cfs	275 cfs	343 cfs	398 cfs	478 cfs

### 3 Project Design Considerations

Streambanks are high disturbance zones combining traditional problems in slope stability with the disturbance of hydraulic forces acting at the toe of the slope. The following section outlines considerations for design of a streambank stabilization project that could replace the existing crib wall and persist over time.

#### 3.1.1 Geotechnical stability / Soils

Given proximity to adjacent fixed infrastructure and private property, the bank stabilization should evaluate geotechnical stability of the bank. The project design team should include a geotechnical engineer who would develop slope stabilization designs and ensure slope stability criteria are met. In locations, the bank height can be as high as 20 ft above the channel thalweg, which could potentially load any structure placed at the toe of slope, and any structure placed at the toe of slope could also affect upslope stability. Additionally, consideration should be given to global slope stability, which could include failure planes that are outside the footprint of the existing log crib wall, but could be addressed if the structure is replaced.

The USDA soil survey was reviewed to identify soil mapping for the project area. The soils underneath the log crib wall footprint and adjacent streambank area are mapped as "Bashaw Clay", a deep clay soil with very low to moderately low capacity to transmit water, and a seasonal water table with saturation near the ground surface. Clay soils have special considerations for slope stability because much of the cohesive strength of clays is lost when saturated, and the soils have a high saturated unit weight, but take longer to drain. The soil survey mapping report is attached.

### **3.1.2 Drainage**

Surface and subsurface drainage both influence upper slope stability and streambank stability, and are a critical consideration for bank stabilization design. It is recommended to incorporate drainage into the bank stabilization design by routing surface drainage away from the bank treatment area, and installing subsurface drainage as a part of the project. This portion of Dixon Creek has been ditched and relocated (RDG 2013) and the bank soils are not typical of alluvial streambanks and are composed of lacustrine clays.

### **3.1.3 Hydraulic forces**

Hydraulic forces acting along the streambank, bed, and upper slope should be considered when designing the project. A HEC-RAS model of this reach of Dixon Creek was created for the City as part of planning efforts for Dixon Creek (RDG 2013). For a 100-yr design storm, velocities near the project area are in the range of 5 to 7 feet per second (fps), and shear stresses in the vicinity of the crib wall are between 2 and 5 pounds per square foot (psf). The hydraulic forces will dictate the size and types of material used to stabilize the bank. The alternatives presented in Section 4 of this memo consider the hydraulic forces at the project area and present alternatives that are feasible, but materials would need to be specifically sized during design efforts. Modeling specific to the project design alternative should be performed to evaluate hydraulic forces acting on the proposed project and attributable to changed channel geometry of the selected alternative.

## **3.2 Considerations for Project Constructability**

The ability to bring equipment to the project site and to move materials in and out are important considerations for this project because access is physically limited by vegetation and property ownership. Specific considerations that could impact constructability are outlined below.

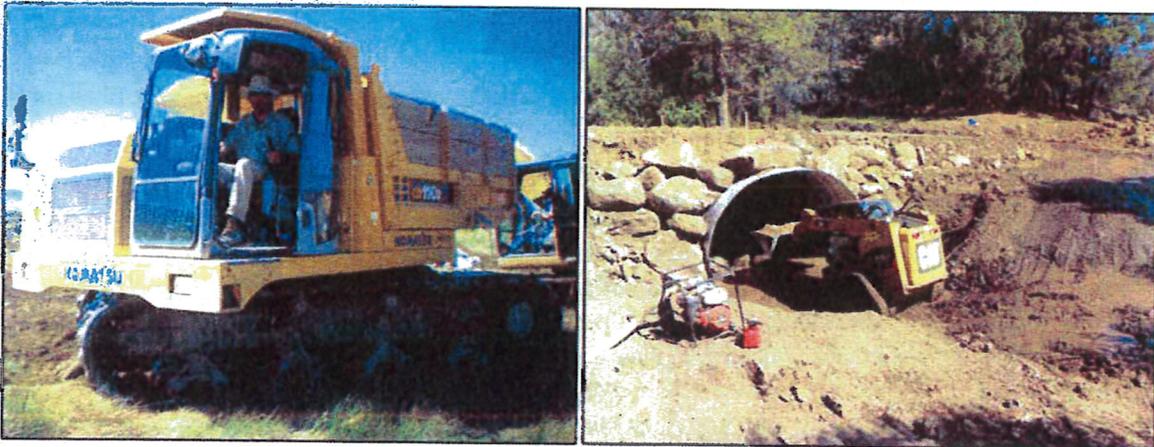
### **3.2.1 Construction Access and Staging**

Access to the project site is constrained due to private infrastructure and mature vegetation and trees and is a critical consideration for implementing the project. Vegetation and trees can be beneficial if left undisturbed for long-term bank stabilization and riparian functions. As a result, physical space to operate equipment is constrained and will limit the size of equipment that can operate at the site. Typical types of equipment that have been used for similar constrained conditions are shown in Figures 3-1 and 3-2



**Figure 3-1.** Example equipment types for digging and placing materials in constrained work areas. Left photo shows a mid-sized, rubber-tracked Kubota KX080 excavator, 19,000 lbs and 70 hp. Right photo shows a Terex HS41M spider excavator, approximately 18,000 lb and 80 hp.

Because these types of equipment do not have the lifting capacity of larger equipment, elements used in project design cannot exceed equipment working capacity, which is typically in the range of 6,000 to 8,000 lb. Additionally, constrained work sites influence project cost because the types of equipment that can move and stage material carry smaller loads and have lower production rates. The production rate needs to be factored into project budgeting.



**Figure 3-2.** Left photo shows a rubber tracked articulating dump truck and right photo shows a skid-steer front loader, capable of moving and staging material in constrained work sites.

Construction access to the work site will require access through private properties to minimize heavy equipment travel through the stream channel. Likewise, excavation equipment typically works best when “pulling” material towards the machine, which would require the equipment to occupy the left bank of Dixon Creek above the existing crib wall. The best construction access is likely through a private residence to the east of the eroding bank. An access route through the stream channel itself, accessed from NW 29<sup>th</sup> Street, may also be possible but would involve a greater dewatering effort and more

impacts to the stream channel outside of the project footprint. Access from NW 29<sup>th</sup> Street through the stream corridor could be pursued if private property access is not feasible.

Area for staging equipment and materials is constrained as well. It may be possible to stage equipment directly in the work area, and it may be possible to utilize the shoulder of NW 27<sup>th</sup> Street for staging. If a staging area is not available, it may be necessary to incorporate materials into the project as they are delivered to the site. The availability of access and staging will have critical influence on the project constructability and cost, and it is recommended that they be evaluated or secured at an early stage to help schedule and budget the work.

### **3.2.2 Land Ownership**

Work to stabilize the streambank and replace the log crib wall will likely involve a mixture of property ownership. The City owns the bottom of Dixon Creek and a portion of the streambanks as a drainage easement, and a portion of the upper bank is in private ownership. The project would require coordination with the adjacent private landowners, who are critical stakeholders in the project. Outreach to the landowners is recommended far in advance of beginning project design. It is important that adjacent landowners understand the reasons the City is undertaking the project, and how it impacts their adjacent land. The landowners may present additional information on site opportunities and constraints. Additionally, it will be beneficial to identify ownership and maintenance responsibilities of any works constructed on private property. Outreach will be critical because work would likely be performed on a portion of the private land, construction activities will create noise and disturbance near the residences. As noted above, construction access and material staging would likely be required on the private lands.

## **4 Bank Treatment Options**

Bank stabilization techniques are highly dependent on the mode and mechanism causing bank erosion and slope failure. The following sections present bank stabilization alternatives based on our previous experience, professional judgment, and our site visits. Based on the Dixon Creek Corridor assessment and this study, we have a general idea of hydraulic forces and failure mechanisms acting on the crib wall and treatments were selected to be feasible in stabilizing the bank against these forces within the constraints of the project site. The alternatives are presented at a conceptual level and have not been designed.

The proposed bioengineering techniques rely primarily on natural vegetation and are techniques that have historically been permitted by regulatory agencies with relative ease. These treatments also require minimal capital costs relative to other, more intensive in-stream engineering treatments which could also be used, but are more expensive and more difficult to permit. Bioengineering techniques also help maintain or restore long-term process and function of the riparian corridor. Three conceptual alternatives are presented below.

### **4.1 Rock Toe with Wood, Sloped and Planted Upper Bank**

Alternative 1 consists of removing the log crib structure and replacing it with a sloping rock streambank toe, placing wood in the streambank toe, and planting the upper bank.

The toe of the streambank is an area subject to elevated hydraulic forces that can remove material from the bank. It is also an area that bridges soil loads to support the streambank and any upper slope area.

Replacing the crib structure with a rock bank toe would place non-erodible material consisting of cobbles and small boulders to help stabilize the toe. Large wood elements would be incorporated into the rock material to provide hydraulic roughness, with associated habitat benefits for aquatic organisms. Roughness is important to reduce near-bank shear stresses and velocities that can entrain rock or soil from the toe. Drainage would be incorporated into the project either oriented perpendicular to the treatment at intervals, or longitudinally in the direction of flow. A vegetated soil lift (VSL), consisting of compacted earth wrapped in coir fabric, would separate the rock from the upper streambank region as illustrated in Figure 4-1 and Figure 4-2.

The upper streambank would be planted with trees and shrubs beginning at a height of approximately 4 ft above the channel bed. A biodegradable coir erosion control blanket and erosion control seeding would provide temporary cover while upper bank vegetation establishes over a 3 to 5 year period.

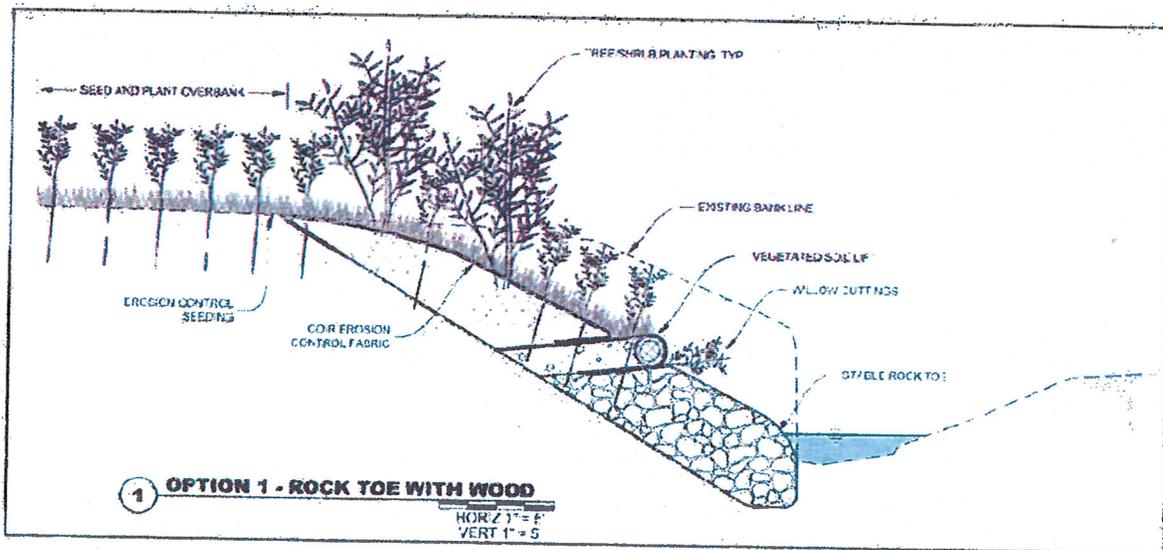


Figure 4-1. Schematic of rock toe bioengineering option and upper slope planting.



**Figure 4-2.** Example of a constructed streambank composed of a rock toe, hardwood plantings, and a sloped upper bank.

Table 4-1 provides a concept-level cost estimate for the rock toe treatment, using typical costs from recent projects in Oregon and consideration of site constraints. Actual costs would need to be updated following project design and permitting.

**Table 4-1. Opinion of probable costs for rock toe with wood.**

WORK ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
Landowner Agreements	2	Each	\$5,000	\$10,000
Mobilization	1	Lump Sum	\$2,000	\$2,000
Site Prep/Clearing	1	Lump Sum	\$4,000	\$4,000
Erosion and Water Control	1	Lump Sum	\$4,000	\$4,000
Structure Removal	1	Lump sum	\$15,000	\$15,000
Rock Toe material	60	Cubic Yards	\$45	\$2,700
8"-12" diam., 20' Wood	60	Each	\$80	\$4,800
Excavation	300	Cubic Yards	\$45	\$13,500
Vegetated Soil Lift	120	Lineal Feet	\$20	\$2,400
Willow Plantings	900	Each	\$0.75	\$675
Erosion Control Seeding	3000	sf	\$0.10	\$300
Erosion Control Fabric	270	Sy	\$3.50	\$945
Tree & Shrubs	90	Each	\$25	\$2,250
Planting Labor	80	Hours	\$50	\$4,000
<b>Total Estimate</b>				<b>\$66,570</b>
<b>Approximate Cost/ft</b>				<b>\$555/ft</b>

## 4.2 Rock Wall with Wood, Sloped and Planted Upper Bank

Alternative 2 consist of removing the log crib wall and replacing it with a rock wall at the streambank toe, placing wood in the streambank toe, and planting the upper bank.

The toe of the streambank would be constructed from large boulders, approximately 2 to 3 ft in dimension, stacked to create a rock wall. A rock wall would allow the bank to be built steeper than if constructed from smaller rock materials and could reduce the overall project footprint. Wood elements would be placed at locations within the wall to create additional near-bank roughness and to provide aquatic habitat benefits. The structure would be backfilled with a drain fill to facilitate upper slope drainage. A VSL would separate the rock wall toe from the upper streambank region. Upper slope treatment would be similar to other alternatives, with a temporary erosion control fabric and seeding, and woody vegetation plantings. A schematic of this treatment is shown in Figure 4-3 and Figure 4-4.

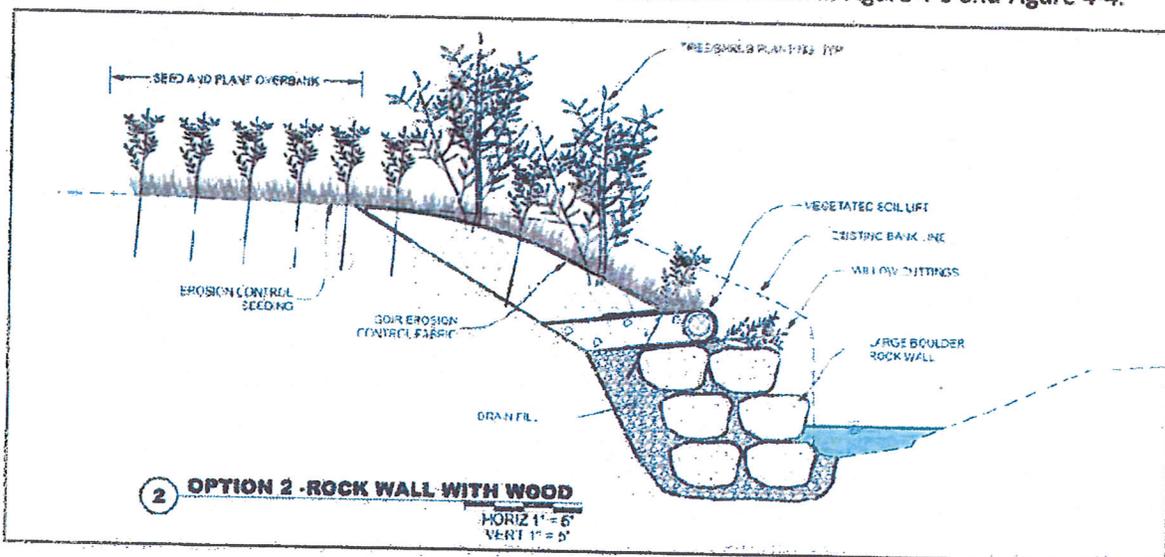


Figure 4-3. Schematic of rock wall toe and upper slope planting alternative.



Figure 4-4. Example of rock wall toe with vegetated upper slope.

Table 4-2 provides a concept-level cost estimate for this treatment, using typical costs from recent projects in Oregon and consideration of site constraints. Actual costs would need to be updated after design and permitting is completed for the project.

**Table 4-2. Opinion of probable construction costs for rock wall toe.**

WORK ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
Landowner Agreements	2	Each	\$5,000	\$10,000
Mobilization	1	Lump Sum	\$2,000	\$2,000
Site Prep/Clearing	1	Lump Sum	\$4,000	\$4,000
Erosion and Water Control	1	Lump Sum	\$4,000	\$4,000
Structure Removal	1	Lump sum	\$15,000	\$15,000
3' Boulders	230	Each	\$125	\$28,750
8"-12" diam., 20' Wood	60	Each	\$80	\$4,800
Excavation	200	Cubic Yards	\$45	\$9,000
Drain Fill	110	Cubic Yards	\$45	\$4,950
Vegetated Soil Lift	120	Lineal Feet	\$20	\$2,400
Willow Plantings	600	Each	\$0.75	\$450
Erosion Control Seeding	2400	sf	\$0.10	\$240
Erosion Control Fabric	270	sy	\$3.50	\$945
Tree & Shrubs	60	Each	\$25	\$1,500
Planting Labor	80	Hours	\$50	\$4,000
			<b>Total Estimate</b>	<b>\$92,035</b>
			<b>Approximate Cost/ft</b>	<b>\$767/ft</b>

### 4.3 Replace Log Crib, Backfill with Rock, Plant Upper Bank

Alternative 3 consists of replacing the existing timber crib structure with a similar logcrib wall constructed from untreated wood. The upper bank would be sloped and planted.

A replacement crib wall would be different from the existing wall in several ways. First, the current log-crib structure is supported by vertical posts whereas this alternative would use engineered log jams (ELJs) as the intermediate crib supports. The log jams would create near-bank roughness and provide cover for fish and aquatic organisms, as well as anchoring the wall. Second, the crib structure would be constructed with untreated wood and dormant willow cuttings would be incorporated into the structure. Third, backfill would consist of a freely draining rock fill placed behind the structure to aid upslope drainage. Finally, a VSL consisting of compacted earth wrapped in coir fabric, would separate the wood and crib toe from the upper streambank.

The upper bank area would be vegetated with a temporary erosion control blanket and dormant hardwood trees and shrubs, as in other alternatives. A schematic of this bank treatment is shown in Figure 4-5 and Figure 4-6.

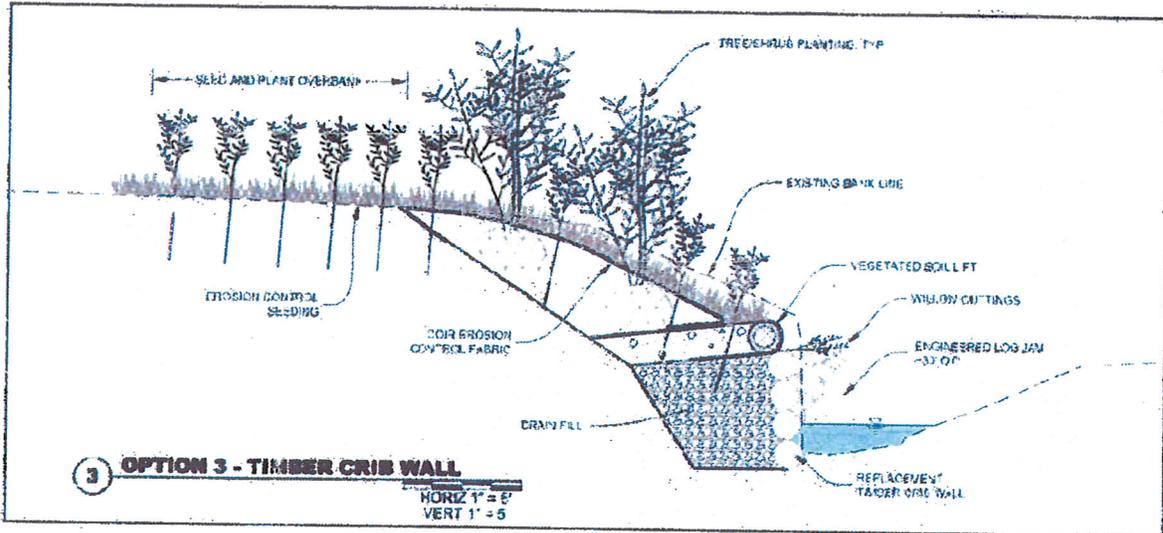


Figure 4-5. Schematic of crib wall replacement with upper slope planting.



Figure 4-6. Example log crib and wood bank revetment with upper slope planting. Log crib is secured by small ELJ's.

Table 4-3 provides a concept-level cost estimate for this treatment, using typical costs from recent projects in Oregon and site constraints. Actual costs would need to be updated as design and permitting are completed for the project.

**Table 4-3. Opinion of probable costs for crib wall replacement.**

WORK ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
Landowner Agreements	2	Each	\$5,000	\$10,000
Mobilization	1	Lump Sum	\$2,000	\$2,000
Site Prep/Clearing	1	Lump Sum	\$4,000	\$4,000
Erosion and Water Control	1	Lump Sum	\$4,000	\$4,000
Structure Removal	1	Lump sum	\$15,000	\$15,000
Drain Fill	110	Cubic Yards	\$45	\$4,950
ELJ's	5	Each	\$4,200	\$21,000
30' x 15"-diam. Crib Logs	16	Each	\$250	\$4,000
Excavation	300	Cubic Yards	\$45	\$13,500
Vegetated Soil Lift	120	Lineal Feet	\$20	\$2,400
Willow Plantings	600	Each	\$0.75	\$450
Erosion Control Seeding	2400	sf	\$0.10	\$240
Erosion Control Fabric	270	sy	\$3.50	\$945
Tree & Shrubs	60	Each	\$25	\$1,500
Planting Labor	80	Hours	\$50	\$4,000
			<b>Total Estimate</b>	<b>\$87,985</b>
			<b>Approximate Cost/ft</b>	<b>\$733/ft</b>

#### **4.4 Revegetation Efforts, Common among Alternatives**

As a result of construction activity, many of the existing trees and shrubs may be disturbed or require removal. All of the disturbed or removed vegetation should be incorporated into the project as useful materials during for construction. In addition, riparian tree and shrub plantings should be incorporated into the bank stabilization treatment at and above the yearly high water level. The plantings are critical to establish near-bank roughness to slow water velocities near the soil surface, and to reinforce soil with roots over time. The riparian buffer trees should be planted throughout the riparian corridor that should extend at least 30 to 50 ft back from the top of bank, and a larger buffer is advisable if possible.

Temporary erosion control planting should be done immediately after construction, however, long-term trees and shrubs should be planted during the dormant season, typically between October and January in the Willamette Valley. Construction of the bank treatment will require heavy equipment but planting efforts could be done using hand labor working above the base flow water elevation during winter months when plants are dormant.

## **5 Project Permits and Timing**

A portion of the work at the project site will be performed within the ordinary high water (OHW) and is therefore regulated by the City (floodplain development), Oregon Department of State Lands (DSL), and Army Corps of Engineers (COE). The City may require net-rise affects of the project to be evaluated because the project will occur within the floodway and could potentially alter mapped flood elevations. The DSL and COE require a joint fill/removal permit application that covers both agencies. These permits would likely take 60 days to obtain based on the small size of the project and the fact that they primarily consist of revegetation and stabilization of a small eroding bank outside the active summer flow.

Bank stabilization projects should be completed during the established in-water work period determined by the Oregon Department of Fish and Wildlife (ODFW) to minimize potential harm to fish and aquatic resources. For Dixon Creek, ODFW has established July 1<sup>st</sup> through October 15<sup>th</sup> as the in-water work period. In order to establish riparian trees, they should be planted during dormant times such as January and February, and should have irrigation provided for initial establishment through the first two or three summers depending on species planted and location. The revegetation portion of the project is not regulated and does not require permits, except that vegetation and planting may be required as a condition of other permits, or may be required to mitigate portions of the project impacts.

A typical project schedule that would accommodate different phases of the project is shown below in Table 4-4. The schedule assumes performance periods for each project phase based on recent projects similar in scale, and assumes linkages between phases.

**Table 5-4. Likely project schedule suitable for all the alternatives provided.**

Project Phase	Jan		Mar		May		Jul		Sep		Nov		Jan	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Outreach														
Design														
Permitting														
Construction														
Planting														

## 6 SUMMARY

A site visit was conducted to evaluate conditions at an existing log crib wall on Dixon Creek. Alternatives were provided for replacing the existing log crib wall on Dixon Creek with bioengineering slope stabilization, and considerations for project design and implementation were provided. It is recommended that bioengineering efforts be used to provide temporary bank stability while long-term stability is provided by re-establishment of vegetation. These techniques tend to be lower cost than in-stream structures and are easier to deal with design and permitting requirements. Various methods exist for establishing vegetation on eroding river banks and typical bioengineering concepts are provided for each site along with representative construction costs.

Portions of the work that will be performed in the active channel and require permits from the City, DSL, and COE. Work below the OHW will have to be performed during the ODFW in-water work period which is July 1st through October 15th. In addition to the typical concepts provided, several other good references exist that provide concepts for bioengineering stream banks. One example is the Natural Resources Conservation Service National Engineering Handbook (Section 654, Technical Supplement 14| Streambank Soil Bioengineering). This technical supplement is included as an attachment to this memorandum.

## MEMORANDUM

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**TO:** Kevin Russell, Land Use Supervisor  
**FROM:** Greg Gescher, City Engineer *rog*  
**DATE:** March 17, 2015  
**SUBJECT:** Dixon Creek Bank Stabilization, Project No. 655467

Public Works is developing a capital project to replace the log crib structure on Dixon Creek between 27<sup>th</sup> and 29<sup>th</sup> Streets. Based on our reading of the Land Development Code (LDC), replacement of this structure is exempt from the floodplain permit process. The log crib, which is City infrastructure, provides stability to the stream bank in the area, is located within a City-owned drainageway, and is failing.

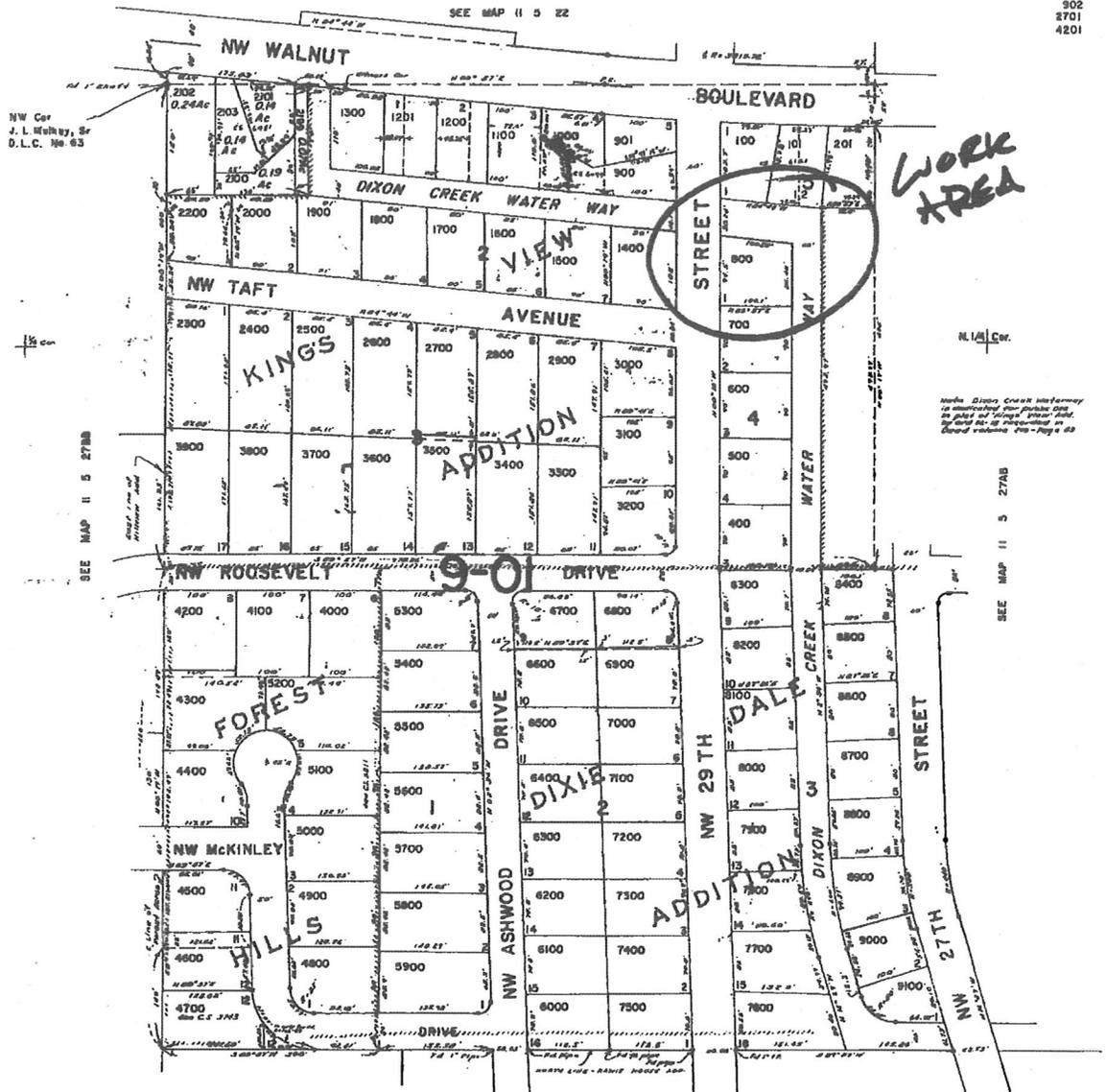
LDC section 2.11.40 outlines development activities that are exempt from a floodplain permit. The log crib replacement referenced above falls under the exemption of 2.11.40 (c), as this is an in-kind replacement of an existing structure that will not result in an increase in the base flood elevation. At the completion of this project, the new bank stabilization structure will result in an increase to the stream cross-section at this location.

Review and Concur

  
Kevin Russell *3/15*  
Date  
Development Services Land Use Supervisor

NE1/4 NW1/4 Sec. 27 T.11 S.R.5W. W. M.  
 BENTON COUNTY  
 1" = 100'

11 5 27BA  
 CORVALLIS  
 REV. 03-02-14  
 CANCELLED  
 300  
 200  
 1001  
 902  
 8701  
 4201



SEE MAP 11 5 27BD

11 5 27BA

