King County

INSTREAM PROJECT DESIGN CHECKLIST

For Design and Construction of Flood and Erosion Protection Facilities and Habitat Restoration Projects that May Include Large Wood Placement or Natural Wood Recruitment

Project Name: Tabor Crowall Revetment Repair Project **Project Manager**: Julie Titchbourne

River/River Mile/Bank: Cedar River/ River Mile (RM) 2.7 (Tabor Crowall) & 3.4 (Brodell)/ right bank

Date: 10/22/2024

Check one or both:

X Project includes placement of large wood elements

X Project may influence the recruitment, mobility and accumulation of natural large wood.

Note: *If the project is comprised of emergency work, then fill out and file this form within 30 days of completion of emergency work.*

I. Project Background and Preliminary Design (30-40 Percent) Information
(Provide general information at a conceptual level)

1. **Describe the overall river management context, strategy and objectives for the river reach. Refer to pertinent plans, policies or documents pertaining to flood hazards, salmon recovery, etc**.

   The Tabor-Crowall and Brodell revetments are on the right bank of the Cedar River between river miles 2.7 and 3.4 in the City of Renton. The reach of the Cedar River where the revetments are located is confined between the valley wall and State Route (SR) 169 and extends roughly from Interstate 405 upstream to the SR 169 Bridge.

   The reach is within the moderate and severe Channel Migration Zone (CMZ) hazard area, 16 percent of the surface is impervious, which is higher even than the lowest Cedar River reaches near downtown Renton. Of the total impervious surface area in the moderate and severe channel migration hazard areas in the Cedar River, more than half is in this reach. Impervious surfaces indicate the potential for degraded habitat and potential water quality concerns in the reach. In addition, this portion of the river has the second highest amount of floodplain fragmentation with 10 miles of road per square mile located within the CMZ. The active river channel width has been significantly reduced compared with conditions in 1936 due to construction of the Maple Valley Highway (SR 169).

   Based on percentages from the habitat suitability model, as developed in 2017 by King County in the Cedar River Corridor Existing Conditions Characterization Report, existing habitat quality in the reach surrounding the project sites ranks moderate compared to other portions of the Cedar River, with most (75 percent) of the area within the CMZ ranked low in habitat quality, 22 percent ranked moderate, and 2 percent ranked high. These percentages are similar to reaches of the Cedar River further upstream; however, this reach has more low-quality habitat based on total number of acres available, suggesting that this reach may have a relatively high level of habitat impairment, limiting factors, or constraints compared with most other Cedar River reaches.

2. **Describe the goals and objectives of the project and its relative importance to the success of DNRP program goals and mandates. Identify funding source(s) and describe any applicable requirements or constraints.**

The identified goals and opportunities for this project are as follows: 1) reduce flood risk to people, property, and infrastructure; 2) ensure new flood protection infrastructure meets current engineering standards to minimize maintenance costs and seismic risk; 3) improve natural river processes, function, and habitat, where feasible; and 4) meet FEMA requirements to design and implement repairs to the Tabor-Crowall revetment. These goals align with the stated goals of the DNRP to protect and restore aquatic habitat and to reduce risk to public safety.

Revetment design follows guidelines established by the US Army Corps of Engineers (USACE).

At Tabor-Crowall, the project has the following four major project elements:

▪ Revetment reconstruction along the right bank to repair damages.
▪ Placement of large wood connected to the revetment to deflect flow away from the revetment.
▪ Construction of a retaining wall above the 100-year water surface elevation along SR 169 to provide space for a more stable revetment slope.
▪ Construct an alcove along the left bank to provide habitat and floodplain storage.

At Brodell, the project has the following four major project elements:
▪ Revetment reconstruction along the right bank in the identified damage section.
▪ Placement of large wood connected to the revetment to deflect flow away from the revetment.
▪ Construction of a retaining wall above the 100-year water surface elevation along SR 169 to allow a more stable revetment slope.
▪ Relocation and protection of utilities crossing the Cedar River.

The large wood installation at the Tabor-Crowall and Brodell revetment repairs will create channel complexity and will allow natural movement and settling of the wood over time. Added deflector jams in places will provide safety for Cedar River recreational users.

The project is funded by the King County Flood Control District and FEMA reimbursement funds.

3. Describe the existing (and historic, if relevant) site and reach conditions, including structural features, channel form, and the presence of naturally-deposited large wood. Describe known utilization by salmonids and any important or unique biological or ecological attributes.

Predevelopment geomorphic conditions at the project sites likely resulted in relatively low channel migration rates and potentially even sediment-starved, incised conditions. This condition relates to deglaciation and the relative patterns of deposition and incision as the major rivers in the Puget Lowland begin to develop an equilibrium profile in a formerly glaciated landscape. Since European settlement in the basin, three major changes have further accentuated the natural incision and lack of channel migration at the project sites. The first of these major changes was at the Cedar River's outlet near Renton. Before 1912, the Cedar River drained into the Black River, not Lake Washington. A series of actions caused the Cedar River tailwater to become controlled by the locks in Ballard, which were considerably lower thus increasing the local gradient of the river. Second, the hydrology and geomorphology of the Cedar River changed due to operations at Seattle Public Utilities facilities in the upper basin (i.e., Masonry Dam, Chester Morse Lake, and the Landsburg Diversion). These facilities have changed the high- and low-flow characteristics of the river and reduced sediment supply to the project sites. Third, development and land-use conversion affect hydrology and sediment supply similar toother urbanized environments (i.e., peakier hydrology and increased sediment input).

4. Describe what is known about adjacent land uses and the type, frequency, and seasonality of recreational uses in the project area. Are there nearby trail corridors, schools or parks? What is the source(s) of your information?

The Tabor-Crowall revetment is located between Riverview Park and Maplewood Roadside Park, both City of Renton parks. Fishing in the vicinity of the Jeffrey P. Hagehorn Memorial Bridge and Maplewood Roadside Park is popular. The riverbank at Riverview Park is less accessible, but still used for recreation. Further, significant recreational activity occurs on the Cedar River Trail walkers and bikers) which passes by both project locations.

5. **If the project includes wood placement, describe the conceptual design of large wood elements of the project, including, if known at this stage in the design, the amount, size, location, orientation, elevation, anchoring techniques, and type of interaction with the river and stream at a range of flows.**

   Proposed work at Tabor-Crowall and Brodell will use large wood roughening complexes to provide habitat and bank stabilization. The large wood features will be composed of two types: bank roughening complex and extended bank roughening complex. Bank roughening complex will use varying wood layouts that extend below the OHWM and up to the 100-year water surface elevation. Extended bank roughening complexes will add hydraulic complexity, increase areas of hydraulic shadows, and provide refuge areas for aquatic organisms. These roughening structures will be interspersed with 10-foot to-12-foot transition zones where minimal wood will encourage formation of scour holes and eddies. Deflector jams will be installed at the upstream end of Tabor-Crowall to address a local scour hole and begin directing the Cedar River to the proposed alcoves on the opposite bank. Large wood for deflecting flows are similar in hydraulic nature to groynes, spurs, or barbs, although far more pervious and complex. The crest length of the large wood complexes will be small enough that the blockage is less than one-third of the channel width to decrease impacts to the opposite bank.

6. **If the project includes wood placement, what is the intended structural, ecological or hydraulic function of the placed wood? What role does the placed wood have in meeting the project's goals and objectives? Is the project intended to recruit or trap additional large wood that may be floating in the river?**

   Wood placement will be used to direct the thalweg away from the revetments. Large wood will provide cover and habitat for aquatic organisms, create hydraulic and channel complexity, act as an indirect source of nutrients, and improve bank stability. At Tabor-Crowall, additional structures will be included to act as deflectors to protect river recreationists. The large wood design will apply recommendations from the Washington State Department of Transportation Hydraulics Manual (2023a) and the Bank Stabilization Design Guidelines (US Bureau of Reclamation (USBR) 2015). These guidelines recommend ELJs as a bank stabilization approach that can control streambank erosion by slowing water velocities and reducing hydraulic shear; further, the National Large Wood Manual (USBR and USACE 2016) notes large wood structures are best when toe erosion is the primary failure process as indicated in the 2017 Cedar River Corridor Existing Conditions Characterization Report. LWM also will be designed to provide a variety of physical and biological benefits to stream morphology and aquatic habitat. The project is not intended to recruit or trap additional large wood transported by the river. This may naturally occur depending on river stage and conditions, but it is not a stated goal of the project.

7. **Is the project likely to affect the recruitment, mobility or accumulation of natural large wood, e.g., by encouraging wood deposition on or near the site or promoting bank erosion that may cause tree toppling? Describe expected site evolution and its potential effects on natural wood dynamics.**

   Recruitment or accumulation of natural large wood may naturally occur depending on river stage and conditions, but it is not a stated goal of the project. Preservation of existing trees will minimize tree loss and recruitment via toppling. The proposed LWM structures will be boulder ballasted and will not contribute additional mobile wood to the Cedar River.

8. **Describe how public safety considerations have been incorporated into the preliminary project design. For placed wood, address each of the considerations:**

   a. **Type, frequency, and seasonality of recreational use**:
   Recreational use of the river in the project sites is intense compared with equivalent river stretches in King County, although most boaters exit upstream of the project sites; *The Cedar River Recreation Study: Floating the Cedar River* (King County 2011). The recreation study also documented that most vessels observed on the river were floating tubes. Because this study was conducted during the summer when usage is higher due to warm weather, it does not address whether there are differences in use during the spring, fall, and winter seasons.

   b. **Wood location, positioning, and anchoring techniques**:
   Structure layout and placement will be further refined during future project design phases. Large wood placement will be informed by the hydraulic shadow and impacts created by the structures and geomorphic

uncertainty associated with the Cedar River. Structure spacing and projection length and height dictate the effects and impacts. Anchoring the proposed roughening complexes and bumper logs will be further defined in future design phases. Horizontal forces will be counteracted by additional ballast, structures embedded deep into banks, or piles supporting the structures.

c. **Maximizing achievement of project goals and objectives while minimizing potential public safety risks**:
A goal for using large wood as part of the Tabor-Crowall and Brodell revetment repair work includes creating a diverse layout that allows natural movement and settling of the wood over time and remains safe for Cedar River recreational users. Bumper logs will be used in some locations to minimize risk to recreationists. Using cabling and chain is not preferable due to concerns to aquatic organisms and recreational river users, and using any anchoring methods will aim to maintain habitat and safety benefits.

d. **Use of established and recognized engineering, geological, and ecological expertise:**
Licensed civil, hydraulic, and geotechnical engineers performed the hydrologic, hydraulic, geotechnical, scour, and large wood stability assessments. Experienced fluvial geomorphologists and geologists conducted field and channel assessments. Licensed Washington State Professional Engineers developed and reviewed all aspects of the 30% Design Plans.

9. **Has the project been reviewed and approved by a Licensed Professional Civil Engineer? Please list other licensed technical staff who have reviewed and provided input on the design (e.g., Licensed Geologist and Licensed Engineering Geologist). Specify the Engineer of Record for the design and any other Licensed Professionals who have sealed their portion of the design plans. Were all reviews and approvals completed?**
The 30% plans have been reviewed by several Licensed Professional Civil Engineers at Jacobs (Dustin Atchison, Amy Carlson) as well as King County (Julie Titchbourne, Dan Brubaker). Key input was provided by a King County Licensed Engineering Geologist (Judi Radloff). Dustin Atchison, PE (Jacobs) is the engineer of record.

10. **Has the project been reviewed and approved by a King County Professional Ecologist (e.g., person with an advanced degree in aquatic and/or biological sciences from an accredited university or equivalent level of experience) if ecological benefits are an intended project objective, to evaluate the consistency of the design with project goals, existing environmental policies and regulations, and expected or known permit conditions? Specify the Reviewing Ecologist for the project. Was this review and approval completed? What is the anticipated schedule for completing project milestones (30-40% design, final design, major construction/earthmoving) and for soliciting public input)?**

John Klochak, Project Ecologist, approved the design of the wood structures and alcoves. The project has reached the 30% design milestone. Final design will be complete in 2025. The anticipated project construction date is Summer 2026.

10/23/2024

Project Manager Date

Supervising Engineer, Project Supervisor or Unit Manager Date