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 Elliott Bridge Reach Off-Channel Habitat And Floodplain Reconnection Project Manager Jon Hansen

River/River Mile/Bank RM 5.2 – 5.6, both banks Date March, 2016

Note: This checklist revises information contained in previously circulated checklist s (January and May, 2015). Phase 1 of this project was constructed during the summer of 2015. All new information regards Phase 2 of the project, which involves construction of a Scour Structure on the right (north) bank of the Cedar River. New or revised information is shown in BLUE text. Text no longer applicable will show with a strike-through line.

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.

Existing planning documents that specifically define management goals and strategies for the Cedar River include:

- Lower Cedar River Basin and Nonpoint Pollution Action Plan (King County Watershed Management Committee, 1997);
- Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Near-Term Action Agenda for Salmon Habitat Conservation (Lake Washington/Cedar/Sammamish {WRIA 8} Forum, 2002);
- Final Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan (Lake Washington/Cedar/Sammamish {WRIA 8} Forum, 2005);
- 2006 King County Flood Hazard Management Plan (King County Department of Natural Resources and Parks, 2006—updated in 2013.)

Both the Lower Cedar River Basin and Nonpoint Pollution Action Plan and the King County Flood Hazard Management Plan identified the need to remove houses that experienced frequent flooding from downstream of the Elliott Bridge (then located in the middle of the present project area) and restore up to 16 acres of flood storage and habitat in this area. The houses identified and several others have already been removed and this project helps to restore flood storage and habitat in the area, consistent with the objectives identified in that plan.

The Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Near-Term Action Agenda identifies loss of channel complexity and connectivity as a factor contributing to decline of Chinook salmon in the system and calls for reconnection/restoration of off-channel habitat, removal of bank-hardening structures from the floodplain, and identification of opportunities to safely increase large woody debris within the system.

The Final Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan identifies protection and restoration of riparian vegetation as a source of large woody debris to the river and direct addition of woody debris to create pools and riffles as technical priorities on its Tier 1 Action Start-List.

In general, all of the planning documents addressing the Cedar River corridor and the Elliott Bridge Reach specifically identify the need to remove flood-prone structures from the floodplain and, where possible, remove structures that restrict the migration and complexity of the river channel. These actions allow natural habitat-forming-processes, including recruitment of woody debris to the mainstem channel, to improve conditions for fish.

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 project will create wetland and aquatic habitat and restore floodplain functions within the Elliott Bridge Reach (EBR) of the Cedar River to satisfy mitigation obligations transferred from WSDOT to King County through the federally authorized In-Lieu Fee Mitigation Program (aka MRP). Specific goals and objectives of the project include:

A. Create wetland, off-channel, in-channel and floodplain habitats that satisfy mitigation obligations transferred to King County from the WSDOT SR 520 project.
B. Address potential impacts to recreational safety.
C. Maintain current level of flood hazard protection to adjacent properties.
D. Implement a project that is compatible with future reach wide habitat and flood hazard reduction projects.

Several of these objectives involve placing large wood in the floodplain, backwater areas and directly in the channel of the Cedar River. Most of these large wood pieces are far from the low-flow channel of the river and are unlikely to be encountered by recreational users.

However, one requirement of the mitigation obligation is the construction of a wood structure that creates a scour pool and cover for adult salmon in the mainstem channel of the Cedar River. Such habitats are increasingly rare in the Cedar River due to its confinement by levees, lack of natural large wood and loss of riparian sources of large wood.

The requirement that the structure form a scour pool means that the structure needs to interact with relatively high-energy currents and precludes locating the structure on the inside of a bend or other sheltered area of the river where it would be less likely to be encountered by recreational river users. The requirement that the structure provide instream cover for fish means that it needs to intrude into the active low-flow channel for fish to be able to use it. Behavioral patterns of adult salmon in the Cedar River indicate that the scour pool and cover will be of most benefit if it is located in a reach of the river heavily used for spawning. All of these factors were considered in siting the scour structure, which will be located along the right (north) bank of the river near the end of an existing levee and revetment (Orting Hill levee). A rock diversion structure will be constructed upstream of the scour structure to deflect river users around the scour structure. A crescent-shaped alcove will be excavated from the right bank of the river, in which the scour structure and rock diversion structure will be built.

Mitigation obligations also require the placement of 51 logs within a backwater channel to be constructed off the left (south) bank of the river. These logs will be anchored by burying them in the bank of the backwater channel. These logs are very unlikely to be encountered by recreational river users.

Five more logs, likely in the form of full-sized coniferous trees, will be placed on the right (north) bank in an area where "aquatic margin habitat" will be enhanced. These logs will be shoreward of the low flow channel with their tips facing riverward and slightly downstream. The location is on the inside of a bend in the river and they are unlikely to be hazardous to recreational river users.

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.

Existing and Historical Conditions

The Elliott Bridge Reach is so named for the bridge that used to cross over the Cedar River around the middle of the present project site. The old Elliott Bridge was removed and replaced by the new 154th Place SE Bridge which is located about 1,000 feet upstream and at the upstream boundary of the present project site. The abutments and elevated approaches to the former bridge are still present in the floodplain on either bank and enforce a constriction in the channel here.

Both sides of the river were, until recently, occupied by residential structures which were protected by levees and revetments. The Orting Hill Levee presently runs along the right (north) bank from the new 154th Street Bridge downstream to the abutment of the old Elliott Bridge. This levee/revetment restricts channel migration and, to a limited degree, prevents flooding of the properties landward. However, these properties still experience relatively frequent flooding and so were purchased by King County as part of its Flood-Prone Property Buyout program over the last several years. All of the residential structures in this area have since been removed.

Another levee, known as the Elliott Bridge Levee, begins on the left (south) bank about 1,000 feet downstream of the 154th Pl. SE Bridge and forces the river to turn slightly to the north. Formerly, this levee constrained the river as it approached the old and now-removed Elliott Bridge and it ends after about 500 feet at the remaining concrete abutment and fill prism that was the southern approach to the old bridge. A corresponding fill prism exists across the river on the right bank. The left (south) bank is unprotected and relatively natural downstream of these old bridge approaches and abutments.

The Punett Briggs Revement armors the right (north) bank beginning about 400 feet downstream of the old bridge approaches and protects several residential structures landward. Between the old bridge approaches and this revetment are two remaining residential structures with relatively low, unprotected banks.

The historical presence of bridges over the river in this location (including a predecessor of the Elliott Bridge that was located near the upstream end of the Prunett Briggs Revement) and the use of levees and revetments to restrict channel migration in their vicinity has caused the river channel to become narrower and simpler through this reach. Historical sources going back to the original Government Land Office maps of the late 1800's show that the channel used to migrate frequently across its floodplain, especially to the south of its present location. The narrower and deeper channel that has resulted also has steeper, often rock-protected banks, all of which have decreased the frequency with which trees mobilized by the river stick and persist in this reach of the river. During the planning phases of this project, virtually no large wood was present in the channel in this reach of the river.

Fish Use and Ecological Attributes
The Cedar River is used by coho, sockeye and ESA-listed Chinook salmon, coastal cutthroat, rainbow and ESA-listed steelhead trout, and other species. The greater Elliott Bridge Reach (extending upstream and downstream from the project area) contains heavily-used salmon spawning grounds (just downstream of the 154th Pl.SE bridge), previous side/backwater channel restoration projects (downstream of the project site), and log jams resulting from landslides (downstream of the project site).

In addition to the levees and revetments described above, there are numerous residential structures located immediately on the river channel banks upstream of the 154th Pl. SE Bridge and more levees and revetments both upstream and downstream of the project site. The project site is just outside the city limits of Renton, Washington and the entire lower and middle Cedar River have been subject to residential, commercial and infrastructure development for well over 100 years. The resulting river is constrained and constricted for most of its length and lacking in off-channel habitats that are critical for rearing of several species of juvenile salmonids.

Development of the Cedar River valley and floodplain has also affected riparian vegetation and function. Few stands of mature conifer trees remain on the river banks and consequently comparatively few such trees are recruited and mobilized by the river during floods and storms. Degradation of riparian vegetation communities, along with residential, commercial and infrastructure development and restriction of channel migration have resulted in a mainstem channel that is simplified and lacks the hydraulic diversity that would be present in a channel allowed to migrate naturally.

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?

Although most of the land adjacent to the river within the project area is owned by King County as a result of previous flood buyout programs, there are several remaining privately-owned parcels fronting the river on either bank within the general project area. Precautions have been incorporated into the design of the project to prevent additional flooding or channel migration risk to these properties. Ron Regis Park, owned and operated by the City of Renton, is located immediately downstream of the project area. The river front of Ron Regis Park is mostly natural and provides good habitat. Heavily used portions of the park, such as ball fields, are located well away from the

river. The Cedar River Trail, constructed on an abandoned railroad grade, runs parallel to State Route 169 and is also well away from the river in this section.

Many recreational floaters use the Cedar River, primarily but not exclusively in the summer months. Studies of recreational use of the Cedar River were conducted by King County in 2010 and again in 2013. These studies showed recreational use in the Elliott Bridge Reach to be among the highest on the river. Cameras set up to characterize summer river use in the reach extending from the 154th Pl. SE Bridge downstream through Ron Regis Park recorded 1,541 individual users in 653 different groups. Of the 1,368 vessels in those groups, almost 80% were inner tubes and only 13.5% had paddles or oars to assist with navigation. Less than 16% of the river floaters and boaters wore life vests or other personal floatation devices (*Synthesis of 2013 River Recreation Studies*, Herrera Environmental Consultants, 2014).

The recreational user study indicates that many users may be unaware of river safety hazards or best practices and lack the basic equipment required to safely navigate this reach of the Cedar River. Furthermore, landslide activities just downstream of the proposed project site have deposited numerous trees and logs in the river channel that could pose hazards to recreational users. The project design team has taken great caution to minimize additional hazards to river users that may result from this project.

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.

The majority of the large wood to be installed as part of this project will be placed far from the mainstem river channel and is very unlikely to be encountered by recreational river users. However, a "Scour Structure" will be constructed in an alcove on the right (north) bank of the river about 300 feet downstream of the 154th Pl. SE Bridge. As described above in the answer to Question 2, this structure must be located where it will interact with current of significant energy in order to produce a scour pool within the main channel. The structure will be constructed in an alcove to be excavated from the right bank of the river channel. This alcove will be about 22 feet wide (measured from the present toe-of-bank to the new toe-of-bank. The scour structure will be located completely within this alcove. Because this location is on the outside of a slight bend in the river, it will still receive sufficient energy from flows in the river, especially during high flows, to cause a scour pool. The structure will consist of 16 logs with rootwads, most of which will be oriented parallel to the channel with rootwads facing upstream. The logs will be stacked three abreast and three high with several oriented perpendicular to the rest and connecting the structure to the adjacent river bank. This complex of logs will be anchored in place using 9 timber pilings driven into the river bed within the alcove. The structure will be secured to the adjacent rock levee face to reduce the potential for flows going between the structure and the river bank. ~~The entire structure will protrude into the low-flow channel of the river, about 15 feet from the toe of the right bank.~~ The entire structure will protrude about 15 out into the channel from the bank of the newly-excavated alcove, but will still be landward of the edge of the existing low-flow channel.

To reduce the potential hazard from this structure to recreational river users, a rock deflector structure will be placed upstream of the log complex to deflect river users around the complex. The deflector structure will be constructed of large and small boulders and cobbles and will extend to an elevation sufficient to deflect river users at flows up to 1,200 cubic feet per second (c.f.s.), well above flow levels at which most recreationists use the river. Most of the rock deflector structure will also be located within the newly-excavated alcove, but the outer tip of the deflector structure will protrude about ten feet into the existing low-flow channel.

The 1,200 c.f.s. level was selected by analyzing patterns of river use by recreational boaters, river flows and air temperature, and by conferring with river rescue experts with King County Sheriff Marine Unit and representatives of the recreational boating community. While highly-skilled kayakers may float the river at almost any flow level, the vast majority of recreational users float only during the late spring and summer when air temperatures are relatively warm (higher than 69 degrees). The King County Sheriff reports that most river rescues and accidents occur during the spring, when air temperature rises, but water temperatures are lower and flows are higher. To be conservative, the design team examined 20 years of air temperature and water flow discharge data for May and June and found that flows rarely (10% of days) exceeded 1200 c.f.s. on days when the air temperature exceeded 69 degrees. Data from King County's study of recreational use of the river also shows that river users using inner tubes or air mattresses very rarely use the river until later in the season, typically the end of June or July, when flow levels are typically much lower. The 1200 c.f.s. level is also consistent with flow levels recommended for boating by American Whitewater, an organization that typically caters to more skilled paddlers. They recommend floating the

Cedar River at flows between 400 c.f.s. and 1200 c.f.s. (http://www.americanwhitewater.org/content/River/detail/id/2078/).

The design of the scour structure was developed and refined using modelling techniques that enabled the designers to increase the ability of the structure to scour a pool while reducing its intrusion into the river. Modelling shows that scour can be increased by building the structure higher, rather than wider. By doing so, the structure interacts with high-energy flows that accompany high river flows which produce significant scour, while reducing interaction with low-energy flows present when most recreational users are in the river.

In addition to the scour structure, five large trees will be placed along the river margin on the right bank between 600 and 800 feet downstream of the 154th Pl. Bridge. This location is on the inside of a bend in the river where recreational users propelled by the river current will be unlikely to encounter them. These trees will be just outside of the low-flow channel and oriented with their tips pointed toward the river and angled slightly downstream. The trees will begin to interact with river flows at around 300-400 c.f.s.

Approximately 51 pieces of large wood will be placed in the backwater channel to be constructed on the left (south) bank. These logs and trees are intended to provide complexity and cover for fish using the backwater channel. Most of these pieces will be buried in the bank of the backwater channel for most of their lengths with the root ball end protruding outward into the backwater channel. Eight large trees will be buried so that their trunks span the bottom of the backwater channel with their tops and root balls buried in opposing banks. The backwater channel will be fed by groundwater and will have very slow currents during all but overbank flood flows. Recreational river users are very unlikely to encounter any of the large wood in the backwater channel due to its small size and relative inaccessibility.

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?

The scour structure is intended to cause formation of a scour pool in the main channel of the river and to provide cover for adult salmon. Adult salmon use cover habitat such as deep pools or wood complexes that are near spawning areas for rest and safety while preparing to spawn. These types of habitat are increasingly rare in the Cedar River, especially in proximity to prime spawning areas, such as those located just downstream of the 154th Pl. SE Bridge.

Construction of the scour pool fulfills a specific requirement of the mitigation for the SR 520 Bridge Replacement. The agreement which transfers the responsibility for these mitigation requirements to King County states that the County will, "(p)rovide an engineered log jam (or similar structure) to form a scour pool(s) suitable for adult salmon holding habitat. Wood should be exposed to the normal range of flows and withstand 100-year flow conditions." The requirement that the structure form a scour pool necessarily entails that the structure interact with currents of sufficient energy to create that scour. For this reason, the structure cannot be located on the inside of a river bend or other more quiescent site where boaters drifting on the current are less likely to encounter it. The location of the structure in an alcove on the outside of a slight bend in the river will allow the structure to interact with high-energy flows during high water events when boaters are unlikely to be present.

The scour structure may recruit additional woody debris. This may enhance the ecological functions provided by the structure, but could also pose risks to recreational river users. King County, in coordination with relevant regulatory agencies and the King County Sheriff's office, will assess and, if necessary, manage recruited wood according to King County procedures.

The five large trees to be placed on the river margin of the constructed wetland are intended to provide cover and complexity to the low-angle, frequently inundated bank area on the inside of the river bend. These areas are used by juvenile salmon, including ESA-listed Chinook, during their rearing stages in the river. These trees and the constructed wetland as a whole may recruit additional wood that floats in the river, especially during floods when these areas are inundated and will form a quiescent backwater. Wood floating in the river may collect here as flood flows retreat. This would be a relatively safe place for wood to collect as recreational river users are unlikely to encounter it.

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?

The Project Manager of the Elliott Bridge Reach project is a King County Professional Ecologist and is the Reviewing Ecologist for this project. Two additional King County Professional Ecologists worked extensively on the design and permitting of this project. The Reviewing Ecologist has reviewed the current plan set. Final design approval will not occur until the Final Design Plans have been completed. The project design has occurred under the supervision of a project supervisor who is also the design unit's manager and a professional ecologist.

30% Design was completed during October, 2014. ~~Final design is scheduled to be completed in March of 2015. Construction will begin in summer, 2015. Formal public review and comment will be solicited in January, 2015.~~ Final Design Plans for Phase 1 of the project, which included all project elements other than the scour structure (and the associated rock deflector structure and right bank alcove), was approved by the Engineer of Record on April 10, 2015. Phase 2 design plans will be approved after all necessary permits have been received and the Final Design Plans are complete.

Plans for Phase 1 of the project and depicting an earlier version of the scour structure (Phase 2) were posted for public comment in May, 2015. This checklist includes updated information regarding the scour structure and Phase 2 of the project, which will be constructed in summer, 2016.

The design team has already engaged members of the recreational boating community to discuss specific design parameters. These individuals have provided numerous suggestions for increasing the safety of the proposed structures, many of which have been incorporated into the designs. They have been very helpful in identifying flow levels at which recreational users are likely to be in the river and specific orientations of log structures that decrease their potential hazard.

Jon [signature] 3/14/16

Project Manager Date

[signature] 3/14/16

Supervising Engineer, Project Supervisor or Unit Manager Date

II. Pre-Construction Information (70% or 100% design with permits) *These questions relate to the designed and permitted project. Information should include input resulting from permit review process, SEPA, boater safety meetings and any other stakeholders.*

11. Have any answers provided in Section I at the Preliminary Design Phase changed in the interim? If so, provide the new answers and the rationale for the change.

    ~~No.~~ The answers provided in Section 1 above, as annotated and amended in blue text, are all still an accurate reflection of site conditions and the project design. The one notable change relates to the schedule for the proposed work. Although the majority of the project will be constructed in 2015, the project is now being phased to delay construction of the scour structure located in the mainstem of the Cedar River until 2016. The decision to phase construction was based on meetings and verbal feedback on the plans received from recreational safety advocates and resource/regulatory agencies. The additional time is intended to provide an opportunity to work through final details of this feature with stakeholders and to ensure input and concerns are fully considered.

12. What regulatory review or permits are required for the project (e.g. HPA, Clearing and Grading permit, COE permits)? List any conditions or requirements included in the permit approvals relevant to placement of large wood in the project.

    The project required local, state and federal permits including:

    - King County - Clearing and Grading, Shoreline Exemption, Flood Hazard Certification, Special Use Permit from KC Dept. of Transportation
    - State - Hydraulic Project Approval (HPA), NPDES Permit, Section 401 Water Quality Certification and Aquatic Use Authorization
    - Federal - Section 404 Nationwide Permit 27, Endangered Species Act Concurrence, Section 106 National Historic Preservation Act Compliance

    Relevant Permit Conditions – King County is obligated through mitigation plans and agreements to incorporate large wood and a mainstem scour structure into the project. Although these requirements were originally conveyed through federal and state permits, they are summarized in the text of the HPA permit ~~(attached)~~. HPA conditions 13 and 14 require wood placement within the created habitat areas and specify that all placed wood must extend a minimum of 1/3 into the low flow channel. Project design staff has worked diligently to design a project that complies with the goals of the conditions of the HPA while minimizing potential safety hazards. A new HPA (attached) has been issued for Phase 2 of the project, which includes the scour structure.

13. What specific actions or project elements were employed to address public safety in the final, permit-approved design?

    Public safety has been a primary consideration in the design of the project from the beginning. Great care has been taken to evaluate potential hazards and to adjust the design to achieve the intended function while minimizing potential risk and hazard. The most prominent feature includes a rock deflector intended to deflect recreational users away from the scour structure at recreational flow levels. Wood placement elsewhere has also been sited and oriented to minimize potential hazards. The newest iteration of the design of the scour structure includes placing that structure in an alcove excavated from the river bank. This will further remove the structure from potential encounters with recreational boaters.

14. Describe how the project team solicited public input on the preliminary design. Describe the input received from the public and how, if appropriate, the project team has responded to this input.

    Members of the project team have proactively sought input on the project from the public, regulatory agencies and recreational safety advocates. In addition to posting plans and project information on the project website, attending

public meetings and sending direct mailings out to residents, the team has held specific meetings with key stakeholders to obtain feedback. Representatives from the team have met on-site with members of the River Safety Council to review plans and discuss safety concerns, as well as project obligations. A similar meeting was held with staff from regulatory and resources agencies. Input received was largely focused on the right bank scour structure which is of keen interest to all parties. Input on the project has been used to revise the design in numerous ways, including the inclusion of additional safety elements (rock deflector) and revised placement of wood (location and orientation) within the project limits.

The project team will continue to work with the public on the design of the right bank scour structure that is slated for construction in 2016.

15. Describe any additional design modifications or mitigating actions that were or will be taken in response to the public comments.

    Project design has been modified in response to the input received from the public including the configuration of a rock deflector upstream of the planned right bank scour structure, reorientation of large wood placed on the right bank and strategically placing another wood cluster at the mouth of the backwater channel and along the left bank. Design of all of the features considered flow levels, river position, sight distance and other factors to maximize achievement of project goals and objectives while minimizing potential hazards to the public.

16. Will further educational or informational materials be made available to the public to heighten awareness of the project (e.g., public meeting, press release, informational website, or temporary or permanent signage posted in the vicinity of the project)? If so, explain.

    Yes. Information related to the project will continue to be distributed through the project website, public meetings, direct mailings and press releases as appropriate. A press release will be made in advance of construction this summer, with updates as necessary to track progress. Following construction, signs will be placed upstream to alert users to the changed river conditions. The project will continue to be monitored and results shared with the public via the County websites and updates at the annual Cedar River meeting and/or Cedar River Council meetings. If hazards develop, a press release will be published and the County river hazard webpage will be updated to advise users and appropriate signage will be placed upstream.

17. If the project is expected to influence the recruitment, mobility or accumulation of natural wood, has a Public Safety Management Plan been completed?

    Yes. A plan for addressing potential hazards that may evolve has been developed for the site.

Project Manager — Date: 3/14/16

Supervising Engineer, Project Supervisor or Unit Manager — Date: 3/14/16