Department of Fish and Wildlife

PROCEDURE FOR USING ALTERNATIVE METHODS TO DESIGN WATER CROSSINGS OVER FISH-BEARING WATERS

This procedure applies:

A. To all bridge or culvert crossing projects that use other published design manuals or guidelines instead of methods outlined in WAC 220-110-190 and the Water Crossing Design Guidelines (WDFW, 2013) for the protection of fishlife.
B. To all bridge or culvert crossing projects using alternative designs instead of methods outlined in WAC 220-110-190 and the Water Crossing Design Guidelines (WDFW, 2013) for the protection of fishlife.

Definitions: <<to be developed as needed>>

1. Procedure for WDFW approval of published water crossing guidelines

A. Submit published water crossing design guidelines or manual to WDFW Habitat Program
B. WDFW engineers and biologists will review document to determine if the procedures and methods address the requirements of state law and code:
    i. Design cannot be based solely on cost and safety concerns but must also consider the protection of fishlife and their habitat. Fish habitat is created and maintained by normal, expected stream processes. Design methods must address the evolution of the channel profile and planform; the movement and staging of sediment and debris; and the preservation or development of natural banks and riparian zone.
    ii. The design method must specifically consider fish passage. As expressed in WAC 220-110-190 passage must be provided for all fish. Passage is defined as the prevailing conditions in the adjacent natural channel not on the swimming or jumping ability of a specific species.

2. Procedure for using alternative design for water crossings

Each alternative design must be accompanied by a background and planning document that includes these elements:

1. **The study plan.** The study plan includes the project background and design with specific objectives and performance measures. The study plan should also consider earlier research on projects similar to the one at hand, and it should include the following:
    a. Background and assumptions behind design that might include some or all of the following:
        i. Suitability of site: slope ratio, channel profile and stability assessment, sediment and debris loading
        ii. Channel bankfull width and an assessment of floodplain functions given site conditions

iii. Any hydrology or hydraulic modeling developed as part of the design giving design flows and depths
iv. An assessment of sediment gradation and transport in the channel

b. Design:
i. Structure width and design justification
ii. Design bed mix
iii. Bed configuration
iv. Profile adjustments and transitions to existing channel.

c. Performance measures: Specific performance measures should be described in the study plan, and might include but should not be limited to:
i. Key bed elevations. The elevation of bed surfaces at the inlet and outlet of the culvert as they relate to a permanent bench mark and the as-built invert elevation or footing top elevation. The criteria might be "inlet crossing bed elevation must be a minimum of 3.0 feet and maximum 4.5 feet above the culvert invert elevation."
ii. Channel gradients. Measure the gradient (slope) of the channel upstream of the culvert, through the culvert and downstream of the culvert. The criteria might say: "gradient of the channel within the culvert should not vary from upstream or downstream gradient by more than 25%."
iii. Bed material gradation. Crossing bed material gradation must meet specified criteria such as: " median project bed material size should +/-20% of adjacent channel median particle size"
iv. Scour remediation has not been required to protect structure.
v. Scour of the bed within the structure has not resulted in depths greater than prevailing stream pool depth.
vi. Additional measures as needed to characterize the project.

2. **Inspection and maintenance.** Compliance monitoring should verify that the project was built according to the plans and specifications with particular attention to the performance measures. Compliance monitoring should be documented with an as-built plan. Deviations from the plans and specifications should be consistent with the design guidelines and approved by the design engineer. Remediation should be based on the contingency plan. The project should be monitored for a minimum of 3 years after completion of construction, and the results documented in a short report provided to WDFW describing the condition of the crossing and an evaluation of the performance measures. Please include photos showing year to year changes, if any.
3. **Contingency plan.** The contingency plan is a commitment to upgrade the crossing or improve the channel conditions if it fails to function structurally for fish passage or fish habitat. The criteria are contained in the performance measures. The contingency plan should include specific actions that will be taken if the performance measures fall outside the stated criteria, as described in section 1(c).

Closure. Prior to submitting the final 3 year monitoring report the participating parties will meet onsite with WDFW to evaluate the project according to the performance measures and determine if any contingencies need to be implemented or if final sign-off can occur. Sign-off may be delayed to a later

date upon mutual agreement of the parties. Projects that have been signed-off do not require additional monitoring.

Continued use of an alternative design method. The design method employed in the alternative procedure described above cannot be used for subsequent projects without the repeated use of this procedure since conditions vary widely between sites. After the successful application of this procedure at 4 sites in a given geographical area encompassing the expected range of site conditions, including a range of hydrologic events to validate the approach, the design method may be considered for approval with a reduced inspection and monitoring routine.