GENERAL CONSTRUCTION NOTES
- Logs will be delivered and decked via road but then moved by helicopter to placement sites on gravel bars or streambank.
- Excavator access route (not shown) is unimproved through side channel and cannot support hauling.
- Native gravel excavated from piling and key member trenches shall be temporarily staged in piles outside of wetted channel.
- Logs will not be cabled.
- Worksite isolation and fish removal will occur, as necessary.
- Turbid construction water may be pumped into side channel and is expected to completely filter before reaching river again.

GENERAL DESIGN NOTES
- Placement locations based on USFWS 2009 geomorphic analysis.
- Structure designs based on natural, stable analogs in White River, WA.
- ELJs may deform, gain or lose wood in-time but overall structure will remain persistent.
- Scour depth predictions based on 50-year flow but geomorphic features based on bankfull discharge (est. 1911 cfs/1.62 RI).
**ELJ 3 WORKSITE ISOLATION NOTES**

- Work at ELJ 3 may occur in wetted channel, as permits allow
- No coffer dam is required, however, key member trench excavation must occur from land toward water to minimize time working instream
- Backfill must occur immediately after placing key members and will occur from water toward land to minimize turbidity and exposure to flowing water

**MATERIALS**

Bulk bags shall be cube-shaped polypropylene woven fabrics with fully open top, flat bottom, four loops, minimum 2-ton weight capacity, and 5:1 minimum safety factor. Bags shall be filled with existing river cobble.

Plastic sheeting shall be at least 6-mm thickness. Roll length shall cover the entire cofferdam without seams. Minimum 12-ft wide roll shall be used for single layer cofferdam.

**PUMPS**

Pumping will lower water levels within each confined area to prevent the escape of turbid water under the cofferdam or through voids into the riverbed gravel. The intent of pumping will not necessarily be to remove all the water from the impoundment area, but to create a low-pressure condition so that if there are any leaks, clean water will flow toward the construction area. The Contractor shall be responsible for determining pump capacity requirements to prevent turbid construction water from escaping the impoundment. Pumping shall be in accordance with all applicable permits.

**DISCHARGE**

Turbid water shall be discharged into the vegetated side channel to allow for infiltration. Cofferdam materials shall be removed after ELJ construction is complete and any construction-related impacts rehabilitated.
**Dillwater Large Wood Enhancement**

**Entiat, WA**

**R. Parrish**

**June 2, 2011**

**ELJ 1 detail**

**Profile View**

---

**Excavate 30 x 45 x 4.5 ft lenticular-shaped scour pool (est. quantity = 117 yds$^3$)**

**Excavate 60 x 40 x 7.5 ft hole to place horizontal key members and pilings, replace all material as ballast (est. quantity = 348 yds$^3$)**

**Backfill key members and create a tapered bar with pool spoils (ballast)**

**Align secondary member root wads just in front of pilings to protect from scour**

**Place secondary members on wetted-edge first**

**Backfill key members and create a tapered bar with pool spoils (ballast)**

**Backfill above key, secondary members with pool spoils, taper and grade 10:1 or flatter**

**Scour pool bed elevation 81.0 ft.**

**Flows**

---

**GENERAL STRUCTURE NOTES**

- Designed to provide fish habitat at all flows (perennial)
- Located on existing depositional bar and adjacent to side channel where splitting flows may dissipate energy
- ELJ is mid-channel-type based on analogs from White River (WA)
- ELJ will incorporate any existing on-site wood
- Internal structure should be packed with lots of branches, slash to reduce velocities inside structure
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur after completing #2
- All work shall occur from dry gravel bar after worksite isolation
- Turbid water created may be pumped into adjacent side channel to naturally filter

---

**Profile View**

NOT TO SCALE
Scour pool excavation
(approx. 125 yds^3)

Dig key member trenches
with 2-hole auger into bank
(approx. 200 yds^3 excavation)

Alternate root wad placement
on bank and in worked channel

Racked members create a
tight weave to deflect
incoming stream energy

Racked members slope
toward river and inversely
to water surface slope

Excavate key members
to elevation below
predicted scour depth
equal to DBH
(approx. 80.0 ft.)

Excavate key members
to elevation below
predicted scour depth
equal to DBH
(approx. 80.0 ft.)

Backfill all trenches to pre-
existing ground elevation

Incorporate willow cuttings into
backfill trenches and streambank

GENERAL STRUCTURE NOTES
- Designed to provide fish habitat at all flows (perennial)
- ELJ will enhance and utilize all existing wood
- ELJ is deflector-type based on analogs from White River (WA)
- Internal structure should be packed with lots of branches, slash to reduce velocities along streambank
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur after completing #4

Deflector Jam 2 Location Photo
CONSTRUCTION NOTES
- Logs will be staged by helicopter immediately adjacent to placement site
- Excavator access is from Coyote Falls Rd
- All excavation can be done from streambank
- Excavation of key member trenches shall occur landward toward water, retaining separation from river until all pieces are ready for immediate placement
- Excavated material shall be placed on fabric to reduce impact to existing soils, vegetation
- Backfill from trenches may be used to reconstruct streambank in alcove to adjacent bank elevation (apprxs. 11 yds³)

GENERAL STRUCTURE NOTES
- Designed to provide fish habitat at all flows but will be overtopped at >bankfull flows
- ELJ is porous to allow flow-thru and reduce shear stress and velocity on streambank
- Rocks and key members buried, keyed into floodplain
- Most wood should be within low flow channel; only racked wood visible above water surface
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur last to enable work during lowest river flows
**GENERAL STRUCTURE NOTES**

- Designed to provide high flow refugia (> approx. 1400 cfs)
- Located on existing depositional bar/island where wood would naturally accumulate
- ELJ is mid-channel-type based on analogs from White River (WA)
- ELJ will enhance splitting flows around island at high flow
- Internal structure should be packed with lots of branches, slash to reduce velocities inside structure
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur after completing #5
- All work shall occur on dry gravel bar; no worksite isolation should be necessary
- Any turbid water generated may be pumped into adjacent side channel to naturally filter

**PLAN VIEW OF KEY MEMBERS AND PILINGS**

- 2pcs. at 40 - 60 ft. x 22" + DBH (horizontal trees)
- 3pcs. at 20 ft. x 22" + DBH (pilings)

**LONGITUDINAL PROFILE OF KEY MEMBERS AND PILINGS**

- Key member hole and piling base elev. 85.0 ft.
- Excavate pilings to below predicted scour depth
- Excavate scour pool to 85.0 ft.
- Bankfull elev. (OHW) = 89.3 ft.
- EGL = 87.6 ft.

**PLAN VIEW OF SECONDARY MEMBERS**

- 4pcs. at 40 - 60 ft. x 22" + DBH

**LONGITUDINAL PROFILE OF SECONDARY MEMBERS**

- Bankfull elev. = 90.0 ft.
- Backfill elev. = 90.0 ft.
- Backfill above key, secondary members with pool spoils, taper and grade 10:1 or flatter
- Place secondary members on top of key members

**PLAN VIEW OF RACKED MEMBERS**

- 30+ pcs. at 20 - 40 ft. x 14" - 22" + DBH

**LONGITUDINAL PROFILE OF RACKED MEMBERS**

- Backfill shall incorporate additional willow cuttings to increase vegetation
- Pilings may be cut to 92.0 ft.
- Place racked members up to bankfull elevation and extending 2/3 distance into upstream scour pool

**MID-CHANNEL JAM 4 LOCATION PHOTO**

- Key member bole and piling base elev. 82.0 ft.
- EGL = 87.6 ft.
- Flow
Excavate 20 x 20 x 6.5 ft hole to place pilings; replace all material as ballast (est. quantity ~ 50 yd³)

Excavate 30 x 15 x 3.5 ft lenticular-shaped scour pool (est. quantity ~ 30 yd³)

Excavate 60 x 4 x 6.5 ft trench between bank and pilings to place horizontal key members, replace all material as ballast (est. quantity ~ 58 yd³)

Key members should be placed at the top of the key members and bank to act as toe protection; alternate root wads

Backfill key members and create a tapered bar with pool spoils (ballast)

Backfill all trenches to pre-existing ground elevation

Excavate pilings to below predicted scour depth

Excavate scour pool to 83.5 ft.

Bankfill elev. (OHW) = 88.5 ft

Appx. elev. of trenched secondary members 85.5 ft

Stack secondary members on top of key members

LONGITUDINAL PROFILE OF SECONDARY MEMBERS

LONGITUDINAL PROFILE OF KEY MEMBERS

GENERAL STRUCTURE NOTES
- Designed to provide high flow refugia (> appx. 1000 cfs)
- NOT intended to arrest bank erosion, but will neither accelerate erosion
- ELJ is deflector-type based on analogs from White River (WA)
- Internal structure should be packed with lots of branches, slash to reduce velocities inside structure
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur first
- All work shall occur on dry gravel bar; no worksite isolation should be necessary
- Any turbid water generated may be pumped upstream into adjacent side channel to naturally filter

HIGH FLOW

Base Flow

Excavate 20 x 20 x 6.5 ft hole to place pilings; replace all material as ballast (est. quantity ~ 50 yd³)

Excavate 30 x 15 x 3.5 ft lenticular-shaped scour pool (est. quantity ~ 30 yd³)

Excavate 60 x 4 x 6.5 ft trench between bank and pilings to place horizontal key members, replace all material as ballast (est. quantity ~ 58 yd³)

Key members should be placed at the top of the key members and bank to act as toe protection; alternate root wads

Backfill key members and create a tapered bar with pool spoils (ballast)

Backfill all trenches to pre-existing ground elevation

Excavate pilings to below predicted scour depth

Excavate scour pool to 83.5 ft.

Bankfill elev. (OHW) = 88.5 ft

Appx. elev. of trenched secondary members 85.5 ft

Stack secondary members on top of key members

LONGITUDINAL PROFILE OF SECONDARY MEMBERS

LONGITUDINAL PROFILE OF KEY MEMBERS

GENERAL STRUCTURE NOTES
- Designed to provide high flow refugia (> appx. 1000 cfs)
- NOT intended to arrest bank erosion, but will neither accelerate erosion
- ELJ is deflector-type based on analogs from White River (WA)
- Internal structure should be packed with lots of branches, slash to reduce velocities inside structure
- Cut-fill balance must be equal since material cannot be hauled off-site
- Construction of this ELJ should occur first
- All work shall occur on dry gravel bar; no worksite isolation should be necessary
- Any turbid water generated may be pumped upstream into adjacent side channel to naturally filter