Issaquah Creek Integrated Fish Passage Project
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Design Process

Study Phases:

• Initial Reconnaissance & Problem Identification
• Conceptual Design
• Feasibility Design
• Design Verification
• Final Plans and Specifications
• Construction
## Recon & Problem Identification

### Problems
- Original dam built 1936 to supply hatchery
- Foundation failure in the 1970s, repaired
- Fish ladder poor functionality
- Sediment entrainment into hatchery
- Passage barrier to most species

### Opportunities
- High quality habitat upstream
- Controlled species re-introduction
- High public visibility & interest
- Tribal, State, and local support
Conceptual Design

From an IDEA to a CONCEPT
Conceptual Design

Hydrologic Regime

<table>
<thead>
<tr>
<th>Event Flow</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow</td>
<td>100</td>
</tr>
<tr>
<td>2-year</td>
<td>950</td>
</tr>
<tr>
<td>10-year</td>
<td>2,000</td>
</tr>
<tr>
<td>100-year</td>
<td>3,300</td>
</tr>
</tbody>
</table>

Sediment Regime

Design Results

- 30% Design & cost estimate
Feasibility Design

From a **CONCEPT** to a **DESIGN**
Feasibility Design

Determining project parameters & criteria

- Cultural & social values and constructs
- Hydrology & hydrologic regime
- Hydraulic characteristics & geomorphology
- Sediment transport & connectivity
- Water supply needs & periodicity

- 60% Design
- Construction cost estimate
- Construction schedule
Design Verification

Physical Scale Modeling

Length 1:16 geometrically scaled
Froude scaling (free surface, gravity-dominant)
Velocity (model:prototype) = Length^{1/2}
Discharge (m:p) = Length^{5/2}

Model extents:
top of bank to top of bank & 100-year limits
Design Verification

Physical Scale Modeling

Model elements:
- Mobile bed sediments
- New intake structure
- 14 fish passage boulder weirs

Model process:
- Agency staff participation
- Local, state, and consultant participation
- Visual confirmation of design concept
- Design refinement through modeling
- Complete transparency
Design Verification

Physical Scale Modeling

- Velocity measurements at key locations
- Discharge measurements (orifice plate, acoustic meter)
- Water surface elevations & profiles
- Scour depth

- Sediment movement, transport, and deposition/scour
- Flow characteristics
Design Verification
Physical Scale Modeling – Sediment & Flow (900 cfs)
Design Verification

Physical Scale Modeling – Sediment & Flow (900 cfs)
Design Verification

Physical Scale Modeling – Sediment & Flow (900 cfs)
Design Verification
Physical Scale Modeling – Sediment & Flow (2,000 cfs)
Design Verification

Physical Scale Modeling – Sediment & Flow (2,000 cfs)
Design Verification

Physical Scale Modeling - Debris
Design Verification

Physical Scale Modeling - Collaboration
Construction

It’s always sunny to start.....
Construction
Construction
Construction
Construction
And then there’s the reminder that we are in the NW.....
Construction
When nature gives you lemons…..
Construction
What? Again?.....
Construction

Ok, now, that’s enough.....
Construction
Cofferdamming lesson #3.....
Construction
That’s a lot of pumps.....
Construction
Almost done.....
Issaquah Creek
Integrated Fish Passage Project