

BONNEVILLE WASHINGTON SHORE FISH LADDER CONTROL SECTION REDESIGN

FFDRWG UPDATE: 30% DDR

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US Army Corps
of Engineers®
Portland District

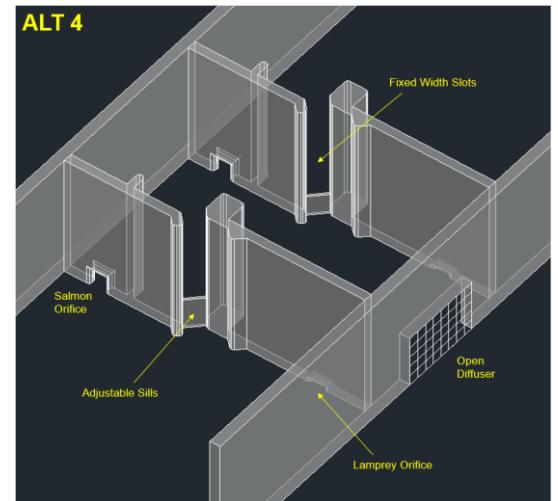
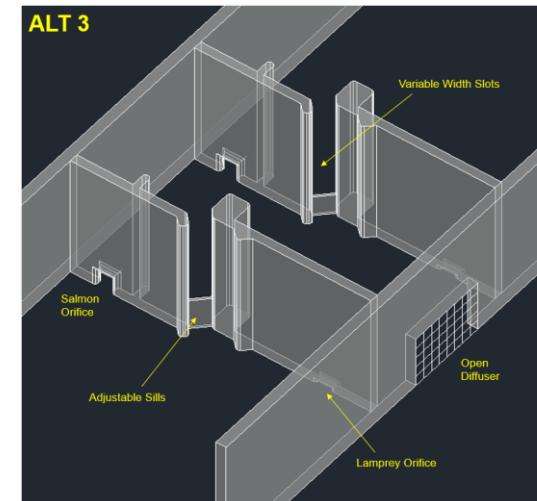
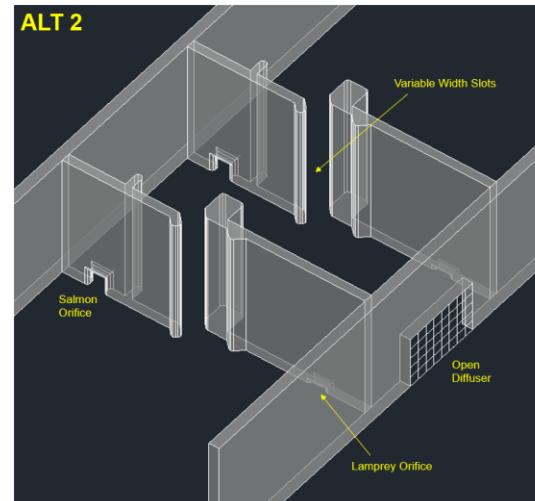
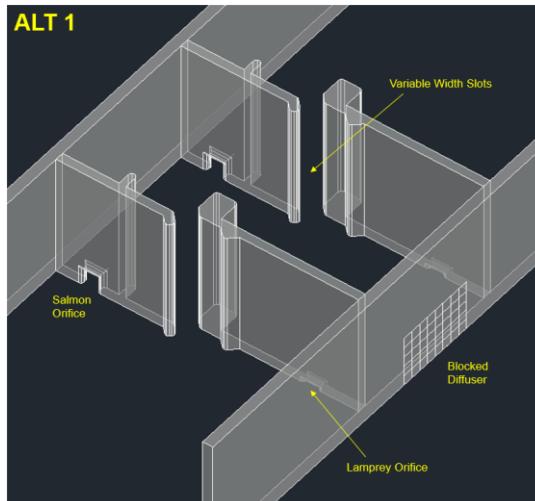


MAJOR TASKS: RECENT PROGRESS

- Screening-level alternatives evaluation
- Proposed modifications (selected alternative)
 - Existing conditions 3D CAD model
 - Preliminary modifications layout 3D CAD model
 - PIT tag antenna conceptual layout
- Cost estimate
 - Planning level cost estimate
- Documentation
 - 30% DDR

SCREENING LEVEL ALTERNATIVES EVALUATION

- Compared four variations on the modifications specified by the CRSO EIS
 - Alternative 1: No Sills, Decommission Bleed-Off and Add-In Diffusers, PIT Tag Detection in Control Section
 - Alternative 2: No Sills, Retain Bleed-Off and Add-In Diffusers, PIT Tag Detection in Control Section
 - Alternative 3: Adjustable Sills, Retain Bleed-Off and Add-In Diffusers, PIT Tag Detection in Control Section
 - Alternative 4: Adjustable Sills, Retain Bleed-Off and Add-In Diffusers, Relocate PIT Tag Detection
- Main Differences
 - The use of the bleed-off and add-in diffusers
 - Presence or absence of adjustable sills in the vertical slots
 - The location of the PIT tag detection array after modification



SCREENING LEVEL ALTERNATIVES EVALUATION

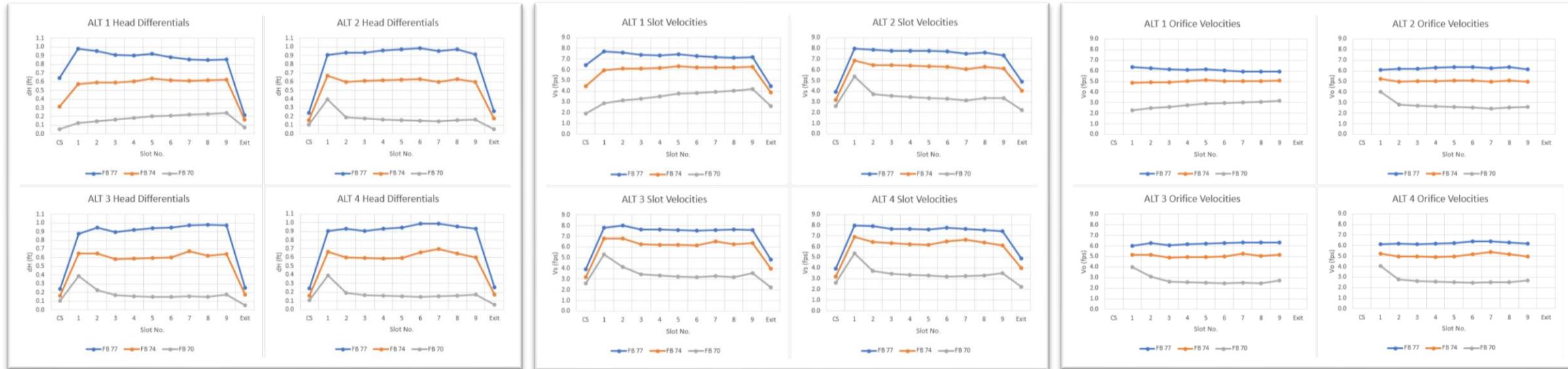
- Factors Considered
 - Fish Passage Conditions
 - Operation and Maintenance
 - Rough Order of Magnitude Cost Estimate

SCREENING LEVEL ALTERNATIVES EVALUATION

- Factor 1: Fish Passage Conditions
 - Hydraulic conditions (velocity and head drop) estimated using a spreadsheet model
 - Hydraulic conditions are generally quite similar
 - Alternative 1 has marginally lower average slot velocities but considerably higher velocity through the count station (would need to be addressed through count station/attraction pool modifications)
 - Adherence to criteria
 - Maximum velocity and head drop: all alternatives comply
 - Minimum head drop
 - ✓ At minimum pool FBL = 70: no alternatives comply for existing or modified ladder
 - ✓ At minimum observed over the past 25 years (FBL = 71.2): Alternatives 2, 3 and 4 comply
 - ✓ At 95% exceedance pool (FBL 72.7): all alternatives comply
 - Energy dissipation factor: all alternatives comply
 - Physical condition for Alternatives 3 and 4 is not preferred because the sills would be an impediment to lamprey passage

SCREENING LEVEL ALTERNATIVES EVALUATION

- Representative hydraulic results



SCREENING LEVEL ALTERNATIVES EVALUATION

- Factor 2: Operation and Maintenance
 - Alternative 1: Requires a new picketed lead and control gate to remove excess flow upstream of the count station
 - The gate would be operated either manually or via PLC and would require periodic maintenance
 - The new picketed lead would introduce another location for debris accumulation and cleaning
 - Alternative 2: All components are fully static and introduce no additional operation or maintenance requirements
 - Alternatives 3 and 4: Include actuated sill gates
 - The gates would be operated either manually or via PLC
 - The gates and associated motors would require periodic maintenance
 - Alternative 4 requires more gates than Alternative 3 (9 gates vs. 5 gates)
 - Alternative 4 requires relocation of the PIT tag detection system, which may result in less desirable maintenance access

SCREENING LEVEL ALTERNATIVES EVALUATION

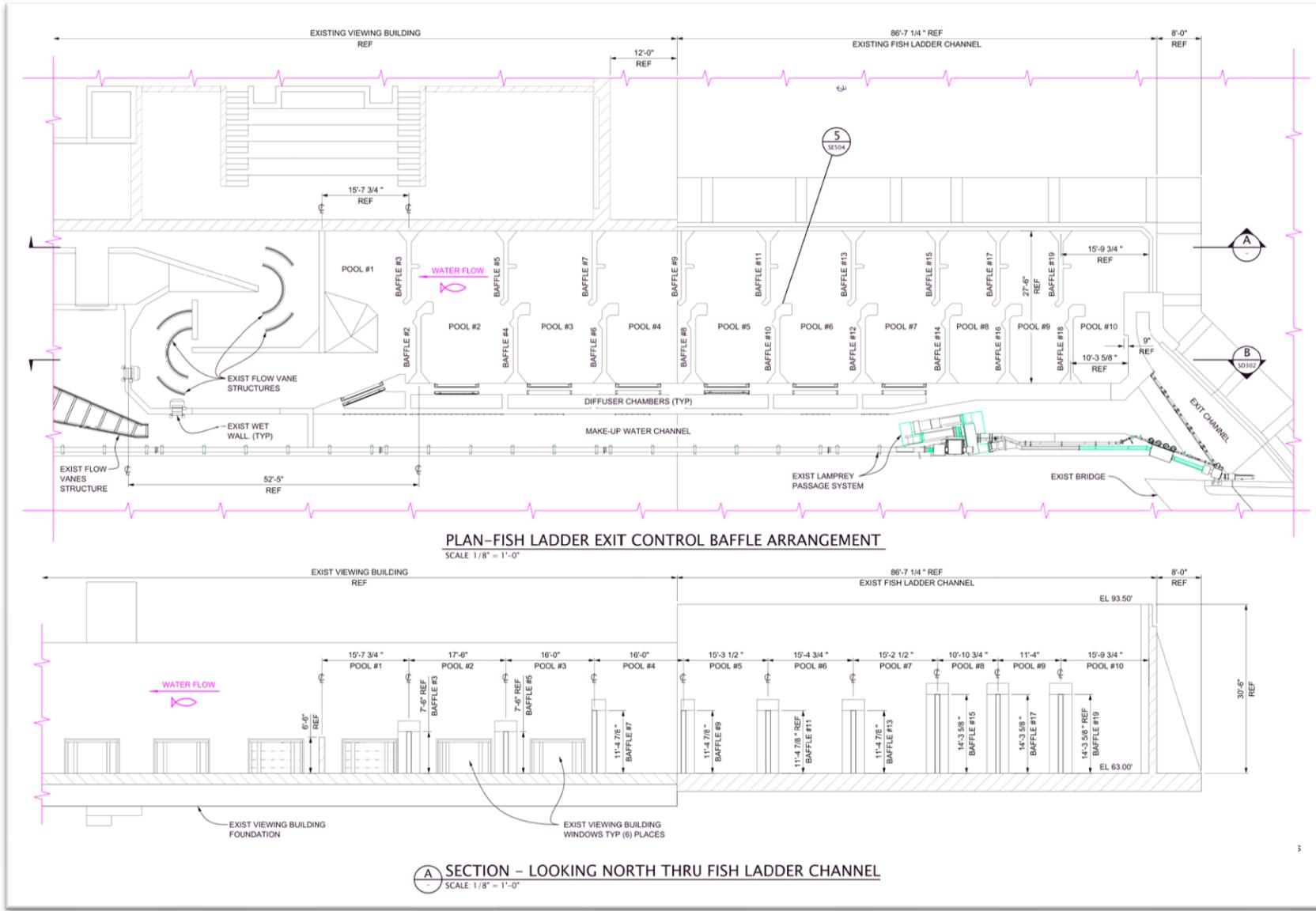
- Factor 3: Cost
 - Rough Order of Magnitude Cost Estimate
 - Alternative 1: \$6.8M
 - Alternative 2: \$5.1M
 - Alternative 3: \$6.0M
 - Alternative 4: \$6.8M

Alternative 2 is preferred
based on anticipated fish passage, O&M and cost factors

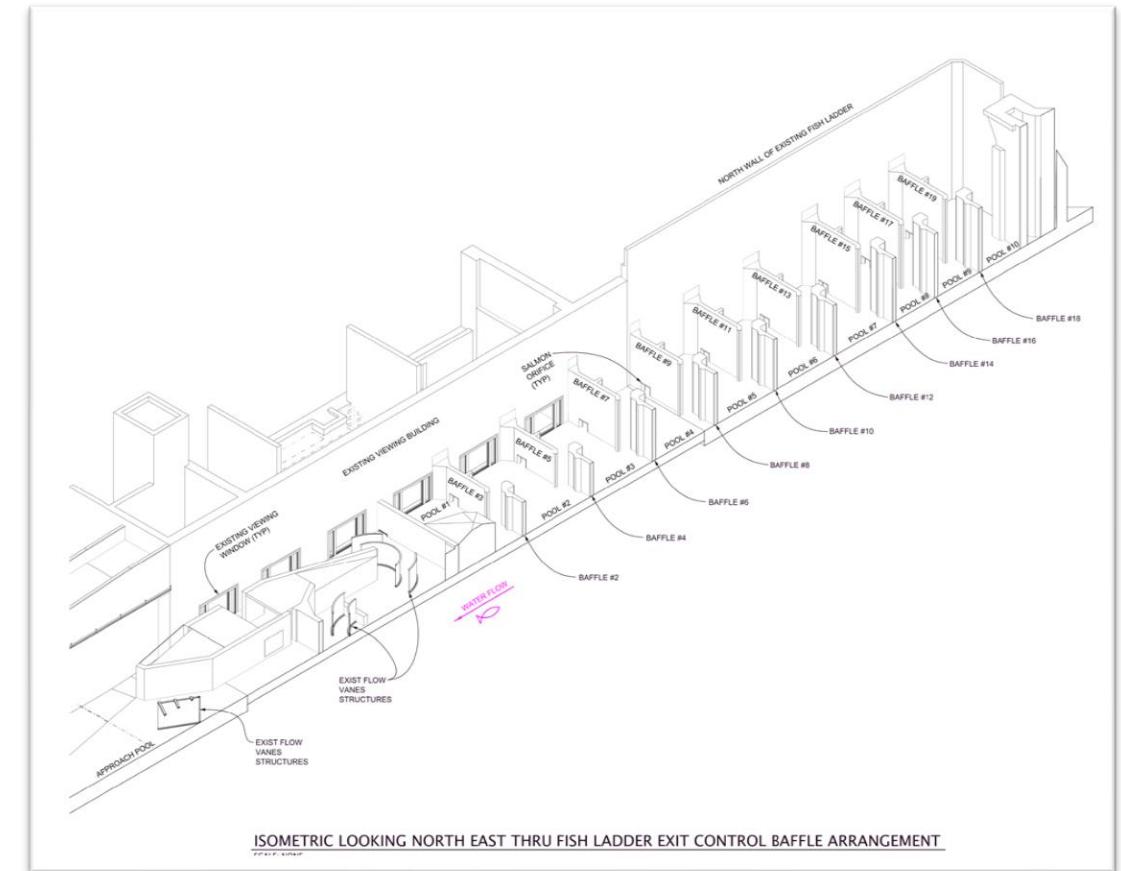
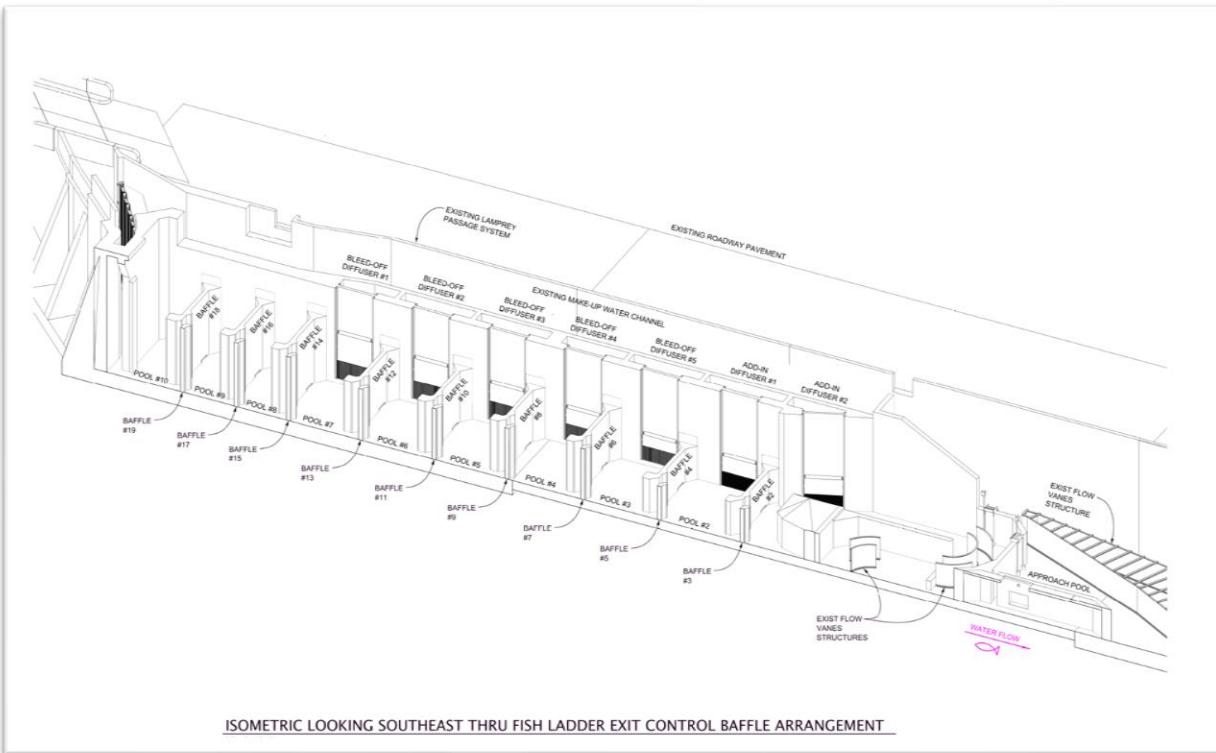
PREFERRED ALTERNATIVE: 30% DDR LEVEL DESIGN

- Major Features of the Work
 - Demolish existing baffles
 - Remove existing PIT tag antennas
 - Install 9 new vertical slot and orifice weirs
 - Slot widths vary from 1.5 feet to 1.7 feet (preliminary dimensions)
 - Include 18-inch square orifice in north baffles; opening flush with invert
 - Include 1.5-inch tall by 16-inch wide “lamprey orifices” in south baffles; opening flush with channel invert
 - ✓ Round edges in all weirs without PIT tag antennas
 - ✓ Chamfer and smooth edges in weirs with PIT tag antennas
 - Move lamprey refuge boxes to south side of ladder control section
 - Install new PIT tag antennas in four consecutive weirs
 - Antennas to be provided in slots and in both sets of orifices
 - Provide access walkways

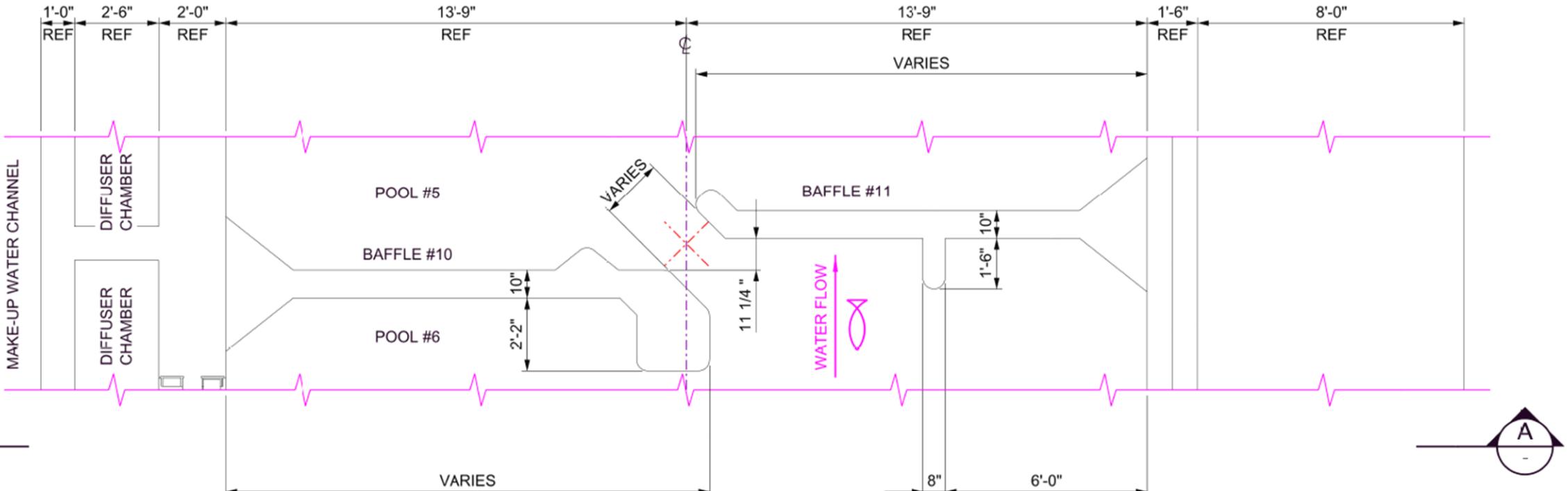
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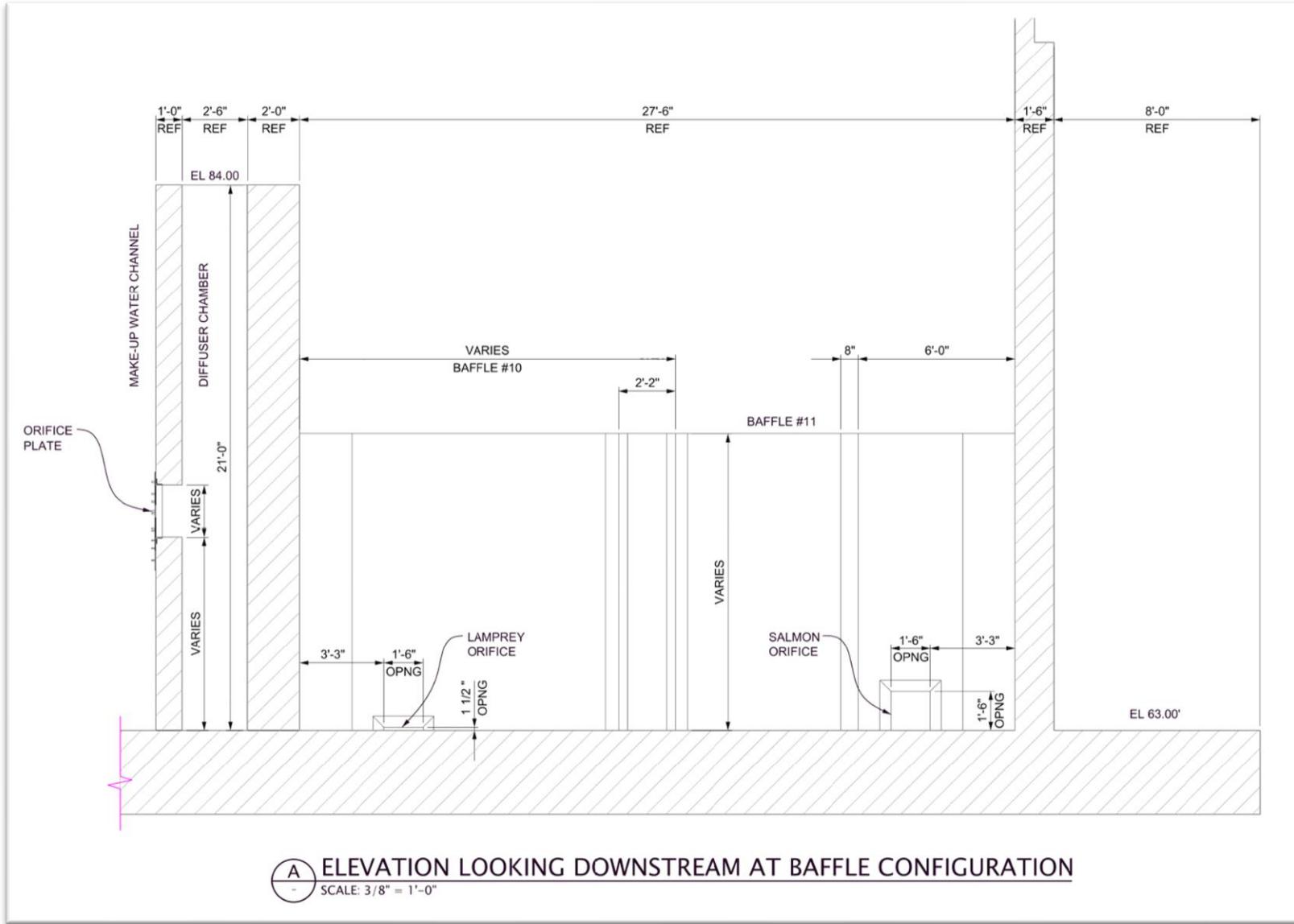


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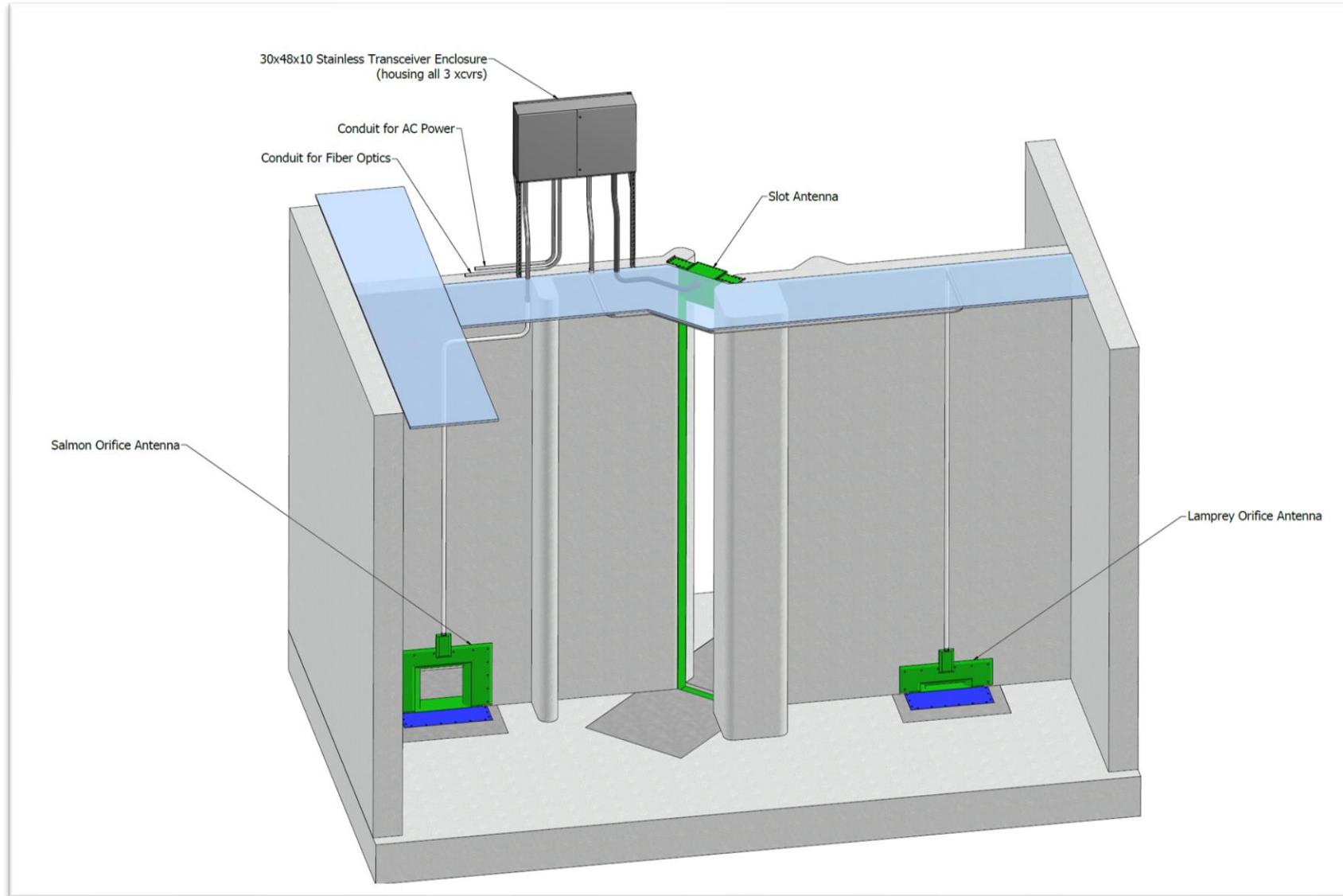
ENLARGED PLAN – TYPICAL FISH LADDER BAFFLE CONFIGURATION

SCALE: 3/8" = 1'-0"

PREFERRED ALTERNATIVE: 30% DDR LEVEL DESIGN



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NEXT STEPS

- Develop 3D CFD Model
 - Verify hydraulic conditions and refine weir layout, as needed
 - Verify or refine bleed-off and add-in orifice plate dimensions
- Develop structural design
 - Verify baffle dimensions and connections to existing structure
 - Design access walkways
 - Work with PSMFC to refine PIT tag antenna details, as needed, and incorporate into the weir design
 - Define temporary works required during construction, e.g. shoring of existing channel walls
- Develop electrical design
 - Design electrical infrastructure to support the new PIT tag antennas