

Orland Dam Alternatives

Preliminary Concepts for the Dam Rehab and Fish Passage Alternatives at Orland Dam
Working drafts

River Flows and Water Surface Elevations

Flood Flows

- 10-Year
 - Flow : 3,210 cfs
 - Water Surface Elevation U/S Dam : 11.87 ft NAVD 88
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88
- 50 – Year
 - Flow : 5,580 cfs
 - Water Surface Elevation U/S Dam : 13.42 ft NAVD 88
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88
- 100 – Year
 - Flow : 7,020 cfs
 - Water Surface Elevation U/S Dam : 14.18 ft NAVD 88
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88
- 500 – Year
 - Flow : 11,300 cfs
 - Water Surface Elevation U/S Dam : 16.04 ft NAVD 88
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88

Fish Passage Flows

- 5% Daily Exceedance
 - Flow : 592.1 cfs
 - Water Surface Elevation U/S Dam : 8.81 ft NAVD 88*
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88
- 50% Daily Exceedance
 - Flow : 147.1 cfs
 - Water Surface Elevation U/S Dam : 7.85 ft NAVD 88*
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88
- 95% Daily Exceedance
 - Flow : 21.9 cfs
 - Water Surface Elevation U/S Dam : 7.43 ft NAVD 88*
 - Highest Tide (Tailwater Elevation) : 10 ft NAVD 88

* WSEL U/S of dam are assumed during mid tide, highest tides overtake U/S Water Surface Elevation



Alternative 1

Vertical Slot Ladder with Obermeyer Gates on Spillway

East Side of the river

Pools: 10 ft L by 8 ft W

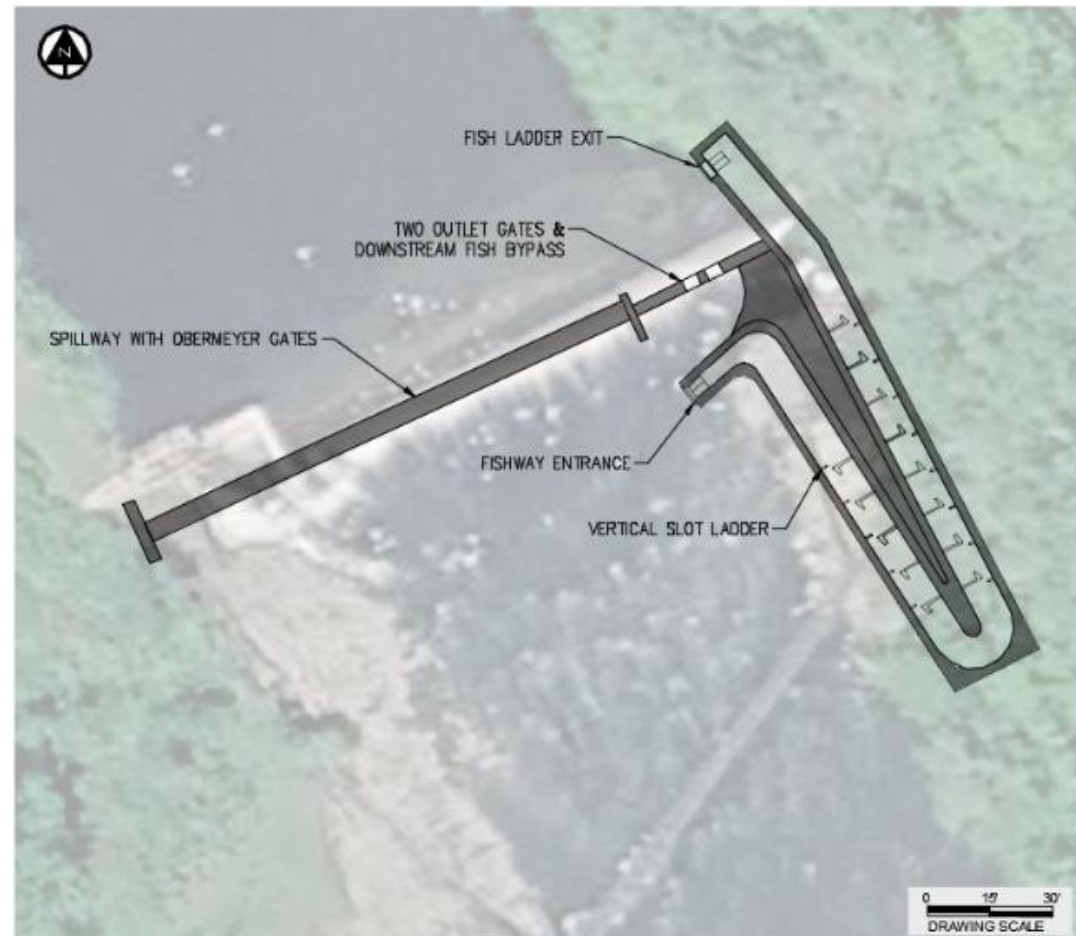
Slot width: 12 inches
(considering larger widths)

Drop per pool: 6 inches

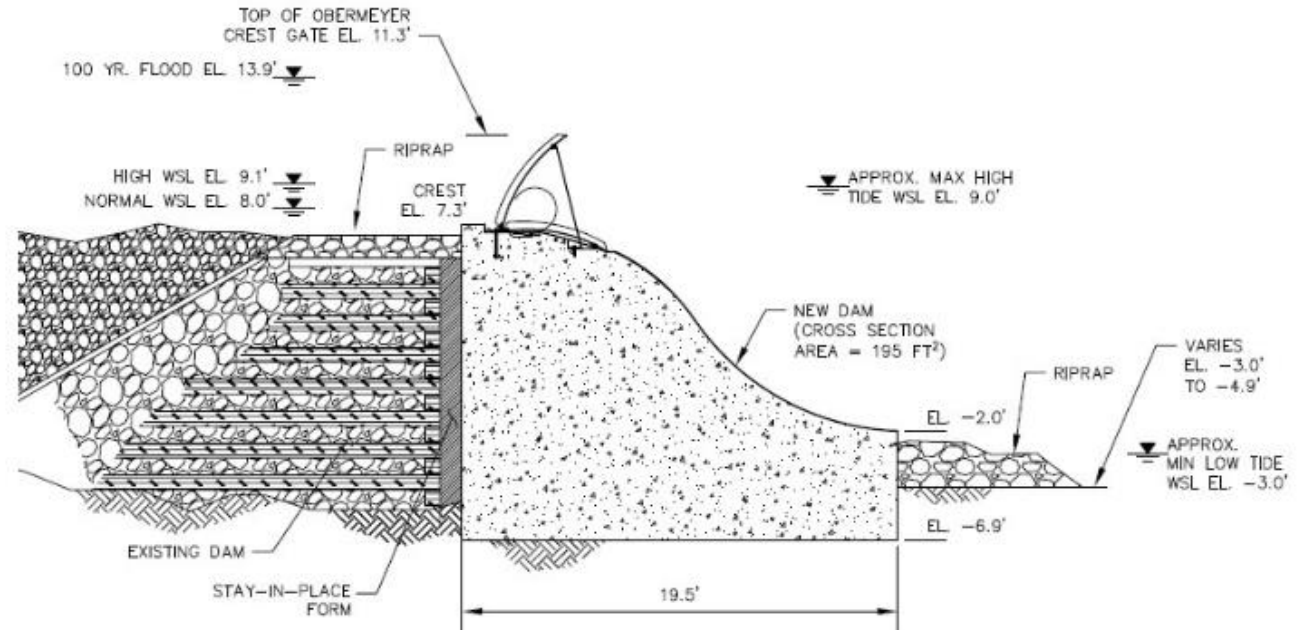
Flow: 20 cfs min

Length: 293 ft

Footprint: 3045 sq ft



Alternative 1



2 DAM CROSS SECTION
C-1 OBERMEYER CREST GATE, ALT. 1

Alternative 2

Vertical Slot Ladder with Rubber Dam along Spillway

Potential for either side of river

Pools: 10 ft L by 8 ft W

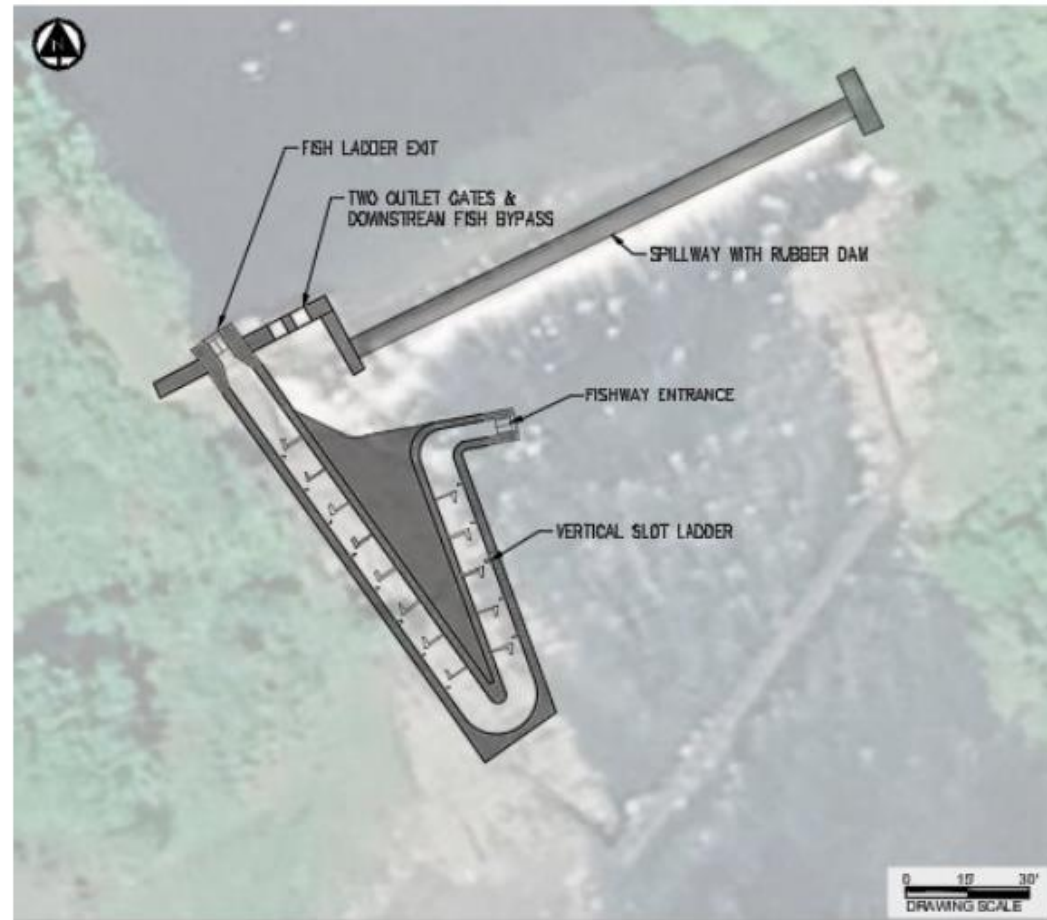
Slot width: 12 inches
(considering larger widths)

Drop per pool: 6 inches

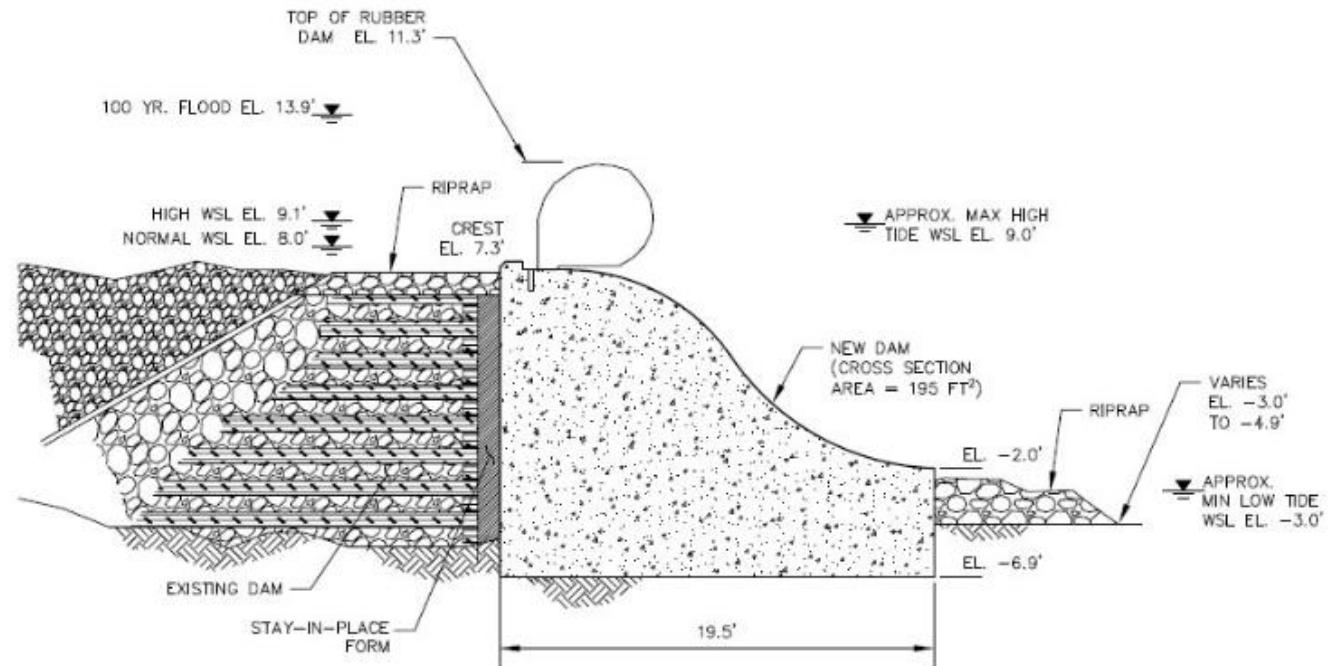
Flow: 20 cfs min

Length: 211 ft

Footprint: 2800 sq ft



Alternative 2



3
C-1 DAM CROSS SECTION
RUBBER DAM, ALT. 2

Alternative 3

Denil Ladder with Wooden Flashboards on Spillway

West Side of river

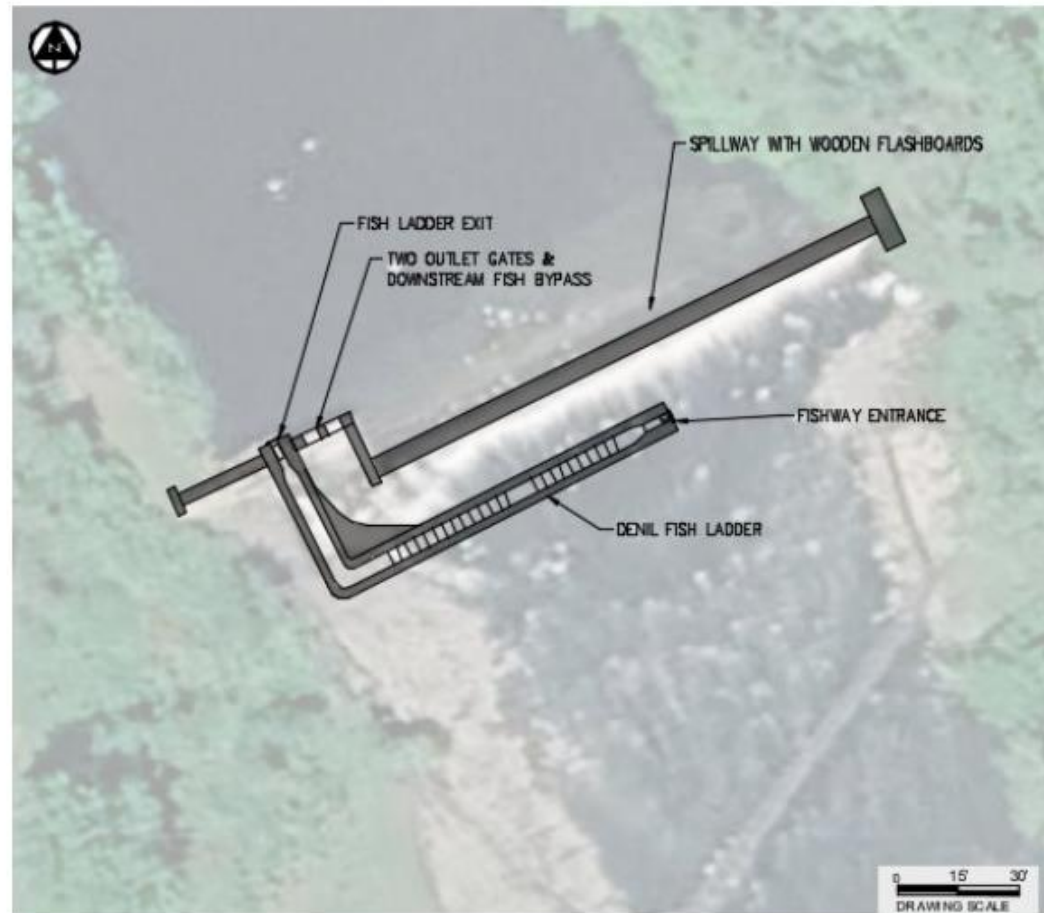
Channel: 24 baffles 4 ft W
(standard Denil design)

Slope: 1V:8H, 12.5%

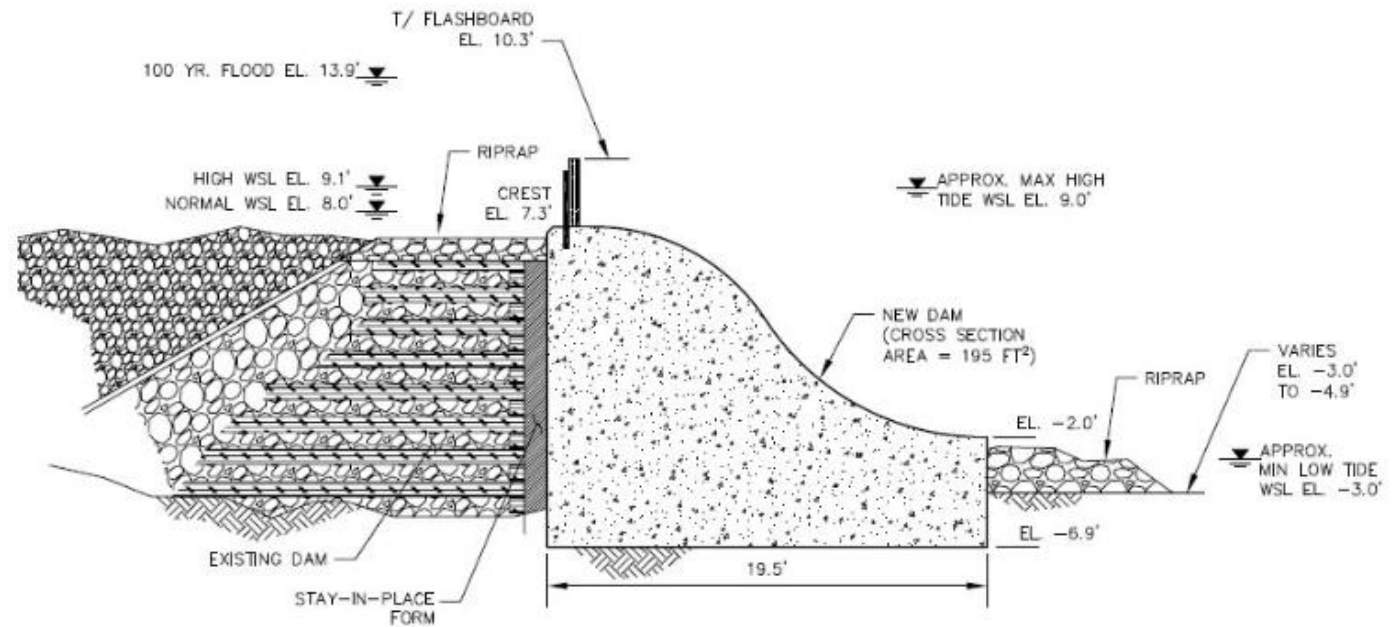
Flow: 6 cfs min

Length: 130 ft

Footprint: 1152 sq ft



Alternative 3



4 DAM CROSS SECTION
C-1 FLASHBOARDS, ALT. 3

Alternative 4

Denil Ladder with hinged tide gate

Middle of river

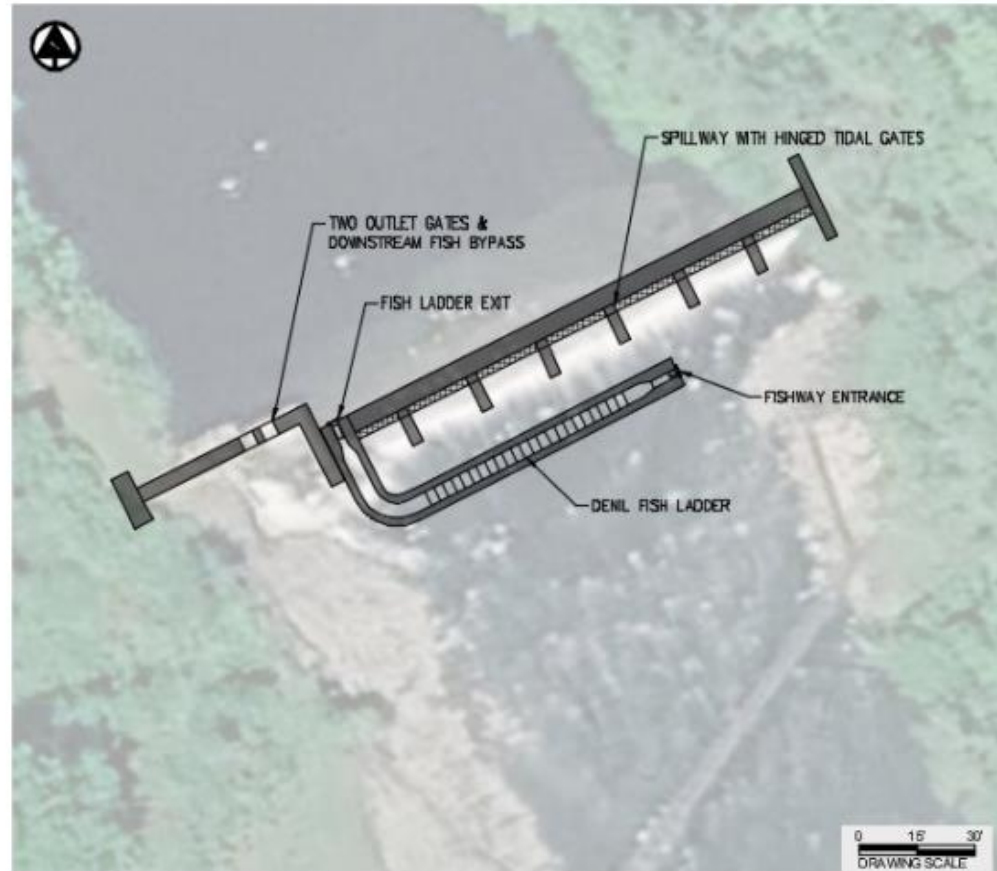
Channel: 24 baffles 4 ft W
(standard Denil design)

Slope: 1V:8H, 12.5%

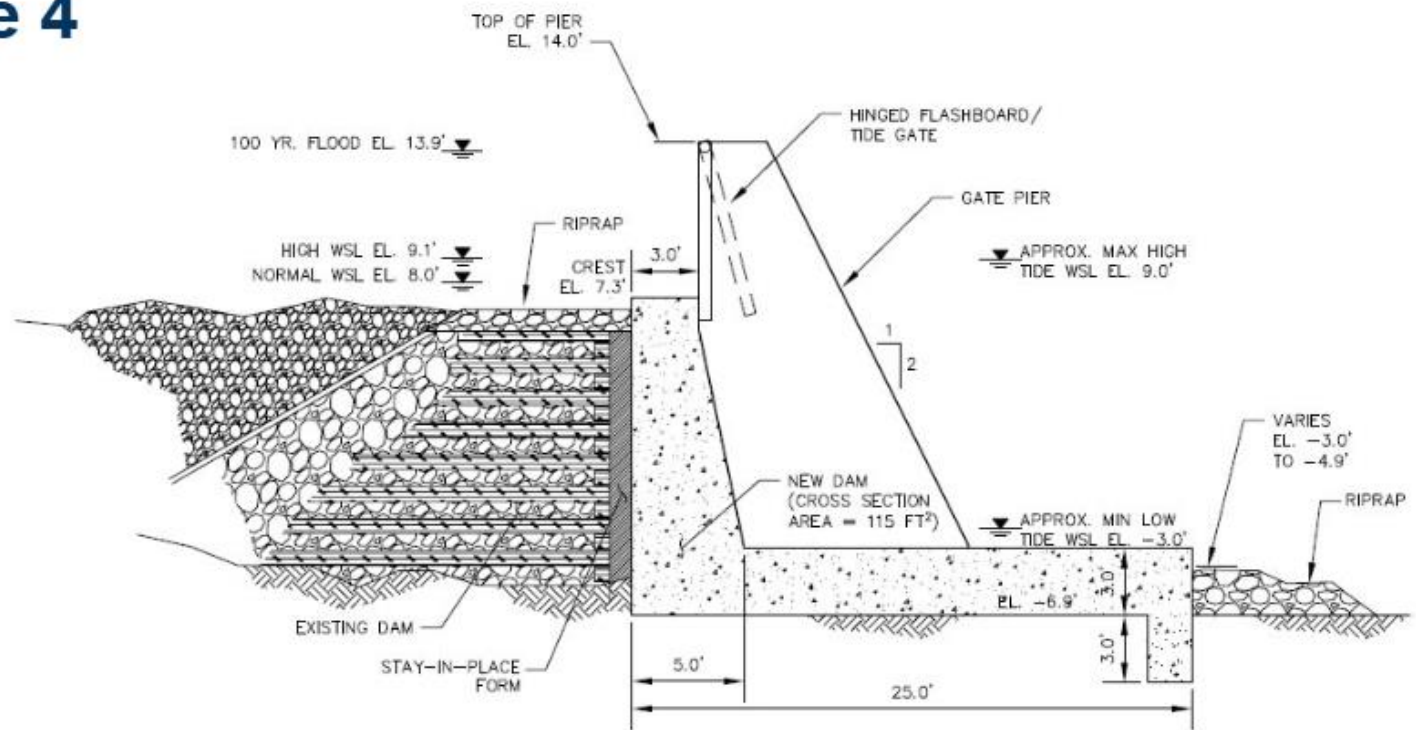
Flow: 6 cfs min

Length: 108 ft

Footprint: 885 sq ft



Alternative 4



5 DAM CROSS SECTION
C-1 TIDE GATE, ALT. 4

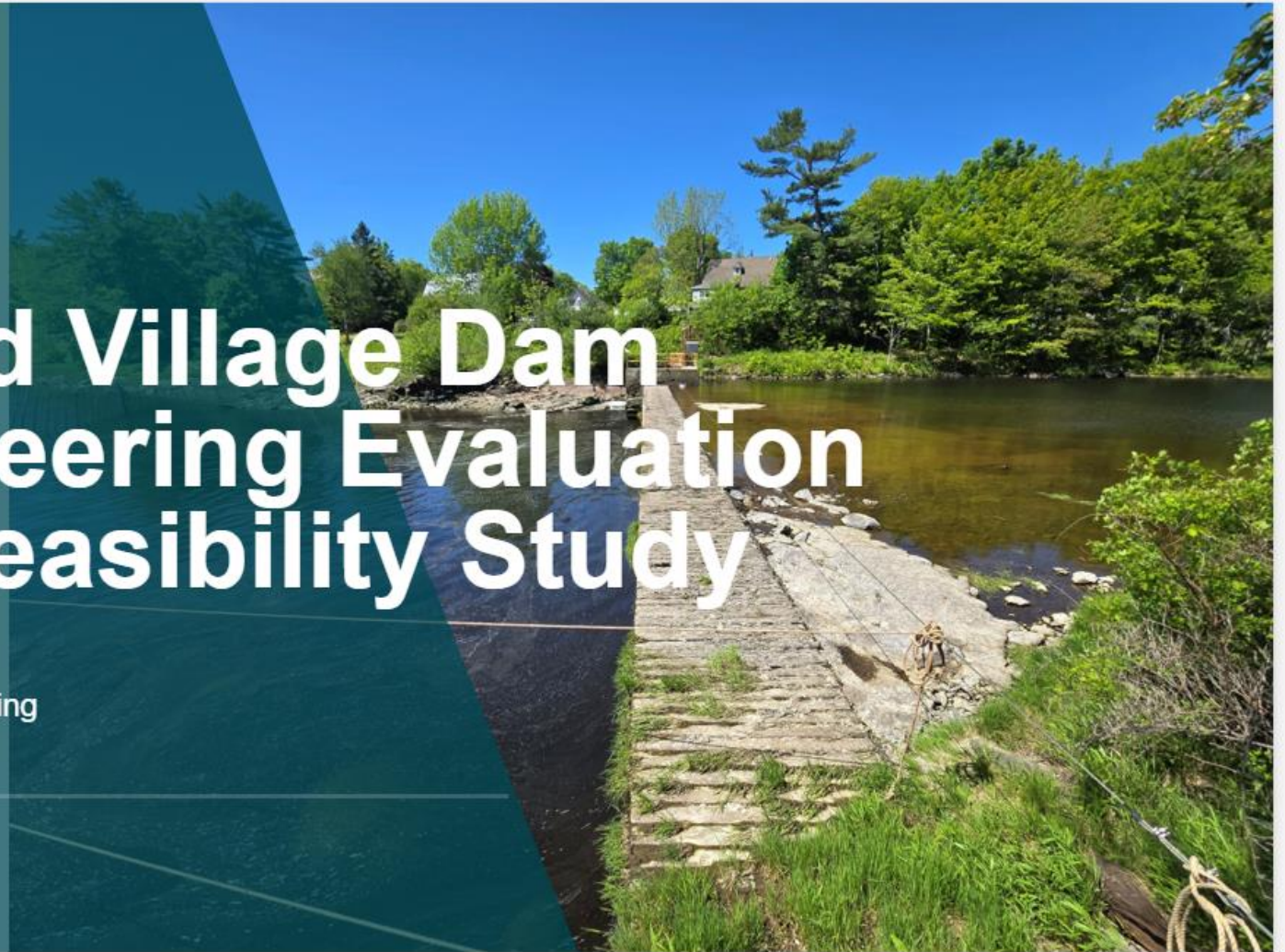
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Orland Village Dam Engineering Evaluation and Feasibility Study

Project Update

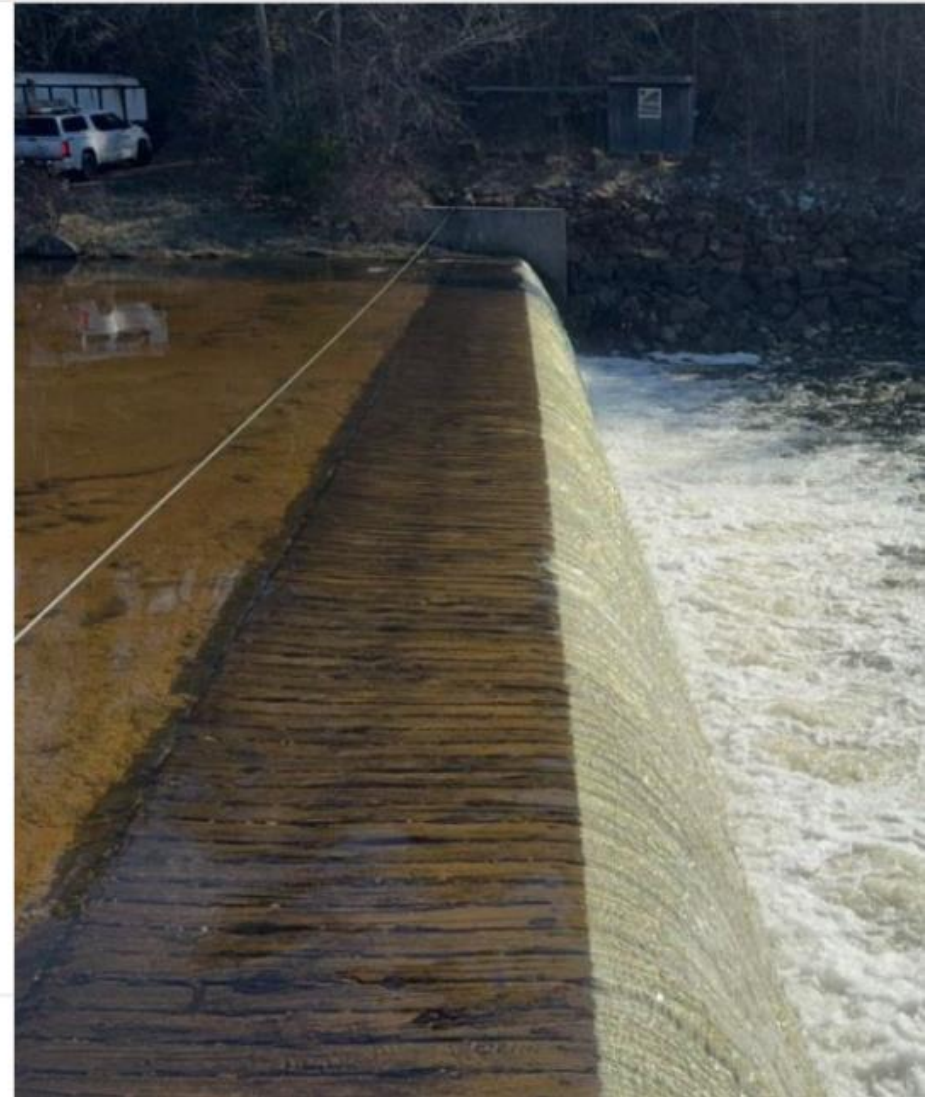
August Monthly Meeting

August 18, 2026



Agenda

- Fishway tour debrief
- Dam rehab and fish passage options
 - Work toward selecting 4 options for construction cost estimates
- Schedule
- Next Steps



Work Completed

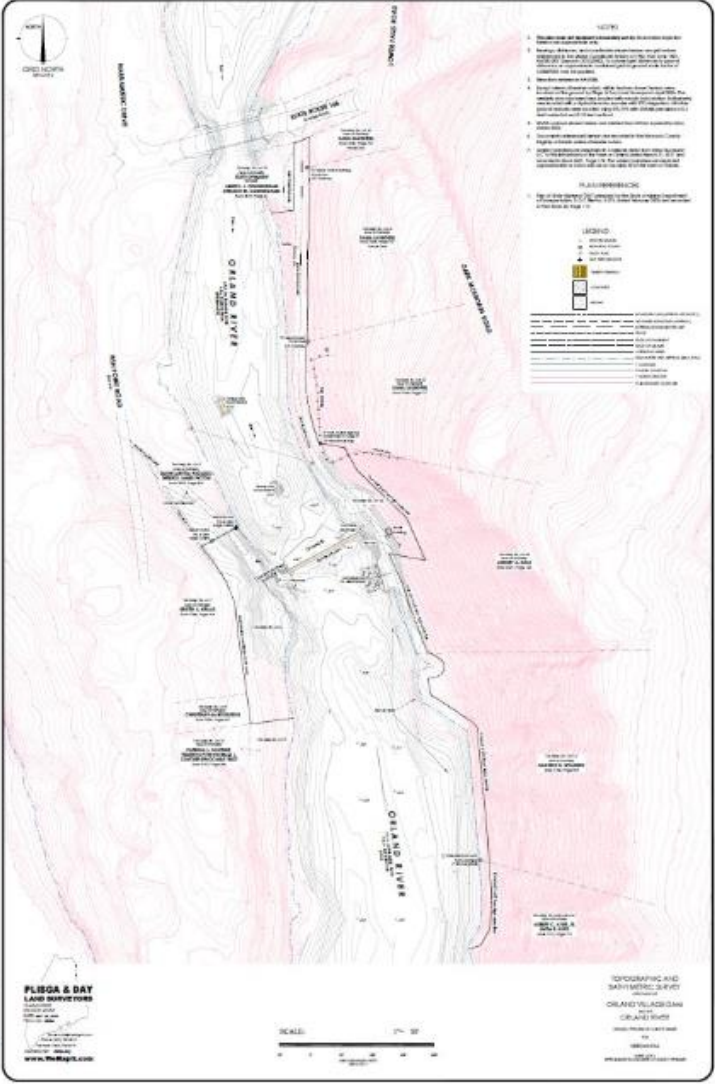
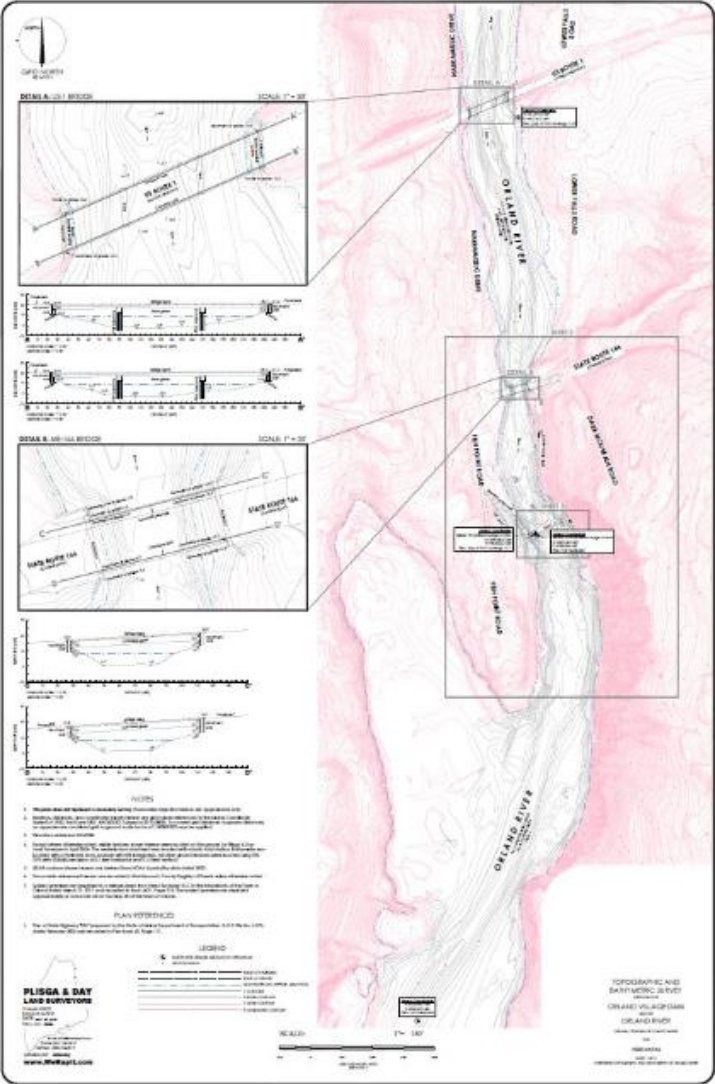
Update on our progress to date:

- Existing data and study review
- Dam and river surveys
- Water level sensors installation
- Dam inspection

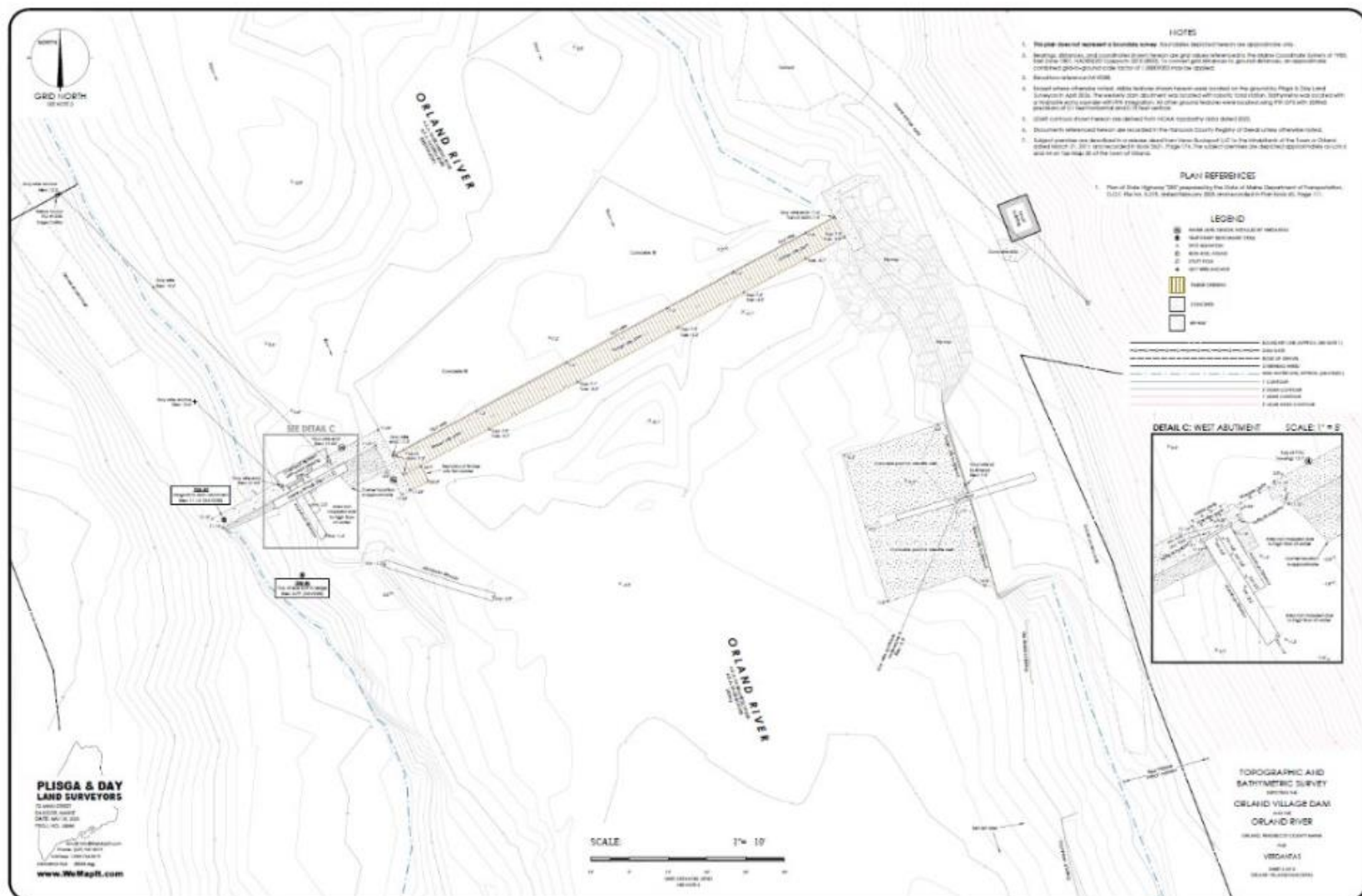


Orland Village Dam

River Surveys



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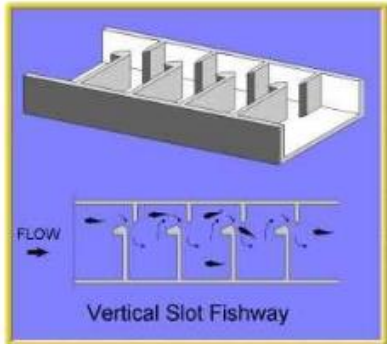


Fish Passage Alternatives

- Denil Ladder
- Vertical Slot Ladder
- Pool and Chute Ladder



Fish Ladder Examples



Vertical Slot



Denil



Pool & Chute



Fish Passage Alternatives

Denil Ladder

Potential for either side of river

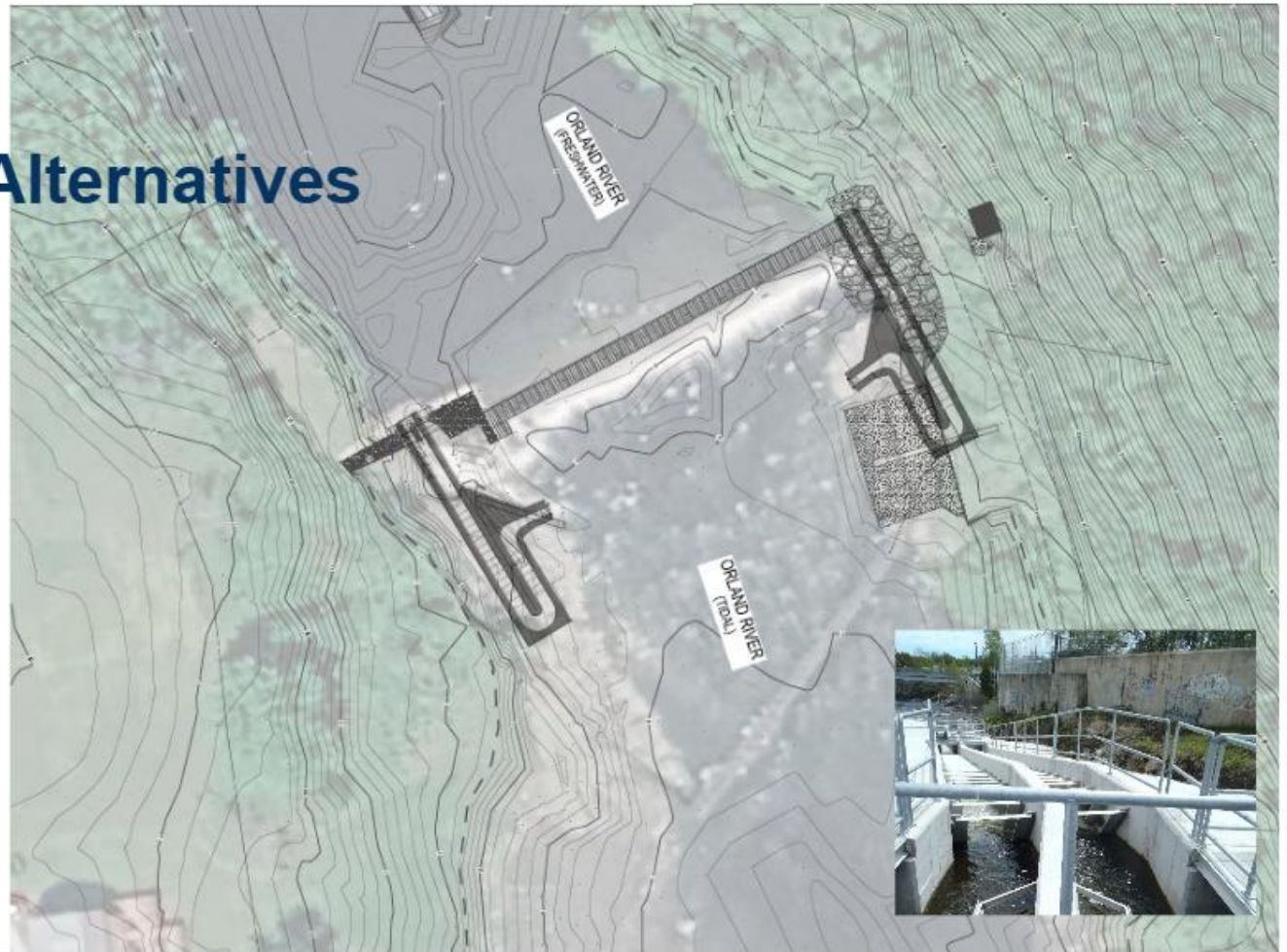
Channel: 24 baffles 4 ft W
(standard Denil design)

Slope: 1V:8H, 12.5%

Flow: 6 cfs min

Length: 108 ft

Footprint: 892 sq ft



Fish Passage Alternatives

Pool and Chute Ladder

Potential for either side of river

Pools: 8 ft L by 8 ft W

Weir width: 2 ft
weir depth: 1.5 ft

Drop per pool: 6 inches

Flow: 17 cfs

Length: 267 ft

Footprint: 3137 sq ft



Fish Passage Alternatives

Vertical Slot Ladder

Potential for either side of river

Pools: 10 ft L by 8 ft W

Slot width: 12 inches
(considering larger widths)

Drop per pool: 6 inches

Flow: 20 cfs min

Length: 293 ft

Footprint: 3045 sq ft



East side, Vertical Slot Fish Ladder

Option 1

Vertical Slot Ladder

Potential for either side of river

Pools: 10 ft L by 8 ft W

Slot width: 12 inches
(considering larger widths)

Drop per pool: 6 inches

Flow: 20 cfs min

Length: 293 ft

Footprint: 3045 sq ft



West side, Vertical Slot Fish Ladder

Option 2

Vertical Slot Ladder

Potential for either side of river

Pools: 10 ft L by 8 ft W

Slot width: 12 inches
(considering larger widths)

Drop per pool: 6 inches

Flow: 20 cfs min

Length: 293 ft

Footprint: 3045 sq ft



Old fish ladder configuration,
appears to be a 4 ft wide Denil
ladder

Option 3

Denil Ladder

Channel: 24 baffles 4 ft W
(standard Denil design)

Slope: 1V:8H, 12.5%

Flow: 6 cfs min

Length: 108 ft

Footprint: 892 sq ft



Old fish ladder configuration,
appears to be a 4 ft wide Denil
ladder

Option 4 (outlined in red)

Denil Ladder

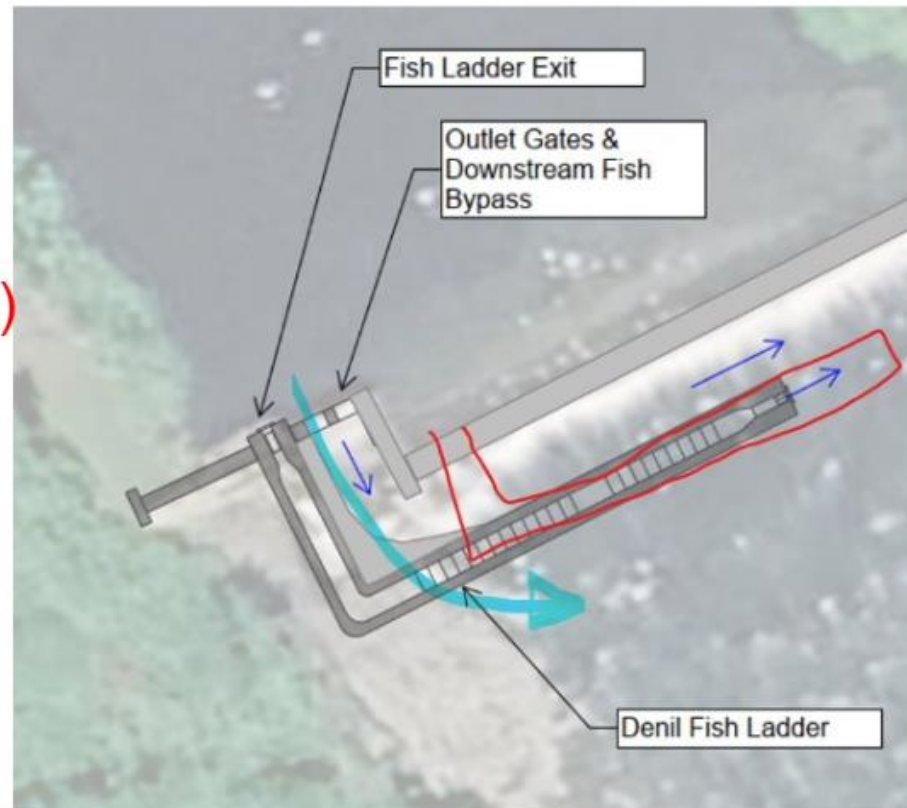
Channel: 24 baffles 4 ft W
(standard Denil design)

Slope: 1V:8H, 12.5%

Flow: 6 cfs min

Length: 108 ft

Footprint: 892 sq ft



Additional Straight Alignment Options

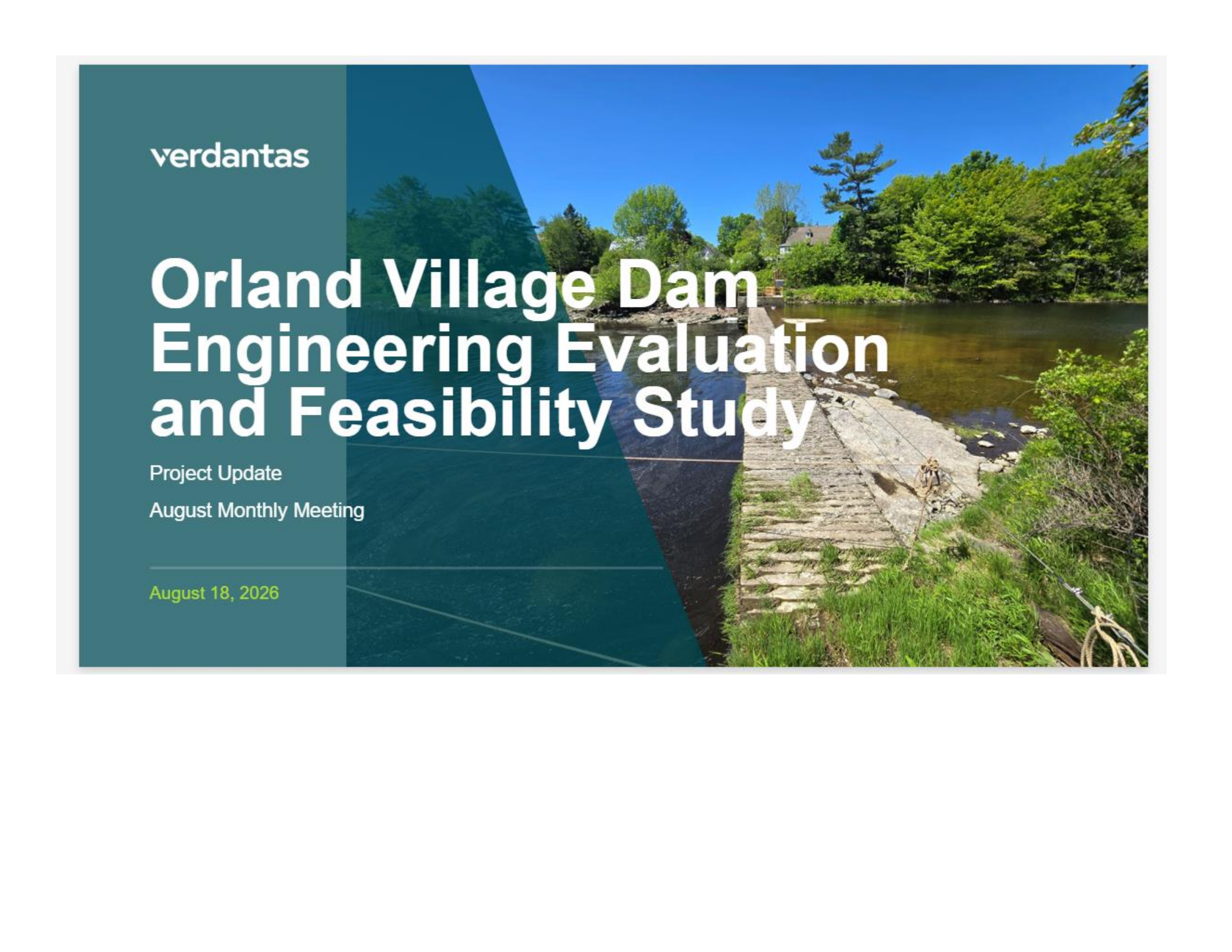


Denil Ladder



Vertical Slot Ladder



The background of the slide is a photograph of a dam and a river. The dam is a long, low structure made of stone or concrete, stretching across the river. The water is calm and reflects the sky. The banks are lined with lush green trees and vegetation. The sky is a clear, bright blue. On the left side of the image, there is a dark teal vertical band that serves as a background for the text.

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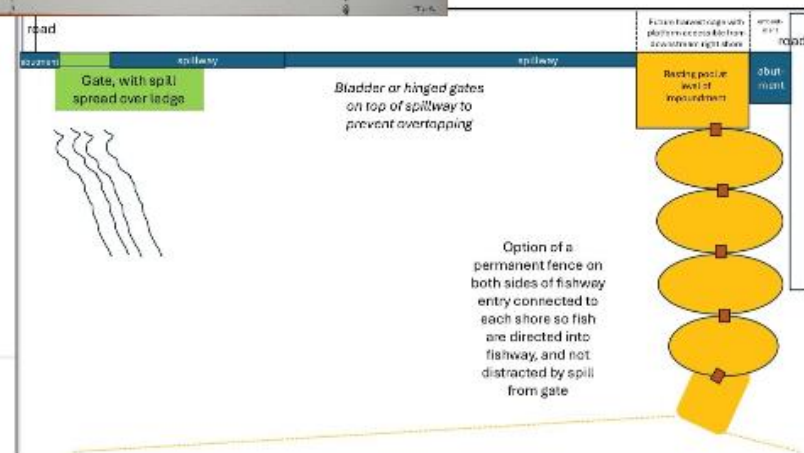
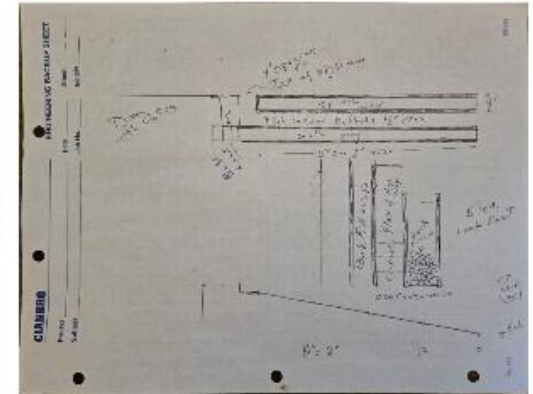
Orland Village Dam Engineering Evaluation and Feasibility Study

Project Update

August Monthly Meeting

August 18, 2026

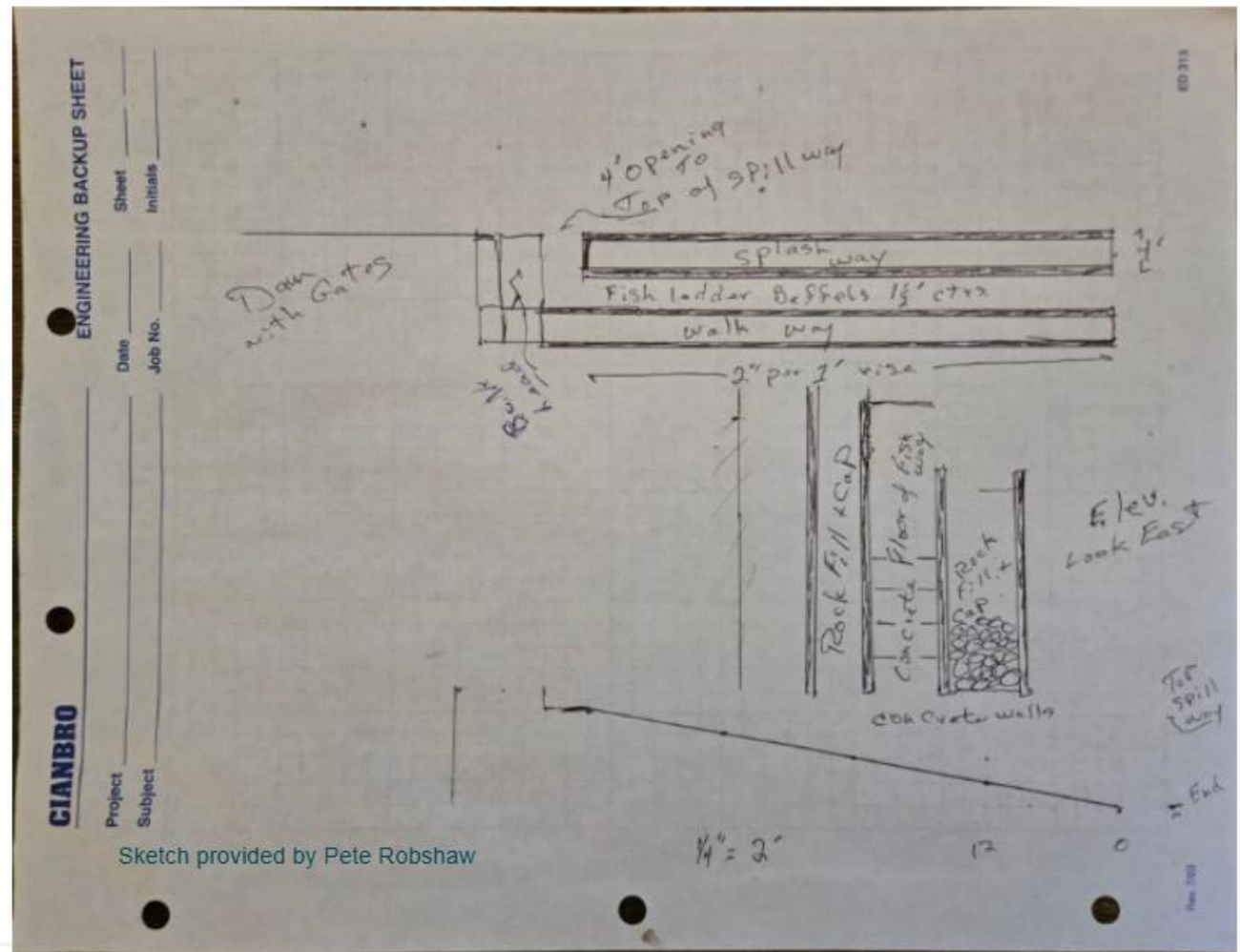
1. Old Fish Ladder configuration (aligned parallel to the dam)
2. Fish ladder entrance closer to exit of fish trap
3. Straight fishway removing turning pools w/ a net to guide fish to entrance



Old fish ladder configuration,
appears to be a 4 ft wide Denil
ladder



Old fishway baffle provided by
Travis Atwood



Summary of Fishways



Option	Approximate Total Ladder Length (ft)	Approximate Total Footprint (sqft)
Vertical Slot West	211	2800
Vertical Slot East	293	3045
Denil West	143	1200
Denil East	143	1200
P&W West	267	3137
P&W East	267	3137
Denil Straight West	108	870
Denil Straight East	108	892
Vertical Slot Straight West	177	2130
Vertical Slot Straight East	194	2386

Note – Denil options 3 & 4 not shown in this table

- Up to 4 construction cost estimates will be developed for alternatives
- Options recommended to cover range of alternatives from largest footprint to smallest (bracketing expected cost range)
- Also chosen to consider either side of river



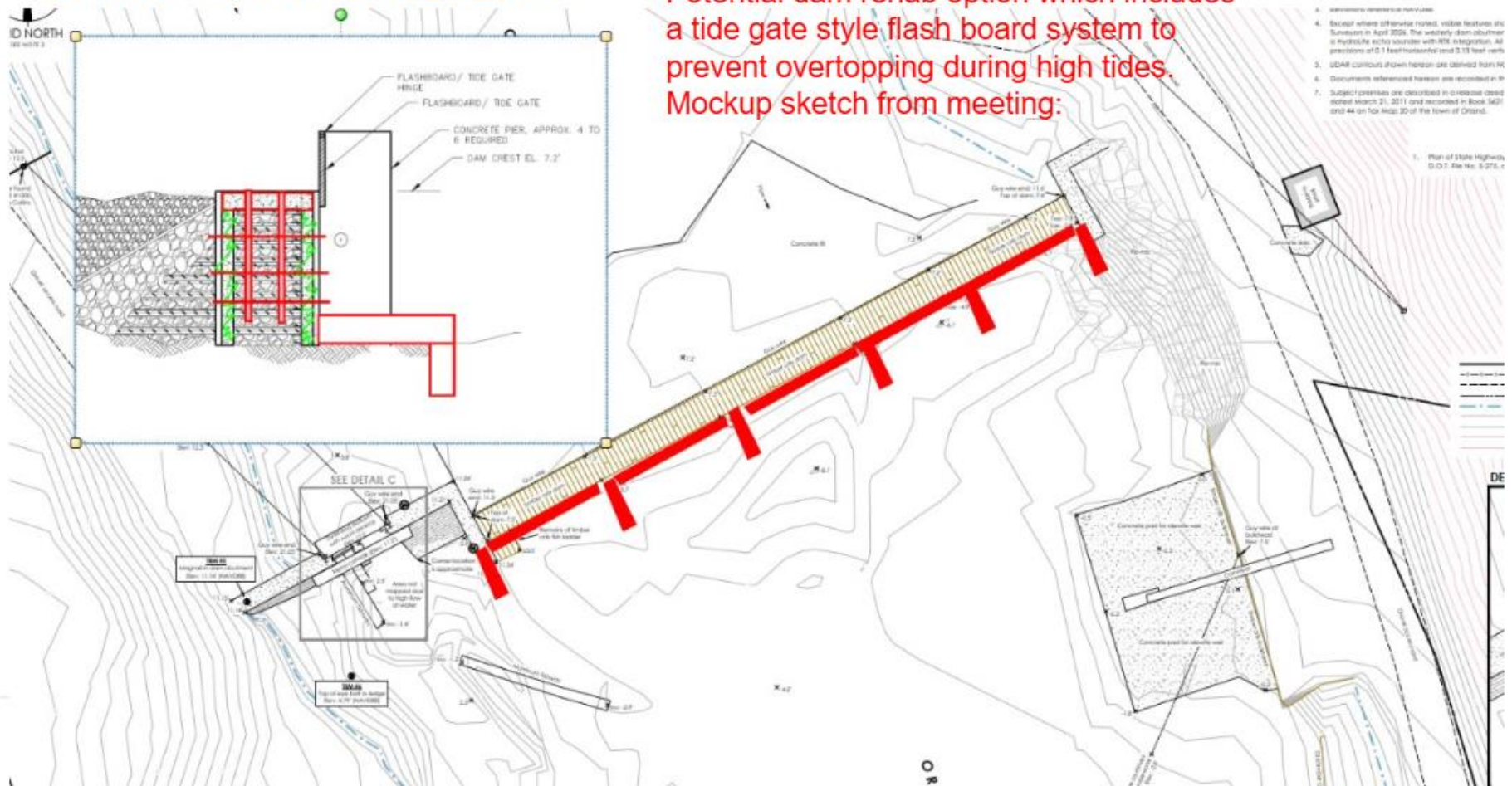
Example Flashboards, Crest Gates & Inflatable Dams

Potential options to mitigate dam overtopping during extreme high tides

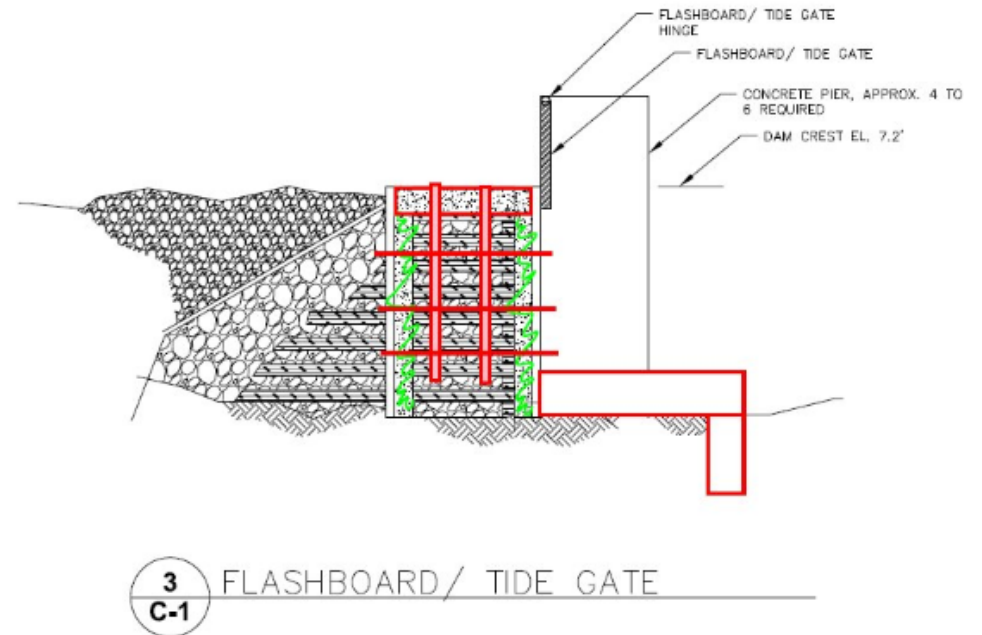
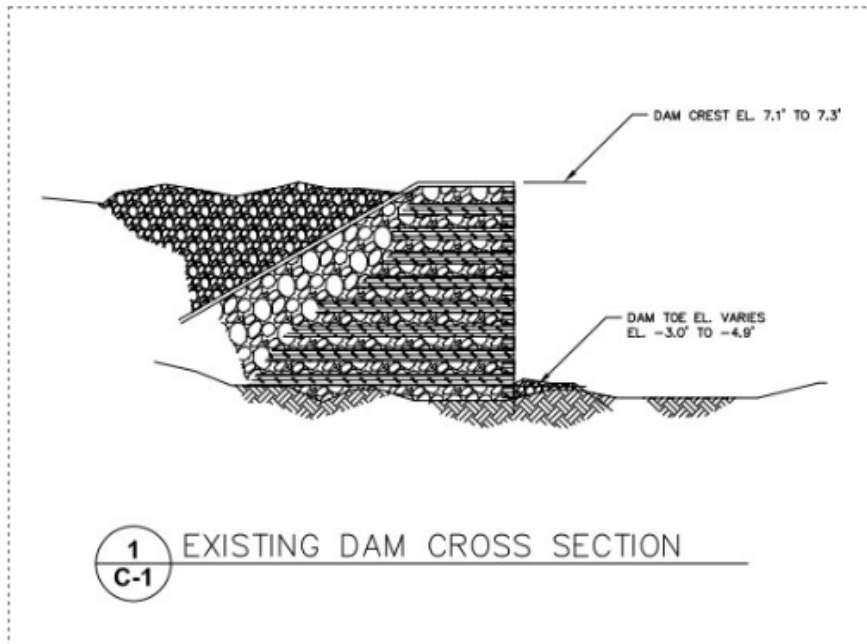


Dam Rehabilitation

Potential dam rehab option which includes a tide gate style flash board system to prevent overtopping during high tides. Mockup sketch from meeting:



Dam Rehabilitation Options

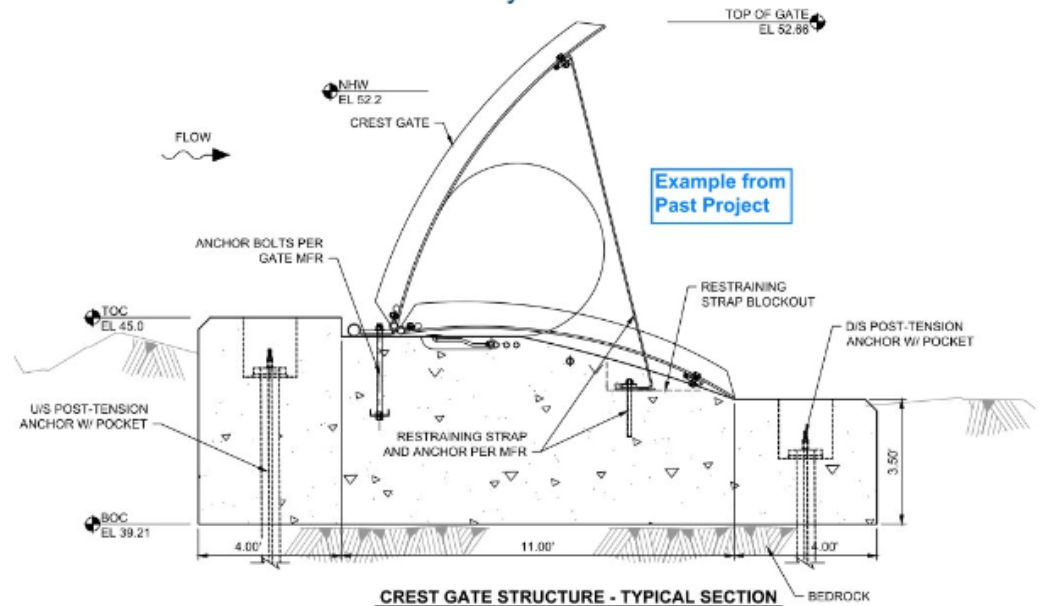


Dam Rehabilitation Options

➤ Dam Replacement

- New Concrete Dam
- Optional addition of Crest Gates or Wooden Flashboards

New Low Head Dam w/ Crest Gate example
Obermeyer Gate



Evaluation of Alternatives

Will include a comparison of:

- Effectiveness
- Constructability
- Cost
- Long-term maintenance
- Alignment with goals

Potential Construction Cost Range

- Rehab + fish ladder: \$5M - \$15M
- Replace + fish passage: \$10M - \$20M

Order of magnitude for planning purposes only



Orland Village Dam



Schedule & Milestones

Item	Description	Completion Date
	Contract and Project Authorization	20-Feb-2026
Task 1	Existing Data Collection and Review	13-Mar-2026
Task 2	Field Investigations	
	<i>Field Surveys</i>	30-May-2026
	<i>Water Level Monitoring</i>	30-Aug-2026
	<i>Dam Condition Assessment</i>	30-May-2026
Task 3	Existing Conditions Update	29-Jun-2026
Task 4	Feasibility and Alternatives Evaluation	30-Sep-2026
Task 5	Selected Design Cost Estimate Update	30-Oct-2026



Next Steps

- Complete hydrology and hydraulic modeling
- Develop conceptual alternatives
- Develop cost estimates
- Comparison of alternatives
- Prepare feasibility report



Orland Village Dam

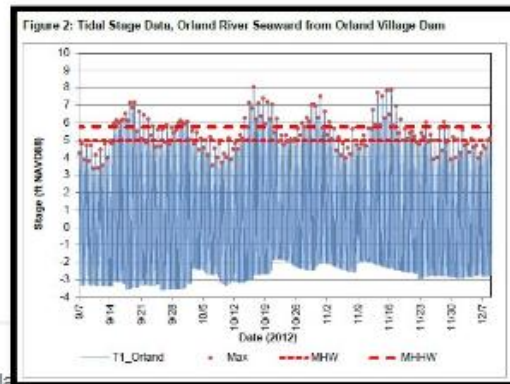


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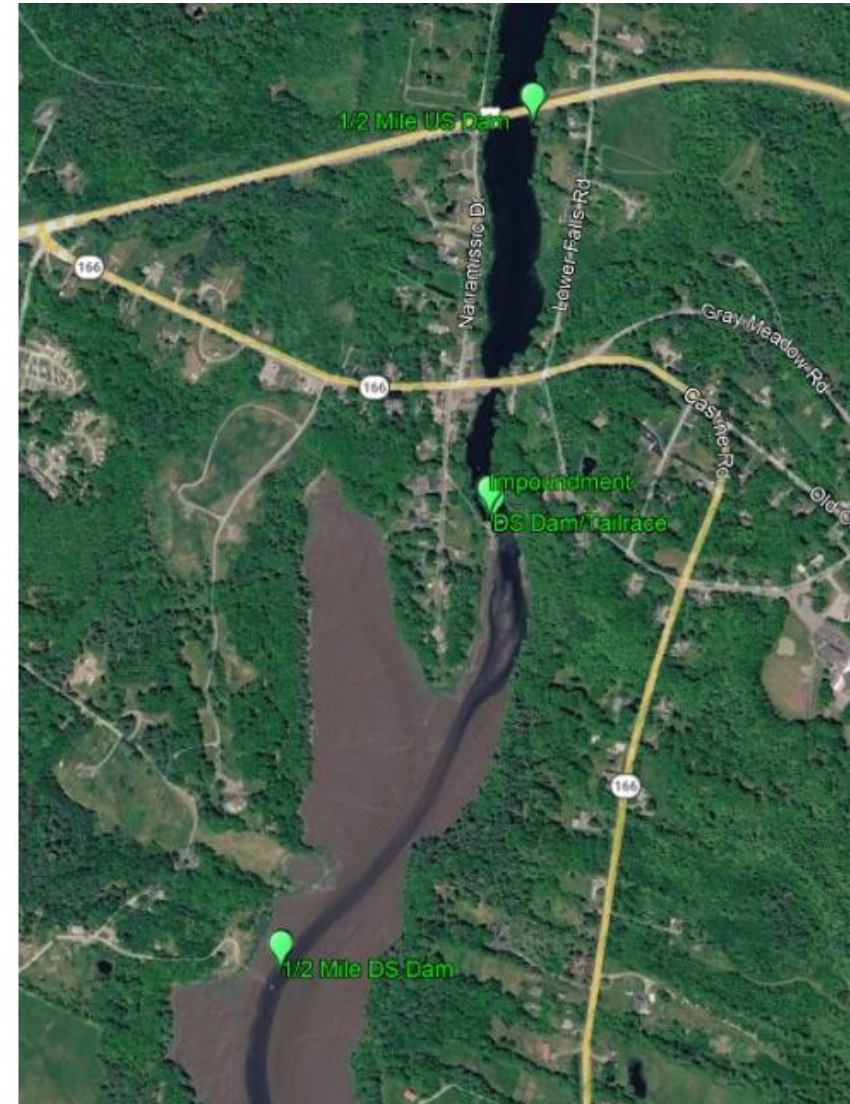
Thank You

Water Level Monitoring

- Installed sensors to determine tides and correlate water level with river flow
- 5 sensors deployed upstream and downstream of the dam
- Valuable data to calibrate hydraulic models and develop design criteria



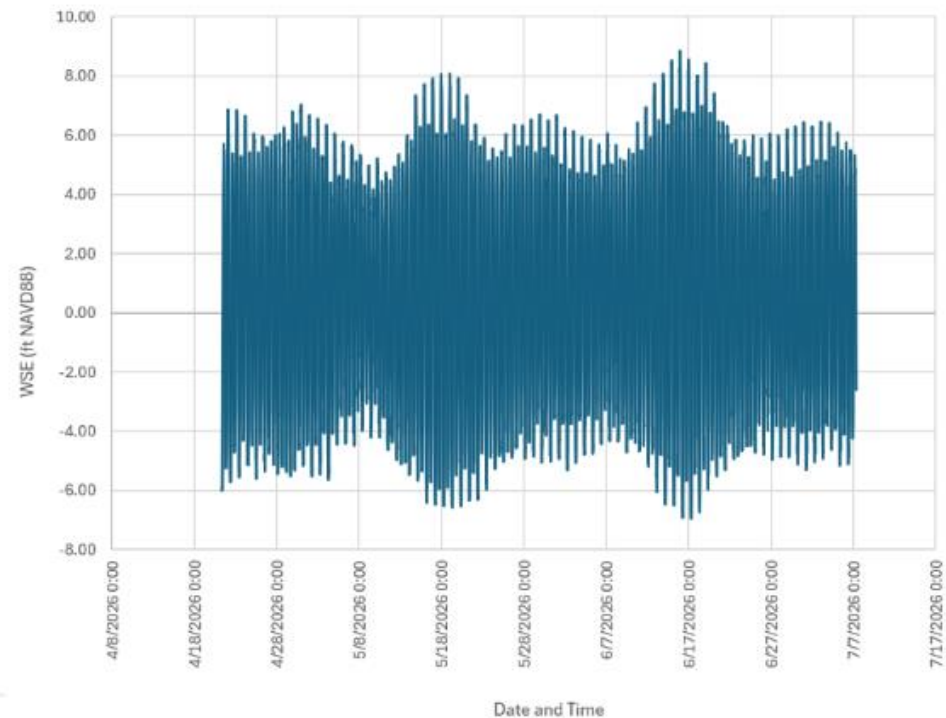
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Data Collection Event 1

- Data was successfully retrieved from all loggers on 7/7/2026.
- Sensor on downstream face of the dam shows evidence of vandalism. Data appears largely salvageable.
- Preliminary review of data looks good
- All sensors redeployed successfully

Tidal Elevation Data 1/2 Mile Downstream of Orland Dam



Dam Inspection Findings

- Inspected on 4/21/2026
- No immediate safety concerns
- Timber crib shows widespread deterioration
- Damaged and deteriorating crest boards
- Voids and gaps observed in abutment interfaces and dam structures

