

VT Department of Environmental Conservation – Water Investment Division – Dam Safety Program

BRIEFING
WATERBURY DAM
SPILLWAY PROJECT UPDATE



Introductions/Roles

Waterbury Dam Ownership

Department of Environmental Conservation - Water Investment Division

- Neil Kamman – Division Director
- Eric Blatt, PE – Director of Engineering
 - Project and financial oversight

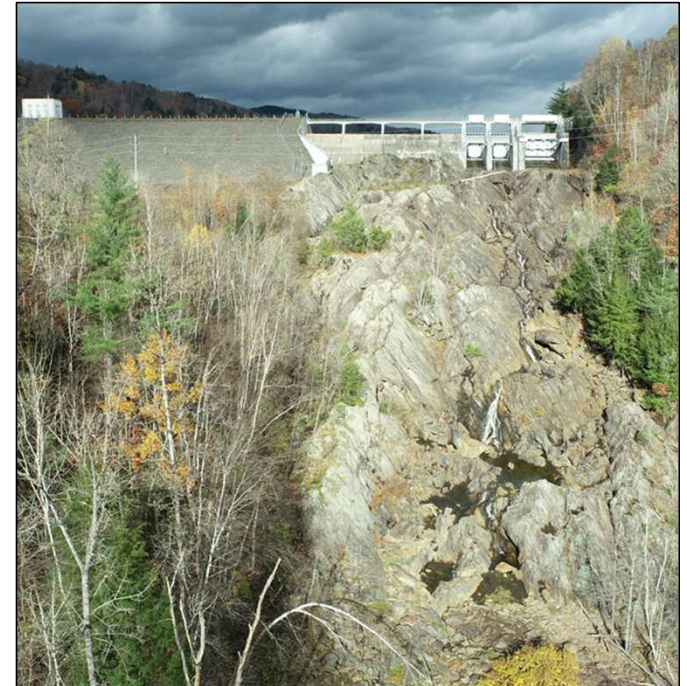
Dam Safety Program

- Ben Green, PE – Dam Safety Program – Section Chief
 - Lead Owner/Operator
 - Technical oversight

Waterbury Dam Technical and Financial Assistance

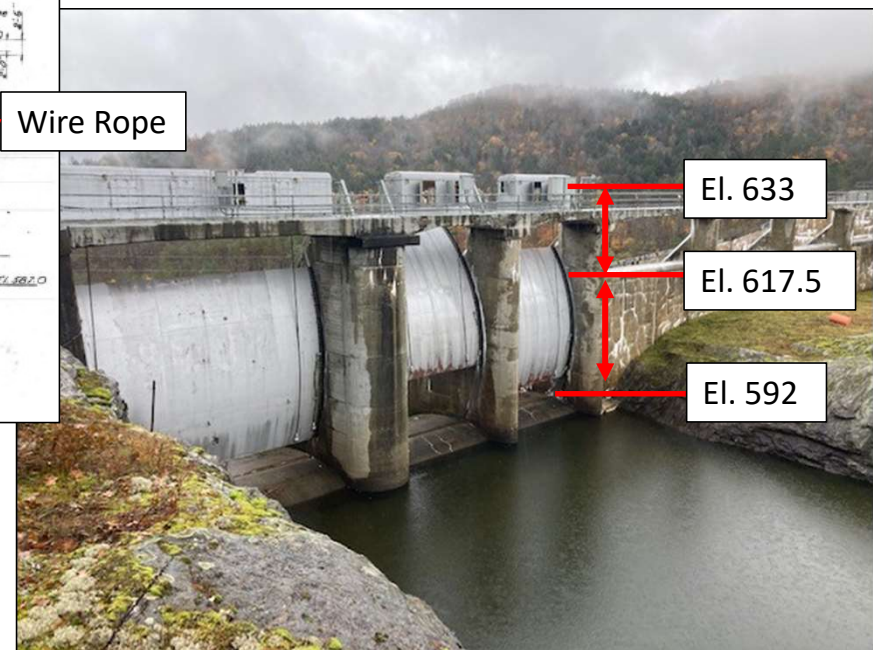
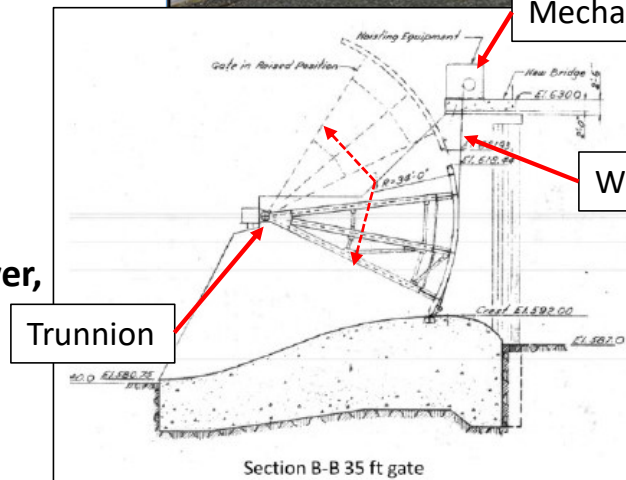
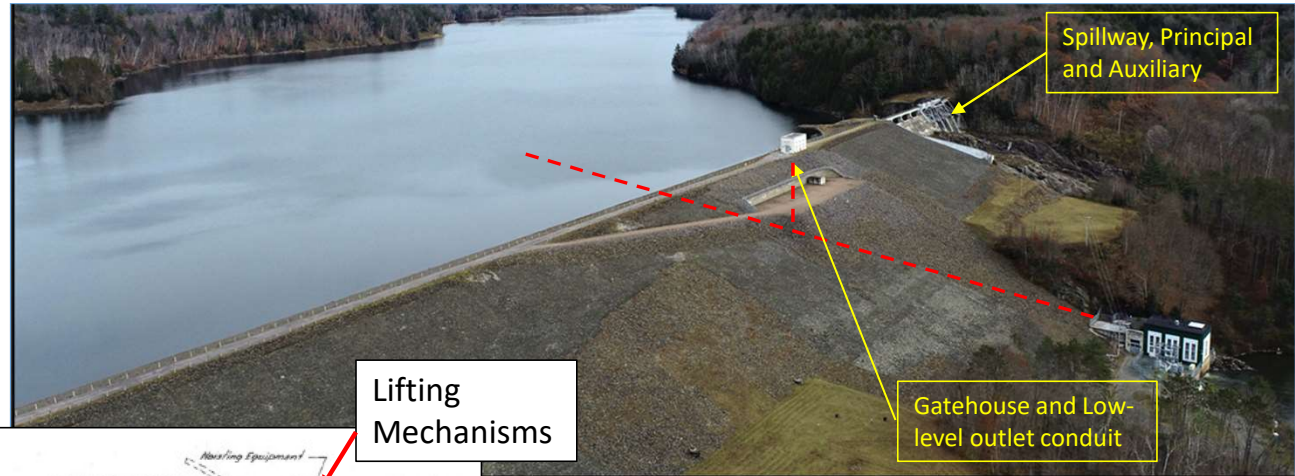
United States Army Corps of Engineers – New England Division

- Financial assistance (all project facets)
- Technical assistance (assessment, planning, design, construction)



Overview

- 109 SM drainage area
- 187 ft. tall
- 2,100 ft. long
- 3rd tallest
- 4th largest storage
- HIGH Hazard Potential
- Flood protection, hydropower, recreation
- History:
 - Built post 1927 Flood
 - Designed by US Army Corps of Engineers
 - Completed 1938



Flood Release at Waterbury Dam



Project Background

- 1957 Modifications –Embankment raise, 3rd gate added
- 1985 Seepage Remediation
- 2002 Additional Seepage Remediation
- **2004 Radial Arm Gate jamming/Gate Seal Repairs**
- Flood load restrictions on gates
- Green Mountain Power – Water Quality Cert. – no drawdown
- Section 1177, WIIN Funding, US Army Corps of Engineers NED
- Federal/State cost sharing



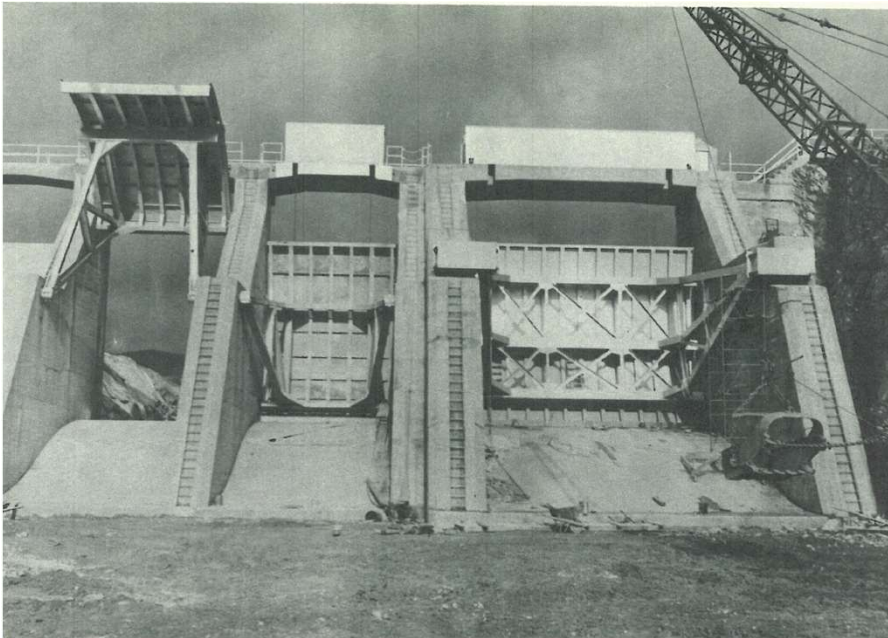
Folsom Dam Tainter Gate Failure, 1995



Waterbury Dam, Spring 2019 Flood Control

Project Goals

- Restore full flood control capability while reducing dam safety risks
- Continue to support hydropower and recreational uses
- End to seasonal drawdowns → improved water quality
- Improved O&M



1959



2022

Project Steps

1. Risk Assessment **(Completed)**

- Assess potential dam failure modes and risk
- Section 542 WRDA – Lake Champlain Basin Program, \$700k
- 2020-2022

2. Dam Safety Modification Study **(Underway)**

- Outline work identified in Risk Assessment
- Section 1177 WIIN, \$3M
- 2023: 10% Design & Cost Estimate
- 2024: 30% Design & Cost Estimate

3. Design **(Upcoming)**

- Section 1177 WIIN, ~\$5M
- 2025 to 2027


4. Construction

- Section 1177 WIIN, up to ~\$67-\$95M
- 2027 to 2029



Completed /Ongoing Work



- Risk Assessment
 - PFM 1: Embankment Overtopping
 - PFM 2: Internal Erosion of Embankment
 - PFM 3: Spillway Debris Blockage leads to Overtopping
 - PFM 4: Spillway Stability
 - **PFM 5: Tainter Gate Failure**
 - **Overstressing of pedestrian bridge**
 - **Overstressing of gate 2/center gate**
 - **Pier movement due to deteriorating concrete**
 - **Discharge channel bedrock erosion**




Waterbury Dam
Little River/Winooski River, Lake Champlain
Watershed, Vermont
(NID VT00027)
Embankment, Outlet Works, and Spillway

**Section 542, Water Resources
Development Act**
Semi-Quantitative Risk Assessment

North Atlantic Division, New England District



Status: FINAL
Report Date: June 2021

 FOR OFFICIAL USE ONLY

Completed /Ongoing Work

- **Field Work (Fall 2022)**
Concrete/bedrock subsurface explorations, testing, and analysis



Completed /Ongoing Work

- Field Work (Fall 2022)
Trunnion Friction Testing

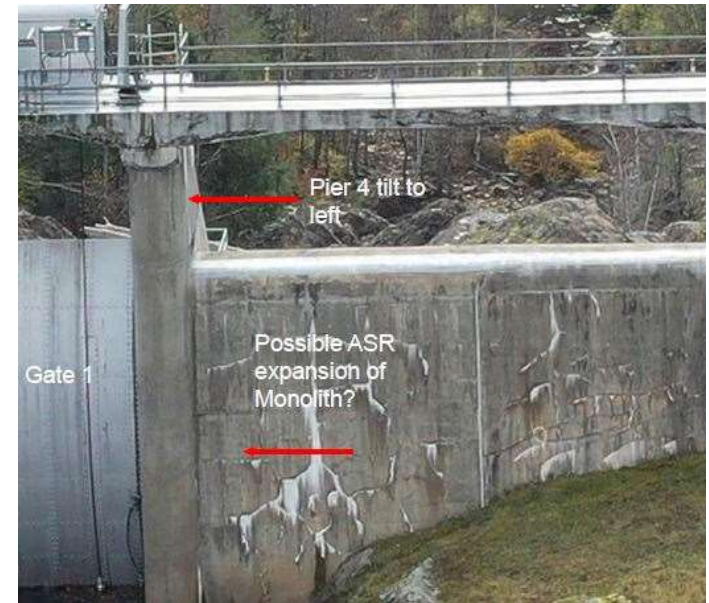


Completed /Ongoing Work

- Field Work

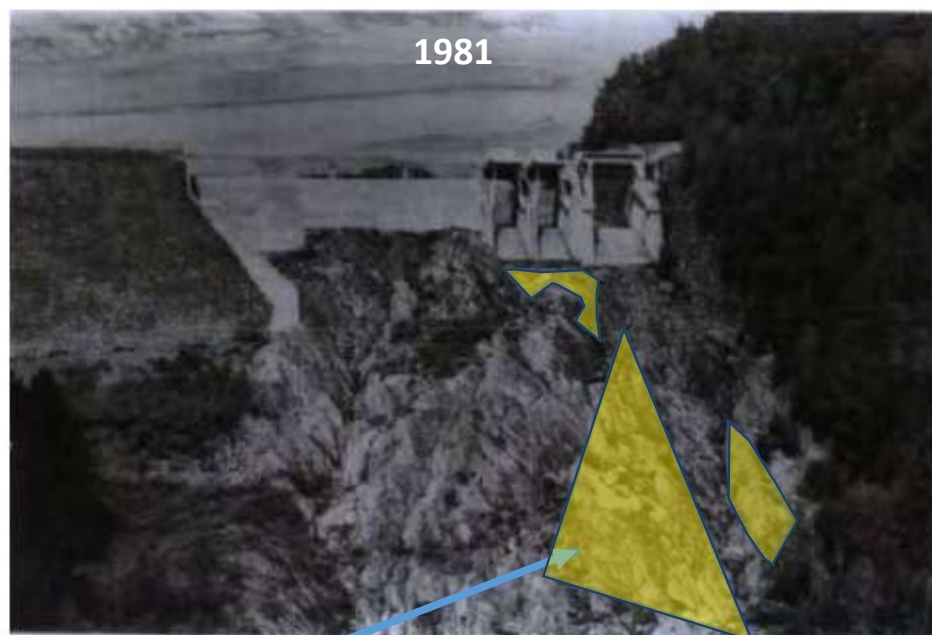
Bridge Inspection, load rating

Pier tilt monitoring



Completed /Ongoing Work

- Field Work
Spillway rock erosion



Shaded areas indicating rock removal and deepening of incisions along preferential erosion pathways. Note shadow-lines at over-hangs and detached bedrock conditions seen in field.

Figure 11: Photographic Evidence of 40 years of Erosion in the Downstream Spillway Channel

Note: From Reported titled, "Waterbury Dam Spillway Geologic Mapping and Testing, USACE NED, August 2021

Overview of 2023 Flood Events

- July – Peak Pool El. 604.33 (6.5' below action, ~14.8' above normal), **4th Pool-of-Record**
- December – Peak Pool El. 604.01 (6.8' Below action, ~14.5' above normal), **6th Pool-of-Record**
- For Pools-of-Record, 4th & 6th in 2023, Pools 3rd through 6th all in the last 12 years of 85-year service history



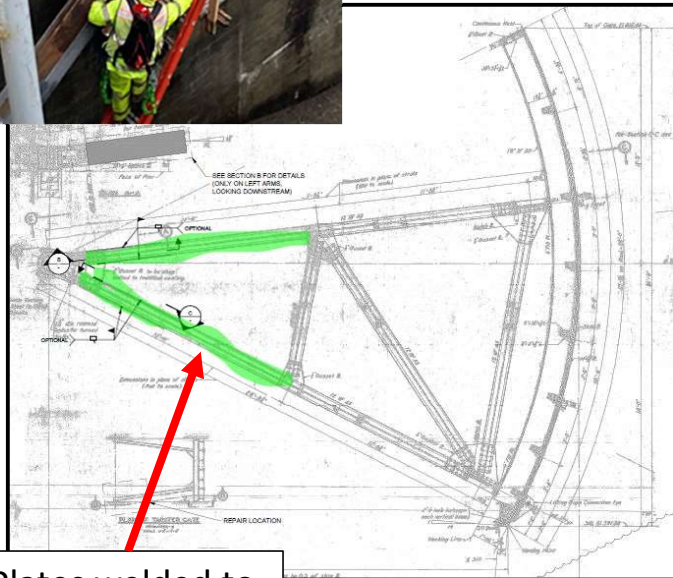
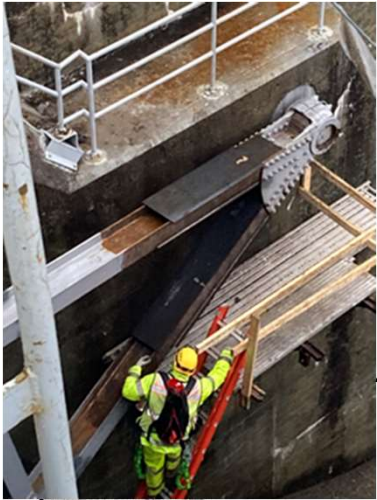
Flood Operation Challenges

- Load restrictions on Gates
- Bridge and Gate 2 overstressed
- Cone valve and Gate 3 only for water releases



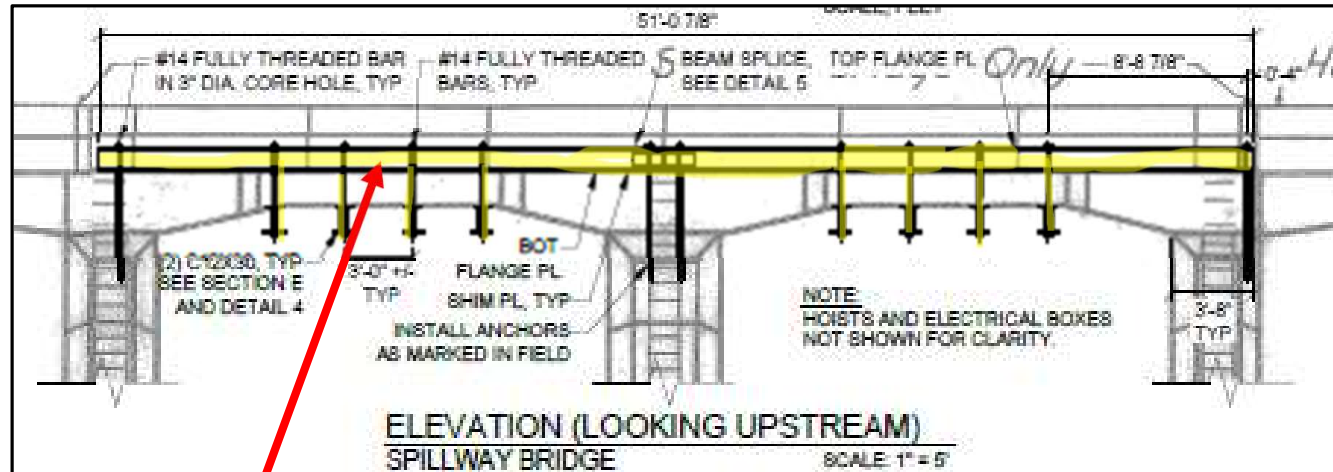
Temporary Risk Reduction Project

- Risk Reduction Project – temporary stabilization measures (Fall 2023/Winter 2024)
- Design and construction budget of \$727,000



Plates welded to strut arms

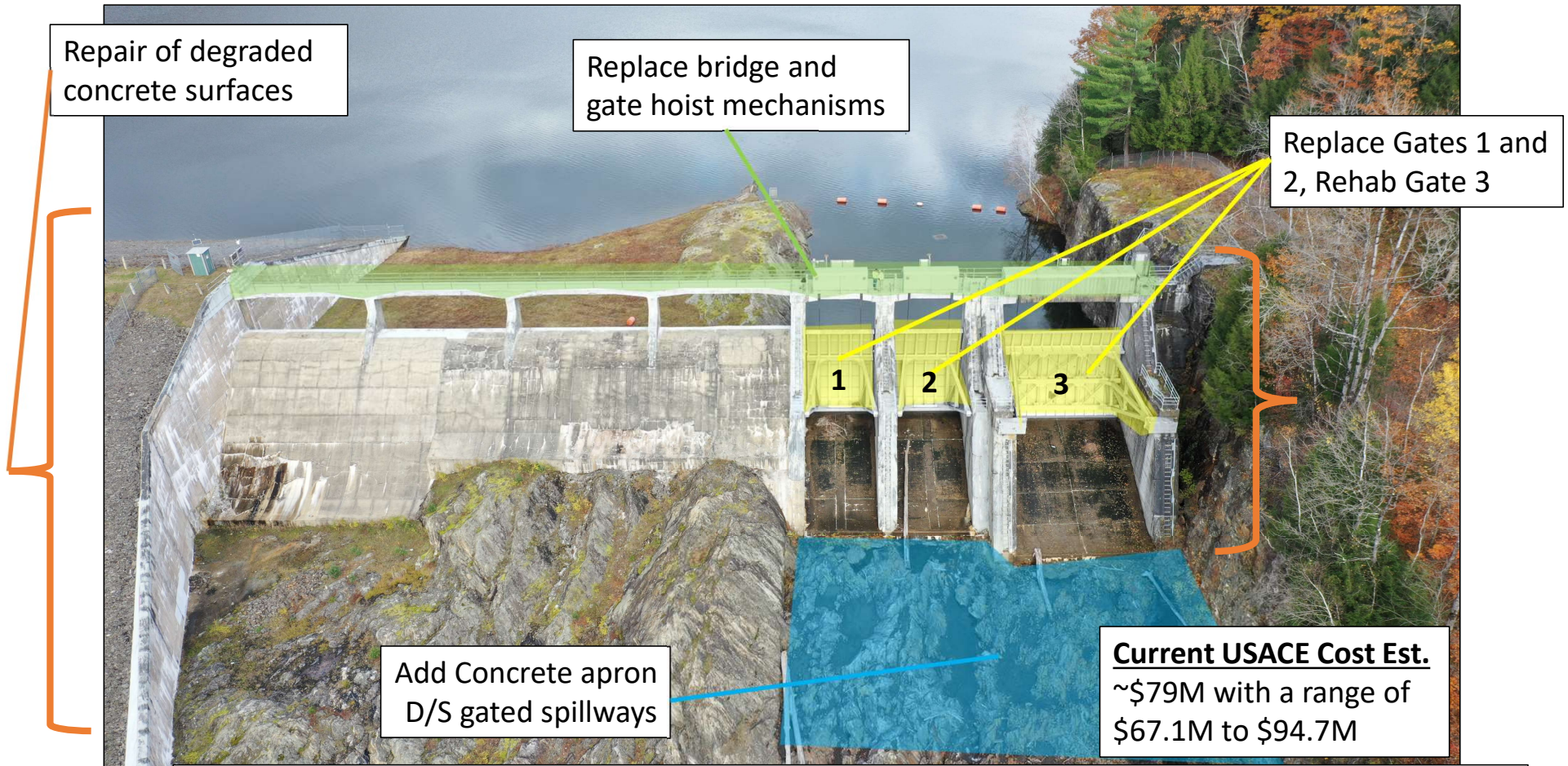
Reinforce strut arms on Gate 2



Top side and bottom side beams

Underpin bridge

Recommended Rehabilitation Measures per USACE



Other: Reservoir Drawdown to provide equivalent flood protection during construction, construction access roads, water quality gate in spillway, etc.

Project Funding Details

- Current construction cost estimate based on 10% design is \$79M but could range to over \$90M based on final selected alternatives and more detailed design.
- WRDA Section 1177 is the Federal Authorizing Statute, presently authorized at \$60M.
- In 2020, \$40M appropriated and incorporated into USACE’s workplan as a “new construction start.”
- In 2020, USACE & VT signed cost share agreement with estimated Total Project Cost of \$60M with cost.
- In WRDA 2022, delegation adjusted cost-share to 7.1% (the historical cost share for Waterbury Dam), down from 50% planning, 35% design/construction.
- For WRDA 2024, delegation has requested a plus up in authorization to \$100M.
- Delegation has been briefed on the appropriation need, which is subject to a more favorable appropriating environment in Congress. They know the need.

<u>In the “Bank”:</u> \$40M Federal Funds \$4.65M Capital Funds for match	<u>In process with Delegation:</u> Increased federal authorization (WRDA) Additional appropriation (Budget)
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Waterbury Dam Spillway Project Summary

- Currently in Study Phase and moving to Design Phase in 2025
- Temporary Risk Reduction Measures Underway
- The USACE cost estimate for spillway rehabilitation is \$67.1M to \$94.7M with the best estimate of \$79M, requiring additional funding
- Construction anticipated in the 2027 to 2029 timeframe, to likely temporarily impact water levels for recreation and power production

THANK YOU!!

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