Four Lakes Task Force Engineering and Technical Symposium

Session 3 - Design Engineering and Construction

October 20, 2022

Rick Anderson, Bill Walton and Phil Martin

Agenda

- 1.0 Introductions
- 2.0 Restoration Schedule
- 3.0 Dam Safety Issues and Interim Repairs
- 4.0 Overview of Permanent Repairs

1.0 Introducing the Design Engineering Team Leads

Four Lakes Task Force

Dave Kepler – President
Dave Rothman – Vice President
Adam Heinrich – Construction and Program Manager
Brad Fedorchak – Operations Lead
Greg Uhl – Lead Operator

GEI Consultants, Inc.

Paul Drew – Program Manager
Rick Anderson – Project Principal
Bill Walton – SCD and SWD Engineer of Record
Jim Nickerson – SCD and SWD Design Lead
Josh Jacak – SCD and SWD Civil Lead
Mike Carpenter – EDN Engineer of Record
Any Baxter – SFD Engineer of Record
Carlin Grundemann – SCD, SWD, EDN Geotechnical Lead
Nisheet Reddy – SCD, SWD Structural Lead
Paul Drew – SCD, SWD Hydraulic Lead
Geoff Kruger – EDN, SFD Hydraulic Lead
Richard Price – EDN Structural Lead
Hugo Velasquez – EDN Civil Lead
Carlos Englert – SFD Structural Lead
Pat Grodecki – SFD Geotechnical Lead
Stephen Oldemeyer – SFD Civil Lead
Marat Mardenov – Resident Engineer
Linda Engels – Project Support Lead

Spicer Group, Inc.

Ron Hansen – Owner Engineer
Kelsea Sutton – Permitting Lead
Warren Miller – Project Manager
Brian Boals – Civil Design Lead
Darrick Huff – M&E
Eric Barden – Lead Surveyor
Dave Boersma – Lead Architect

IEC

Phil Martin – President

Essex Partnership

Fred Szufrnarwoski
Bob Gates

AECOM (Third Party Review on Behalf of EGLE)

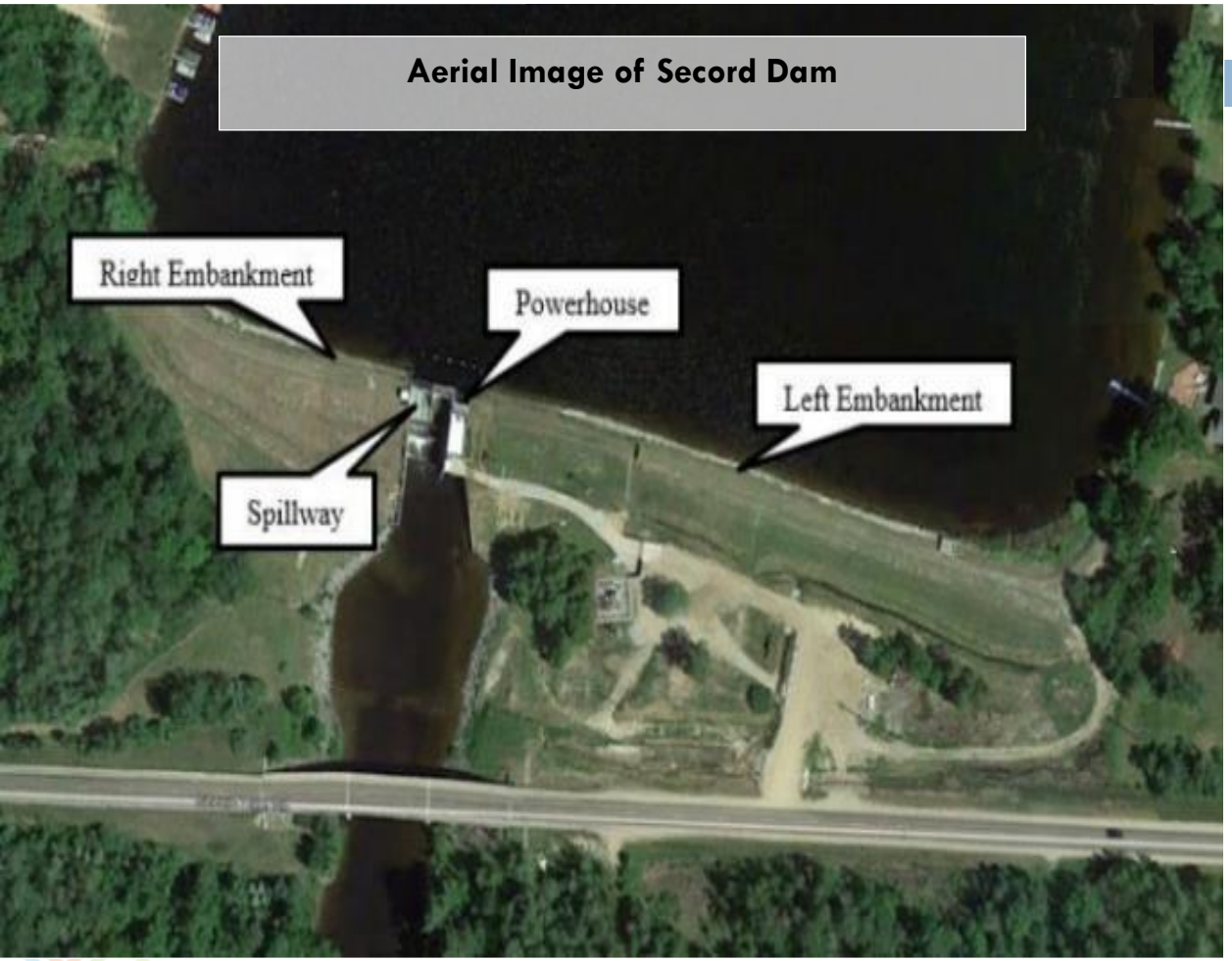
Paul Perri – Project Manager

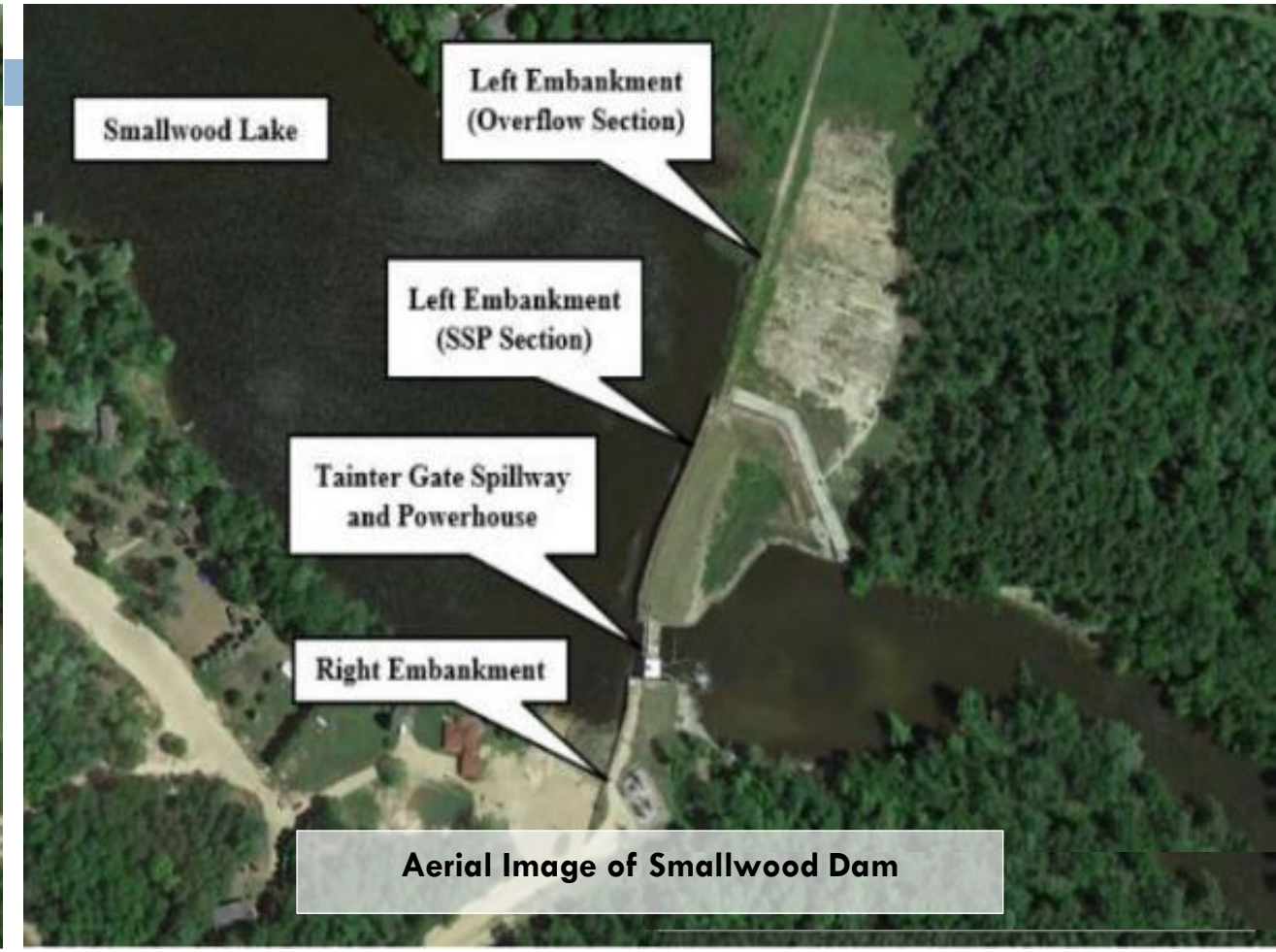
Plus a team of over
100 engineers, scientists and professionals

Panel Discussion – Dam Safety Issues

- What are the current dam safety issues?

Secord and Smallwood Dams – Dam Safety Issues





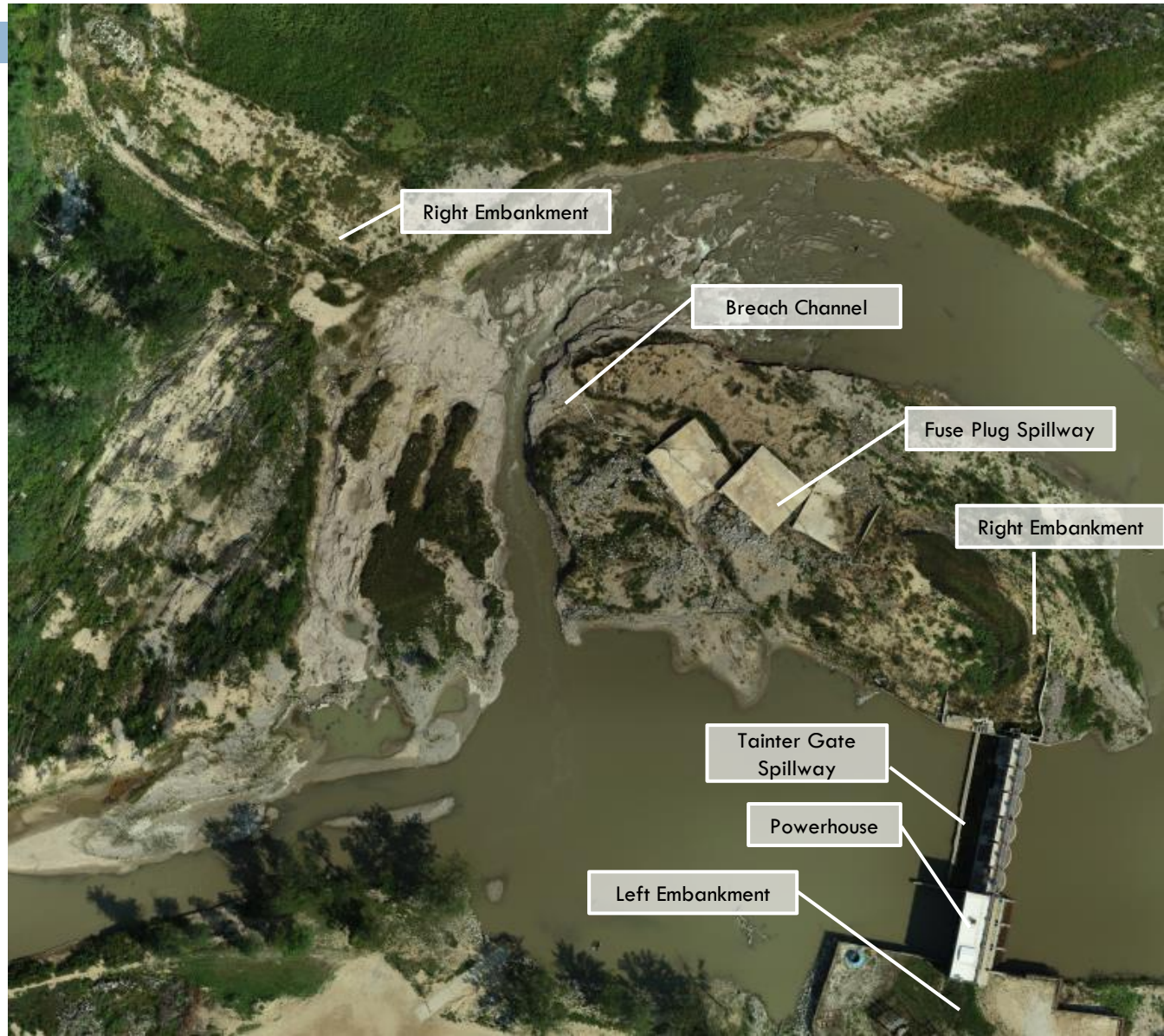
Insufficient spillway discharge capacity – reduced pool operating condition

Edenville Post-Flood Condition – Dam Safety Issues

- Inadequate Spillway Capacity
- Embankment Dam Stability
  - Unstable under flood loading
  - Uncontrolled seepage
- Breached Left Embankment Needs to be restored – perfect spot for adding auxiliary spillway capacity

Sanford Dam Pre- and Post-Flood

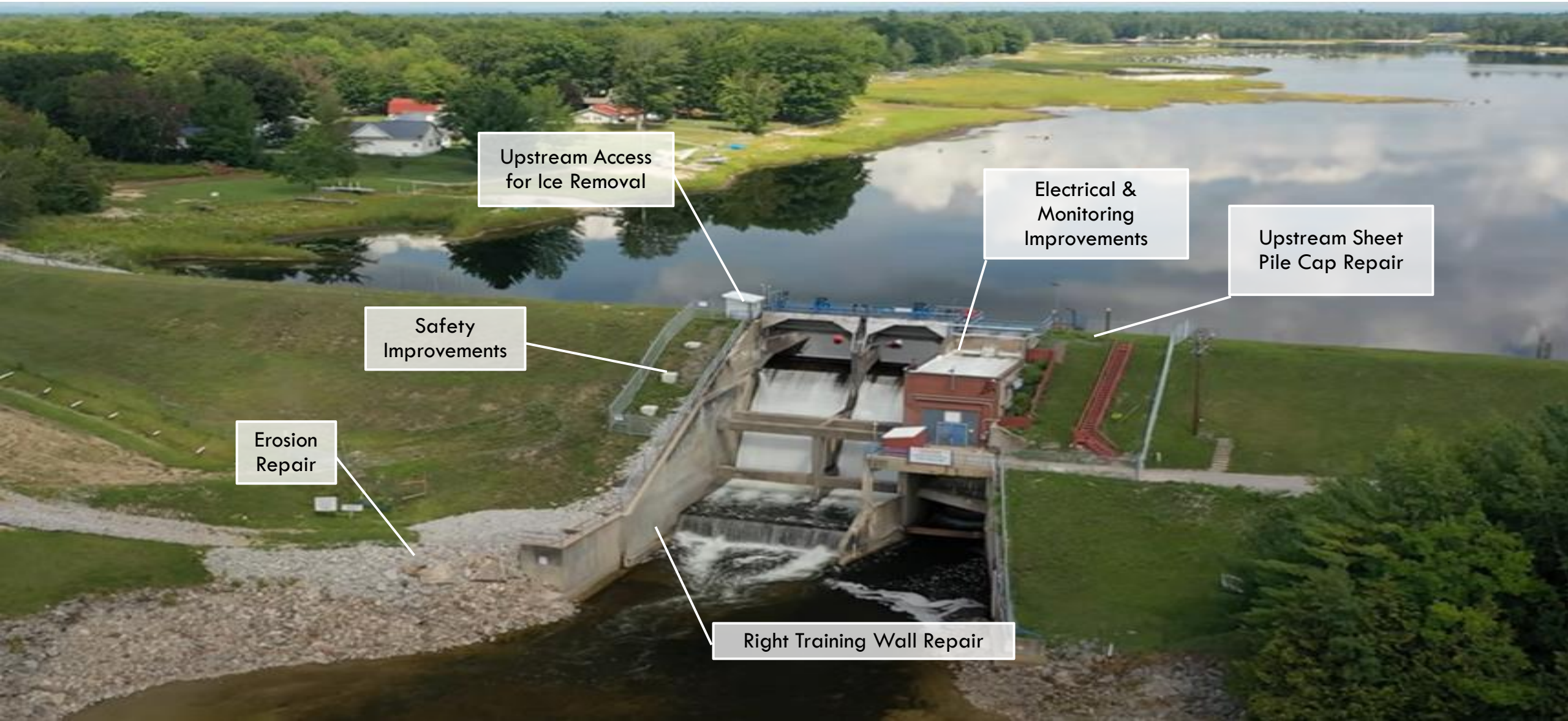
- Inadequate Spillway Capacity
- Right Embankment Breached
- Left Embankment Overtopped and Damaged



Panel Discussion – Interim Repairs

- What (interim) repairs have been completed so far?

Secord Dam – Current Status (Post-Flood Interim Repairs)



Smallwood Dam – Current Status (Post Flood Interim Repairs)

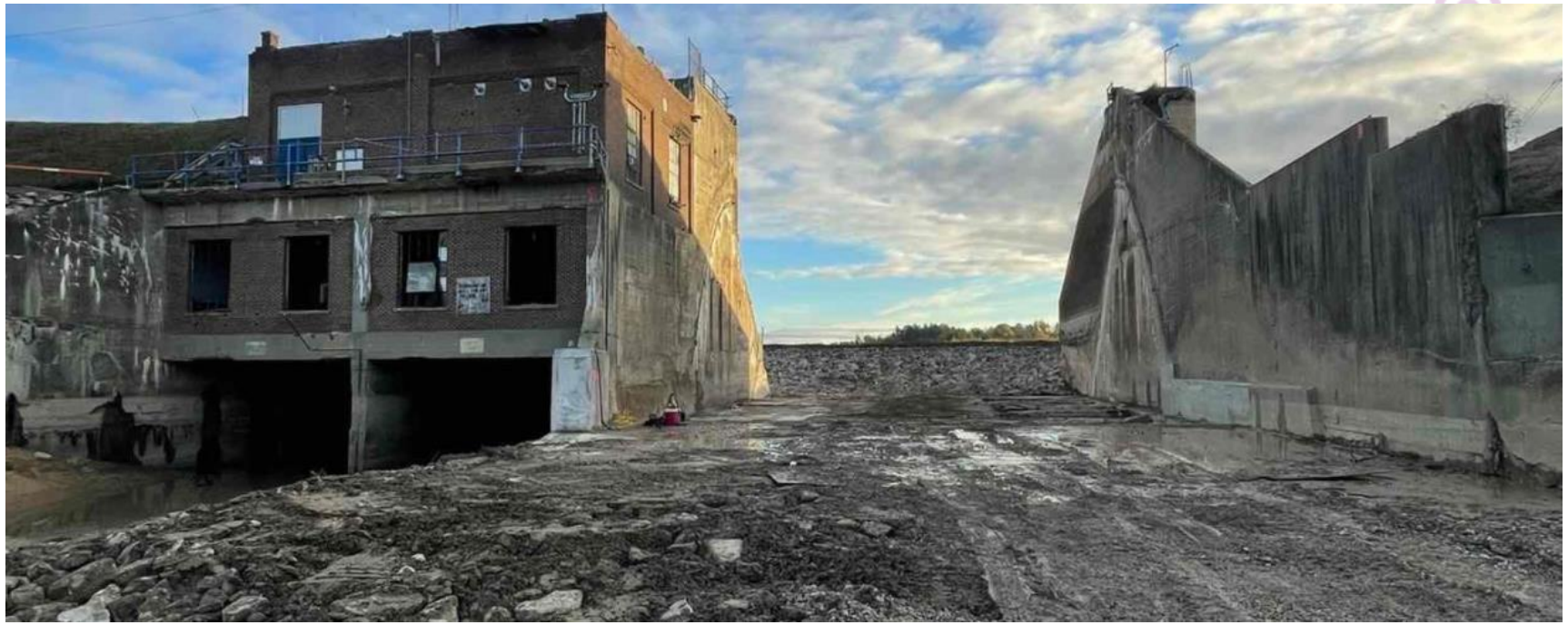
Edenville Dam: Tobacco and Tittabawassee Rivers Back in Their Original Channels

Edenville Dam Phase I – Interim Stabilization at Tobacco (TBO) Spillway

- Re-established Tobacco River flow
- Removed Gates and Rollways
- Added Stepped Spillways
- Braced Piers and Walls
- Restored Downstream River Channel

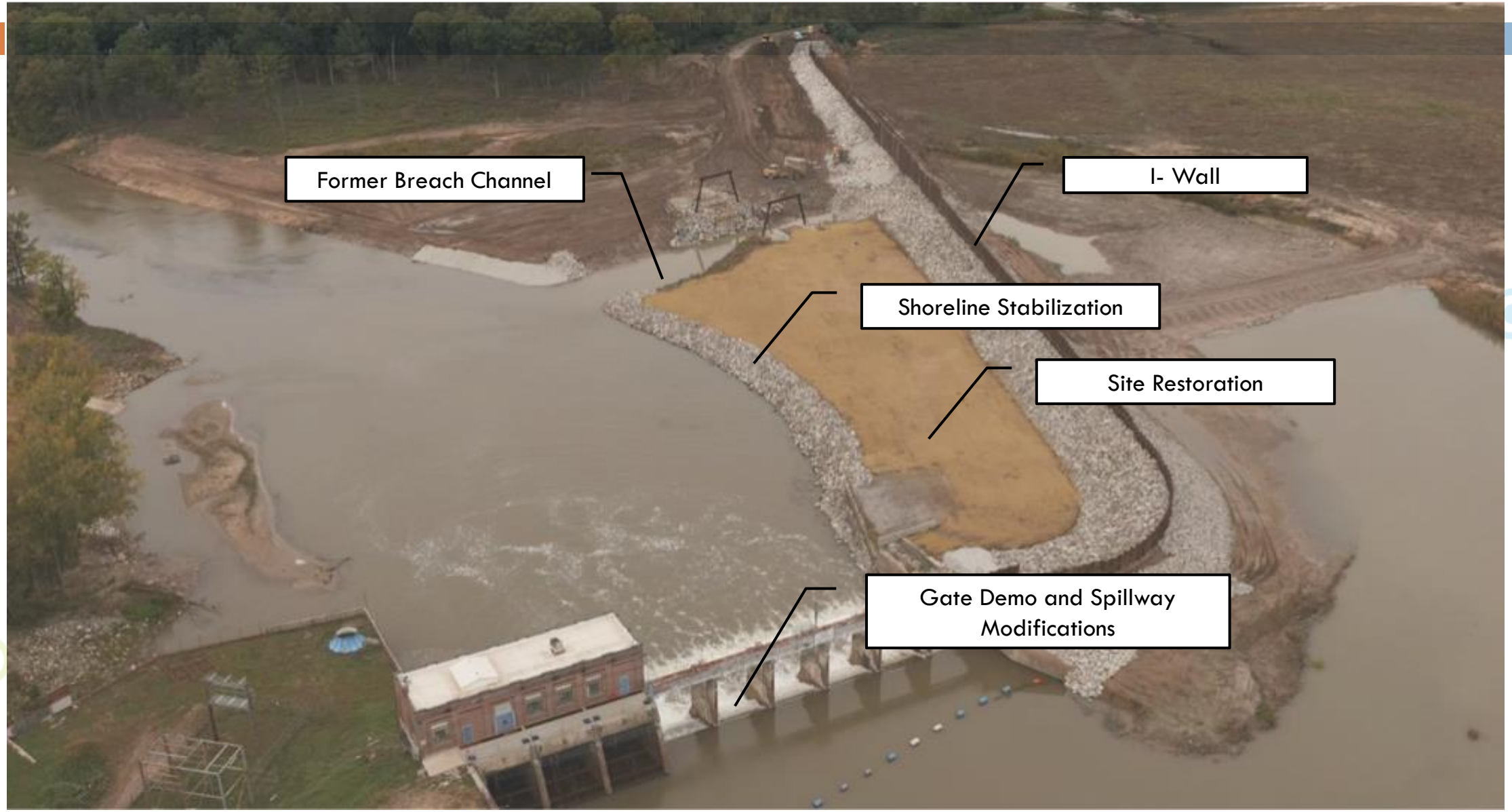
Edenville Dam Phase II – Interim Stabilization at Tittabawassee (TBW) Dam

- Re-established TBW river flow
- Installed I-Wall across Breach
- Removed Spillway Gates, Rollway and Piers
- Repaired Upstream Embankment Slopes



Sanford Dam Current Status

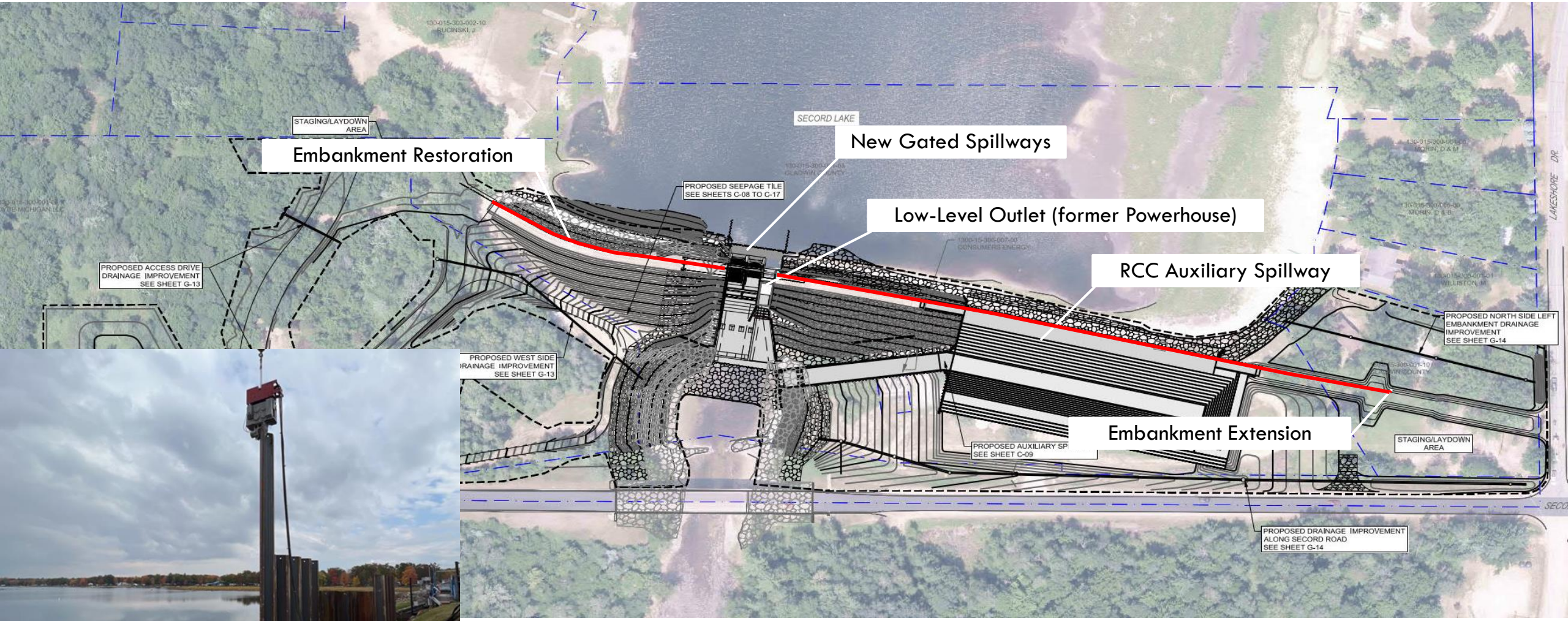
Sanford Dam – Current Status (Post-Flood Interim Repairs)



Panel Discussion – Permanent Repairs

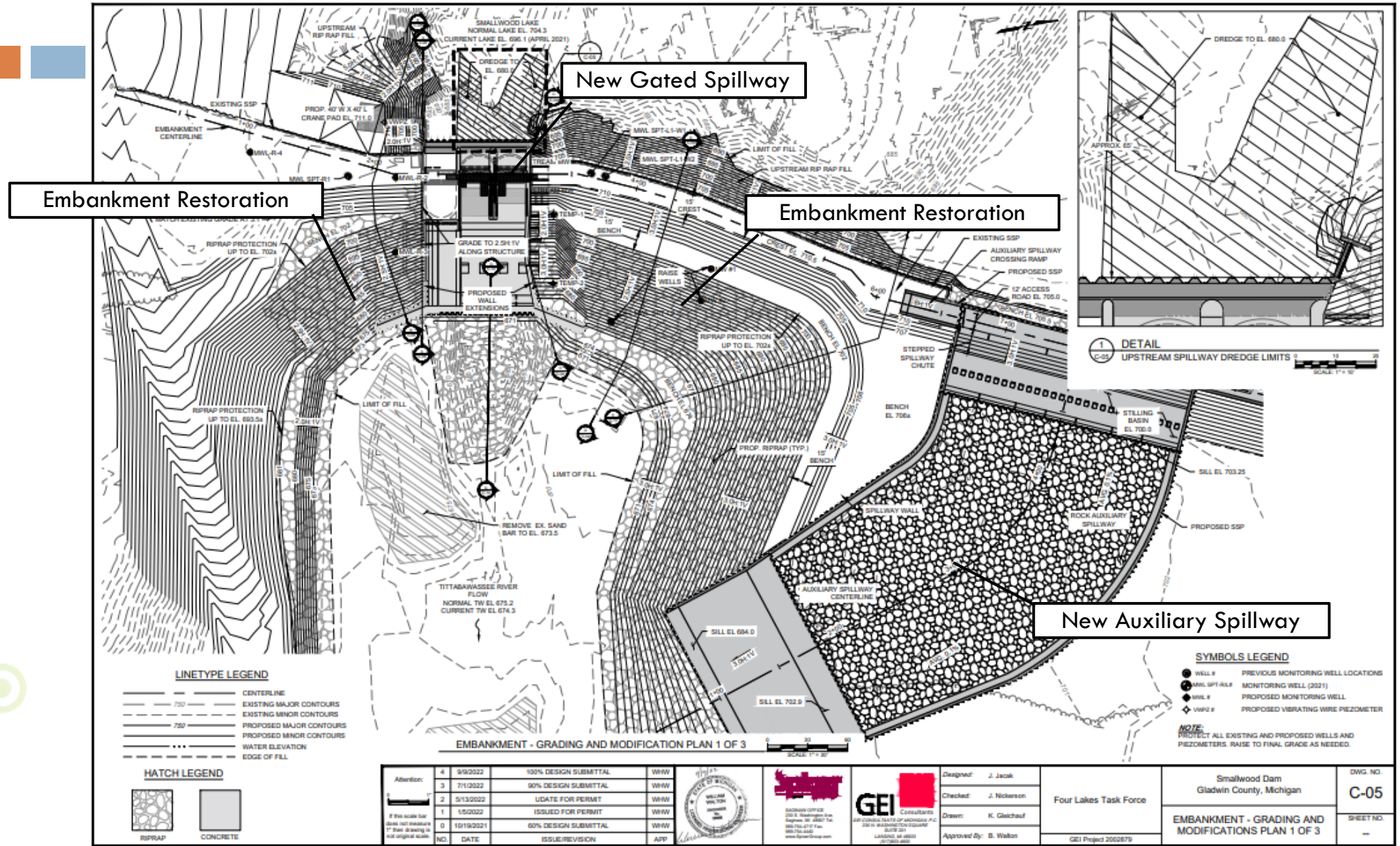
What (permanent) repairs still need to be completed before the lakes can be refilled?

Secord Dam – Restoration (2022 to 2024)

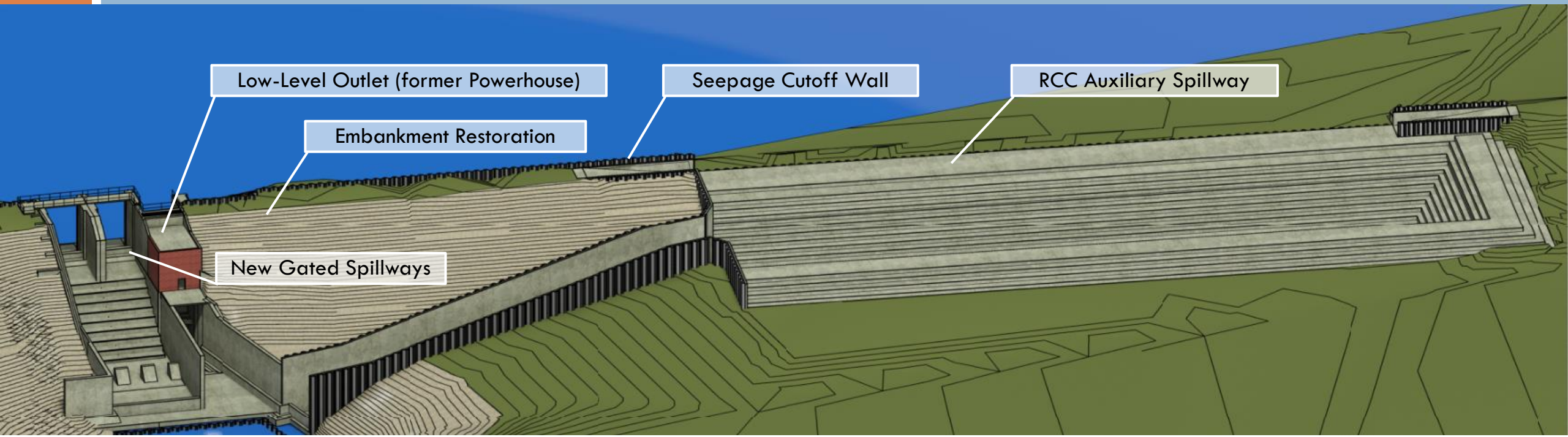


Seepage Barrier wall installation currently underway

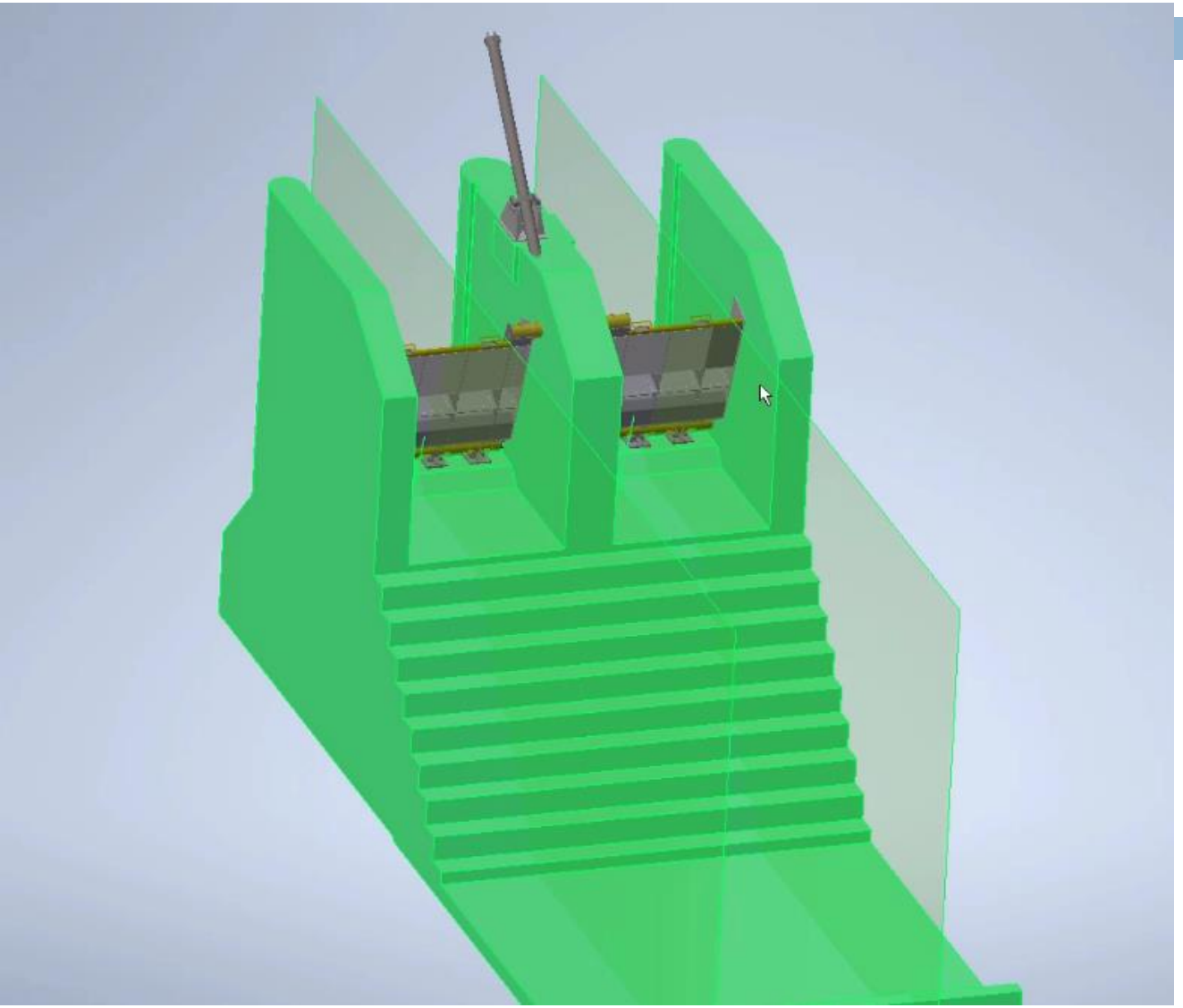
Smallwood Dam Restoration (2022 to 2024)



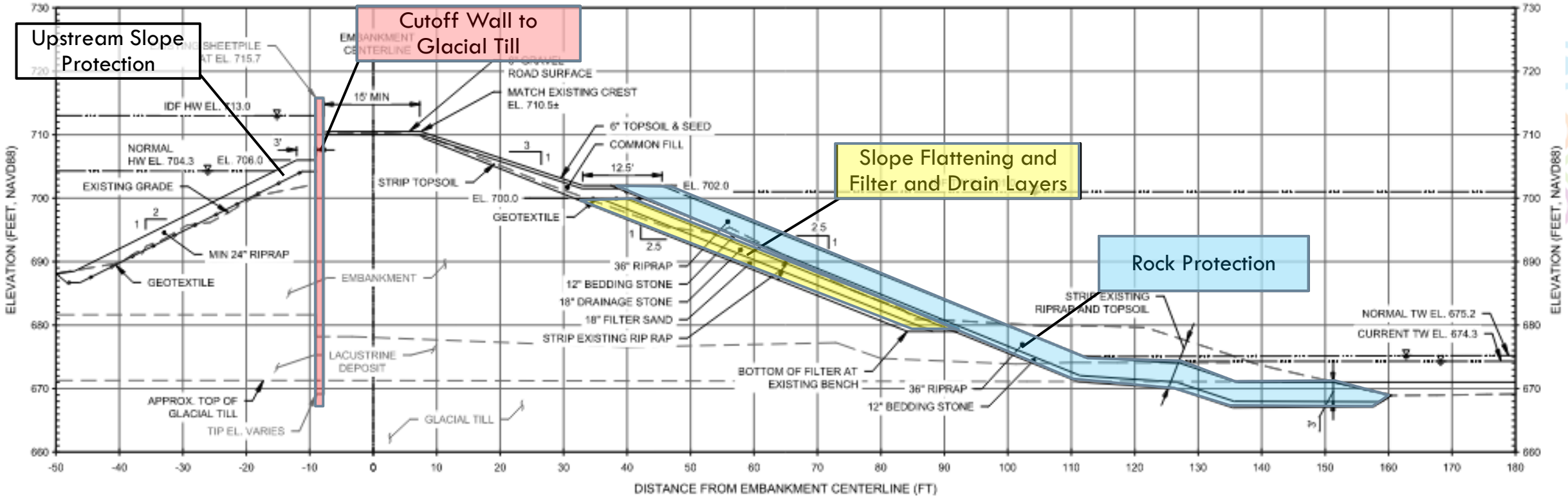
Secord Dam – New RCC Auxiliary Spillway



Secord and Smallwood Dams – New Taller Spillway Gates

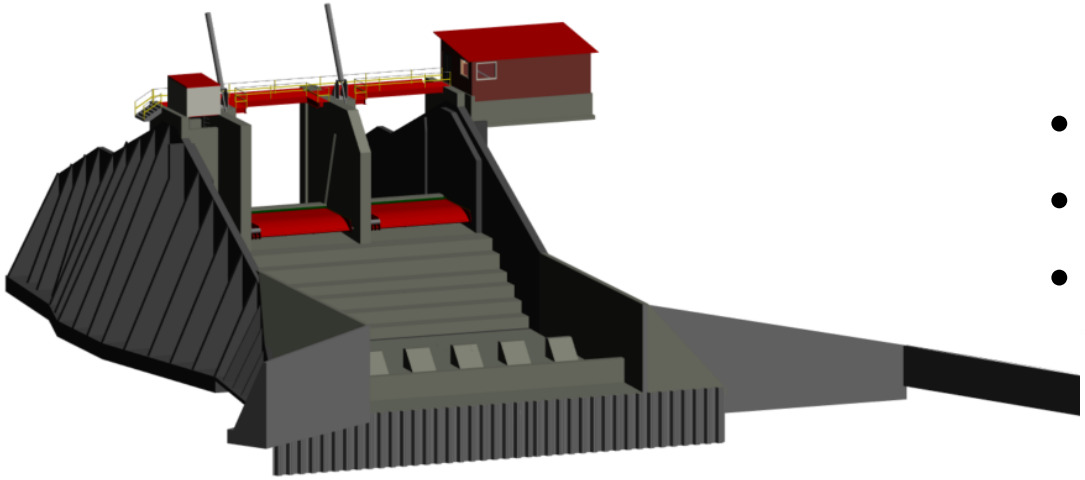


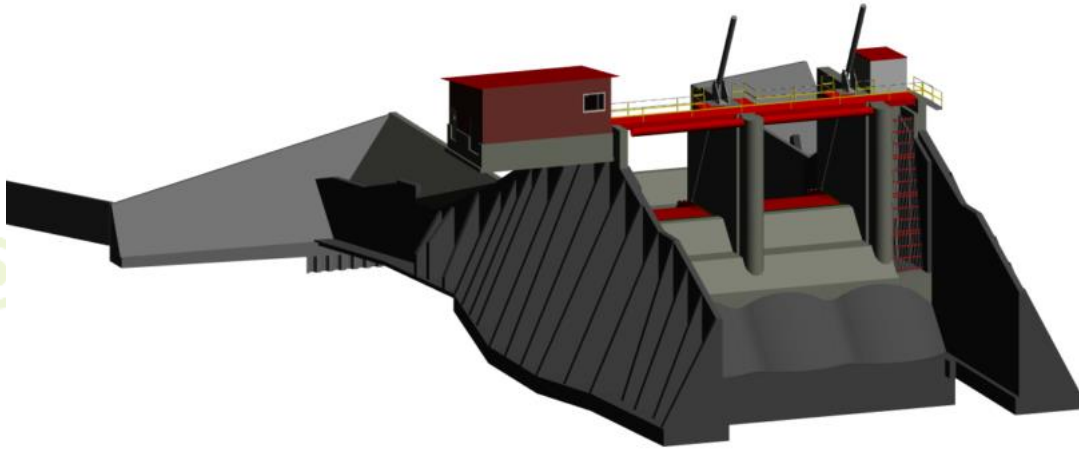
Secord and Smallwood Dams – Embankment Stabilization



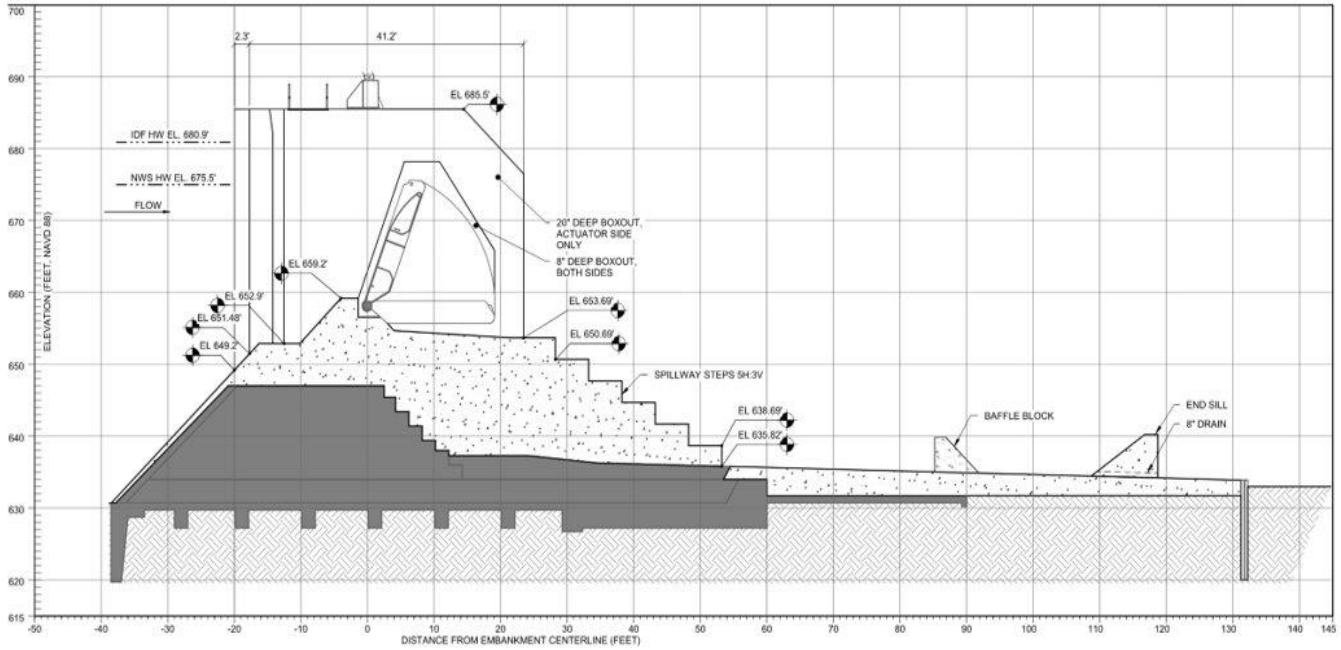
Edenville Dam Reconstruction (2023-2026)

Tobacco Spillway | Summary of Improvements



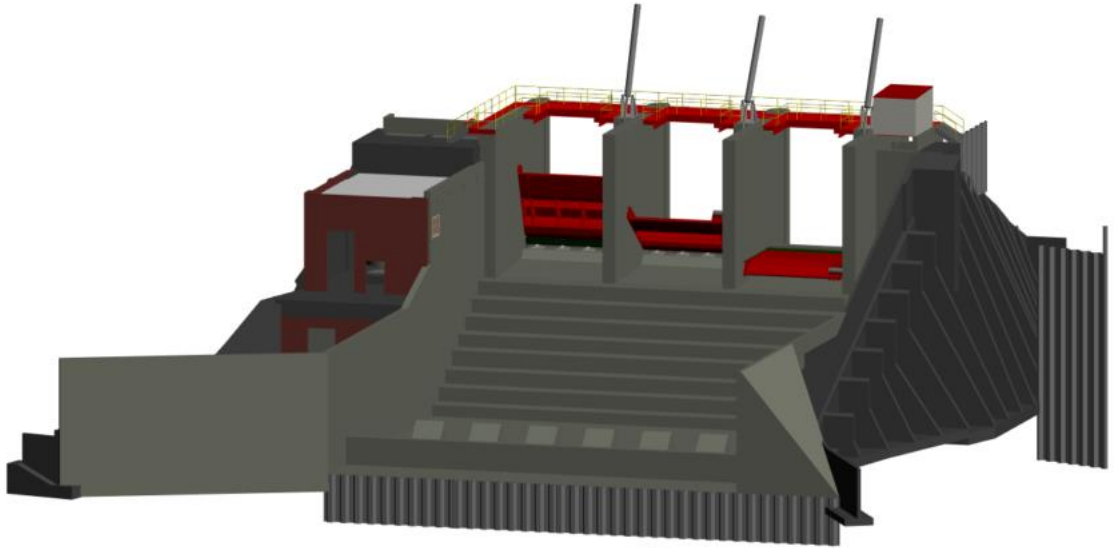


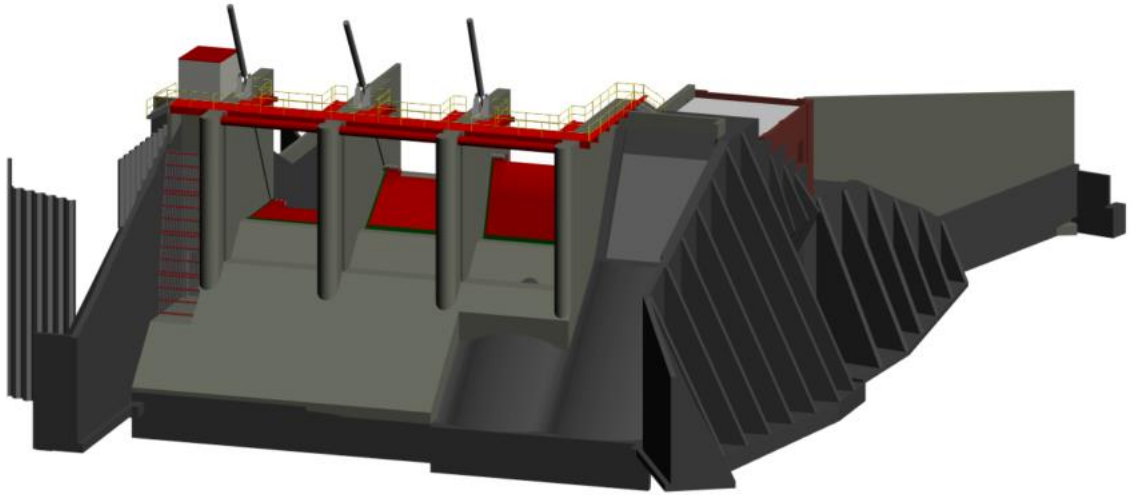
- Construct two new 27-foot-wide, 16.5-foot-tall crest gates
- Construct one vertical 5x7-foot LLO gate
- Spillway mass concrete
- New stilling basin with baffle blocks



Q TOBACCO DAM - ELEVATION - PIER 2
SCALE: 1" = 5'-0"

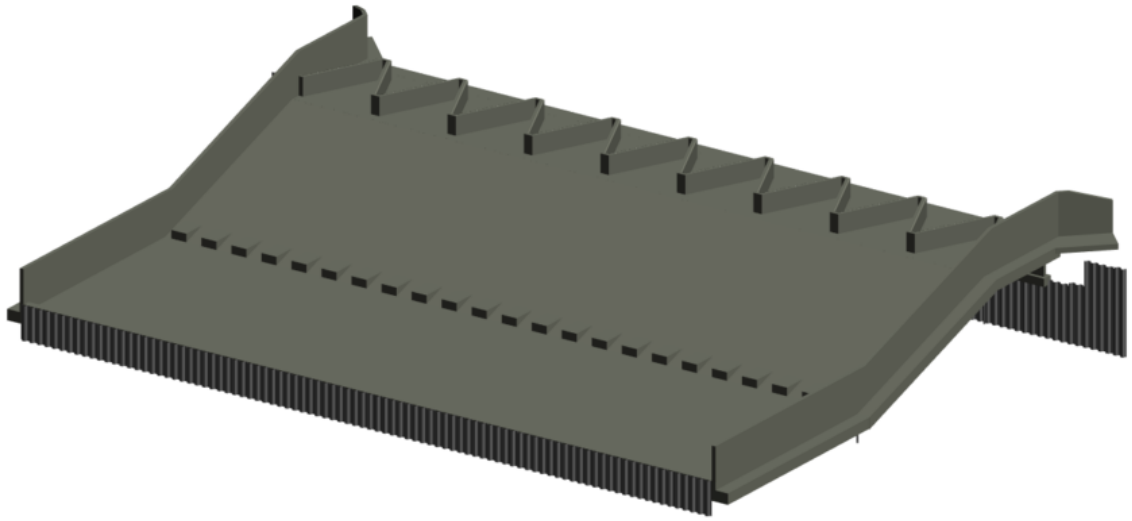
Tittabawassee Spillway | Summary of Improvements

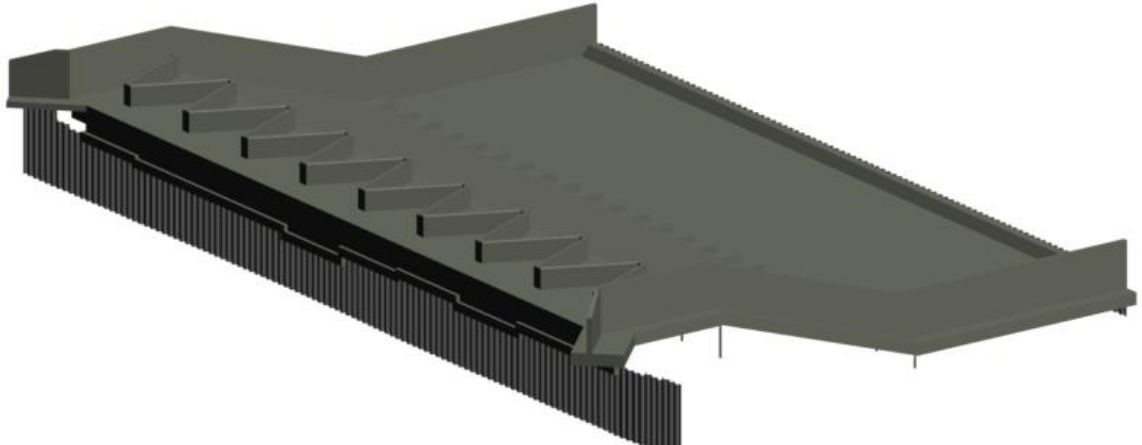




- Demolish the left bay of the Powerhouse
- Construct three new 21.75-foot-wide, 16.5-foot-tall crest gates
- Construct one vertical 6x8-foot LLO gate
- Spillway mass concrete
- New stilling basin with baffle blocks

Tittabawasee Dam – New Labyrinth Auxiliary Spillway

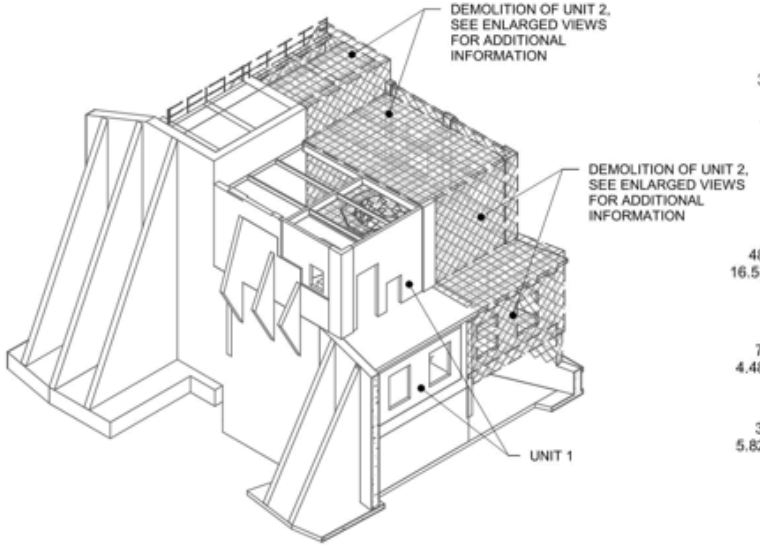




- 275-foot-wide Labyrinth Spillway
- Located on TBW Left Embankment

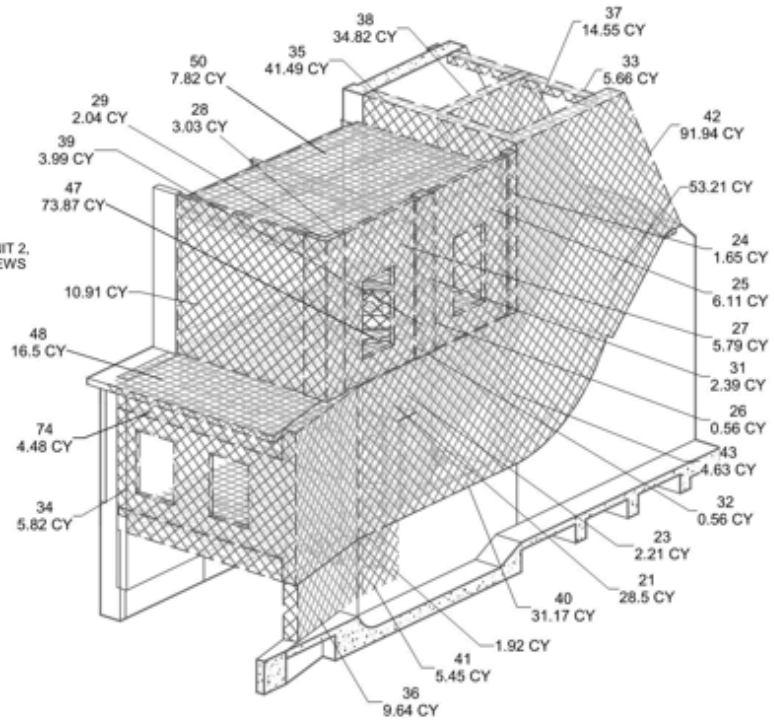
Planned Construction Sequence – Powerhouse Demolition

Raze Unit 2 Superstructure



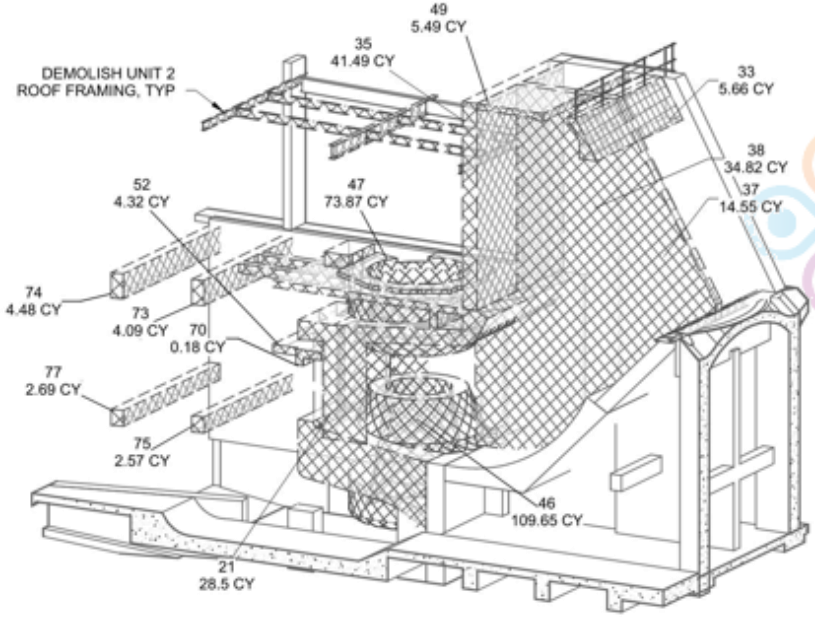
TITTABAWASSEE DAM - DEMOLITION ISOMETRIC TASK TW-A-4

SCALE:



TW DAM DEMOLITION ISOMETRIC TASK TW-A-4 - UNIT 2 EXTERIOR

Save Unit 2 Foundation Slab

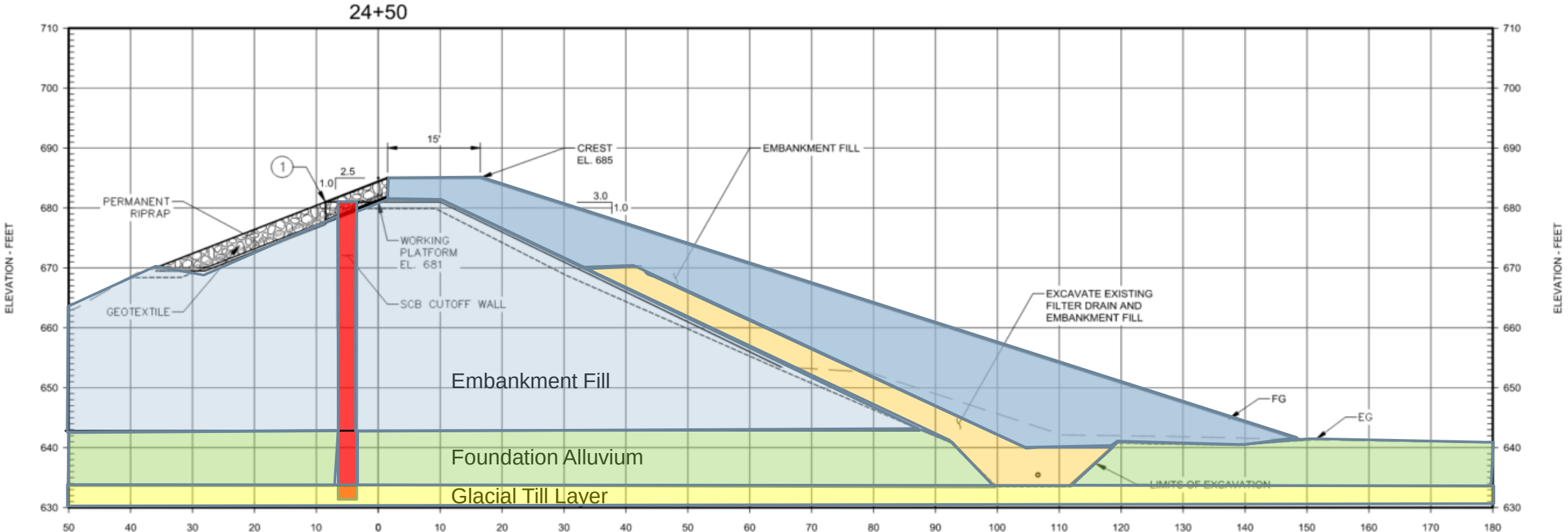


TW DAM DEMOLITION ISOMETRIC TASK TW-A-4 - UNIT 2 INTERIOR

Fill Unit 1 Intake and Tailrace with Mass Concrete

TBW and TBO Embankment Stabilization and Seepage Reduction

- Steel Sheet Pile or Mix-in-Place Soil-Cement-Bentonite Seepage Barrier Wall to glacial till
- Raise Embankment crests
- Install filter and drainage blanket material and new toe drain to collect seepage
- Flatten upstream and downstream slopes



Seepage Barrier Wall – Deep Soil Mix Wall Rig

Trencher	Soil-Mixed Walls		Collection Trenches			
	Width	Depth	Width	Pipe Dia.	Backfill	Direct Bury
MT 1600X MT 2000	30"	80'	18"	4"	35'	40'
	36"	70'	24"	6"	35'	40'
	48"	65'	24", 30"	8"	35'	40'
	51"	55'	36"	12"	20'-25'	40'
			48"	18"	20'	20'-25'

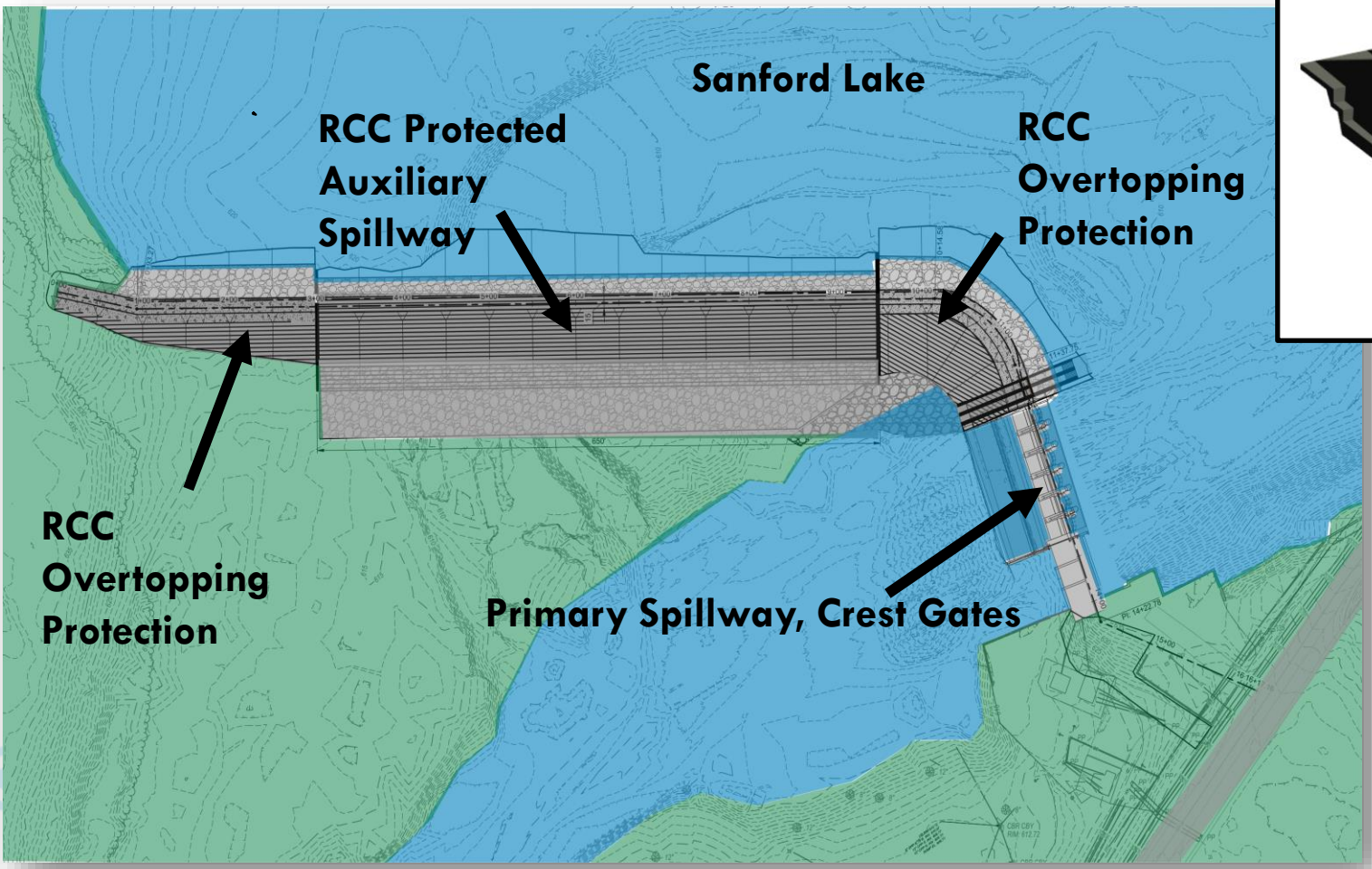
MID-SIZED TRENCHERS

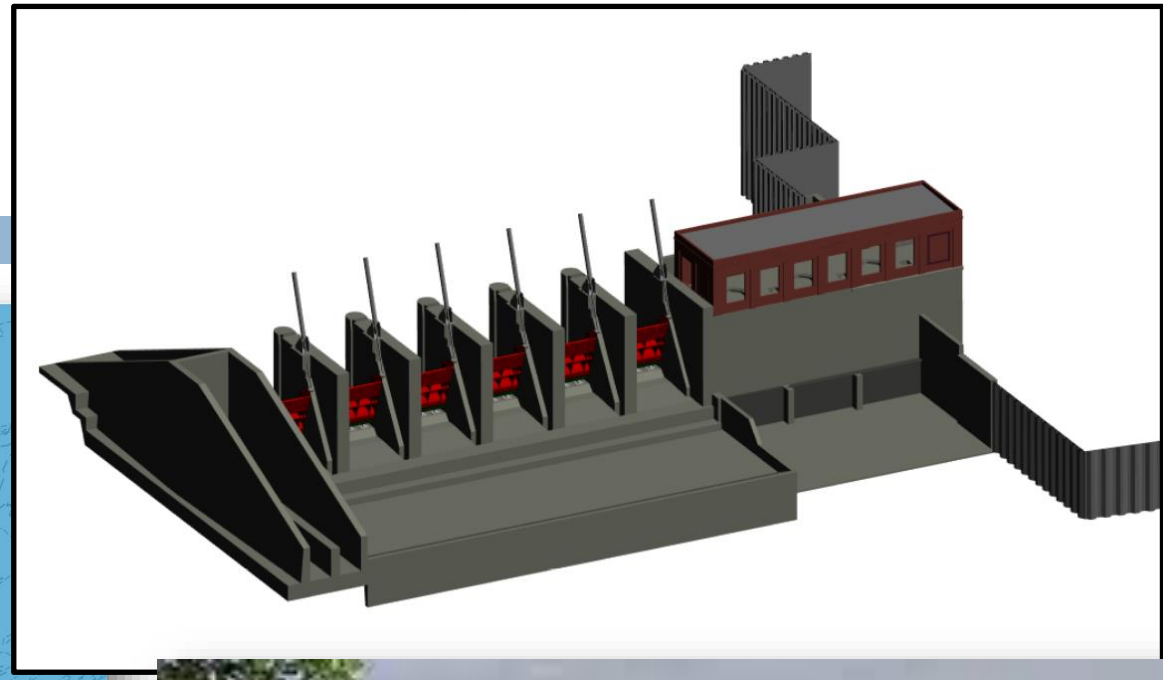
- ✓ MT 1600X
- ✓ MT 2000

One-Pass Trenching Fleet

Sanford Dam Reconstruction (2023-2025)

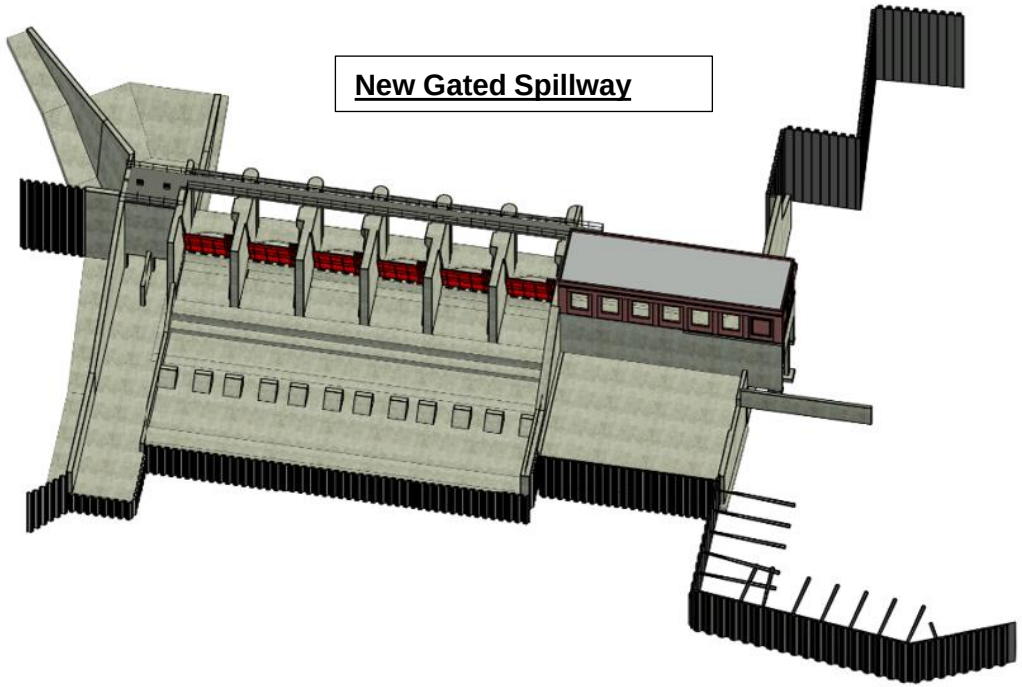
Sanford Dam Design

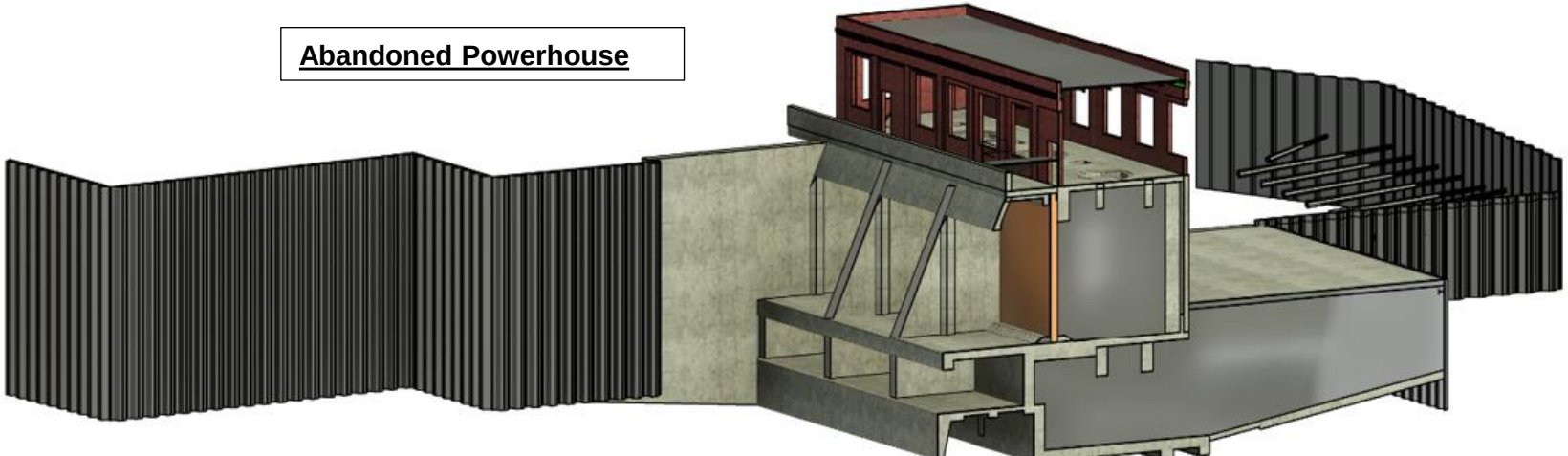




Sanford Dam Spillway Upgrades

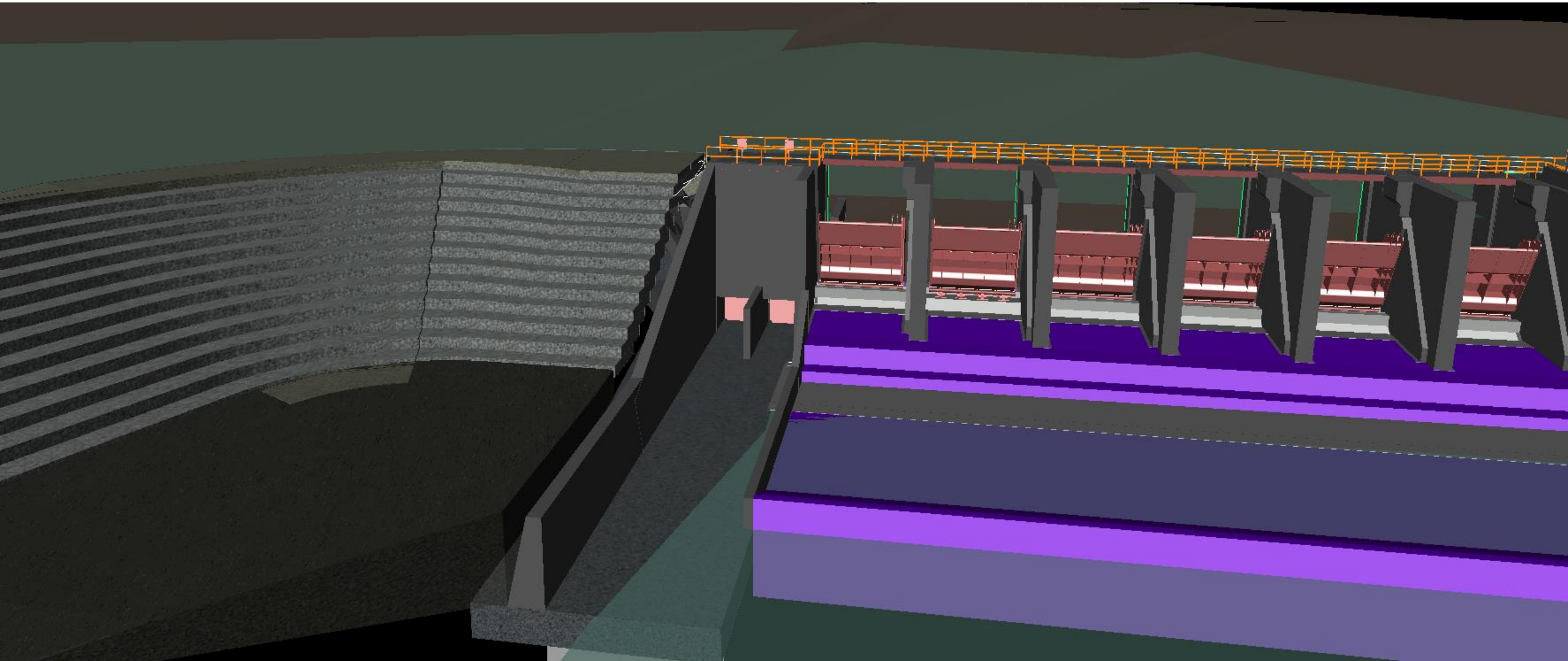
- Existing spillway/powerhouse structures will be partially demolished
- Six new 16.5' high hydraulic spillway gates.
- Two new low level outlet sluice gates to pass base flows
- Reinforced concrete stepped chute





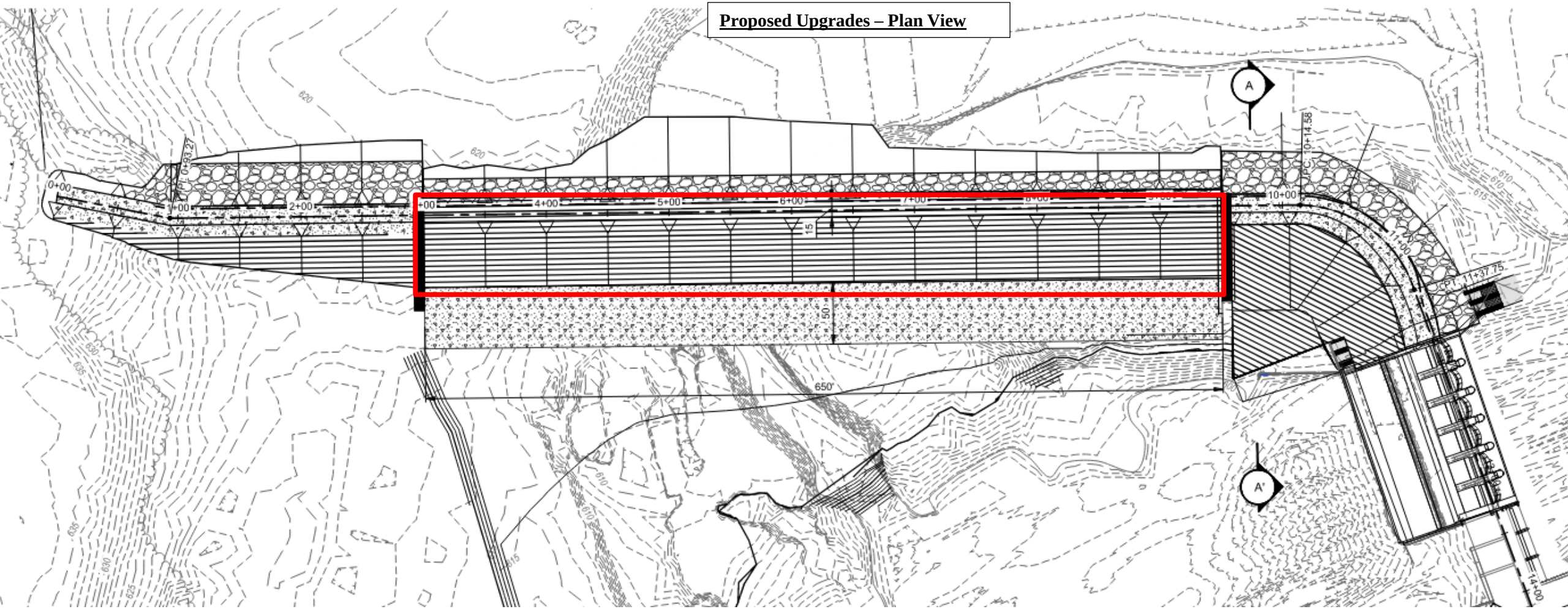
Remove turbines and generators and fill Units 1, 2 and 3 with Mass Concrete

Sanford Dam – Spillway Final Configuration



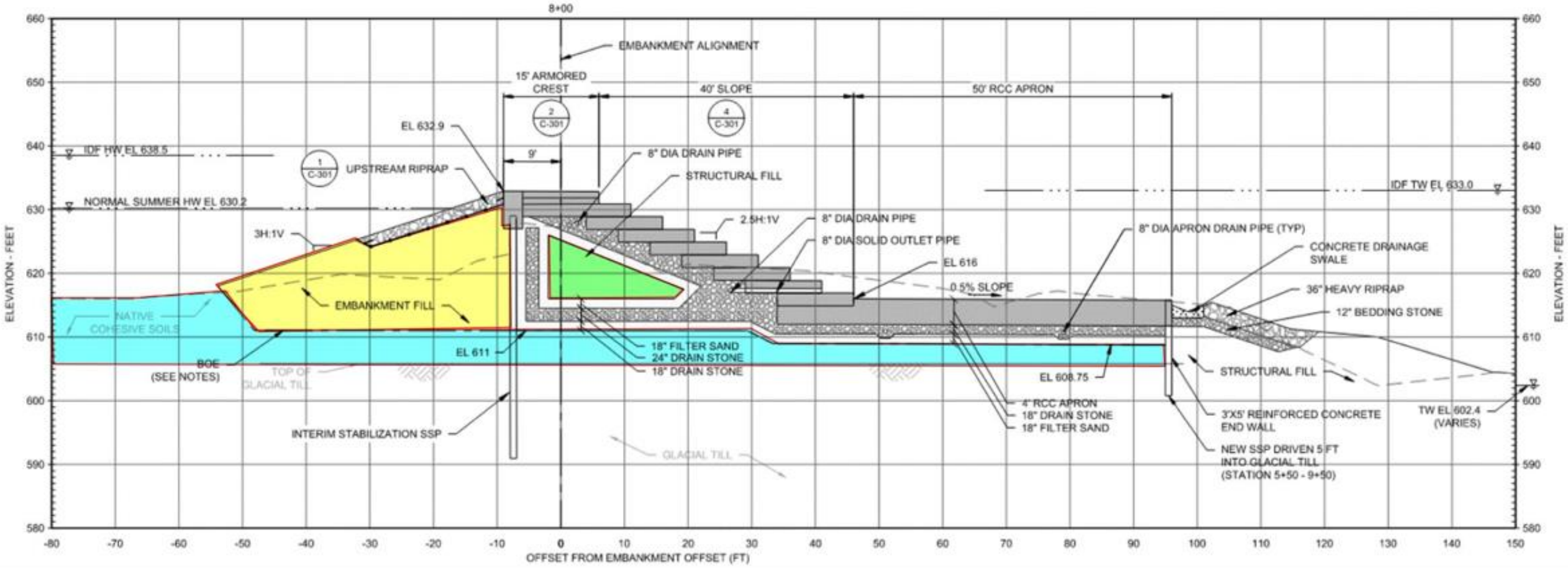
Sanford Dam - Spillway Final Configuration

New 650-foot-wide RCC Auxiliary Spillway

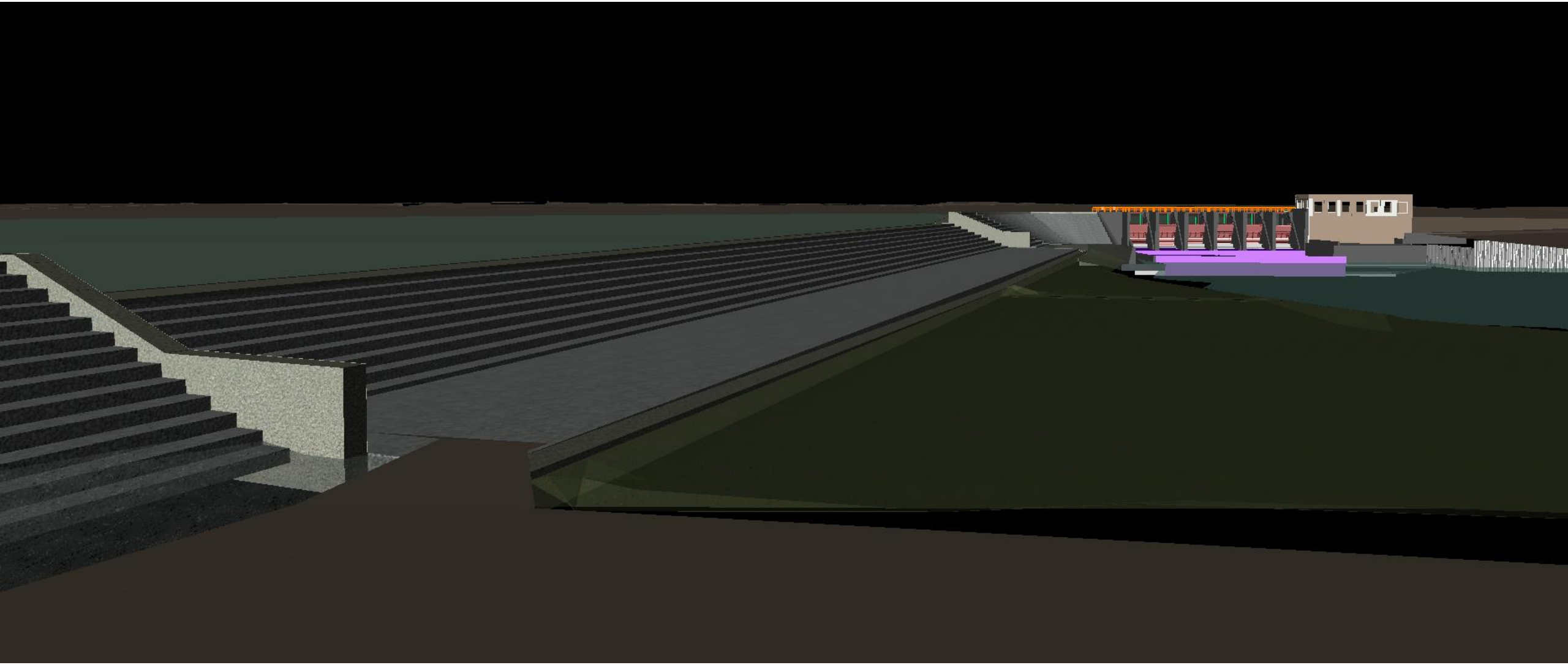


New 650-foot-wide RCC Auxiliary Spillway

Auxiliary Spillway – Section View



Sanford Dam



Panel Discussions

- What impacts to the community can be expected during construction?

Construction Activities

Construction Activities

THANK YOU!