Cooper Lake Dam Rehabilitation
Public Presentation

Mescal Hornbeck Community Center, Woodstock

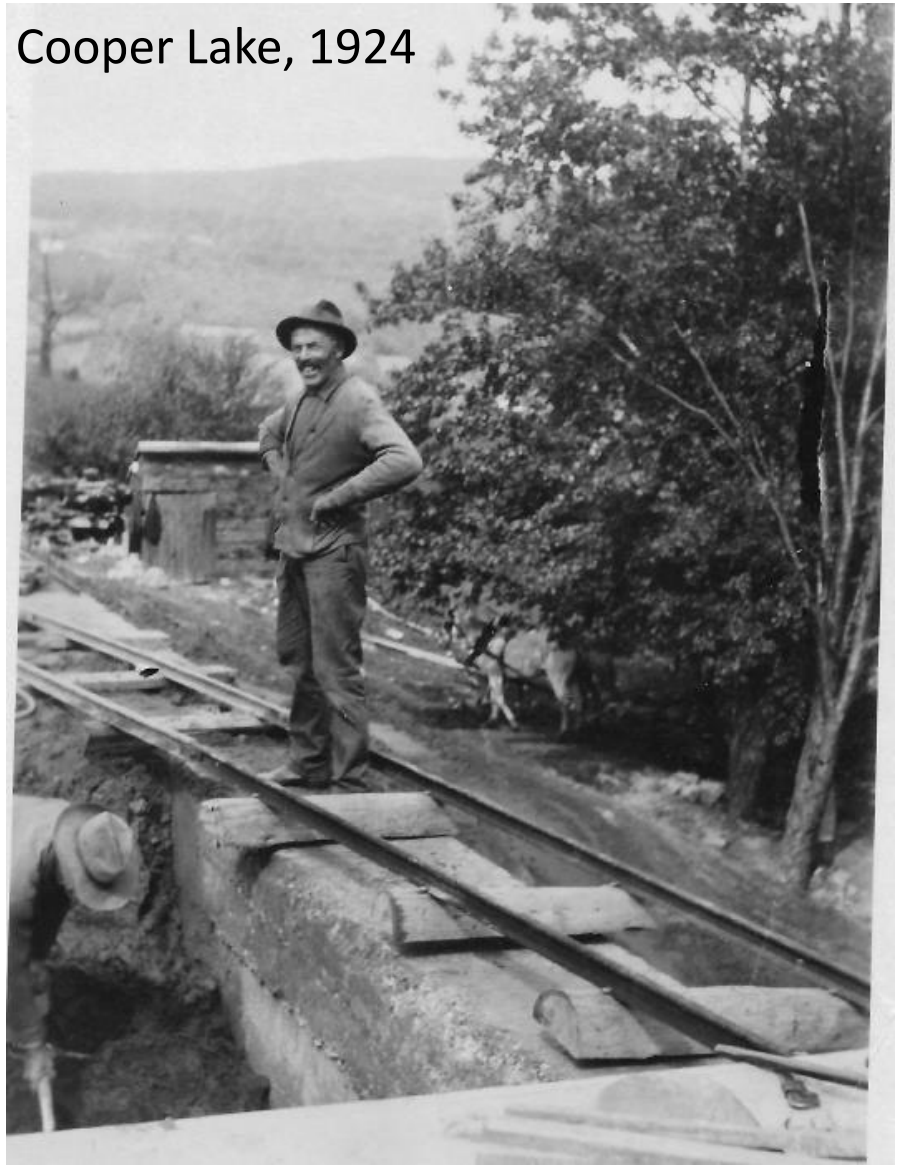
November 18, 2019

Schnabel ENGINEERING

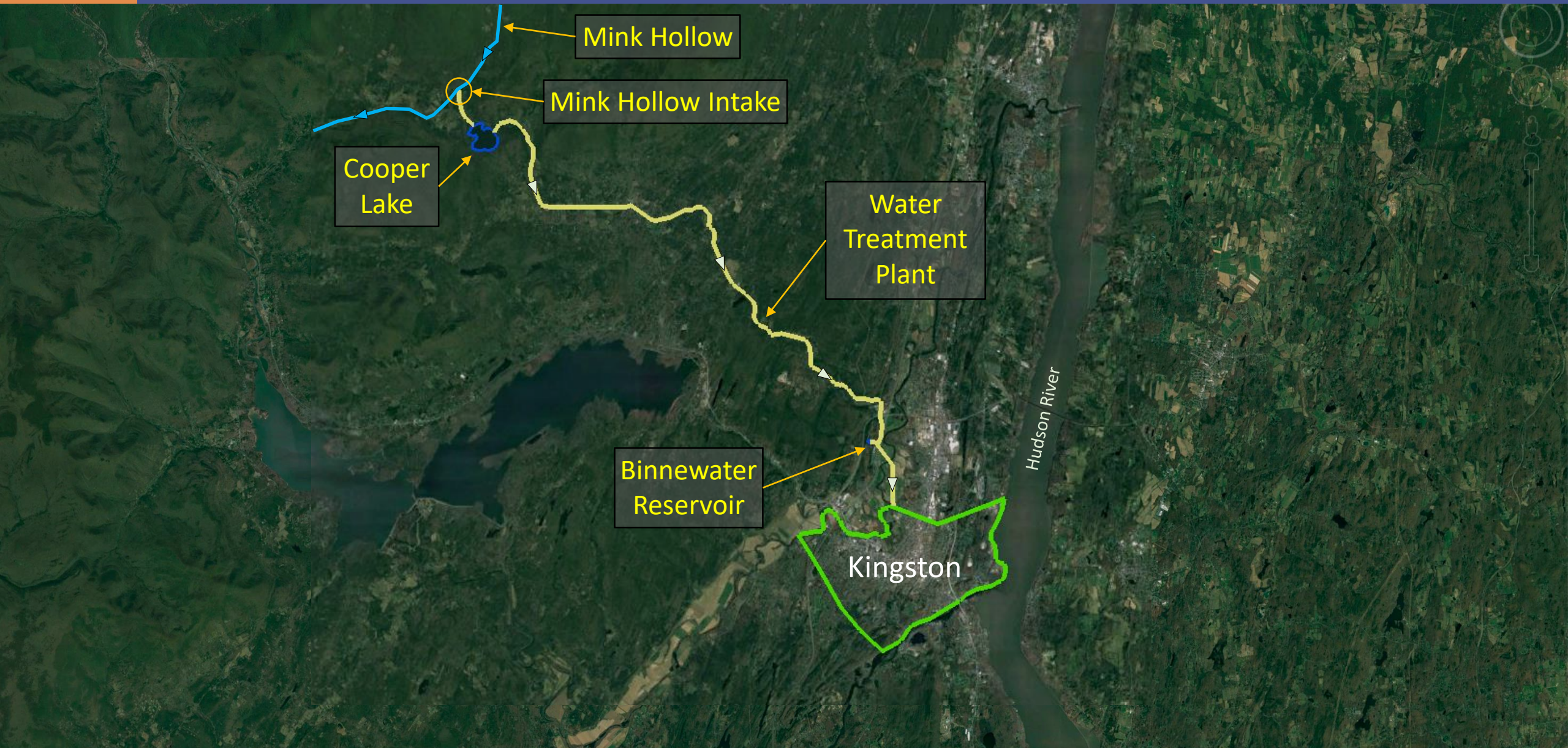
In association with CDM Smith

Presentation Outline

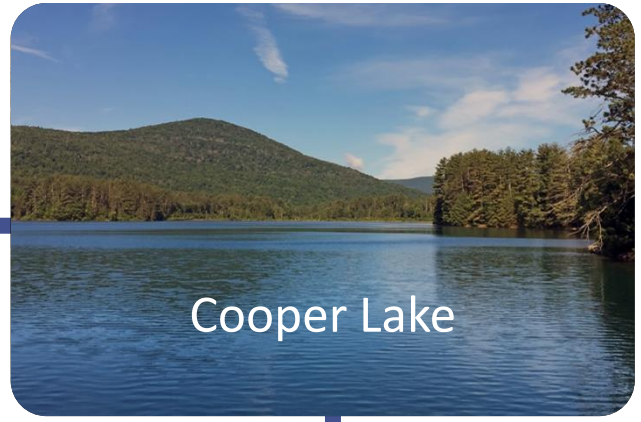
- Overview of Water Supply System
- Cooper Lake Site Description
- Project Drivers
- Project Elements
- Construction/Permitting Items
- Project Costs/Financing
- Q&A

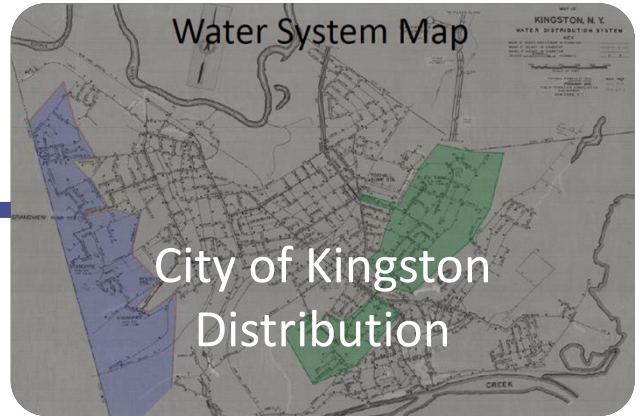

Cooper Lake, 1924

City of Kingston Water System

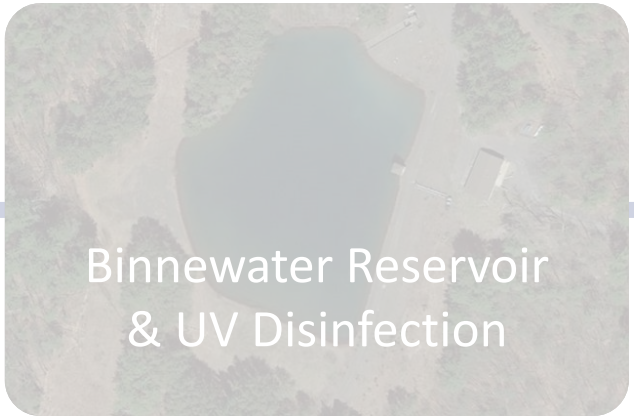


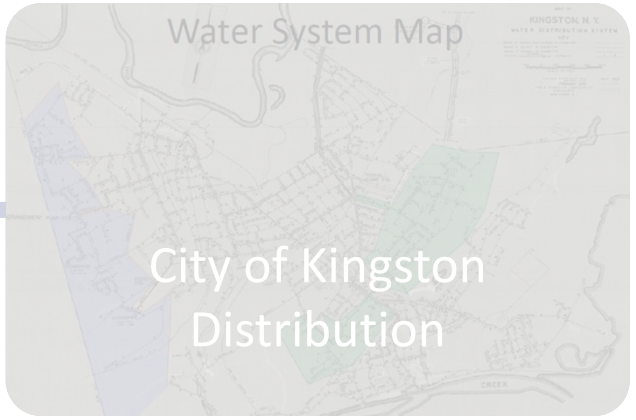
Water System Overview



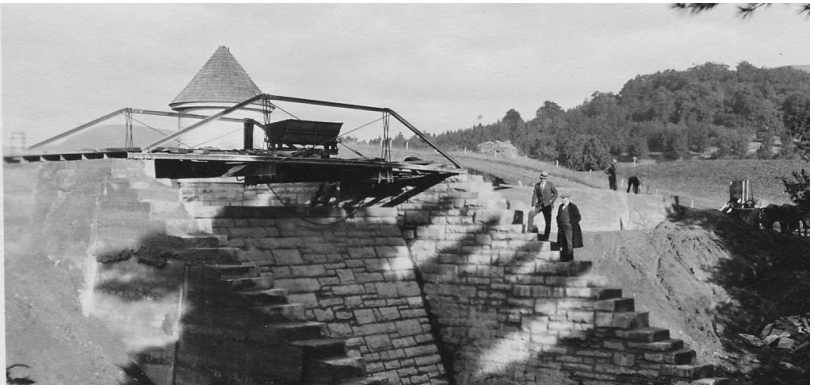


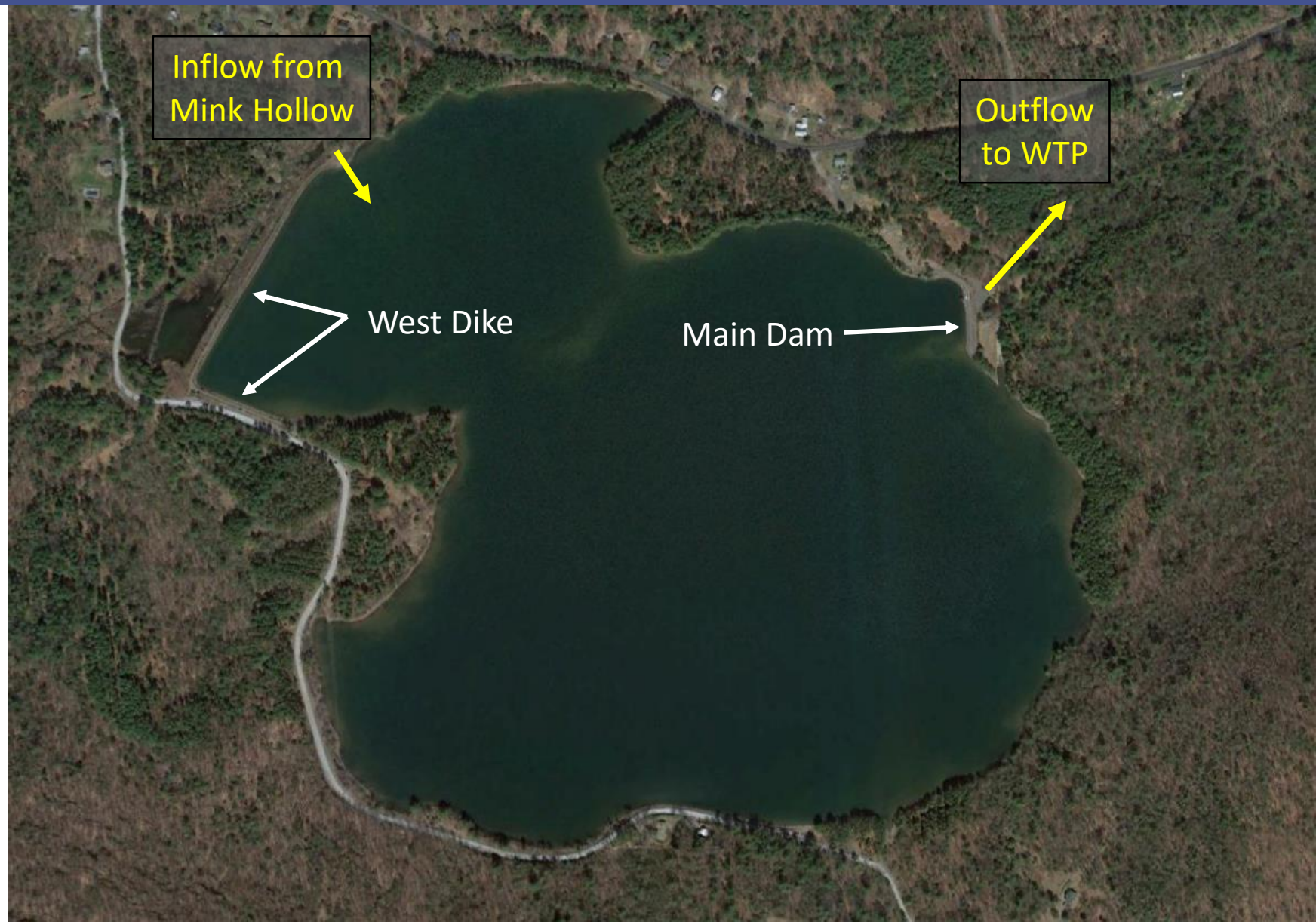
Water System Overview





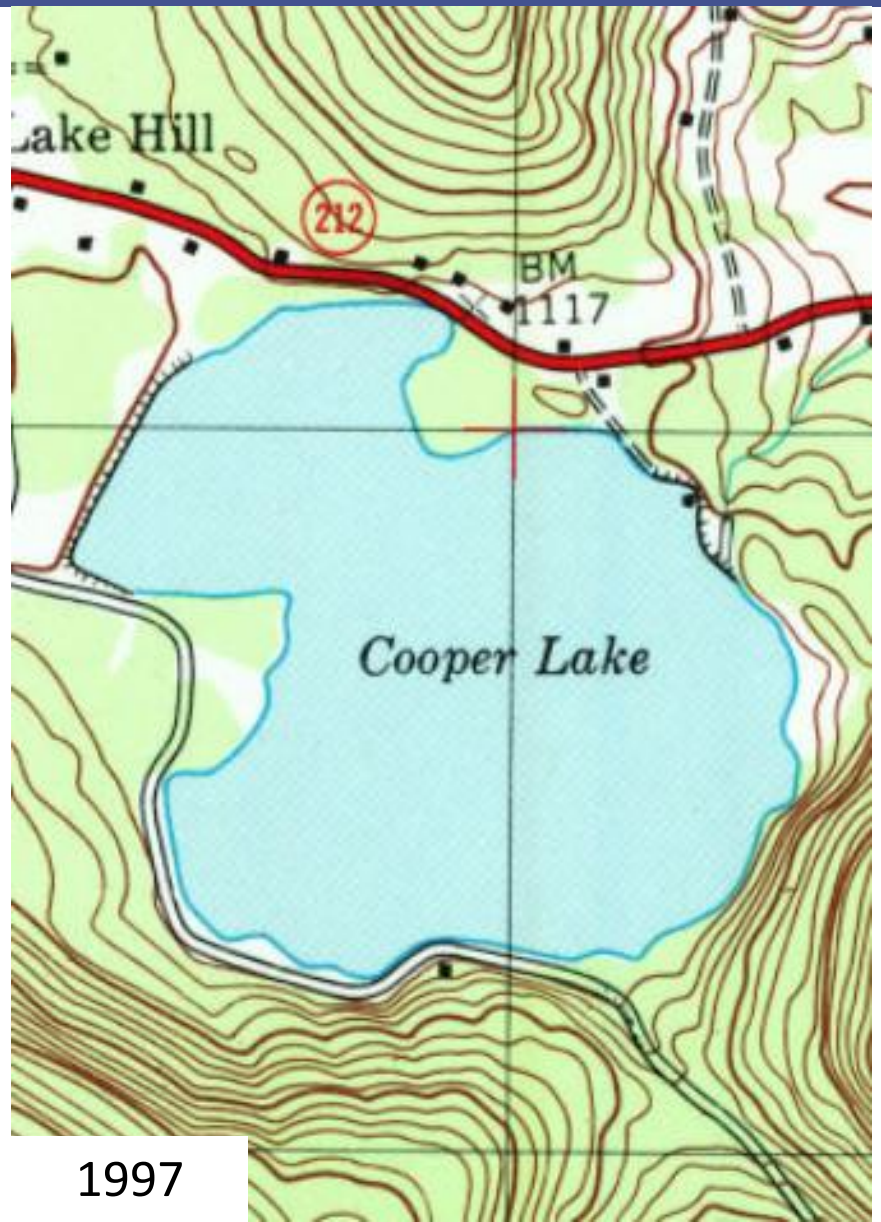
Cooper Lake



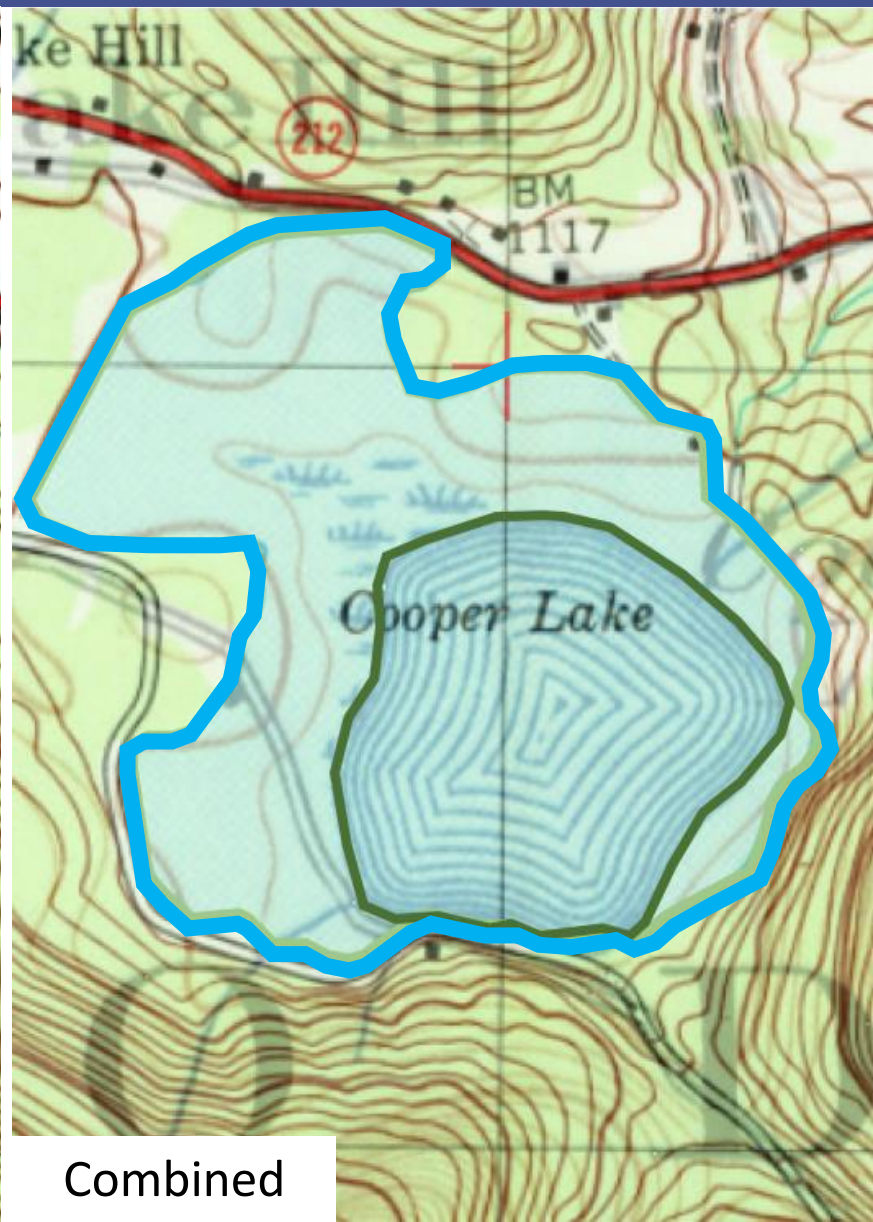


Cooper Lake

1903



1997



Combined

Cooper Lake Dam

Outlet Tower

Cooper Lake Dam

Main Dam

Outlet Tower

Cooper Lake Dam

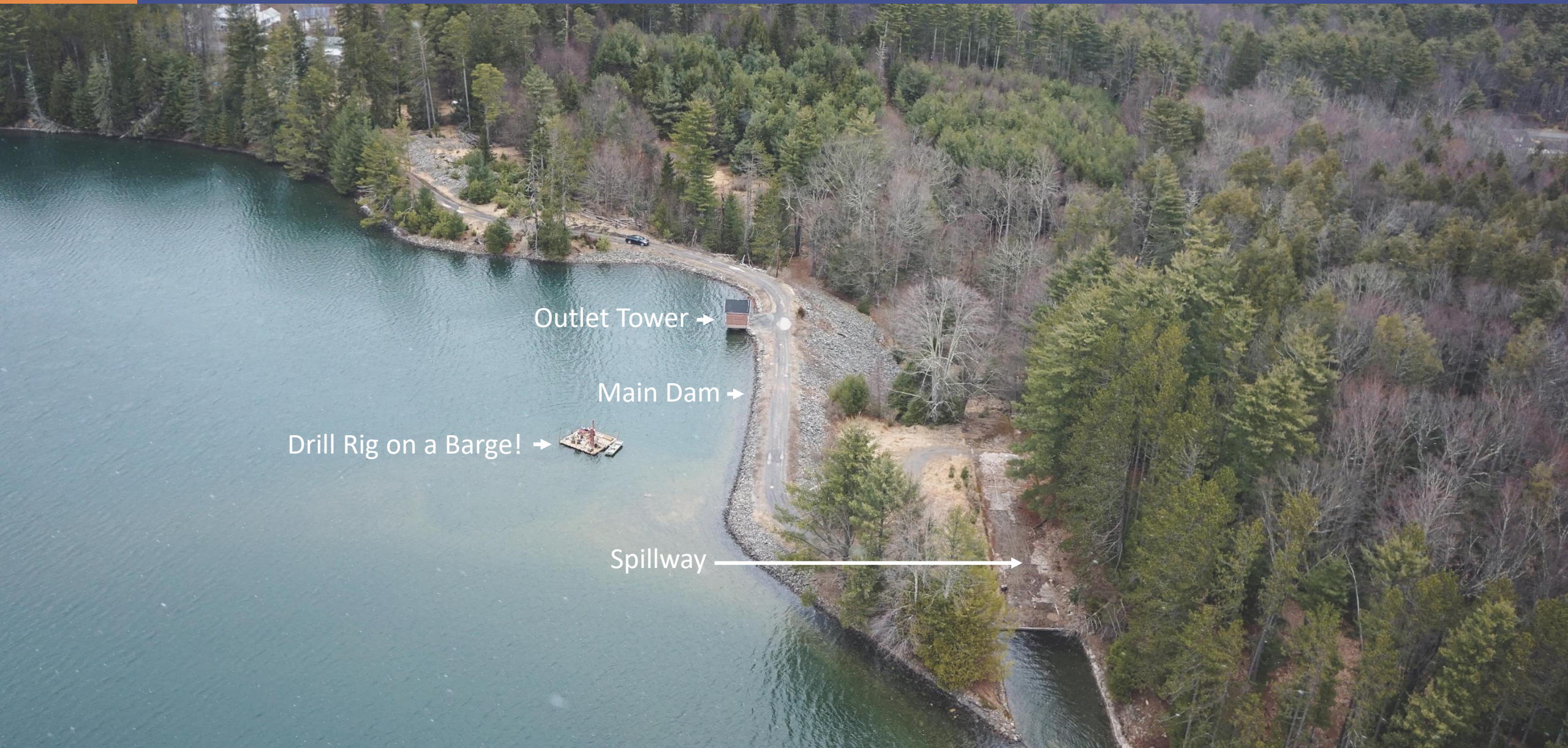
Outlet Tower

Main Dam

Drill Rig on a Barge!

Cooper Lake Dam

Cooper Lake Dam

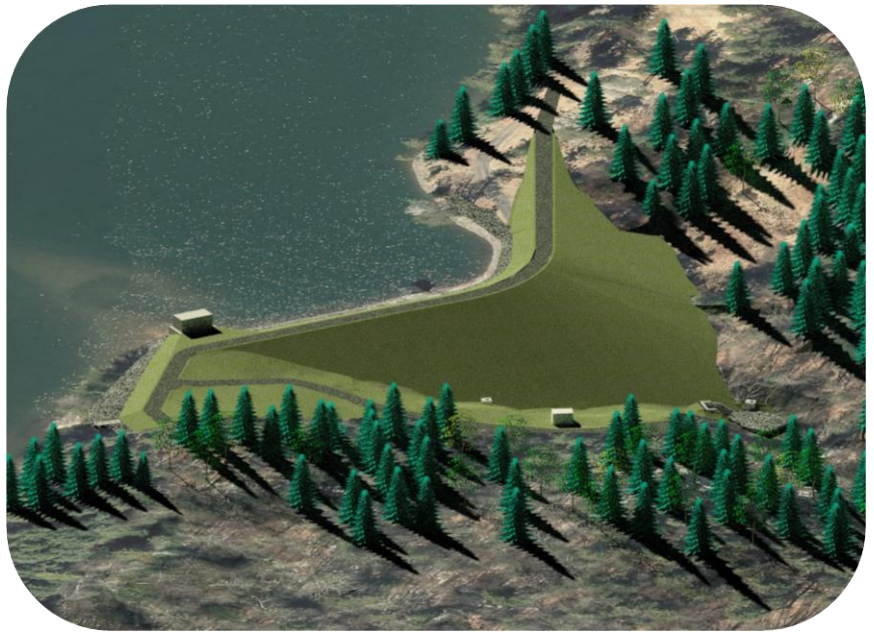


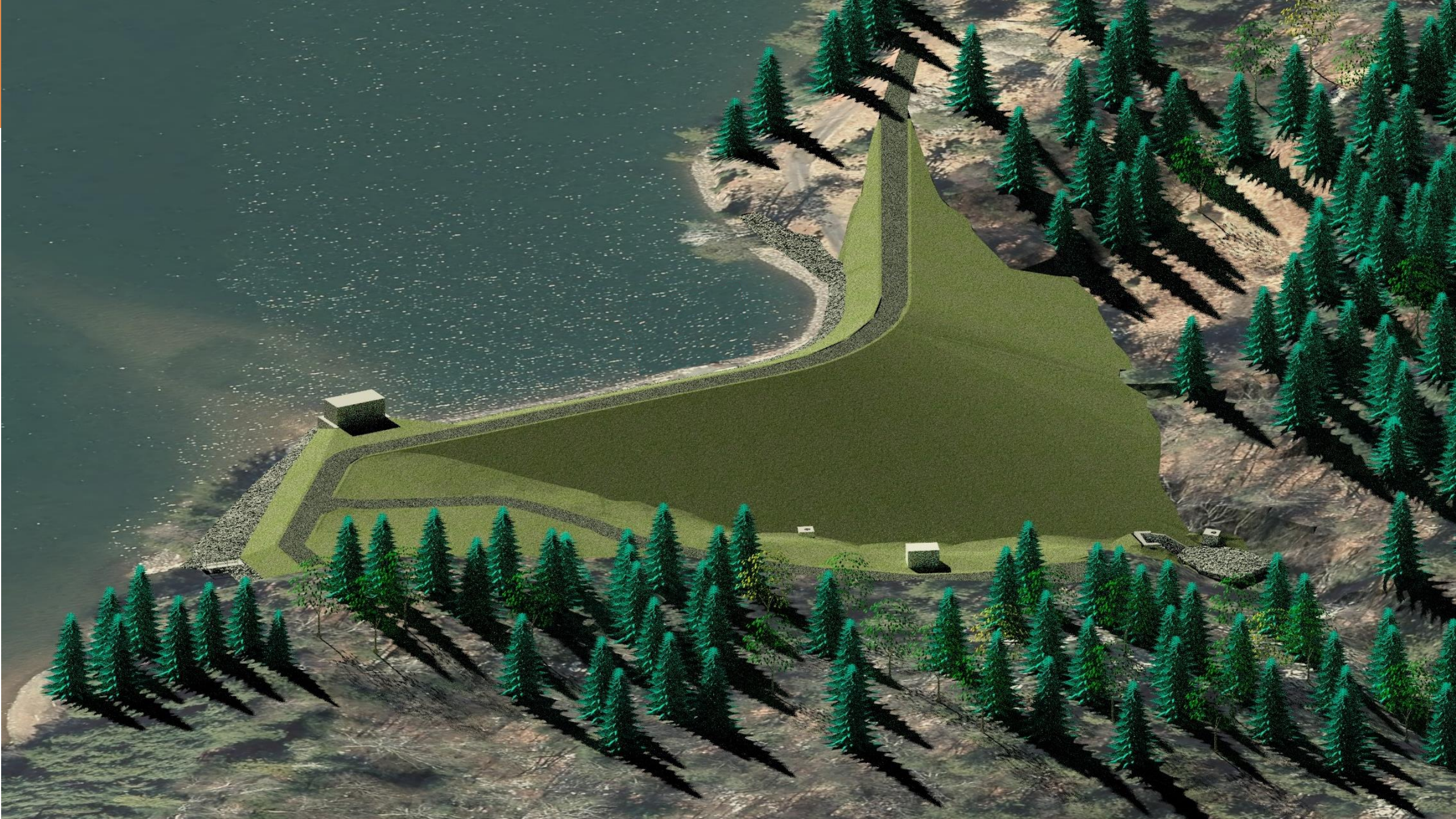
Project Drivers

- October 2007 Observations
  - Displaced manholes at toe of dam
  - Dam is stable but with insufficient Factors of Safety
- NYCRR Part 673 Regulations
  - Insufficient factors of safety for stability
  - Inadequate spillway capacity
  - Inoperable low-level outlet
- Water Supply Operations
  - Inoperable intake valves
  - No flow control redundancy
  - Intake tower not suitable for reuse/rehabilitation

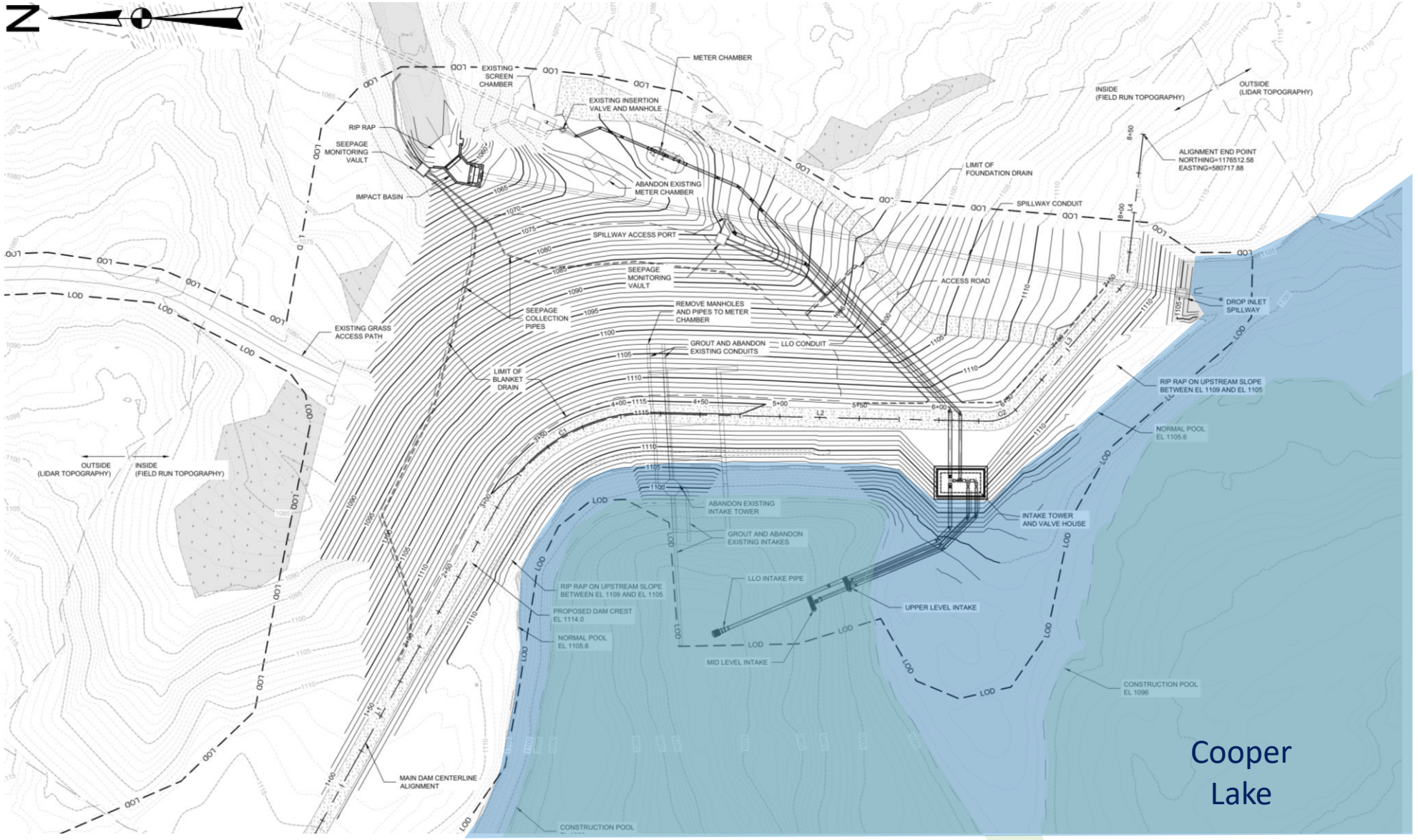
Project Goals and Elements

- Achieves Regulatory Compliance
  - New spillway and stilling basin
  - New low-level outlet
  - Embankment improvements
  - West Dike raising and leveling
- Restores Operational Capabilities
  - New intake tower
  - New intake piping and valves
  - New metering chamber
- Prepares for Future Additional Storage
  - Main Dam raise from EL. 1108± to EL. 1114
- Construct in 2020/2021/2022

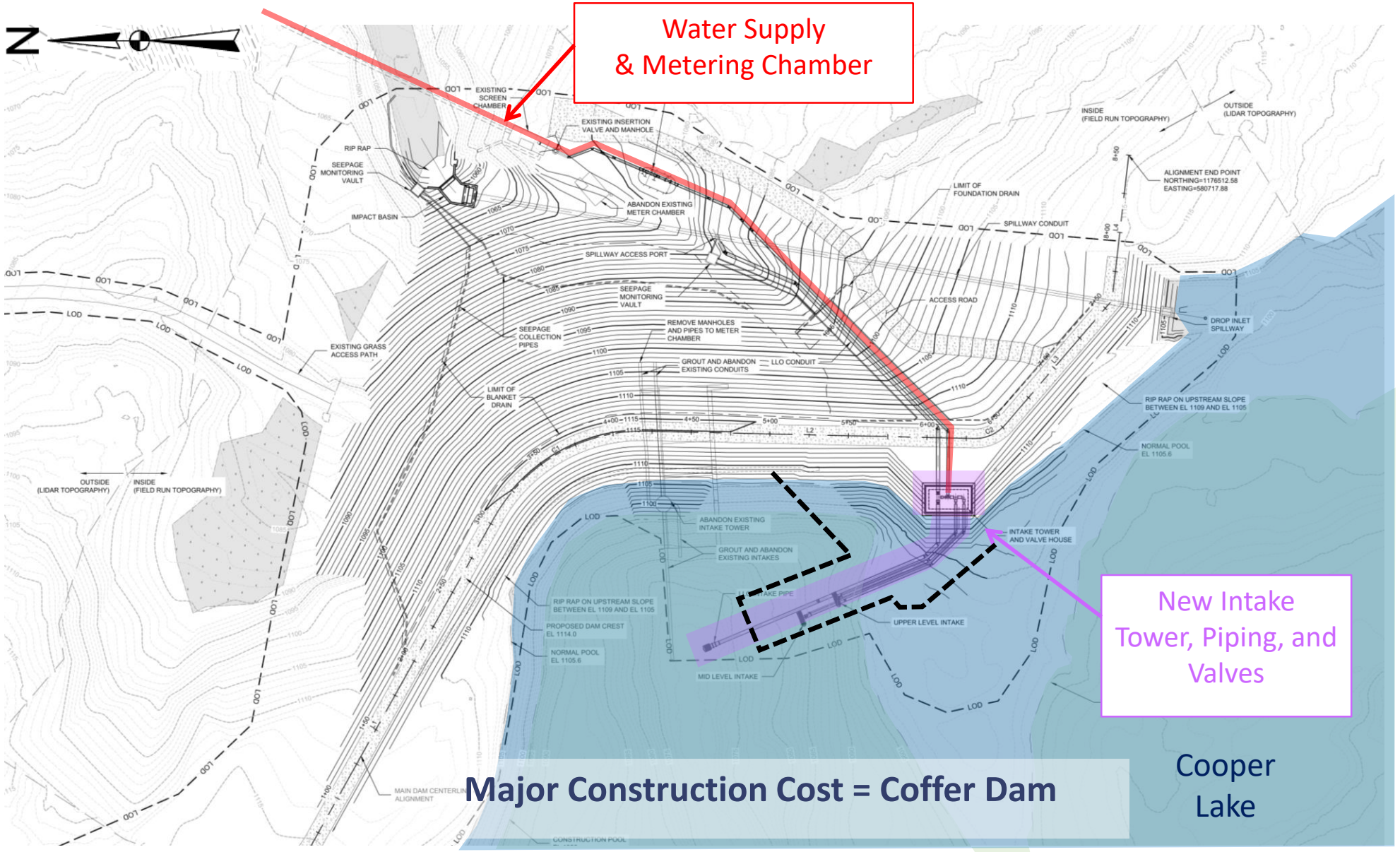




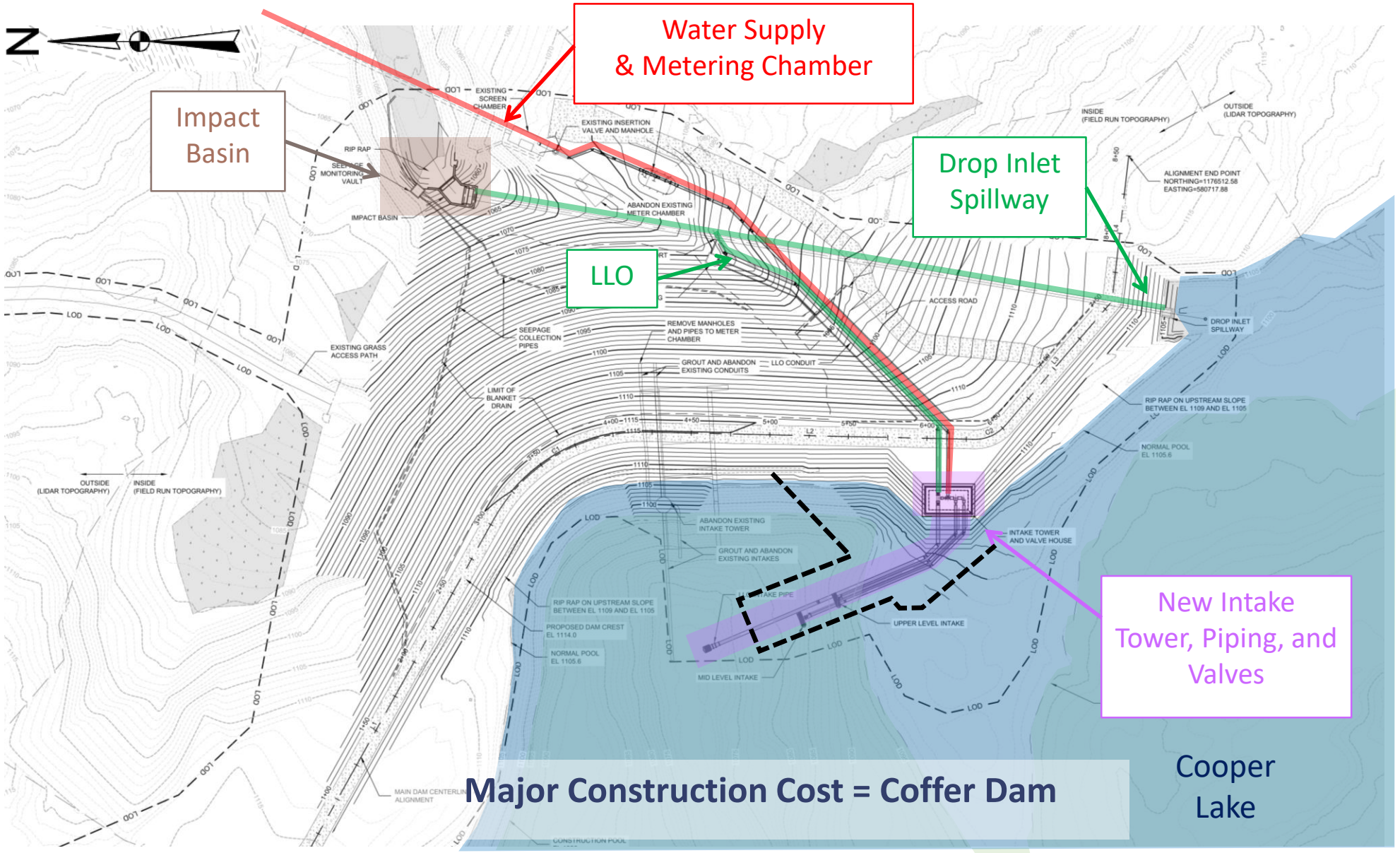
Dam Rehabilitation Site Plan – Main Dam



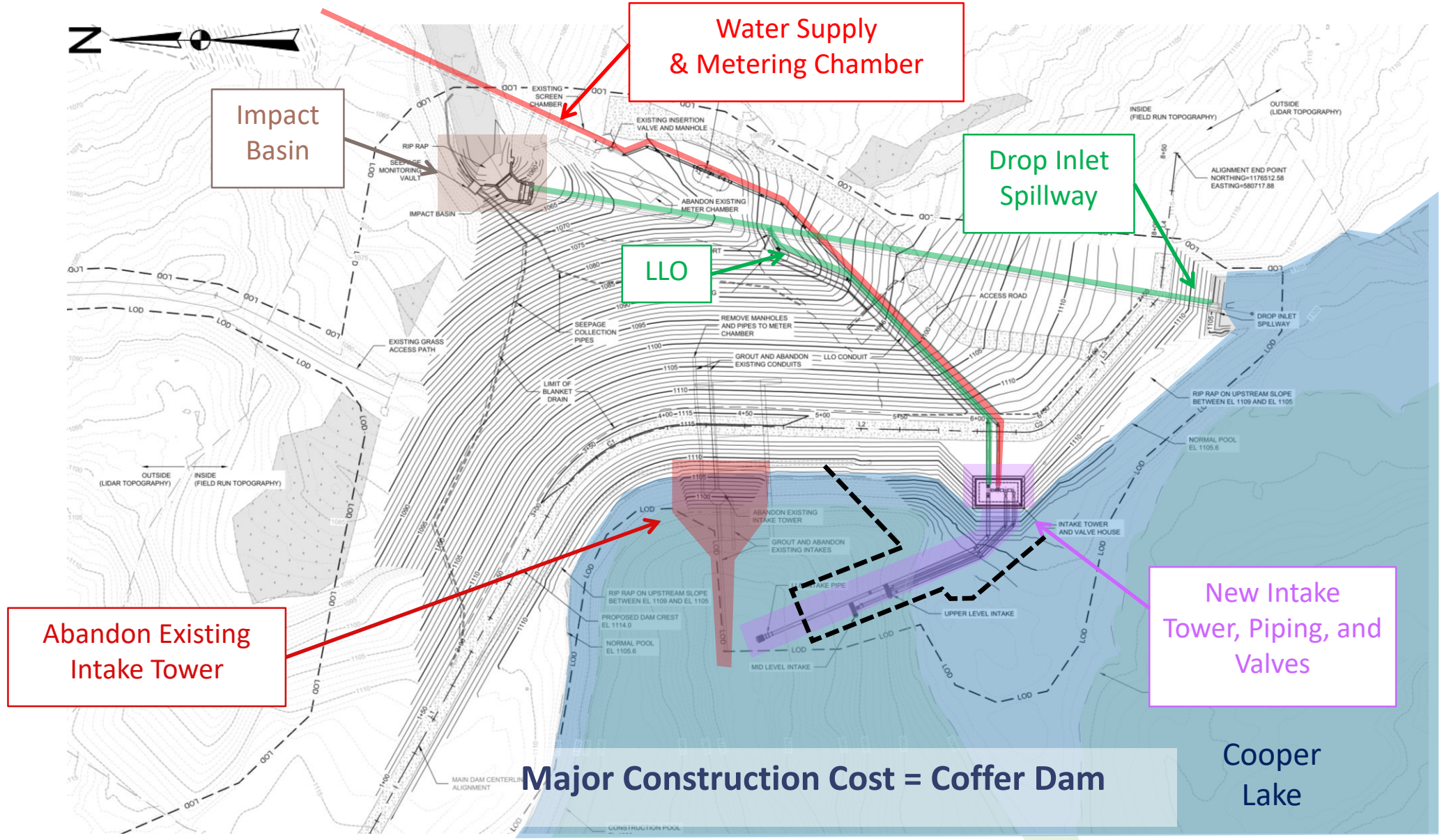
Dam Rehabilitation Site Plan – Main Dam



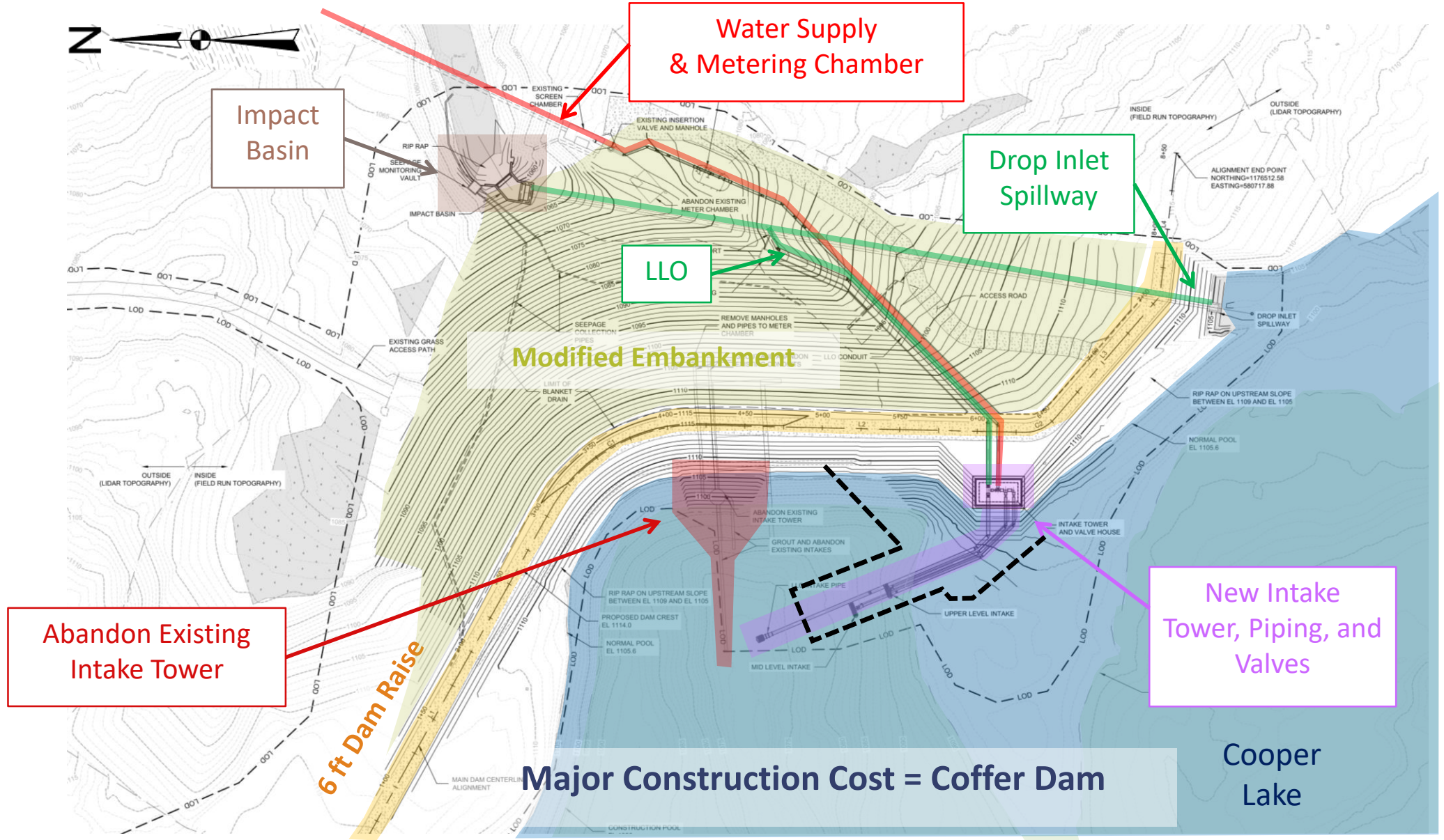
Dam Rehabilitation Site Plan – Main Dam



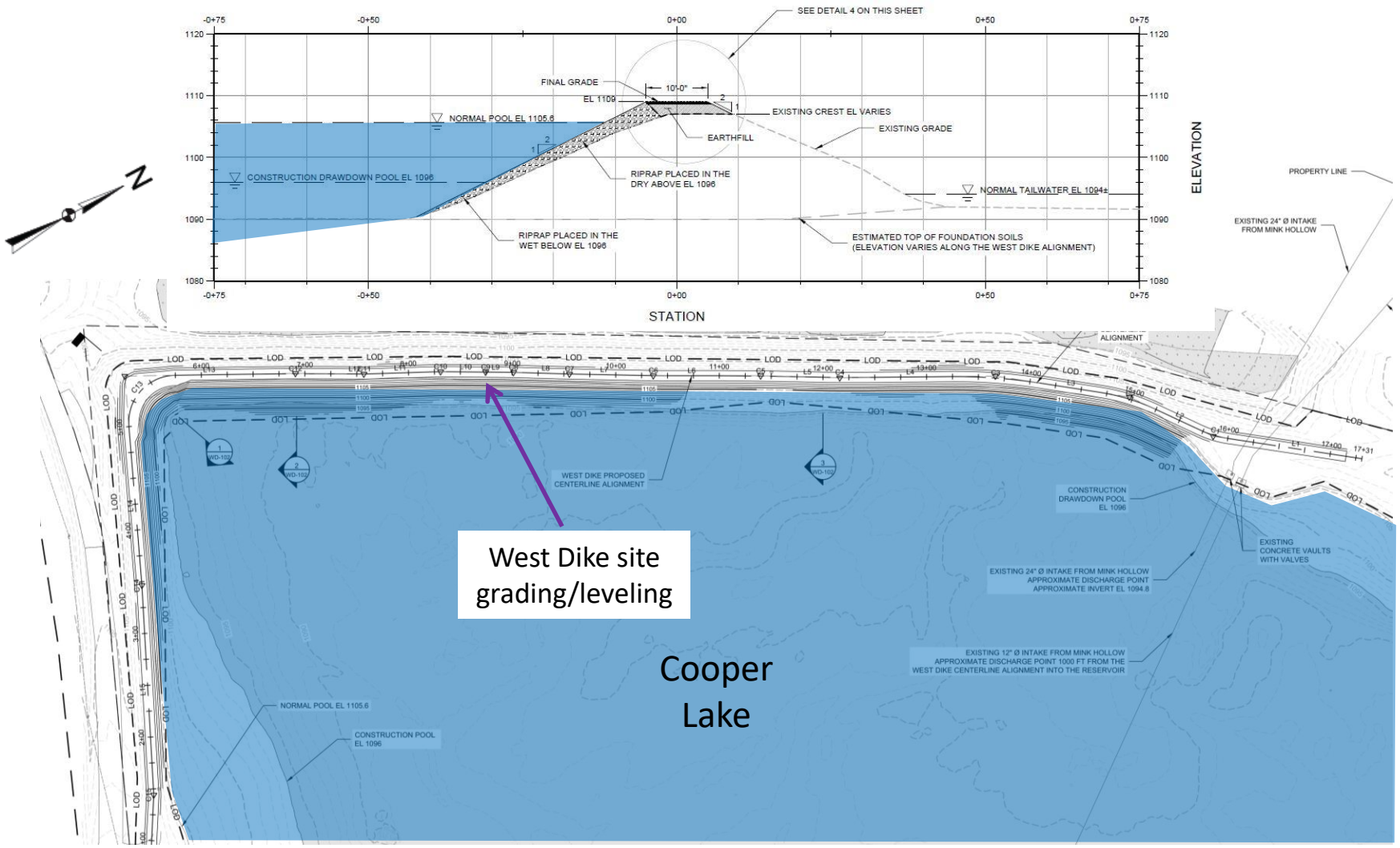
Dam Rehabilitation Site Plan – Main Dam



Dam Rehabilitation Site Plan – Main Dam



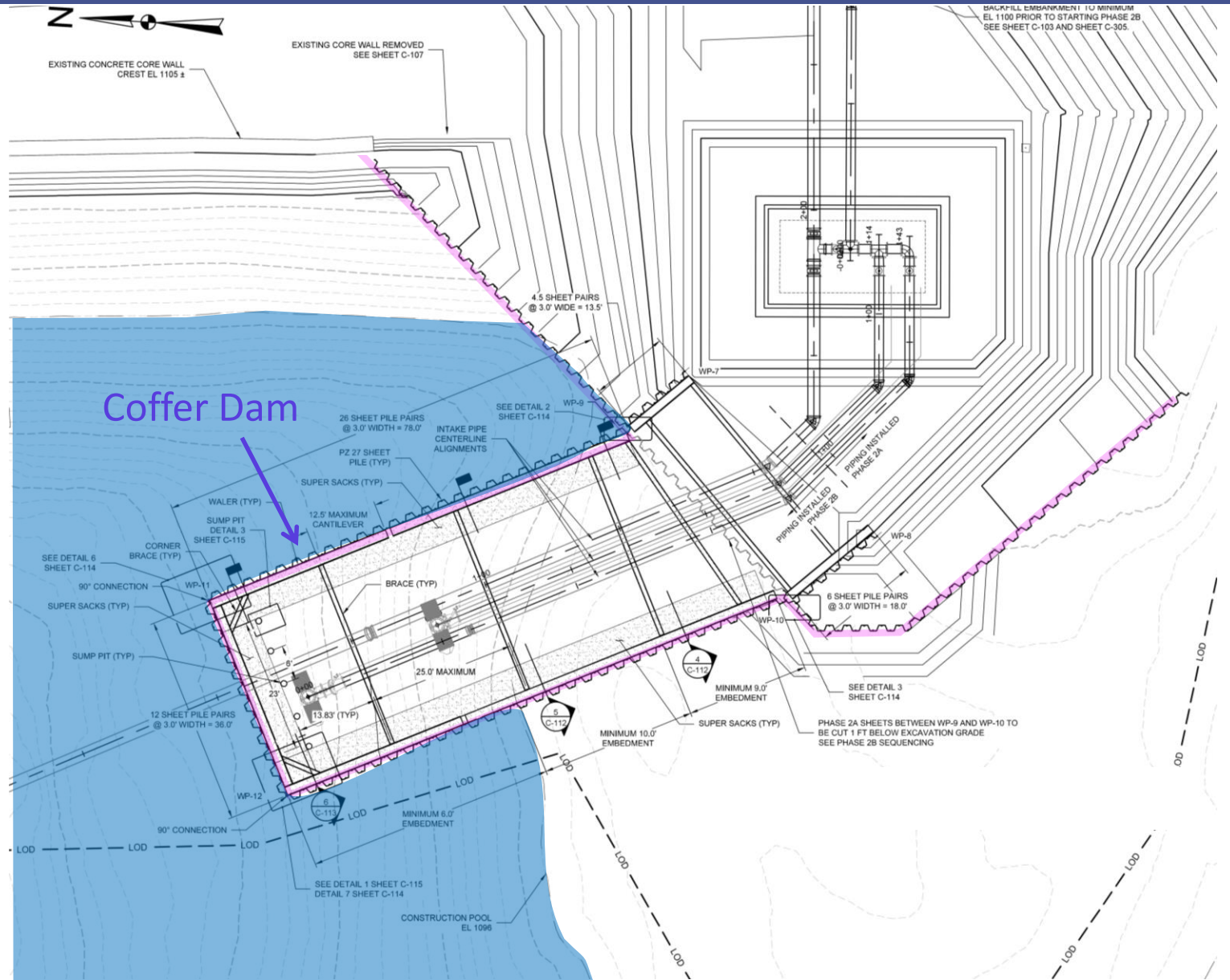
Dam Rehabilitation Site Plan – West Dike



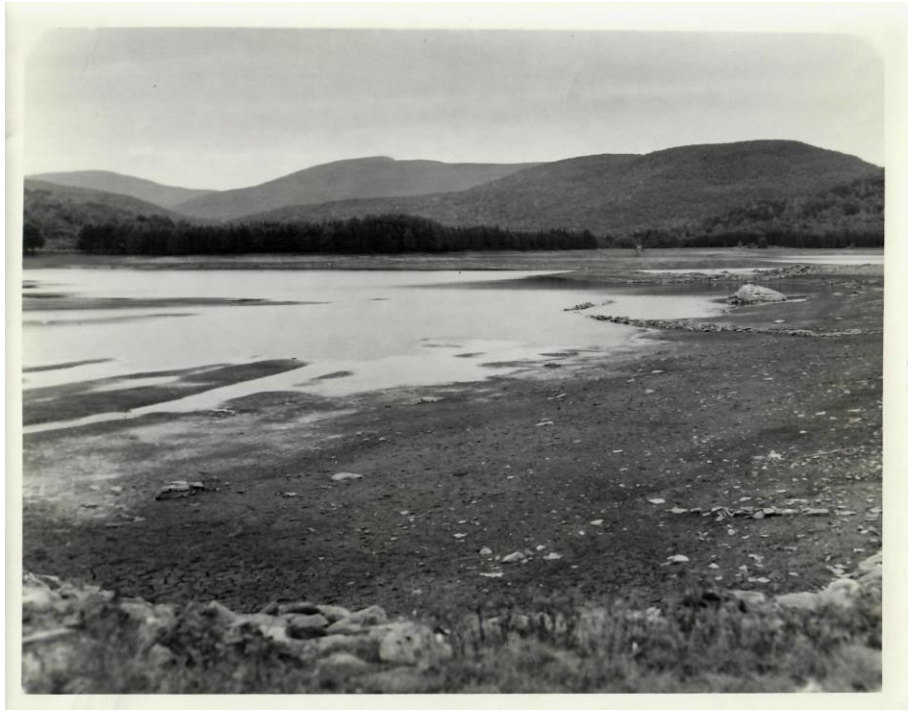
Construction Staging & Cofferdam

Coffer Dam

- 350 ft long
- 15 ft high + 6 ft embedment
- *Normal Pool Lowered 10 ft*



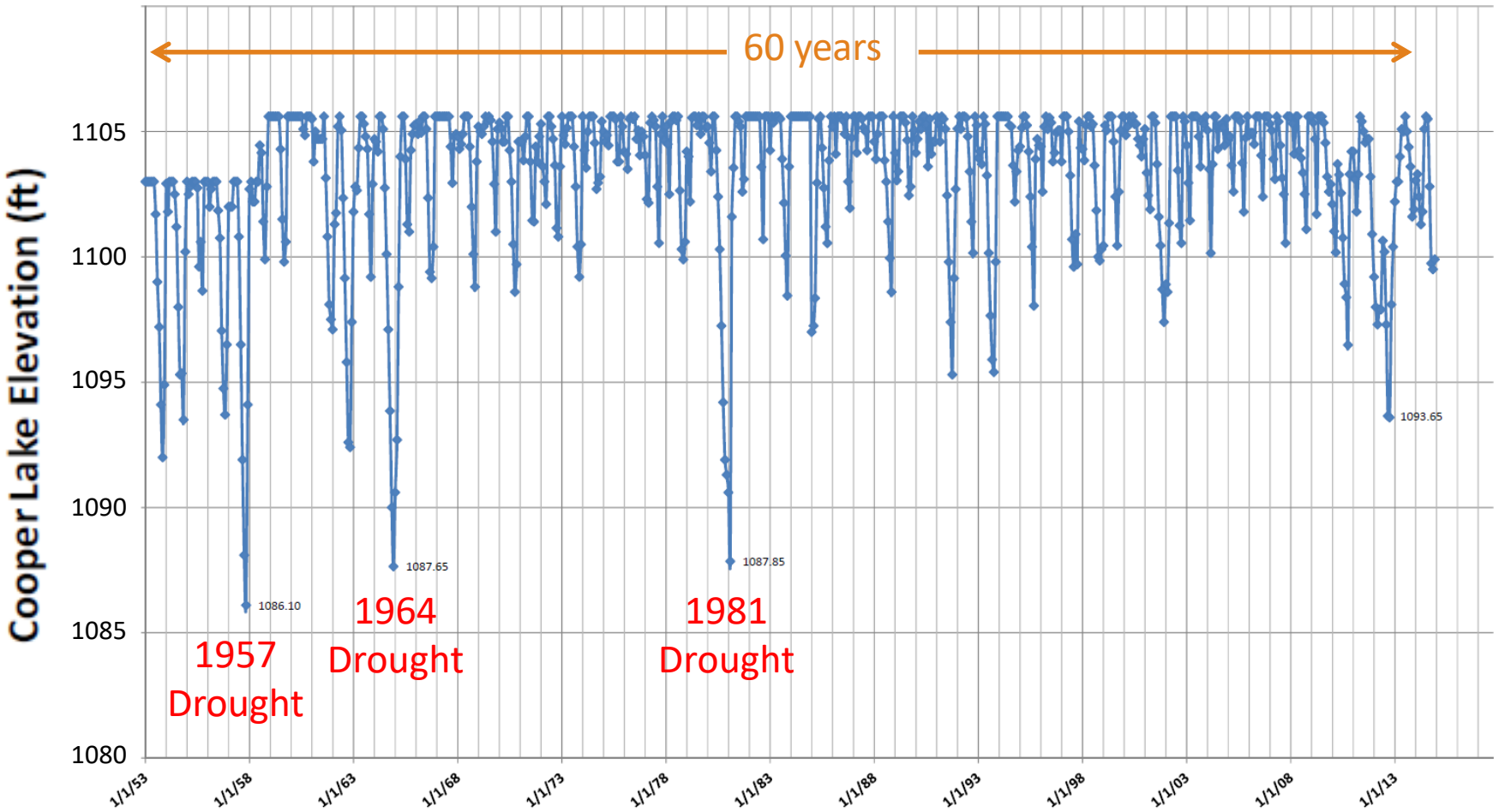
Cooper Lake – 1957 Drought



1957

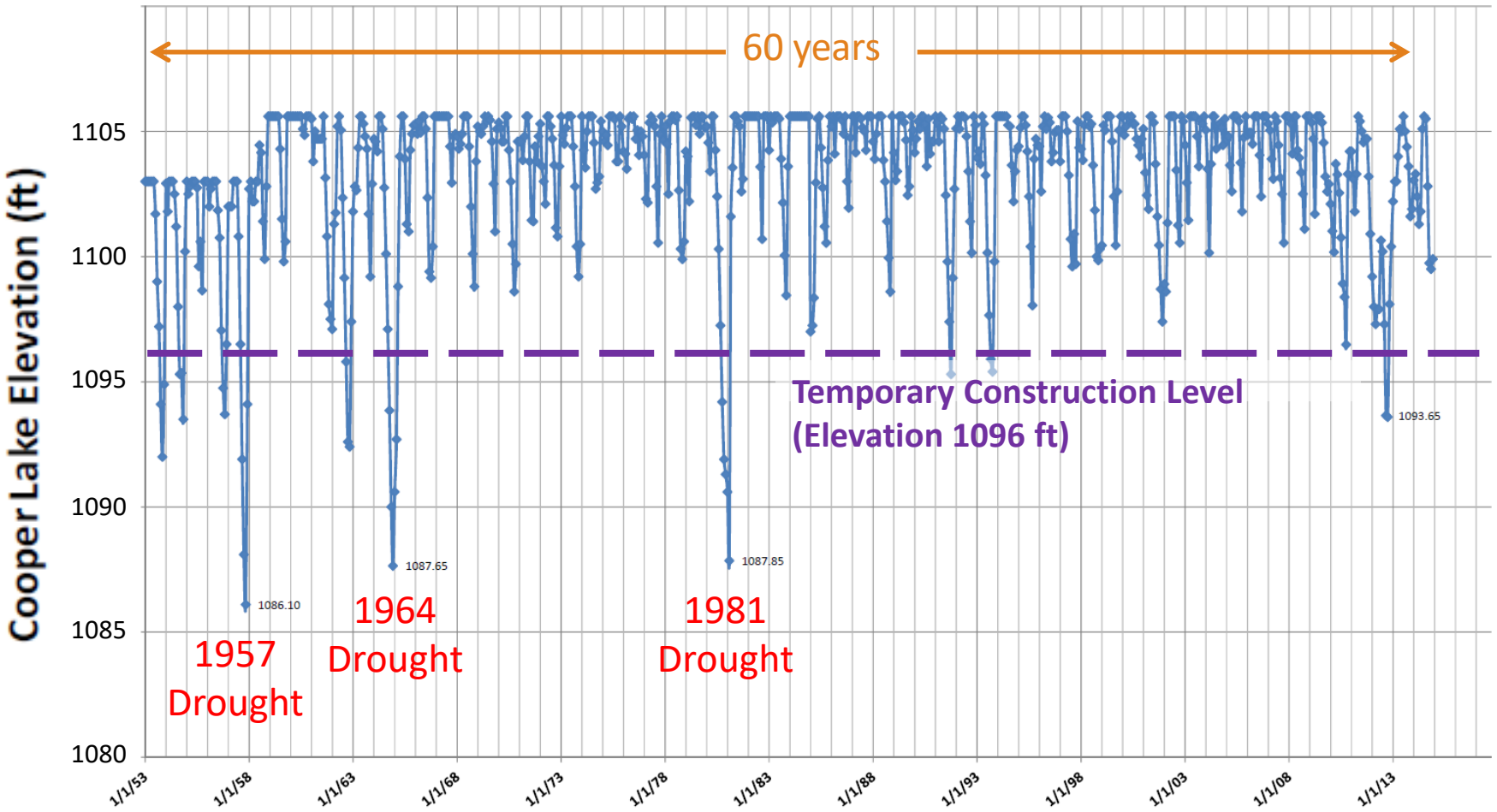
2018

Cooper Lake – Historical Elevations



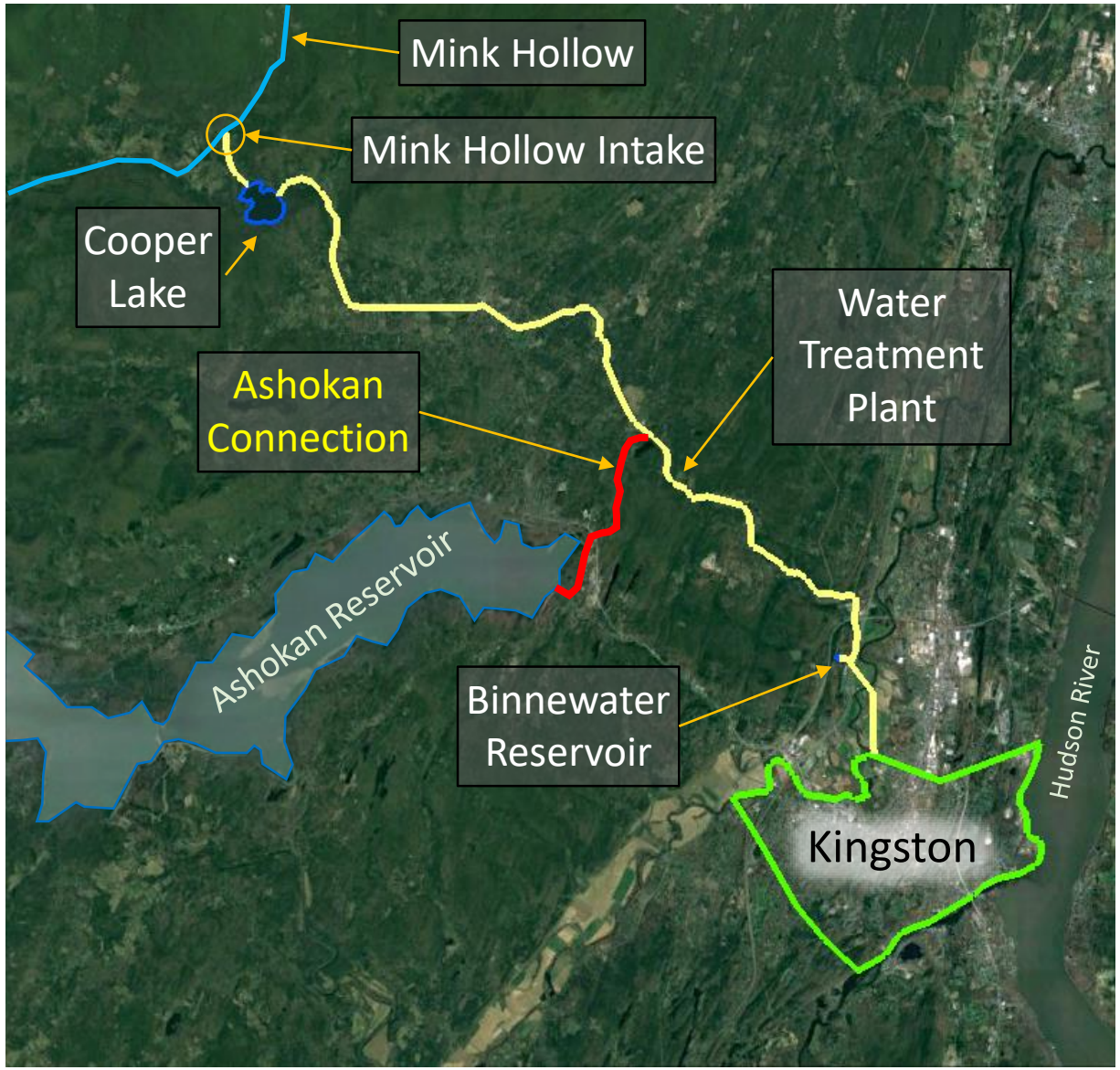
Note: Bottom of Reservoir Approx. 1066 ft

Cooper Lake – Temporary Construction Level



Note: Bottom of Reservoir Approx. 1066 ft

Ashokan Reservoir Connection



Permanent

- Connection Chambers
- Electrical Service
- Road Crossing Sleeves (3)

Temporary (if needed)

- Pumps at Ashokan
- Overland Water Main
  12-Inch HDPE ~16,000 ft

Temporary Ashokan Reservoir Connection Map

Permanent

- Connection Chambers
- Electrical Service
- Road Crossing Sleeves (3)

Temporary (if needed)

- Pumps at Ashokan
- Overland Water Main
  12-Inch HDPE ~16,000 ft

Completed/Ongoing Permitting Items

- Clearances Obtained for Main Dam and West Dike Work – No impact
  - Natural Heritage
  - State Historic Preservation Office
- Clearances for Ashokan Connection
  - NYCDEP Permitting ongoing
  - Natural Heritage and SHPO Clearances submitted
- Site Specific Items
  - Wetlands
  - Minor Open Water Work/Filling
  - Temporary Lake Lowering During Construction
  - Temporary Piping - Stream Crossings

Construction Impacts – Truck Traffic

- Construction of the Tower/Spillway
  - Estimated 10 trucks per day for 10 days
- Construction of the Embankment(s)
  - Estimated 40 trucks per day for 80 days
  - 5 trucks per hour
- Contractor Dependent
  - Available equipment
  - Source quality
- Weather Dependent

Project Phasing

- Phase 1 – Emergency/Temporary Connection to Ashokan Reservoir
- Phase 2 – Construction of New Water Supply Outlet Works
- Phase 3 – Abandon Existing Water Supply
- Phase 4 – Construction of Dam Embankment Improvements

Engineers Opinion of Probable Construction Cost

Construction Element	Anticipated Cost
Main Dam Embankment Modifications	$ 2,500,000
Spillway Modifications, including West Dike leveling	$960,000
Outlet Works and Intake Modifications	$ 6,200,000
Ashokan Connection Works	$ 1,000,000
CONSTRUCTION TOTAL	**$ 10,660,000[1]**
Bid Phase Engineering Services	$ 40,000
Construction Phase Engineering Service	$ 1,300,000
PROJECT TOTAL	**$12,000,000[2]**

(1) Estimated construction cost range of $9.5M to $12.3M.

(2) Estimated project cost range of $10.7M to $13.8M.

QUALITY AND SERVICE TO THE COMMUNITY
KINGSTON WATER DEPARTMENT
SINCE 1895

Schnabel ENGINEERING

In association with CDM Smith

Extra Info

Kingston Water Supply – A Brief and Unconfirmed History

- 1870's – Original Construction of Cooper Lake Dam
- 1895 – Kingston Water Department Founded
- 1899 to 1927 – Dam Raised 3 or 4 Times
- 1957 – Significant Drought
- 1960's – Safe Yield Analysis
- 2010 and 2011 – Storm Damage to Mink Hollow (Watershed and Intake Structure)
- 2012 – Mink Hollow Intake Reconstruction (Supply Issues Identified Shortly After)
- 2014 – Safe Yield Analysis & CFD Evaluation
- 2015 – Mink Hollow Intake Improvements (Additional Intake Gates)
- 2018 – Safe Yield Updated (New Gates and Updated Bathymetry)
- 2020 – Dam Rehabilitation (and 5th Raising of Dam)