US Army Corps
of Engineers
Louisville District

Rough River Dam Safety Assurance Project

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Presentation Outline

- Tangled Web of Intangibles
- Brief Project Overview and History
- Dam Safety Assurance Project
- Consequences of Dam Failure
- Project Status and Conclusions

Objective

"Our emphasis continues to be public safety and to minimize public inconvenience."

Reality

"Our emphasis continues to be public safety and to minimize public inconvenience."

"You can please half of the people some of the time, and some of the people half of the time, but all of the people none of the time."

Stakeholders

- Project Operations Personnel
- State Resort Park and Golf Course
- State Highway Department
- Old Grist Mill at Green Farm Resort
- Politicians, Tourism, Chamber of Commerce
- Local Residents and Recreational Visitors
- Old Time Fiddlers Contest
- Environmental Activists

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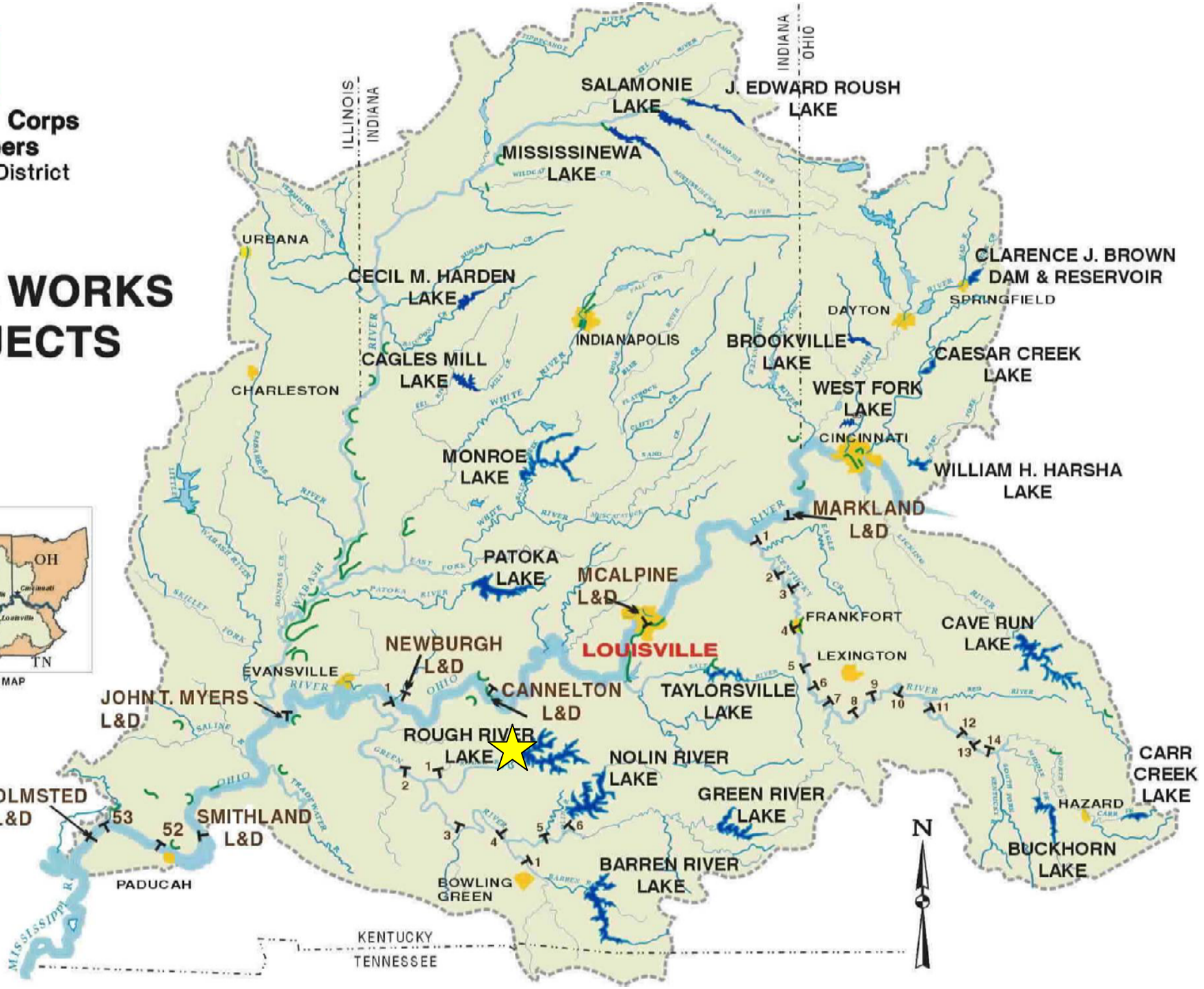
Louisville District

CIVIL WORKS PROJECTS

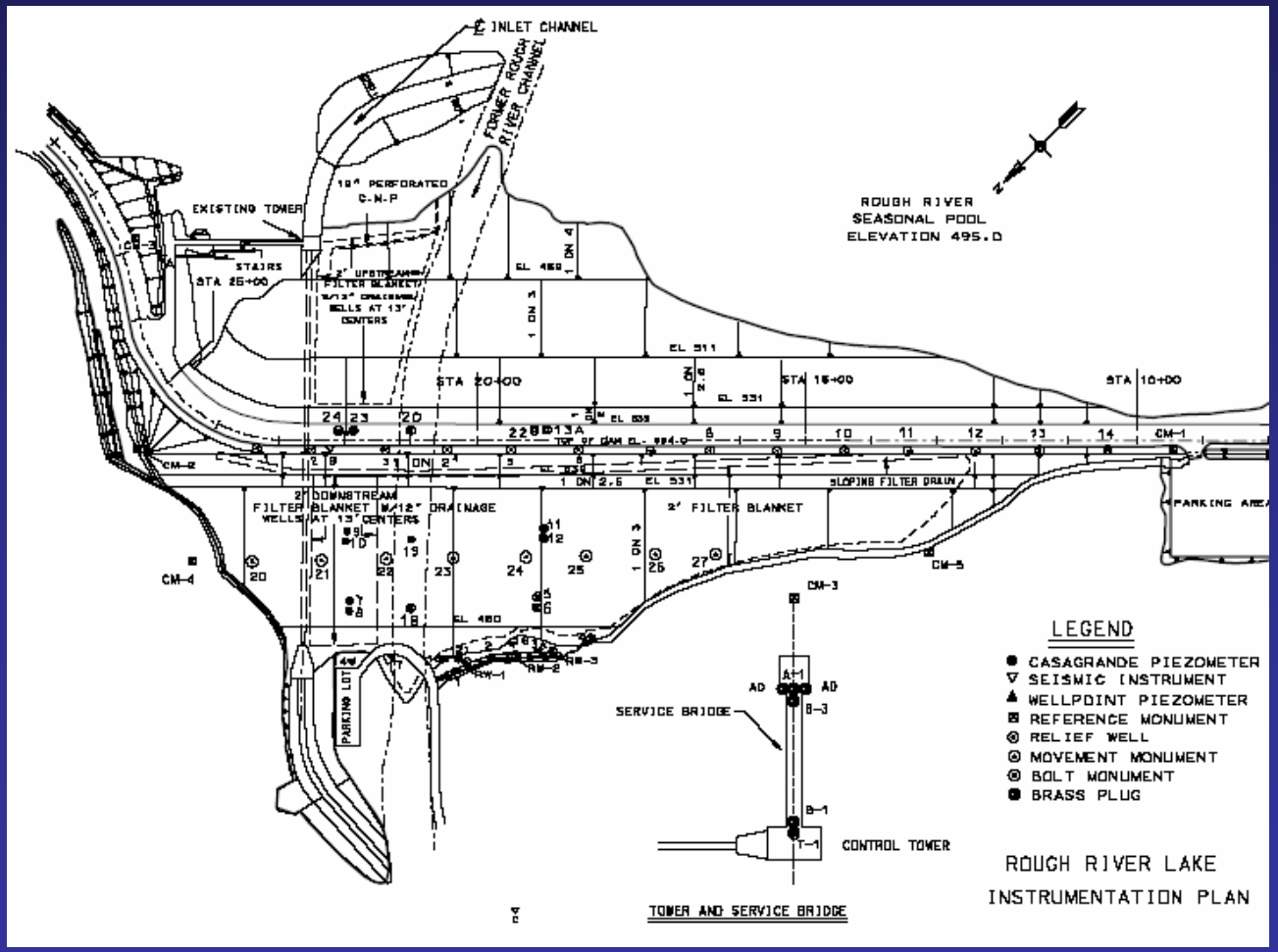
VICINITY MAP



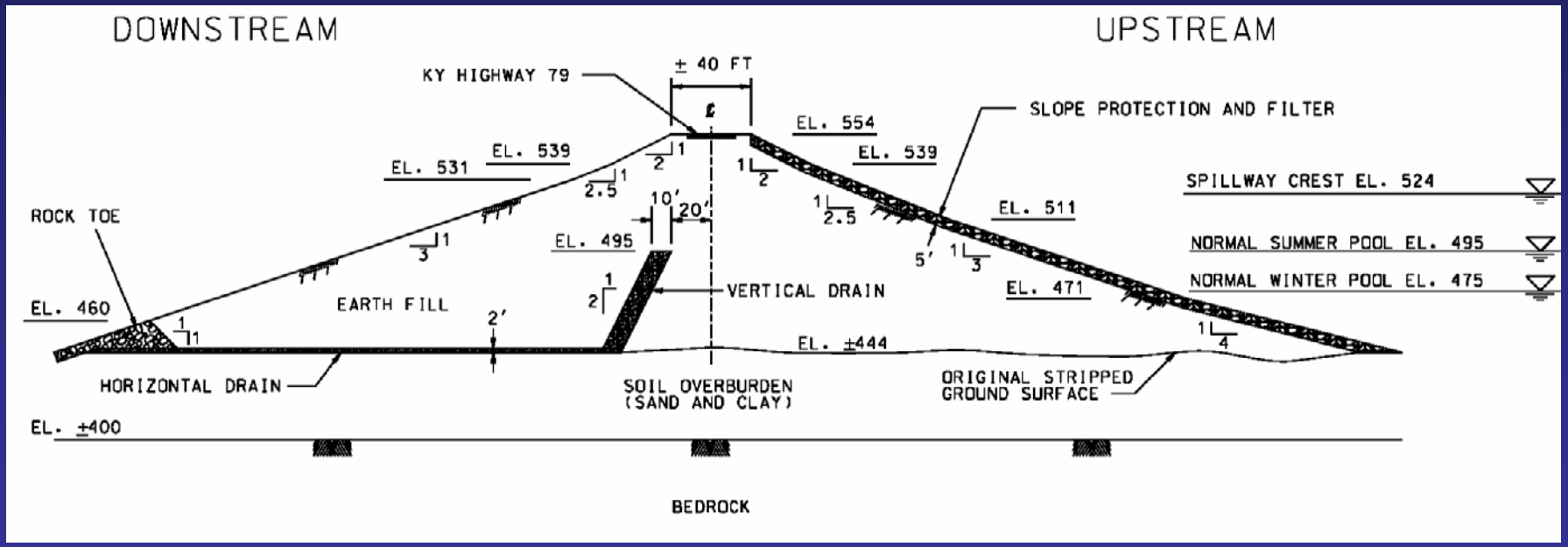
Project Overview

Overview of Dam

Instrumentation Plan



Typical Existing Cross-Section



Existing Slopes

Project History

- 1955: Construction begins
- 1957: Extensive damage to outlet bucket and channel during flood releases
- 1958: Construction complete
- 1960: Complete flood control operational
- 1971: First Periodic Inspection; erosion and damages noted to channel and apron
- 1975: Damage to apron

Project History (cont.)

- 1979: Extensive erosion damage to channel and apron; deep scour hole
- 1984: Severe apron and channel damage (88 CY)
- 1985: Apron undermining and erosion
- 1989: Record pool; two apron repairs (28+ CY)
- 1991: Two apron repairs (13 CY and 6 CY)
- 1993: Apron damage

Project History (cont.)

- 1998: Apron undermining and failure
- 2002: Sinkhole on downstream slope
- 2003: DSA geotechnical investigation
- 2004: "Short-term" repairs to paved apron; DSAP Evaluation Report

Dam Safety Assurance Project

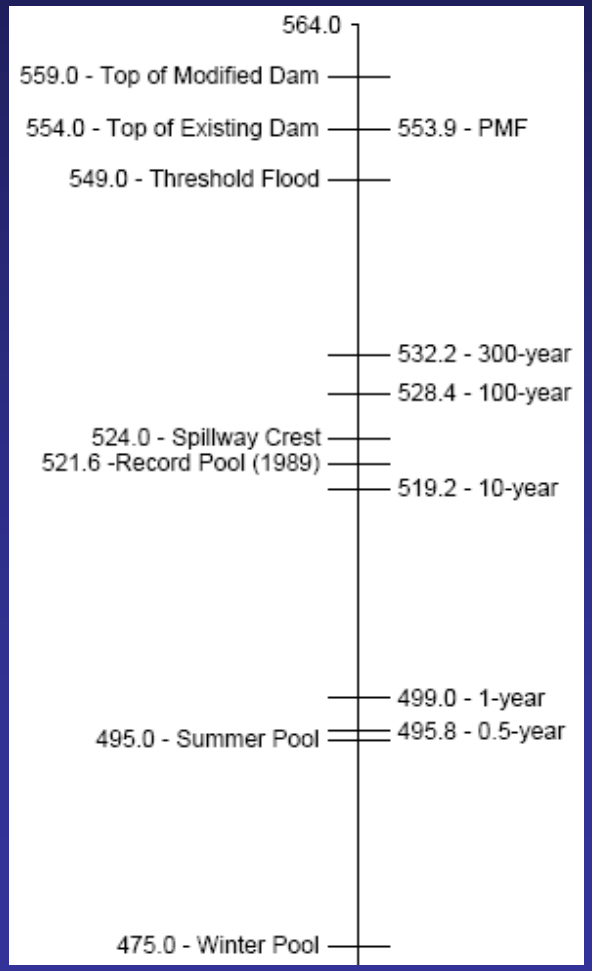
Spillway Inadequacy

Existing Spillway

Looking Upstream from KY 79 Bridge

Looking Downstream at KY 79 Bridge

Pool Frequency Data



- PMF Elevation = TOD
- Threshold Flood = 87% PMF
- Required Freeboard = 5 feet
- BSC = 100% PMF

- No spillway events to-date
- Record Pool = 521.6 feet

Spillway Vicinity

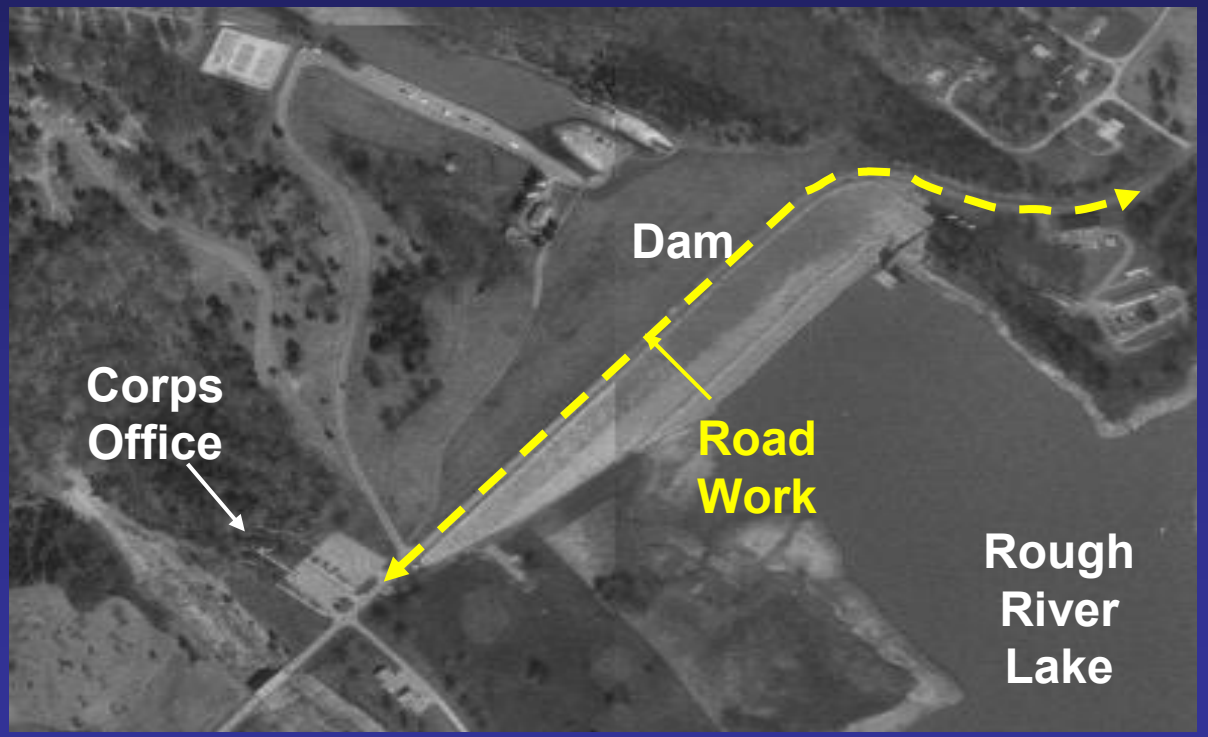
Spillway Remediation: Options

- Widen spillway by 85 feet to left or right
- Deepen spillway by 20 feet; add gates
- ➢ Raise dam crest by 5 feet with earth fill, parapet wall, inflatable dam or other mechanical-gated structure, or a <u>combination</u> of these options

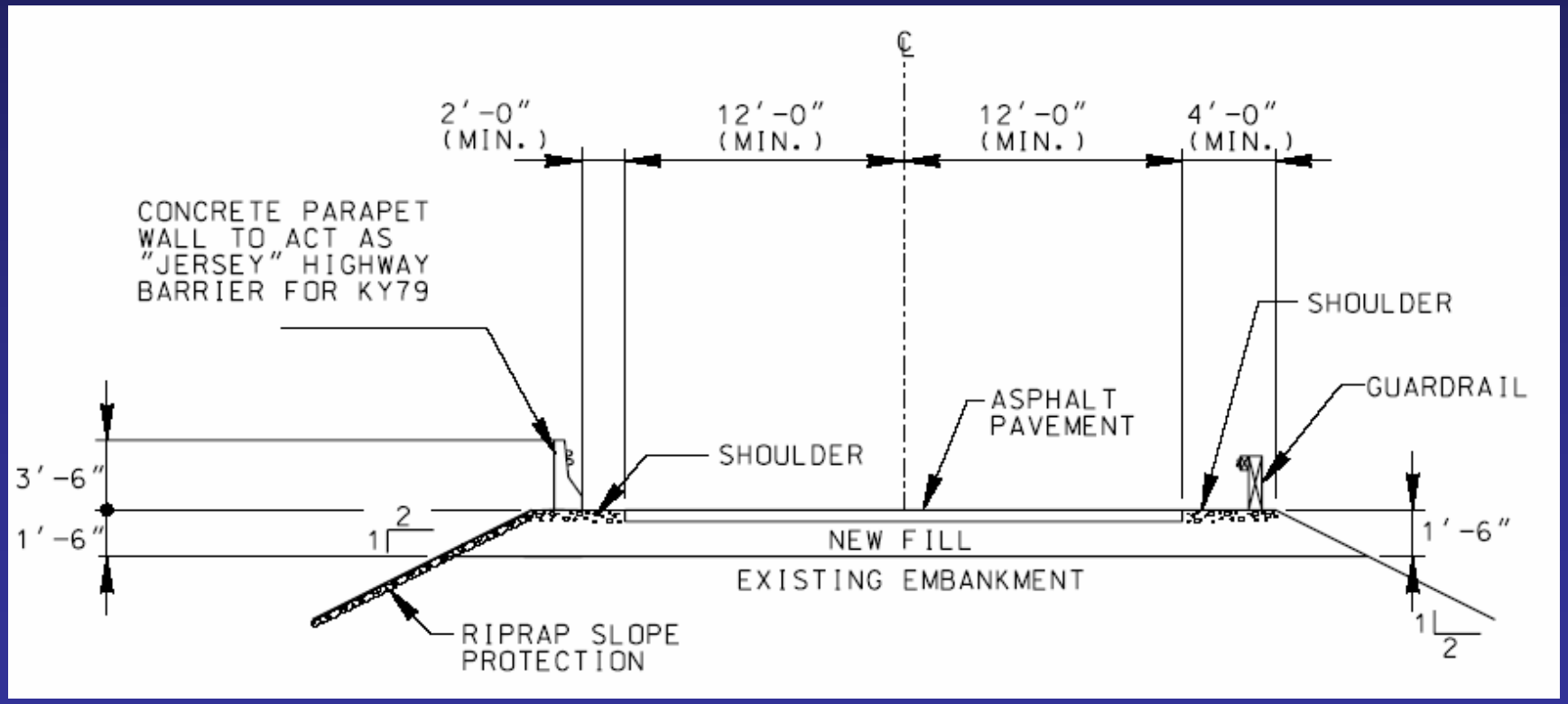
Spillway Remediation

Construct 3.5′ tall parapet wall along upstream crest of dam to meet KDOH standards

Raise road ±1.5′



New Dam Crest Geometry



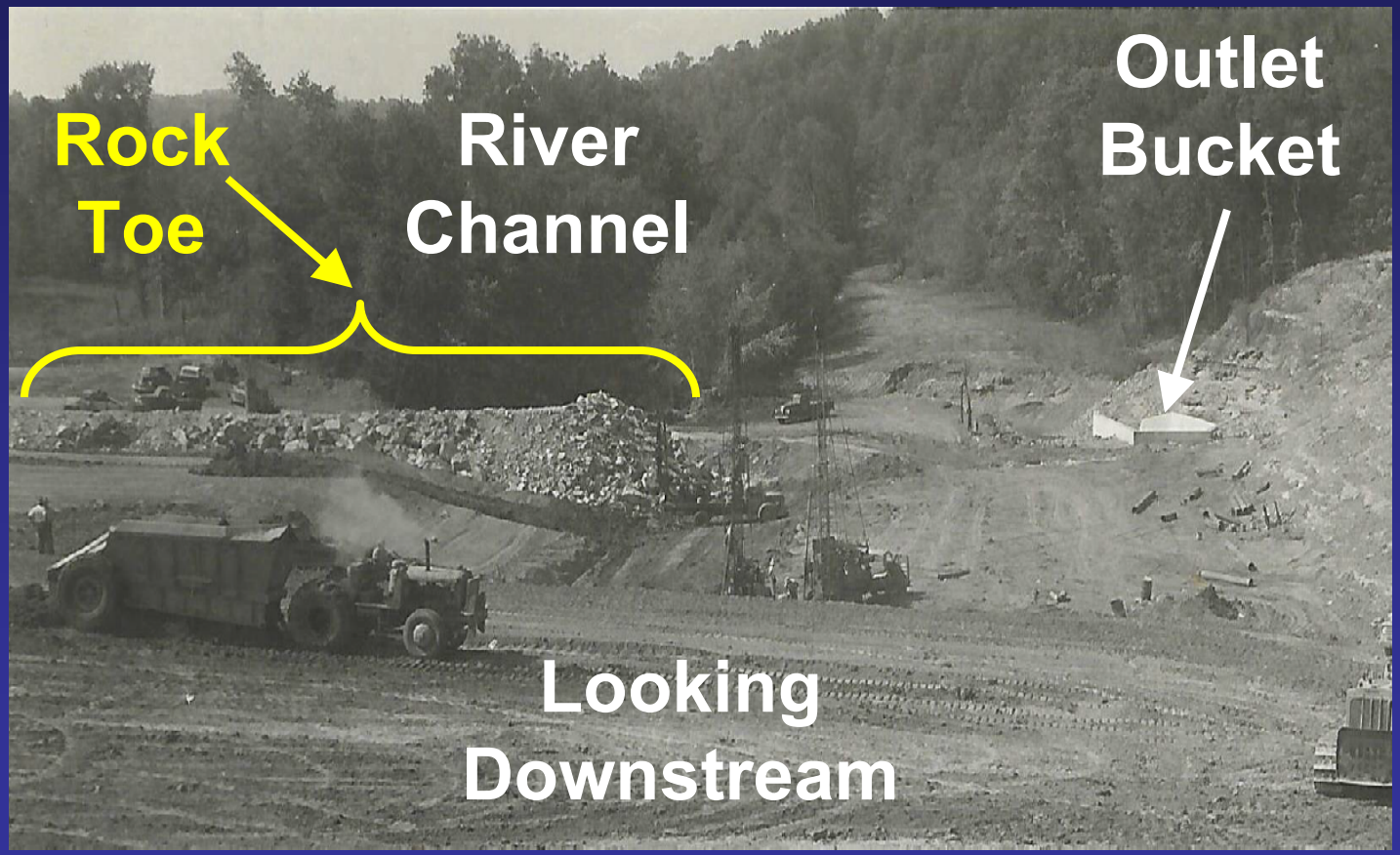
Rock Toe Repair

Sinkhole on Downstream Slope

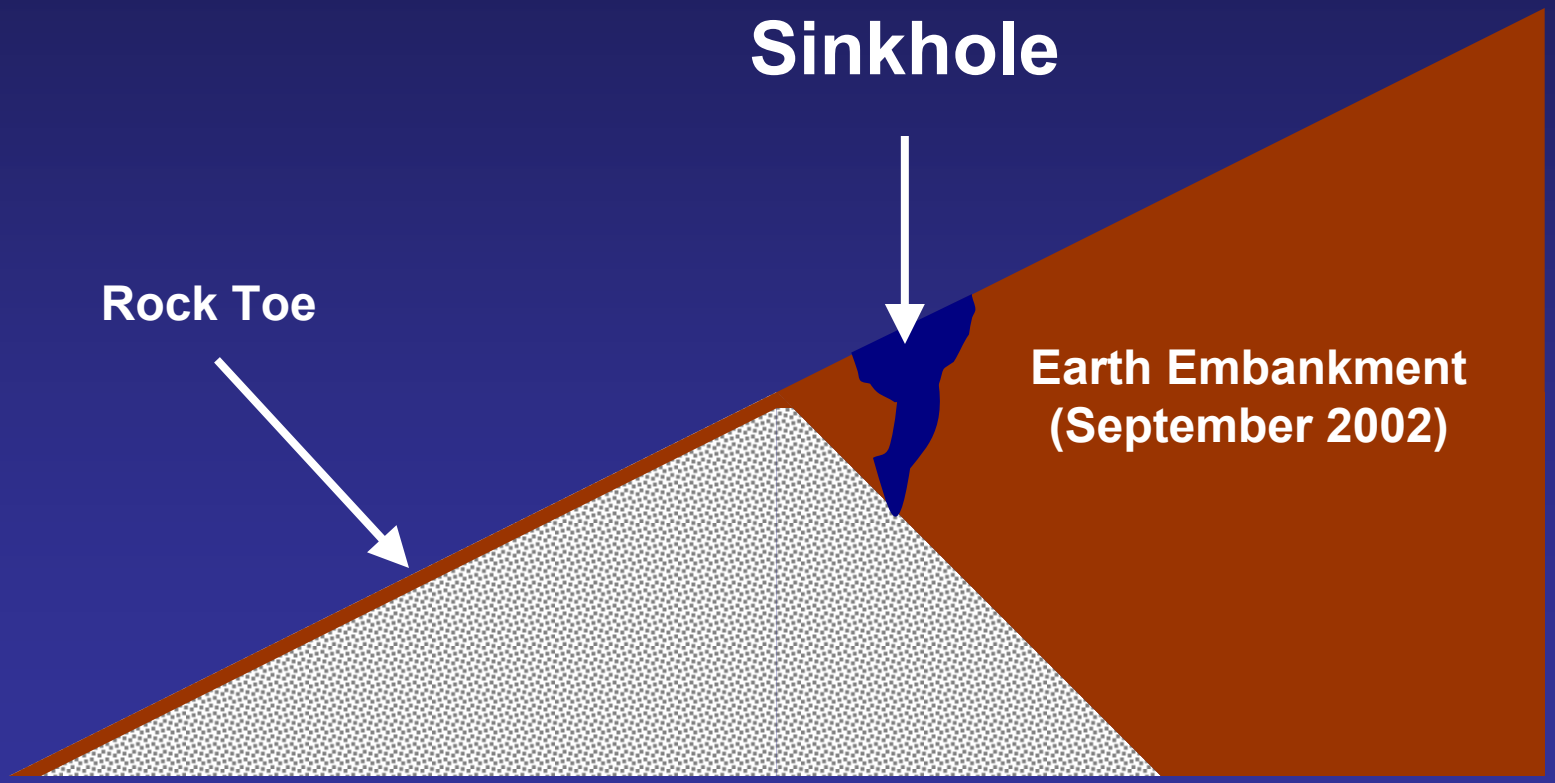
Remnants of Hurricane Isidore

- September 2002
- 6.5 inches of rain in 24 hours

Rock Toe Construction



Sinkhole Development



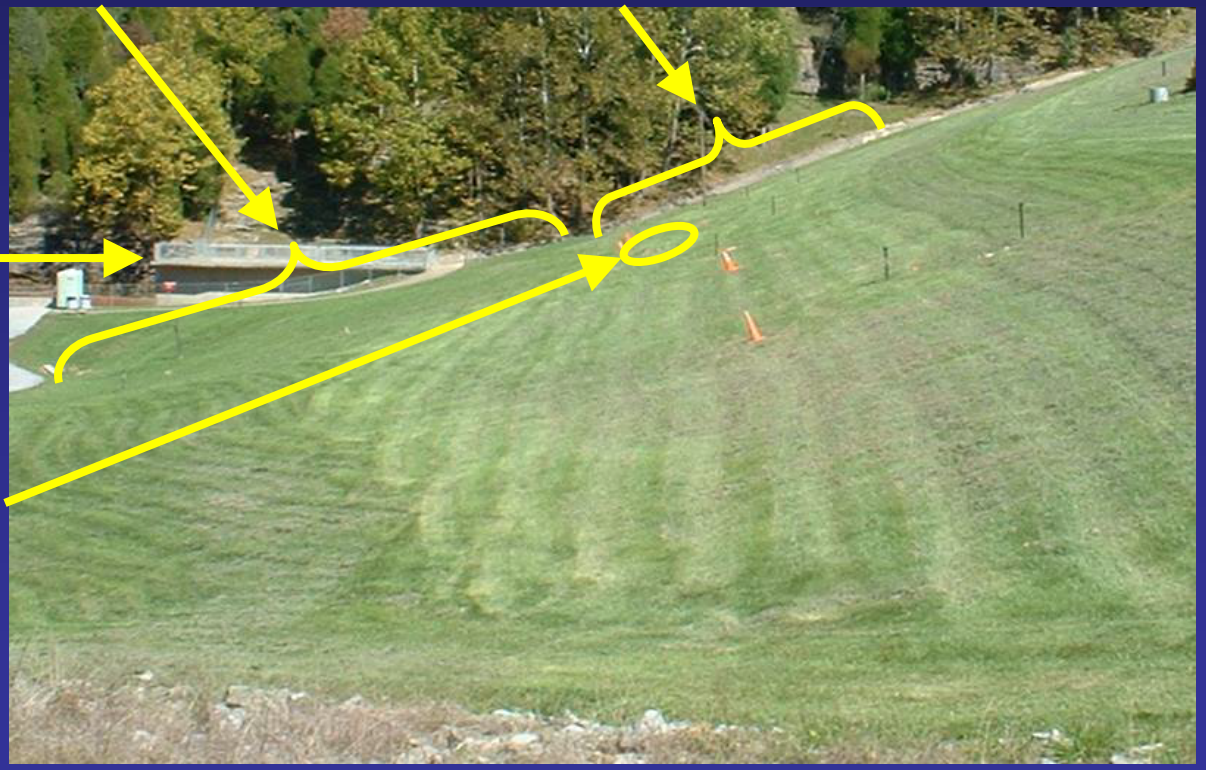
Downstream Slope Condition

Rock Toe

Depressions

Outlet Bucket

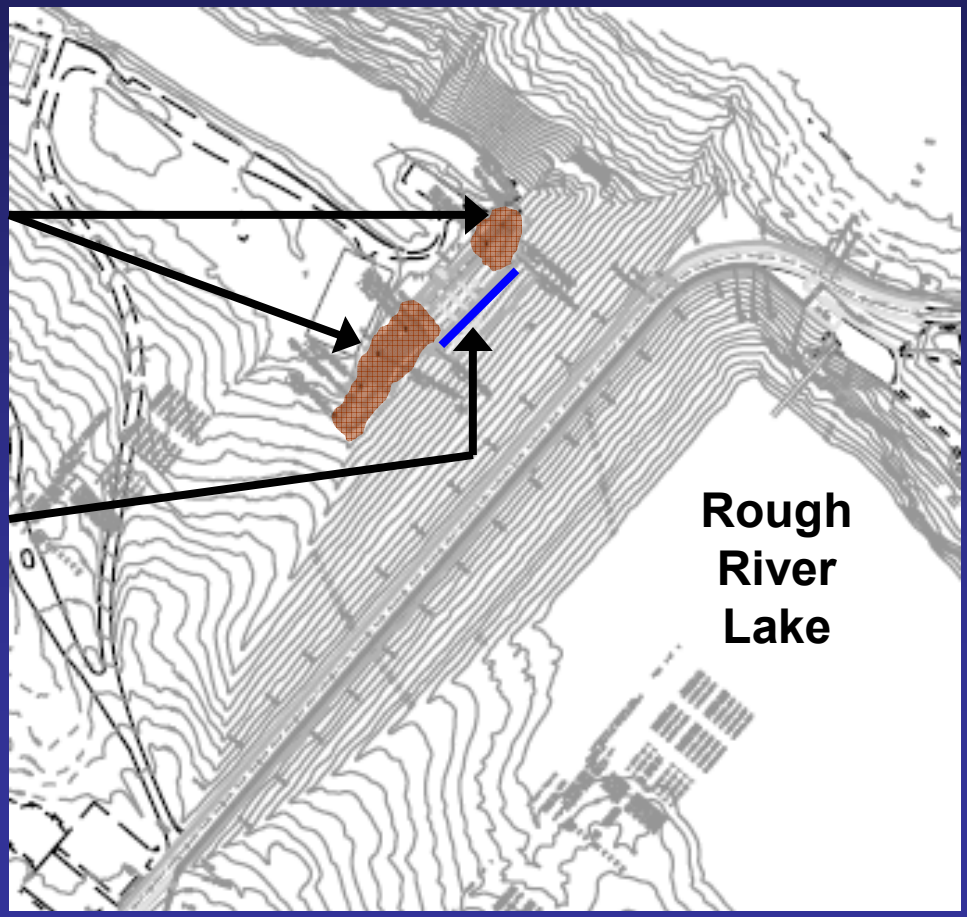
Approx. Location of Sinkhole



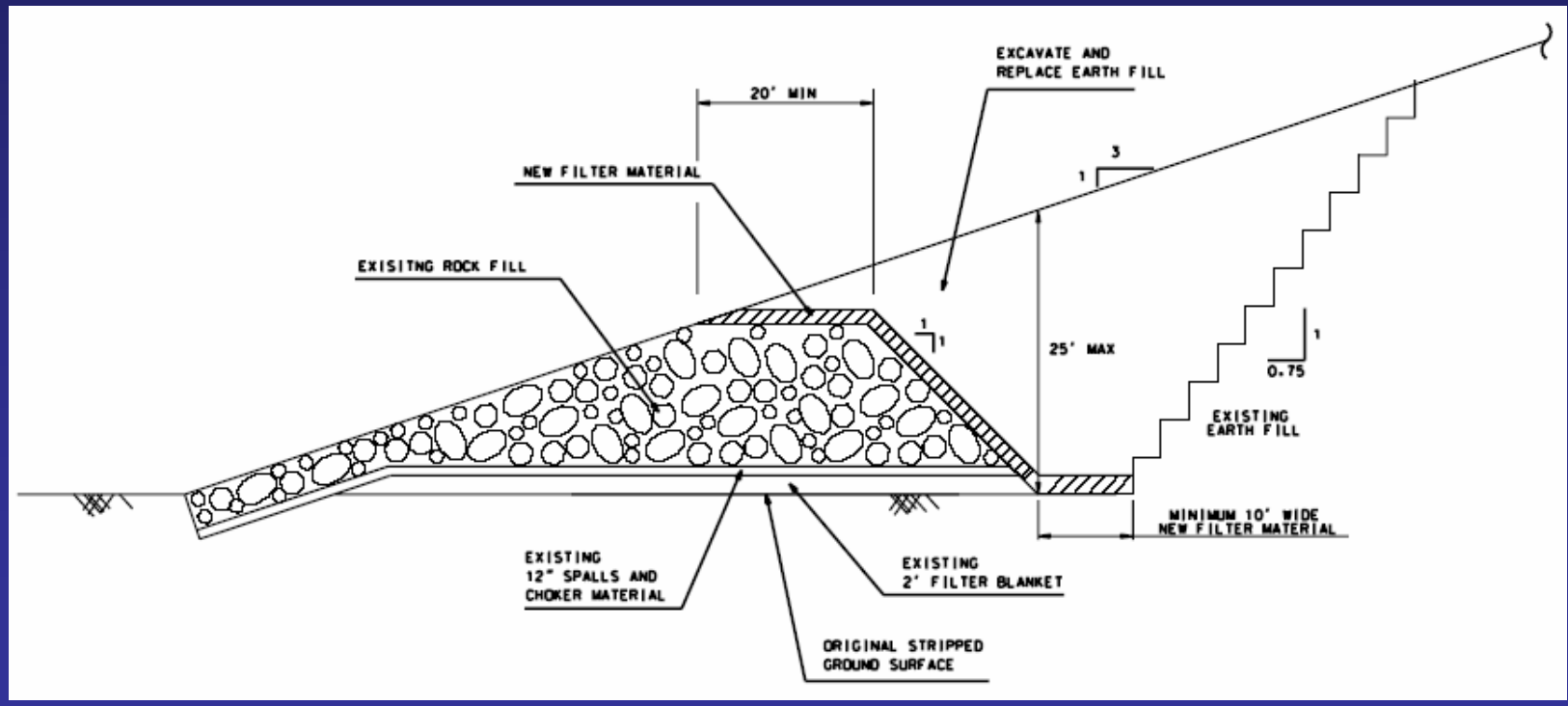
Rock Toe Repair

Complete Repair:
Excavate; place granular filter; replace earth fill

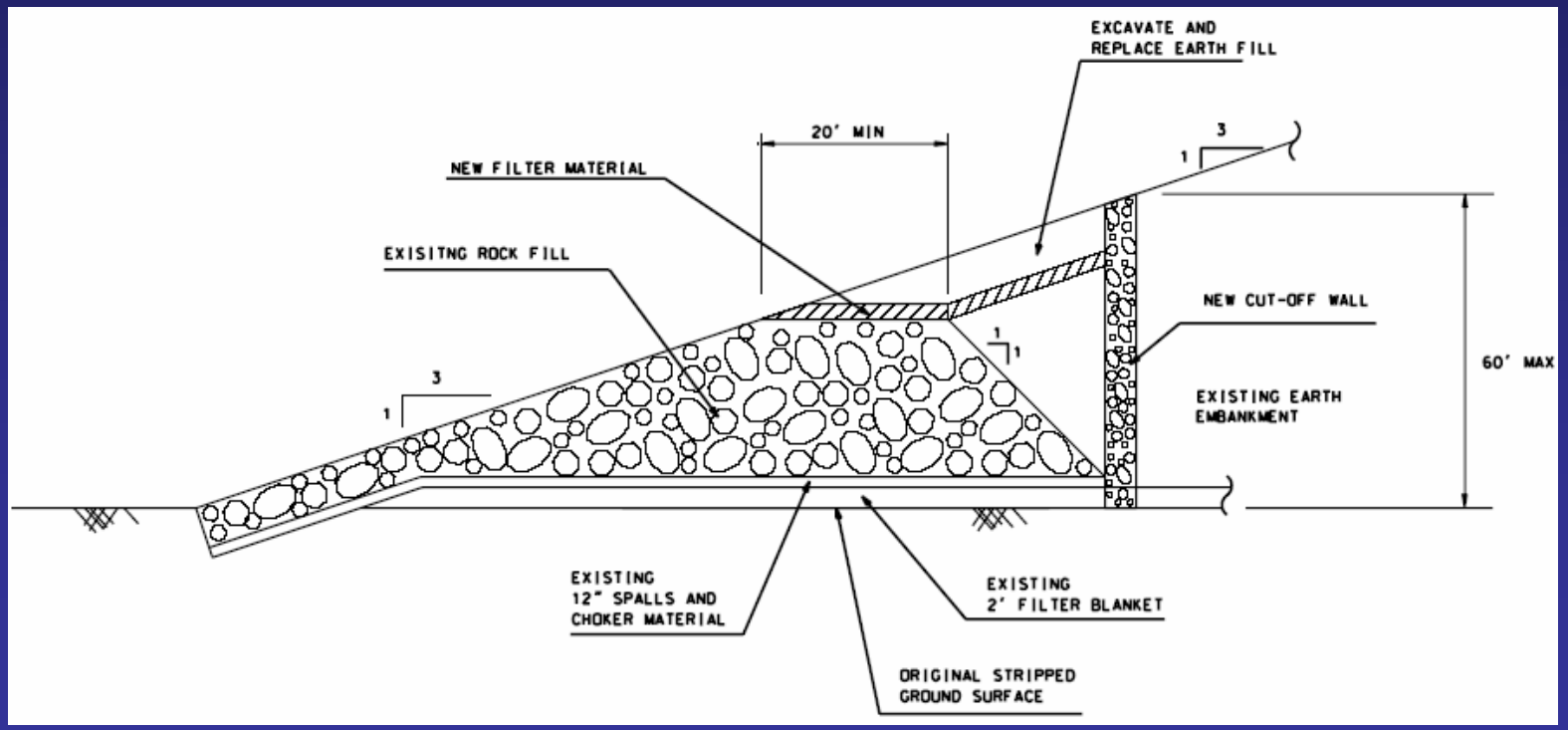
Partial Repair:
Place cutoff wall; seal surface with granular filter



Complete Rock Toe Repair: Excavate, Repair, and Replace

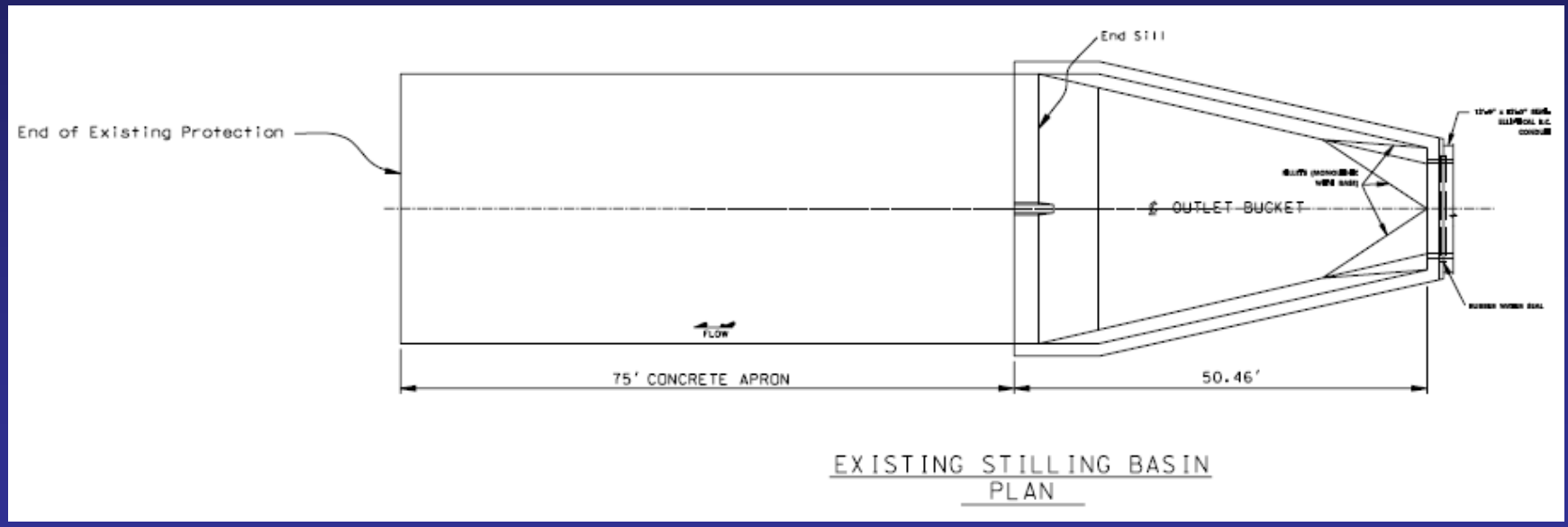


Partial Rock Toe Repair: Cutoff Wall; Seal Surface



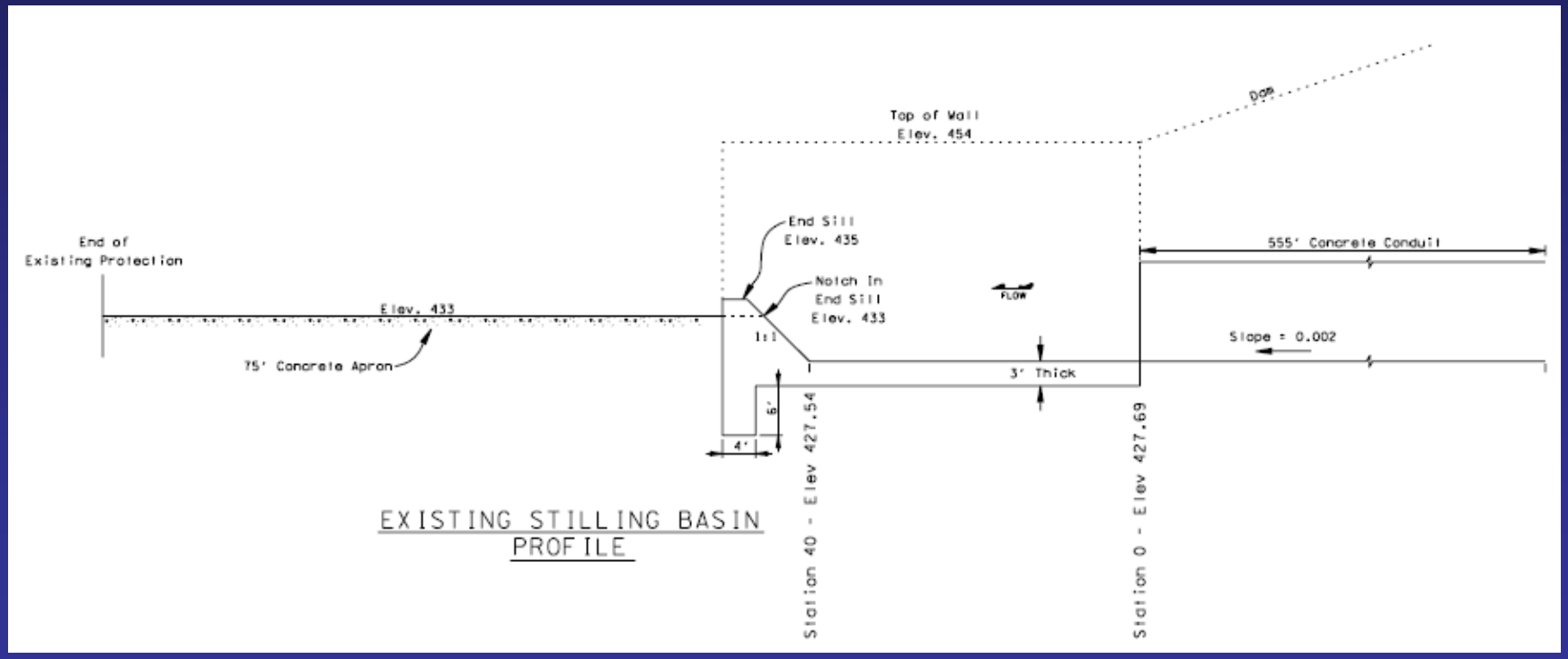
Stilling Basin Inadequacy

Plan of Existing Stilling Basin



EXISTING STILLING BASIN
PLAN

Profile of Existing Stilling Basin



Existing Stilling Basin

Note: Conduit nearly submerged with respect to tailwater

Existing Stilling Basin

Note: Discharge in photographs is 50% of required discharge for the design flood pool and 20% less than the maximum discharge for channel capacity.

Consequences of No Stilling Basin Modification

Stilling Basin Remediation

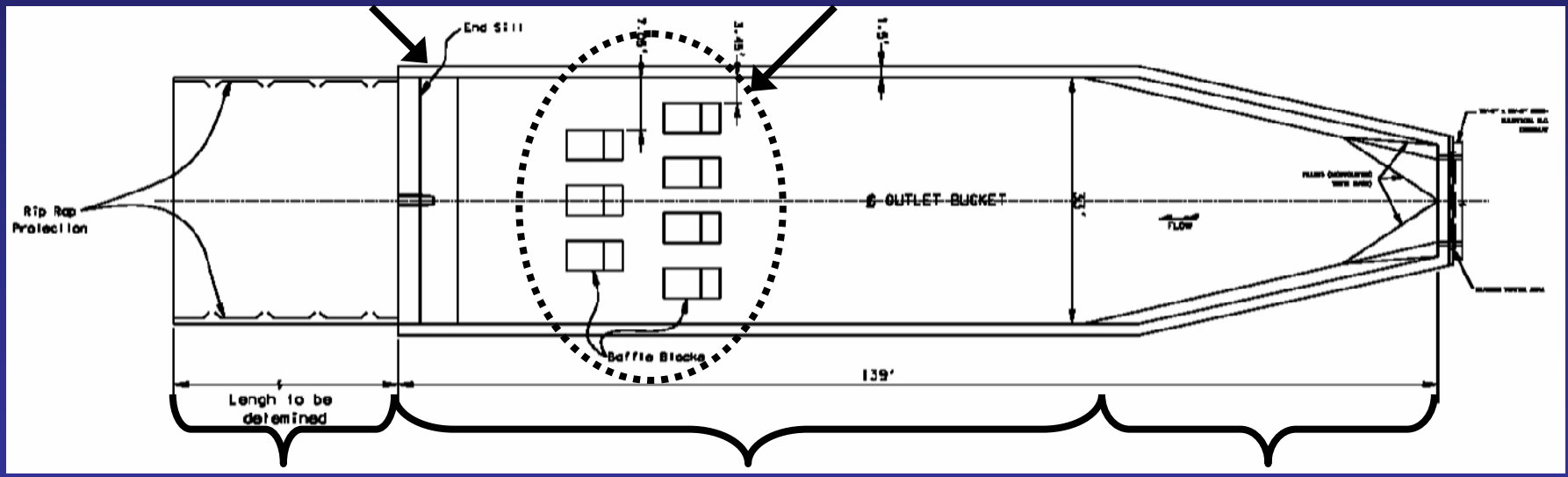
ERDC 1:25-scale model study:

- Lengthen Basin: Move end sill ±90 feet downstream and add baffle blocks
- Downstream Weir: Construct a weir downstream of the existing apron in conjunction with some channel armoring

Conceptual Modification I: Lengthened Stilling Basin Plan

End Sill

Baffle Blocks

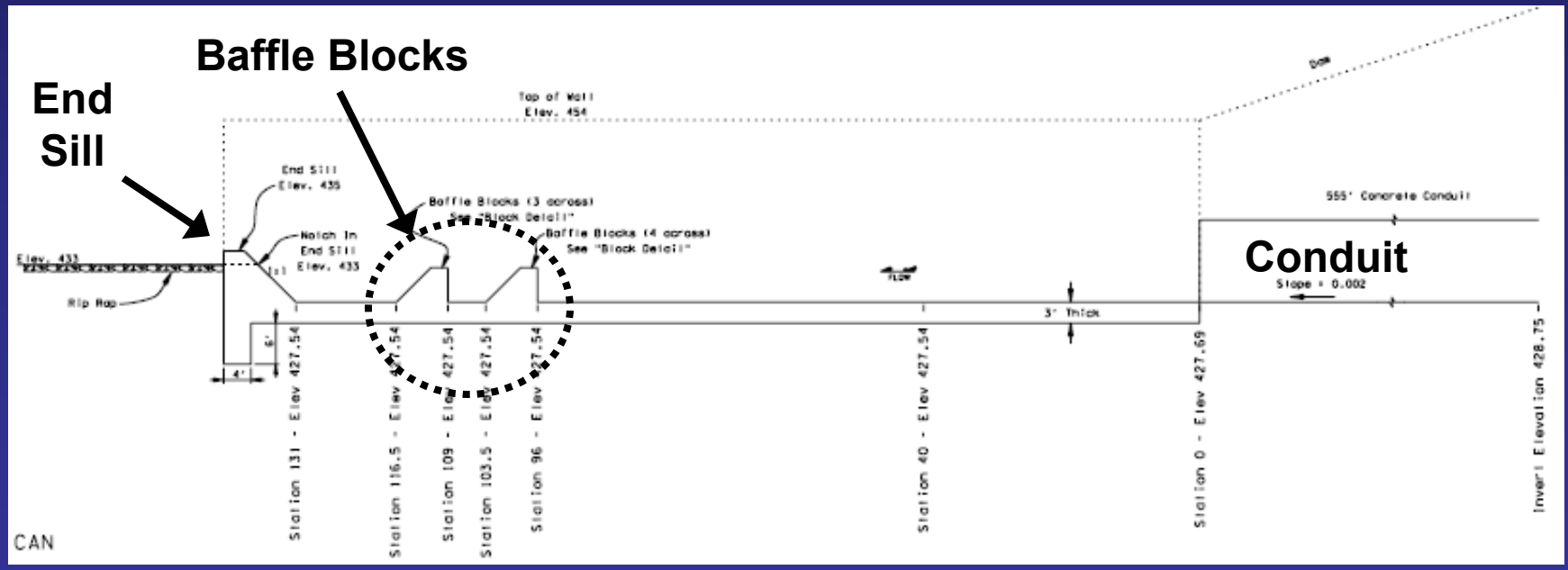


New Rip Rap

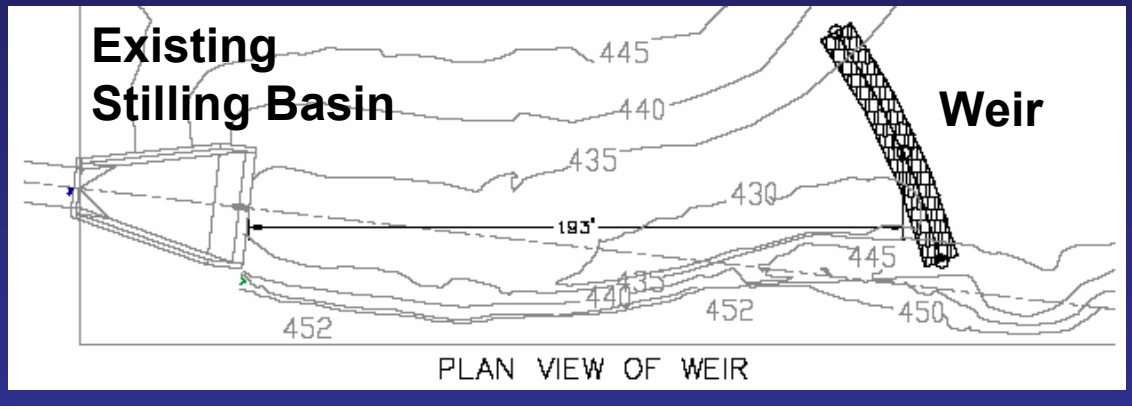
Lengthened Stilling Basin (±90 feet)

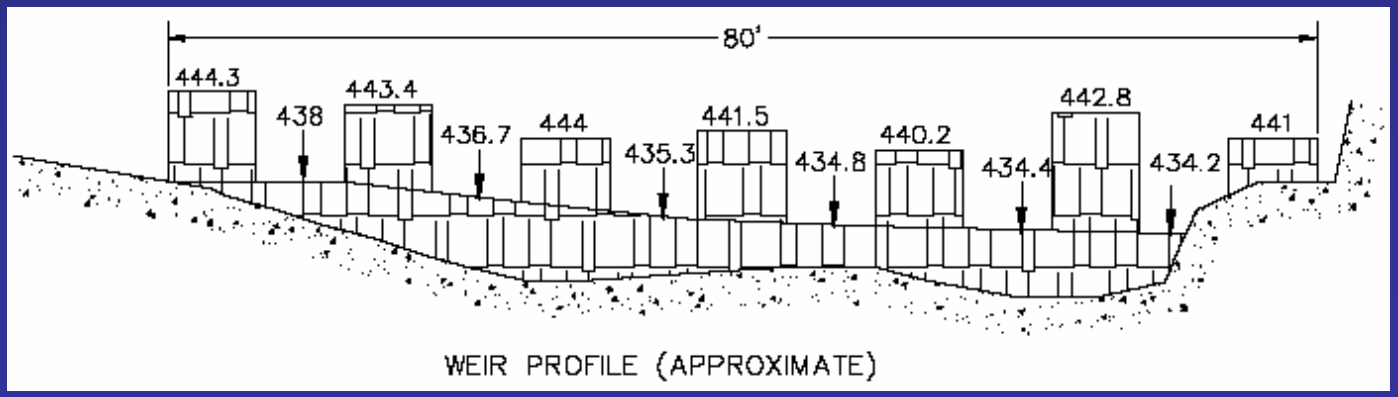
Existing Stilling Basin (±50 feet)

Conceptual Modification I: Lengthened Stilling Basin Profile



Conceptual Modification II: Construct Downstream Weir

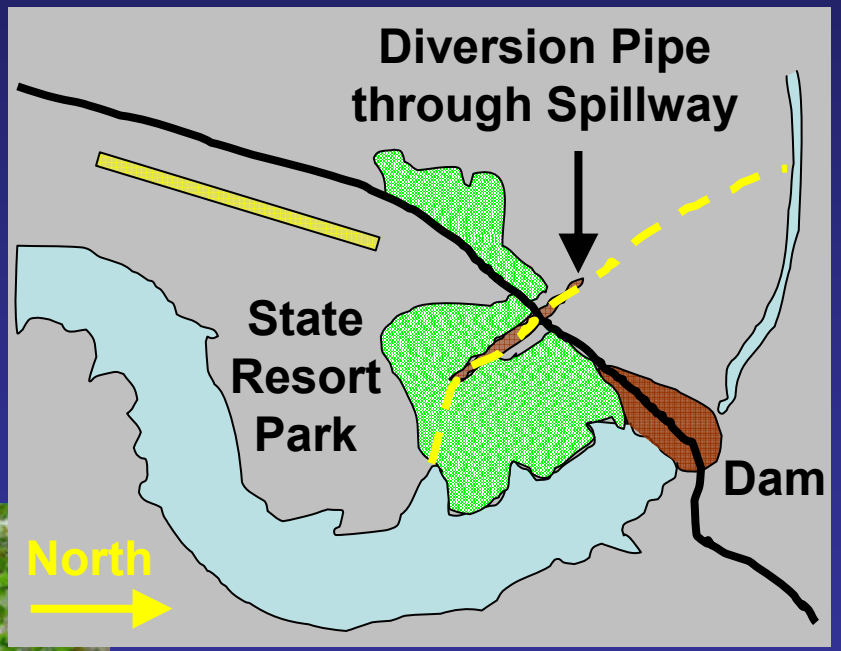




Tailwater Improvements

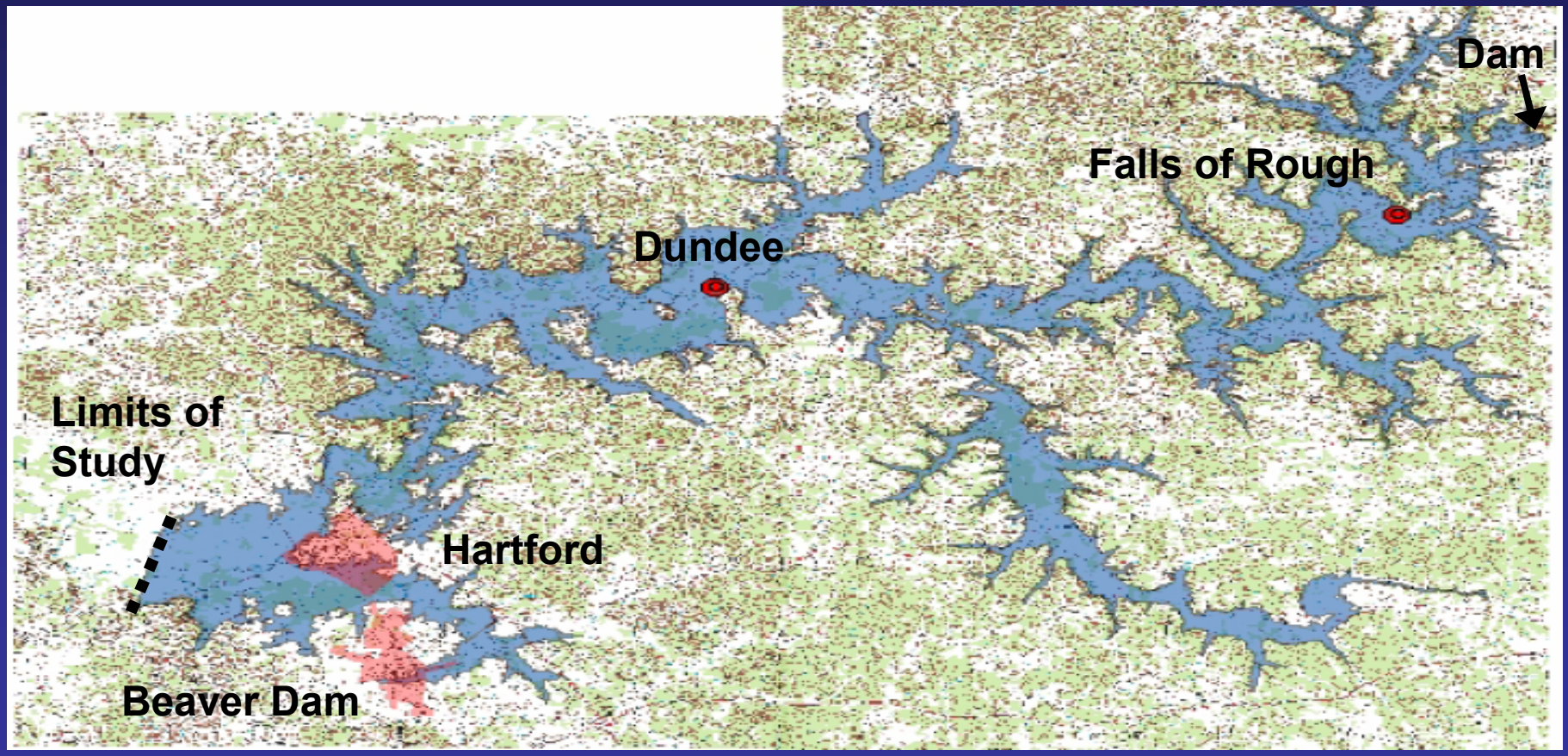
- Raise grade of access road at toe of dam to prevent flooding during high tailwater
- Expand parking lot; provide turn-around
- Add fishing platform along river bank
- Construct ADA-accessible fishing platform along top of new stilling basin wall

Construction Water Control



Consequences

PMF Dam Break Inundation



Economic Losses with Dam Failure

Immediate urban flood damage	$19.8M
Annual flood control benefits lost	$ 4.5M
Annual recreation benefits lost	$ 8.3M
Total annual benefits lost	$12.8M

Economic Losses with Dam Failure (cont.)

Original construction cost	$ 2.4M
Dam replacement	$20.5M
Rebuild Lafayette Golf Course	$ 2.0M

Economic Losses with Dam Failure (cont.)

- Loss of water supply:

Grayson County	25,000
Breckinridge County	19,200
Total Population	44,200

- Agricultural losses: 28,600 total crop acres
- Environmental/ecological losses

Human Consequences with Dam Failure

	Population at Risk (PAR)	Loss of Life (LOL)
Permanent	1,258	5 (1 to 11)
Transient	6,750	28 (5 to 56)
Total	8,008	33 (6 to 67)

Project Schedule

	Design Complete	Award Contract	Construction Complete
Spillway and Rock Toe Remediation:	Sep. 2005	Dec. 2005	Oct. 2006
Stilling Basin Remediation:	Mar. 2006	Aug. 2006	Mar. 2007

Project Funding

FY 2005 CG/Wedge: Model Study, Design	$0.5M
FY 2006 CG: Construction, S&A, EDC	$2.2M
FY 2007 CG: Construction, S&A, EDC	$2.0M
Total	$4.7M

Conclusions

"Our emphasis continues to be public safety and to minimize public inconvenience."

- Common Sense
- Courtesy
- Communication, communication, communication

Contact Information

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Questions?