

# ALABAMA DAM SAFETY PROGRAM OVERVIEW

2023 ASCE Alabama Section Winter Meeting



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TTL, Inc.

March 7, 2023



# BASIC LADDER SAFETY

- Choose the right ladder for the job
- Check for any damages or issues before each use
- Check the load limit
- Use a flat, stable surface for ladder set up and apply the 1H:4V rule
- Wear slip resistant shoes or boots with a defined heel
- Identify and barricade the work area to prevent unauthorized access
- Always face the ladder directly when climbing and climb cautiously
- Maintain three points of contact while using a ladder
- Carry only small items
- Don't over reach – move ladder instead

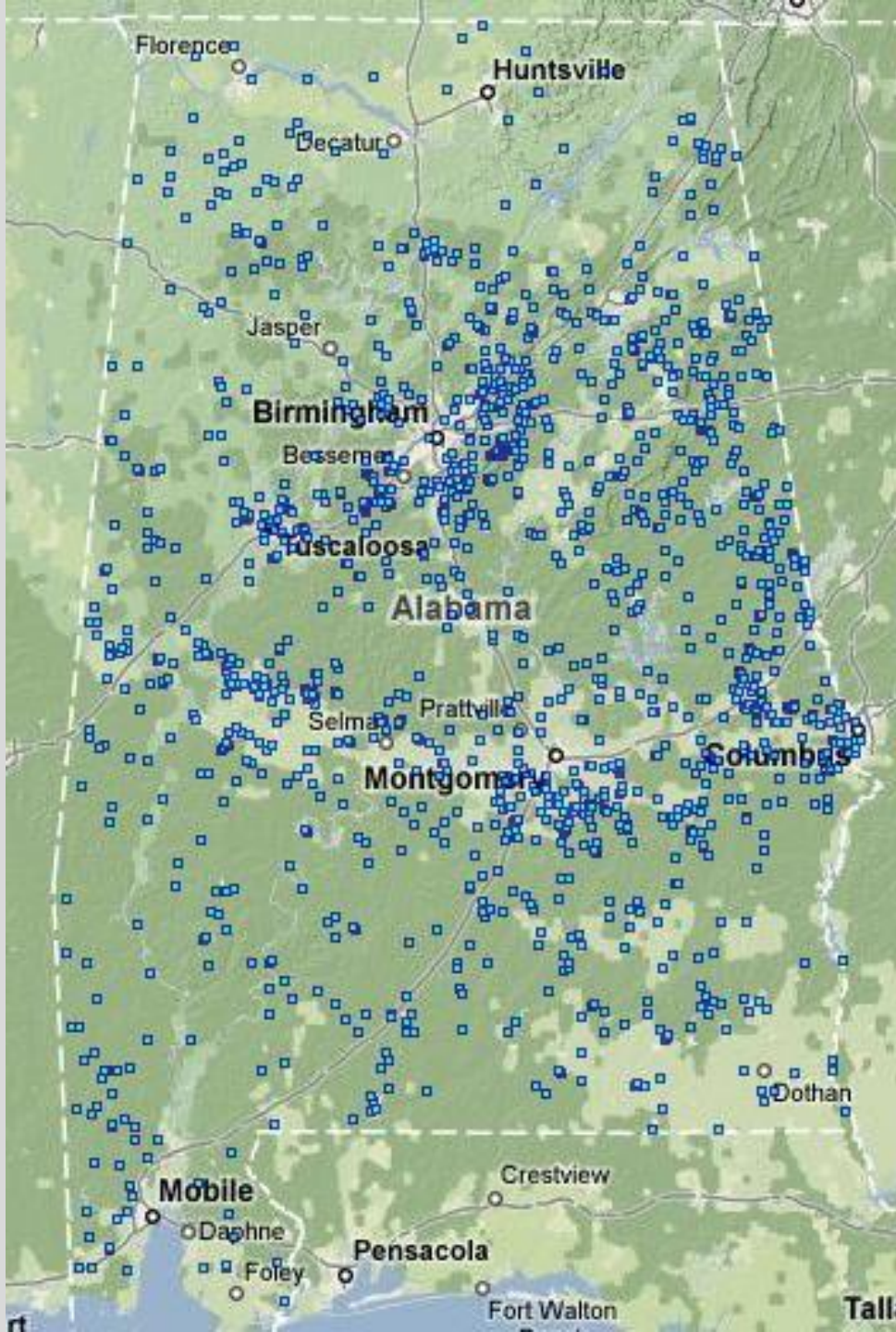
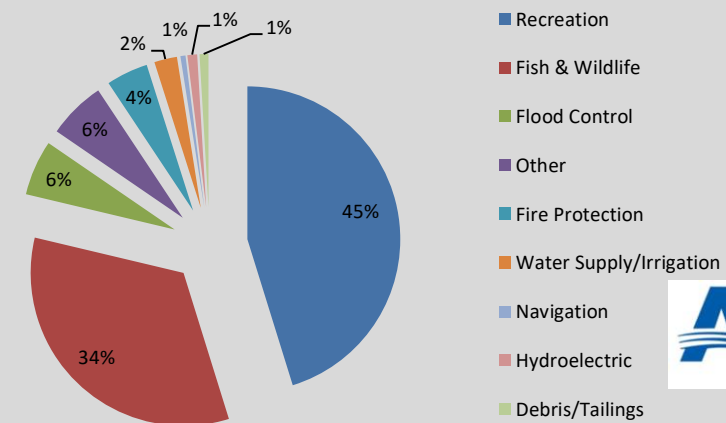


*Dam failure looks imminent! At this stage, all we can do is wait and keep our fingers crossed.*



# DAMS IN ALABAMA

- We know of approximately 2,300 dams
- Beneficial Uses of dams
  - Hydropower generation – renewable, clean energy
  - Flood control
  - Water storage
    - Public water supply
    - Industrial water supply
    - Irrigation
  - Navigation
  - Recreation
  - Fish & Wildlife



# DAMS IN ALABAMA



## – Dam Owners:

- Industries, agriculture and other private entities (89%)
- State and local government including public water systems (8%)
- U.S. Army Corps of Engineers and Tennessee Valley Authority (2%) – have dam safety protocols
- Electric utilities – Hydropower generation (1%) - Dam safety is a critical part of FERC's hydropower program and receives top priority.

# DAMS IN ALABAMA



## – Types of dams

- **Embankment** dams are the most common type of dam in use today. Generally referred to as “earthfill” or “rockfill” dams
- **Concrete** dams may be:
  - **Gravity** Concrete dams are the most common form of concrete dam. The mass weight of concrete and friction resist the reservoir water pressure.
  - **Buttress** dam is a specific type of gravity dam in which the large mass of concrete is reduced, and the forces are diverted to the dam foundation through vertical or sloping buttresses.
  - **Arch** Concrete dams are typically thin in cross-section. The reservoir water forces acting on an arch dam are carried laterally into the abutments. the vertical plane as well. Such dams are
- **Hybrid Concrete/Embankment** dams

# DAMS IN ALABAMA

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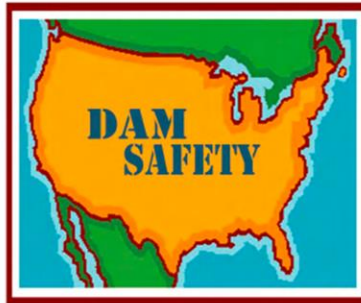
- Dam Hazard Classification is determined by the extent of damage a dam failure would cause downstream
- Dam Hazard Classifications
  - High Hazard Potential – probable loss of human life
  - Significant Hazard Potential – no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.
  - Low Hazard Potential – no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner’s property.

# DAMS IN ALABAMA

The National Dam Safety Program

## Model State Dam Safety Program

FEMA 316/July 2007



Federal Emergency Management Agency  
[www.fema.gov](http://www.fema.gov)

Association of State Dam Safety Officials  
[www.damsafety.org](http://www.damsafety.org)

- Today, every state except Alabama has a dam safety regulatory program
- A state dam safety program would provide for:
  - Comprehensive and complete dam inventory
  - Safety evaluations of existing dams
  - Review of drawings and specifications for dam construction and major repair work
  - Periodic inspections of construction work on new and existing dams
  - Review and approval of Emergency Action Plans
  - Allow Federal infrastructure funding through FEMA



# DAMS IN ALABAMA



- 87% of the known dams have an earthen component - most problematic from a safety perspective
- Over 75% of the known dams in Alabama are more than 40 years old
- Over 200 dams are classified as high hazard potential – loss of life
- To minimize potential loss of life, Emergency Action Plans (EAPs) should be developed for high hazard potential dams
- EAPs are used by the state and local Emergency Management Agencies to facilitate emergency evacuations in a timely manner
- Only 19% of high hazard potential dams in Alabama are being inspected, maintained and have EAPs.

# ALABAMA SAFE DAM COALITION TECHNICAL COMMITTEE

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- **Technical Committee Membership:**
  - Alabama Section of the American Society of Civil Engineers (leading the effort)
  - American Council of Engineering Companies of Alabama
  - Alabama League of Municipalities
  - Association of County Engineers of Alabama
  - Alabama Department of Economic and Community Affairs
  - State Sen. Clyde Chambliss, P.E.
- **Last attempt at dam safety legislation was in 2014**
- **We are currently making measurable progress**

# ALABAMA SAFE DAM COALITION TECHNICAL COMMITTEE

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- The Committee has developed a road map that includes the following goals:
  - Build broad support around the urgent need
  - Improve the confidence of the existing inventory in several of the most populous counties
  - Help understand overall risks and liabilities
  - Recommend practices to manage liabilities
  - Provide a means for the general public to understand their risks
  - Provide dam safety education



# ALABAMA SAFE DAM COALITION TECHNICAL COMMITTEE

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## Proposed Pilot Study:

- Establish a Steering Committee
- Develop an updated inventory of dams in 3 Alabama counties using current technology
- Develop and conduct a Dam Safety Survey and Evaluation Study in which a select number of dams identified in the inventory will be inspected and evaluated for safety, structural integrity, hazard potential and downstream consequences
- Based on the findings of the Dam Safety Survey and Evaluation Study, develop:
  - A plan for evaluating the remaining dams in the state
  - Framework and recommendations for a cost-effective implementation of a dam safety program utilizing lessons learned from other state programs.

# ALABAMA SAFE DAM COALITION TECHNICAL COMMITTEE

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- Provide recommendations for the Alabama Dam Safety Program
  - Cost-effectively meet the needs of Alabama
  - Meet the Federal Emergency Management Agency minimum criteria
  - Identify dams that will initially be included in the program
  - Identify the enabling state agency and funding
  - Identify stakeholders
- The Alabama Dam Safety initiative received supplemental appropriations from the Alabama Legislature to fund the pilot study
- ADECA received proposals from consultants on October 14, 2022 and has made a selection – currently negotiating the final scope of work and fee
- This pilot study will begin this year



**2022**

REPORT CARD FOR  
**ALABAMA'S**  
INFRASTRUCTURE

ALABAMA SECTION  
OF THE  
AMERICAN SOCIETY  
OF CIVIL ENGINEERS



# 2022 ALABAMA REPORT CARD

- Part of the national ASCE Infrastructure Report Card
- Unveiled in Montgomery on March 31, 2022
- Twelve Infrastructure Categories
- Overall infrastructure grade for Alabama: **C-**



Infrastructure Sectors	2015 ASCE-AL Grades	2022 ASCE-AL Grades	TREND
Aviation	B-	C	↓
Bridges	C-	C+	↑
Dams			
Drinking Water	C+	C-	↓
Energy	B	B	↔
Inland Waterways	D+	D	↓
Ports	B-	B	↑
Rail	B-	B	↑
Roads	D+	C-	↑
Stormwater		D+	New Category
Transit	D	C-	↑
Wastewater	C-	D+	↓
<b>OVERALL GPA</b>	<b>C-</b>	<b>C-</b>	<b>↔</b>



# CIVIL ENGINEERING OPPORTUNITIES

- Advise our clients
- Confirm the hazard potential of the dam
- If the dam is considered high hazard potential:
  - Prepare a dam break analysis with downstream inundation potential
  - Prepare an Emergency Action Plan
  - Provide the EAP with the county Emergency Management Agency



# CIVIL ENGINEERING OPPORTUNITIES

- Develop a dam safety program which may include:
  - Compile legacy data on the dam
  - Review any previous inspection and perform an inspection
  - Review extent of and enhance, as necessary, the dam instrumentation (piezometers, inclinometers, settlement/movement monuments, etc.)
  - Condition of emergency drain
  - Calculate the design spillway capacity and compare with basin hydrology for extreme events
  - Recommend and design dam rehabilitation strategies
  - Review dam security



# SUMMARY

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- When it comes to dam safety and related risks in Alabama, we don't know what we don't know
- Progress is being made on the Alabama Dam Safety Program
- Talk with your state legislative representative about the urgent need for this program
- Need to implement a state dam safety program before a catastrophic failure occurs
- Dam owners need to begin or continue with dam inspection and repair activities
- Opportunities for civil engineers to make a difference
- Don't wait on the state



# Questions?

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