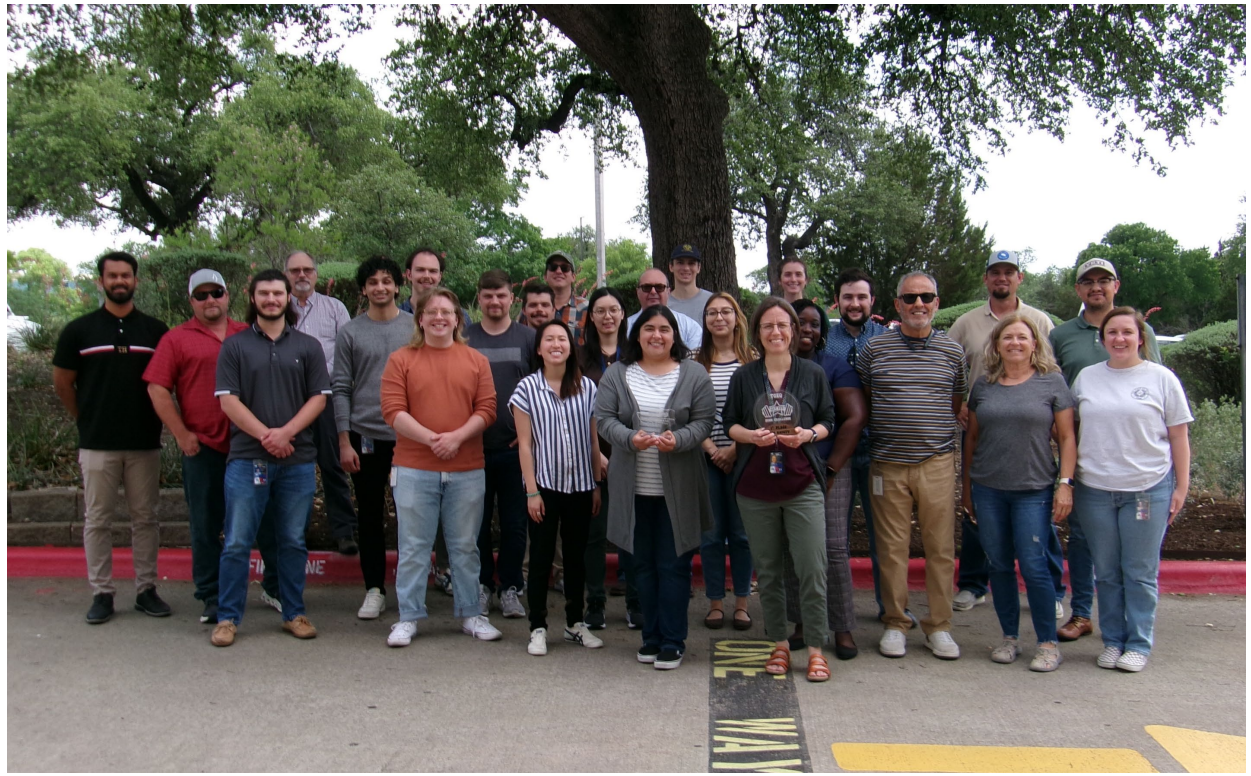
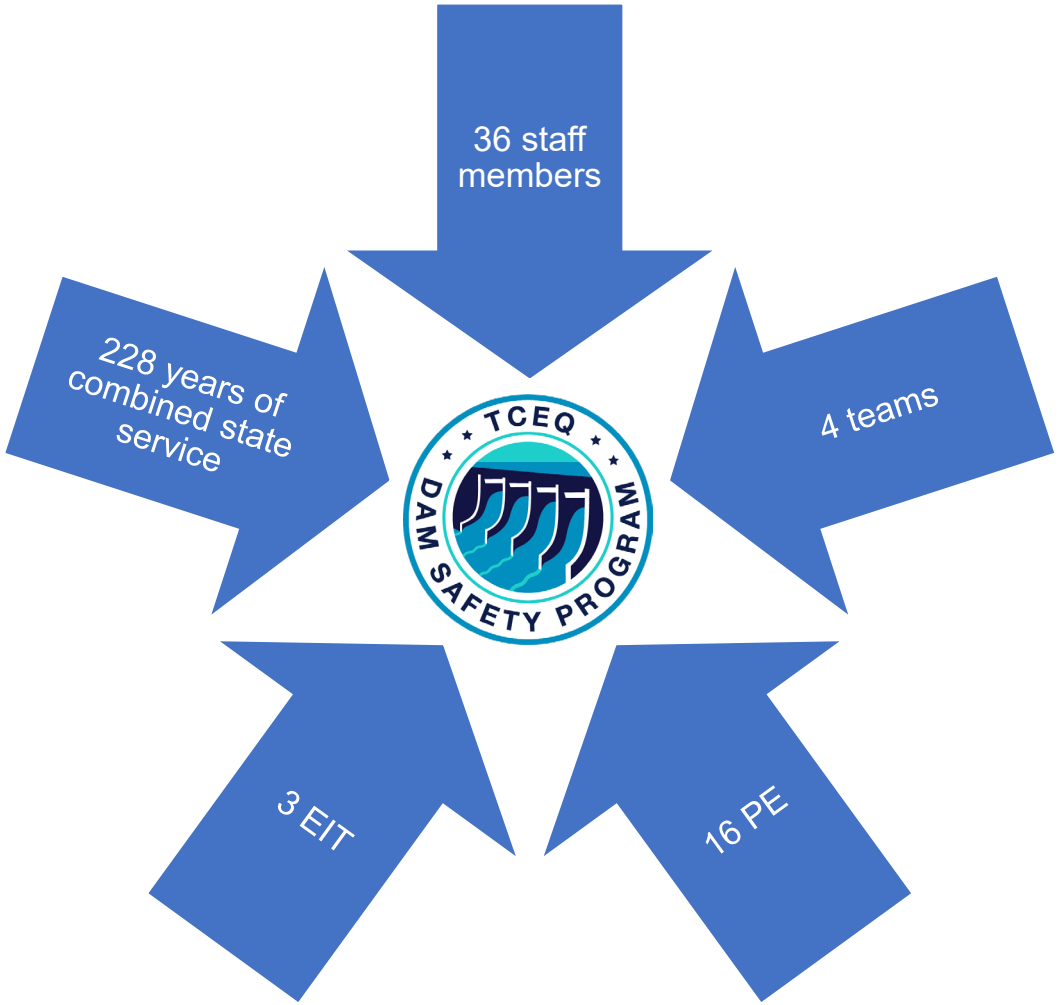
Dam Safety Updates

Trina Lancaster, PE

Dam Safety Stats





Program Stats

- Projects Completed (9/1/24 – 6/1/25)
  - Inspections - 302
  - EAP Reviews - 121
  - H&H - 17
  - Breach - 32
  - Plans & Specs - 24
  - Other - 124

Dam Stats

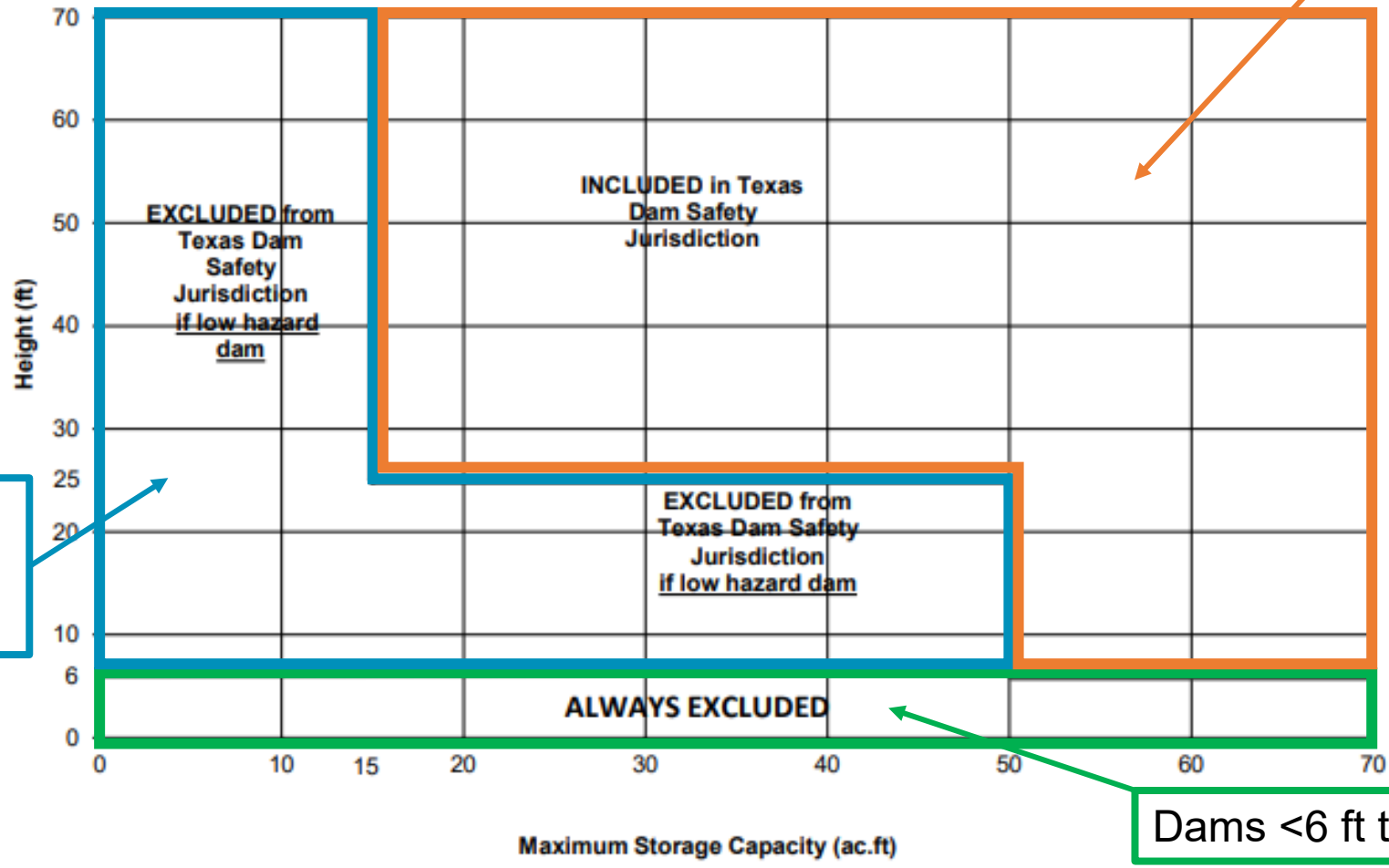
- State Regulated Dams = 7,384
  - Non-Exempt = 4,147
    - High = 1,574
    - Significant = 295
    - Low = 2,278
  - Exempt = 3,237
    - Significant = 245
    - Low = 2,992

Dam Safety 101 - Rules

Texas Water Code	12.052 12.053
Title 30 Texas Administrative Code	Chapter 299

Dam Safety 101

Dams in this area are included (all hazard classifications)

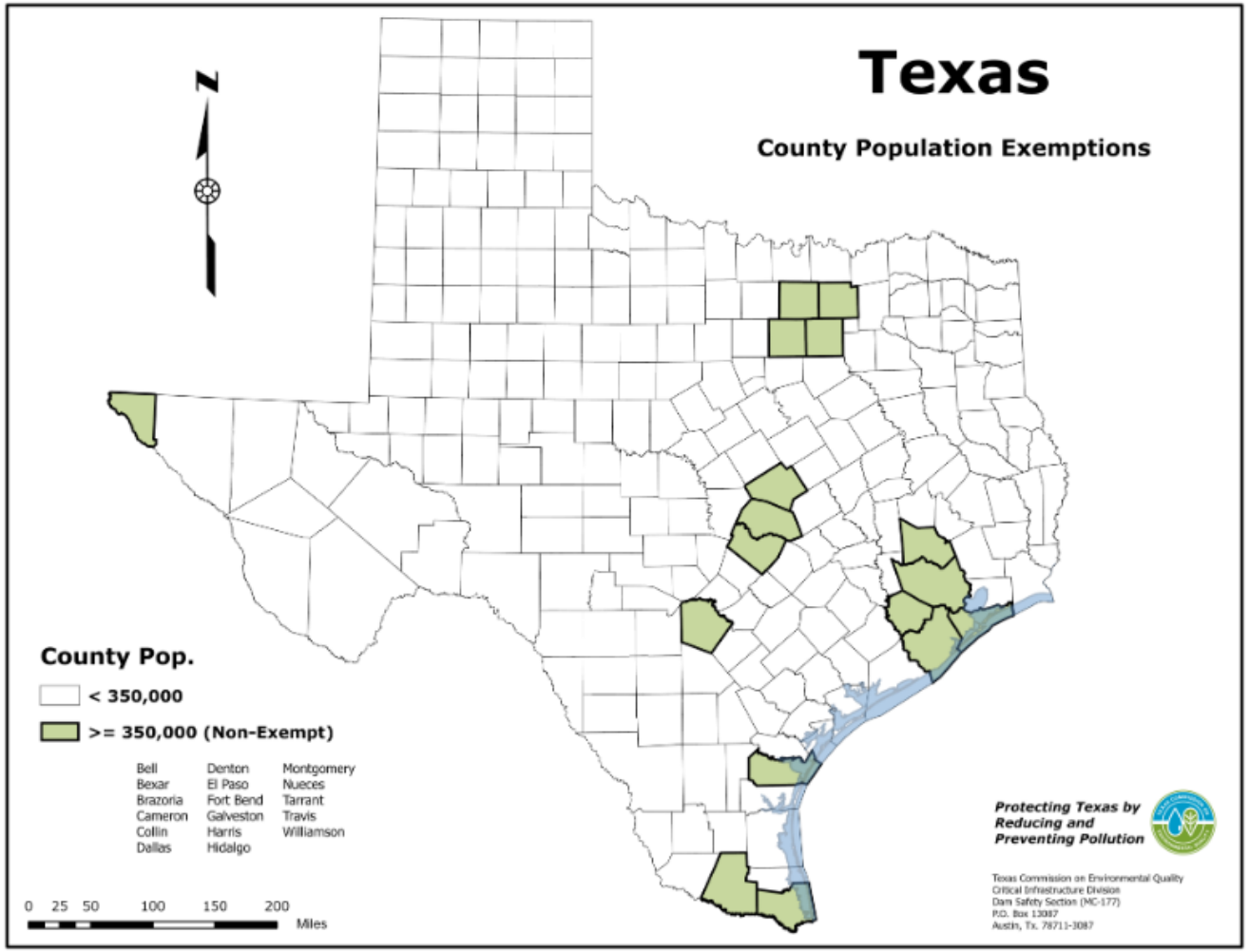


Dams in this area, excluded only if low hazard

Dams <6 ft tall, always excluded

Dam Safety 101 - Exemption

- A dam is exempt from Chapter 299 if it meets all of the following:
  - located on private property
  - maximum capacity of less than 500 ac-ft
  - low or significant hazard
  - located in a county with a population of less than 350,000 based on the most current US Census numbers, and
  - not located inside the corporate limits of a municipality



Hazard Classification

Low Hazard

- No loss of human life expected
  - No permanent habitable structures in the breach inundation area

- Minimal economic loss
  - May damage occasional farm buildings, limited agriculture improvements, minor highways

Hazard Classification

Significant Hazard

- Loss of human life possible
  - 1 – 2 habitable structures in the breach inundation area

- Appreciable economic loss
  - Damage to isolated homes, secondary highways, minor railroads
  - Interruption of service or use of public utilities

Hazard Classification

High Hazard

- Loss of human life expected
  - 3 or more habitable structures in the breach inundation area

- Excessive economic loss
  - Extensive damage to public facilities, agricultural/industrial/commercial facilities, public utilities, main highways, major railroads

Program Funding

- We had delays in our federal funding disbursements this year during funding pauses.
- As of now, funding disbursements are up to date
- No news on future funding availability

Funding for Owners

FLOOD INFORMATION CLEARINGHOUSE

Home About Funding Opportunities Events Contact Resources

Am I Eligible?

Is My Project Eligible?

What Funding is Available?

Submit a Request for Information Form

Attend an Event

Other Resources

Funding for Owners

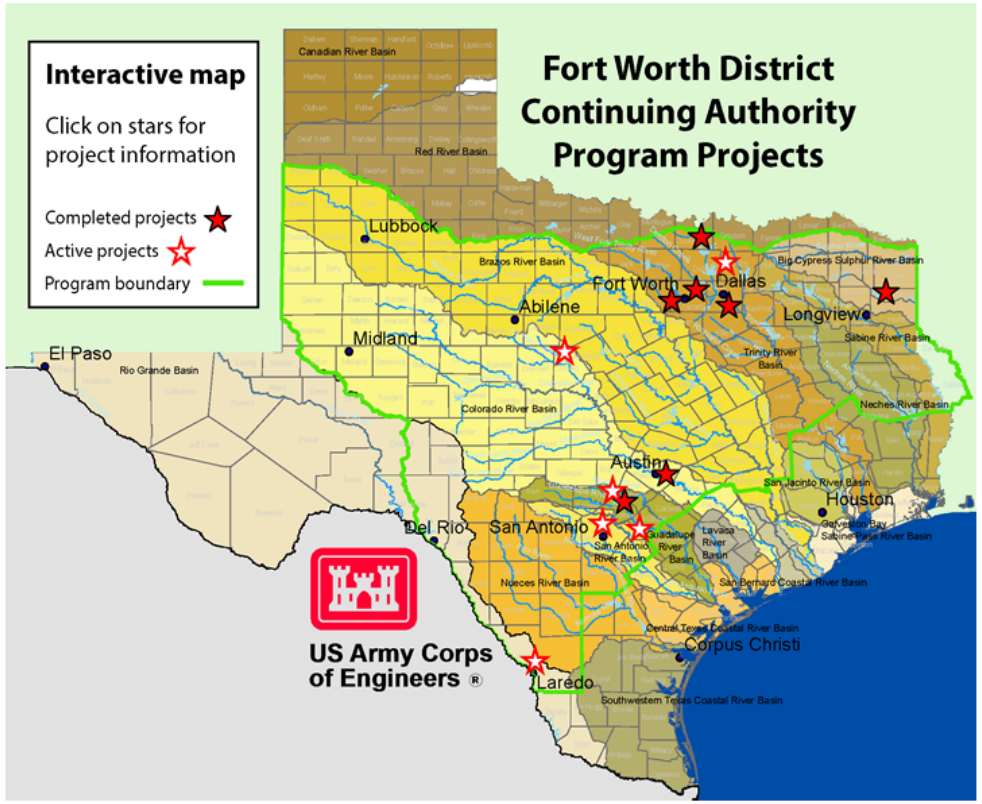
Overview

The Corps Water Infrastructure Financing Program (CWIFP) is a credit assistance program providing direct loans to non-Federal entities for dam safety and levee projects. The program enables critical local infrastructure investments to improve public safety across the nation. Projects are fully implemented at the local level, with local control and ownership. CWIFP provides significant financial savings to local taxpayers while leveraging minimal federal investment and risk.

https://www.usace.army.mil/Missions/Civil-Works/Infrastructure/Revolutionize/CWIFP/cwif_overview/

Funding for Owners

Continuing Authorities Program (CAP) - Overview



The U.S. Army Corps of Engineers Continuing Authorities Program (CAP) is a useful tool to support smaller community projects without the lengthy study and authorization process typical of most larger Corps of Engineers projects. It allows the Fort Worth District to plan, design and construct projects of limited size, cost, scope and complexity. It is ideal for funding projects for flood risk management, ecosystem restoration, erosion control and streambank protection.

Rehabilitation of High Hazard Potential Dams Grant

Grant Year	Texas Award	National Funding	% available funding	# dams funded
2019	$574,647	$10,000,000	6%	3
2020	$987,217	$10,000,000	10%	8
2021	$1,556,603	$11,600,000	13%	6
2022	$0	$22,000,000	0%	0
2024	$10,737,479	$185,120,000	6%	12

Emergency Action Plans

The owners of all high- and significant-hazard dams, shall prepare an emergency action plan to be followed by the owner in the event or threat of a dam emergency.

History has shown that on occasion, dams do fail and often these failures cause extensive property damage and sometimes death.

Emergency Action Plans

Not a substitute for proper maintenance

Facilitates the recognition of dam safety problems as they develop

Establishes a means of minimizing the risk of loss of life and reducing property damage

Emergency Action Plans

EAPS required for:

- High Hazard Dams
- Non-exempt Significant Hazard Dams

EAPS recommended for:

- Exempt Significant Hazard Dams

Emergency Action Plans

EAP requirements

- Review and update annually

- Conduct a tabletop exercise every 5 years

Emergency Action Plan Stats

EAPs for High/Significant Dams

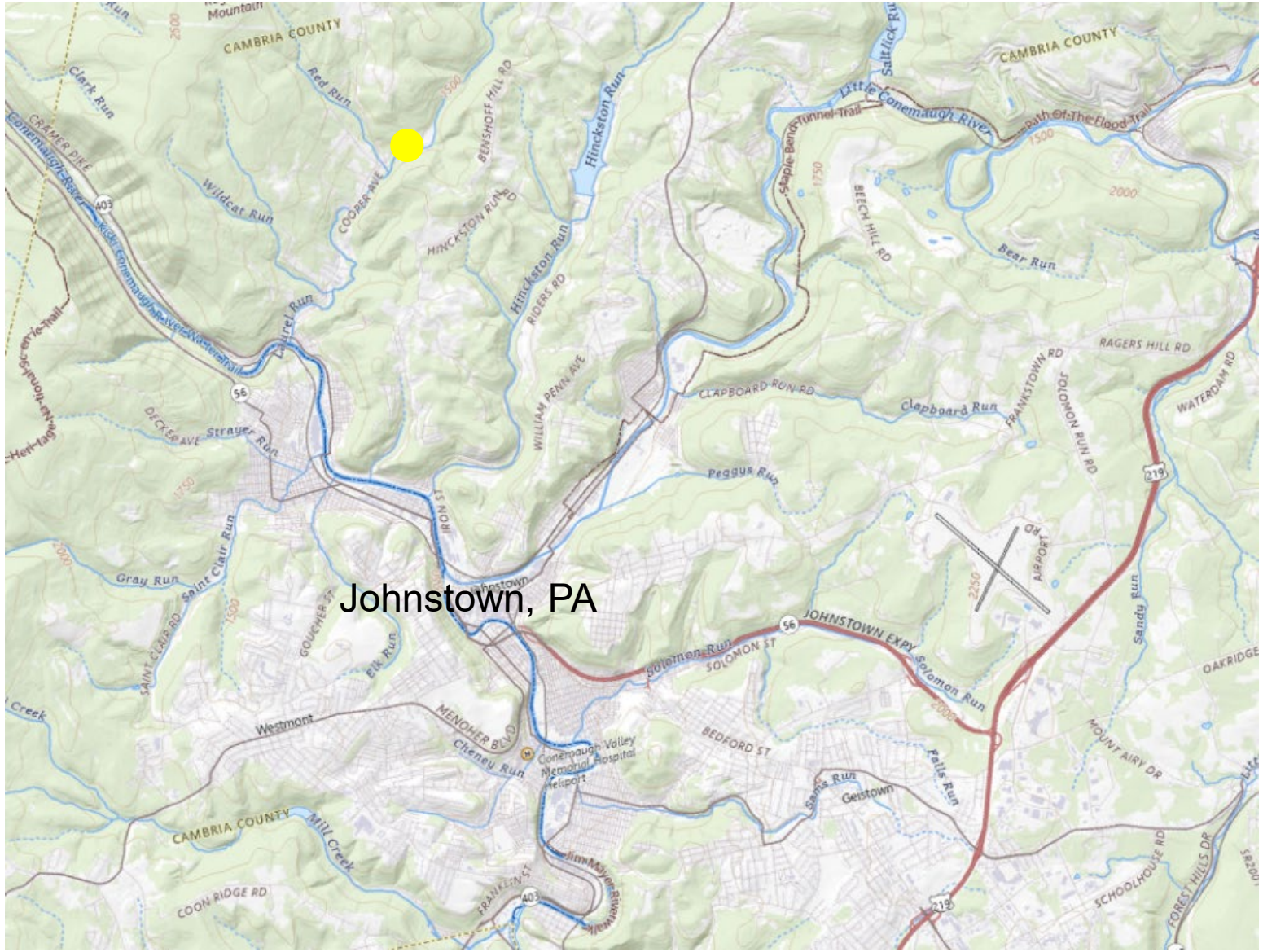
- EAP on Record: 566
- Draft EAP on Record: 896
- EAP Not on Record: 402

Tabletops

- Completed in last 5 years: 304

Dam Failure – Laurel Run Dam (PA, 1977)

Location of Laurel Run Dam in Pennsylvania

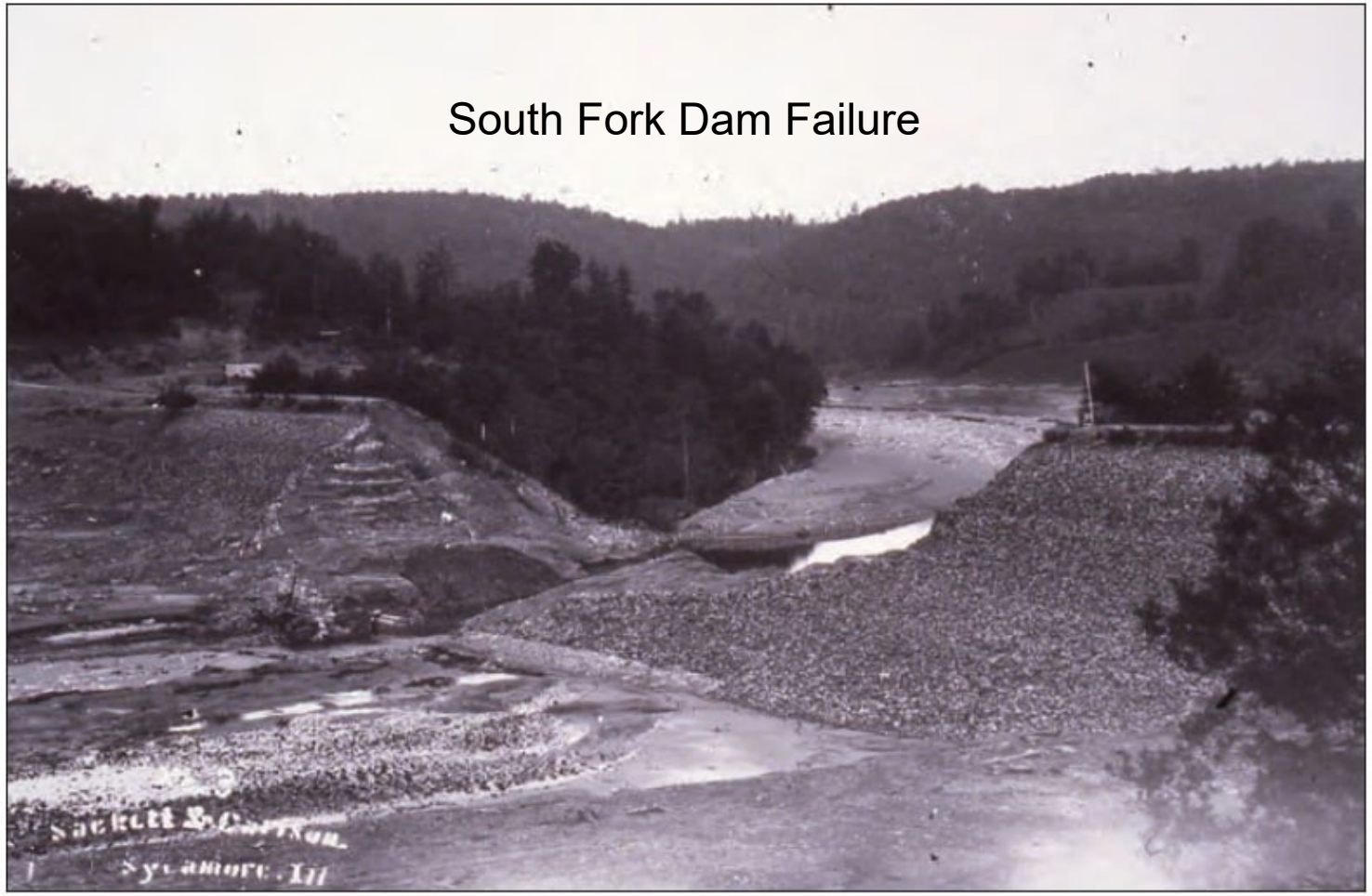


Dam Failure – Laurel Run Dam (PA, 1977)

Dam Failure – Laurel Run Dam (PA, 1977)

Johnstown, PA

- South Fork Dam failed in 1889
  - 2,208 people lost their life
  - No significant flood measures were undertaken
- ASDSO Webinar May 13, 2025



May 13

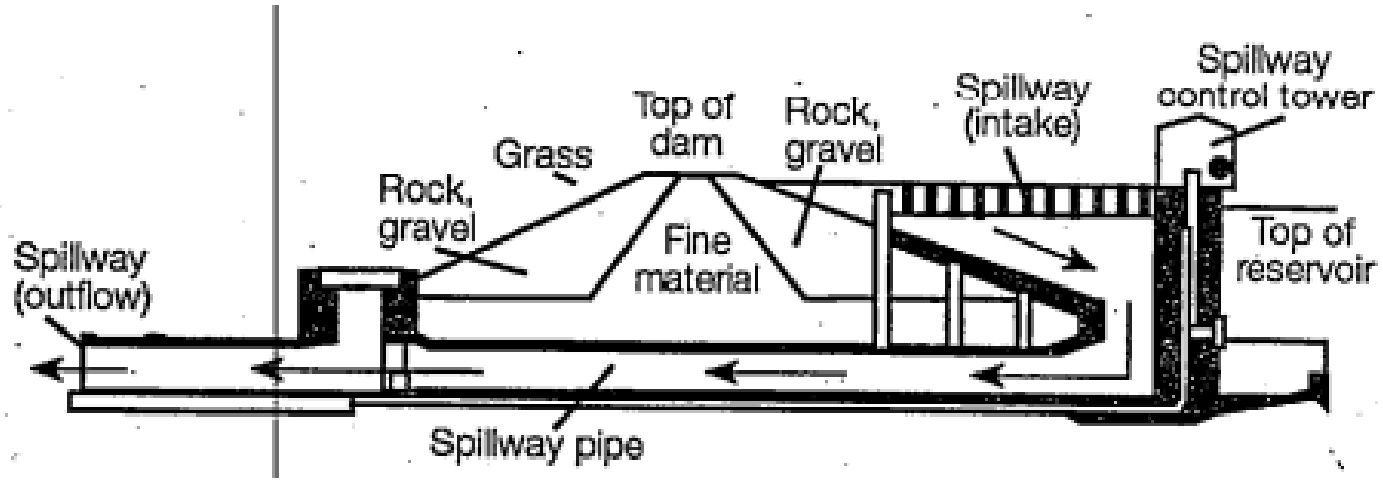
The South Fork Dam Breach and Johnstown Flood of 1889: A Civil and Dam Engineering History of the USA's Deadliest Dam Failure

Dam Failure – Laurel Run Dam (PA, 1977)

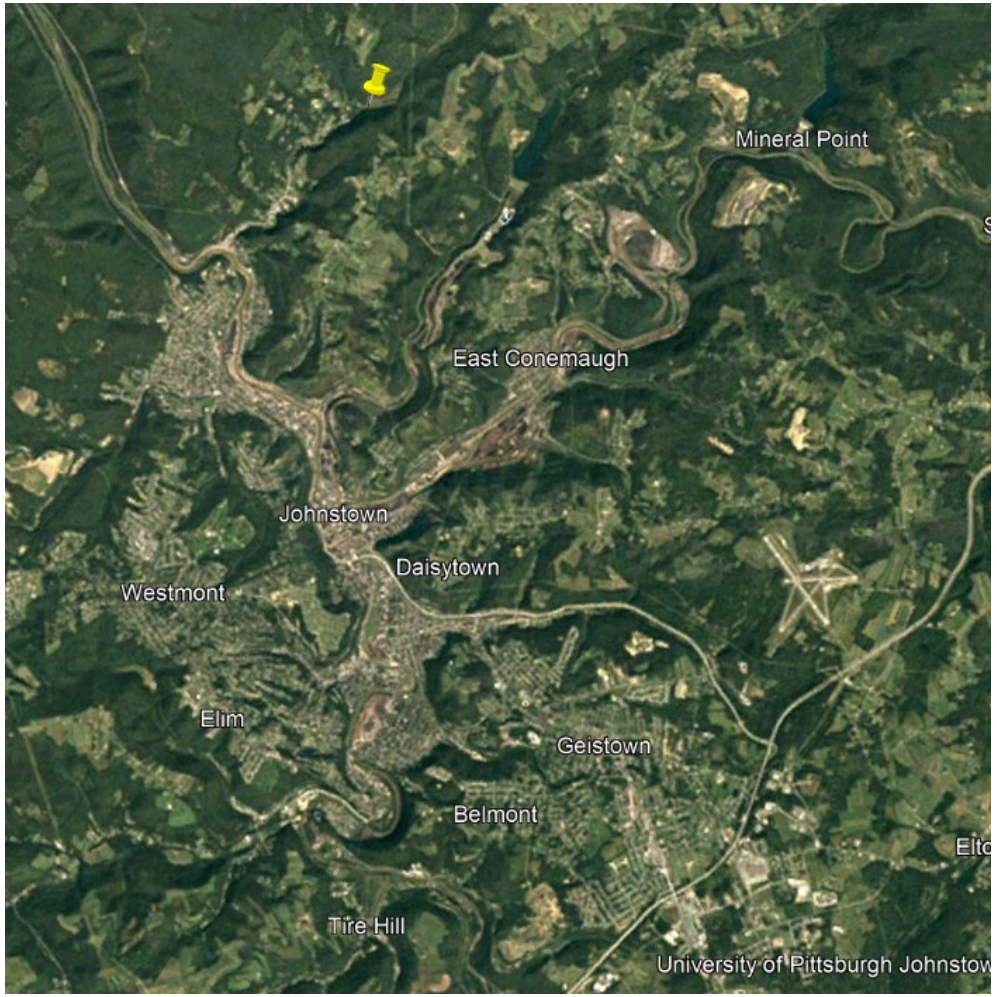
- Johnstown, PA
  - 1936 - heavy snow run-off and 3 days of rainfall caused flooding
  - US Army Corps of Engineers undertook a study to remove threat of serious flooding
  - 1938 – began constructing flood control measures
  - 1943 – Johnstown Channel Improvement Project complete

Dam Failure – Laurel Run Dam (PA, 1977)

- Dam was constructed between 1915 and 1918
- Earthfill Dam
- Masonry Spillway



Dam Failure – Laurel Run Dam (PA, 1977)



- Provided drinking water and industrial water
- Height = 42 feet
- Length = 620 feet
- Storage = 309 acre-feet

Dam Failure – Laurel Run Dam (PA, 1977)


Dam warning sounded long ago

- 1943 – spillway was determined to be inadequate to handle large storm events
- 1959 – dam assessment noted the spillway was less than half the required size
- 1970 – classified as a high hazard dam

Dam Failure – Laurel Run Dam (PA, 1977)

July 19, 1977

11.8 inches of rain in 8 hours

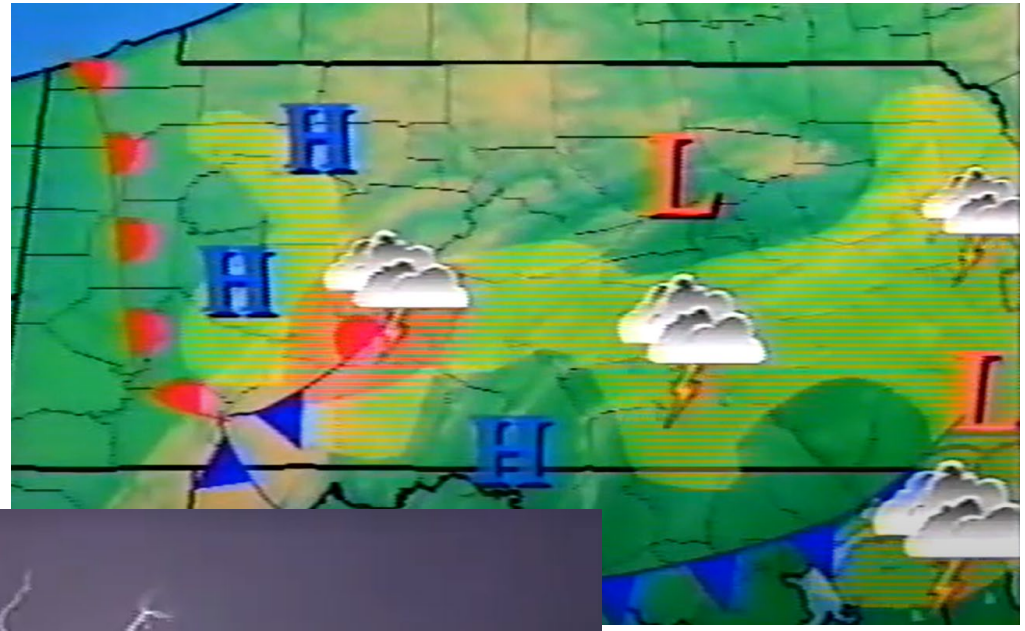
July 20, 1977

1:00 am

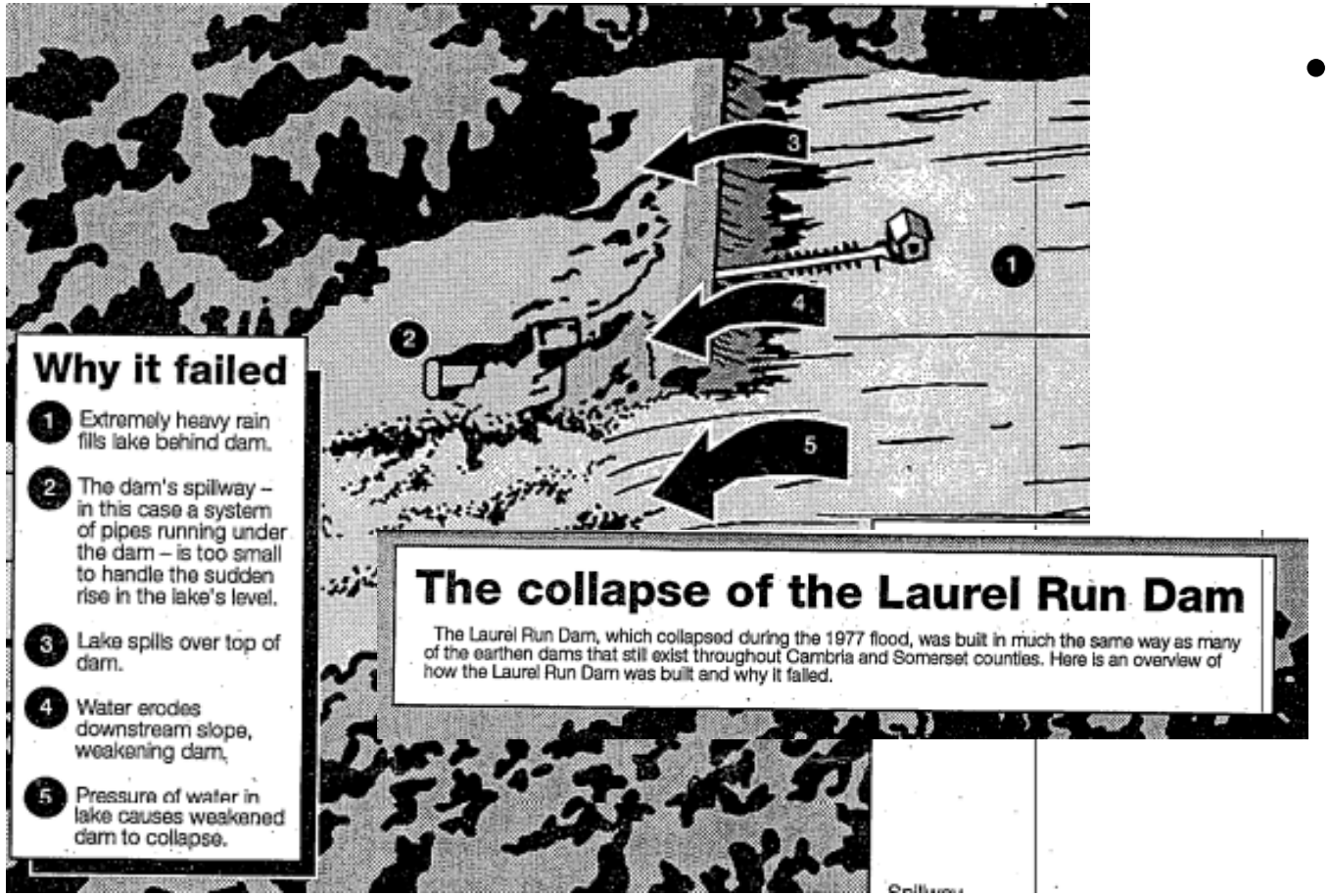
flooding resulted in loss of communication

1:30 am

Water reached the top of the dam and began overtopping



Dam Failure – Laurel Run Dam (PA, 1977)

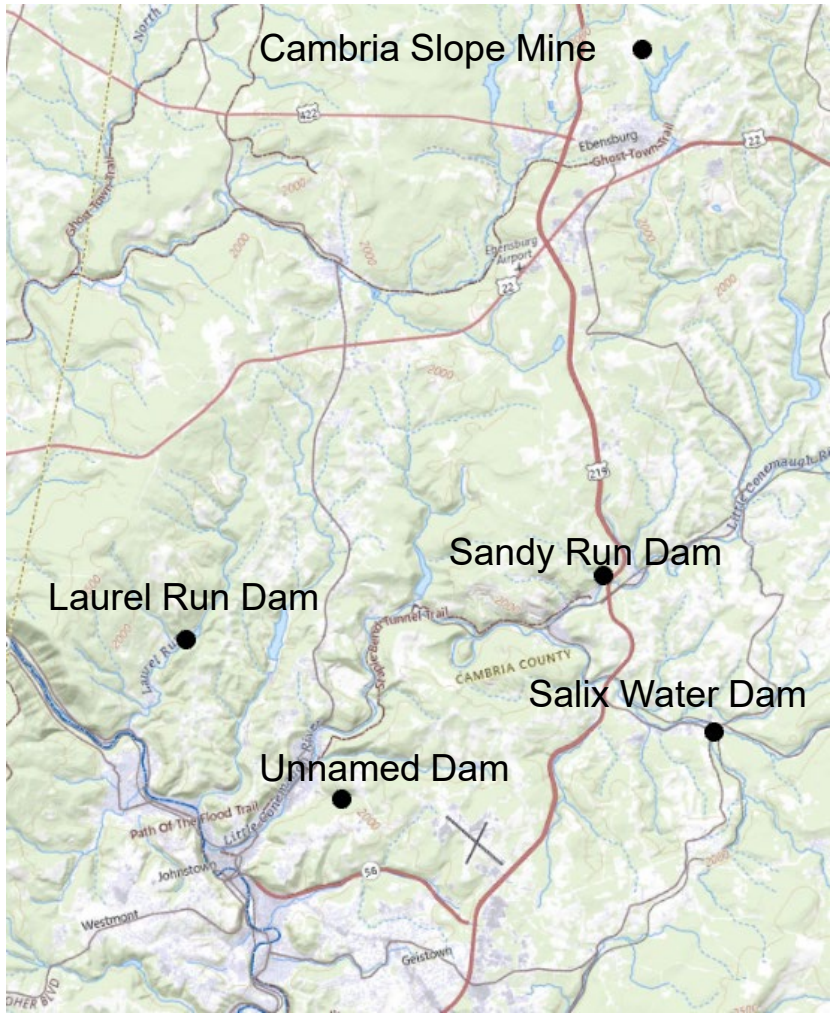


- July 20, 1977, 2:15 am
  - Overtopping scoured the downstream slope
  - Dam breached

Dam Failure – Laurel Run Dam (PA, 1977)

A wall of water reaching heights of 20 feet and speeds of 12 mph ripped down the narrow valley, crushing the community of Tanneryville, West Taylor Town-

Dam Failure – Laurel Run Dam (PA, 1977)

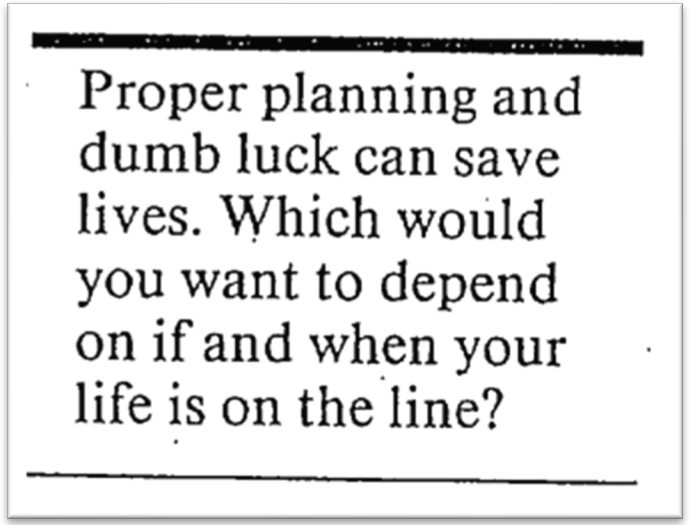


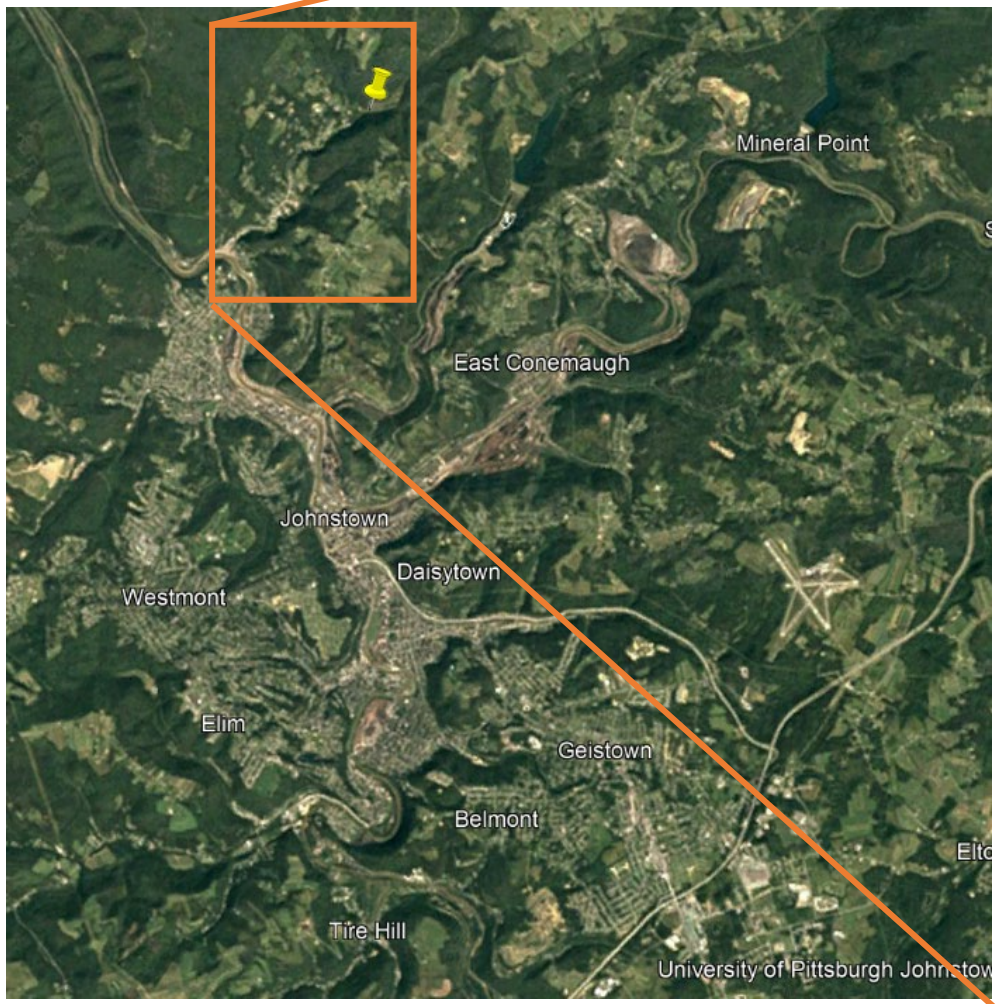
- Due to the storms 6 dams failed
  - Laurel Run Dam, 309 ac-ft
  - Sandy Run Dam, 55 ac-ft
  - Cambria Slope Mine, 21 ac-ft
  - Salix Water Dam, 6 ac-ft
  - 2 unnamed Dams, < 1 ac-ft

Dam Failure – Laurel Run Dam (PA, 1977)

- No emergency action plan
- No one monitoring the Laurel Run dam during the storms
- No evacuation warnings issued
- Weather Service issued a generic flood warning at 2:40 am


Destruction came without warning


Proper planning and dumb luck can save lives. Which would you want to depend on if and when your life is on the line?



Flood Wave

The collapse of the Laurel Run Dam during the 1977 flood killed 39 people in Tanneryville – almost half the total number of people who died in the flood. All but one of them died in or near their homes; one died in a car.

The Laurel Run Reservoir normally held about 101 million gallons of water. When it collapsed, it contained 146 million gallons of water.

Dam Tender's home

Laurel Run

1 person killed at 1 home

2 people killed at 1 home

3 people killed at 1 home

3 people killed at 1 home

1 person killed at 1 home

Cooper Ave

2 people killed at 1 home

The leading edge of the flood wave took nine minutes, 26 seconds to reach the Conemaugh River. The floodwaters reached their peak within the next three minutes, 28 seconds.

Wildcat Road

1 person killed in a car

4 people killed at 1 home

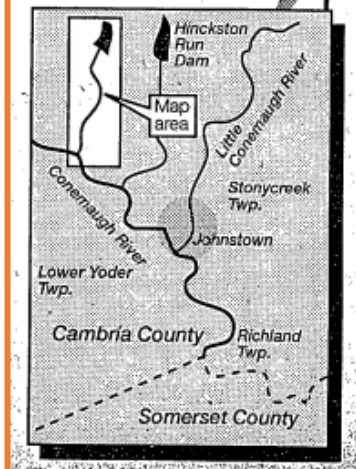
22 people killed at 9 homes

Coopersdale

Conemaugh River

To Johnstown

Cramer Pike



Long, stormy night

After the Laurel Run Dam burst at 2:15 a.m. on July 20, it took just over nine minutes for the leading edge of the flood wave to thunder through Tanneryville and reach the Conemaugh River. Within the next four minutes, the worst of the flood had passed. Here is a time-line of events leading up to the collapse of the dam:

9 p.m. – 1 a.m. : The level of the Laurel Run Reservoir rose at the rate of 1.4 feet per hour.

1:20 a.m. : The reservoir level reaches the crest of the dam and begins overtopping.

1:45 – 1:50 a.m. : The reservoir reaches its maximum level; a section of the left side of the dam begins to weaken and form a breach.

2:15 – 2:25 a. m. : By this time, the breach has formed a trapezoid-shaped hole more than 40 feet deep, 15 feet wide at the bottom and 225 feet wide at the top.

Dam Failure – Laurel Run Dam (PA, 1977)

- Johnstown was flooded, 85 total deaths
- 2,696 injured
- $250 million in damages
- 50,000 people displaced
- 600 homes destroyed
- 5,256 homes severely damaged
- 405 businesses destroyed or severely damaged

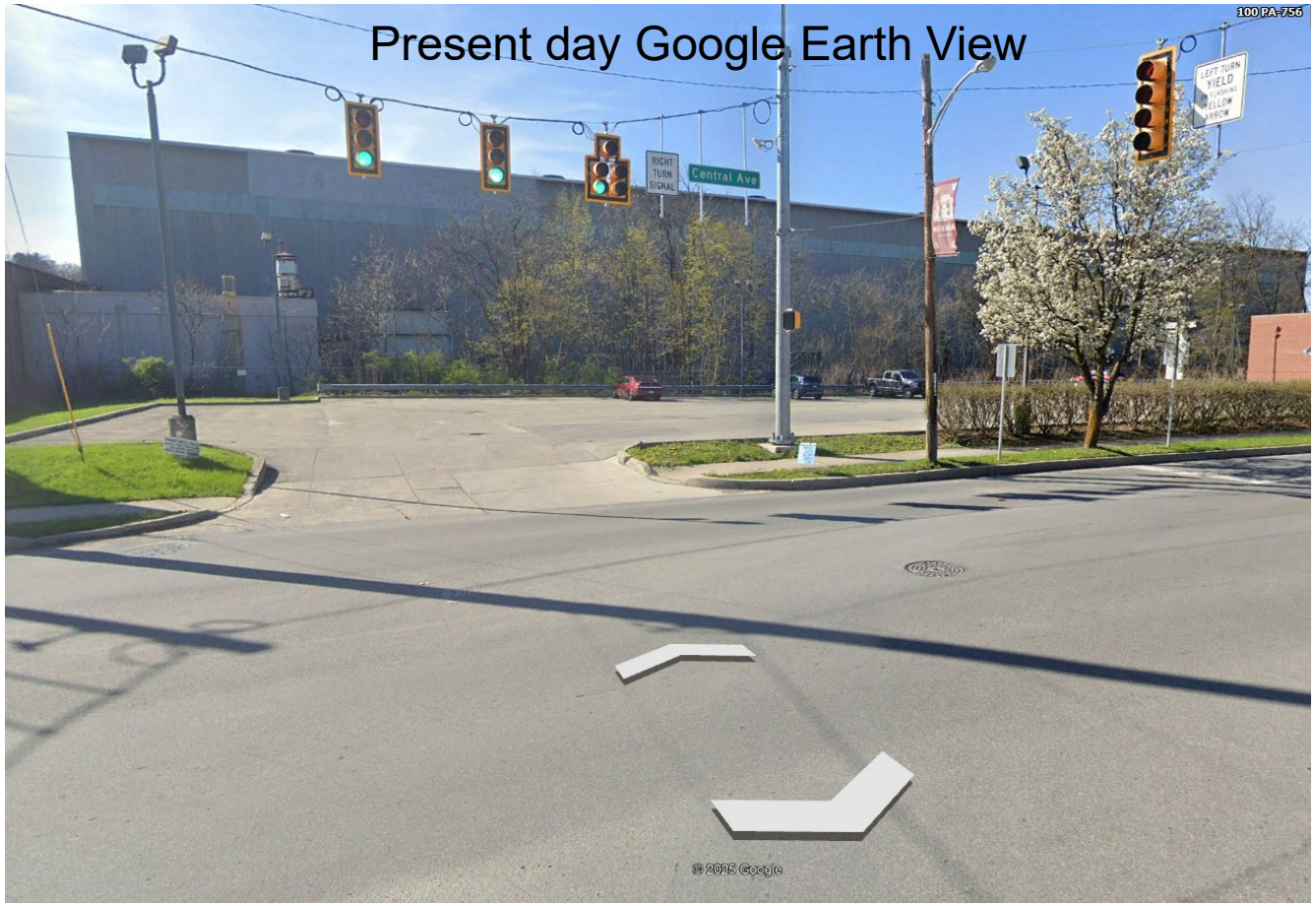
Dam Failure – Laurel Run Dam (PA, 1977)

- National Guard/State Police – assigned to assist with local police for looting
- Federal Disaster Assistance Administration provided communications
- US Army Corps of Engineers helped clear debris/damages

Johnstown's City Hall. The three sets of double markers bracketing the building's corner show the high water marks for the 1889, 1936 and 1977 floods (from top).

Dam Failure – Laurel Run Dam (PA, 1977)

Dam Failure – Laurel Run Dam (PA, 1977)



Dam Failure – Laurel Run Dam (PA, 1977)

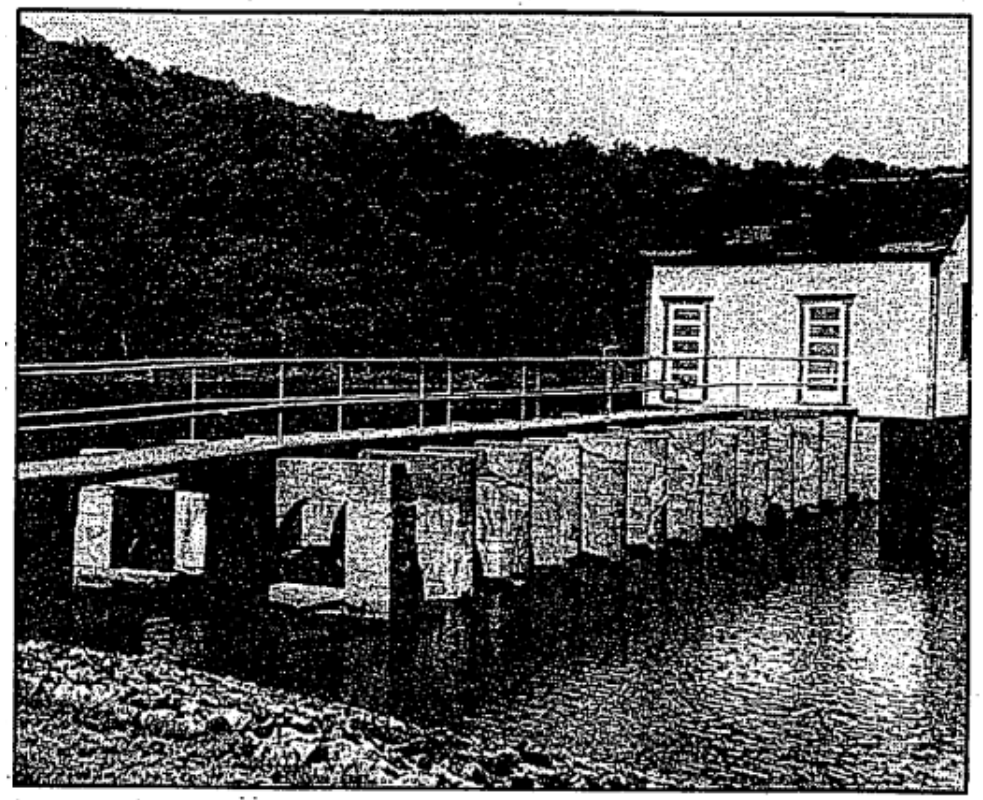
Dam Failure – Laurel Run Dam (PA 1977)

Dam Failure – Laurel Run Dam (PA, 1977)

"Laurel Run is well known to me. We investigated this dam in the '60s. Its deficiencies were recognized and reports prepared for modification, but for various reasons, over a period of one-and-a-half decades, remedial steps or new construction was not undertaken," Elio D'Appolonia wrote in 1977. "If the dam had been upgraded in accordance with today's prudent engineering practice, the dam would have been able to store and/or pass the storm."

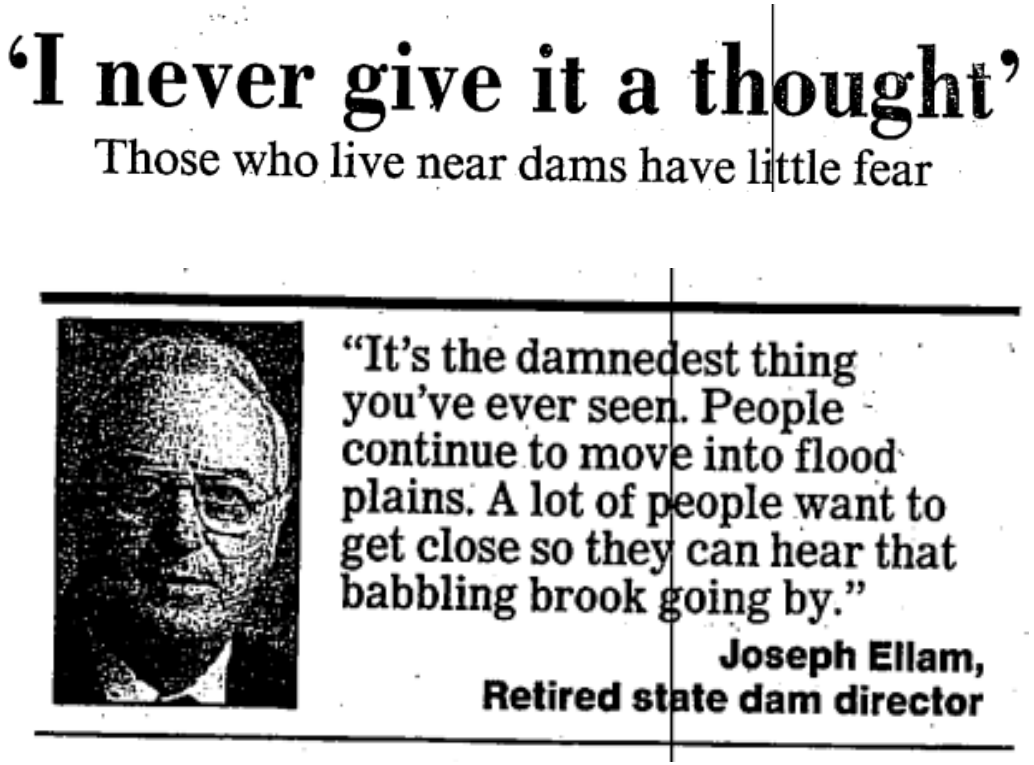
Dam Failure – Laurel Run Dam (PA, 1977)

- General Manager of Bethlehem Water System
  - Acknowledged he knew of the spillway deficiencies
  - Didn't discuss with the water authority because he didn't believe the problems were severe



Before the 1977 flood, the Laurel Run Dam's spillway fell behind state standards. Although the inadequacy was reported, it was never corrected.

Dam Failure – Laurel Run Dam (PA, 1977)



‘I never give it a thought’

Those who live near dams have little fear

“It’s the damnedest thing you’ve ever seen. People continue to move into flood plains. A lot of people want to get close so they can hear that babbling brook going by.”

Joseph Ellam, Retired state dam director

- Chairman of the Johnstown Water Authority
  - Testified he wasn’t sure of the dam’s construction, how much water it held, or what rate it could pass floodwaters
  - The dam’s risk to life never entered his mind.

Dam Failure – Laurel Run Dam (PA, 1977)

- Owner's Engineer
  - Pointed out spillway problems in the 1959 and 1963 studies
  - Stated they felt something should be done but also considered that the dams had been operating without issues
  - After the sale of the dam to Johnstown, they never recommended enlarging the spillway to the Water Authority


Dam warning sounded long ago

DANGER ZONE

Living in the shadow of hazardous dams

Forewarned, not forearmed

Nearly half of the 1977 flood deaths could have been prevented, reports show

Dam Failure – Laurel Run Dam (PA, 1977)

- Lawsuits by flood victims
- Settled out of court in 1989
  - $4 million settlement
- Dam was not rebuilt
- 2,300 steel jobs were cut in Johnstown after the floods

Dam Failure – Laurel Run Dam (PA, 1977)

- Details for the Laurel Run Dam Failure from:
  - ASDSO damfailures.org
    - https://damfailures.org/case-study/laurel-run-dam-pennsylvania-1977/
    - The Tribune-Democrat (March 19-21,1995)
      - https://damfailures.org/wp-content/uploads/2015/07/Laurel-Run-Dam-Report.pdf
  - Wikipedia
    - https://en.wikipedia.org/wiki/Laurel_Run_Dam
    - https://en.wikipedia.org/wiki/Johnstown_flood_of_1977
  - Flooding photos from Douglas Muenzer

DAM SAFETY PROGRAM
Texas Commission on Environmental Quality

Questions?

Trina Lancaster, PE
trina.lancaster@tceq.texas.gov
512-239-4283