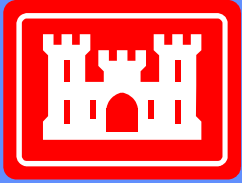


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# *Dam Safety Seismic Issues*

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*10 November 2003*



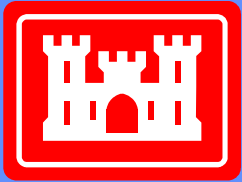
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# Our History

## Corps of Engineers

- **Founded in 1775**
- **Civil Works Mission**  
**Established in 1800**
- **First Dam Built in 1824**
- **Newest Dam Completed**  
**in May 1999**



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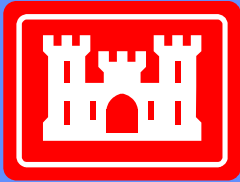
# Our Mission

**To provide quality, responsive engineering services to the nation including:**

**Planning, designing, building and operating water resources and other civil works projects (Navigation, Flood Control, Environmental Protection, Disaster Response, etc.)**

**Designing and managing the construction of military facilities for the Army and Air Force. (Military Construction)**

**Providing design and construction management support for other Defense and federal agencies. (Support for Others)**



# Civil Works Program Activities

800 Coastal Navigation Projects



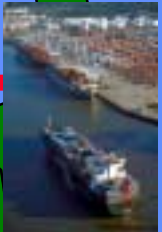
24 Million Acres Public Lands



450 Major Lakes & Reservoirs  
385 M Visitors/yr

12,000 miles Inland Waterways

299 Deep Draft Harbors



400 miles Coastal Structures

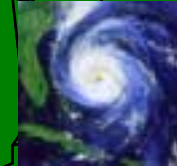


4300 Recreation Areas



275 Locks

8500 Miles of Levees



Emergency Operations

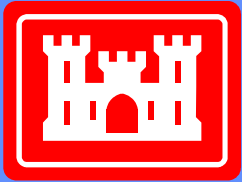
\$500M Annual Dredging Costs



Environmental Stewardship



- US Ports & Waterways convey > 2B Tons Commerce
- Foreign Trade alone Creates > \$160B Tax Revenues
- Cumulative Flood Damage Prevention > \$290B

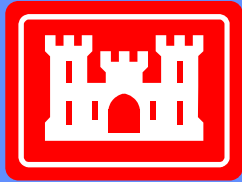


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# USACE Dam Safety Responsibilities

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- **Planner**
- **Designer**
- **Construction Manager**
- **Owner**
- **Operator**
- **Self Regulating**

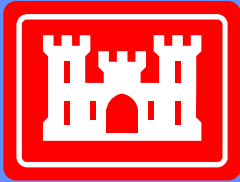


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# USACE Dam Safety Organization

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- **Three Levels of Command**
  - Headquarters
  - Divisions (8)
  - Districts (41)
- **Dam Safety Program Management Team**
- **Dam Safety Organization**
  - Dam Safety Officer
  - Dam Safety Program Manager
  - Dam Safety Committee



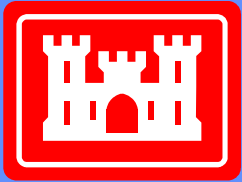
# Our Civil Works Dams

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- **Corps owns 609 dams, Nationwide and in P.R.**
  - embankment = 86 %
  - concrete = 7 %
  - combination = 7 %
- **Project purposes include:** flood control, navigation, hydropower, water supply, F&W conservation, recreation
- **Median height:** 93 feet
- **Mean height:** 112 feet
- **Average age:** 46 years
- **High Hazard dams:** 77 %
- **Total storage capacity:** 331 Million Ac-ft



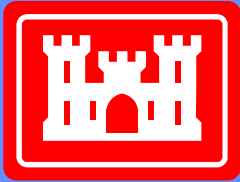


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# Seismic Issues

- **Dams Located in all Seismic Zones**
- **Various Earthquake Types**
- **Areas of Concern**
  - Embankment Subsidence
  - Conduit Rupture
  - Structure Failure



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# Seismic Safety Evaluation Process

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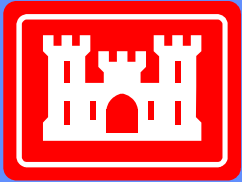
## Published Process

**ER 1110-2-1155** – Dam Safety Assurance Program.

**ER 1110-2-1806** – Earthquake Design and Evaluation for Civil Works Projects.

## Publications Available on Internet –

<http://www.usace.army.mil/inet/usace-docs/>

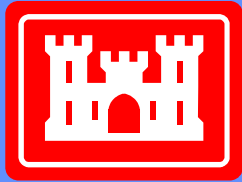


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# Seismic Safety Evaluation Process

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- **Seismic Safety Review**
  - Policy Compliance and Criteria Review
- **Phase I Special Study**
  - Policy Compliance and Criteria Review
- **Phase II Special Study**
  - Policy Compliance and Criteria Review
- **Dam Safety Assurance Program  
Evaluation Report**
- **Phase III Detail Design**
- **Project Modification**



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# Dam Safety during Construction

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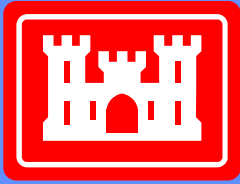
## Construction Phase --

### Quality Assurance --

- 1) Construction field offices report unforeseen conditions to Engineering and Design.
- 2) Insure construction meets plans and specifications standards.

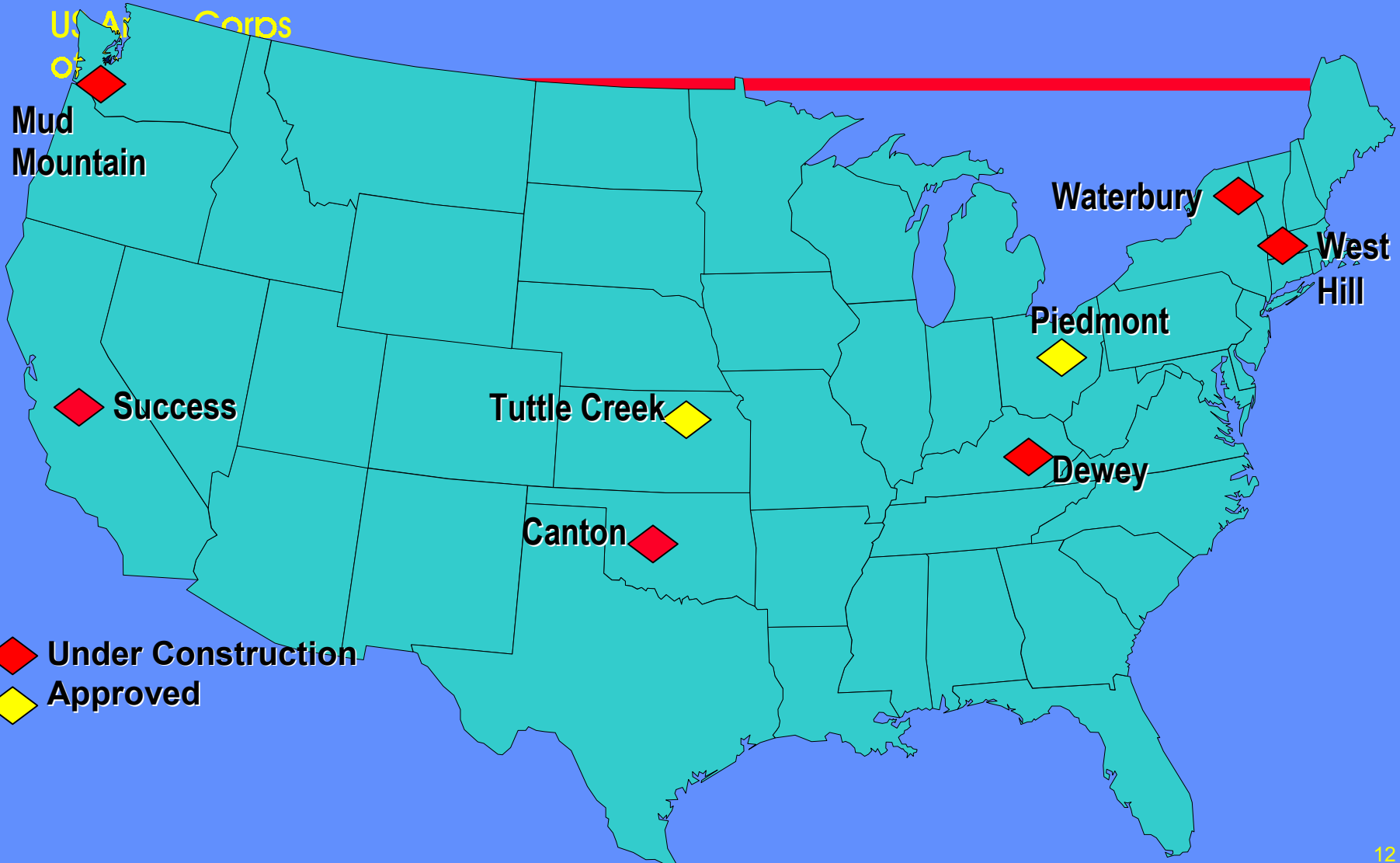
### Operations During Construction --

Cofferdams and completed portions of dams are operated in accordance with dam safety standards.

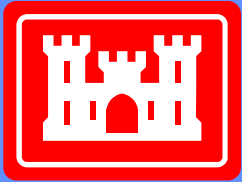


# Dam Safety Modifications Approved or Under Construction

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- Under Construction
- Approved



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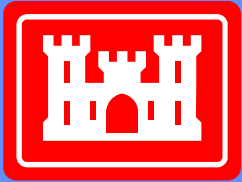
# Dams Remaining on the Seismic Evaluation List

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## ● Division Areas --

- Great Lakes & Ohio River – 0
- Mississippi Valley – 3
- North Atlantic – 1
- Northwestern – 19
- Pacific Ocean – 0
- South Atlantic – 1
- South Pacific – 22
- Southwestern – 1

## ● Studies are awaiting Funding



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# Dam Safety during Operations and Maintenance

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## Inspections --

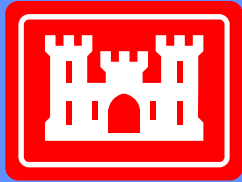
**Daily -- During ordinary operations for unusual changes.**

**Seasonal -- In preparation for raising pool levels.**

**High Water -- In accordance with O&M Manual.**

**Periodic -- 5 year detailed Engineering Inspection. Guided by Operations and Maintenance Manual.**

**Special -- After major events.**



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# Our Third Century



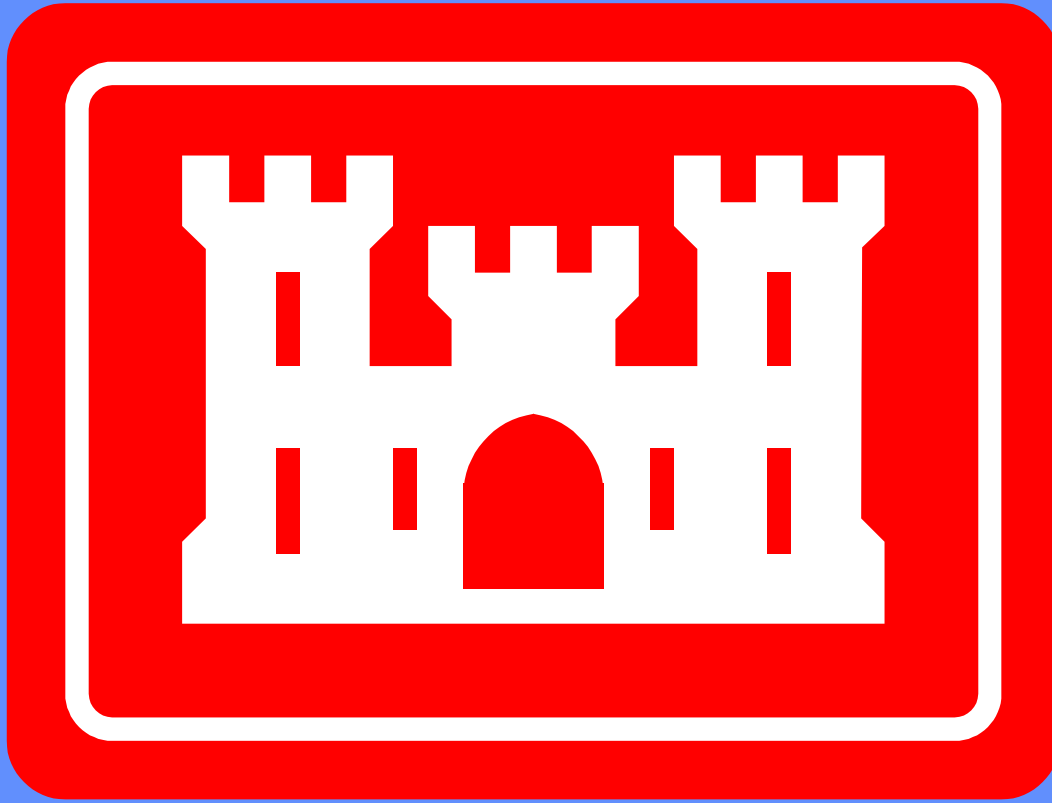
## ● Challenges:

- Aging infrastructure
- Shrinking budgets
- Changing technical criteria



## ● Opportunities:

- Historically strong program and commitment
- Top-notch people and capabilities
- New technologies (strong R&D program)
- Risk-based methodologies



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