Lewisville Dam

Draft Dam Safety Modification Environmental Assessment Public Review

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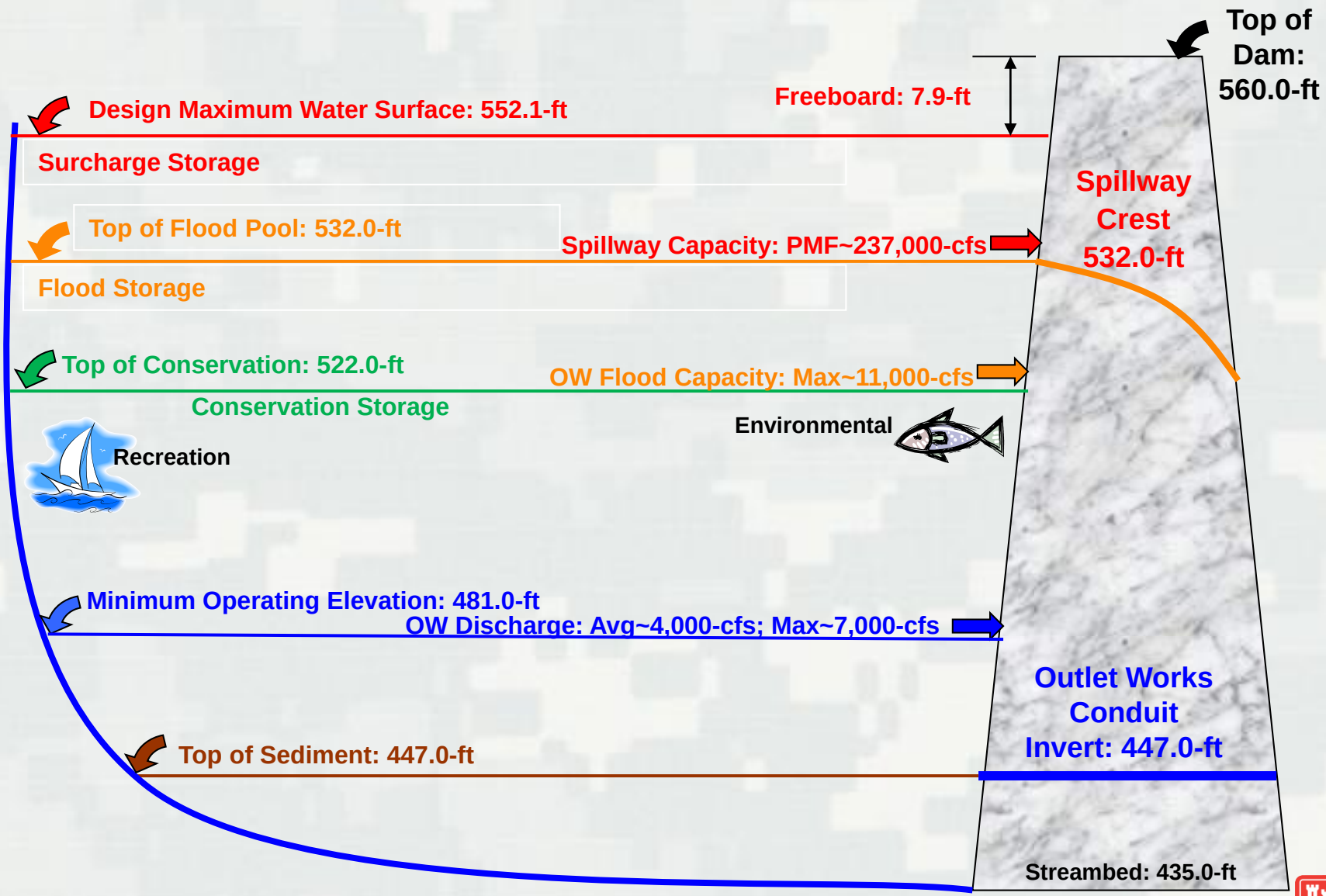
Presentation Overview

- General Project Information
- Study Framework
- Screening of Measures & Alternatives
- Recommended Plan
- Path Forward
- Contacts and Information

Lewisville Dam

General Project Information



What Changed?

- Then
  - Prior to 2009, USACE evaluated risk based on probability (likelihood) only
  - Operation, Maintenance, Repair, Rehabilitation, and Replacement program and funding used to keep dam functioning as designed
- Now
  - Since 2009, USACE evaluates risk as a function of probability (likelihood) and consequences
    - High consequences mean high risk, even if the probability is low or remote
  - Dam Safety Modification – construction dollars used to invest in recapitalization of aging infrastructure
  - Operation, Maintenance, Repair, Rehabilitation, and Replacement program and funding used to keep dam functioning as designed AND re-evaluate consequences associated with infrastructure on a ten year cycle; re-evaluation of probability continues to be ongoing

Potential Failure Modes

Risk Driving PFMs

• Internal erosion of soil foundation (seepage that progresses to piping and loss of embankment materials) – very high incremental life loss with likelihood of failure moderate to low

• Instability, uplift and sliding – high incremental life loss with likelihood of failure high to moderate at the Probable Maximum Flood elevation

Other PFMs Being Considered

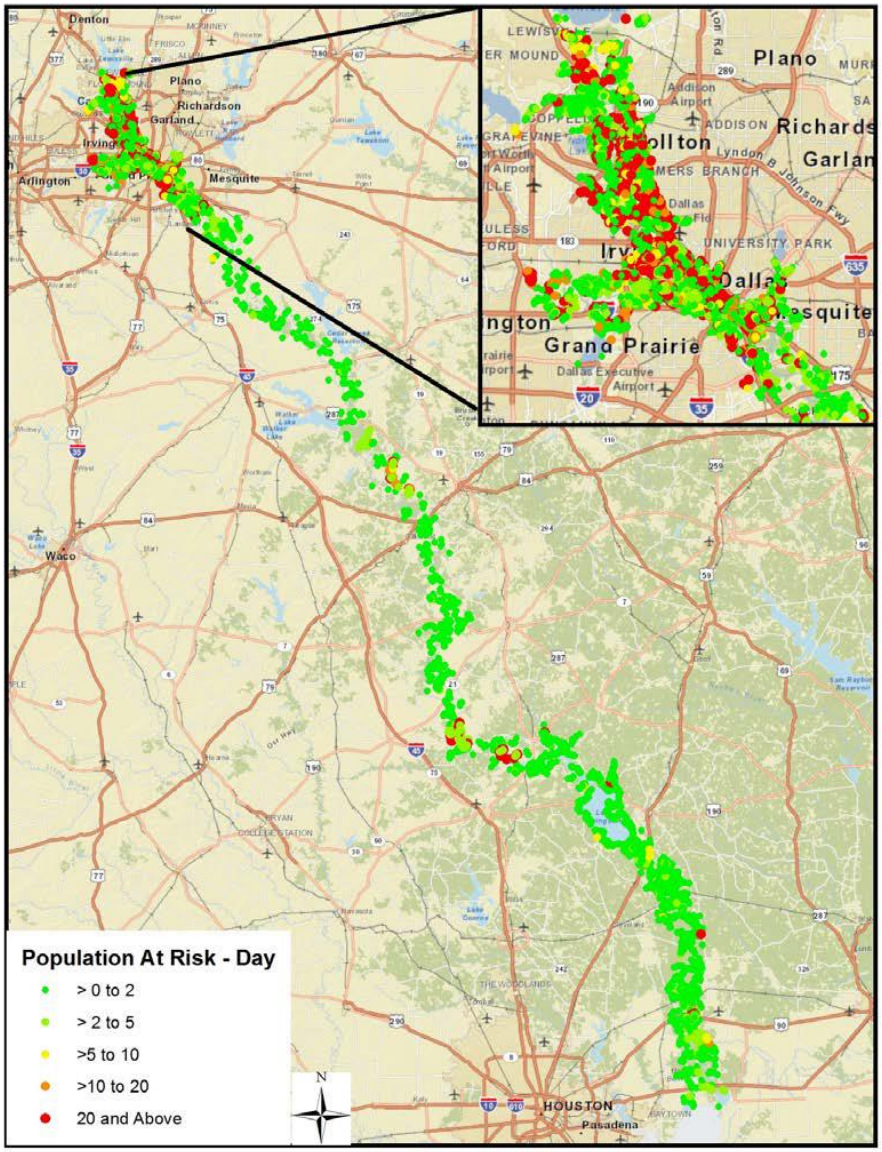
• Internal erosion of embankment along the main water conduit (very high risk of incremental life loss with likelihood of failure low to remote)

• Failure of municipal water lines along the embankment toe, resulting in erosion of toe (very high risk of incremental life loss with likelihood of failure low to remote)

•Municipal water line relocation will occur regardless of the alternative chosen.

• Local Instability of Embankment Leading to Loss of Crest (high risk of incremental life loss with likelihood of failure remote)

Study Framework

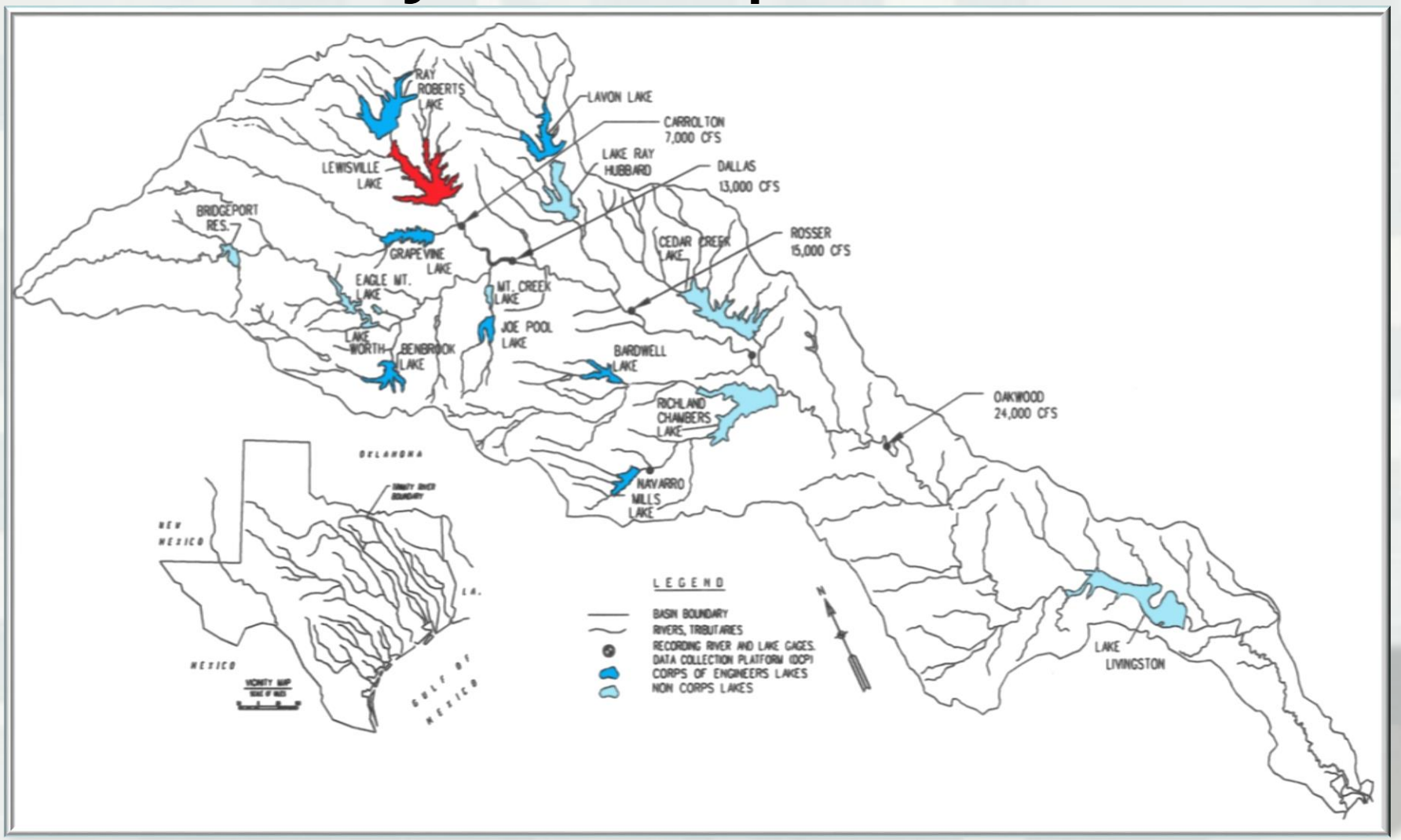


- Modeled Area
  - Hydrology
  - Hydraulics
  - Economic Damages
  - Life Loss
- Denton & Dallas Counties
  - 96% of economic damages
  - 98% of life loss
  - Focus for stakeholder coordination

Study Framework

- Problems
  - Geologic Conditions (Seepage, Instability), Consequences
- Opportunities
  - Reduce Probability/Consequences
  - Knowledge Growth Since Design and Construction
  - Includes non-risk driving PFMs for ALARP
- Objectives
  - Reduce PFM Probabilities
  - Reduce Potential Consequences
- Constraints
  - Water Supply Storage Agreements
  - Applicable Laws and Policies
- Issues/Risks
  - Reservoir System Operations and System Flood Fighting

System Operation



Formulation

- Potential Measures (started with over 30) and Alternatives (started with 13)
  - ▶ Structural implemented by USACE
  - ▶ Non-structural
    - Implemented by USACE
    - Implemented by others

Screening

- Iterative Process
- Effectiveness – how much does it buy down the risk?
- Efficiency – is there something that buys down the risk just as much, but costs less?
- Completeness – Does it address all of the risk driving failure modes?
- Acceptable – Does it comply with Federal, State, and Local laws?
- Redundancy, Resiliency, and Robustness – Are there features of the measure/alternative that provide added protection or secondary effectiveness that can't be quantified?

Alternatives

- The following are required alternatives:
  - No Action
  - Meeting full tolerable risk guidelines
  - Achieving only tolerable risk limit for life-safety
  - Remove structure
  - Replace structure
- 8 Alternatives identified for further development and consideration
- ALARP – As Low As Reasonably Practicable – what makes sense to add for non-risk driving PFMs

Alternatives

PFM	MEASURE	ALTERNATIVE							
		1	2	3	4	5	6	7	8
4A	Upstream Cutoff Wall	X	X						
	Downstream Inverted Filter Berm with Collection Trench			X	X	X	X	X	X
4B	Upstream Cutoff Wall	X							
	Downstream Inverted Filter Berm					X	X		
	Collection Trench		X	X	X				
	Relief Wells							X	X
6	Post-Tensioned Anchors with Upstream Geomembrane Cutoff				X		X		
	Buttress with Piers and Upstream Geomembrane Cutoff	X	X	X		X		X	X
7	Remove and Replace Apron Slabs	X	X	X		X			
	Overlay Apron Slabs				X		X	X	
	Minimal apron repairs with lateral drainage								X
2	Conduit Filter	O	O	O	O	O	O	O	O
8	Stability Berm with Crest Replacement	O	O	O	O	O	O	O	O

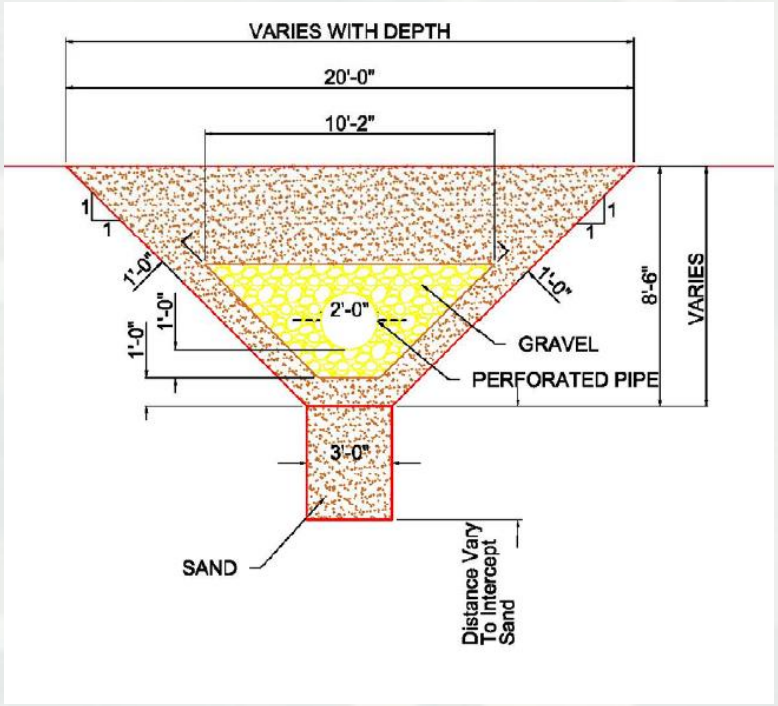
Alternatives

PFM	MEASURE	ALTERNATIVE							
		1	2	3	4	5	6	7	8
4A	Upstream Cutoff Wall	X	X						
	Downstream Inverted Filter Berm with Collection Trench			X	X	X	X	X	X
4B	Upstream Cutoff Wall	X							
	Downstream Inverted Filter Berm					X	X		
	Collection Trench		X	X	X				
	Relief Wells							X	X
6	Post-Tensioned Anchors with Upstream Geomembrane Cutoff				X		X		
	Buttress with Piers and Upstream Geomembrane Cutoff	X	X	X		X		X	X
7	Remove and Replace Apron Slabs	X	X	X		X			
	Overlay Apron Slabs				X		X	X	
	Minimal apron repairs with lateral drainage								X
2	Conduit Filter	O	O	O	O	O	O	O	O
8	Stability Berm with Crest Replacement	O	O	O	O	O	O	O	O

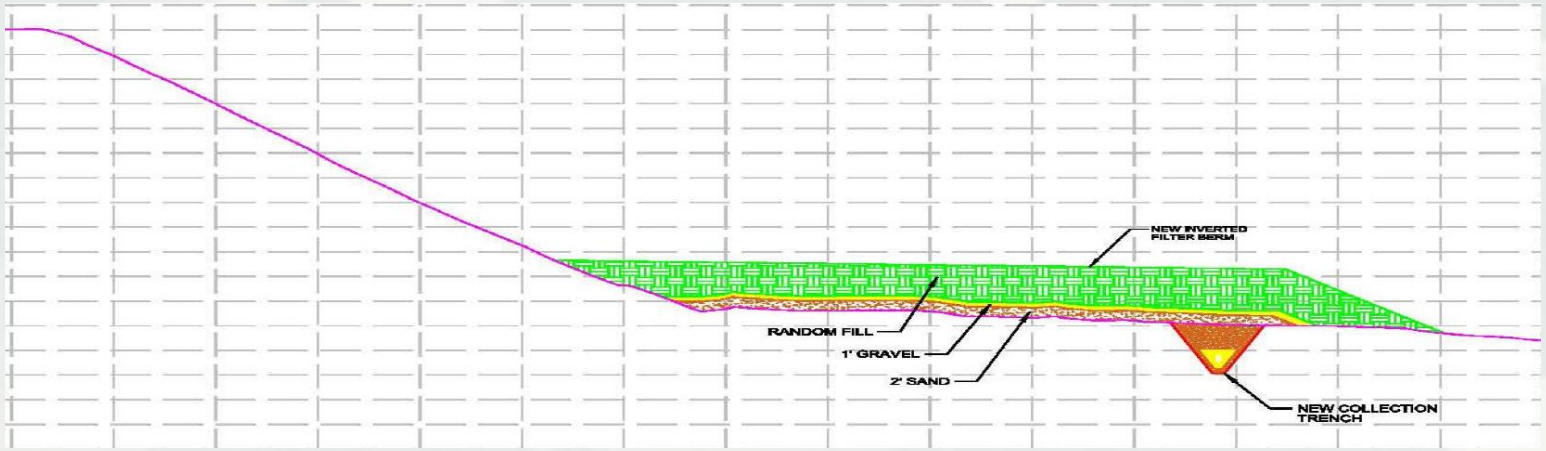
Proposed Modifications

PFM	MEASURE	ALTERNATIVE							
					4				
4A									
	Downstream Inverted Filter Berm with Collection Trench				X				
4B									
	Downstream Inverted Filter Berm				X				
	Collection Trench				X				
6	Post-Tensioned Anchors with Upstream Geomembrane Cutoff				X				
7									
	Overlay Apron Slabs				X				
2	Conduit Filter				O				
8	Stability Berm with Crest Replacement				O				

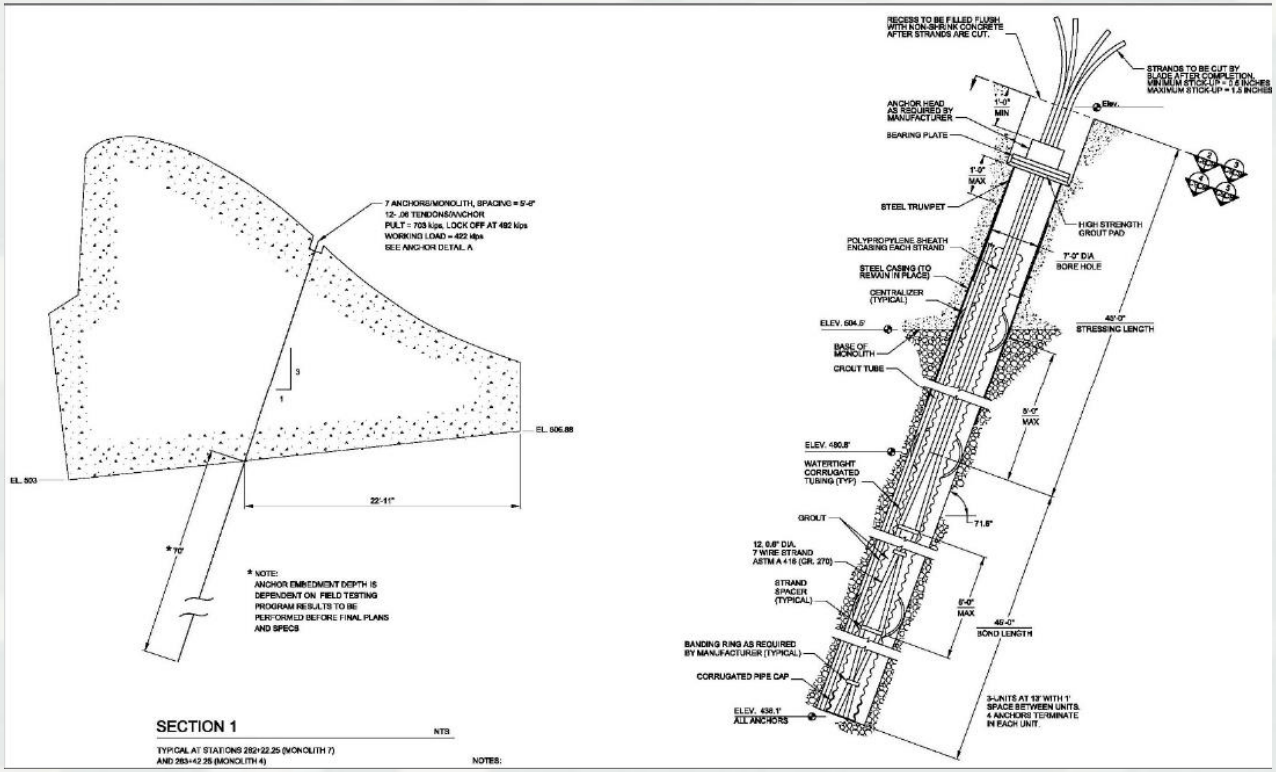
Inverted Filter Berm and Collection Trench



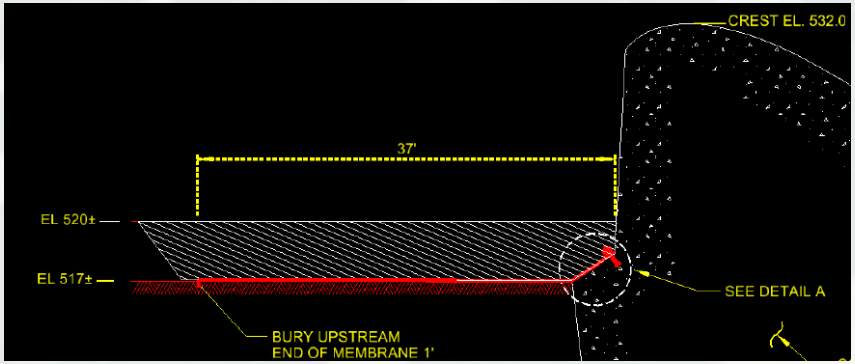
- Collection trench safely collects seepage at sources and allows for measurement and monitoring
- Berm resists uplift due to higher pressures predicted for extreme high pools
- Both provide filtration which reduces movement of embankment materials - i.e. seepage stays clear, not muddy



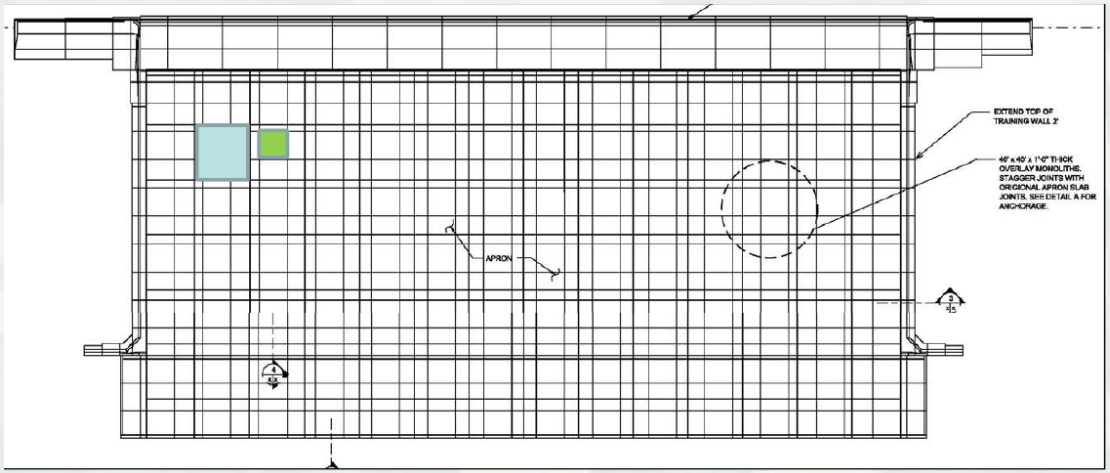
Spillway Anchors



- Anchors add stability and prevent sliding of weir monoliths during extreme high pools
- Geomembrane reduces excessive uplift pressures that may be associated with extreme high pools

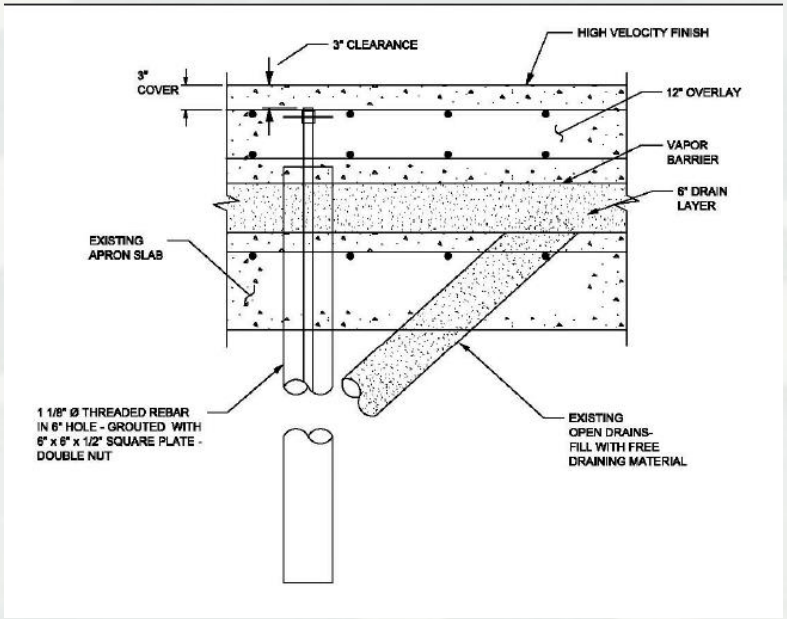


Apron Slab Overlay



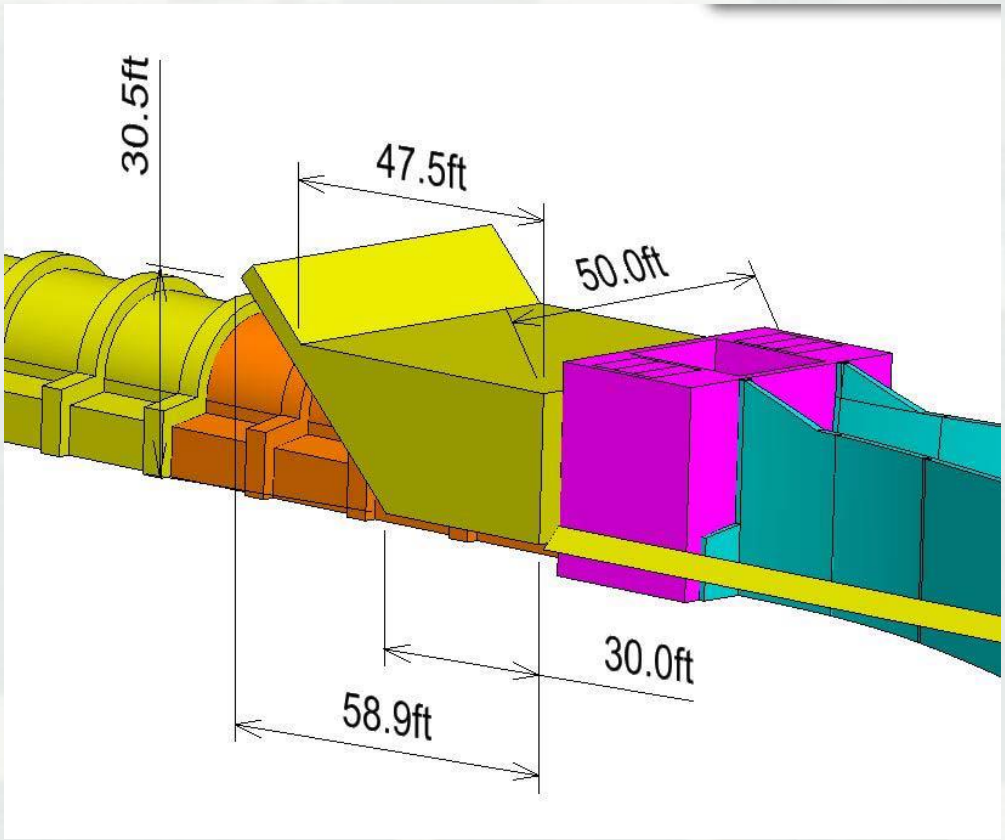
Plan View

Apron overlay slab Existing apron



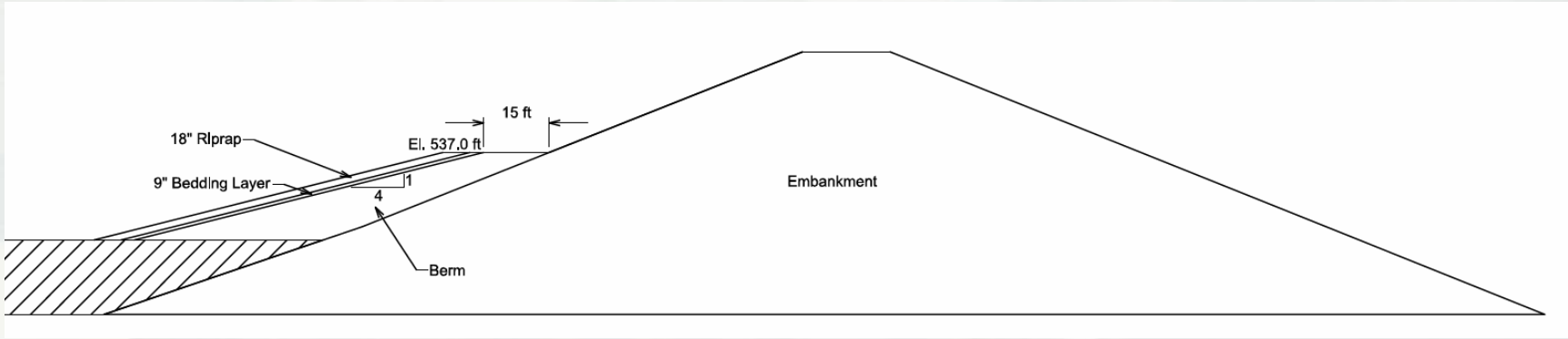
- Resistance to uplift
- Substantial Redundancy and Robustness

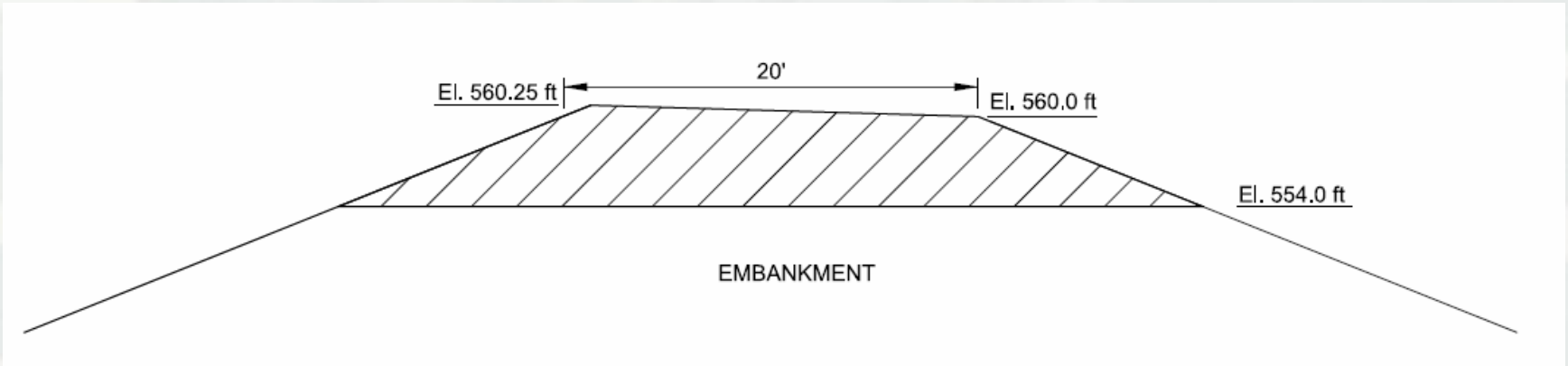
Conduit Filter



- Prevents migration of soil particles
- Provides a defense if seepage were to develop along the conduit

Stability Berm with Crest Replacement





- Increases slope stability
- Limits slides to being shallow and above pool of record
- Reduces desiccation cracking during droughts

Key Points of Interest

- Public Review open through 15 October
- The dam continues to perform as designed
- All planned construction activities and borrow areas are on lands already owned by USACE
- Currently no need to temporarily lower pool beyond top of conservation pool for construction
- Consequences will still be high even following the construction of the modifications; USACE will maintain a heightened state of awareness and communication with the Emergency Management Community
- FEMA Living with Dams: Know Your Risks https://www.fema.gov/media-library/assets/documents/28161
- FEMA provided flood preparedness information: https://www.fema.gov/media-library/assets/documents/90164
- Local Emergency Management web pages

Moving Forward

- Complete Required Study Phase Reviews (Nov 2016)
- Cost Certification (Feb 2017)
- Report/EA Approval (Summer 2017)
- Pre-construction Engineering and Design
  - Additional site investigations
  - Continue coordination with financially and operationally impacted stakeholders
  - Finalize designs of recommended measures
  - Conduct required reviews
    - Quality Control/Technical Reviews
    - Independent External Peer Review/Safety Assurance Reviews
    - State and Federal Agency Coordination and Reviews
- Estimated First Construction Contract Award (Summer 2018)
- Estimated Construction Completion (Fall/Winter 2024)

Thank you for coming!!!

EA Point of Contact

Marcia Hackett, U.S. Army Corps of Engineers,

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Fort Worth, Texas 76102-0300

or by email at

Marcia.R.Hackett@usace.army.mil

Contacts

- Comments or Questions on Draft Environmental Assessment

  Marcia Hackett, U.S. Army Corps of Engineers, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300 or by email at Marcia.R.Hackett@usace.army.mil

- Copies of Information Provided Today

  http://www.swf.usace.army.mil/About/Organization/PPMD/Peer-Review-Plans/

- FEMA Living with Dams: Know Your Risks
  https://www.fema.gov/media-library/assets/documents/28161

- FEMA flood preparedness information/tools:
  https://www.fema.gov/media-library/assets/documents/90164

- Any other matters

  Public Affairs, U.S. Army Corps of Engineers, Fort Worth District, CESWF-PAO, P.O. Box 17300, Fort Worth, TX 76102-0300, public.affairs@usace.army.mil