

Engineering and Operations Committee

Item # 6b

Subject: Colorado River Aqueduct Seismic Uplift Study

Purpose: To review the results of a recent assessment of the vulnerability of the Colorado River Aqueduct to a major seismic event on the San Andreas Fault System

This presentation will provide an overview of a recent seismic vulnerability study that assessed the impact of a major rupture of the Southern San Andreas Fault system on water deliveries from the Colorado River Aqueduct.



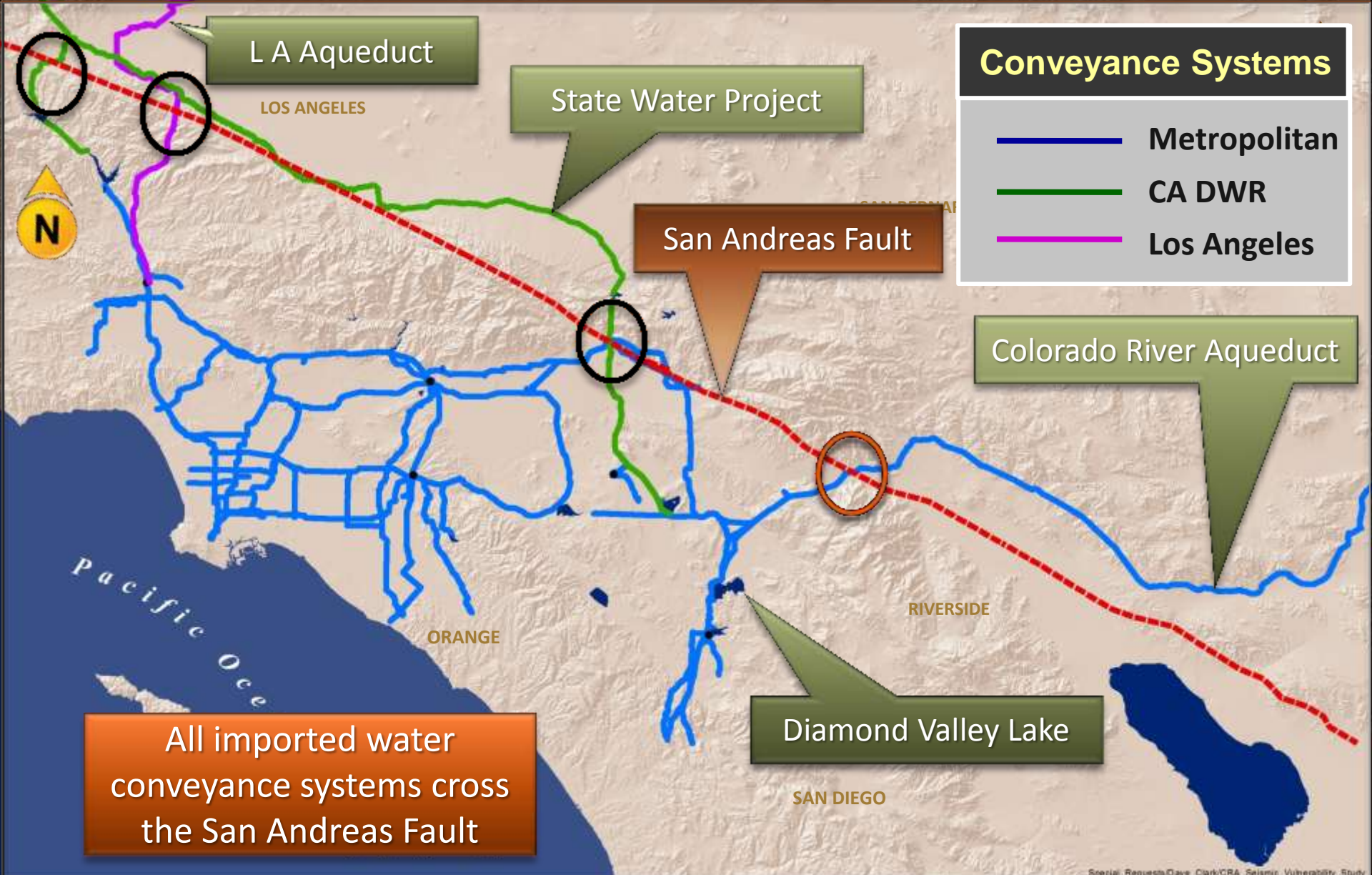
Colorado River Aqueduct Seismic Uplift Study

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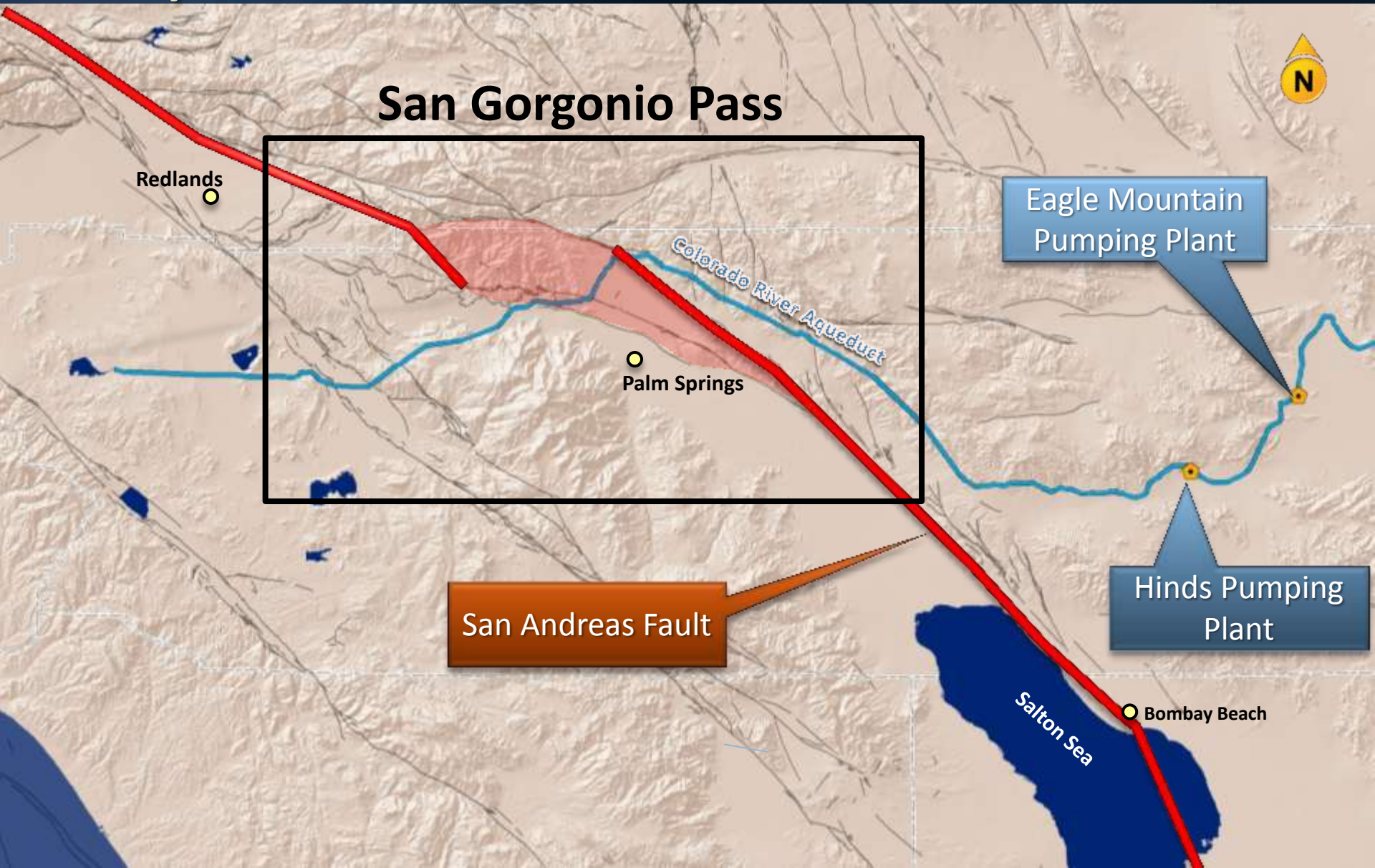
October 13, 2014

Seismic Risks



CRA Seismic Uplift Study

Study Area



CRA Seismic Uplift Study

M7.8 Event

- Scope
 - Confirm potential for uplift
 - Evaluate potential impacts
 - Identify mitigation options
- Included industry experts
- Utilized most recent data
- Developed seismic deformation models



CRA Seismic Uplift Study

Findings for M7.8 event

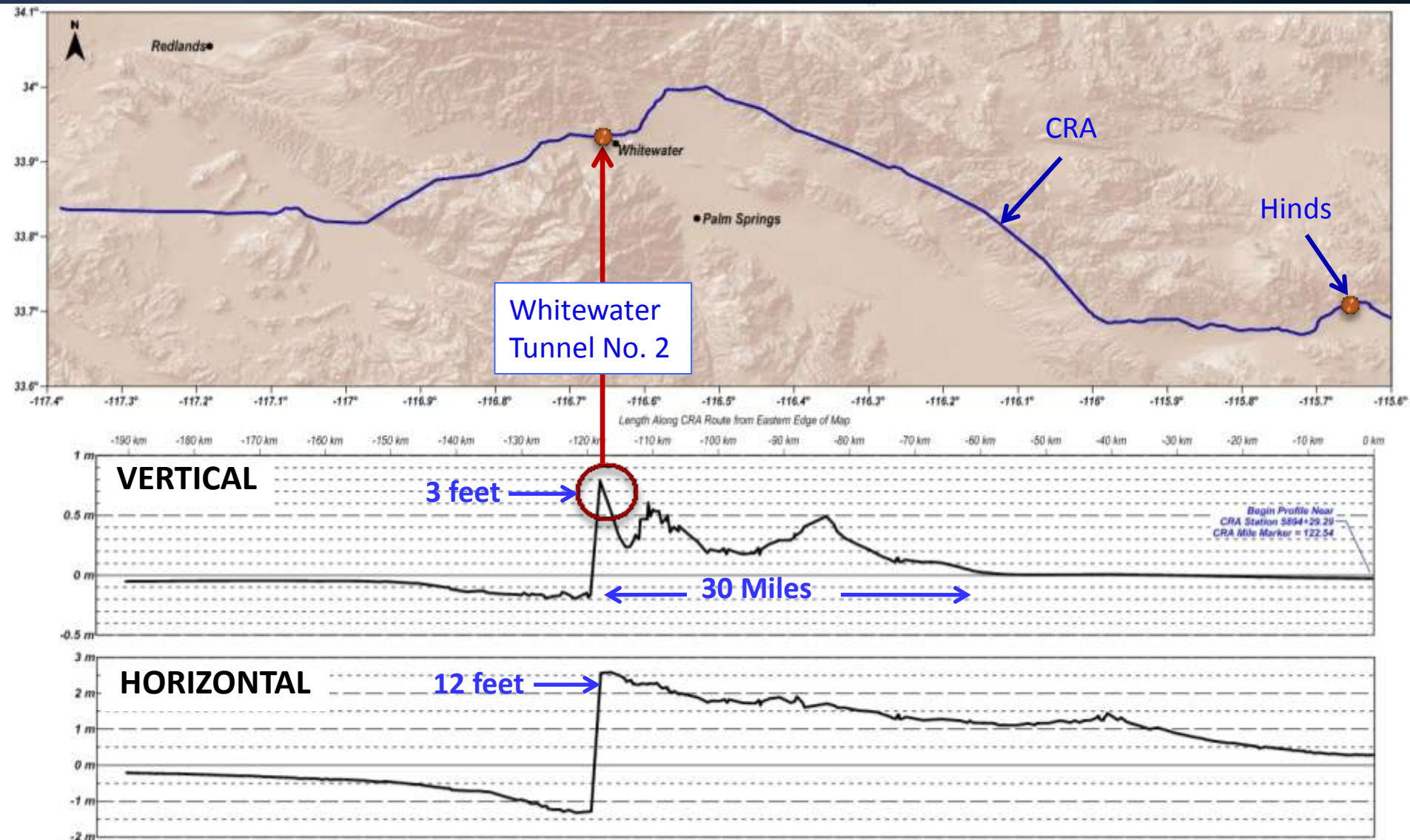
- Up to 3 feet of uplift
 - < 20% flow reduction after initial repair
- Up to 12 feet of horizontal deformation
- Rupture may occur in Whitewater Tunnel No. 2



1992 Landers Earthquake (M7.3)

CRA Seismic Uplift Study

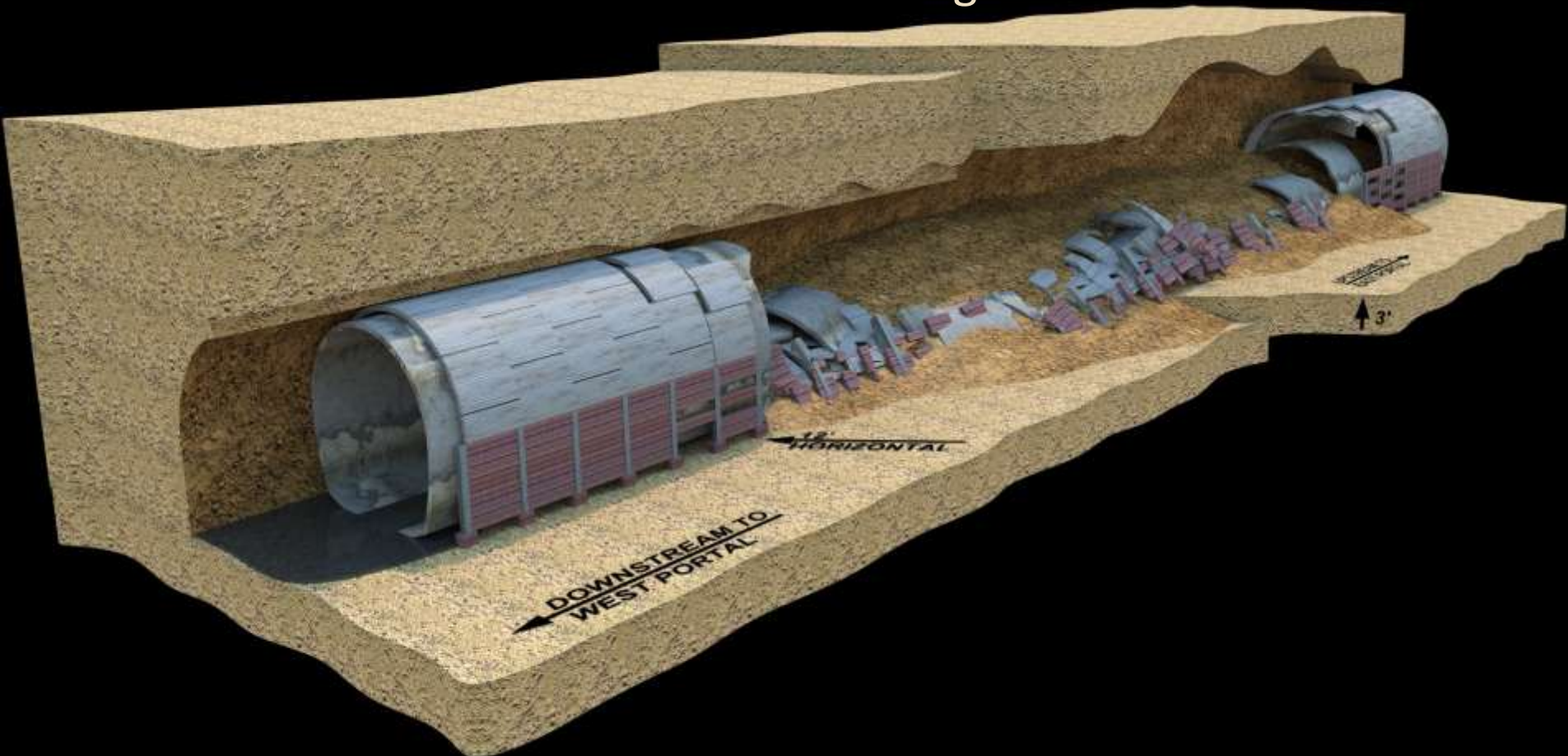
Deformation Profile (M 7.8)



CRA Seismic Uplift Study

Tunnel Repair Workshop

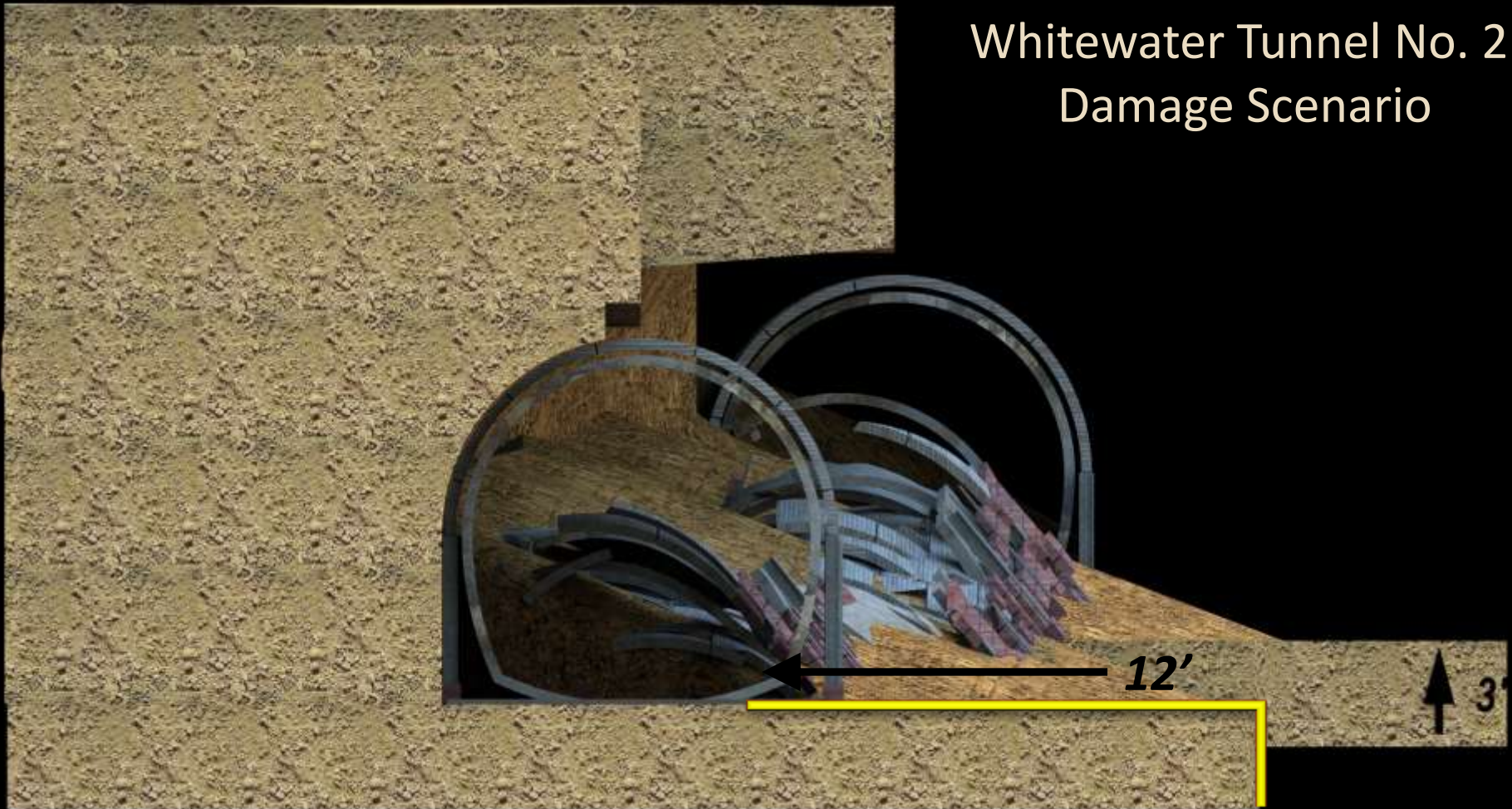
Whitewater Tunnel No. 2 Damage Scenario



CRA Seismic Uplift Study

Tunnel Repair Workshop

Whitewater Tunnel No. 2
Damage Scenario



CRA Seismic Uplift Study

Tunnel Repair Workshop Findings

- Tunnel can be repaired in 6 months
- Pre-planning recommended
 - Repair elements should be pre-designed
 - Tunnel contractors should be pre-qualified
 - Key materials should be procured in advance
- Consider new access structure at Whitewater Tunnel No. 2 west portal



Conclusions

- Vertical uplift is credible
- Impact of uplift is less severe than postulated
- Assumptions confirmed for recovery time

Next Steps

- Evaluate recommended pre-planning activities
- Continue to collaborate with agencies & researchers
- Conduct similar vulnerability assessment on tunnels in the distribution system
- Consider viability of strengthening at-risk tunnel sections

