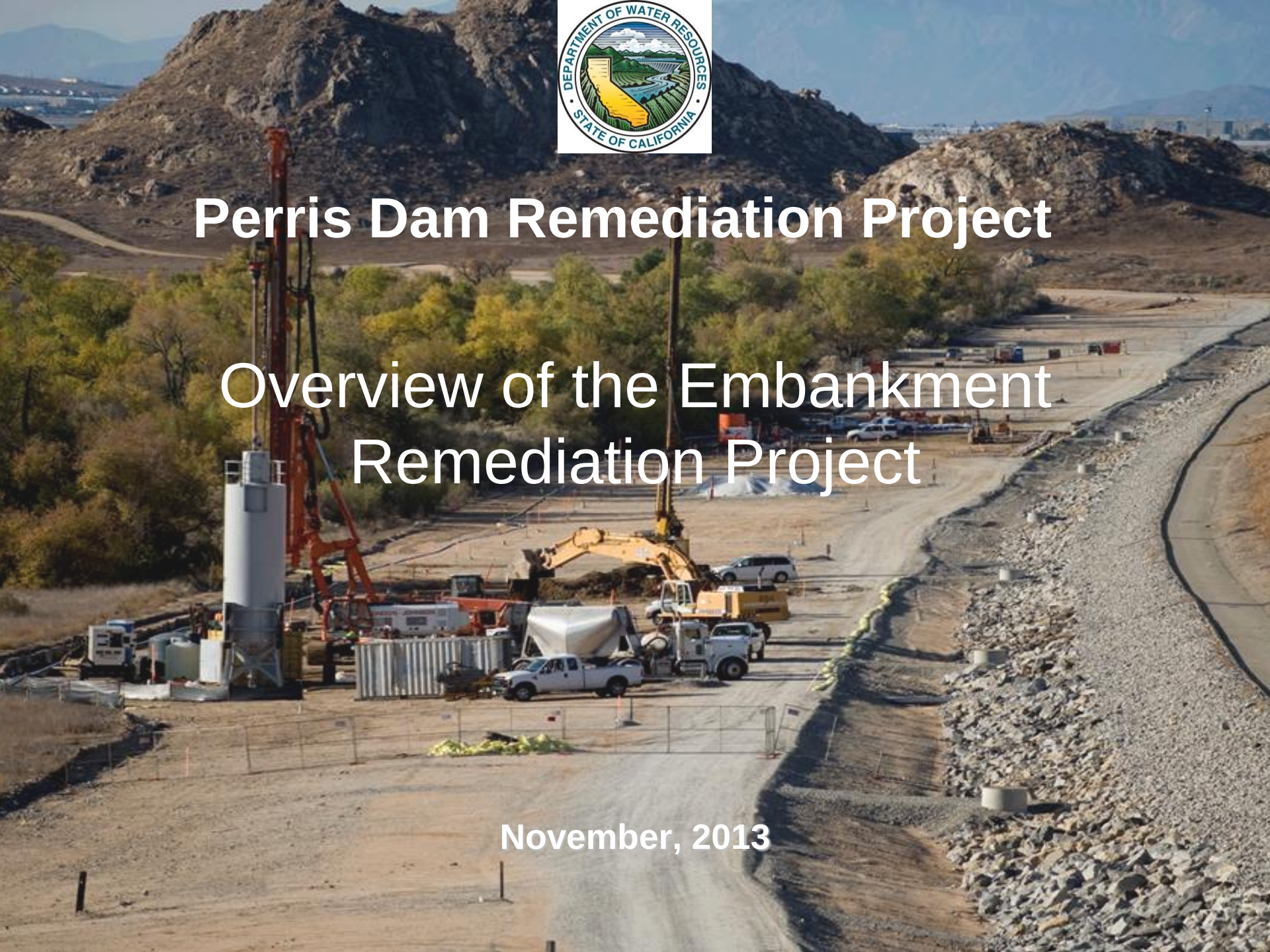
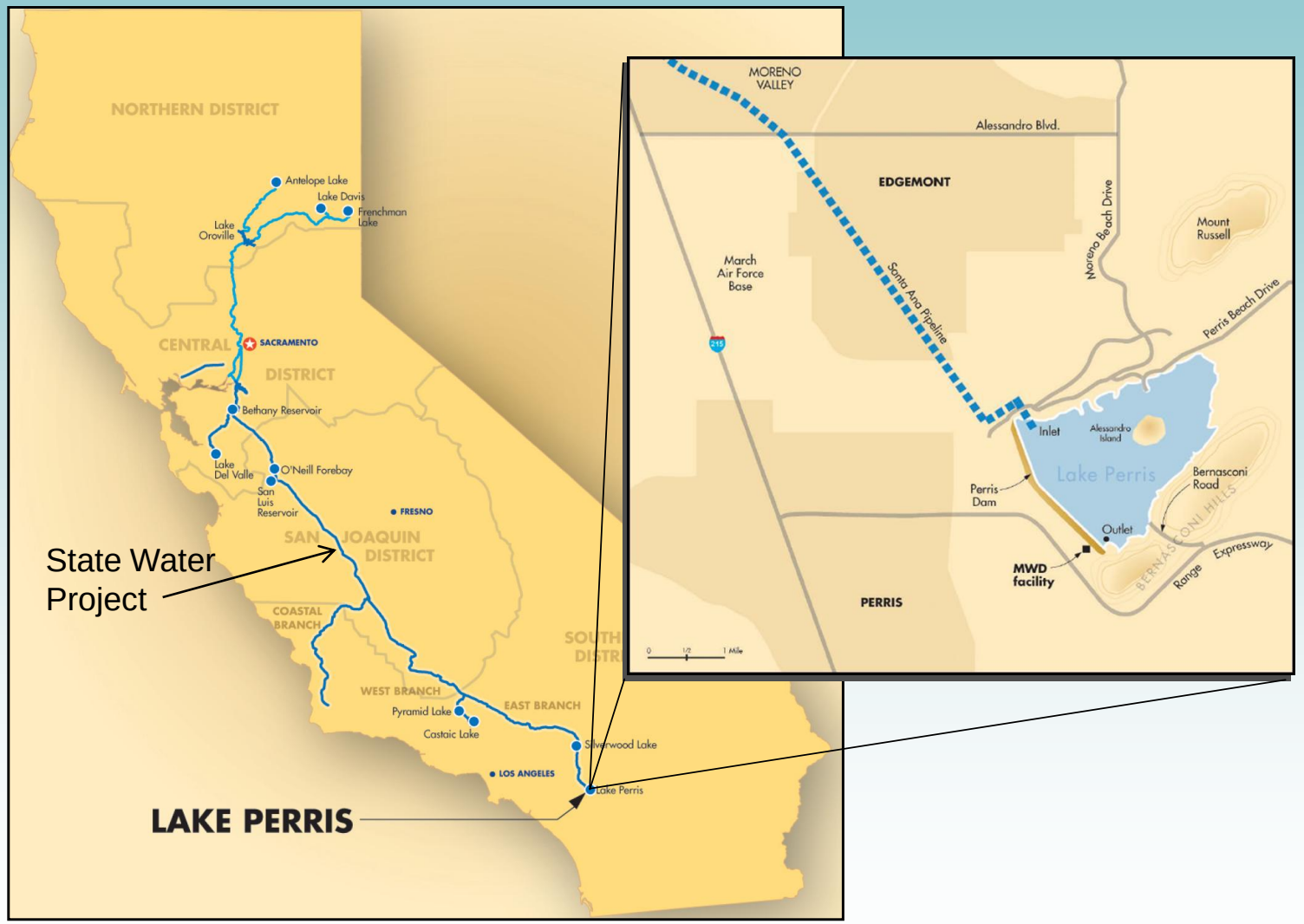


Perris Dam Remediation Project

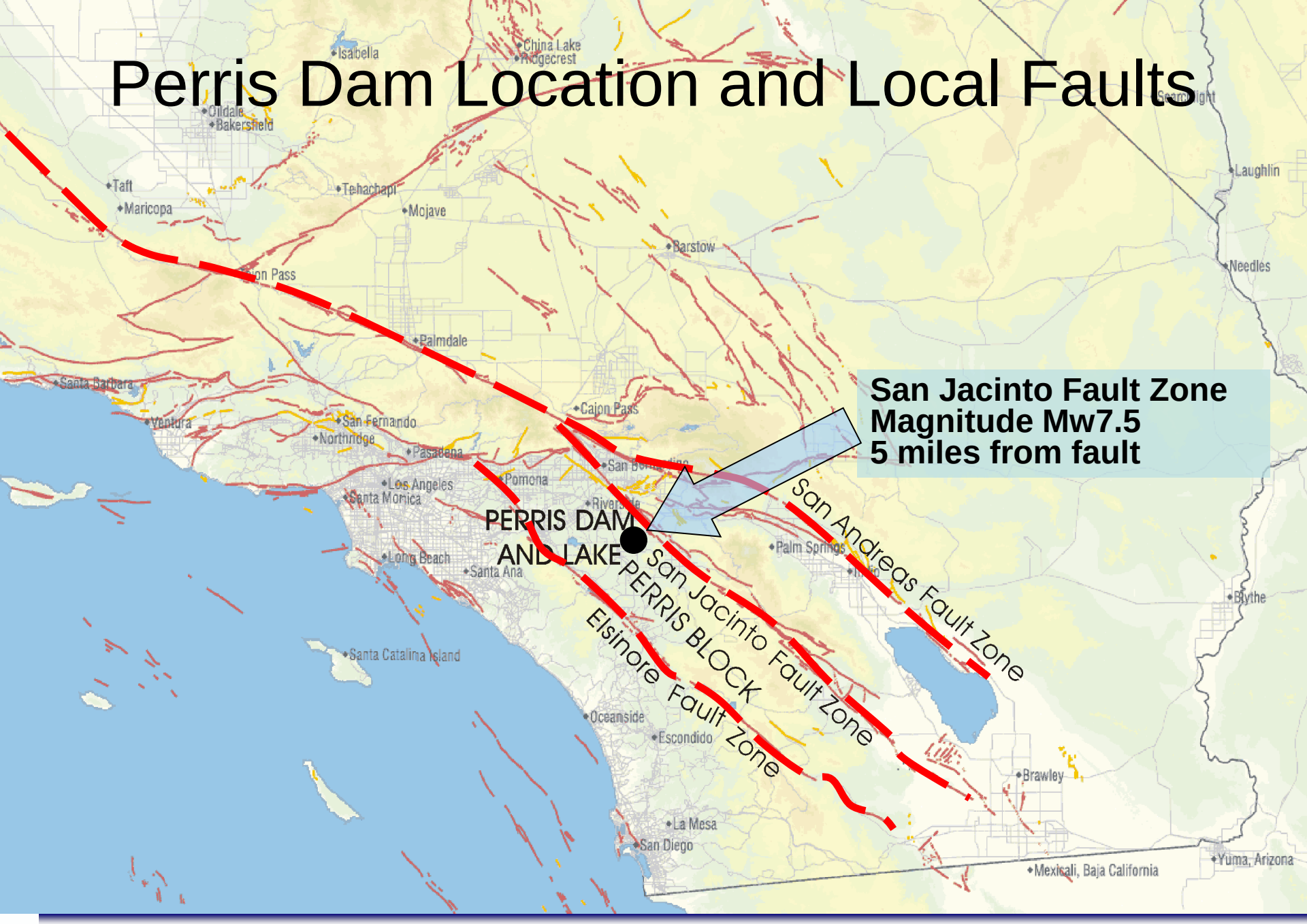
Overview of the Embankment Remediation Project

November, 2013

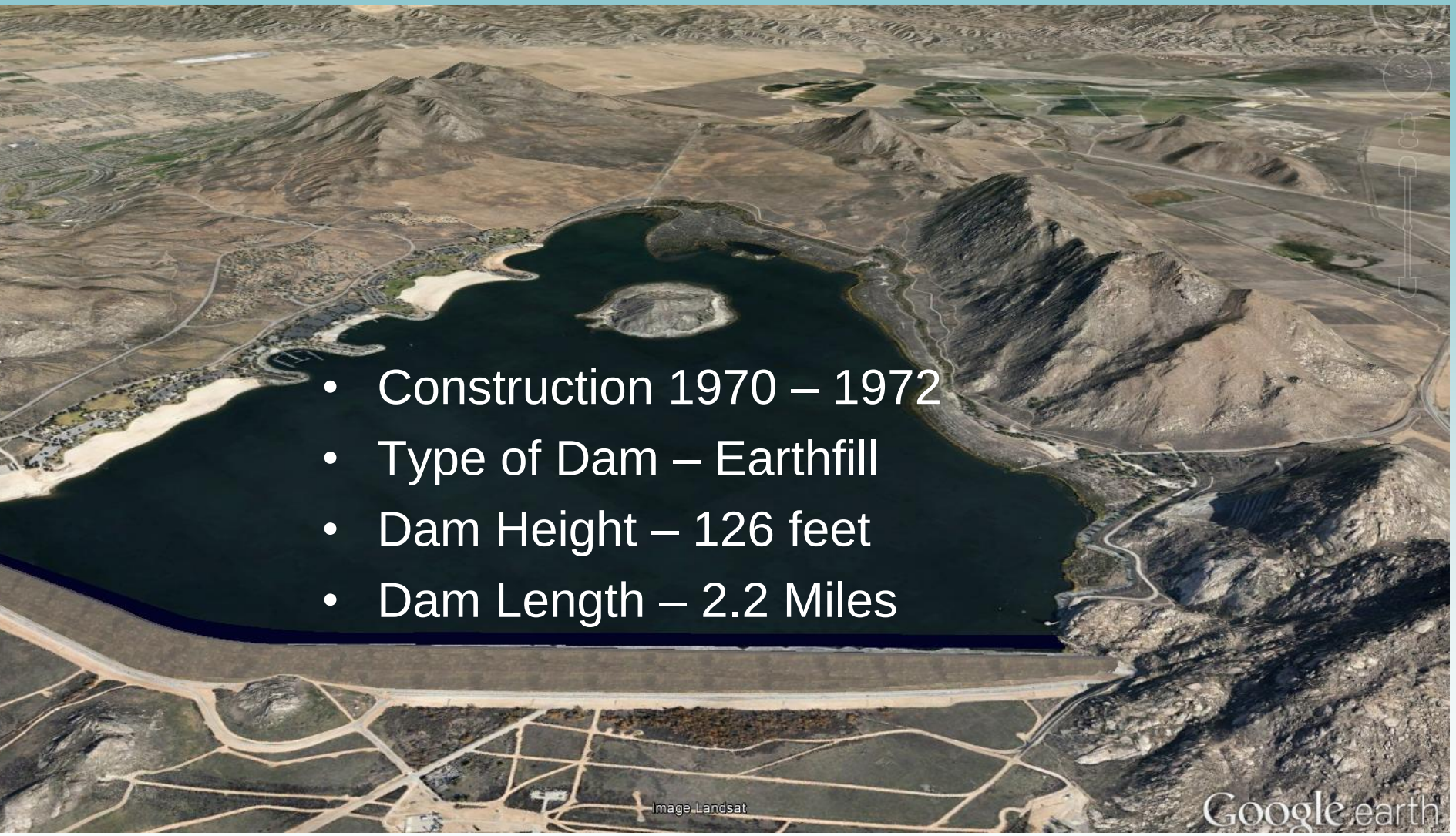
Location of Perris Dam and Lake



Perris Dam Location and Local Faults



Dam Features

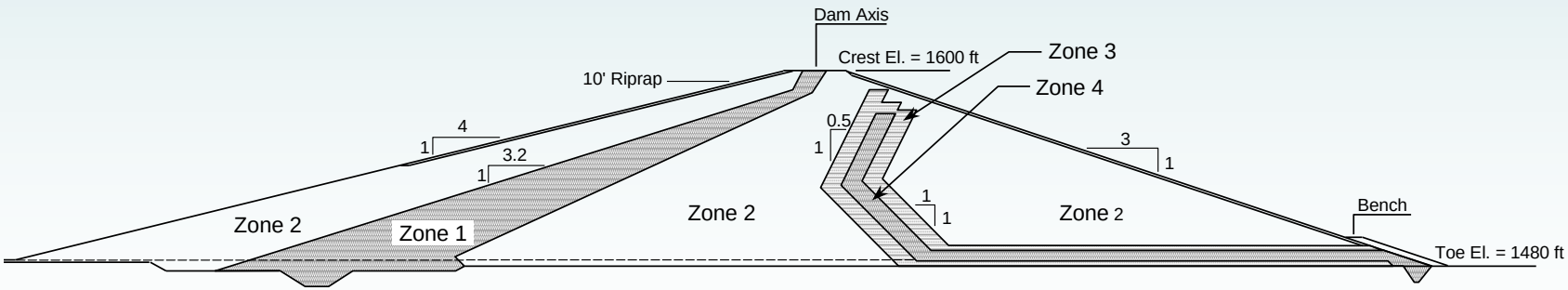


- Construction 1970 – 1972
- Type of Dam – Earthfill
- Dam Height – 126 feet
- Dam Length – 2.2 Miles

Embankment Design and Construction

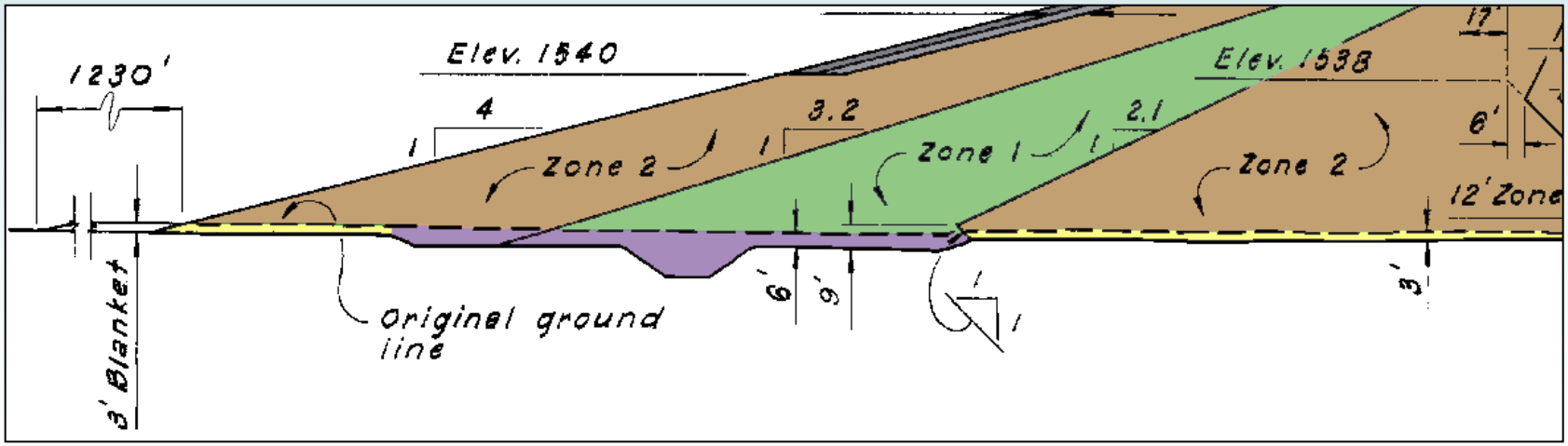
- Embankment Section
  - Primarily Silty Sand
  - Inclined Sandy Clay Core
  - Compaction Requirements
    - DWR Standard
      - (20,000 ft-lb/ft^3)

Zone	Spec. 70-25	Average As-Placed
1	97%	98%
2	97%	101%



Embankment Design and Construction

- Foundation Preparation
  - 3 ft excavation beneath Zone 2
    - Remove organic material & loose surface sands
  - 6 ft excavation beneath Zone 1 (core)
    - 10-25 ft Core Trench



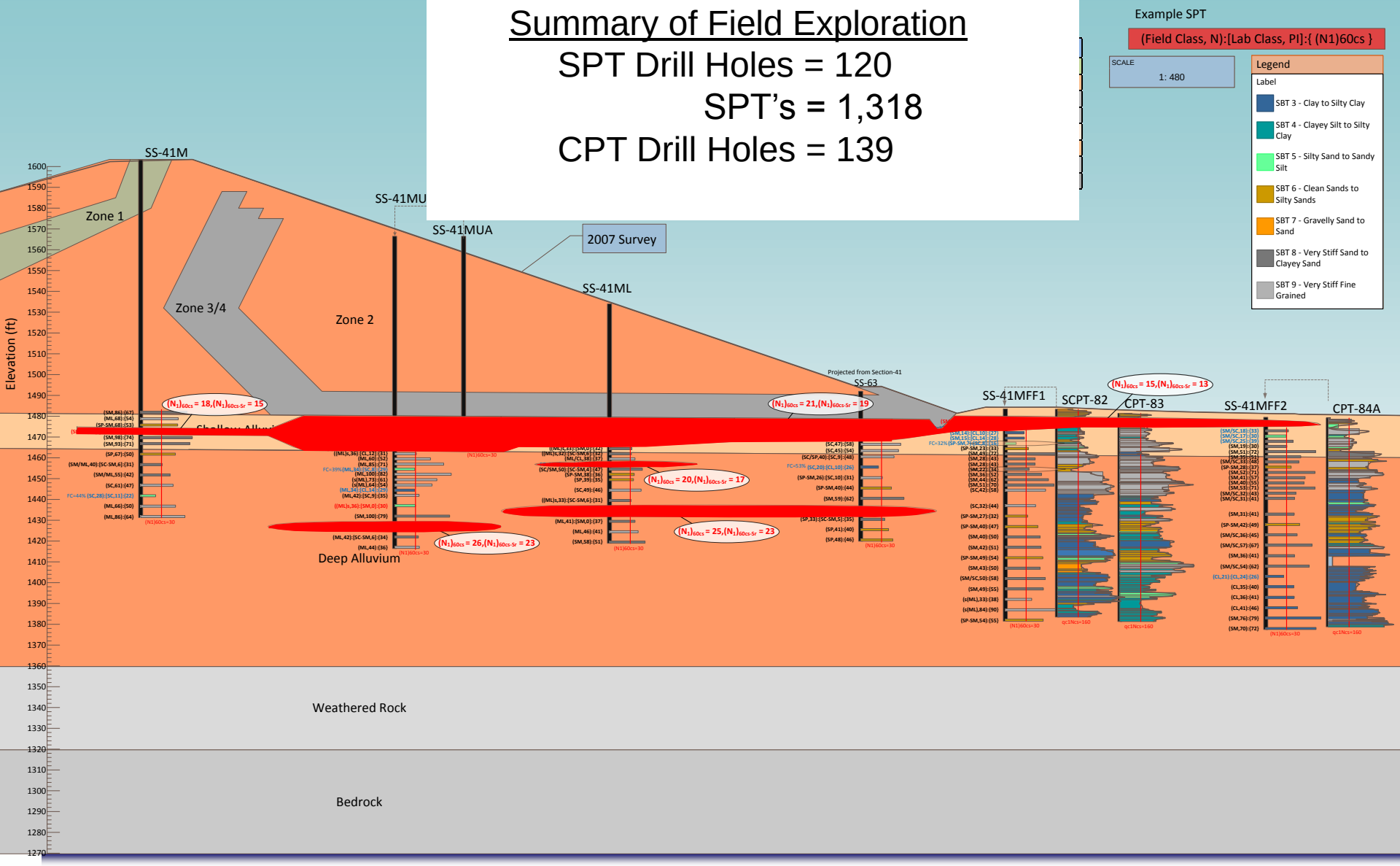
Example Cross Section Evaluation

Summary of Field Exploration

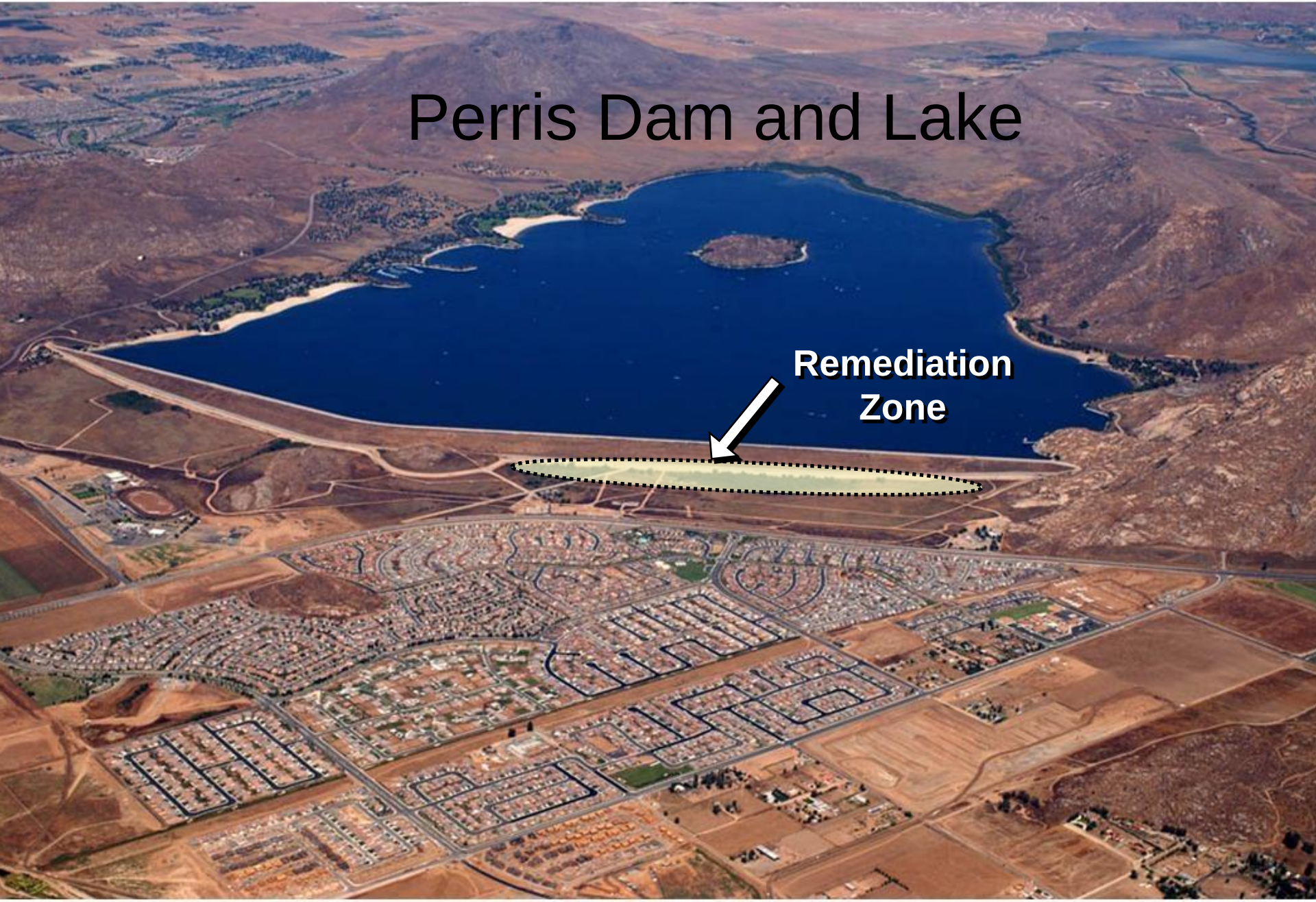
SPT Drill Holes = 120

SPT's = 1,318

CPT Drill Holes = 139



Perris Dam and Lake



Dam Safety and Design

- Division of Safety of Dam (DSOD)
  - Dam regulator to ensure a safe design
  - Approve design analysis, plans, and specifications
  - Oversees the construction in accordance with the approved plans and specifications

- Board of Consultants (BOC)
  - Appointed by the Director of DWR
  - Formed by a group of experts
  - Perform independent review of the dam design.
  - Approve design work for construction

Design Concept

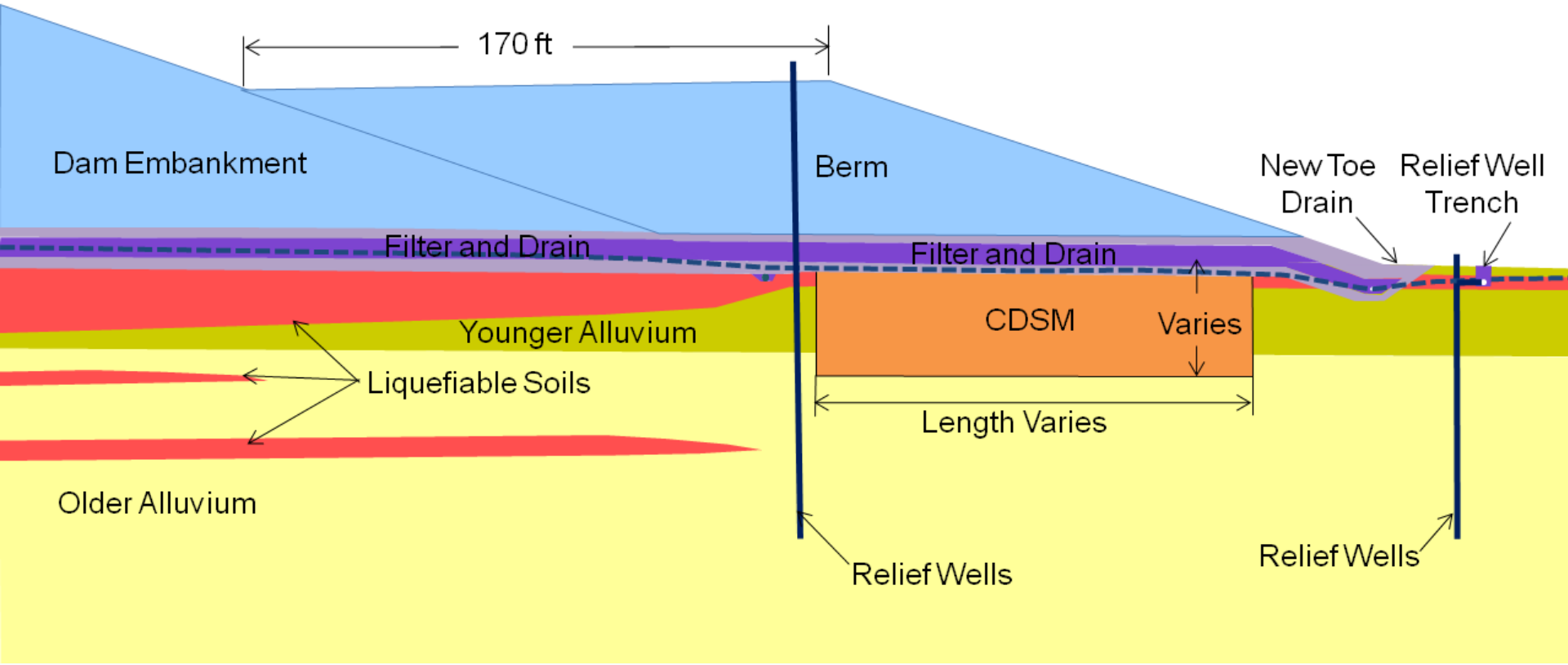
- Remove and replace loose shallow soils.
- Improve the deeper foundation soils by Cement Deep Soil Mixing (CDSM)
- Construct a stability berm on the downstream side of the dam

Perris Dam Remediation - Construction Contract - Scope of Work

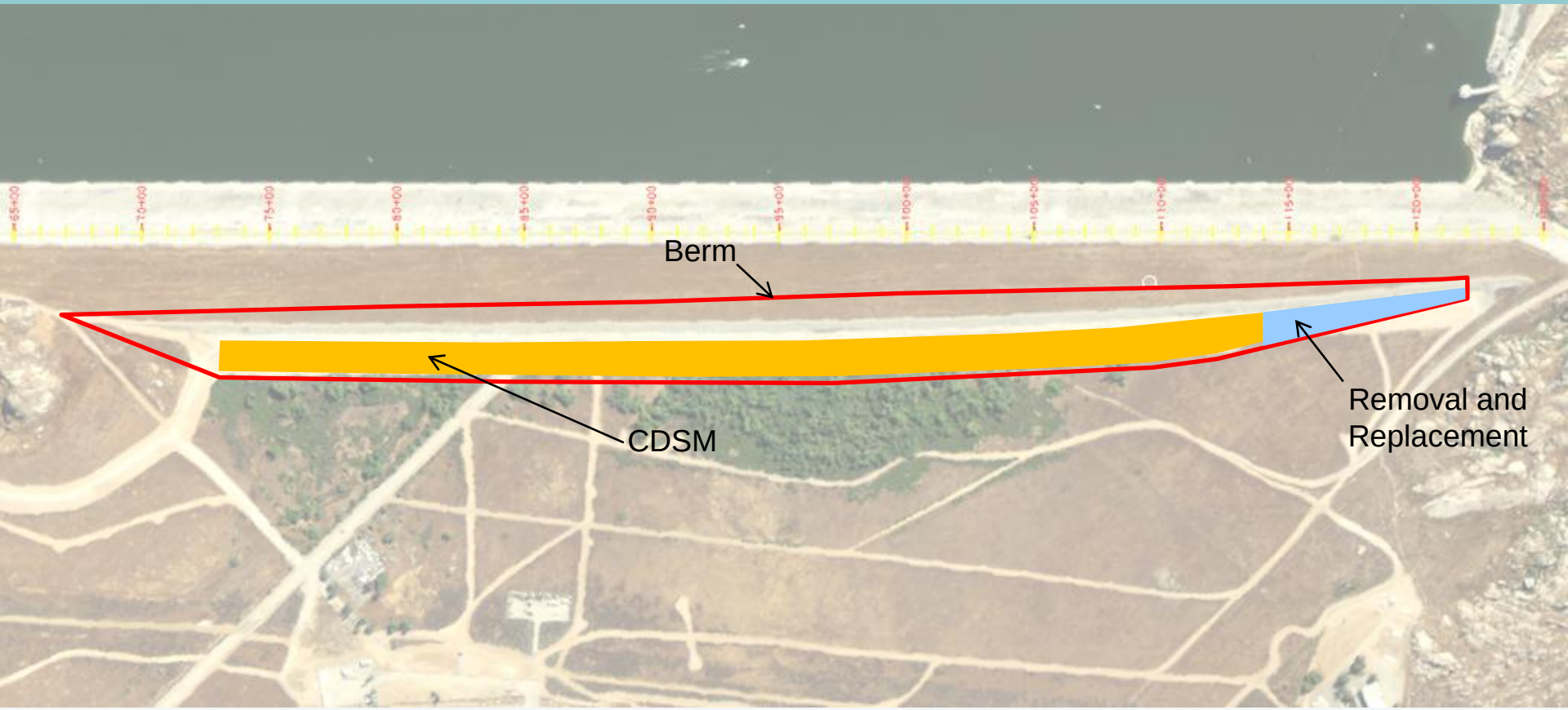
- Clearing and Grubbing
- Lake Bed Haul Roads
- Sitework
- Production Blasting
- Controlled Blasting
- Rock Processing and Stockpiling (Filter and Drain)
- Dewatering at Dam Toe and Borrow Area
- Seepage Collection System (Remove and Replace)
- Relief Well System (Remove and Replace)
- Cement Deep Soil Mixing (CDSM)
- Stability Berm
- Right Abutment Dam Repair

Project Overview

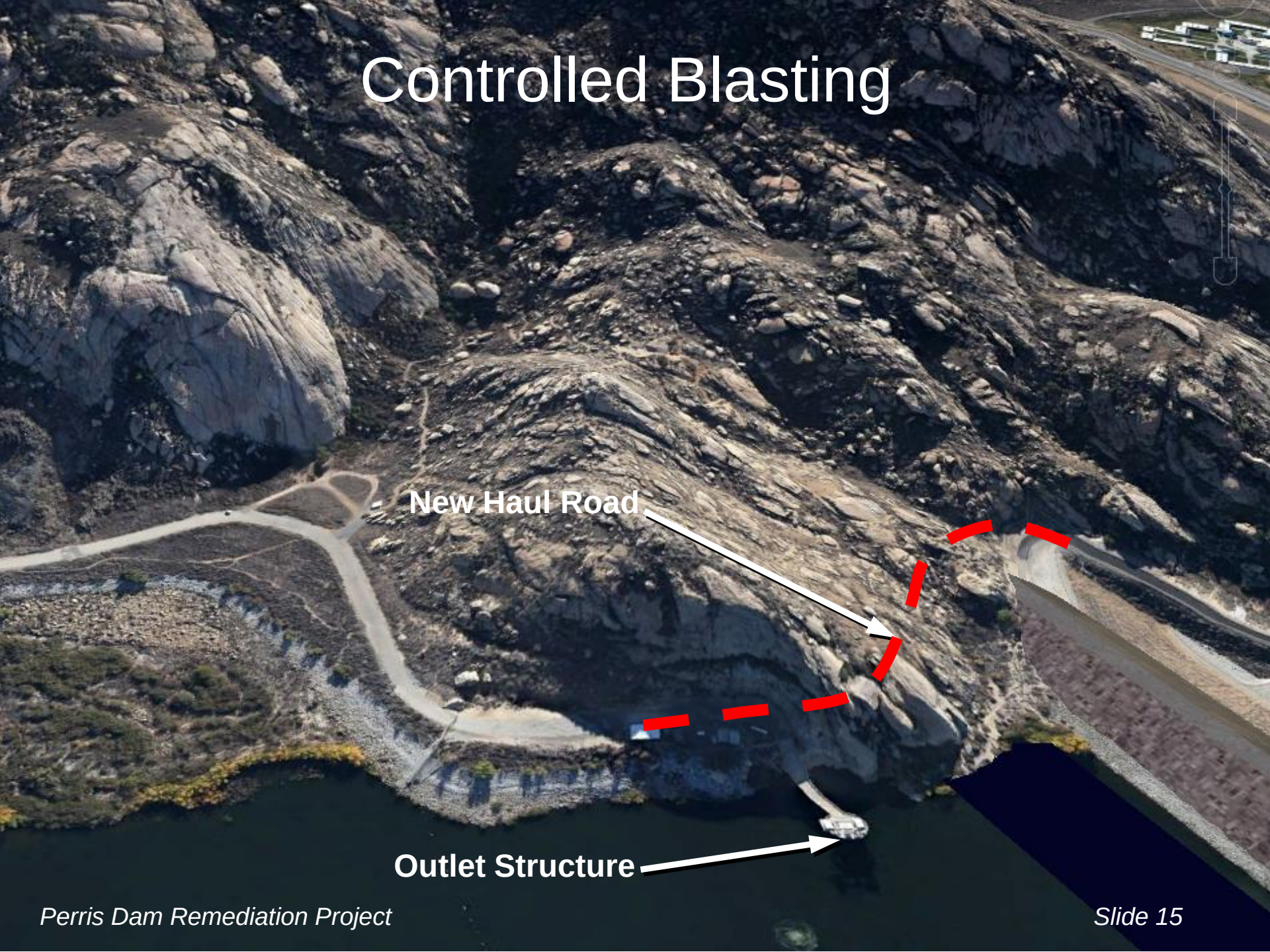
Foundation Treatment and Stability Berm



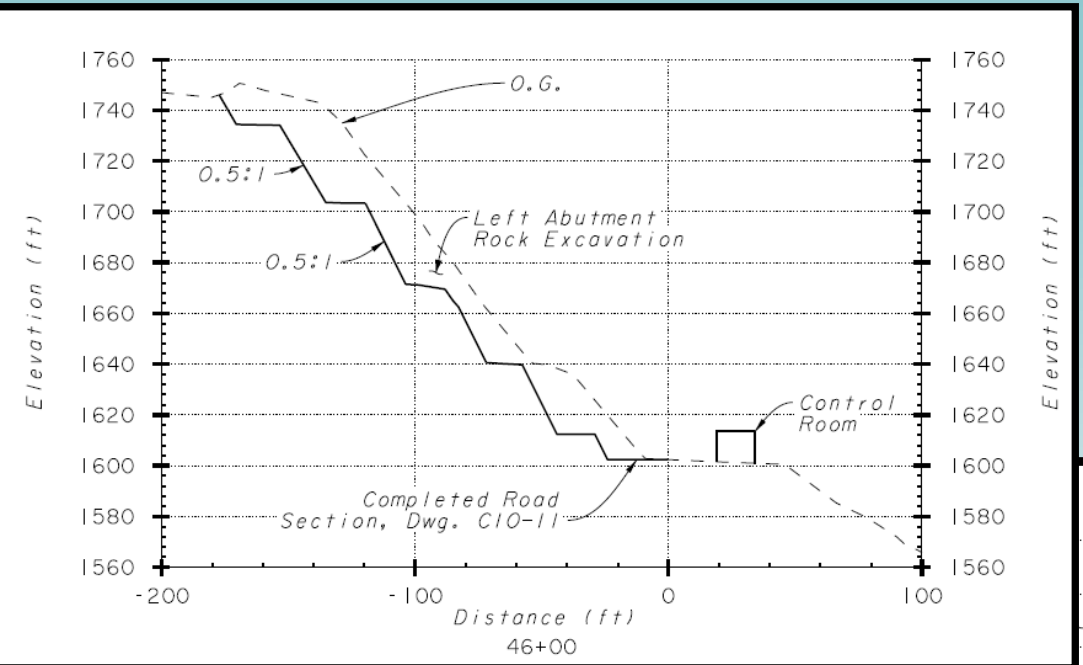
Foundation Treatment



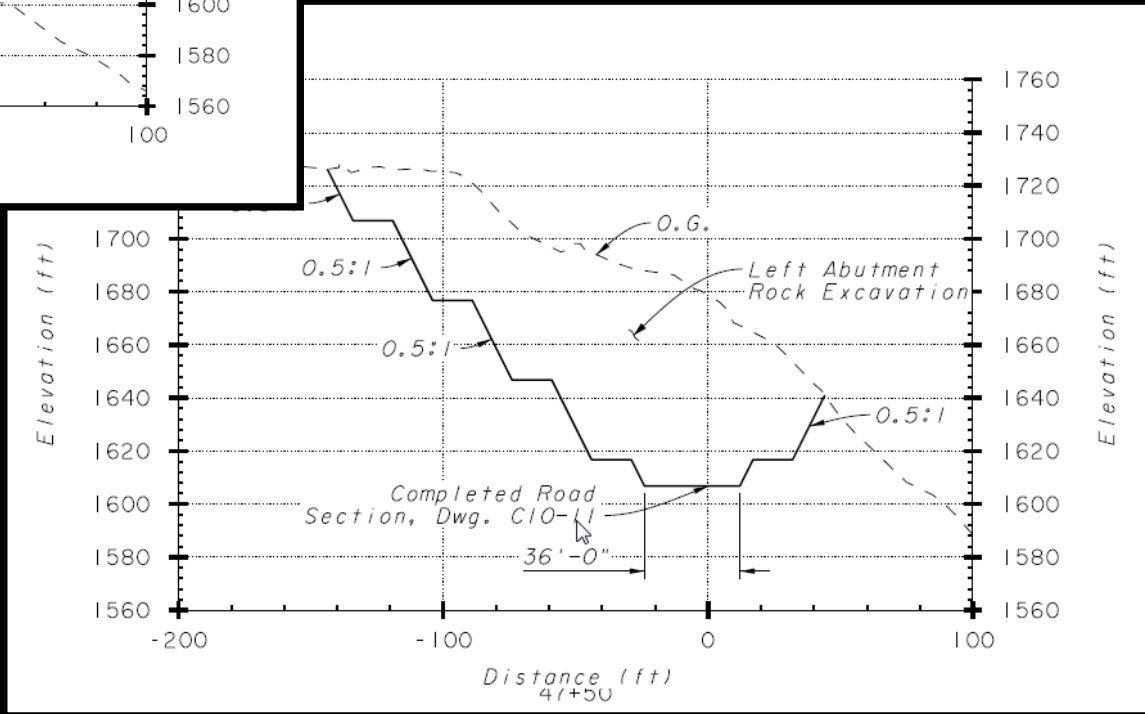
Controlled Blasting



Controlled Blasting



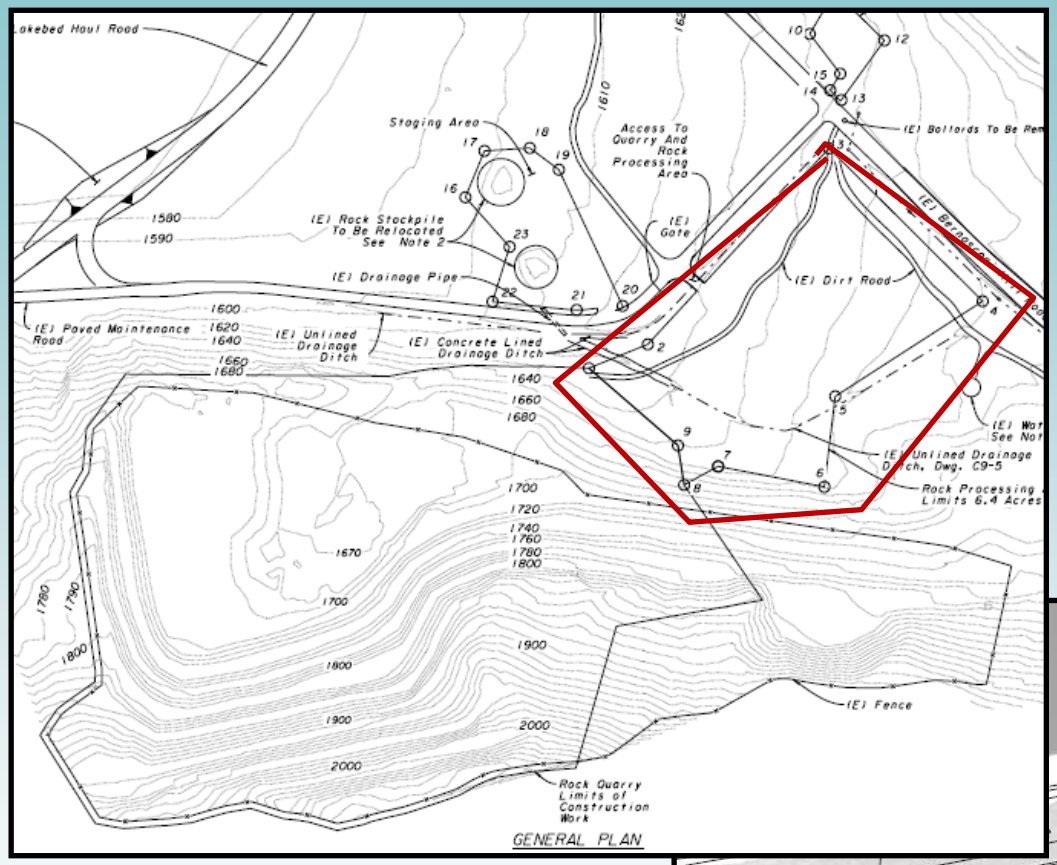
- **Low ground velocity restriction**
- **Protect existing facilities**

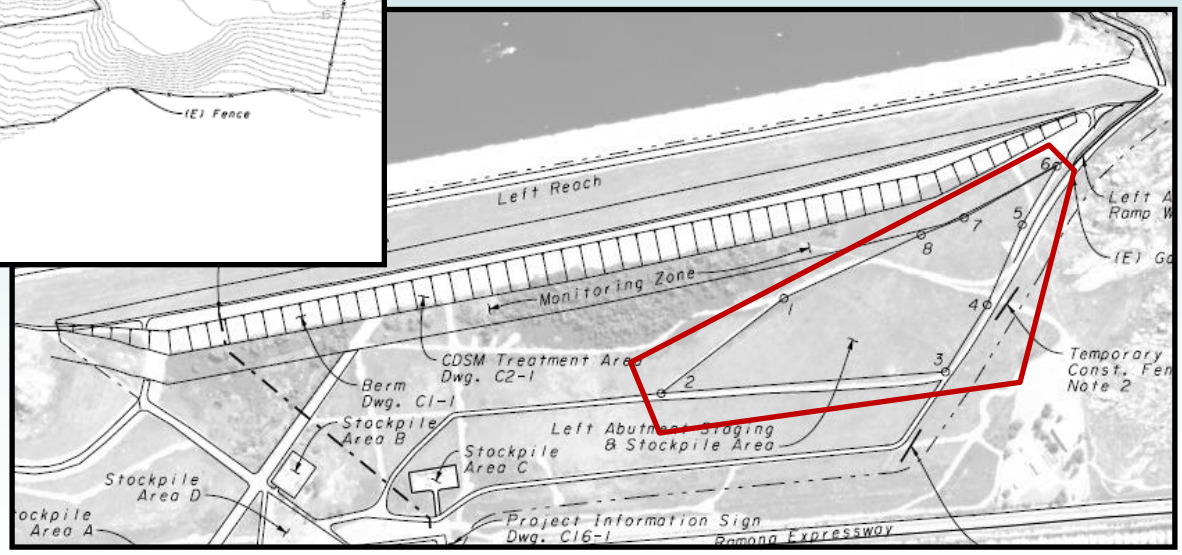


Production Blasting

Production Blasting

Rock Processing and Stockpile

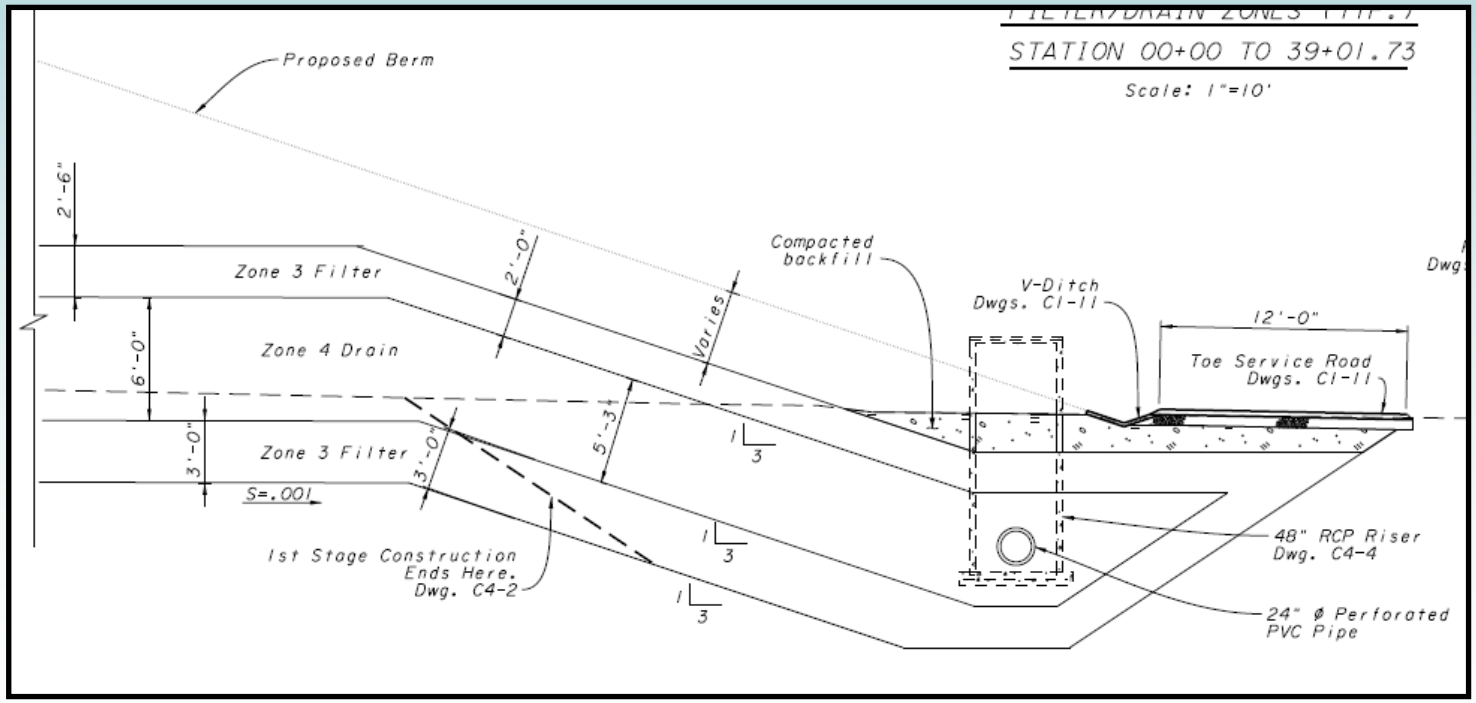




- **Rock from Blasting used for Filter and Drain System**
- **Cleanness requirements**
- **Segregation requirements**
- **Limited Areas**

Seepage Collection System

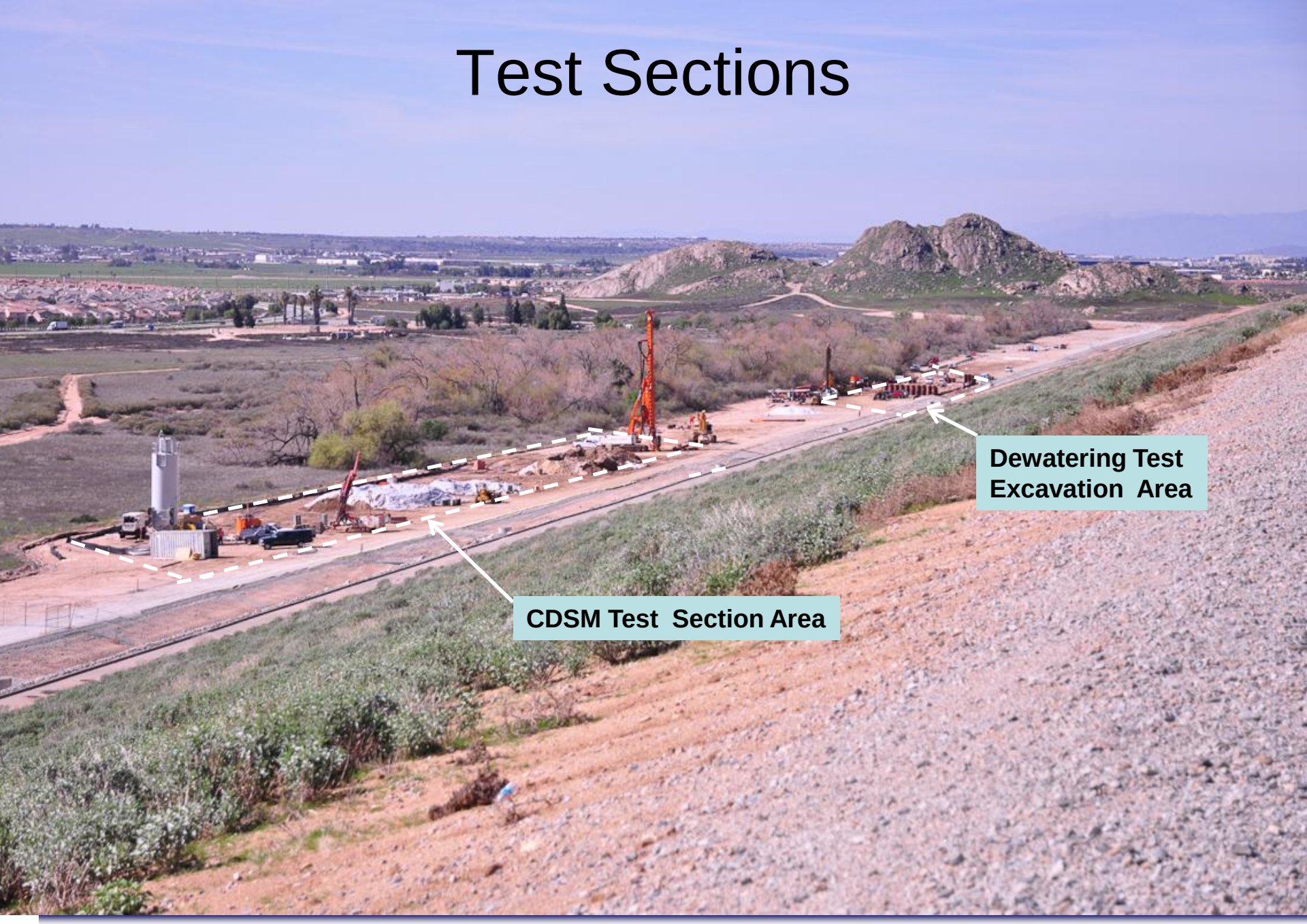
- **Remove existing wells and drain system**
- **Existing system flowing water**
- **Construct new system at berm**



Design Phase Test Sections

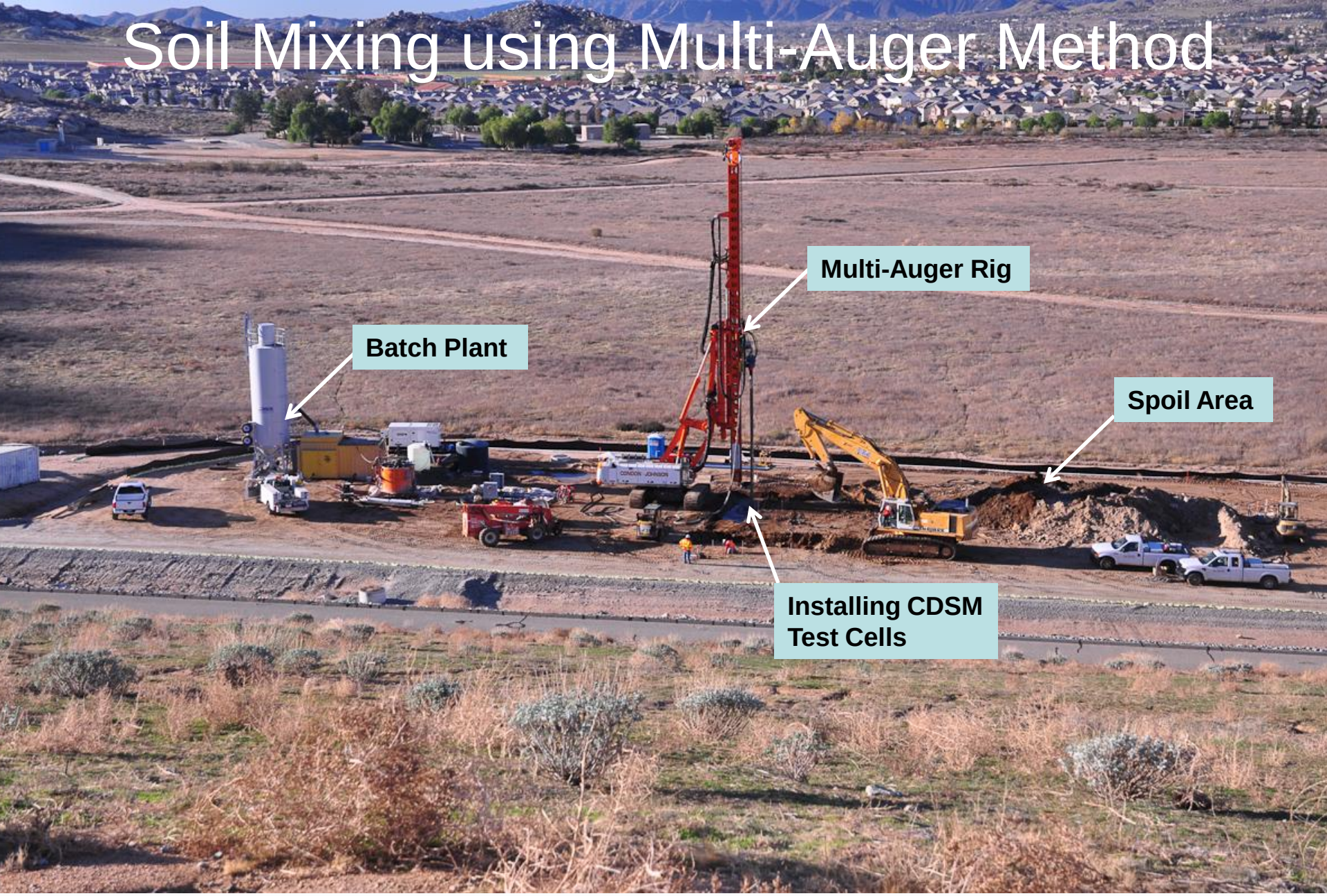
- DWR conducted testing to evaluate design and construction of the foundation treatment, dewatering, and other construction features.
  - Identified potential problems
  - Provided confidence in the design
  - Refined design of foundation repairs. Resulted in final design with shallower excavation and confirmed CDSM treatment.

Test Sections



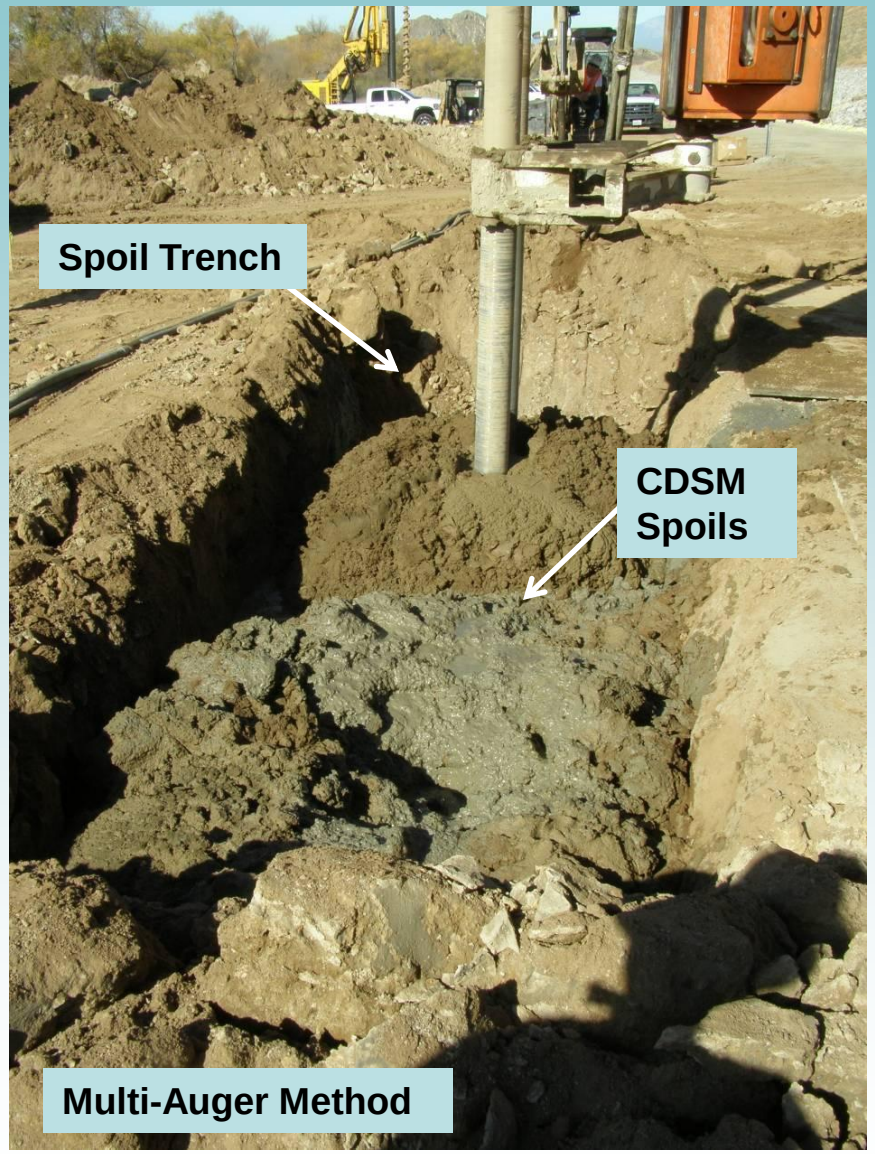
Pre-drilling

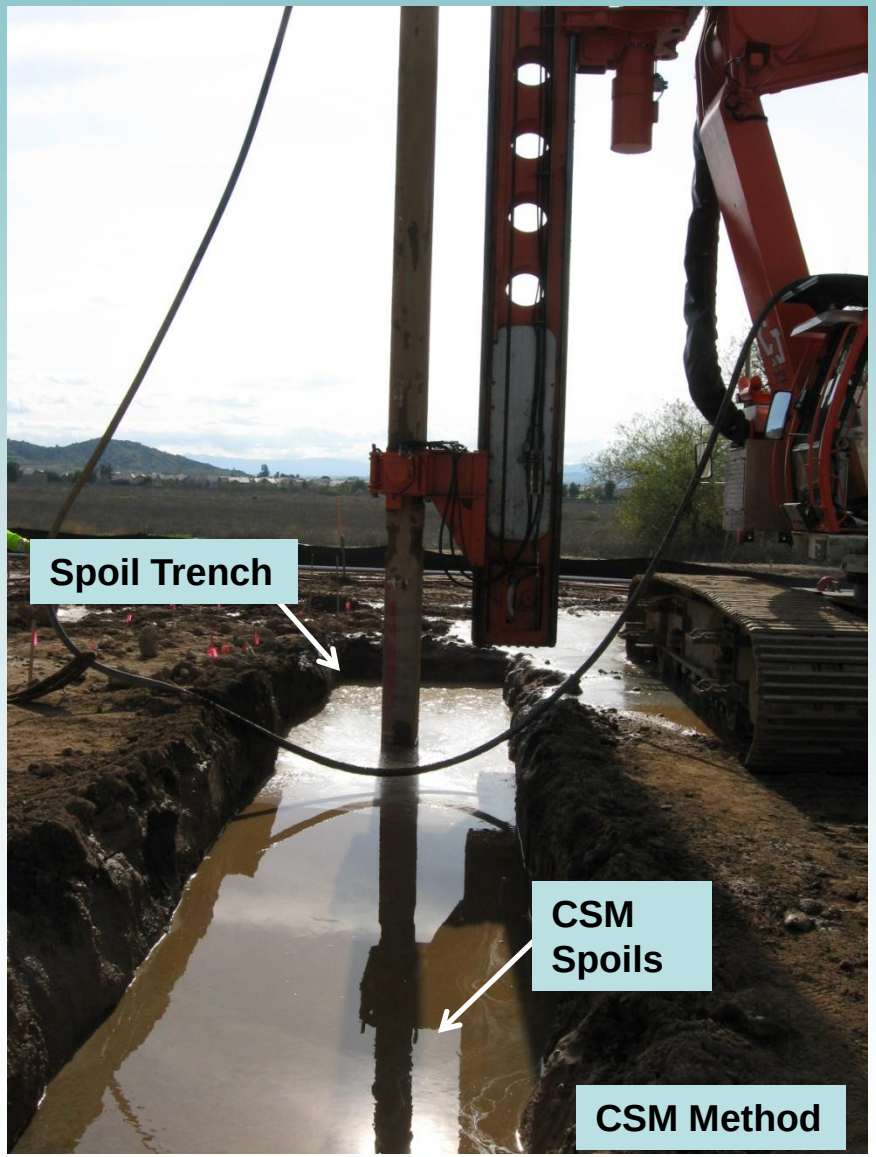
Soil Mixing using Multi-Auger Method



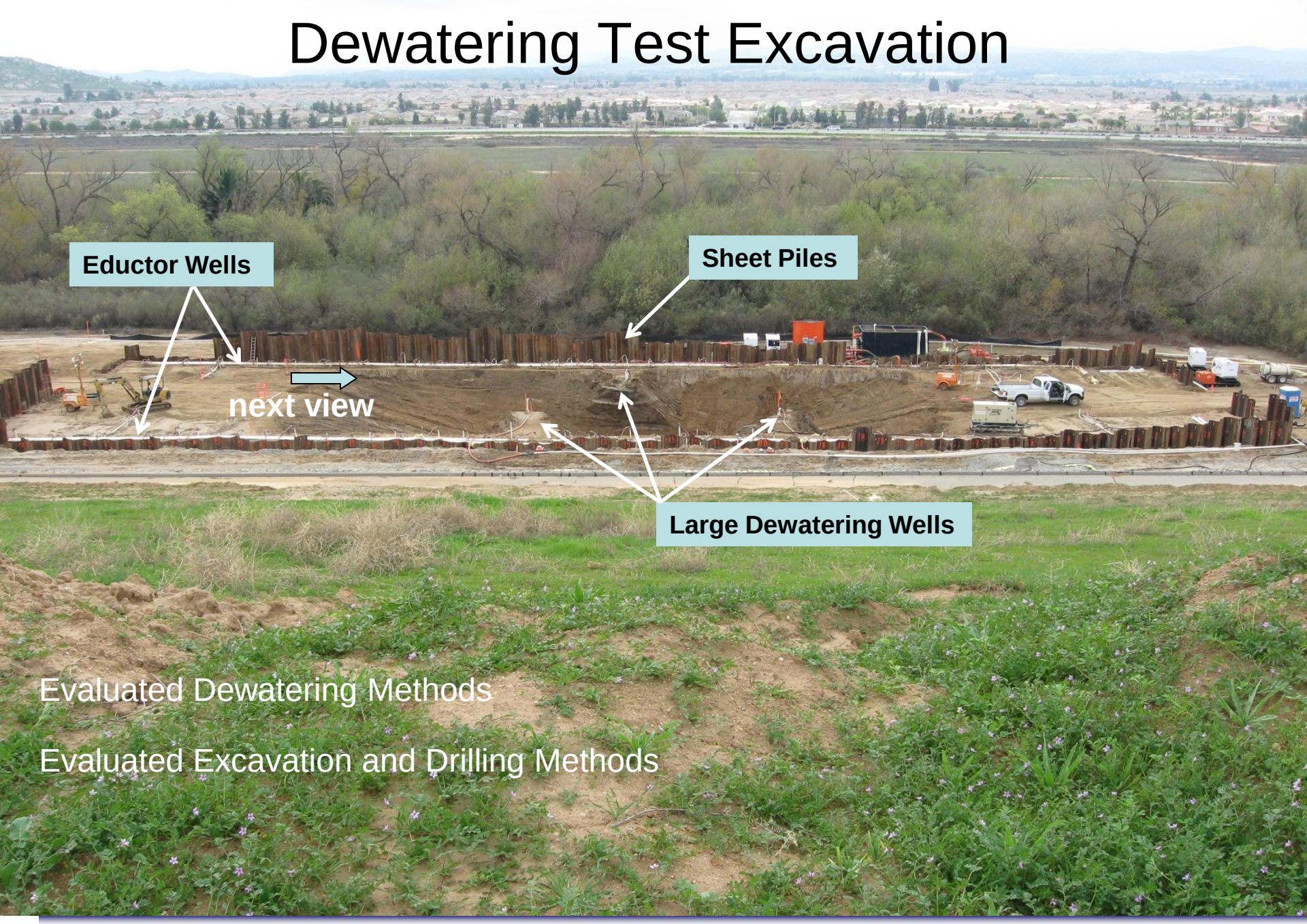
Soil Mixing Using CSM Method

Soil Mixing Operation





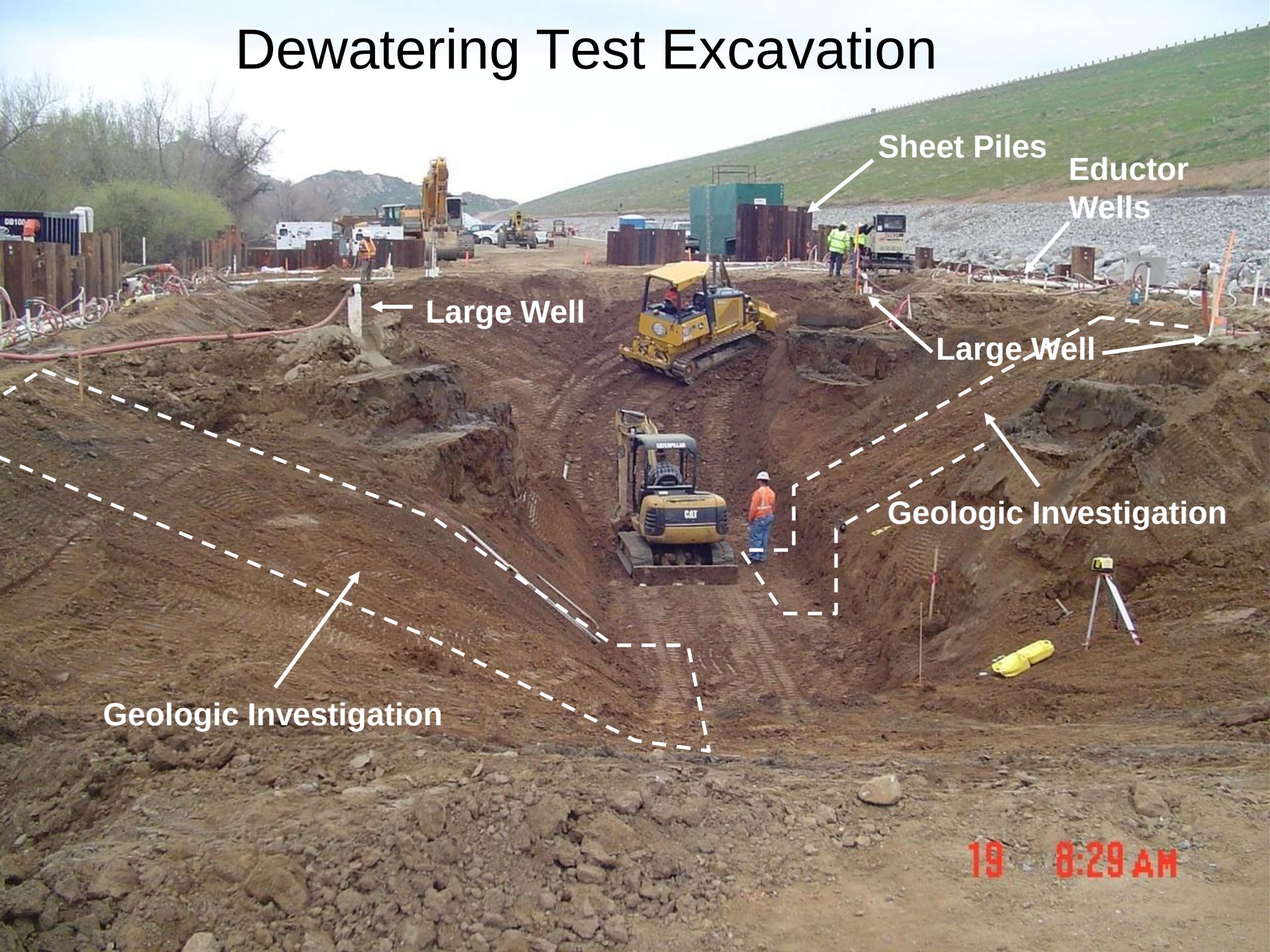
Dewatering Test Excavation



Evaluated Dewatering Methods

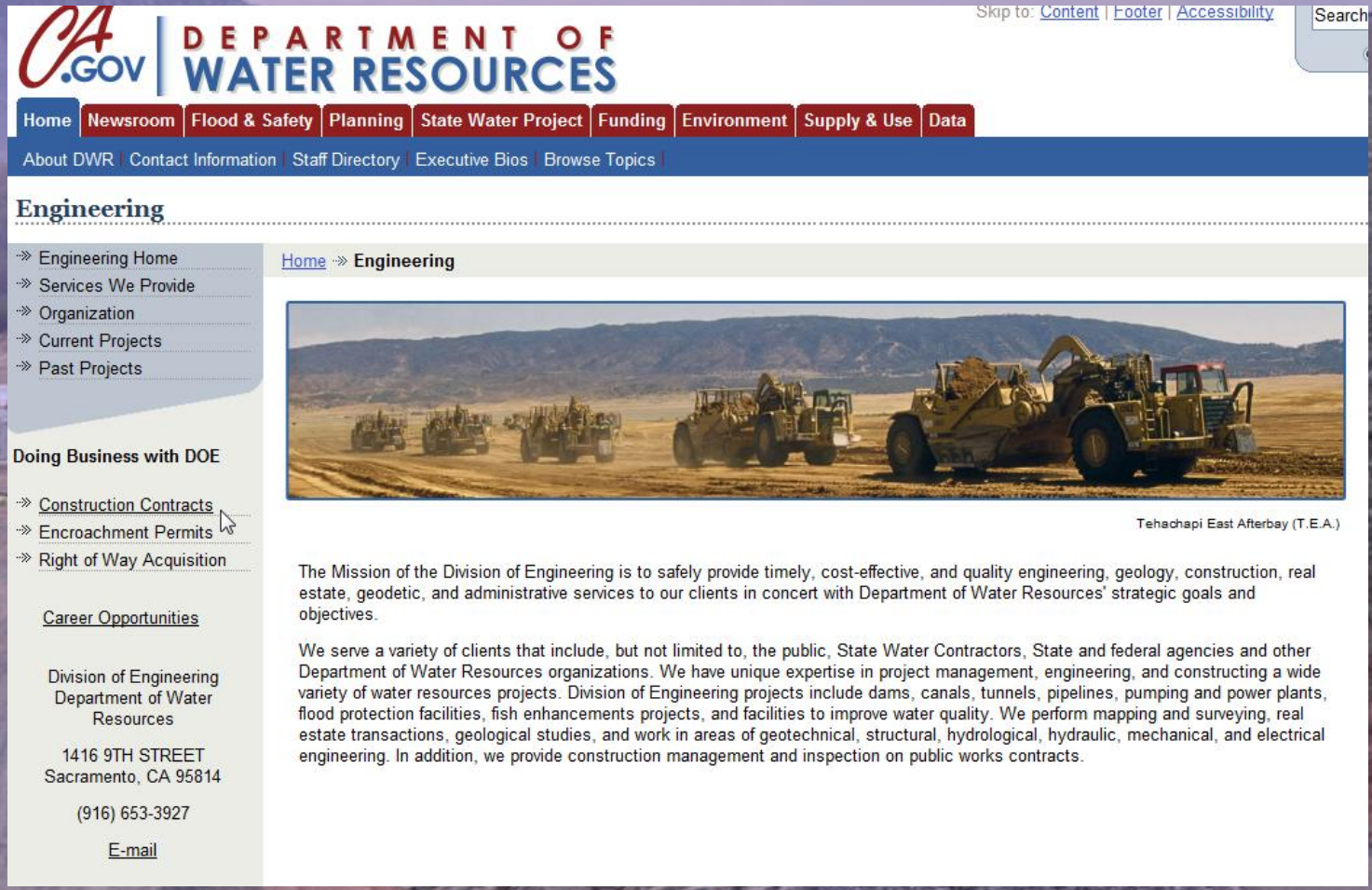
Evaluated Excavation and Drilling Methods

Dewatering Test Excavation



Additional Information

- Contractor Participation:
  - http://www.water.ca.gov/engineering



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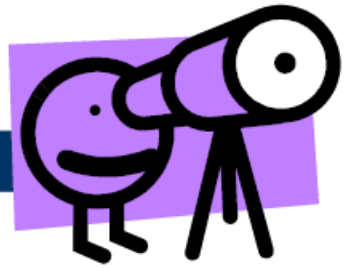
Department of Water Resources

Division of Engineering
Construction Office



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