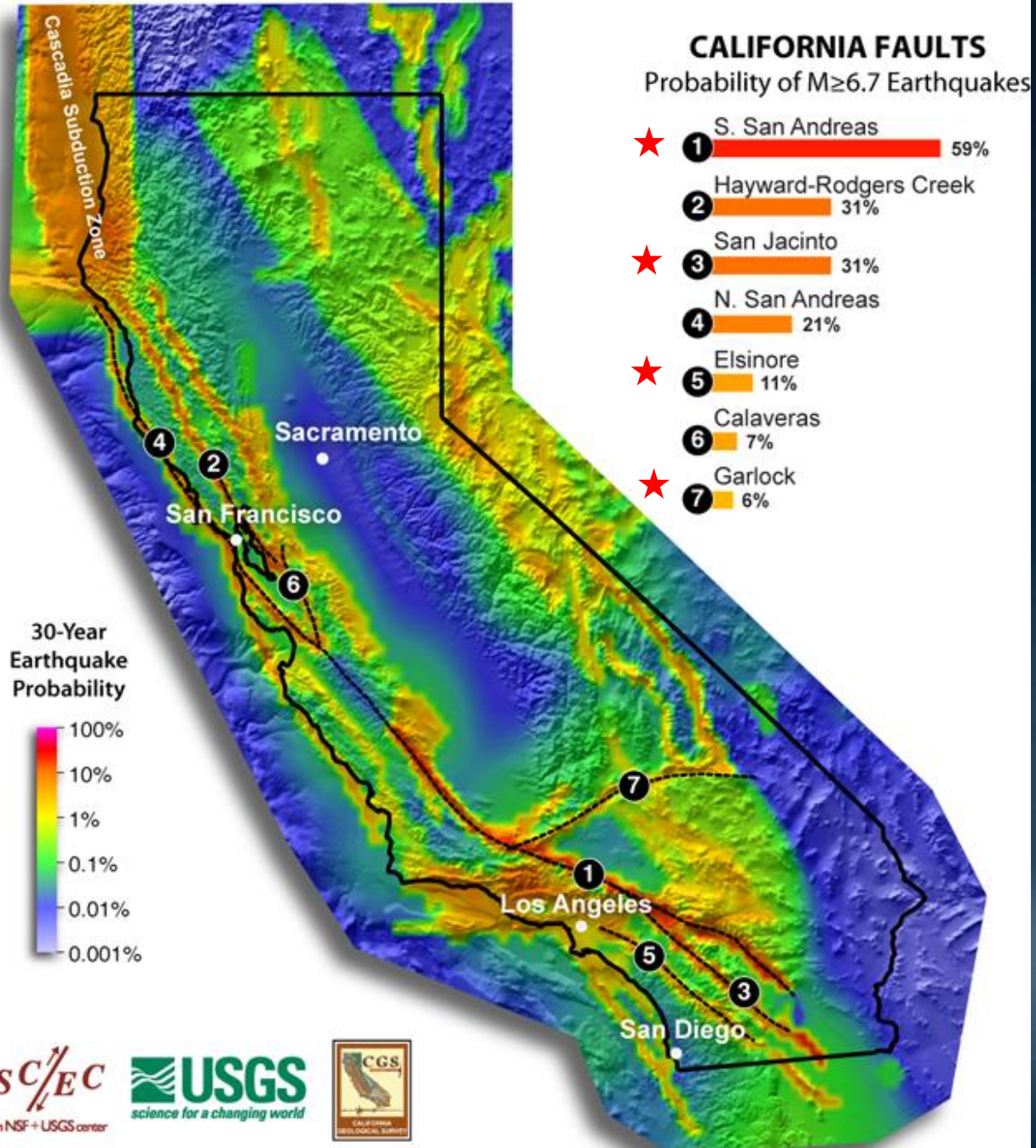


# Metropolitan's Seismic Assessment Program

Engineering and Operations Committee  
Item 6b  
June 7, 2010

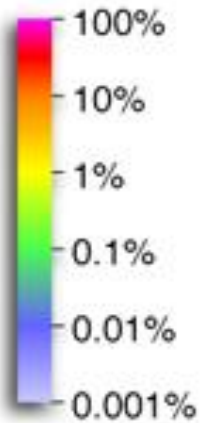
# Background

- US Geological Survey:  
*2008 Update of Seismic Hazards*
  - The USGS predicts a 97% chance of an earthquake of Magnitude 6.7 or greater in So. California within the next 30 years
  - The San Andreas Fault has the highest likelihood of rupture



# So. California's Most Active Faults

30-Year  
Earthquake  
Probability



San Andreas

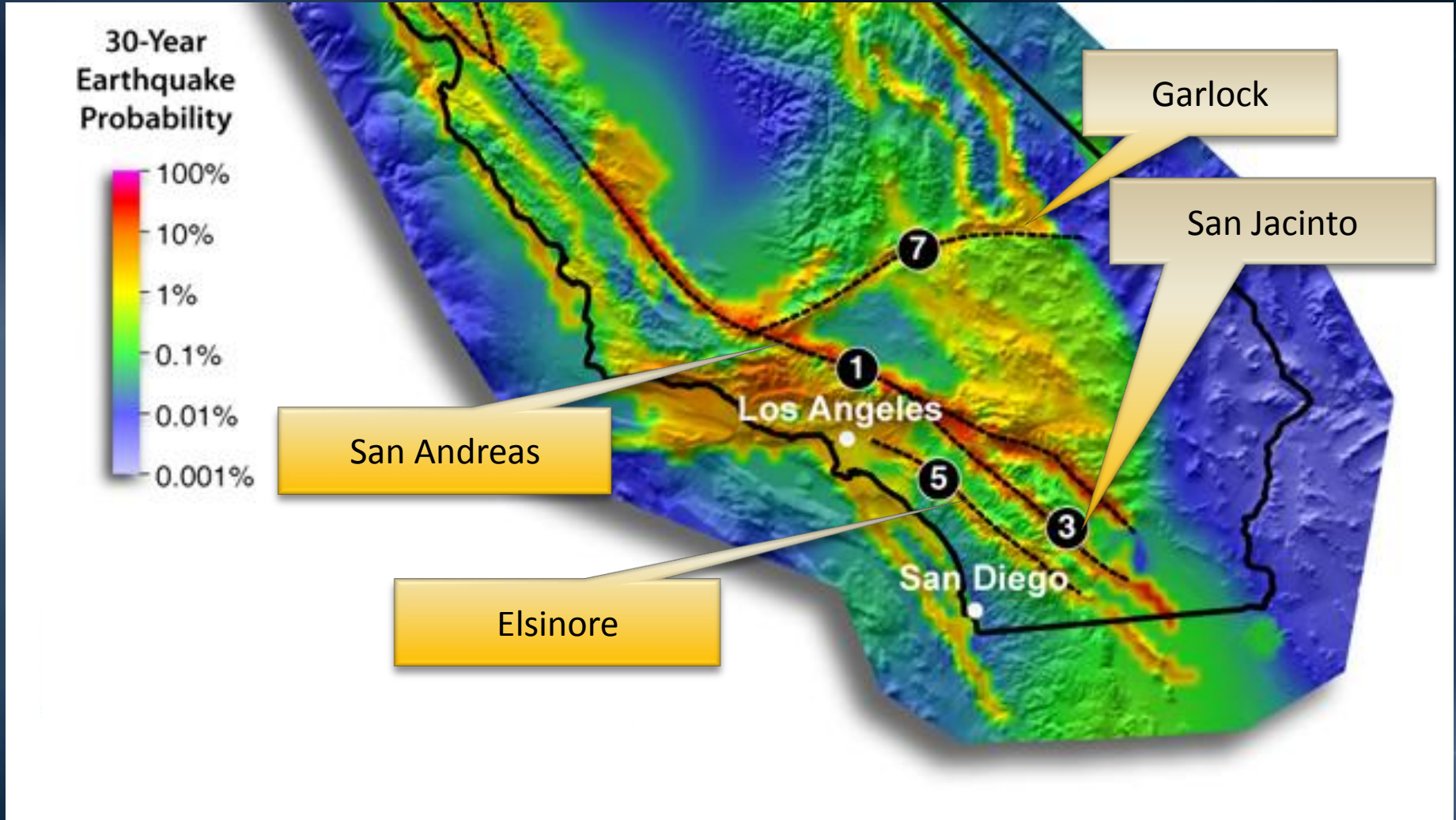
Elsinore

Los Angeles

San Diego

Garlock

San Jacinto



# Earthquake Faults in Southern California



# So. California Earthquakes

Decade	Moderate Events M6 to 7	Extreme Events M7 to 8
1970's	1	0
1980's	3	0
1990's	3	2
2000's	0	1*

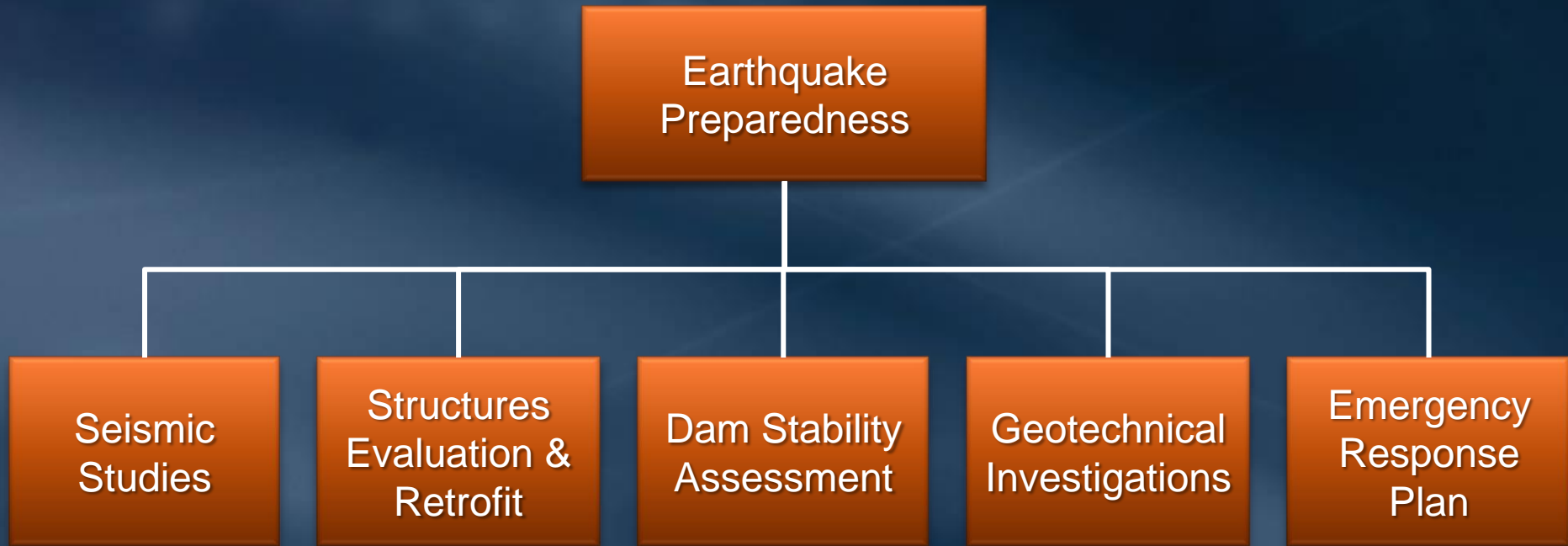
\* Includes 7.2 magnitude earthquake in Mexicali, Mexico (April 4, 2010)

# Seismic Hazards

- Surface rupture
- Liquefaction
- Strong ground motion
- Landslides



# Metropolitan's Seismic Program





# Prior Seismic Studies



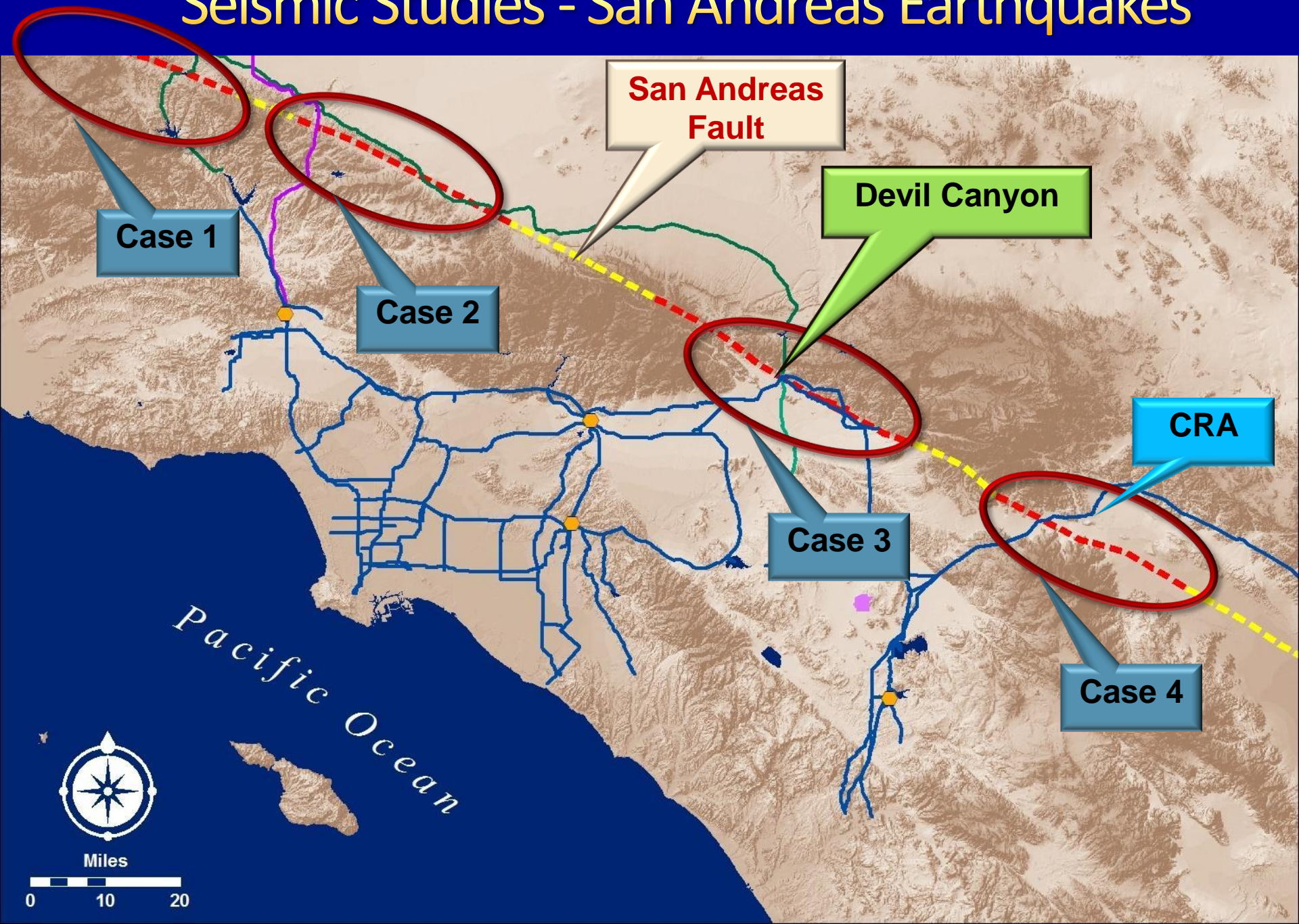
**SYSTEM RELIABILITY PLAN**  
POTENTIAL EFFECTS OF SOUTHERN CALIFORNIA  
SEISMIC EVENTS ON  
METROPOLITAN WATER DELIVERIES



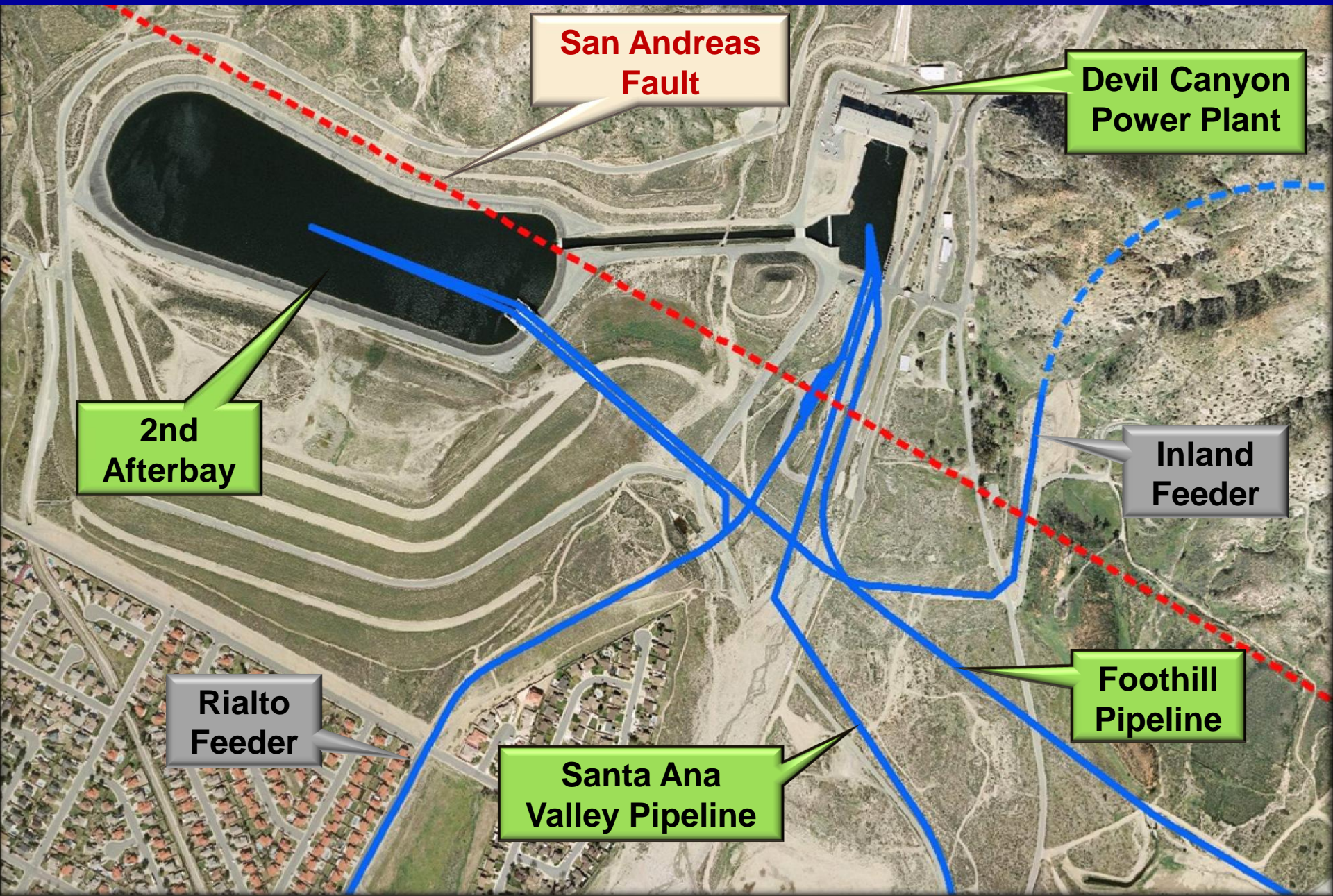
**JANUARY 2009**  
REPORT NUMBER 1335

- Estimated financial impact of earthquakes (1998)
- Post earthquake repair durations (1996)
- Evaluated system-wide effects of earthquakes (2009)

# Seismic Studies - San Andreas Earthquakes

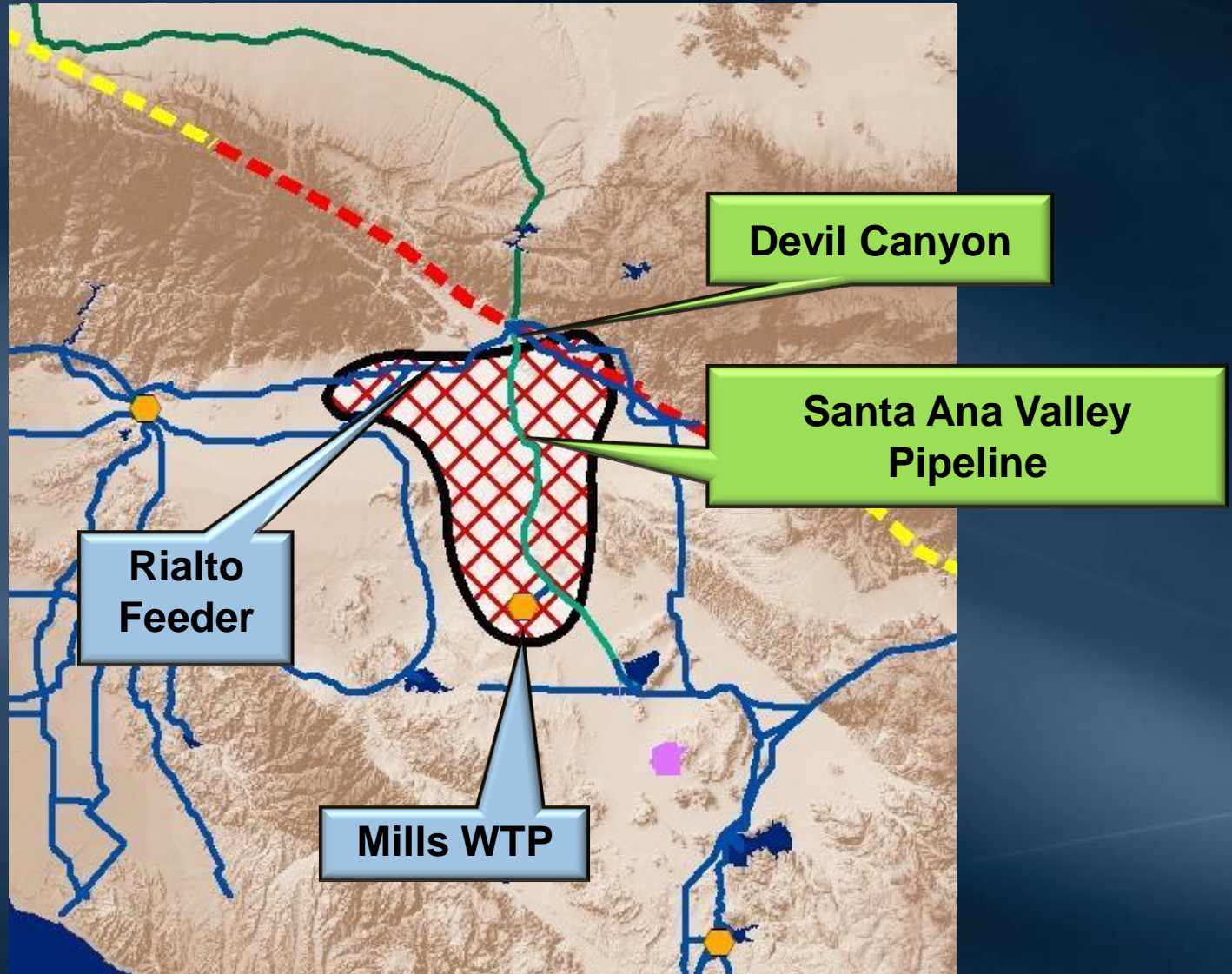


# Case 3 – Fault Rupture at Devil Canyon



# Seismic Studies – San Andreas Earthquakes

## Case 3 - Area of Impacted Water Supply



# Structures Evaluation & Retrofit

- Facilities designed pre -1990:
  - Buildings
  - Water treatment basins
  - Water storage tanks
  - Above ground structures
  - Standpipes



# Structures Evaluation Status (not including dams)

Structures to be Evaluated

308

Seismic Evaluation Status

300  
Complete

8  
Remain

Seismic Evaluation Results

192  
O.K.

108  
Retrofit Required

Retrofitted Structures

79  
Complete/In Progress

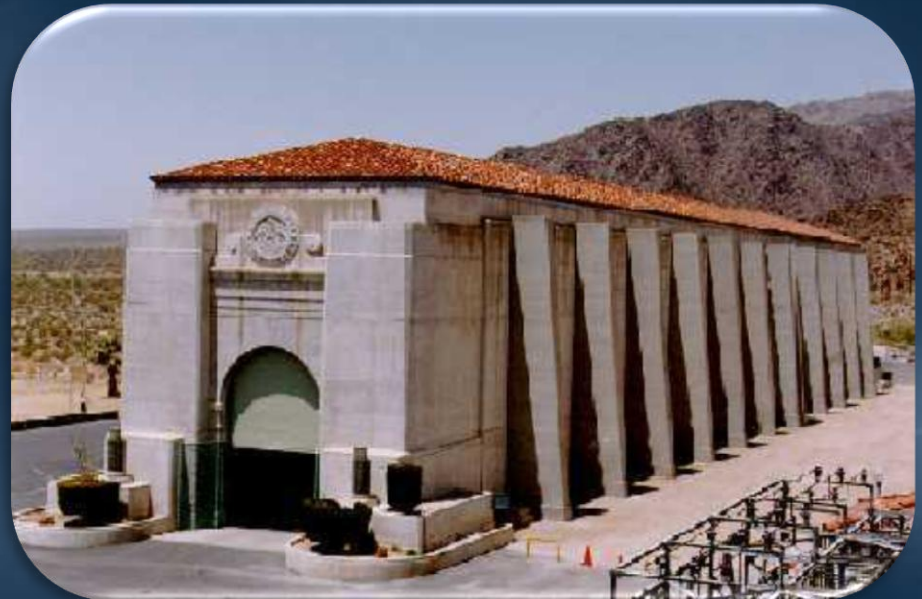
Structures to be Retrofitted

5  
Related to  
Water Delivery

24  
Not Related to  
Water Delivery

# Major Retrofit Programs - Over \$200M since 1998

- Lake Mathews Outlet Tower \$ 72M
- CRA Pump Plants \$ 11.6M
- Diemer South Slope Stabilization \$ 85M



# Dam Monitoring & Assessment

29 dams





# Dam Monitoring & Assessment

- Monitoring
  - Annual inspections by DSOD
  - Semi-annual staff inspections
  - Remote/on-line instrumentation
  - Dams in full compliance



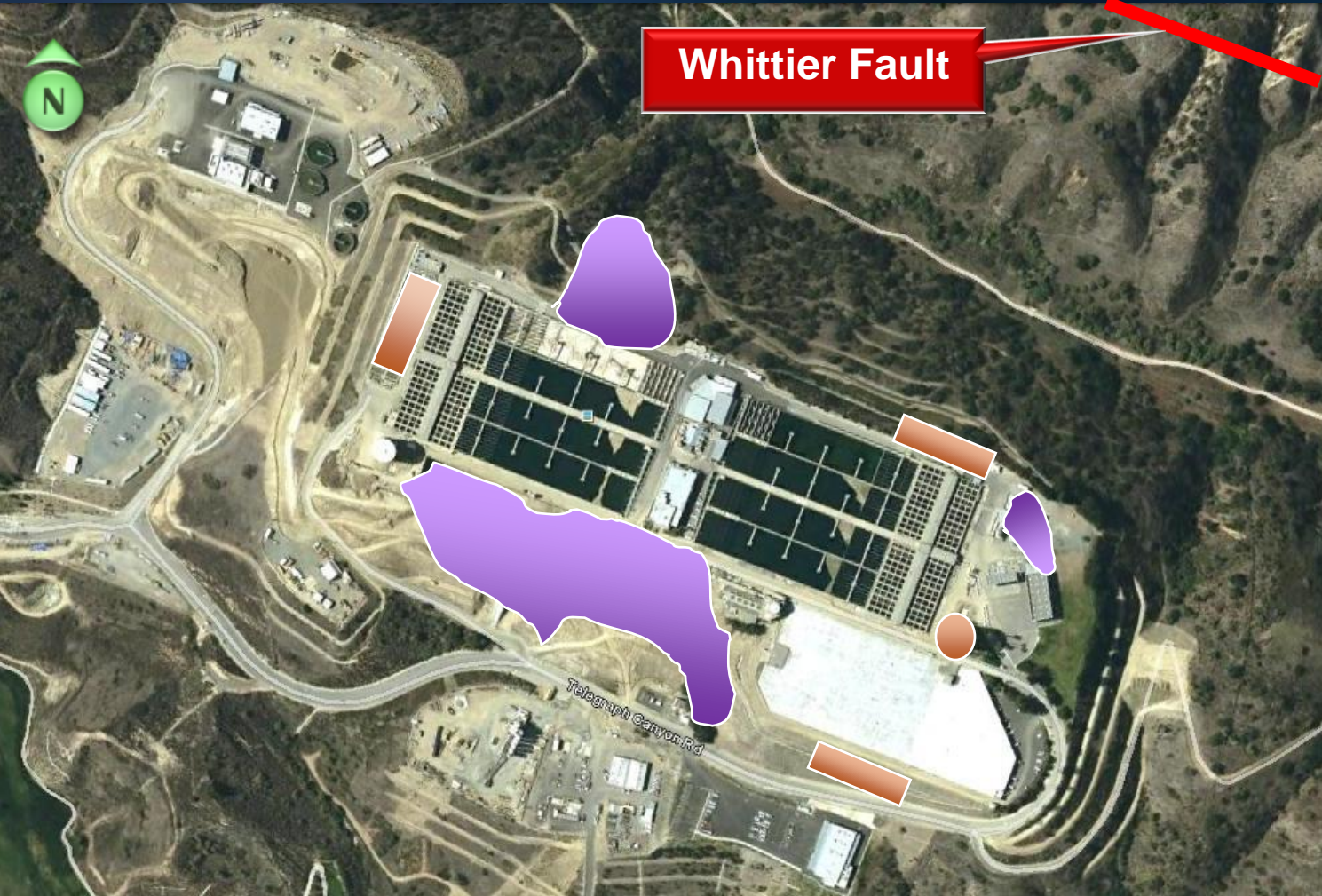
# Dam Monitoring & Assessment

- Detailed Seismic Assessments
  - 29 dams assessed in 4 phases
    - 17 dams - reviews complete – ok
    - 12 dams - reviews in progress
    - 2 – 3 dams & ancillary facilities - modification anticipated

# Geotechnical Investigations

- Staff periodically updates geological data
- Findings reveal soil stability issues at two treatment plants
  - Diemer
  - Jensen

# Soil Stability Projects at Diemer Plant



**Whittier Fault**

Work Complete



Work in Progress



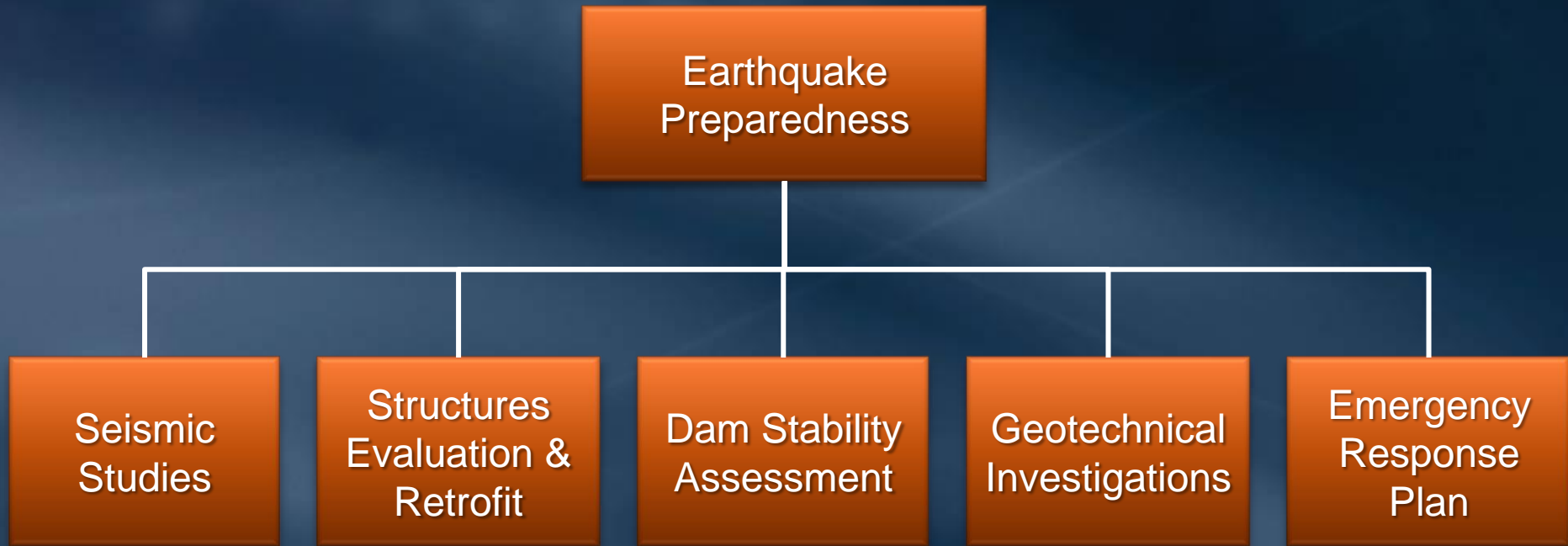
# South Slope Stabilization at Diemer



# Fill Placement at Diemer



# Metropolitan's Seismic Program



# Metropolitan's Seismic Program

- Comprehensive monitoring, evaluation and retrofit program
- Seismic issues have been prioritized and are being addressed
- Over \$200M expended
- Seismic Program is an on-going effort



