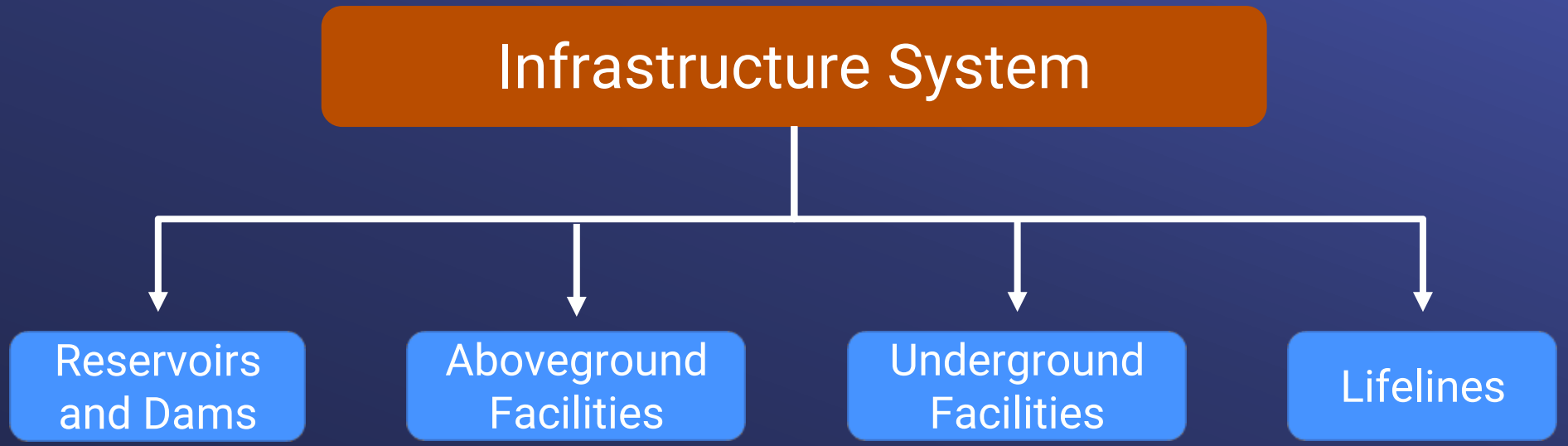
Engineering, Operations, & Technology Committee

Annual Seismic Resilience Update

Item 7a

April 10, 2023

Main Components of Metropolitan's Infrastructure System

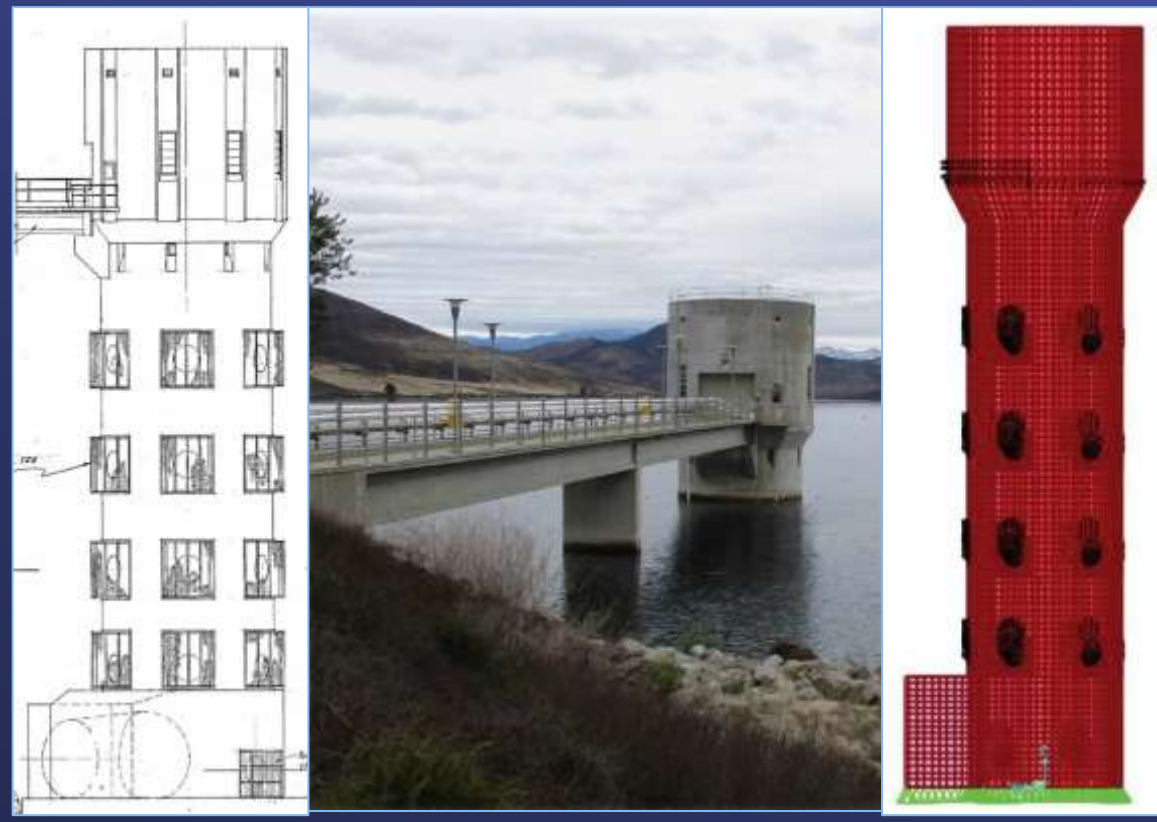


Each category is assessed by Metropolitan to understand and ensure its satisfactory performance and resilience under seismic events

Status Update

1. Dams and Reservoirs

- Lake Skinner Outlet Tower Seismic Evaluation
  - Preliminary analysis completed
  - Conducting advanced analysis
  - Replacing bottom-tier valves
- Weymouth Finish Water Reservoir
  - Seismic evaluation completed
  - Satisfactory seismic performance
- Garvey Reservoir Outlet Tower
  - Preliminary analysis completed
  - Tower strengthening as part of overall site improvements project
- Diemer Washwater Reclamation Plant No. 2
  - Preferred retrofit scheme identified

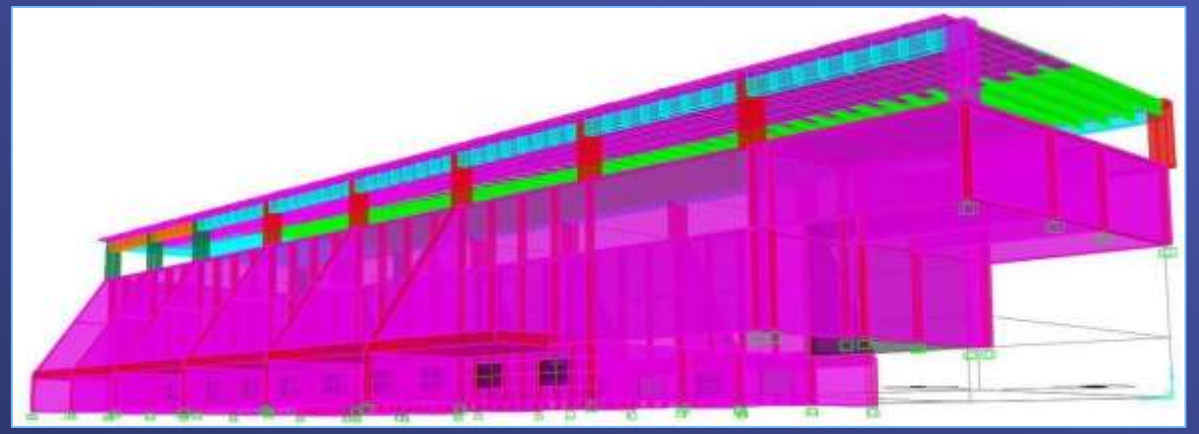


Lake Skinner Outlet Tower

Status Update

2. Aboveground Facilities

- Retrofit construction completed
  - Diemer West Filter Basin and Filter Building
  - LA Headquarters Building
    - Retrofit work completed
    - Fully ductile concrete building
    - Continuing functional and security improvements
- Projects in design and construction phases
  - Foothill Control Building
  - La Verne Water Quality Lab (WQL)
  - Weymouth Admin/Control Bldg.
- Rapid evaluation of post-1990 structures
  - Total structures identified: 28
  - 17 completed (12 O.K, 4 require detailed evaluation, 1 retrofitted)



Foothill Control Building - 3D Structural Model

Foothill Control Building

Status Update

3. Lifelines

- Casa Loma Siphon No. 1 in construction (95% completion)
  - Final tie-in completed in February
- DVL to Rialto Flexibility Improvement
  - Wadsworth Bypass Line is in construction
  - Remaining three contracts will be awarded in summer 2023
- 2nd Lower Feeder Reach 9
  - Fault crossing mitigation in preliminary design
- Eagle Lift and Eagle West Siphons Seismic Evaluation
  - Rapid eval. completed (detailed eval. recommended)
- Tasks deferred to 2023 due to limited resource
  - Updating tunnel risk assessment
  - Updating pipeline vulnerability assessment

Casa Loma Siphon No. 1 – Excavation (2022)

Casa Loma Siphon No.1 – ERDIP Joint Assembly

Status Update

4. Underground Structures

- 6300 underground structures in inventory
  - Meter structures
  - Valve structures
  - Access structures
  - Bifurcation structures
- Inspected 195 meter structures to assess existing condition
- Tasks deferred to 2023/2024 due to limited resource
  - Conduct initial screening of high-risk structures
  - Developing mitigation measures for high-risk structures identified as seismically deficient

Meter Structure

Access Structure

Status Update

Agency Partnerships

- Seismic Resilience Water Supply Task Force
  - Improve regional resilience through collaboration between three main imported-water agencies
- Conducted Task Force meeting in November 2022
  - Exchanged knowledge by sharing recent seismic resilience efforts
  - Collaborated on emergency response structure and exercise
- Future collaborations
  - Conducting joint emergency response exercise
- Updating emergency response plan

Colorado River Aqueduct

California Aqueduct

Los Angeles Aqueduct

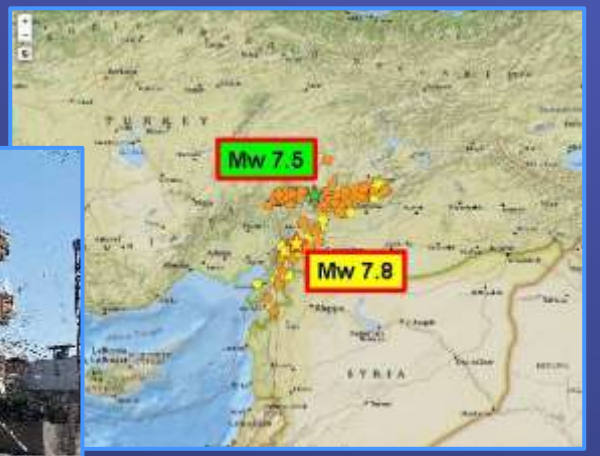
12th US-Japan-Taiwan Water System Seismic Conference

- Biennial events with regional water agencies and industry experts
  - January 30 to February 1, 2023
  - Held in Kumamoto, Japan
  - Kumamoto City experienced widespread damage in 2016 (two major earthquakes within 28 hours)
- Metropolitan participation
  - One of keynote speeches on seismic resilience strategies
  - Knowledge sharing on application of earthquake-resistant pipes (Casa Loma Siphon No. 1)

Kumamoto Castle: Damage in 2016 earthquake

February 2023 Turkey Earthquakes

- Two major earthquakes within 9 hours
  - Mw 7.8 and Mw 7.5
  - Approximately 50 miles between two epicenters
- Widespread damage to infrastructure
  - Dams
  - Transportation
  - Buildings
  - Lifelines
- Severe casualties due to collapsed buildings
  - Non-ductile concrete buildings
  - Under enforcement of building standards



Credit: USGS & Taiwan NCREE

Ductility in Concrete Buildings

- A ductile building may experience localized damage but would prevent catastrophic collapse
- Effective measures to improve ductility in concrete buildings
  - Confine concrete cores
  - Minimize damage at primary load-bearing members (columns/foundations)
  - Detail local members (beams/walls) to allow post-yield energy dissipation
  - Build in redundancy

Example of Non-ductile Building

Example of Column Failure

Example of Ductile Beam – HQ Building

Metropolitan's Concrete Buildings

- In compliance with seismic standards at the time of construction
- All non-ductile concrete buildings are being addressed
  - Mostly pre-1970 construction
  - Critical facilities have been retrofitted
    - CRA Pump Stations
    - LA Headquarters Building
    - Weymouth Filter Buildings
    - Diemer Filter Buildings
    - Diemer Admin Building
- Other facilities are being designed or in construction
  - Weymouth Admin/Control Building
  - La Verne Central Storage Building

Diemer Admin Building Seismic Upgrade


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA
1928