

Engineering, Operations, & Technology Committee Annual Infrastructure Resilience Update

ltem 9-2 April 7, 2025 Item 9-2 Annual Infrastructure Resilience Update

Subject

Annual Infrastructure Resilience Update

Purpose

- Provide updates on:
 - Strategic Infrastructure Resilience Plan (SIRP) Seismic resilience activities

Next Steps

- Continue development of the SIRP & inform CAMP4W
- Continue improvement of infrastructure seismic resilience

Strategic Infrastructure Resilience Plan (SIRP)

- A component of Metropolitan's System Reliability Strategy
- SIRP component of an integrated process to identify activities to improve Metropolitan's infrastructure
- A joint activity between SRI & Engineering
- Identified projects, programs, or activities will inform the CAMP4Water process
 - Addressed in Working Memorandum 7



Purpose of the SIRP

- Formulate strategies to improve infrastructure resilience
- Align organization-wide resilience efforts by defining vision, goals & strategies
- Guide the development of a comprehensive resilience program & its implementation
- Ensure integration of resilience program into existing operational framework & alignment with other core programs

SIRP Development Road Map

Phase 1 Scope

- Initiate SIRP Development
- Identify Characteristics of Resilient Infrastructure Systems
- Identify Key Hazards
- Develop Maturity Scale
- SME Survey: Establish Resilience Maturity Levels

Phase 2 Scope

- Establish Target Maturity Levels
- Assess Resilience Gaps
- Develop Strategies to Close the Gaps
- Establish Infrastructure
 Resilience Goals

Phase 3 Scope

- Develop SIRP
- Prepare SIRP final draft
- Present SIRP at the 2026 infrastructure resilience update

Improve Ability to Withstand, Adapt to & Recover From Hazard Strikes



Increasing

Threats &

Consequences

of Service

Disruption

SIRP Phase 2 Development Updates

- Establish target maturity levels completed
 - Based on survey of subject matter experts (SME)
- Determine maturity gaps
 - SME survey conducted in Phase 1 development
 - Subjectivity affected consistency of survey results
 - Establishing resilience goals that align expectations & minimize subjectivity
 - Follow-up survey in planning
- Establish infrastructure resilience goals completed

Maturity Gaps Assessment

- Resilience against:
 - Natural hazards
 - Example: Earthquakes, floods, wildfires
 - Technical hazards
 - Example: Cyber attacks
 - Human-caused hazards
 - Example: Accidental infrastructure damage
 - Unanticipated Events
 - Example: Pandemic (pre-2020)
- Maturity gap analysis identifies key weaknesses in systems & prioritizes mitigation efforts

Hazards Evaluated

- Earthquake
- Drought
- Wind
- Wildfire
- Flood
- Technical & Human-Caused Hazards
- General & Unanticipated Events

Importance Matrix

- Developed for each hazard
 - <u>Target Maturity Level</u>: all characteristics of a hazard should strive to achieve
 - Lower Bound Maturity Level: all characteristics of a hazard should meet
 - <u>Zones</u>: defining levels of urgency to place on improving characteristics
- Helps to identify maturity gaps & prioritize mitigations



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There is a	moderately high need for additional emphasi

- Need for additional emphasis to reach or exceed lower bound maturity level
- Limited need for additional emphasis until higher priority actions are complete
- Maintain current emphasis, some additional effort may be warranted

Importance Matrices Survey Results for Earthquake & Wildfire Resilience



SIRP Resilience Goals Categories

 Drafted 18 goals (6-Organizational, 8-Technical, 4-Social/Economic) with clearly defined attributes to assess maturity levels



Resilience Goal Example

<u>Organizational Goal 3 (O3)</u>: Adequate Resources <u>Definition:</u>

Metropolitan will ensure adequate support and resources to implement resilience measures.

Description:

Metropolitan will create written plans for developing and implementing a hazard resilience program. Metropolitan will strive to maintain a resilience program that is encouraged and supported by all stakeholders. The program will embody *multi-hazard resilience* and incorporate all existing hazard resilience plans (e.g., earthquake). Metropolitan will endeavor to ensure it has adequate resources to implement resilience measures over time.

—GENERAL —EARTHQUAKE —DROUGHT —FLOODING —WILDFIRE —WIND —TECHNOLOGY AND/OR HUMAN-CAUSED HAZARDS

Infrastructure Resilience Update – Seismic Resilience

- Approach to enhance resilience
 - Pre-event mitigation
 - Minimize impacts of seismic events on water delivery
 - Post-event restoration
 - Quickly restore system capacity to prevent lasting adverse effects



Categorization of Major Facilities for Seismic Program

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Seismic Risk Mitigation Update – Reservoirs & Dams

- Dam Risk Assessments
 - Lake Mathews complete
 - Lake Skinner being finalized
 - Additional assessments planned
- Monitoring System Upgrades
 - Garvey Reservoir complete
 - DVL underway
 - Additional system upgrades planned



Garvey Reservoir Accelerograph Output

Seismic Risk Mitigation Update – Above-ground Facilities

- Completed Activities
 - Construction of Foothill HEP/PCS seismic upgrade
 - Seismic assessment of Upper San Gabriel Tower
- Ongoing Activities
 - La Verne Water Quality Lab Rehabilitation
 - Preliminary design complete
 - Weymouth Admin & Control Buildings
 - Final design nearly complete



Column Strengthening of Foothill HEP/PCS

Seismic Risk Mitigation Update – Underground Facilities

- Complete inspections of meter structures largely complete
- Develop app to standardize data collection in the field to prepare for subsequent data analytics



GIS Application of Meter Inspection Results

< Meter	Structure Assessment Vulnerabil	іту Арр 🛛 🗞
* Access		
Type of structure	Below ground structure entrance	Above ground structure entrance
v	÷	
Door Coating	Platforms	Cast Iron of Steel Cover/Hetch
×	×	
Ladder	Handral	
×	×	
Installed Notinstalled		
* Structure		
Cast in place Concrete Wall, roof and floor Visual Condition	Precast concrete elements/ marihole rings/ grade rings Visual Condition	Structure water inflitration
	~	
5: Temperature/shrinkage cracking only. No null stains or spalling. No Efflorescence or other deterioration 4: Rust Stains: Minor Localized	5: No Visible Cracking 4: Minor Cracking Visible 3: Rast Stains Visible	5: Structure is Dry 4: Minor infittation draining to functional sump
Spalling 3: Large areas of spalling. Reinforcement steel cross section is	2: Extensive Rust Stains Visible; Spalled and Corroding Steel	2: Regular pumping required
Wall and Slab Condition	Roof Condition	Water Intrusion
6	1. M	3
5: No Damage	5: No Damage	No water instrusion
4: Hairline Cracks	4: Minor Gracks for Concrete and Minor Resting for Metal	Water Intrusion
a minor uracks no need to repair.	3-Hading Cracks for Concepts and	Critician Contract of Contract

Condition Assessment App

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Seismic Risk Mitigation Update – Lifelines

- Update pipeline seismic vulnerability study
- Initiate CRA tunnels seismic evaluation
- Continue prestressed concrete cylinder pipe rehabilitation



Northridge Earthquake Hindcast Estimated Repair Scenarios

Measures to Enhance Resilience against Extreme Events

- Build up emergency response capability
 - Maintain in-house resources & expertise
 - Completion of La Verne Shops Stage 5 Improvements
 - Promote inter-agency collaboration (Aqueduct Seismic Resilience Task Force)



Plasma Table Contractor Provided Training at La Verne Machine Shop



Task Force Emergency Response Exercise (CalOES, CalWARN, DWR, LADWP, MWD)

Next Steps – Infrastructure Resilience

• SIRP

- Refine maturity gap analysis
- Develop an SIRP implementation plan
- Prepare final draft of SIRP
- Present SIRP in Spring 2026
- Seismic
 - Continue implementation of seismic upgrade program to improve infrastructure reliability
 - Develop restoration strategies to supplement retrofit/upgrade efforts to plan for resilient infrastructure
 - Complete 2025 Seismic Resilience Report Update



SEISMIC RESILIENCE REPORT 2020 UPDATE



The Metropolitan Water District of Southern California 700 N. Alameda Street, Los Angeles, California 90012



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2020 Seismic Report

