SEAWALL EARTHQUAKE SAFETY & DISASTER PREVENTION PROGRAM

Presentation to the Port Commission
March 13, 2018
• Up to $5B program over 30 years

• $500M Phase I to be completed by the end of 2026

• Phase I will prioritize the most critical and vulnerable assets.
SEAWALL EARTHQUAKE SAFETY & DISASTER PREVENTION PROGRAM GOALS

1. ACT QUICKLY TO IMPROVE DISASTER PREPAREDNESS
2. REDUCE EARTHQUAKE DAMAGE
3. IMPROVE FLOOD RESILIENCE
4. ENHANCE THE CITY & THE BAY
5. PRESERVE HISTORIC RESOURCES
6. ENGAGE THE COMMUNITY
Port sea level rise modeling identifies near-term flood risk, and maps rising tide and storm surge scenarios.

**LIFELINES COUNCIL INTERDEPENDENCY STUDY**
Seawall identified as one of the City’s Top 5 most critical lifeline safety assets. Seismic and sea level rise vulnerabilities identified for further multi-hazard risk assessment to inform investment prioritization.

**SEA LEVEL RISE INUNDATION ANALYSIS**

**April 2014**

**MAYOR’S SEA LEVEL RISE ACTION PLAN**
San Francisco establishes aggressive agenda for further sea level rise analysis, adaptation planning, and implementation.

**July 2016**

**SEAWALL EARTHQUAKE VULNERABILITY STUDY**
Seawall is found vulnerable to seismic hazards, posing risk to the City’s critical emergency response and lifeline assets.

**November 2016**

**FEDERAL INTEREST DETERMINATION**
Army of Corps of Engineering issues federal interest determination under its flood hazard mitigation authority.

**November 2017**

**PLANNING, ENGINEERING, AND ENVIRONMENTAL CONSULTANT (PEEC) CONTRACT**
Port launches Planning phase of the Seawall Earthquake Safety and Disaster Prevention Program.
PROGRAM TEAM ORGANIZATION

Executive Steering Committee

Capital Planning Committee

ENGINEERING INFRASTRUCTURE & STRUCTURES
LAND USE/ENVIRONMENT/URBAN
ECONOMICS /FINANCE
LEGISLATIVE/EXTERNAL AFFAIRS
STAKEHOLDER ENGAGEMENT
INDEPENDENT SEISMIC PEER REVIEW PANEL

Composed of established academic and industry leaders with technical expertise in
- Earthquake Engineering
- Geotechnical Engineering
- Structural Engineering
Provides independent technical oversight of approaches and decisions

SEISMIC PEER REVIEW PANEL MEMBERS

Shahriar Vahdani, Ph.D., P.E., G.E.
GTC – Chair

Stephen Dickenson, Ph.D., P.E., D. PE
New Albion Geotechnical, Inc. – Co Chair

Jonathan Bray, Ph.D., P.E., NAE,
U.C. Berkeley Faculty Chair in Earthquake Engineering Excellence

Mark Salmon, S.E.,
BART Earthquake Safety Program, MGE

Daryl English, P.E., S.E.,
Berger-Abam
Planning Phase

- Provide expert planning, engineering, and environmental services for risk assessment & alternatives development
- Develop an overall seawall improvement program including definition of the initial improvements for Phase I

Design & Engineering Phase

- Complete preliminary design, engineering and environmental approval of the selected Phase I improvements
- Develop implementation strategy for final design and construction of Phase I improvements

Construction Phase

- Provide strategic and technical assistance during execution of final design and construction of Phase 1 improvements
**CH2M/ARCADIS - PLANNING PHASE SCOPE**

<table>
<thead>
<tr>
<th>Task 1.02 Stakeholder Engagement and Community Planning</th>
<th>Task 1.03 Existing Conditions Assessment</th>
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</thead>
<tbody>
<tr>
<td>• Stakeholder interviews and web survey</td>
<td>• Initial Data Inventory TM</td>
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<tr>
<td>• Stakeholder Engagement Plan</td>
<td>• Existing Conditions TM</td>
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<tr>
<td>• Stakeholder engagement</td>
<td>• Additional investigations</td>
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<td>• Project Graphic Information System</td>
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<table>
<thead>
<tr>
<th>Task 1.04 Multi-Hazard Risk Assessment</th>
<th>Task 1.05 Alternatives Analysis &amp; Program Selection</th>
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<tbody>
<tr>
<td>• Seismic and Flood Analysis</td>
<td>• Needs, Risks, and Aspirations</td>
</tr>
<tr>
<td>• Infrastructure Risk Assessment</td>
<td>• Alternatives Analysis</td>
</tr>
<tr>
<td>• Land Use, Urban Realm, and Regulatory/ Environment Analyses</td>
<td>• Recommend initial improvements alternative for design and environmental compliance</td>
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<tr>
<td>• CEQA Options TM</td>
<td>• Recommended Program</td>
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<tr>
<td>• Economic Analysis</td>
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<td>• MHRA Report</td>
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</table>
1.03 – Existing Conditions Assessment

- Initial Data Inventory TM
- Existing Conditions TM
- Additional Investigations
- Project GIS

**Highlights**

- Collected and synthesizing available data (project database and GIS)
- Identified data gaps
- Developed geotechnical field investigations options
- Held kick-off meetings with City/regional infrastructure agencies

**Look-Ahead**

- Initiate geotechnical field investigation
- Complete asset inventory, GIS, and Existing Conditions Report
- Work with City/regional infrastructure agencies to launch risk assessment
Video showing digital model of existing data
Advanced geotechnical field investigations to begin this spring
MULTI-HAZARD RISK ASSESSMENT

1.04 – Multi-Hazard Risk Assessment

- Infrastructure Risk Assessment
- Land Use Analysis
- Urban Design Analysis
- Regulatory/Environment Analysis
- CEQA Options
- Economic Analysis
- MHRA Report

Purpose

- Provide transparent, risk-based decision tool to inform investment prioritization
- Characterize seismic and flooding risk, including sea level rise

Outcomes

- Quantification of life safety, damages, and disruptions resulting from seismic and flood scenarios
- Identify land use, environmental, and urban constraints and opportunities
MULTI-HAZARD RISK ASSESSMENT

1.04 – Multi-Hazard Risk Assessment

- Infrastructure Risk Assessment
- Land Use Analysis
- Urban Design Analysis
- Regulatory/Environment Analysis
- CEQA Options TM
- Economic Analysis
- MHRA Report

**Highlights**

- Initiated risk assessment methodology and approach
- Developed GIS asset inventory for economic analysis
- Developed draft reports for infrastructure systems exposure analyses
- Developed GIS data standards

**Look-Ahead**

- Kick-off seismic and flood hazard analysis
- Continue work with infrastructure agencies to assess critical assets and consequences
- Conduct Public Life Survey to inform urban constraints and opportunities
- Initiate land use, urban, and regulatory tasks
1.05 – Alternatives Analysis & Program Selection

- Needs, Risks, and Aspirations
- Alternatives Analysis
- Recommend initial improvements alternative for design and environmental compliance

**Purpose**

- Formulate and analyze alternatives to address seismic and flood risks
- Engage stakeholders in development and selection of alternatives

**Outcomes**

- “Adaptation Toolbox”
- Endorsed Phase I Improvements
- Recommended long-term program and vision framework
- Financing strategy
- Tools and processes for Port-wide applications
- Engaged and informed stakeholders
Highlights

- CAP 103 - Conducted charrette to brainstorm and vet flood protection alternatives for a limited reach of waterfront and the Muni Tunnel
- General Investigation - Developed draft strategy document to assess approaches to General Investigation Study

Look-Ahead

- CAP 103 - Support completion of CAP103 major decision milestone in late June 2018
- General Investigation – Meet with USACE in Washington DC
### PHASE I DETAILED SCHEDULE
CURRENTLY UNDER CONSIDERATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Program Development/Planning, $14m</th>
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<tbody>
<tr>
<td>2018</td>
<td>Data Collection &amp; Field Investigations</td>
</tr>
<tr>
<td>2019</td>
<td>Multi-Hazard Risk Assessment</td>
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<tr>
<td>2020</td>
<td>Alternatives Development &amp; Analysis</td>
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<tr>
<td>2021</td>
<td>Selection of Phase 1 Projects</td>
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<td>2022</td>
<td>Development of Overall Program</td>
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<thead>
<tr>
<th>Year</th>
<th>Preliminary Design &amp; Environmental Approvals, Phase I Projects, $25m</th>
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<tbody>
<tr>
<td>2018</td>
<td>Design &amp; Engineering to 35%</td>
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<tr>
<td>2019</td>
<td>NEPA &amp; CEQA</td>
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<td>2020</td>
<td>Solicitation of Contractors (DBB, DB, CMGC)</td>
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<tr>
<th>Year</th>
<th>Life Safety and Pilot Projects, $75m</th>
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<tbody>
<tr>
<td>2018</td>
<td>Critical life safety projects</td>
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<tr>
<th>Year</th>
<th>Final Design &amp; Construction, Phase I Projects, $385m</th>
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<tbody>
<tr>
<td>2018</td>
<td>Final Design &amp; Engineering</td>
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<tr>
<td>2019</td>
<td>Construction &amp; CM</td>
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<tr>
<td>2020</td>
<td>Permits</td>
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<tr>
<td>2021</td>
<td>Closeout</td>
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<tr>
<th>Year</th>
<th>USACE CAP 103 (Near Term Flood Protection Project), $6m</th>
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<tbody>
<tr>
<td>2018</td>
<td>Feasibility Study</td>
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<tr>
<td>2019</td>
<td>Project Partnership Agreement</td>
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<tr>
<td>2020</td>
<td>Design &amp; Construction</td>
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**Program Management Stakeholder Engagement**

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WHERE WE ARE HEADED

+6' SEA LEVEL RISE

+3' SEA LEVEL RISE

CURRENT WATER LEVEL
• April – Bond Report Action Item
• June & September – Quarterly Updates
• November - Election