

WATERFRONT RESILIENCE PROGRAM UPDATE

Port Commission Agenda Item #12A
December 14, 2021



Waterfront Resilience Program



WATERFRONT RESILIENCE PROGRAM

Today's Update



- Overview of risks facing the Embarcadero waterfront
- Post-MHRA planning work
- Embarcadero Early Projects
- Next Steps

An aerial photograph of the San Francisco waterfront, showing several large white ferries docked at a pier. In the background, the city skyline is visible, including the Transamerica Pyramid and the San Francisco Ferry Building. A dark blue semi-transparent rectangle is overlaid on the left side of the image, containing white text.

Waterfront Risks

Multi-Hazard Risk Assessment Findings



EARTHQUAKE RISKS FACING THE EMBARCADERO

Embarcadero Multi-Hazard Risk Analysis (MHRA) Findings

Up to \$30 billion cost of damages and disruption from **combined seismic and flood risk by 2100**



Embarcadero Roadway and underground utilities vulnerable to ground shaking and liquefaction



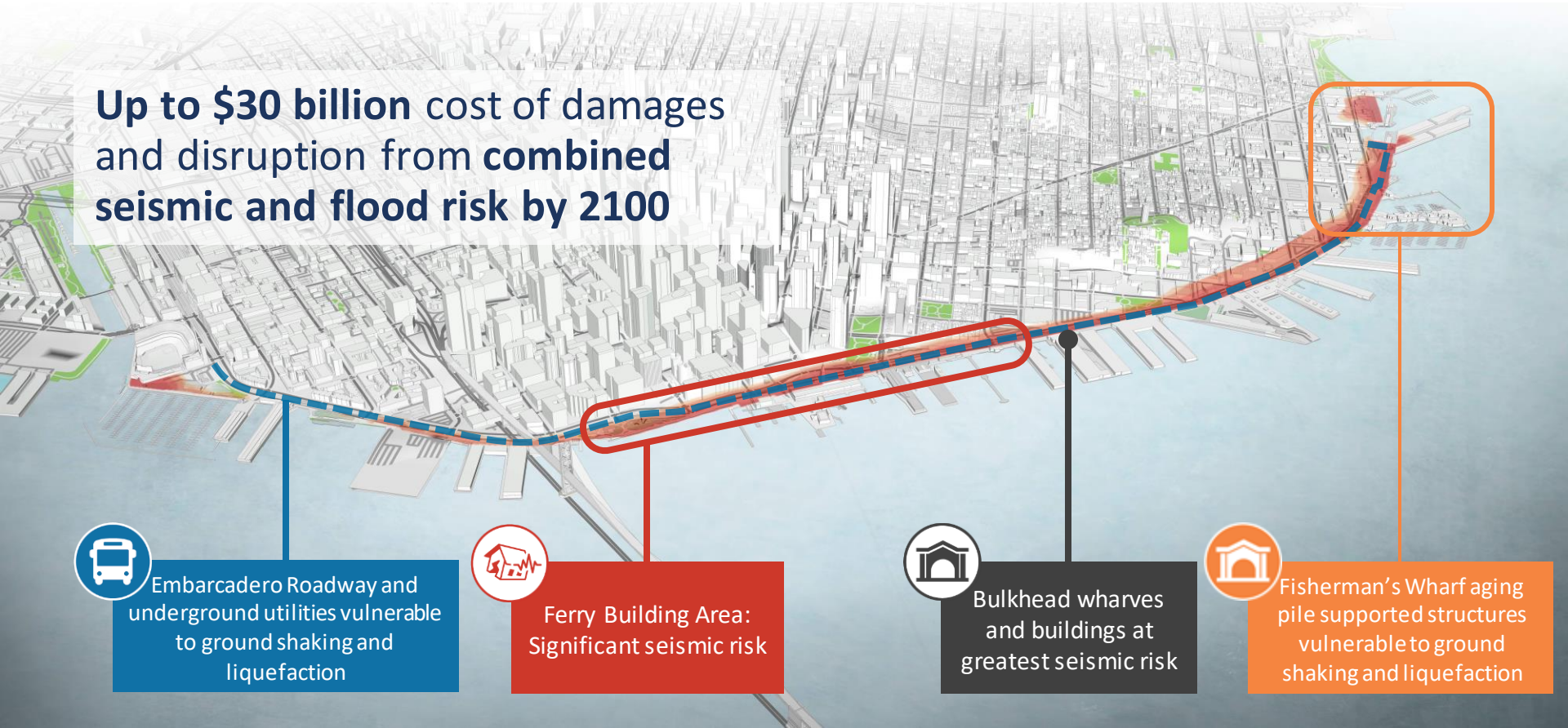
Ferry Building Area: Significant seismic risk



Bulkhead wharves and buildings at greatest seismic risk

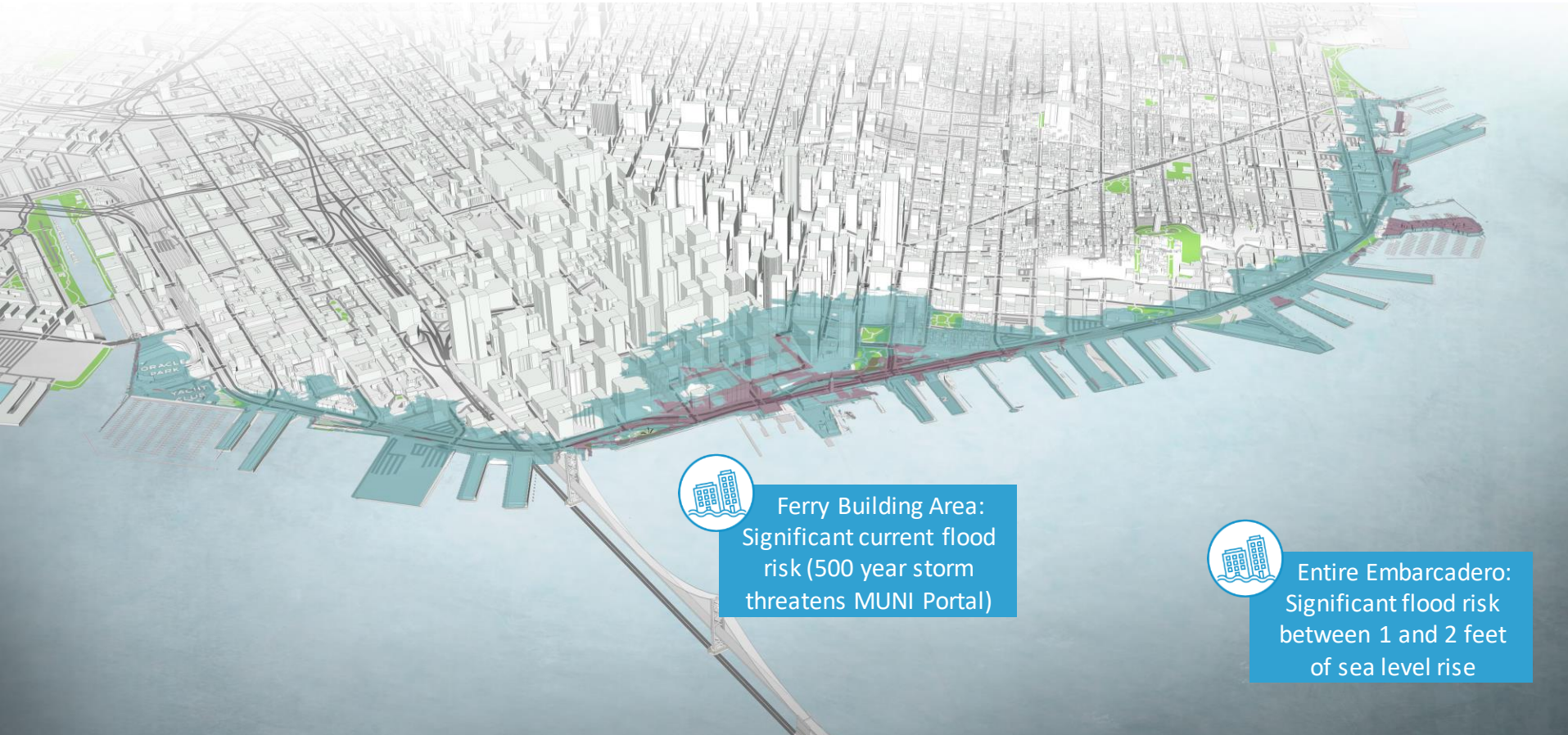


Fisherman's Wharf aging pile supported structures vulnerable to ground shaking and liquefaction



FLOOD HAZARDS FACING THE EMBARCADERO

Embarcadero Multi-Hazard Risk Analysis (MHRA) Findings



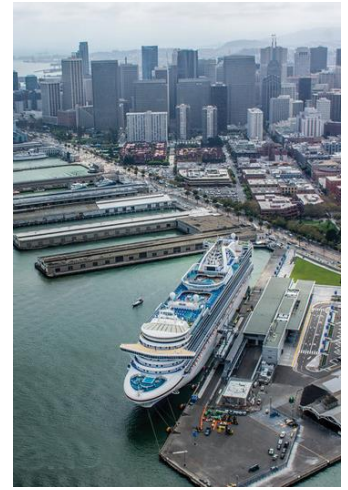
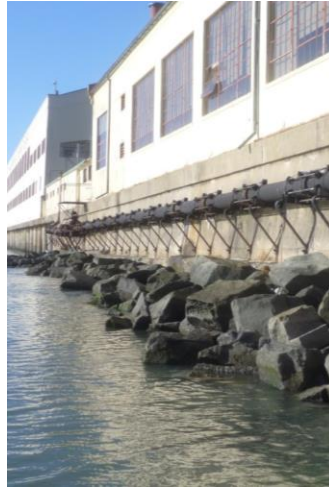
Ferry Building Area:
Significant current flood
risk (500 year storm
threatens MUNI Portal)



Entire Embarcadero:
Significant flood risk
between 1 and 2 feet
of sea level rise

DISASTER RESPONSE EXERCISE

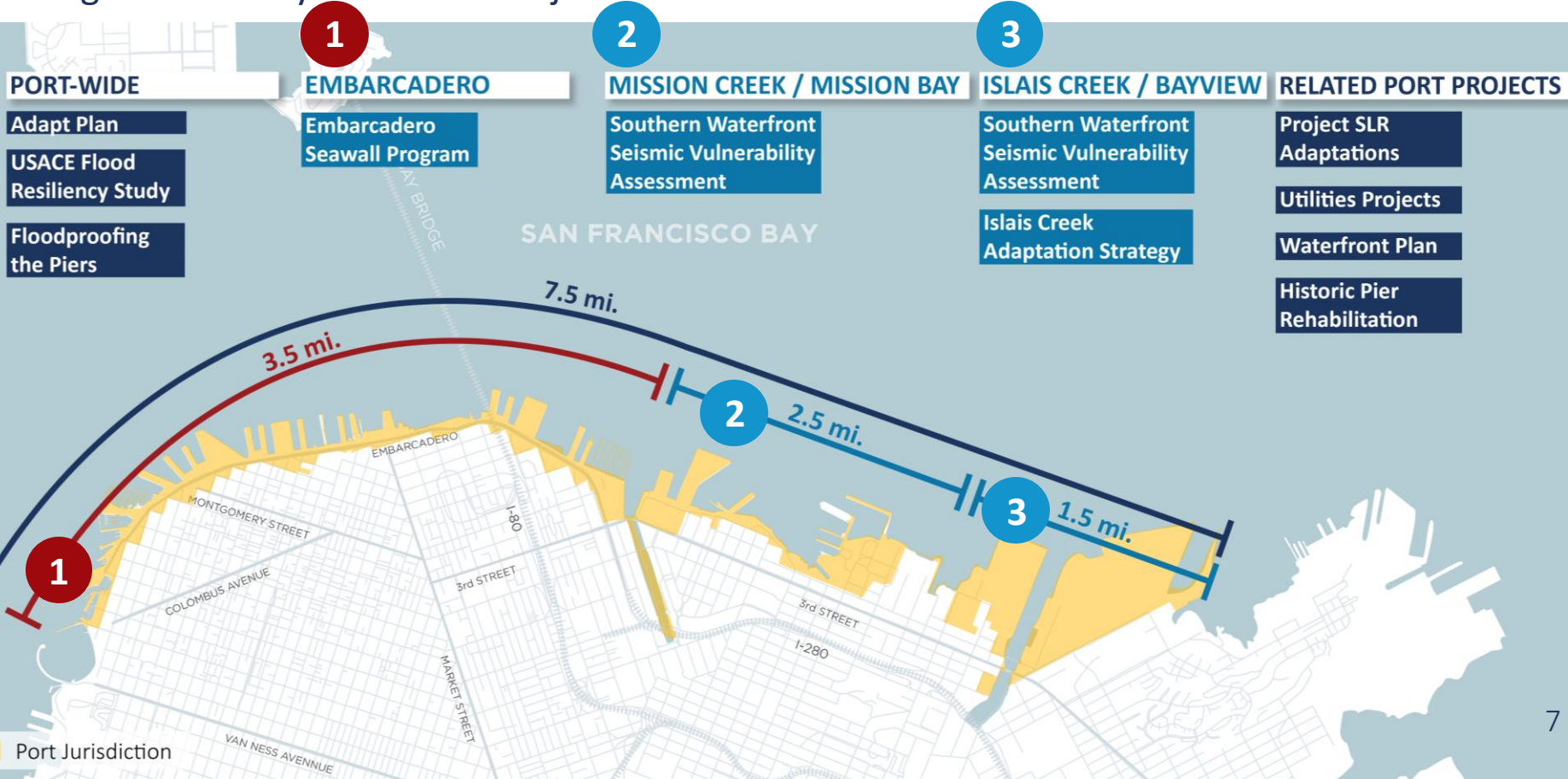
Summer 2021



Confirmed the importance of Port's berths, piers and wharves for moving people and supplies, the Port's role in waterfront recovery, and the importance of the Embarcadero Roadway

WATERFRONT RESILIENCE PROGRAM EFFORTS

Program and City Resilience Projects and Efforts



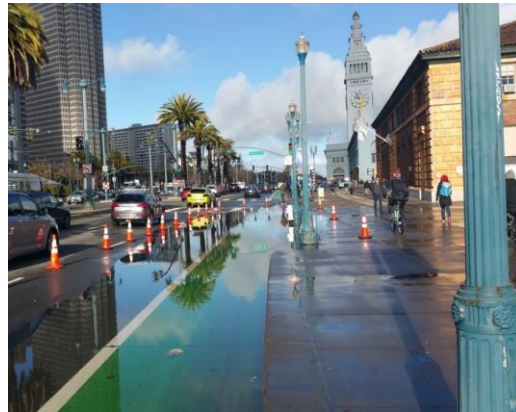
ADAPTATION STRATEGIES DEVELOPMENT OVERVIEW

Waterfront-wide Resilience efforts that will address risk over the next few decades

Based on findings from the MHRA and stakeholder engagement work, the WRP team is formulating geographically-focused adaptation strategies.



CONSTRUCTION PROJECTS



POLICIES



ADAPTATION PLANNING

An aerial photograph of San Francisco, California, showing the city skyline with the Transamerica Pyramid in the center. The foreground features the waterfront area with a long pier extending into the water, several boats, and buildings along the shore. The sky is blue with some light clouds.

Waterfront Resilience Program

Embarcadero Early Projects

US Army Corps Flood Study



DEFINING EMBARCADERO EARLY PROJECTS

Goals for Embarcadero Early Projects



Identify
Critical Projects for
Early Implementation

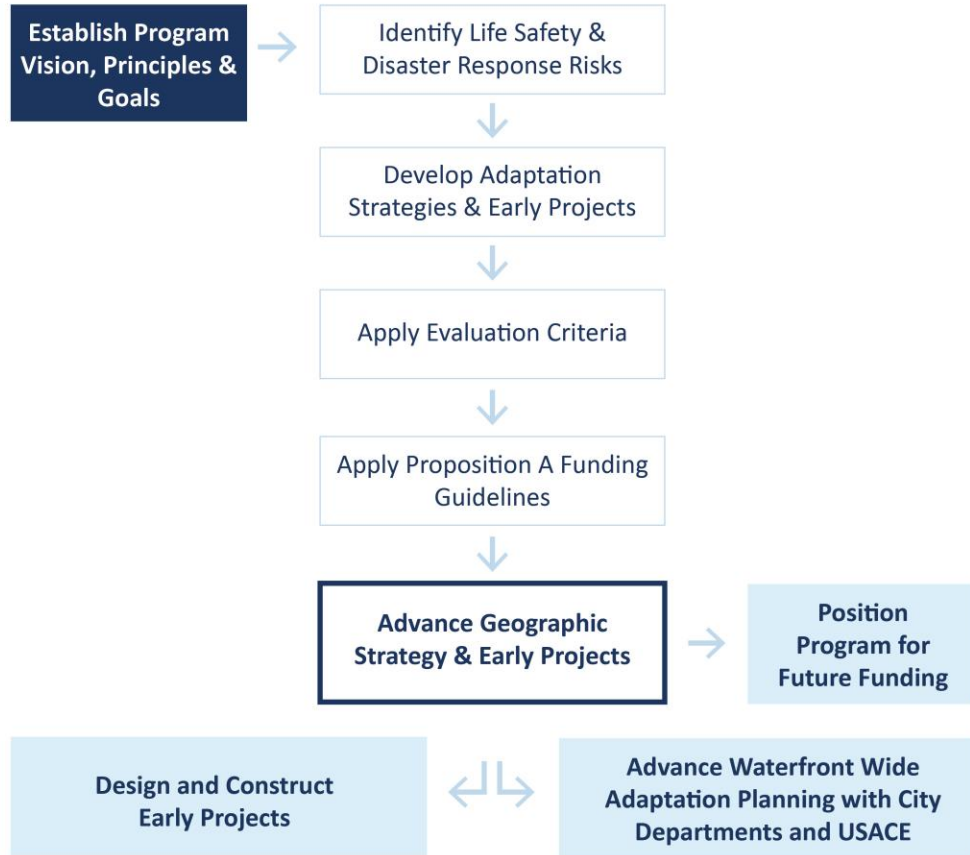


Prioritize Life Safety +
Emergency Response



Near-Term
Flood Defenses

WATERFRONT RESILIENCE PROGRAM DECISION FRAMEWORK



EVALUATION CRITERIA

35 individual criterion across five categories, developed with community input



**Feasibility
& Performance**



**Society
& Equity**



**Economic
& Financial**



Environmental



**Governance
& Partnerships**

PROPOSITION A FUNDING GUIDELINES



Disaster Response

- Are we focusing investment on **Life Safety and Disaster Response**?



Funding

- Is more analysis or planning needed?
- Are there other funding sources such as private equity or public financing that can pay for improvements?



Partnerships

- Are projects planned by other **City agencies** that would allow delivery in partnership?
- Does the Port have a **long-term tenant or development partner** the Port can partner with to build improvements?



Society & Equity

- Is investment prioritized for improvements that benefit the **whole city**?
- Are safety improvements spread across the Embarcadero Seawall area in an **even** manner?

EMBARCADERO EARLY PROJECTS LIST



- **11** advancing straight to pre-design (needs assessment) using Proposition A funding
- **5** advancing through a geographic strategy for the stretch between Piers 19 and 41
- **7** advancing through coordination with long-term Port tenants, capital programs, and City agency coordination

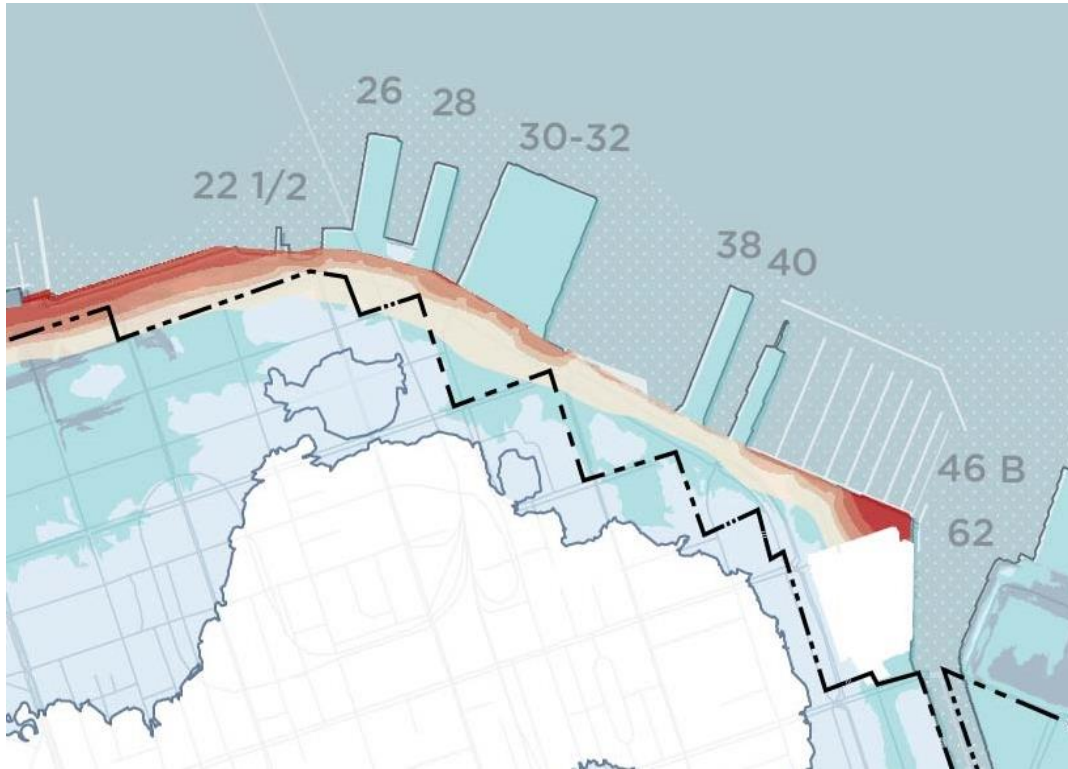
- **Blue Circle** Proposition A Predesign
- **Red Circle** Coordination with Long-term Tenants, Capital Programs and City Agencies
- **Green Circle** Advance through Geographic Strategy

PROJECT LIST:

- 1 Joint Operations Security Center and Fuel Dock Reliability Project
- 2 Wharf J9 Replacement and Resilient Shoreline Project
- 3 Taylor Street Seawall Earthquake Stabilization Project
- 4 Pier 45 Apron Earthquake Safety Retrofit and Flood Risk Reduction
- 5 Pier 43-1/2 Seawall and Wharf Earthquake Safety Project
- 6 Pier 41 Seawall Earthquake Stabilization and Wharf Retrofit
- 7 Pier 39 Seawall Earthquake Stabilization & Wharf Retrofit/Replacement
- 8 Pier 33 to 35 Seawall and Wharf Earthquake Reliability Project
- 9 Pier 31-1/2 Bulkhead Wall and Wharf Earthquake Safety Retrofit
- 10 Pier 27 Seawall and Wharf Earthquake Reliability Project
- 11 Pier 15 Bulkhead Wall and Wharf Earthquake Safety Retrofit
- 12 Pier 9 Bulkhead Wall and Wharf Earthquake Safety Retrofit
- 13 Pier 9 Historic Shed Building Earthquake Safety Retrofit Project
- 14 Pier 1 Bulkhead Wall and Wharf Earthquake Reliability Project
- 15 Ferry Building Seawall & Substructure Earthquake Reliability
- 16 Agriculture Building Bulkhead Wall and Wharf Earthquake Safety
- 17 Pier 5 to Pier 22-1/2 Near-Term Coastal Flood Risk Reduction Project
- 18 Pier 24 to Pier 28-1/2 Bulkhead Wall and Wharf Earthquake Safety
- 19 EFWS, Intake Tunnel #1 Earthquake Reliability Project
- 20 Giants Seals Plaza Seawall Earthquake Stabilization Project
- 21 Pier Fire Suppression & Waterside Evacuation Improvements
- 22 EFWS, Fireboat Manifold Earthquake Reliability Projects
- 23 Pier Utility Connection Earthquake Retrofits at Seawall

SOUTH BEACH

Risks

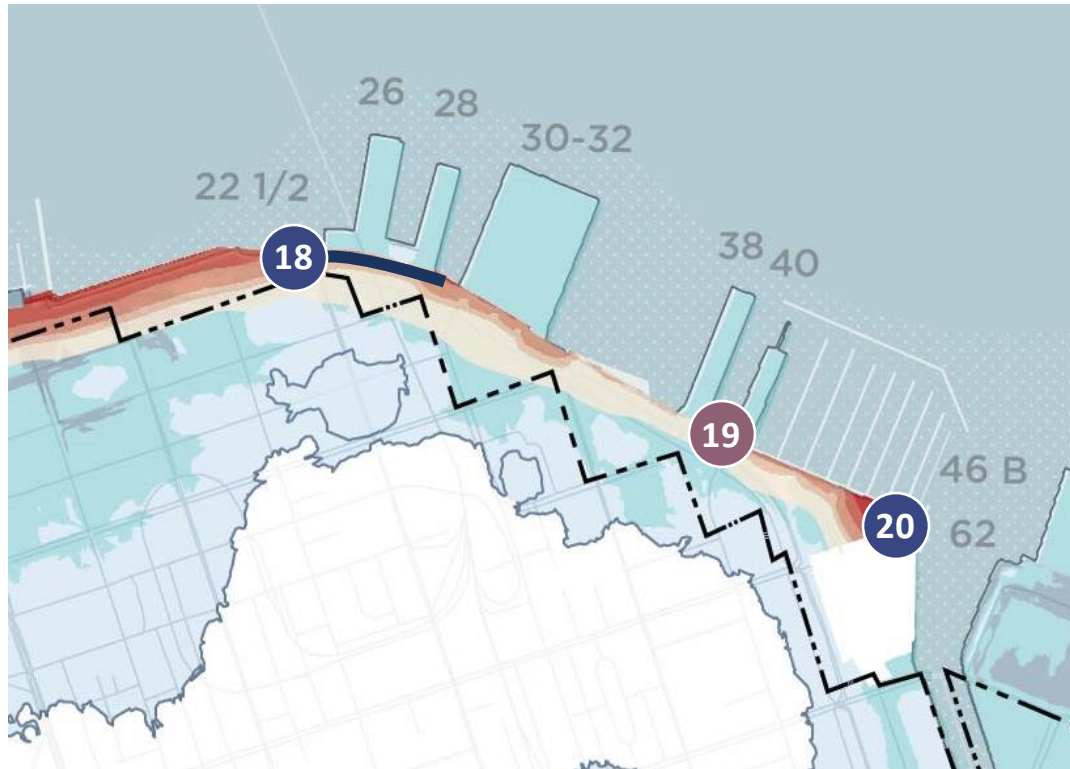


EARTHQUAKE & FLOOD RISKS

- Better soils under Seawall
- Lateral spreading risk: LOW (More stable shoreline)
- Bulkhead Wharf EQ risk: HIGH (ground shaking)
- Embarcadero EQ risk: MODERATE (Fill liquefaction)
- Coastal Flood SLR risk: EMERGING

SOUTH BEACH

Early Projects



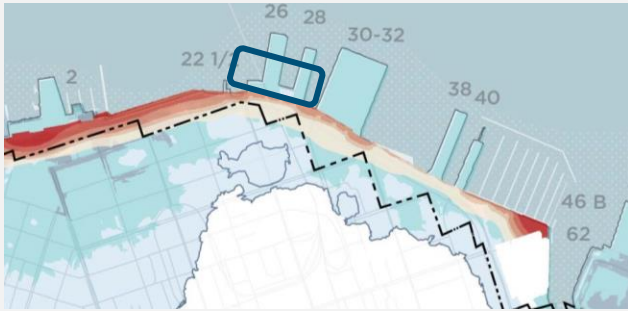
- 18** Pier 24 to Pier 28-1/2 Bulkhead Wall and Wharf Substructure Earthquake Safety Retrofit Project
- 19** Emergency Fire Water System, Intake Tunnel #1 Earthquake Reliability Project
- 20** Giants Seals Plaza Seawall Earthquake Stabilization Project

● Proposition A Predesign

● Coordination with Long-term Tenants, Capital Programs and City Agencies

PIER 24 to PIER 28-1/2 BULKHEAD WALL AND WHARF STRUCTURE EARTHQUAKE SAFETY PROJECT

18



Cost Range: \$5-25M

Project Duration: 2-4 Years

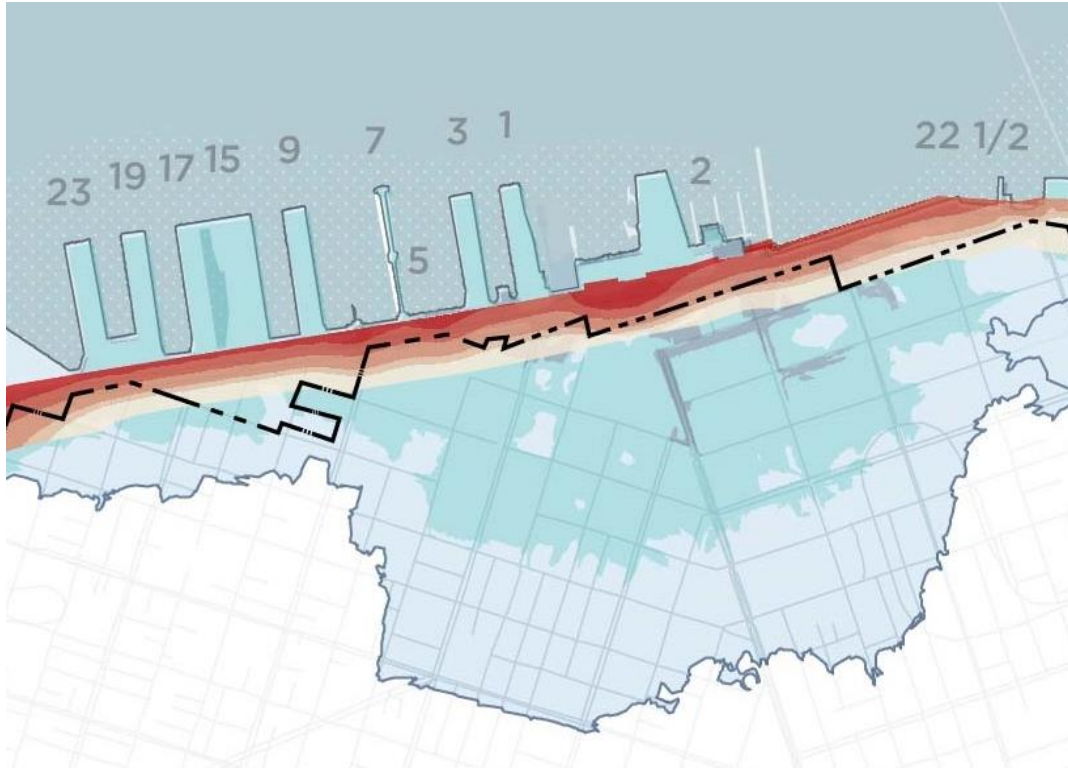
Complexity: Low

- The bulkheads located between Pier 24 and Pier 28 ½ are some of the oldest on the waterfront.
- This project focuses on improving earthquake safety by retrofitting the wall and wharf substructures to reduce damage.



FERRY BUILDING / FORMER YERBA BUENA COVE

Risks

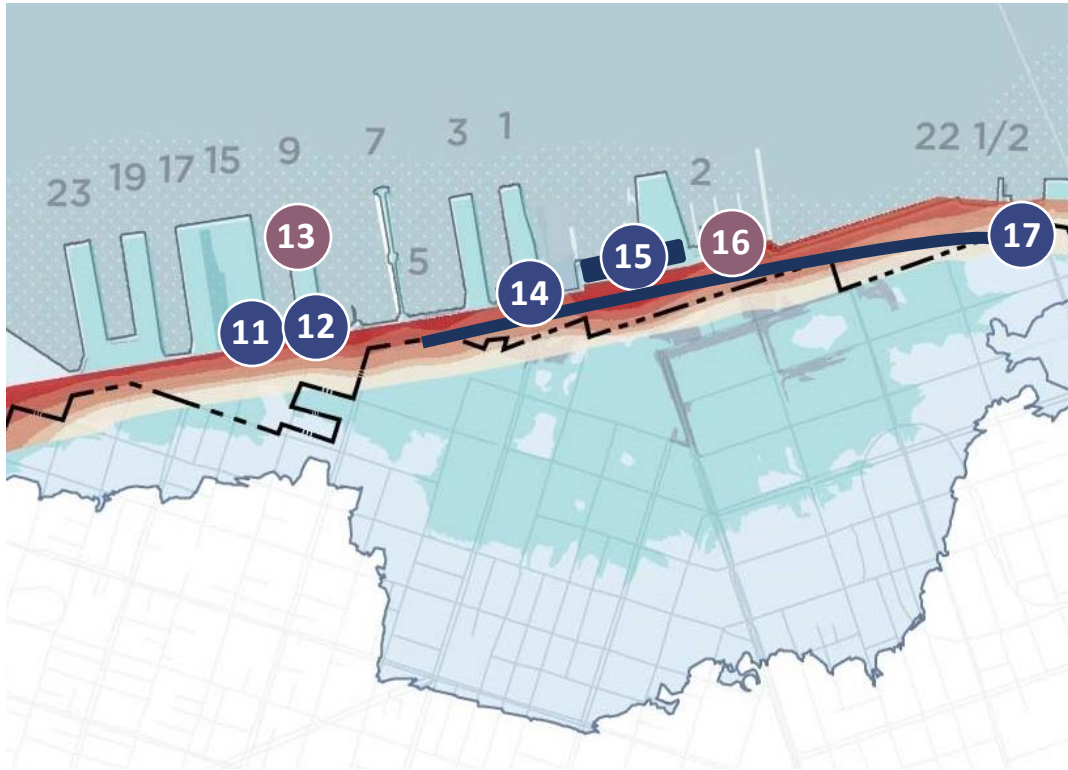


EARTHQUAKE & FLOOD RISKS

- Thick Bay Mud & deep bedrock
- Lateral spreading risk: V. HIGH
- Bulkhead Wharf EQ risk: HIGH (lateral spreading + shaking)
- Embarcadero EQ risk: HIGH (lateral spreading + liquefaction)
- Coastal Flood SLR risk: TODAY (lowest area of Embarcadero)

FERRY BUILDING / FORMER YERBA BUENA COVE

Early Projects



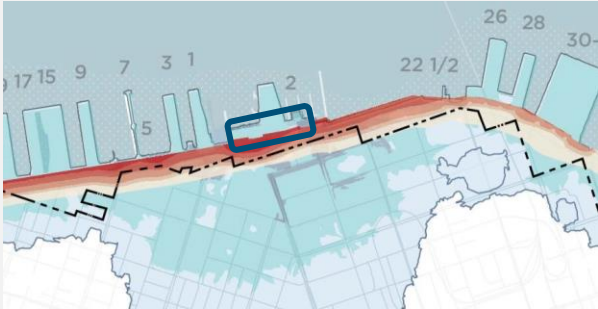
- 11** Pier 15 Bulkhead Wall and Wharf Substructure Earthquake Safety Retrofit Project
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- 16** Agriculture Building Bulkhead Wall and Wharf Substructure Earthquake Safety Project
- 17** Pier 5 to Pier 22-1/2 Near-Term Coastal Flood Risk Reduction Project

● Proposition A Predesign

● Coordination with Long-term Tenants, Capital Programs and City Agencies

FERRY BUILDING SEAWALL AND SUBSTRUCTURE EARTHQUAKE RELIABILITY PROJECT

15



Cost Range: \$60-230M

Project Duration: 4-7 Years

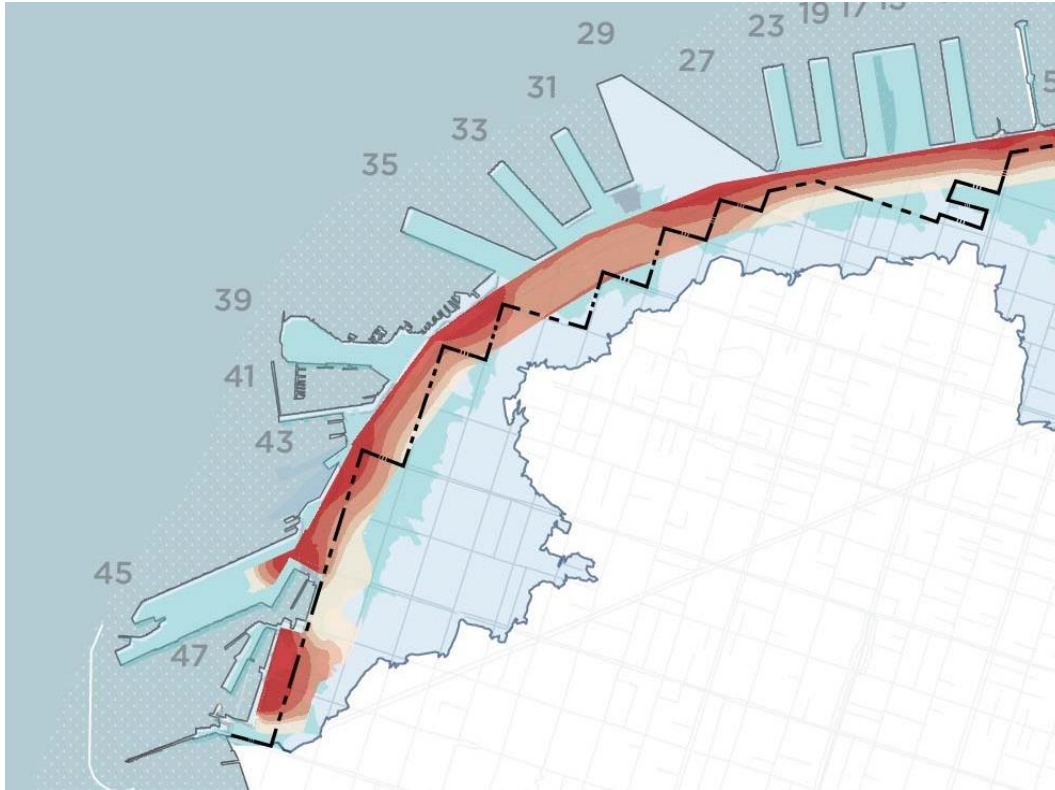
Complexity: High



- This project will improve earthquake safety and disaster response capacity by strengthening the Seawall and substructure at the Ferry Building area
- The strengthening is also intended to support interim flood protection and later sea level rise adaptation
- Stakeholders consistently cited the Ferry Building as one of the most important structures to protect

NORTHEAST WATERFRONT AND FISHERMAN'S WHARF

Risks

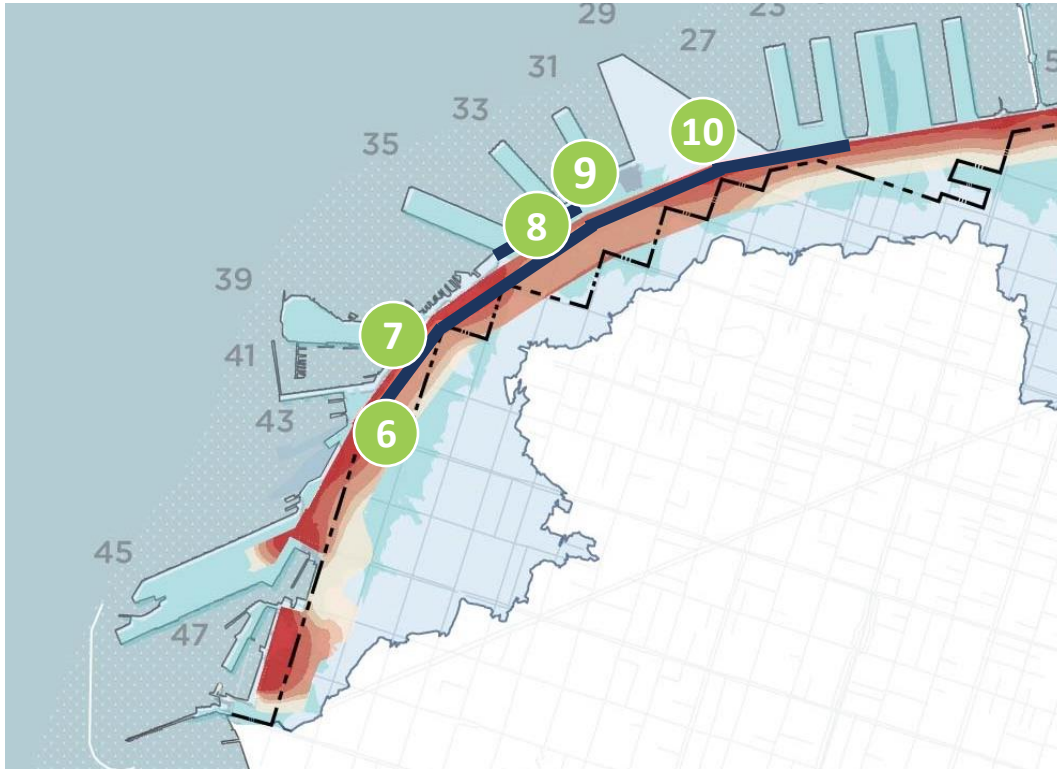


EARTHQUAKE & FLOOD RISKS

- Thinner layers of poor soils
- Lateral spreading risk: HIGH
- Bulkhead Wharf EQ risk: HIGH (lateral spreading + shaking)
- Embarcadero EQ risk: HIGH (lateral spreading + liquefaction)
- Coastal Flood SLR risk: EMERGING (some lower spots)

PIER 19 TO 41 SEAWALL IMPROVEMENT AND RESILIENT SHORELINE STRATEGY

Geographic Strategy and Potential Early Projects

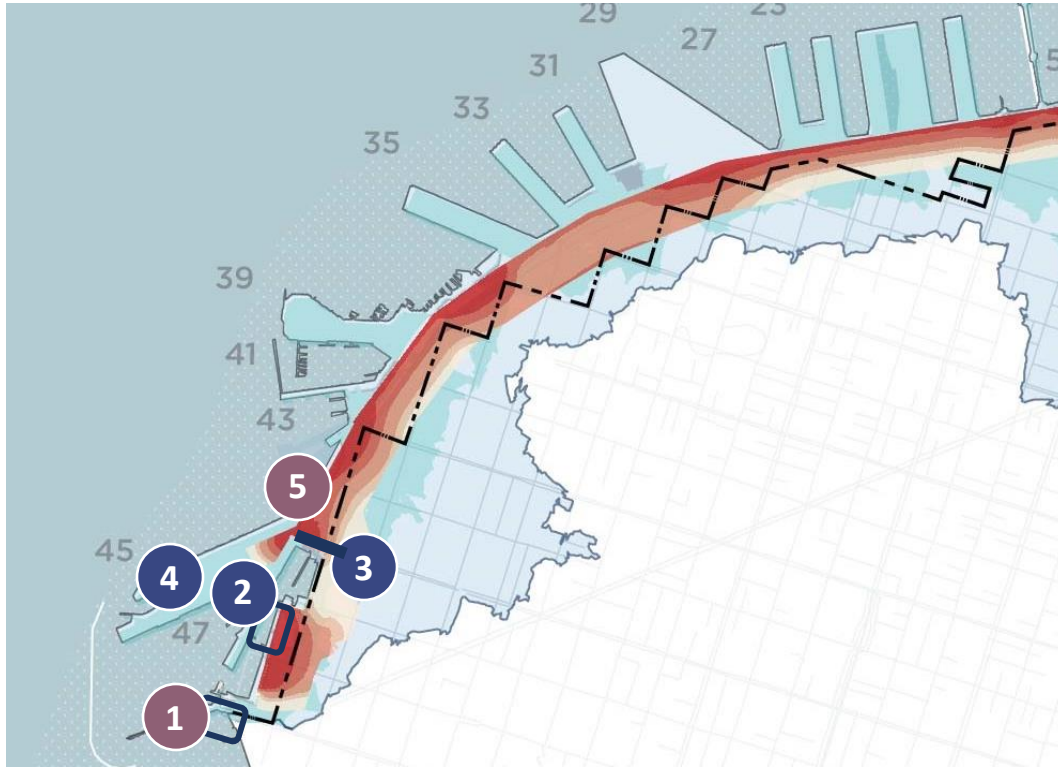


● Advance through Geographic Strategy

- 6 Pier 41 Seawall Earthquake Stabilization and Wharf Retrofit
- 7 Pier 39 Seawall Earthquake Stabilization & Wharf Retrofit/ Replacement
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FISHERMAN'S WHARF

Early Projects



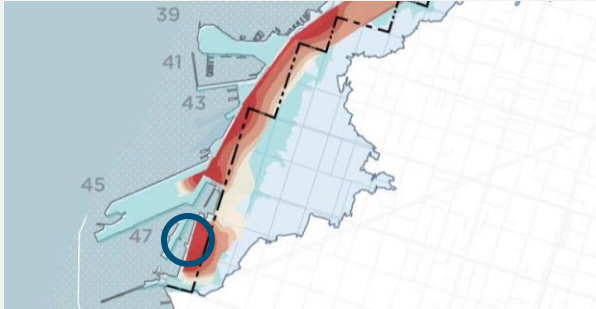
- 1 Joint Operations Security Center and Fuel Dock Reliability Project
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- 3 Taylor Street Seawall Earthquake Stabilization Project
- 4 Pier 45 Apron Earthquake Safety Retrofit and Interim Flood Risk Reduction Project
- 5 Pier 43-1/2 Seawall and Wharf Earthquake Safety Project

● Proposition A Predesign

● Coordination with Long-term Tenants, Capital Programs and City Agencies

WHARF J9 REPLACEMENT AND RESILIENT SHORELINE PROJECT

2



Cost Range: \$15-60M

Project Duration: 3-5 Years

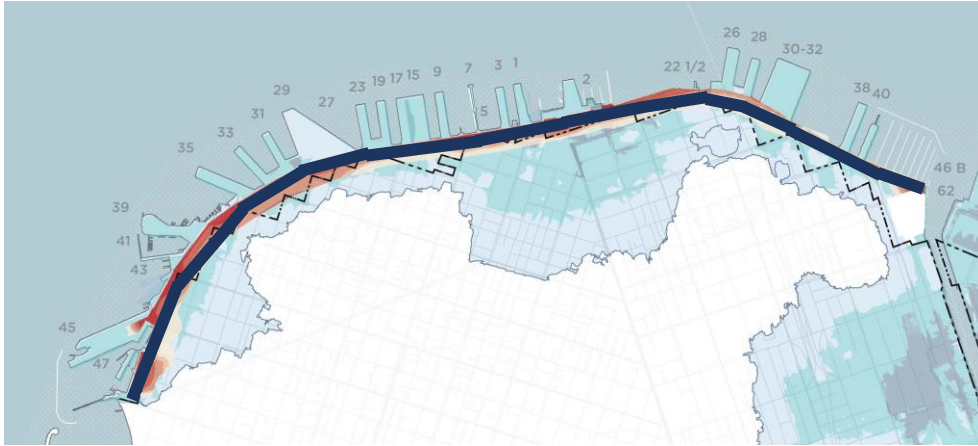
Complexity: Moderate



- Wharf J9 is a timber bulkhead and wharf with small-vessel berths for the fishing industry.
- This Project is an opportunity to revitalize and reopen this space with a new wharf and bulkhead that is stable in an earthquake.
- Ideas developed in this project can be used to inform other areas of the Fisherman's Wharf shoreline.

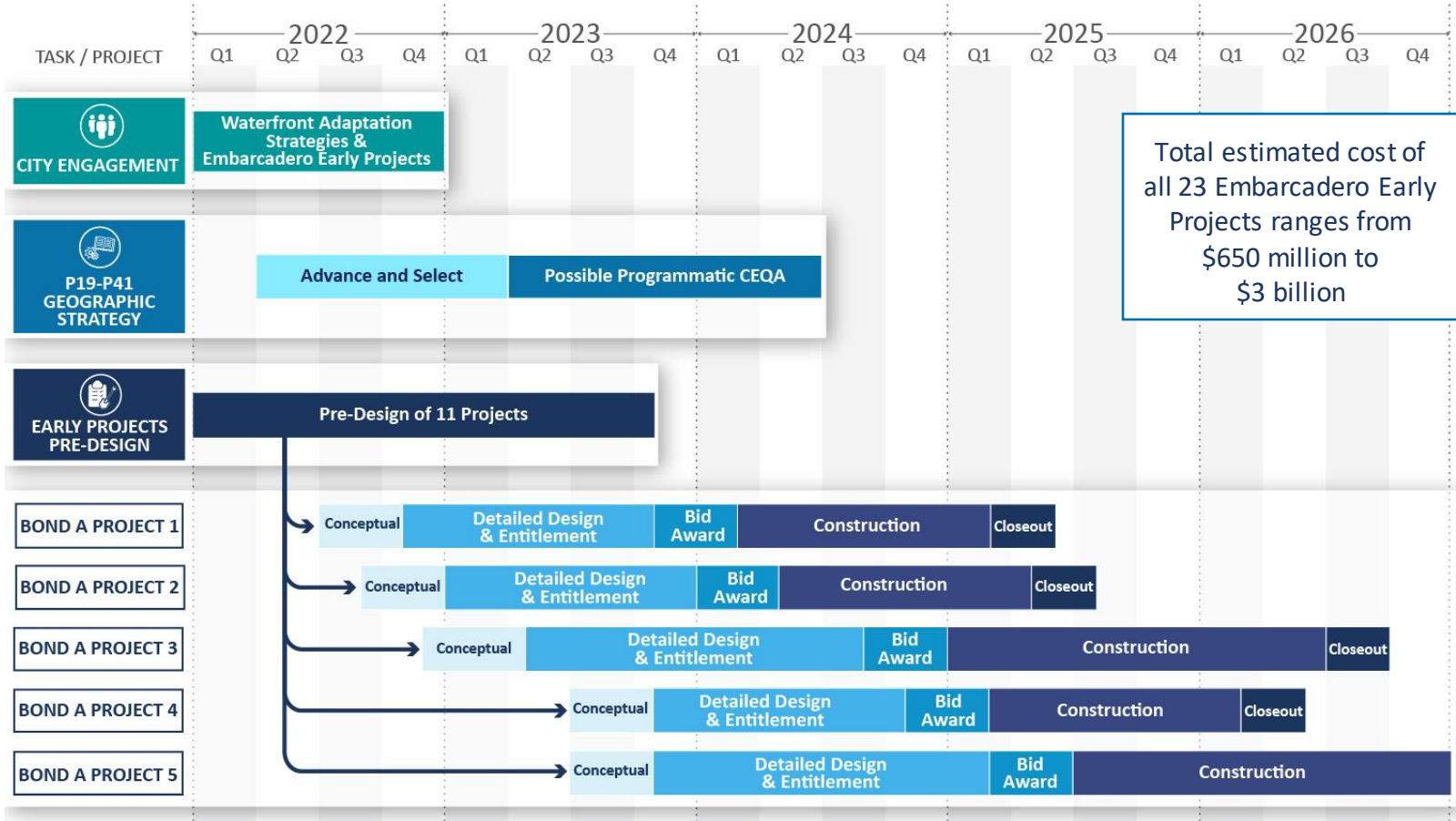
WATERFRONT WIDE

Early Projects



- 21 Pier Fire Suppression & Waterside Evacuation Improvements
- 22 EFWS Fireboat Manifold Earthquake Reliability Projects
- 23 Pier & Wharf Utility Connection Earthquake Retrofit at Seawall Project

HIGH LEVEL SCHEDULE AND PROPOSED BUDGET



KEY CONSIDERATIONS FOR PORT COMMISSION INPUT

Proposed Next Steps



- Advance planning for the entire waterfront
- Detailed focus on Piers 19-41 Geography
- Needs assessment and alternatives analysis of a suite of Embarcadero Early Projects
- Advance other Early Projects through coordination with city departments and long-term tenants
- Updates to the Commission to advance projects into final design and construction

Thank You!

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