

An aerial photograph of San Francisco, California. The top half of the image shows a dense urban skyline with numerous skyscrapers, including the Transamerica Pyramid and the US Bank Tower. The bottom half of the image shows the Embarcadero waterfront, featuring the iconic blue clock tower of the Ferry Building, a long pier with many small boats, and a large parking lot. The water is a deep blue-green color.

# Embarcadero Early Projects Update

Port Commission Agenda Item #10A

September 13, 2022





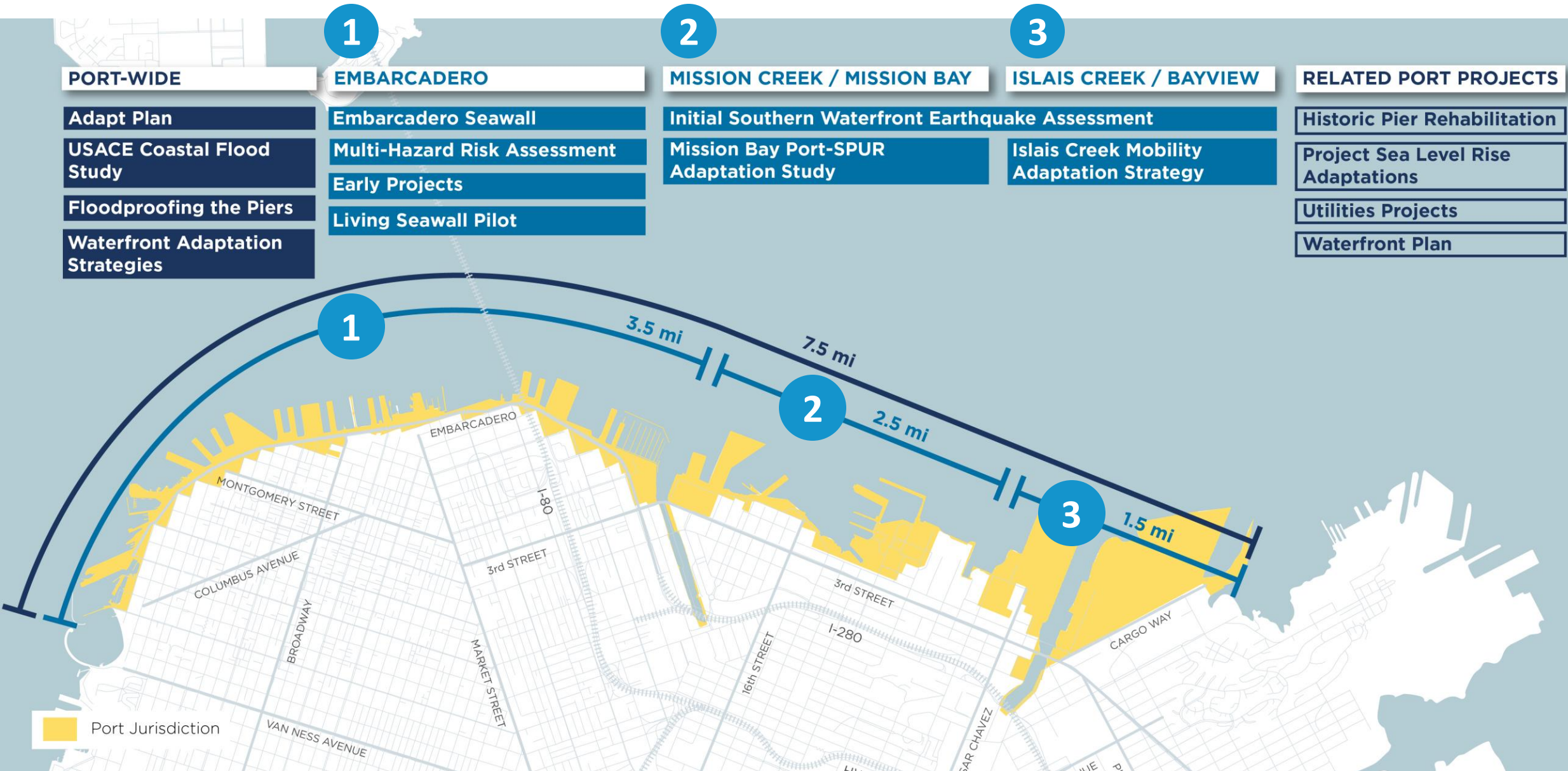
# AGENDA



- Embarcadero Early Projects Overview
- Wharf J9 Resilience Project
- Pier 15 Earthquake Safety Project
- Pier 9 Earthquake Safety Project
- Ferry Building Earthquake Safety Project
- Pier 5 to 22½ Flood Risk Project
- Pier 24.5 to 28.5 Earthquake Safety Project
- Next Steps

# WATERFRONT RESILIENCE PROGRAM EFFORTS

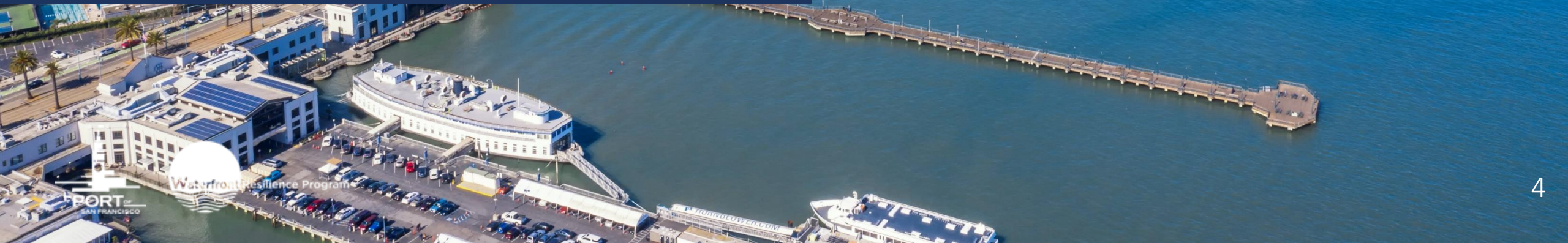
## Overview





# Embarcadero Early Project

## Overview & Development



# DEFINING EMBARCADERO EARLY PROJECTS

## Goals for Embarcadero Early Projects



Identify  
Implementable  
Projects



Reduce EQ Risk  
Prioritize Life Safety +  
Disaster Response  
Capability



Reduce Flood Risk  
Near-Term Flood  
Defenses & Later  
Adaptation



# EMBARCADERO EARLY PROJECTS LIST



## 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

## 23 Embarcadero Early Projects Identified & Evaluated

- 11 advancing to pre-design using Proposition A funding
- 5 advancing to pre-design thru 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

➔ 6 of 12 Needs Assessment Reports Completed

# WATERFRONT RESILIENCE PROGRAM PROJECT DEVELOPMENT PROCESS

## Overview



# Embarcadero Early Projects

## Needs Assessment Report Updates





# WHARF J9 REPLACEMENT & RESILIENT SHORELINE PROJECT

## Background and Project Site



- Failing Wharf J9 is currently closed to the public and berthing due to poor structural conditions
- Shoreline has high risk of earthquake lateral spreading
- Wharf J9 and Al Scoma Way contribute to Fish Alley Historic Character District
- Emerging Sea Level Rise, though protected from wave action by harbor breakwater

# WHARF J9 REPLACEMENT & RESILIENT SHORELINE PROJECT

## Project Vision: Objectives, Constraints, and Other Considerations

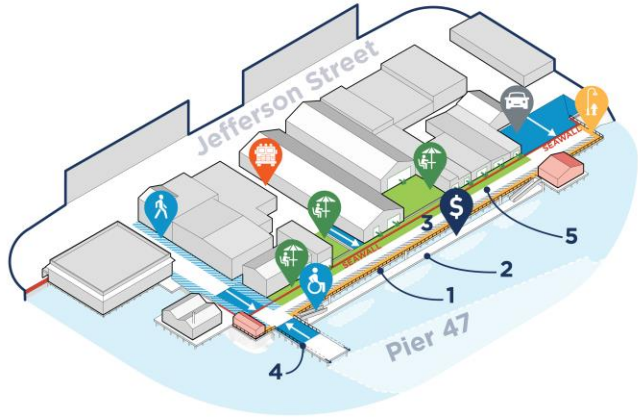


- Replace the failing Wharf J9 and bulkhead to current seismic standards to stabilize shoreline and defend Fisherman's Wharf from sea level rise
- Revitalize an underinvested area
- Increase disaster response capability
- Connect residents and visitors to working fishing industry
- Create a continuous waterfront experience

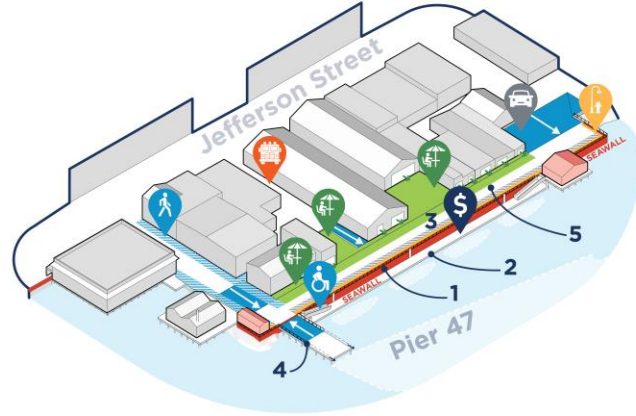


# WHARF J9 REPLACEMENT & RESILIENT SHORELINE PROJECT

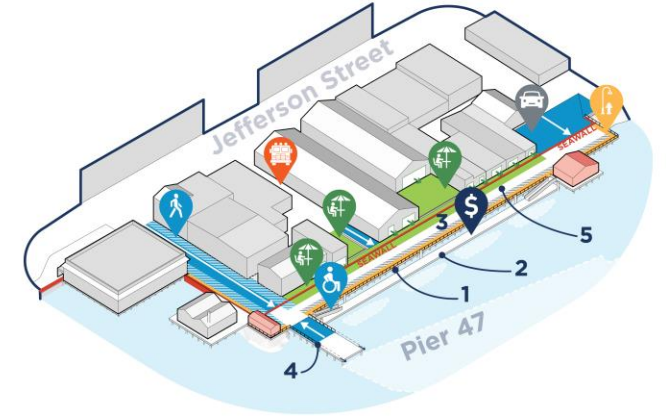
## Draft Project Alternatives



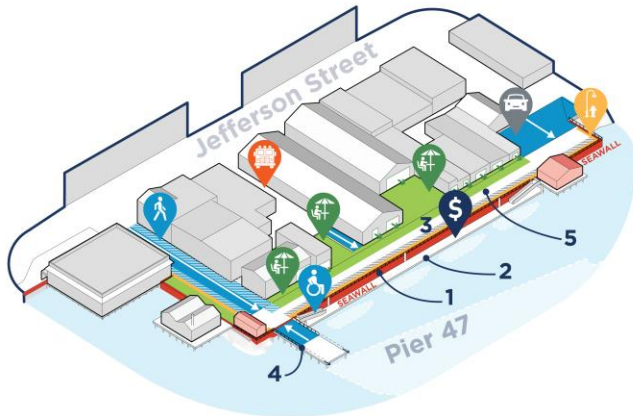
**Alt 1: Wharf J9 Only**



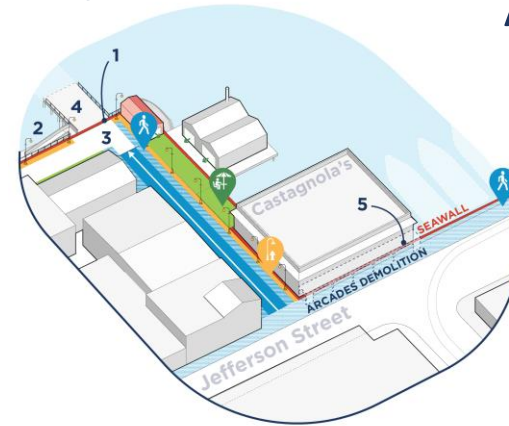
**Alt 2: Wharf J9 Only**



**Alt 3: Wharf J9 +  
Al Scoma Way**



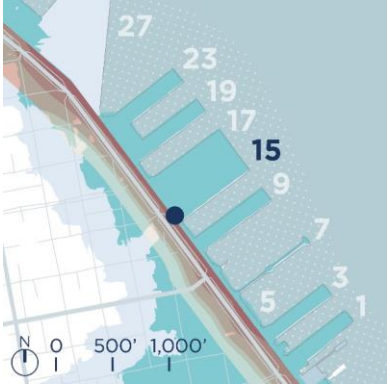
**Alt 4: Wharf J9 +  
Al Scoma Way**



**Alt 5: Wharf J9 + Al Scoma  
Way + Jefferson Street**

# PIER 15 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Background and Project Site



- Pier 15 is a rehabilitated and seismically strengthened historic finger pier that is home to the popular Exploratorium science museum and vessel berths that can support earthquake response
- Seawall earthquake risk is high
- This early project focuses on more easily implementable solutions to improve safety



# PIER 15 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

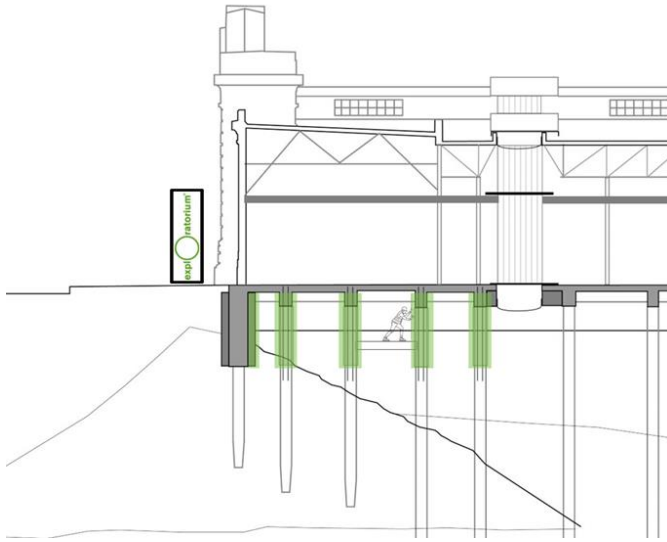
## Project Vision: Objectives, Constraints, and Other Considerations



- Reduce Earthquake Risk: Prevent collapse of high occupancy bulkhead and protect egress from finger pier in high-risk seawall and wharf zone
- Reduce today's seismic risk quickly, design improvements to move with shoreline rather than waiting to stabilize shoreline in this challenging zone
- Exploratorium is primary stakeholder and construction may be challenging

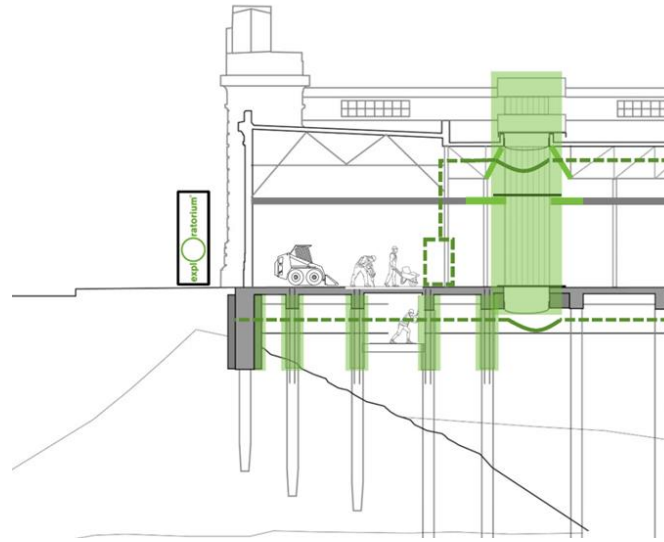
# PIER 15 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Draft Project Alternatives



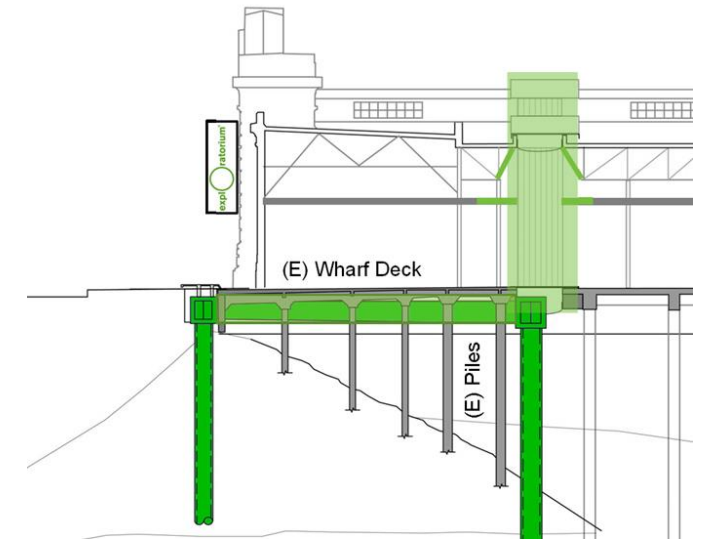
### Alt 1: Work w/ Joint

Existing joint can accommodate some lateral spread, pair with pile retrofits.



### Alt 2: Improved Joint

Expand existing joint, pair with wharf retrofit. Disrupts bulkhead building.



### Alt 3: Spider Frame

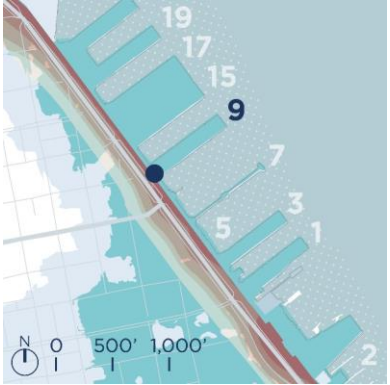
New high-performance substructure built in place. Disrupts bulkhead building and Embarcadero.

Pier 9 Early Project will develop this concept further.



# PIER 9 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Background and Project Site



- Pier 9 is an historic finger pier housing diverse businesses and maritime offices including the San Francisco Bar Pilots and WETA
- High Seawall earthquake risk that may damage the bulkhead wharf compromising safety and limiting access
- This early project focuses on solutions to improve safety by better accommodating earthquake movement of the Seawall

# PIER 9 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Project Vision: Objectives, Constraints, and Other Considerations

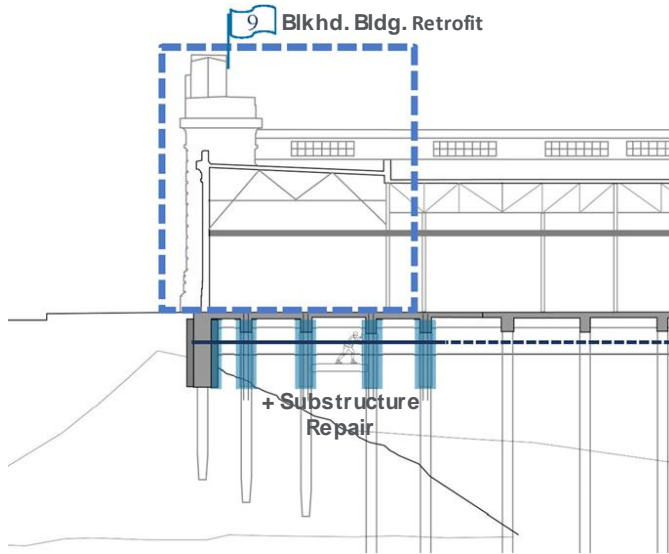


- Prevent collapse of bulkhead building, wharf and Seawall in a high occupancy pier housing critical maritime functions
- Fix Pier 9's current "weak link" in earthquakes, while incorporating Pier 9 age, condition, and future plans into project decision-making
- Reduce today's seismic risk quickly, design improvements to move with shoreline rather than waiting to stabilize shoreline in this challenging zone



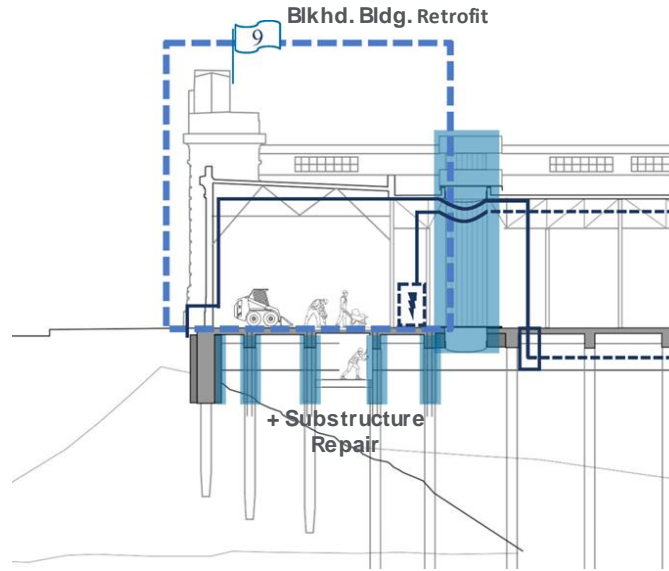
# PIER 9 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Draft Project Alternatives



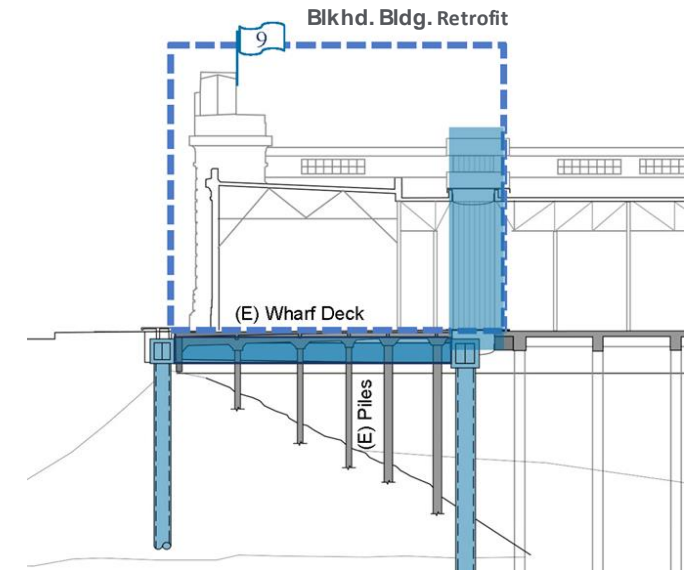
### Alt 1: Avoid Seismic Joint

Can wharf collapse prevention be achieved without adding seismic joint?



### Alt 2: Traditional Retrofit

Add a seismic joint and perform substructure retrofits from above and below deck.



### Alt 3: Spider Frame

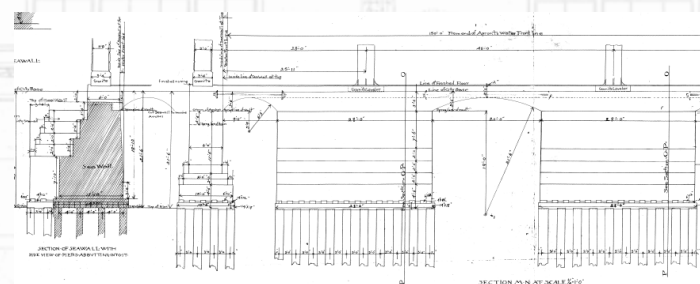
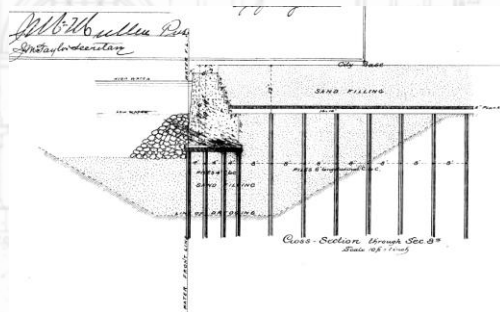
New high-performance substructure built in place, including new seismic joint.

# FERRY BUILDING SEAWALL & SUBSTRUCTURE EARTHQUAKE RELIABILITY PROJECT

## Background and Project Site



- The 125-year-old Ferry Building Seawall, building substructure, and surrounding piers are at risk of damage in large earthquakes
- Jeopardizes emergency response, public safety, and the historic resource itself
- Ferry Building area has the highest sea level rise risk on the Embarcadero





# FERRY BUILDING SEAWALL & SUBSTRUCTURE EARTHQUAKE RELIABILITY PROJECT

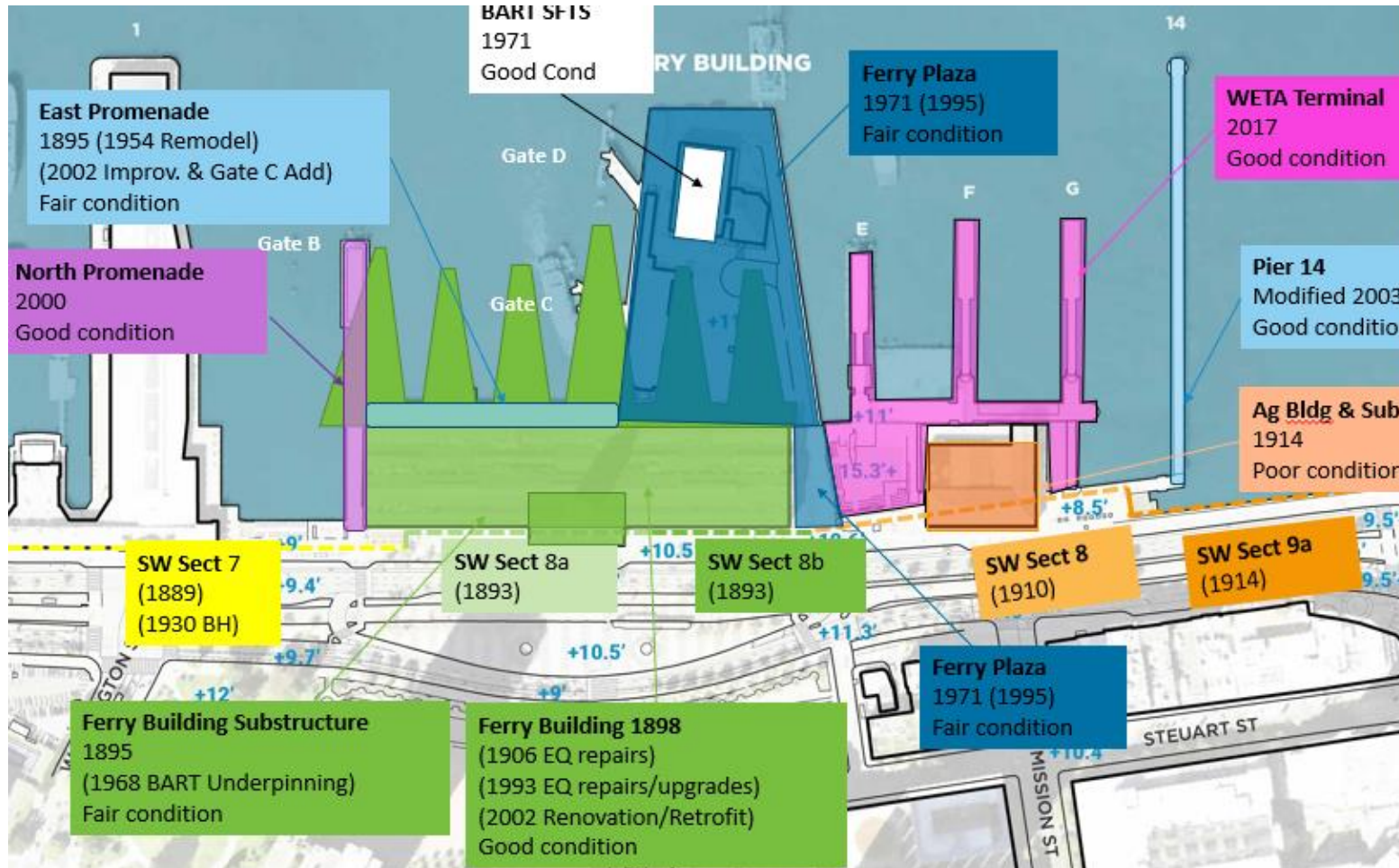
## Project Vision: Objectives, Constraints, and Other Considerations



- Preserve iconic Ferry Building for future generations
- Improve Ferry system and support WETA & GG Ferry improvements
- Improve waterside Public Realm
- Improve reliability of utilities, especially sewer, and consider power upgrades for electric Ferry boats.
- Minimize construction impacts to transit and business and avoid closures of building

# FERRY BUILDING SEAWALL & SUBSTRUCTURE EARTHQUAKE RELIABILITY PROJECT

## High Complexity and Challenging Conditions

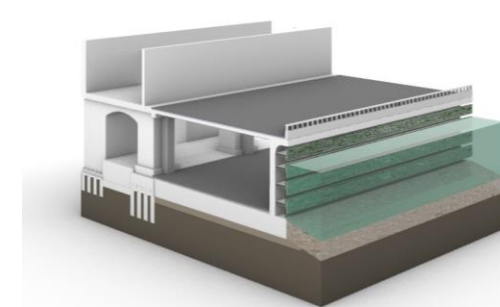
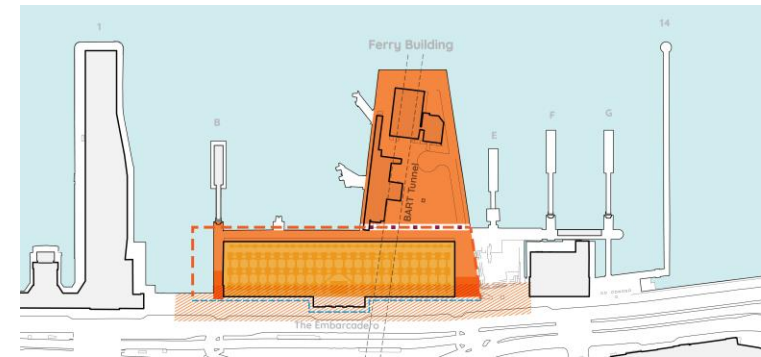
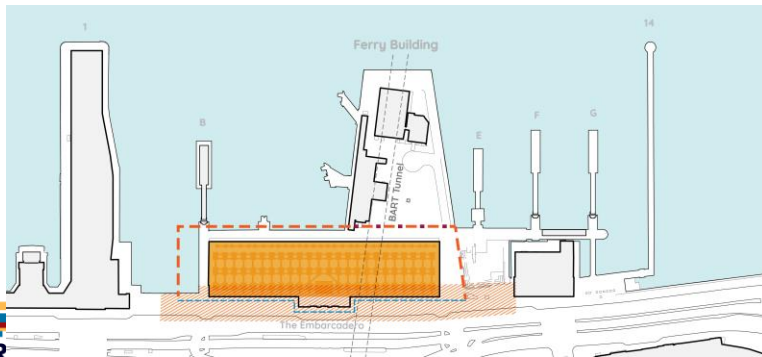
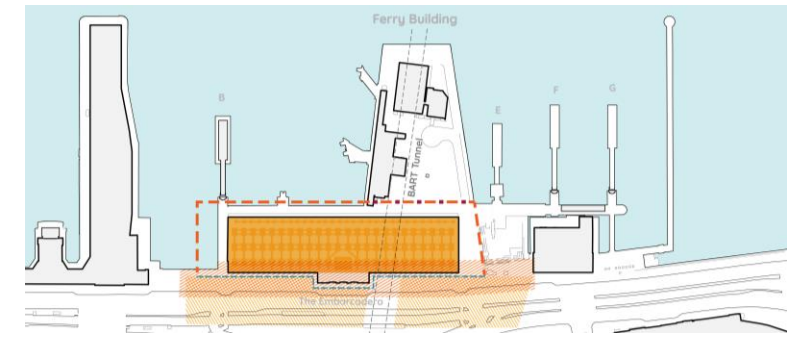
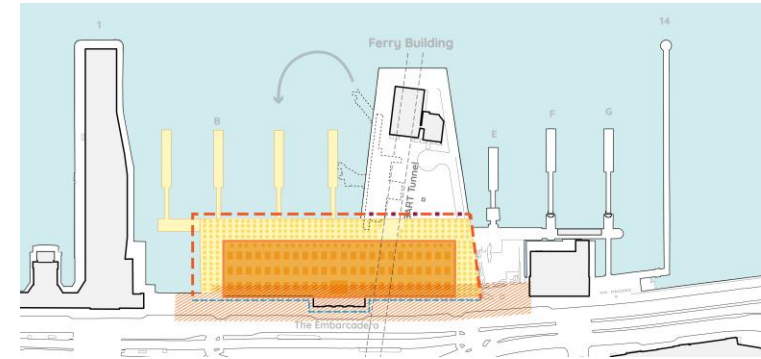
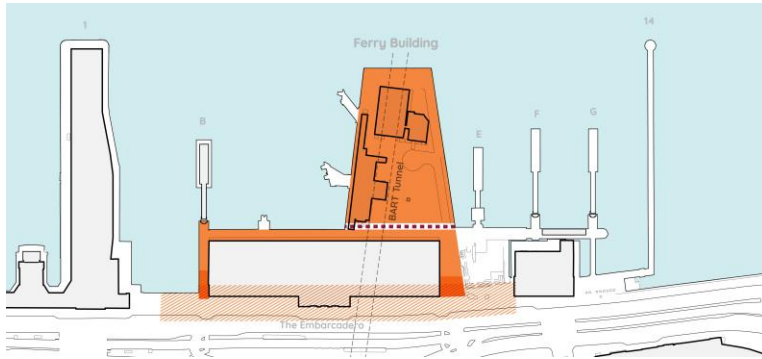
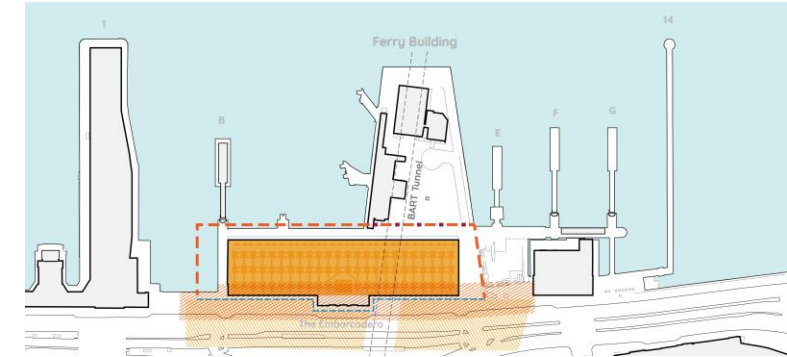
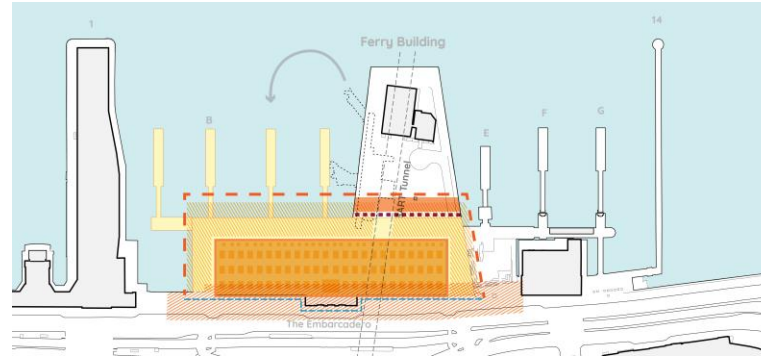
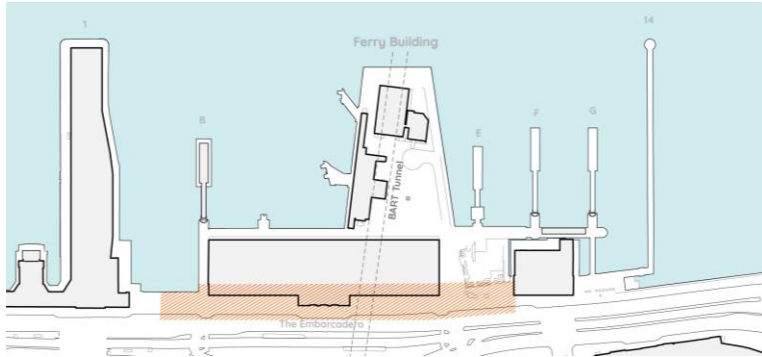


- Ferry Building is among the most complex areas of the waterfront to improve
- Achieving earthquake reliability for staging disaster response will be difficult and may require a substantial investment
- Developed a seismic measures toolkit and eight different draft project alternatives.



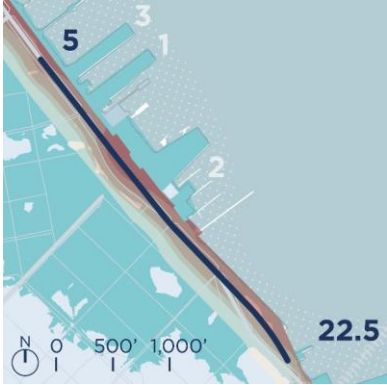
# FERRY BUILDING SEAWALL & SUBSTRUCTURE EARTHQUAKE RELIABILITY PROJECT

## Draft Project Alternatives

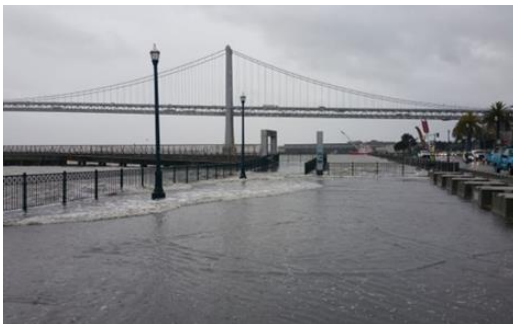


# PIER 5 to 22½ NEAR-TERM COASTAL FLOOD RISK REDUCTION PROJECT

## Background and Project Site



- This is the most at-risk segment of the Embarcadero Seawall for sea level rise and regularly overtops during high and king tides today
- If no action is taken before 2040, sea level rise is projected to cause regular shutdowns and flood damage
- Saltwater is already causing damage to Promenade pavement and railings





# PIER 5 to 22½ NEAR-TERM COASTAL FLOOD RISK REDUCTION PROJECT

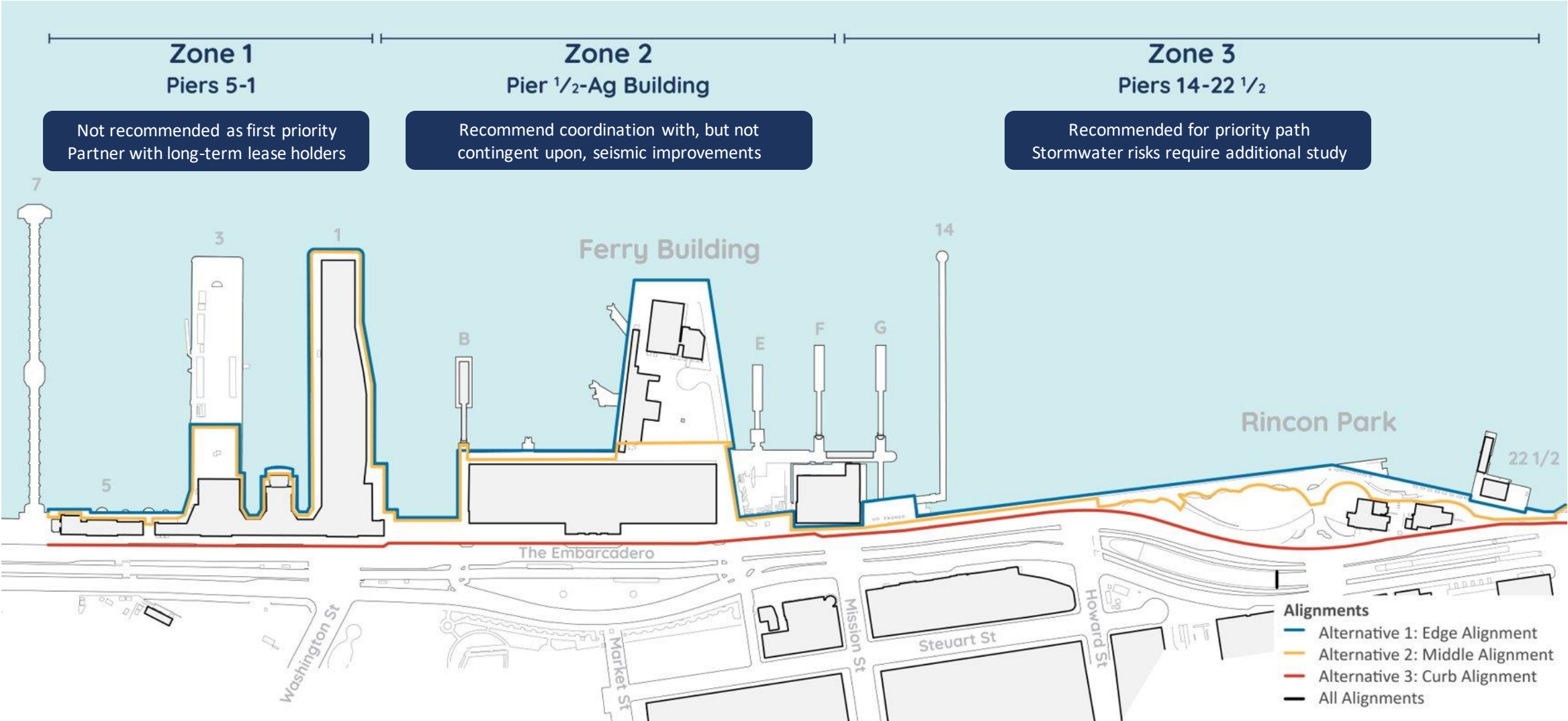
## Project Vision: Objectives, Constraints, and Other Considerations



- Construct flood barrier for near term flood risk while long-term solution for SLR & Earthquakes is developed
- Support disaster response, historic resources, continuity of downtown businesses & transportation
- Maintain public realm & enhance habitat
- Gain alignment with other City Agencies on storm water management
- Balance risk reduction with cost
- Impacts of existing substructure condition unknown

# PIER 5 to 22½ NEAR-TERM COASTAL FLOOD RISK REDUCTION PROJECT

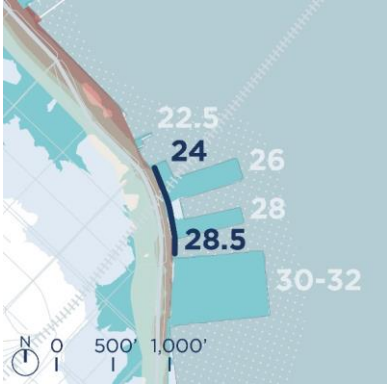
## Draft Project Alternatives





# PIER 24½ to 28½ BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Background and Project Site



- There is very high earthquake risk to the tall bulkhead wall and wharves
- This early project proposes to reduce seismic risk to a 900-foot-long section of bulkhead wall and wharf supporting about half the width of the Embarcadero Promenade from Pier 24½ to Pier 28½

# PIER 24½ to 28½ BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Project Vision: Objectives, Constraints, and Other Considerations

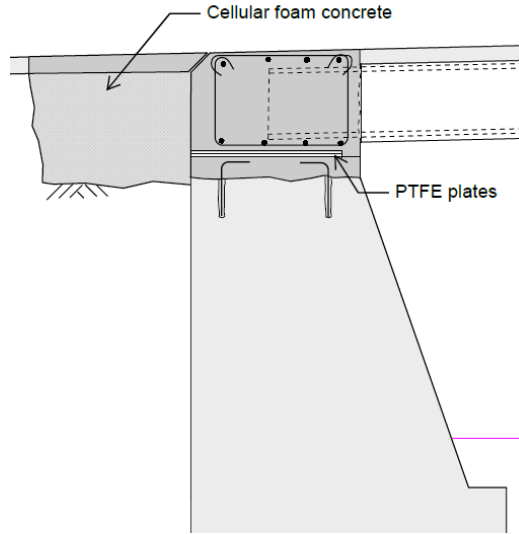


- Reduce Earthquake Risk: Collapse prevention of bulkhead wall and wharf supporting Embarcadero Promenade
- Retrofits preserve and protect existing structures, while new infrastructure should be adaptable to future Sea Level Rise
- Pier 28½ restaurant building is a key constraint, part of Historic District and only building directly supported by wharf



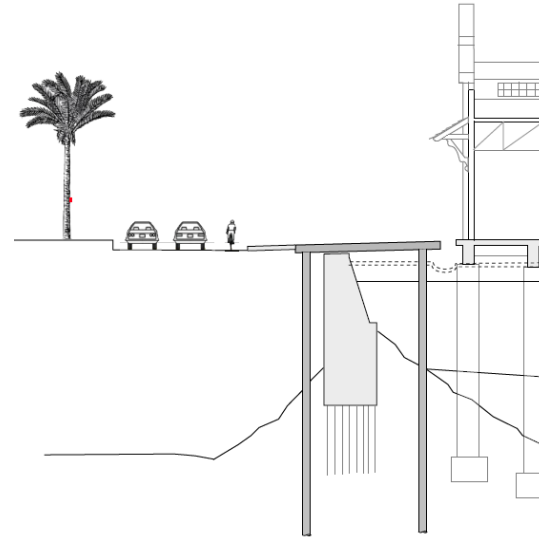
# PIER 24½ to 28½ BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Draft Project Alternatives



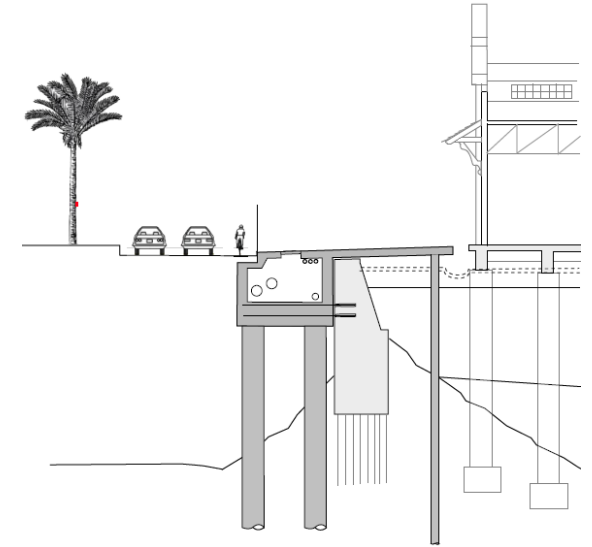
### Alt 1 & 2: Retrofits

Allow for wall movement without wharf losing vertical support.



### Alt 3: Replace Wharf

New wharf designed for high seismic performance and future elevation gain.



### Alt 4: Stabilize Shoreline

Wall stabilization with resilient utility corridor. Potential link to shoreline improvements by Piers 30-32 and Piers 38 & 40 development projects.

# Next Steps



# NEXT STEPS



- Fast track 1 or more Embarcadero Early Projects to be construction-ready by 2024
- Advance several projects directly to Alternatives Analysis (Early Wins)
- Begin Needs Assessment for one or more Tier 2 Embarcadero Early Projects

# Thank You

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Waterfront Resilience Program

