# 2018 Embarcadero Seawall Earthquake Safety Bond

## Annual Status Report

Presented to the Citizens' General Obligation Bond Oversight Committee

January – December 2023

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Waterfront Resilience Program

# AGENDA

## Presentation Overview

- Update on 2018 Proposition A Seawall Bond
- Additional Funding Sources
- Waterfront Resilience Program Overview
  - Embarcadero Early Projects
  - USACE Flood Study
  - Draft Adaptation Strategies

# 2018 Proposition A Bond Annual Report

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Waterfront Resilience Program

# 2018 EMBARCADERO SEAWALL EARTHQUAKE SAFETY BOND

## Bond Sales


- First Bond sale was approved by the Board of Supervisors and Mayor's Office in July 2019 and **finalized on June 2, 2020 for $49,675,000, with $47,303,963 expended**

- Second Bond sale was approved by the Board of Supervisors and Mayor's Office in February 2023 and **finalized on April 11, 2023 for $39,020,000 with $2,665,117 expended**

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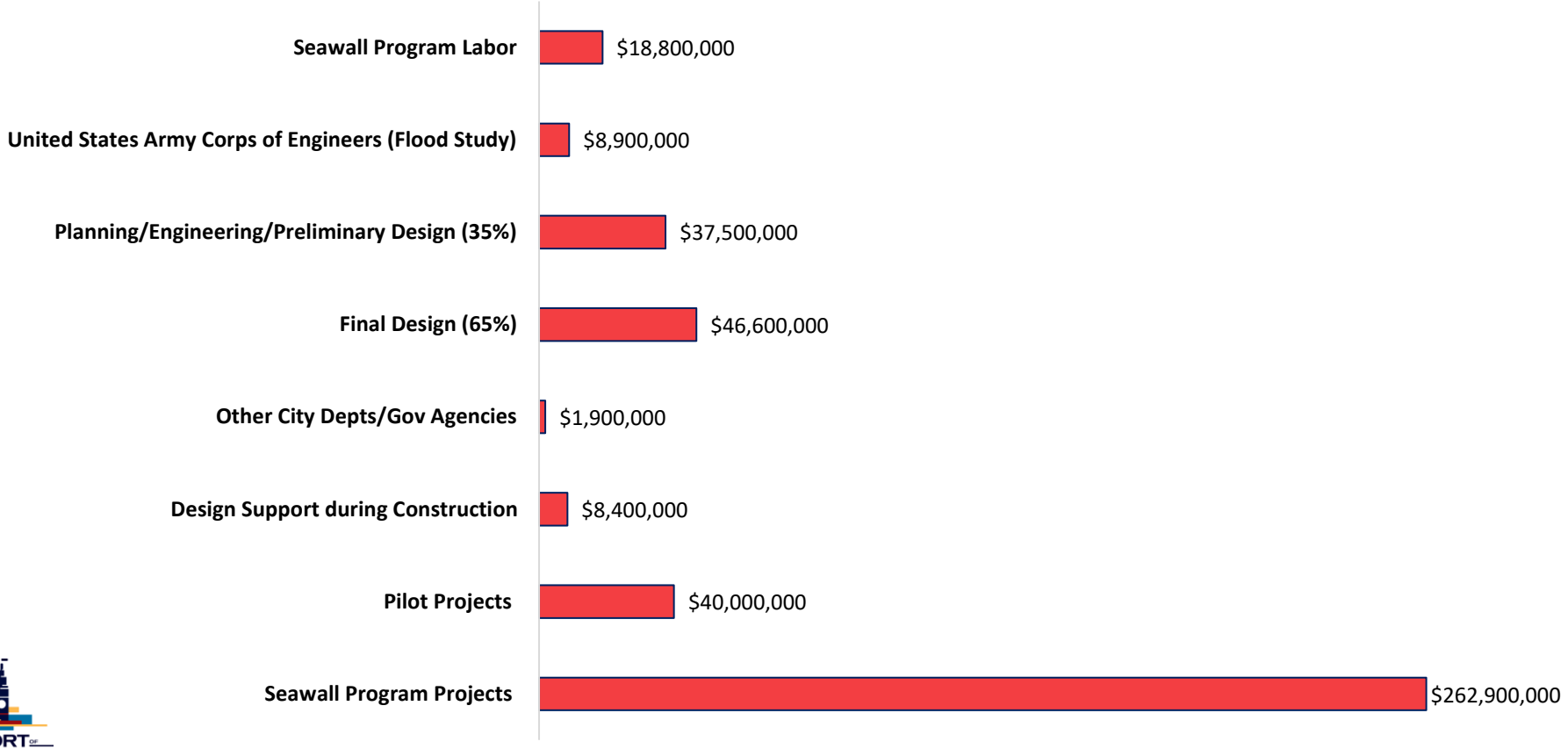
# 2018 EMBARCADERO SEAWALL EARTHQUAKE SAFETY BOND

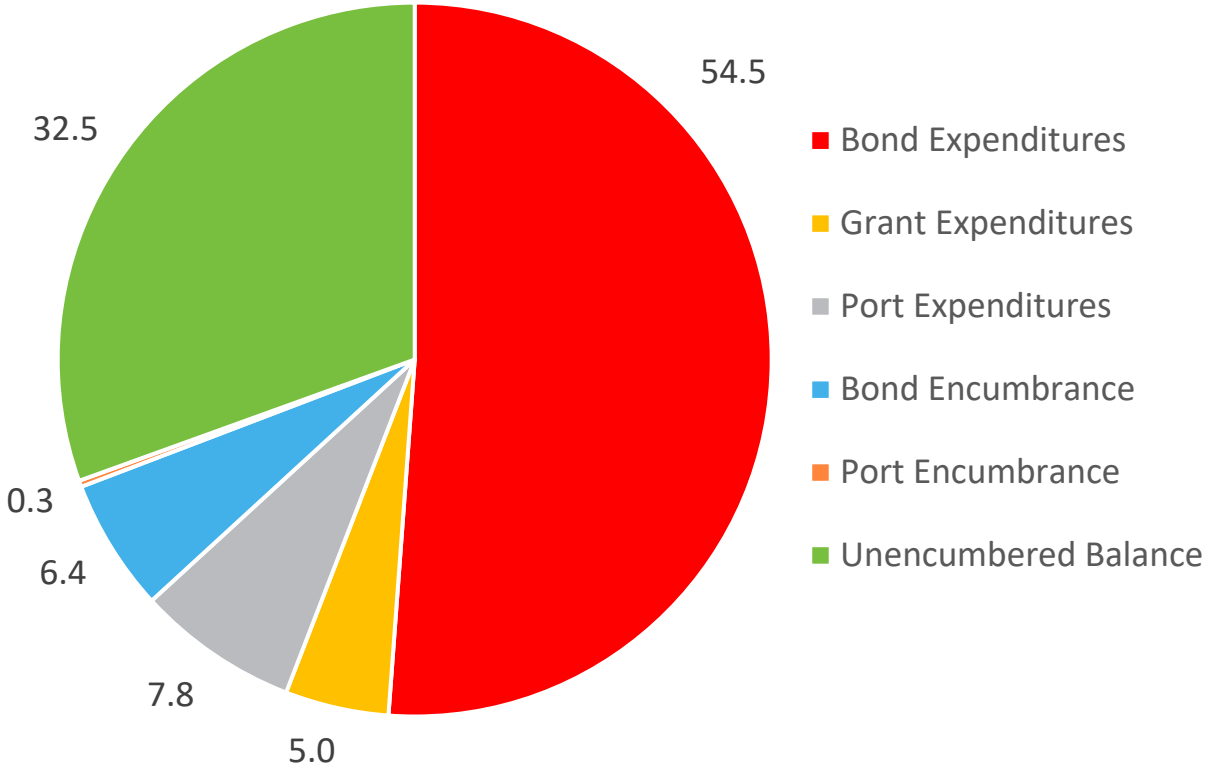
## Overview of Scope and Budget - $425M



# 2018 EMBARCADERO SEAWALL EARTHQUAKE SAFETY BOND

Overall Program Expenditures, Encumbrances, and Balances ($M) through December 2023

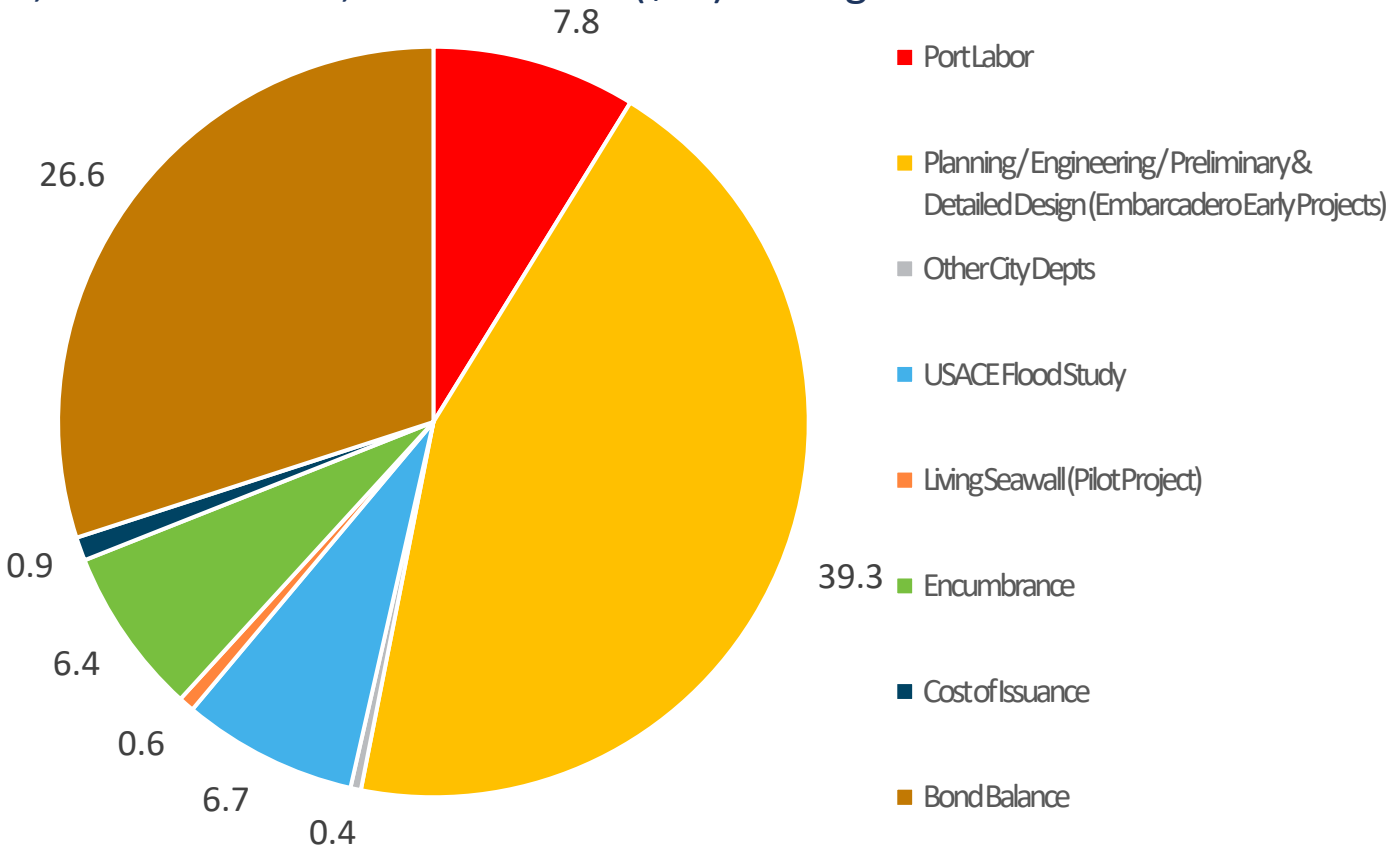
**Total: $106.5M**



# 2018 Embarcadero Seawall Earthquake Safety Bond

## Bond Expenditures, Encumbrances, and Balances ($M) through December 2023

**Total: $88.7M**



# 2018 EMBARCADERO SEAWALL EARTHQUAKE SAFETY BOND

## Seawall Program Appropriations, Expenditures, Encumbrances, and Balance

| Components | Original Budget | General Obligation Bond | | | |
|---|---|---|---|---|---|
| | | Appropriations | Expenditures | Encumbrances | Balance |
| Seawall Program Labor | 18,800,00 | 15,400,000 | 7,800,000 | | 7,600,000 |
| United States Army Corps of Engineers (Flood Study) | 8,900,00 | 10,00,000 | 6,700,000 | | 3,300,000 |
| Planning / Engineering / Preliminary Design (Embarcadero Early Projects) | 37,500,000 | 39,000,000 | 32,100,000 | 2,900,000 | 4,000,000 |
| Detailed Design (Embarcadero Early Projects) | 46,600,000 | 21,000,000 | 5,900,000 | 3,500,000 | 11,600,000 |
| Other City Depts / Gov Agencies | 1,900,000 | 1,000,000 | 400,000 | | 600,000 |
| Design Support during Construction (Embarcadero Early Projects) | 8,400,000 | | | | |
| Pilot Projects | 40,000,000 | 900,000 | 600,000 | | 300,000 |
| Construction (Embarcadero Early Projects) | 262,900,000 | | | | |
| Oversight, Accountability & Cost of Issuance | - | 1,395,00 | 900,000 | | 495,000 |
| **TOTAL** | **425,000,000** | **88,695,000** | **54,400,000** | **6,400,000** | **27,895,000** |

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# Embarcadero Grants Update

Total awarded and pending: $59.12M

# Embarcadero Projects with Grant Funding

**Southern Embarcadero Resilience & Enhancement Project**

Source: Coastal Conservancy Grants Program

Award amount: **$7.8M**

Scope: Develop schematic planning for SLR protection of a 0.6-mi section of the Embarcadero and detailed plans for 600 linear feet, including plans to demolish Piers 30/32.


**Embarcadero Mobility Resilience Plan**

Source: CalTrans Sustainable Transportation Planning Grants

Award amount: **$1.32M**

Scope: Conduct comprehensive transportation planning to prioritize SLR adaptation projects, mobility improvements, and investments for transportation infrastructure along and adjacent to the Embarcadero. SFMTA is the lead applicant.

**Downtown Coastal Resilience Project (DCRP)**

Source: FEMA Building Resilient Infrastructure & Communities (BRIC)

Award amount: **$50M***

Scope: Reduce SLR and storm related coastal flood risk to lifeline infrastructure, buildings, and residences along an 0.8 mile stretch of the Embarcadero between Pier 9 & 22.5.

*Official FEMA award pending – tentatively selected for award and under final round of FEMA review.


# Waterfront Resilience Program

Update on Embarcadero Early Projects

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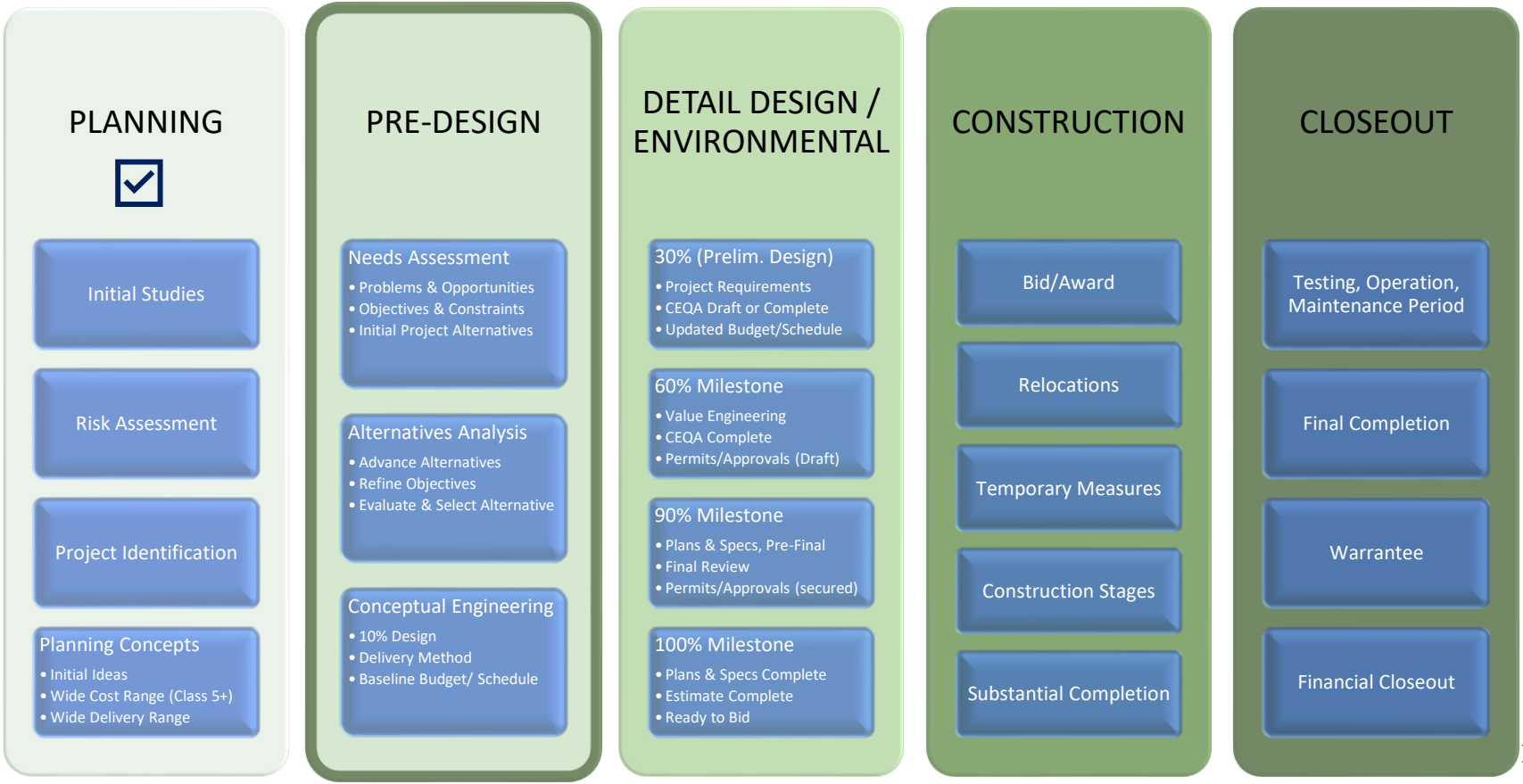
Waterfront Resilience Program

# WRP PROJECT DEVELOPMENT PROCESS

## Overview



# Embarcadero Early Projects

Project Pre-Design Updates

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Waterfront Resilience Program

# 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 flood risk from Sea Level Rise, however, breakwater protects harbor from waves giving more time.

# WHARF J9 REPLACEMENT & RESILIENT SHORELINE PROJECT

Project Vision (Phases 1 and 2)


*Replace Wharf J9 Seawall and Wharf* to create an earthquake and flood resilient shoreline section in the Fisherman's Wharf Outer Lagoon.

*Include floating dock berthing* for ADA accessibility to fishing industry including off the boat fish sales

*Improve disaster response capability* by providing earthquake reliable EFWS Fireboat Hydrant and berths

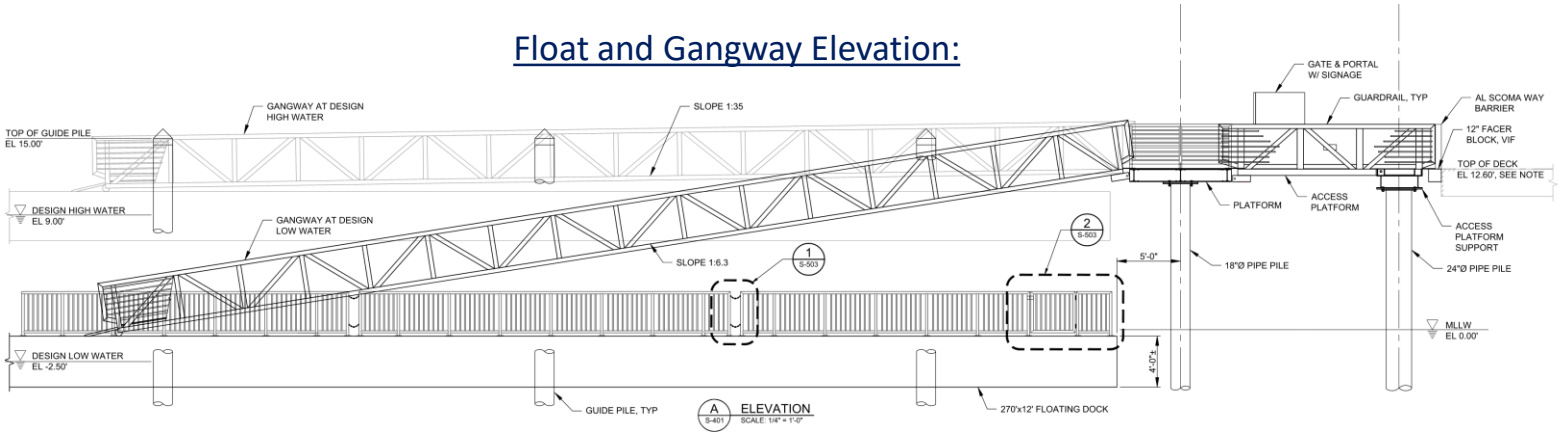
*Improve public realm* to better connect residents and visitors to working fishing industry and create a continuous waterfront experience

# WHARF J9 REPLACEMENT & RESILIENT SHORELINE PROJECT

## Project Delivery Plan

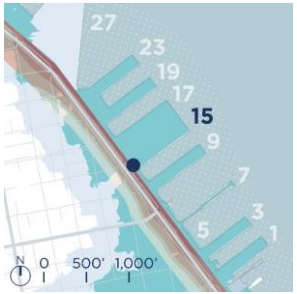
- Phase 1:  Construct Float & Gangway, June 2024 thru Nov 2024
  - 12ft x 270ft Concrete Float, Gangway & Landing
  - Install adjacent to Wharf J9, Connect to Al Scoma Way Bridge
  - Dredge Outer Lagoon, June 2024
- Phase 2:  Replace Seawall and Wharf 2027 to 2030 TBD
  - Relocate Float
  - Demolish Wharf J9 & bulkhead
  - Construct New Seawall & Wharf
  - Re-install Float and Gangway, connecting to Wharf J9

Float and Gangway Elevation:



# 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 Exploratorium science museum and deep water berths that can support earthquake response
- Seawall earthquake risk is high across this area with thick Bay Muds below the wall that can shift damaging the bulkhead zone
- This early project focuses on more easily implementable solutions to improve safety

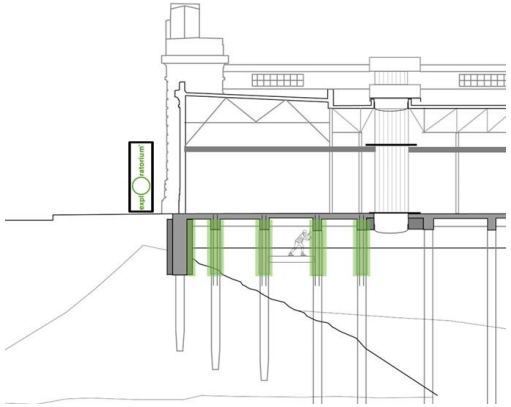
# PIER 15 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

Project Vision: Objectives, Constraints, and Other Considerations


- *Improve earthquake safety* by retrofitting bulkhead wall and wharf.
- *Improve disaster response capability* by provide reliable access across Seawall to deepwater berths.
- Due to difficulty in fixing Bay Muds, include major Seawall improvements as part of later SLR adaptation.
- Keep Exploratorium open during construction

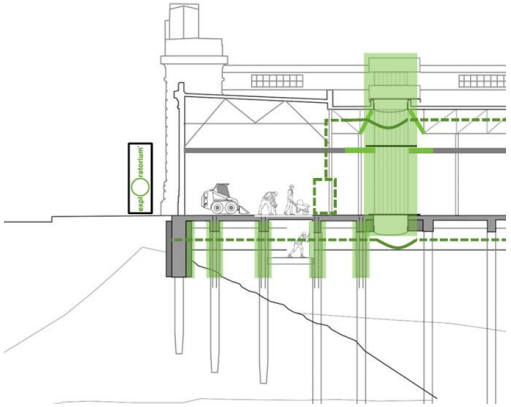
# PIER 15 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Draft Project Alternatives



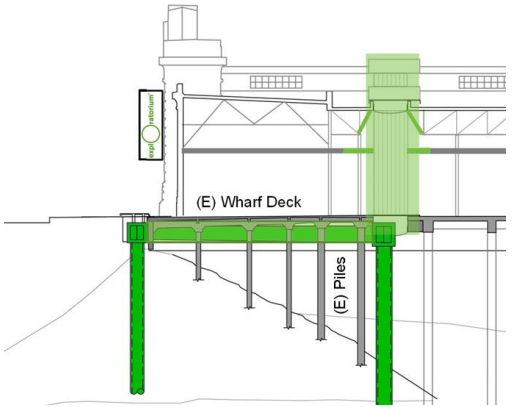
### Alt 1: Substructure Retrofits

- Strengthen bulkhead wall
- Wrap piles
- Improve pile and wall connections to deck



### Alt 2: Widen Seismic Joint

- Widen existing seismic joint to handle Seawall movement
- Alt 1 substructure retrofits




### Alt 3: Spider Frame

- New piles and substructure girders
- Design to be jackable for future sea level rise.
- High construction impacts make this unlikely.

# 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

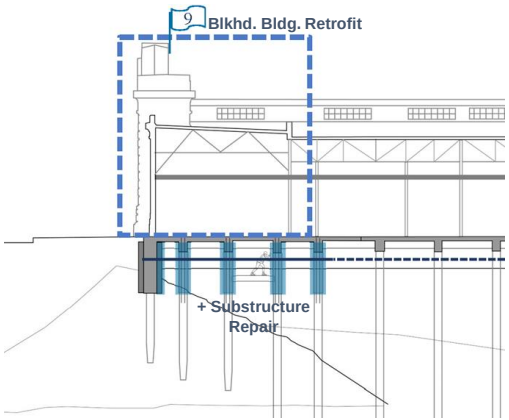
# PIER 9 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

Project Vision: Objectives, Constraints, and Other Considerations

- *Improve earthquake safety* by retrofitting bulkhead wall and substructure to reduce damage and risk of collapse
- *Improve disaster response capability* by provide reliable access across Seawall to deepwater berths.
- Due to difficulty in fixing Bay Muds, include major Seawall improvements as part of later SLR adaptation.
- Consider wharf deterioration in alternatives analysis

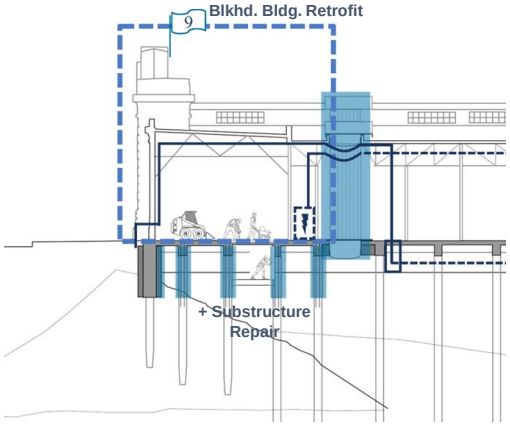
# PIER 9 BULKHEAD WALL & WHARF EARTHQUAKE SAFETY RETROFIT PROJECT

## Draft Project Alternatives



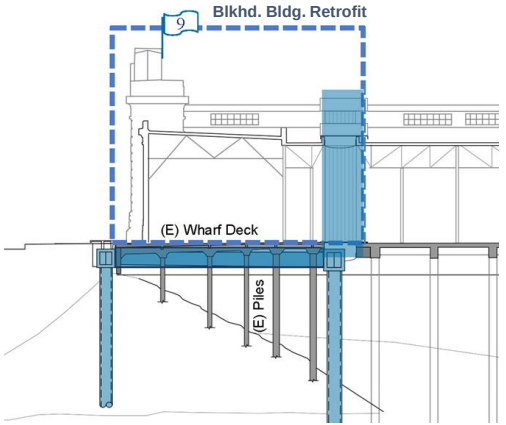

### Alt 1: Substructure Retrofits

- Strengthen bulkhead wall
- Wrap piles
- Improve pile and wall connections to deck




### Alt 2: Joint and Bldg

- Add a seismic joint to handle seawall movement
- Retrofits bulkhead building
- Include Alt 1 Substructure Retrofits

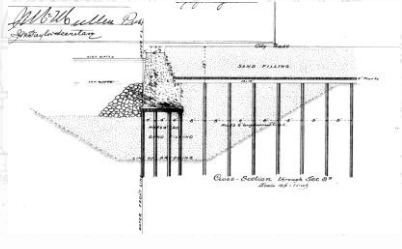


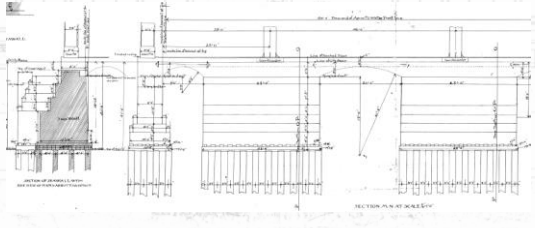

### Alt 3: Spider Frame

- New piles and substructure girders
- Design to be jackable for future sea level rise
- Fixes deteriorated substructure conditions

# FERRY BUILDING SEAWALL & SUBSTRUCTURE EQ 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

- *Improve earthquake safety* by strengthening the Seawall and substructure of the iconic Ferry Building
- *Improve disaster response* by providing earthquake reliable earthquake access for Ferry berths and staging areas
- Improve waterside public realm, reliability of utility services, and Near-term flood defenses
- Minimize construction impacts
- Develop a long-term adaptation plan and consider these investments as steps on the path

# Work Performed in AAR Part 1

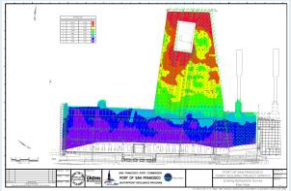
## Data Collection

The aim of the AAR phase was to further advance the alternatives brought forward from the NAR. To do this, important site data was collected to improve our understanding of the existing conditions of this part of the waterfront.

Discipline teams utilized boats to verify and survey existing conditions under the ferry building and ferry plaza, as well as building and clock tower inspections performed on foot. Ground investigations in the form of borings and CPT's were also undertaken around the Ferry Building and Plaza.

### Utilities

- Bathymetric Survey
- Topographical Survey
- Under-Deck Point Cloud 3D Scan & Ortho-Photos
- Utility Survey and Composite Plan



### Structural

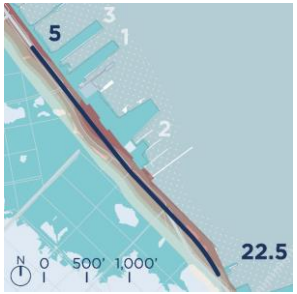
- Structural Visual Boat Inspection for technical analysis
- Ferry Building and Clocktower visual inspections
- Seawall Testing – core samples

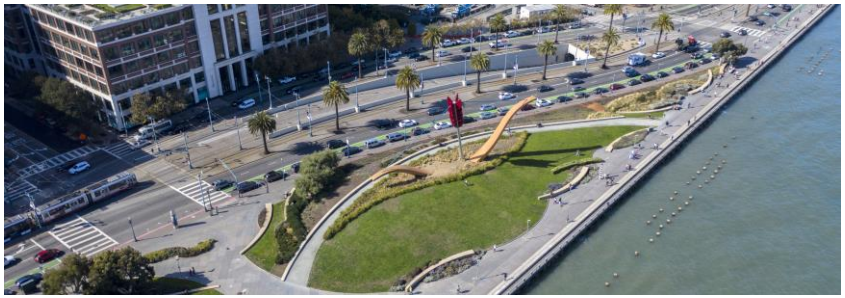
### Geotechnical

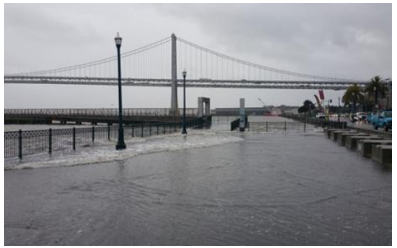
- CPT and Boring Explorations

# DOWNTOWN COASTAL RESILIENCE 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

# DOWNTOWN COASTAL RESILIENCE PROJECT

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

- *Reduce near-term flood risk* to multi-modal Embarcadero transit corridor, BART and Muni, and historic resources, while longer-term solutions are developed for earthquake stability and sea level rise
- *Balance near-term flood risk reduction with larger adaptation moves.*
- *Maintain a high-quality public realm*, fix flood damage & explore habitat enhancements
- Partner with SFPUC to include storm water management improvements.
- Consider deteriorated bulkhead and substructures

# ALIGNMENTS

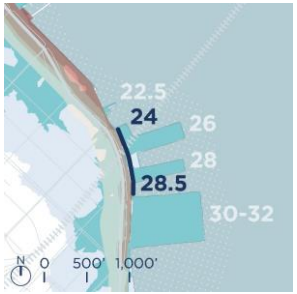
Pier/Warf Edge

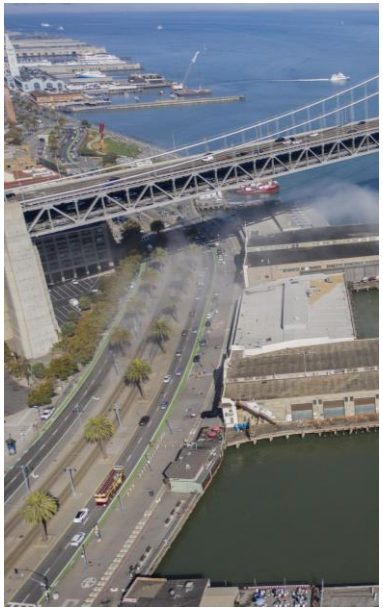
Promenade/Bike

Median

# PIER 24½ to 28½ BULKHEAD WALL & WHARF EQ SAFETY 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

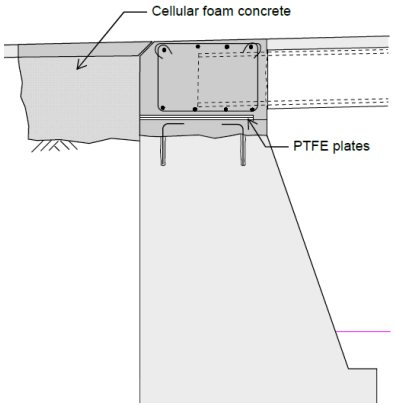
# PIER 24½ to 28½ BULKHEAD WALL & WHARF EARTHQUAKE SAFETY PROJECT

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

- *Improve earthquake safety* in bulkhead zone and Promenade by reducing collapse risk
- Consider age, condition and rehabilitation needs.
- Include simple retrofits to full replacement alternatives
- Full replacement alternatives to be adaptable for SLR.
- Consider utility needs and adjacent Pier 30/32 and Pier 38/40 development projects

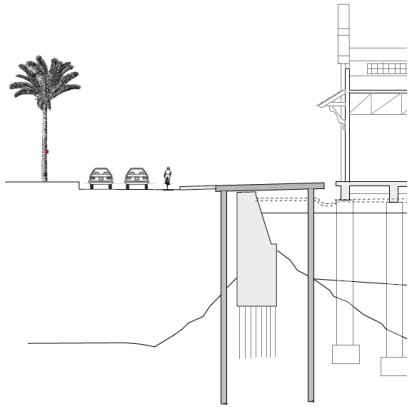
# PIER 24½ to 28½ BULKHEAD WALL & WHARF EARTHQUAKE SAFETY PROJECT

## Draft Project Alternatives



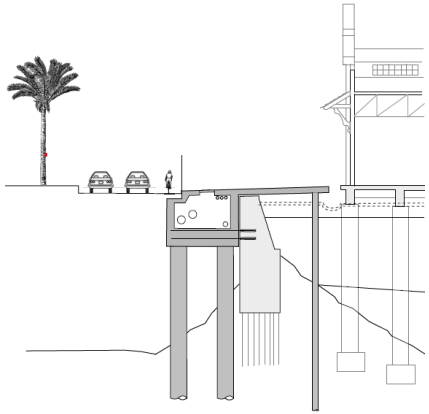

### Alt 1 & 2: Retrofits

Simple structural retrofits that allow for wall movement without wharf losing vertical support. Include seismic joints to protect piers.



### Alt 3: Replace Wharf

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

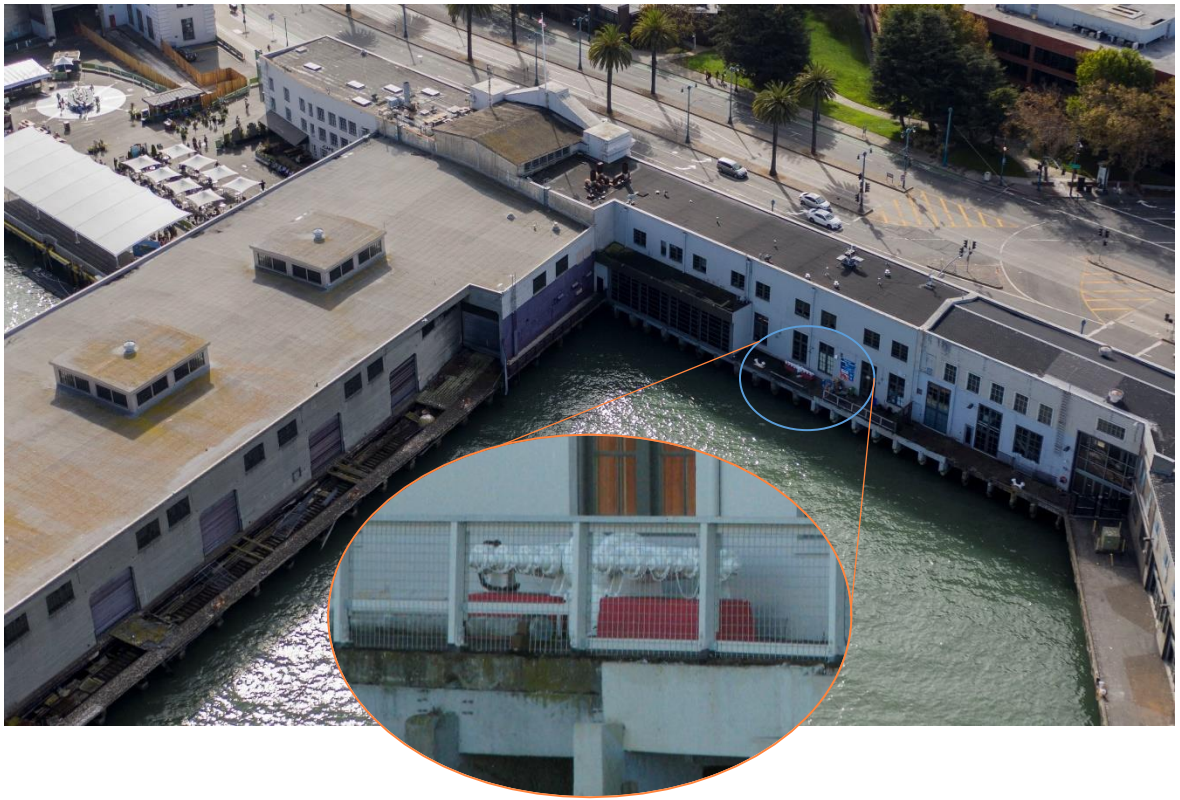


### Alt 4: Stabilize Shoreline

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

# P35.5 EFWS Fireboat Berth and Manifold Reliability Project

## Background

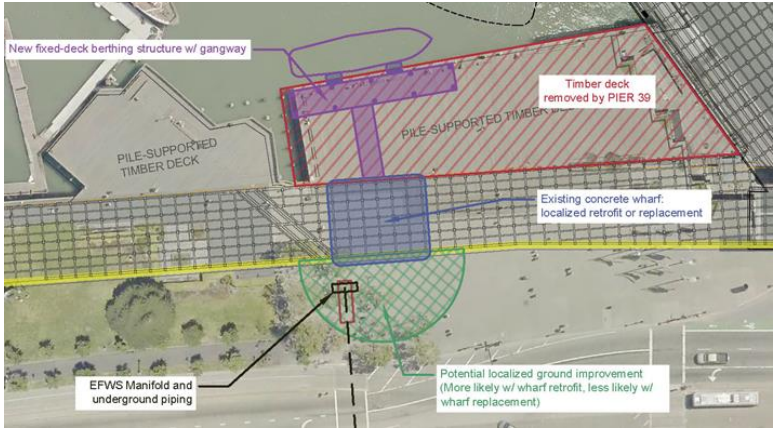


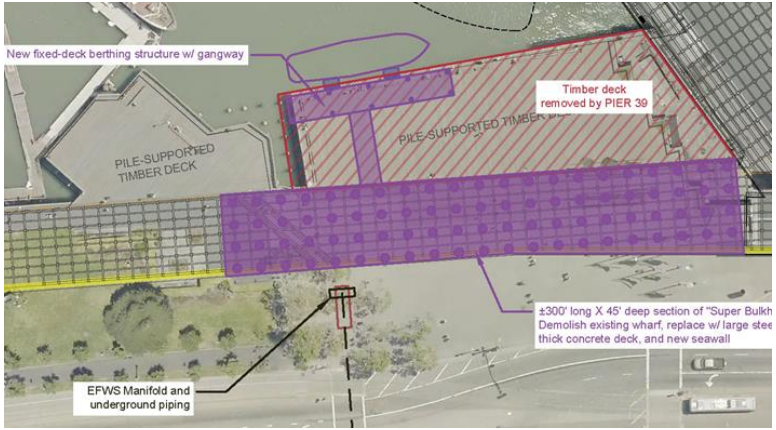
Fireboat manifolds are a redundant and resilient water source following a major earthquake, but:

- Current wharf and building vulnerable to earthquakes
- Piping to manifold exposed to bay, passes through seawall
- Historic bulkhead building obstructs fire fighting operations
- Currently not a usable berth

# P35.5 EFWS Fireboat Berth and Manifold Reliability Project

## Initial project concepts and comparison




**Concept 1:** EQ-Reliable Fireboat Manifold

- ✓ Emergency Response
- × Shoreline Seismic Resilience
- × Flood protection and sea level rise adaptation

**Concept 2:** Add Seawall Replacement

- ✓ Emergency Response
- ✓ Shoreline Seismic Resilience
- ✓ Flood protection and sea level rise adaptation

# LIVING SEAWALL

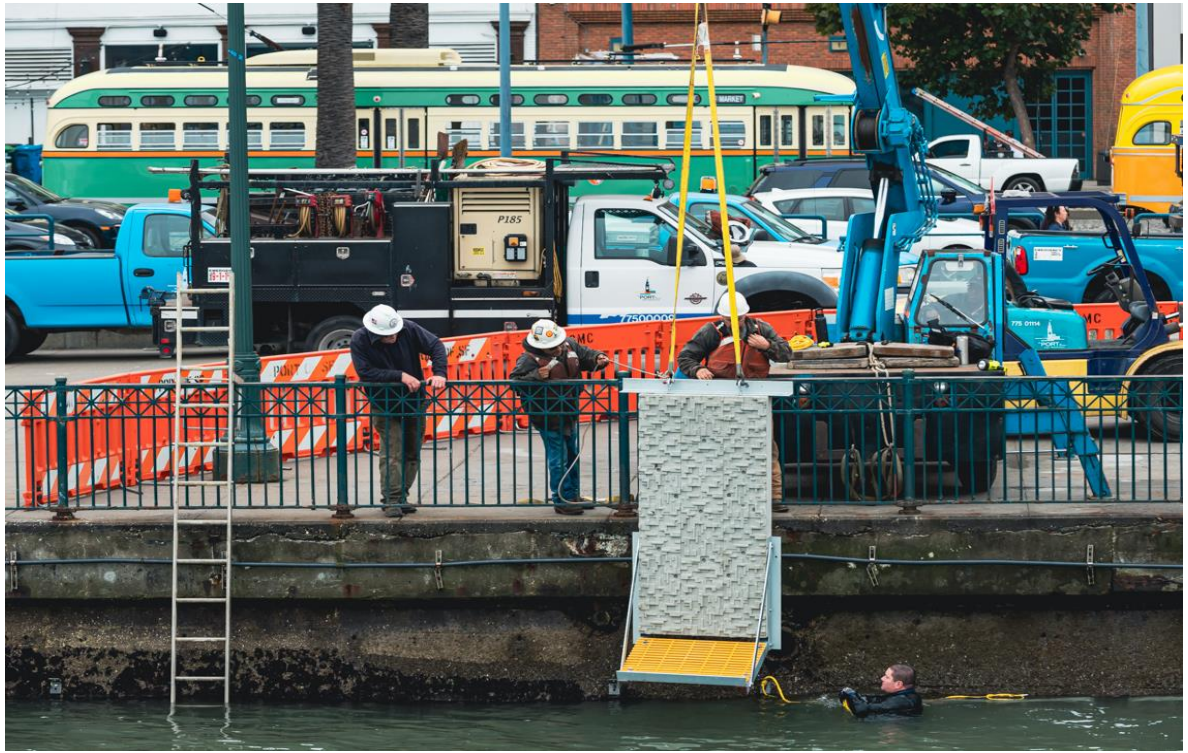
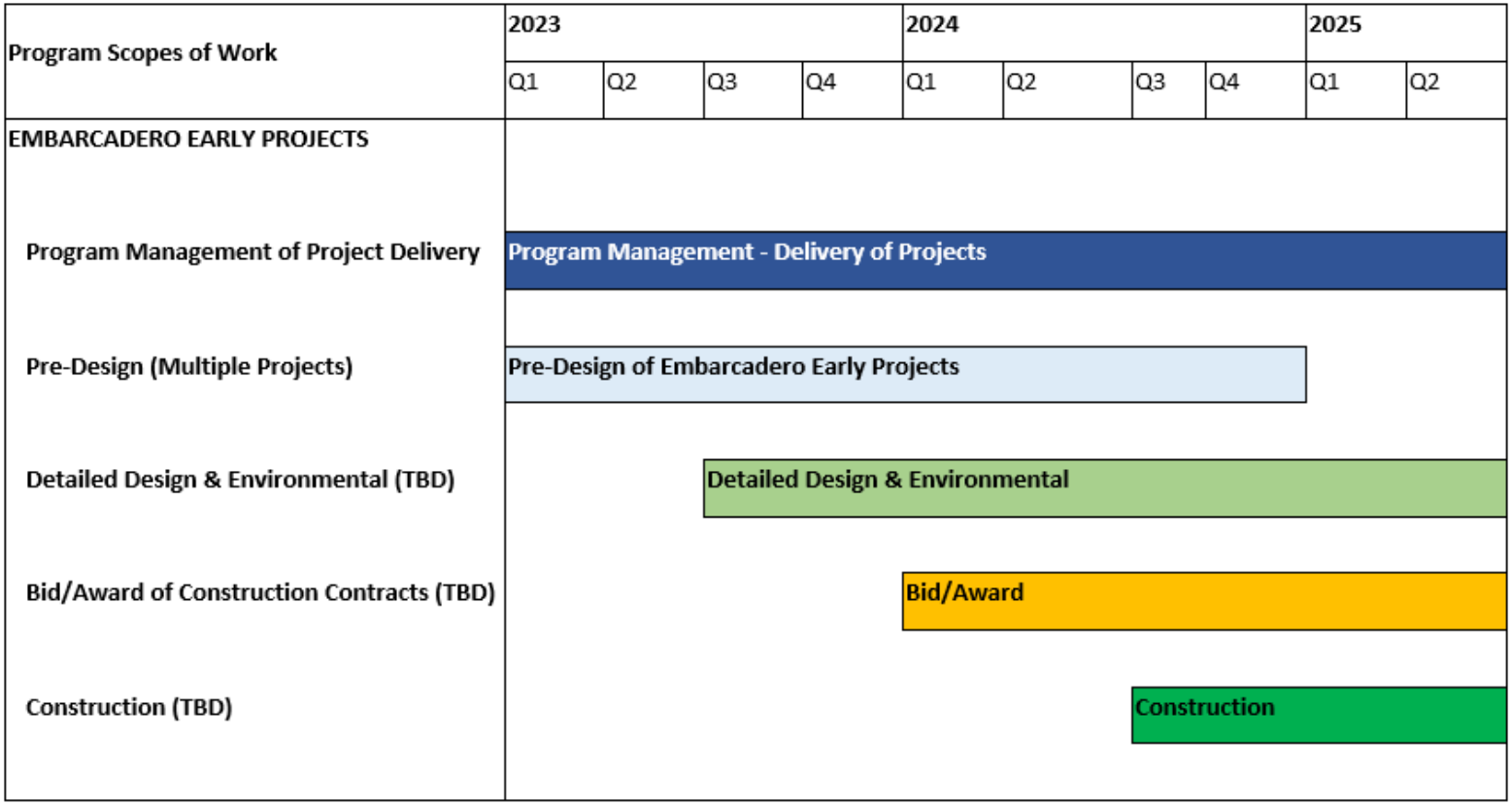


Photo: Lonny Meyer

- Objective: ecological enhancement of seawalls
- Study ecological growth on concrete using textured surfaces and concrete admixture composition
- All frames and tiles are constructed and installed
- Two years of monitoring by the Smithsonian

# HIGH LEVEL EMBARCADERO EARLY PORJECTS SCHEDULE




Projects that advance to Detailed Design and Construction to be determined at completion of Pre-Design

# U.S. Army Corps of Engineers San Francisco Waterfront Flood Resiliency Study

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Waterfront Resilience Program

# WHERE ARE WE IN THE FLOOD STUDY PROCESS?

**We are here**
**Release of Draft Plan**


***What to expect***

**Draft Plan** for public engagement and technical reviews *(Winter 2024)*, and Recommended Plan *(2025)*

***What to expect***

USACE Chief of Engineers recommends the project to Congress.
Congress will then decide whether to authorize and fund the project.

***What to expect***

Detailed design and engineering, implementation, and phasing pending Congressional funding

***What to expect***

Phased construction of coastal flood defense infrastructure, related seismic stabilization, and other improvements

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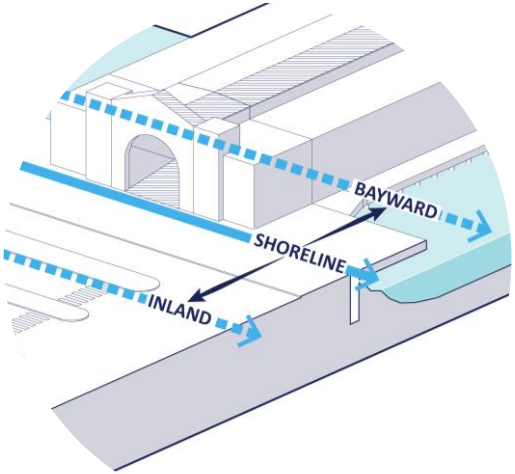
US Army Corps of Engineers®

*Note: Dates are approximate and subject to change. Projects will occur in phases which will extend over decades.*

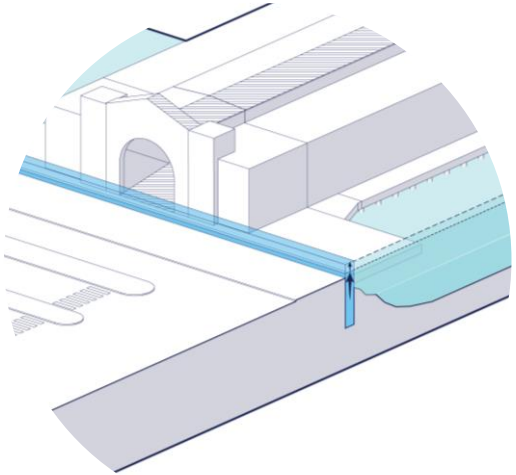
# WHAT IS IN THE DRAFT PLAN?

***Where*** to build flood defenses



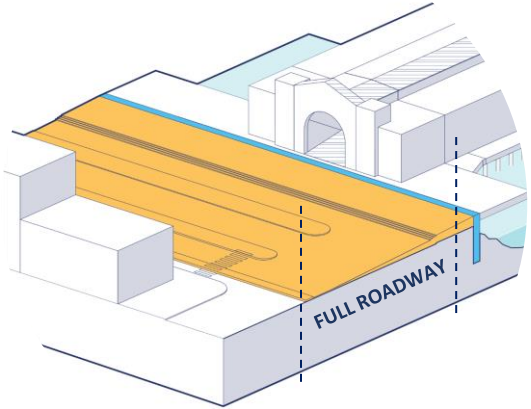

*Have we located the flood defenses in the right place?*

***How high*** to build flood defenses



*Should we invest in higher levels of flood defense first, or adapt in multiple phases?*

***How much space*** to use




*More space provides more flexibility but is associated with more disruption. Less space means more abrupt grade changes.*

*...and How flood defenses can **be adapted** in the future*

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## *What's not being decided at this stage?*

The Draft Plan **does not include** the following:

- Detailed designs for flood defenses
- Designs for waterfront streets, open spaces, and infrastructure (including pumping stations)
- Timing and sequencing of construction
- Funding plan

These elements will be developed during later project phases with the public, USACE and City Agencies.

## *The Draft Plan is not:*

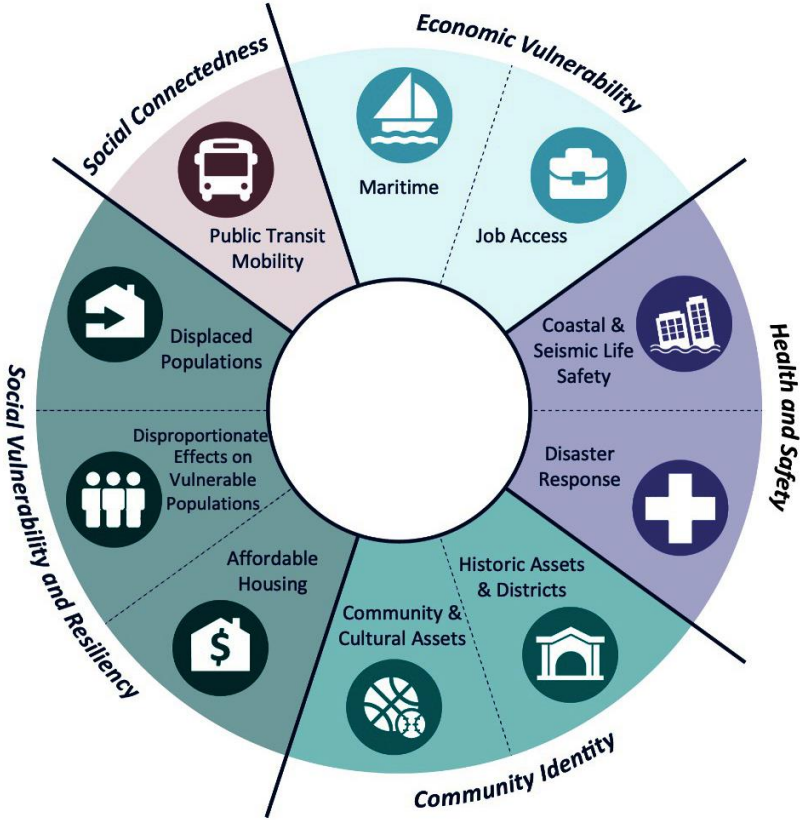
- A re-design for the future waterfront
- A plan for the Embarcadero Historic District, the Ferry Building and public plazas and roadway, and creek and shoreline amenities

Project plans and implementation strategies will leverage other opportunities, align with other public and private projects, and reflect what the City can afford given other capital obligations

# A COMPREHENSIVE COST BENEFIT ANALYSIS THAT ELEVATES EQUITY

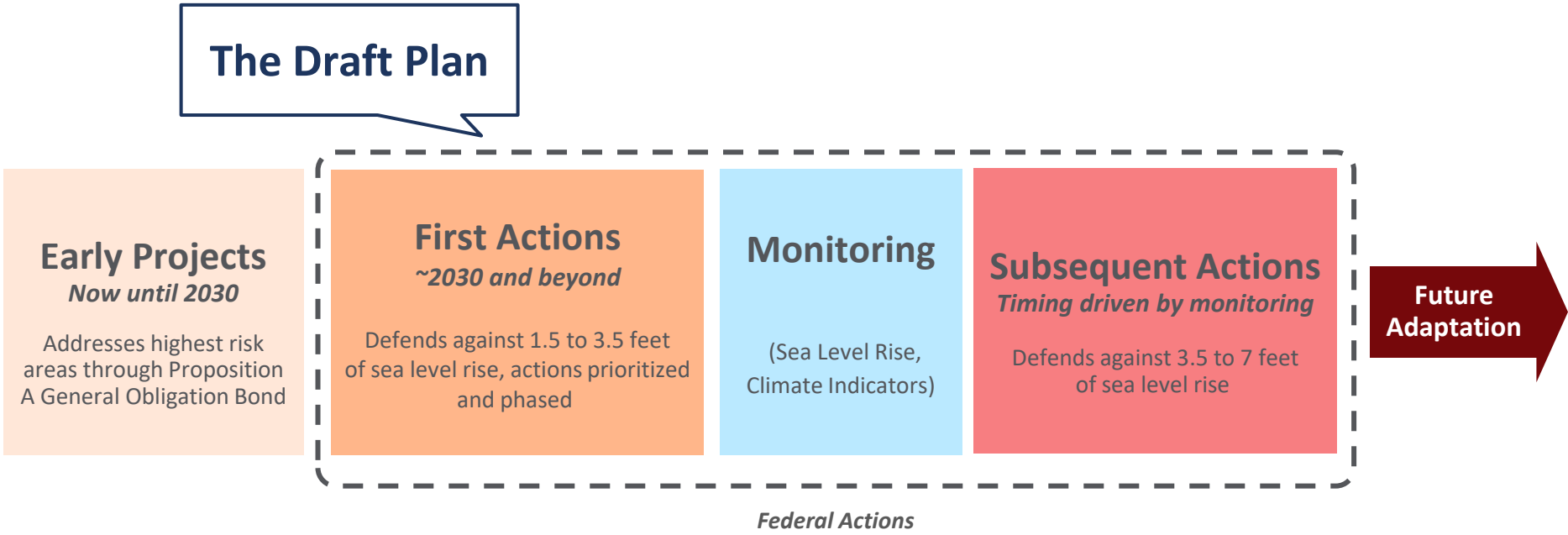
Historically, plan selection maximizes NED national economic benefits. This plan incorporates analysis across four categories:

+ National Economic Development (including damages prevented, cost of construction)
+ Regional economic impacts (including jobs)
+ Environmental quality, consequences, and compliance (including pollution)
+ **Other social effects (including disproportionate effects on vulnerable populations)**



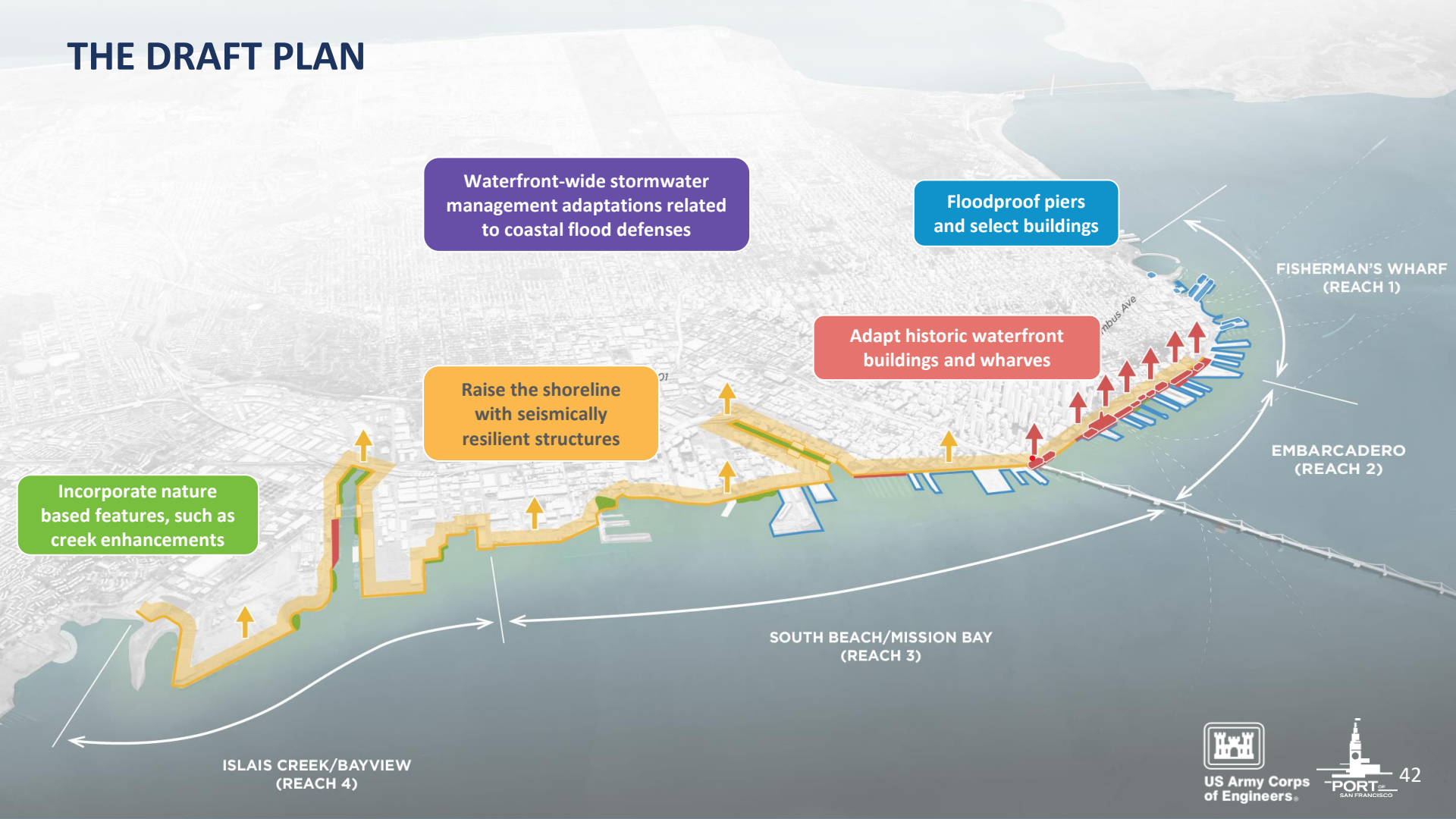

*Other Social Effects (USACE Analysis) data included in Alternative Selection*

# MONITORING AND ADAPTATION ACTIONS OVER TIME




*Note: Dates are approximate and subject to change. Projects will occur in phases which will extend over decades.*

# THE DRAFT PLAN

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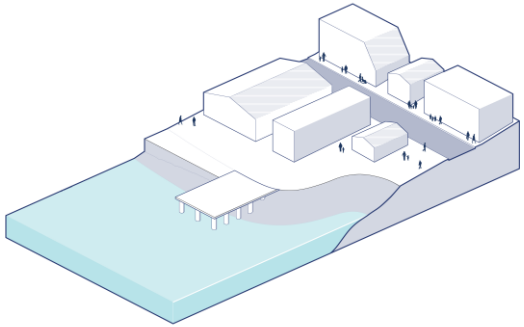
# ACTIONS EXPLAINED

## Floodproof select buildings

Some facilities can be modified to keep water out entirely, while others can be modified on the inside to allow water to enter and exit the facility, causing little or no lasting damage.

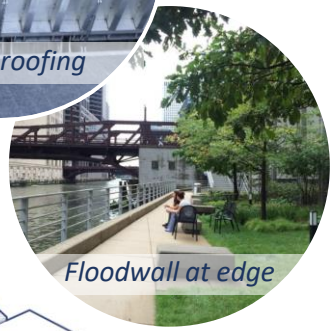
## Add short walls around piers

Build up to two-foot walls around piers to manage flood risks & defend against intermittent high water.

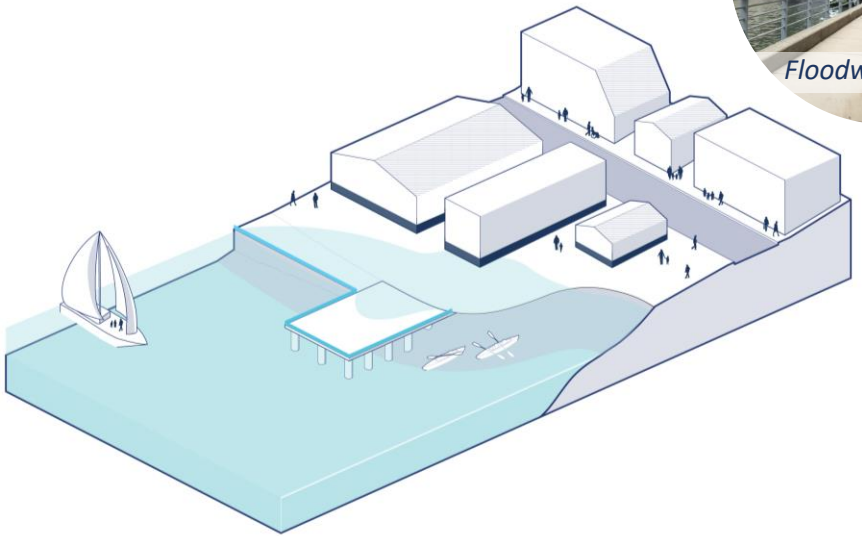


*Current condition*

*Floodproofing*



*Floodwall at edge*



*Future condition*

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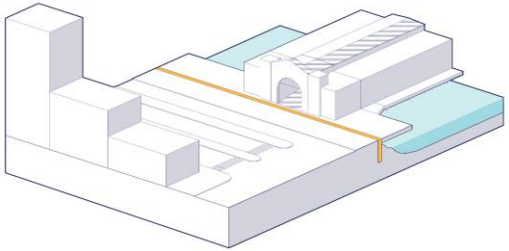
# ACTIONS EXPLAINED

## Elevate buildings and wharves

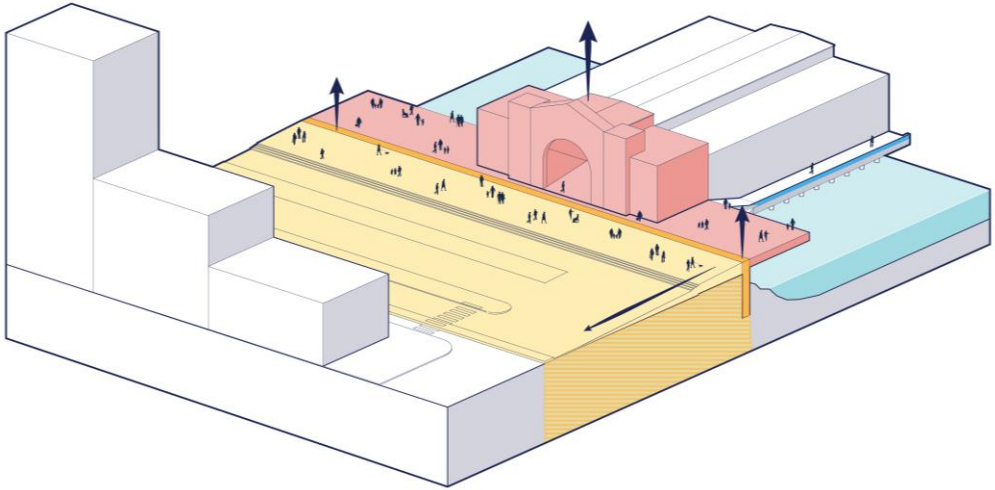
Elevate buildings and wharves along the water's edge, including the Ferry Building and historic bulkhead buildings. Enhance seismic stability for wharves and buildings.



*Current condition*


## Add short walls around piers

Build up to two-foot walls around piers to manage flood risks and defend against intermittent high water.



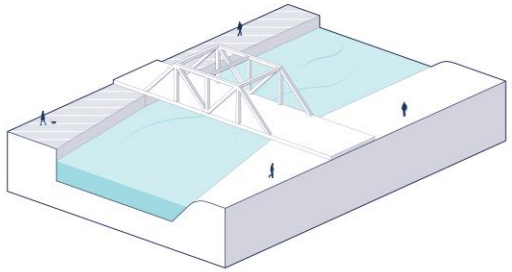
*Future condition*

# ACTIONS EXPLAINED

## Closure structure on bridges

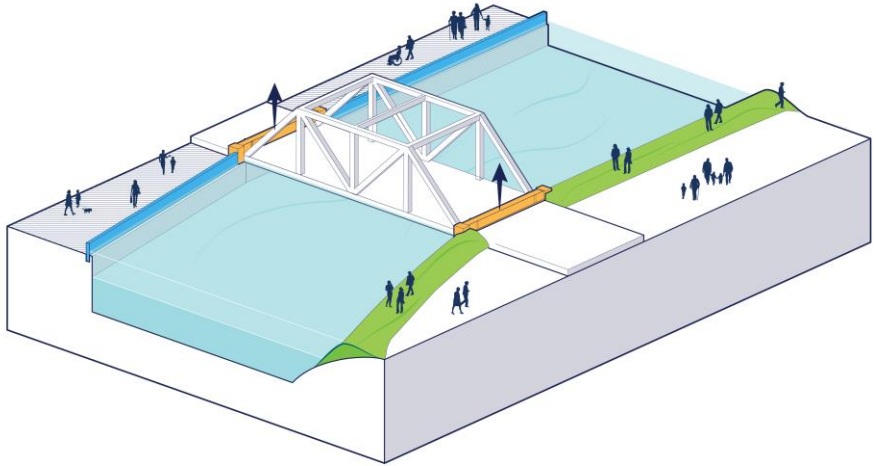
Closure structures on Third and Fourth Street Bridges will close gaps in the elevated shoreline to prevent flooding.

It is anticipated that these closures would be infrequent (less than once a year) and used in anticipation of a large storm or tide event.



*Current condition*

*Closure Structure*



*Future condition*

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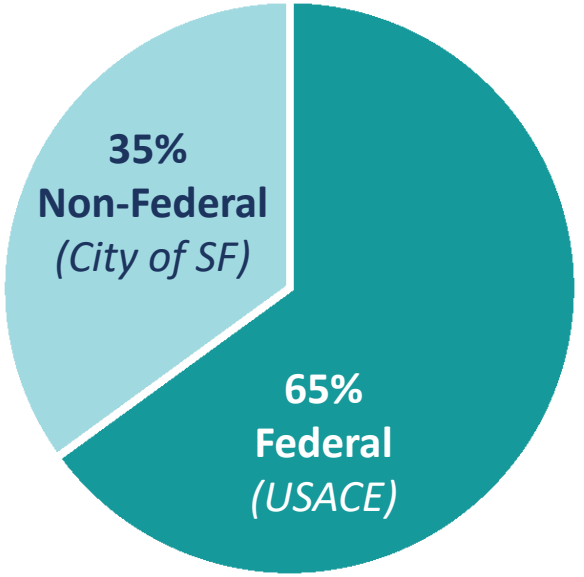
# PROJECT COSTS

*To address the risks and hazards that the city faces:*

Total Cost: **$13.5 Billion**

*Project Cost Sharing*



# A CATALYST FOR A MORE RESILIENT SAN FRANCISCO

***This is a once-in-a-century opportunity to:***

**Defend communities**, assets, and infrastructure equitably against coastal flooding

Improve **earthquake safety** related to flood defense projects

Invest in a **great public waterfront** along with flood defense projects

Safeguard resilient **transit and utility networks**

**Secure funding** through collaboration with the Federal government

Adapt **historic and cultural resources** to climate change

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# WATERFRONT RESILIENCE PROGRAM PARTNERS

Port team working in close coordination with key partners

# Thank You!

Steven Reel, Deputy Program Manager – Engineering and Program Management
steven.reel@sfport.com
Adam Varat, Deputy Program Manager – Planning
adam.varat@sfport.com
Carlos Colon, Waterfront Resilience Program Administrator
carlos.colon@sfport.com