

SAN FRANCISCO WATERFRONT FLOOD STUDY

Draft Report and Public Feedback

January 26 – March 29, 2024

3/20/24 Northern Advisory Committee



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WHAT IS THE FLOOD STUDY?

- The **Flood Study** analyzes **coastal flood risk** and the effects of **sea level rise** to the San Francisco waterfront along the Port's 7.5-mile jurisdiction over the next 100 years.
- The **Draft Plan** will inform subsequent stages of funding and design in order to develop targeted construction projects.
- The proposed solutions are estimated to cost **\$13.5 billion** (high-level, preliminary cost estimate) and, if approved by Congress, the Federal government may pay **65% of the cost**.
- The Flood Study is led by the **U.S. Army Corps of Engineers (USACE)** in collaboration with the **City of San Francisco**.



San Francisco Waterfront
Flood Study

San Francisco
Planning

ONESF
Building Our Future



San Francisco
Water Power Sewer



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WHAT'S AT RISK?

Potential Sea Level Rise by 2100

The **Flood Study** encompasses the Port's jurisdiction, which includes **7.5 miles of shoreline** - a substantial piece of our City's waterfront.

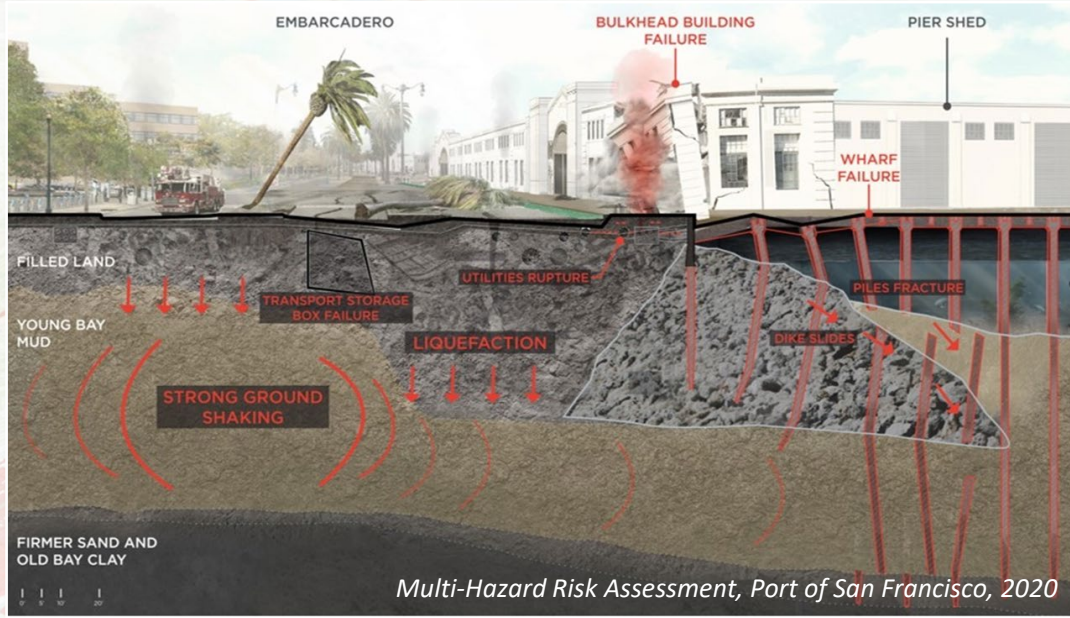
Without a Federal project, modeling shows:

- By 2050, **100 to 500 structures** and **assets** will be vulnerable to flooding
- By 2140, damages could amount up to **\$23 billion**



WHAT'S AT RISK?

Seismic Hazard



San Francisco, 1906

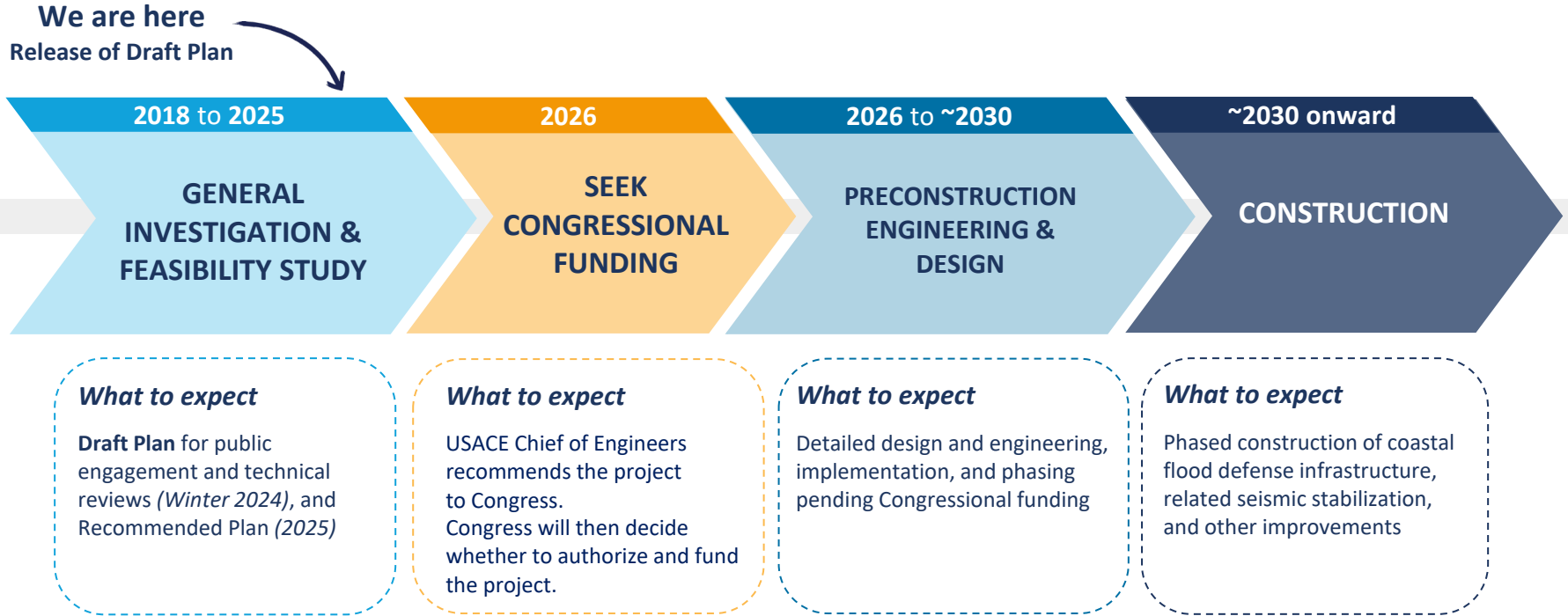
Up to **40,000** people could be at risk on Port property if an earthquake occurs during the day



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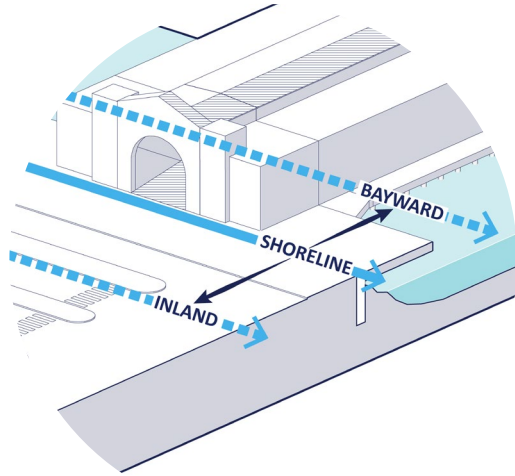
WHERE ARE WE IN THE FLOOD STUDY PROCESS?



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

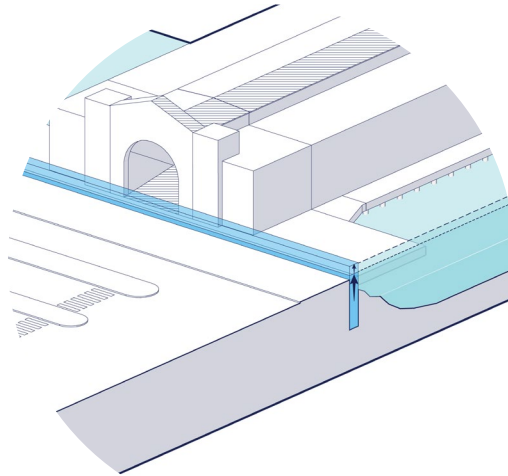
WHAT IS IN THE DRAFT PLAN?

Where to build flood defenses



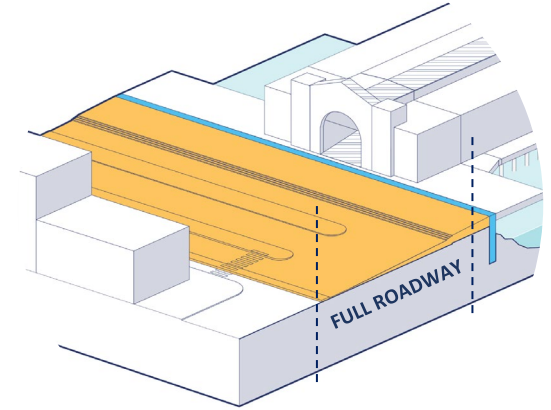
Have we located the flood defenses in the right place?

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*

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:

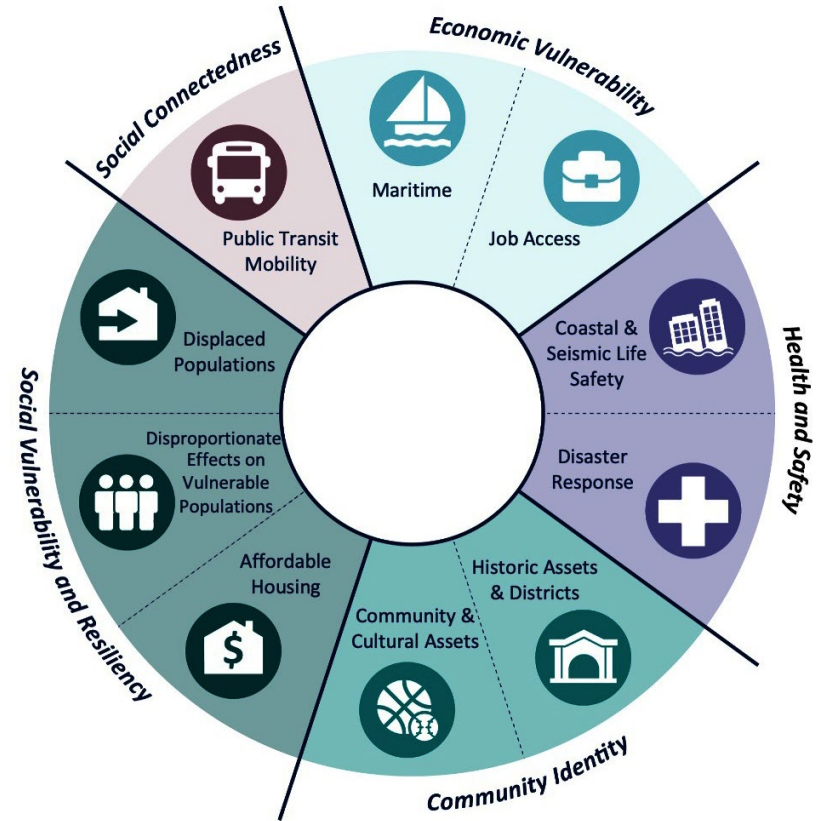
- A re-design for the future waterfront
- A plan for the Embarcadero Historic District, the Ferry Building and public plazas and roadway, and creek and shoreline amenities

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)**



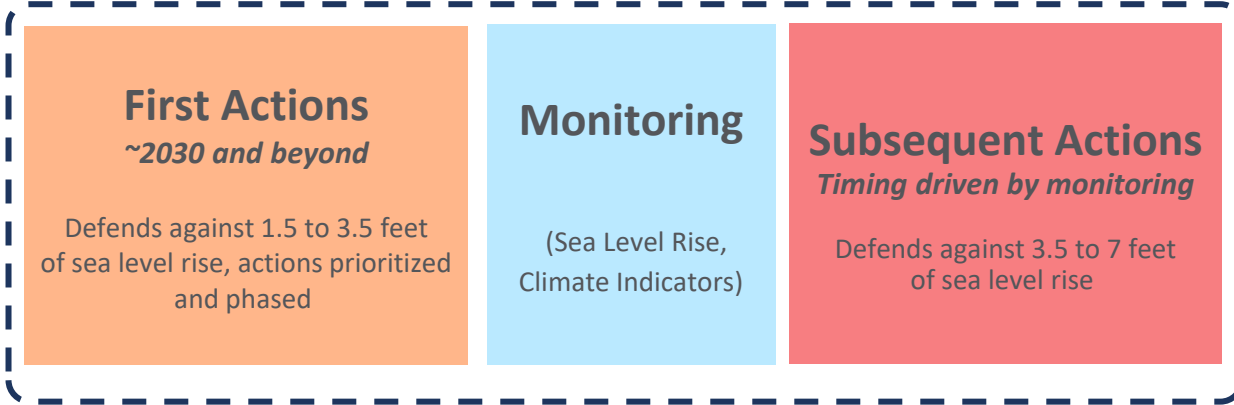
Other Social Effects (USACE Analysis) data included in Alternative Selection

MONITORING AND ADAPTATION ACTIONS OVER TIME

The Draft Plan

Early Projects
Now until 2030

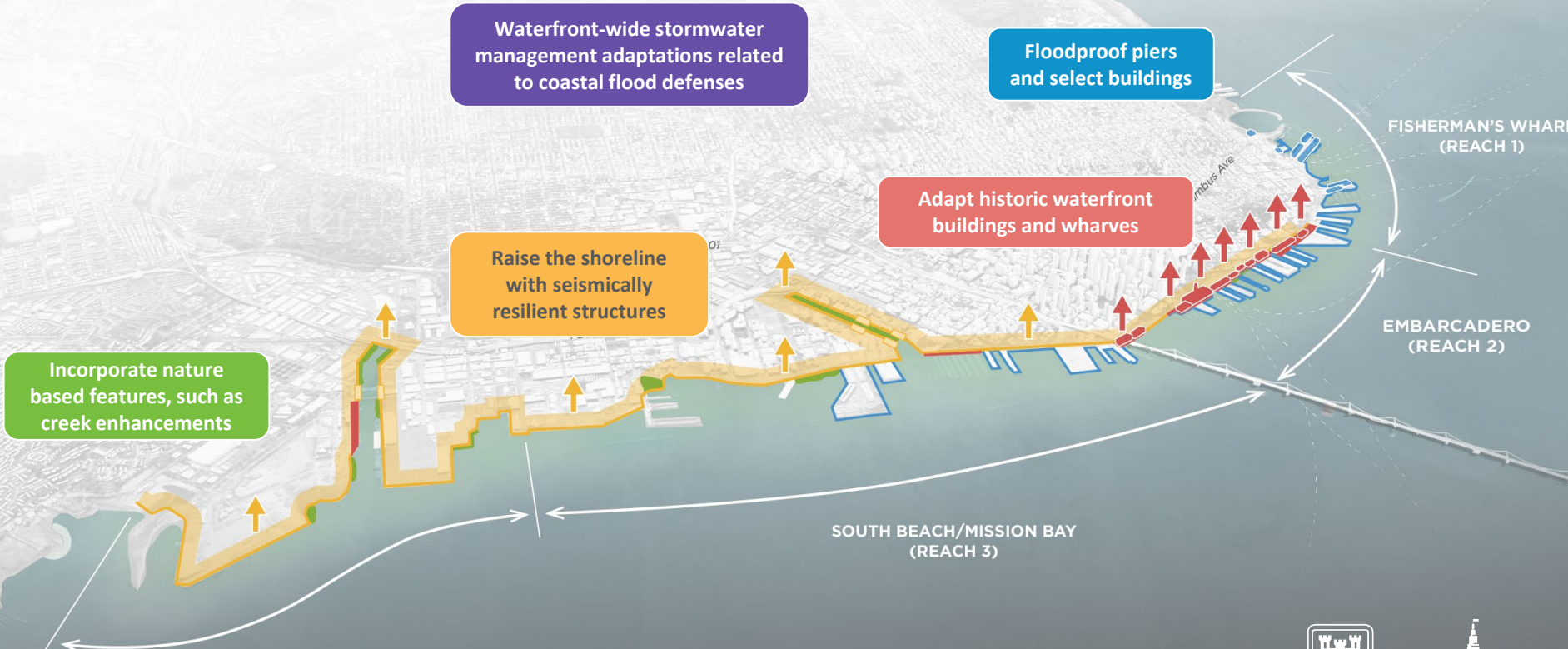
Addresses highest risk areas through Proposition A General Obligation Bond



Federal Actions

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

THE DRAFT PLAN



Incorporate nature based features, such as creek enhancements

Raise the shoreline with seismically resilient structures

Waterfront-wide stormwater management adaptations related to coastal flood defenses

Adapt historic waterfront buildings and wharves

Floodproof piers and select buildings

ISLAIS CREEK/BAYVIEW (REACH 4)

SOUTH BEACH/MISSION BAY (REACH 3)

EMBARCADERO (REACH 2)

FISHERMAN'S WHARF (REACH 1)

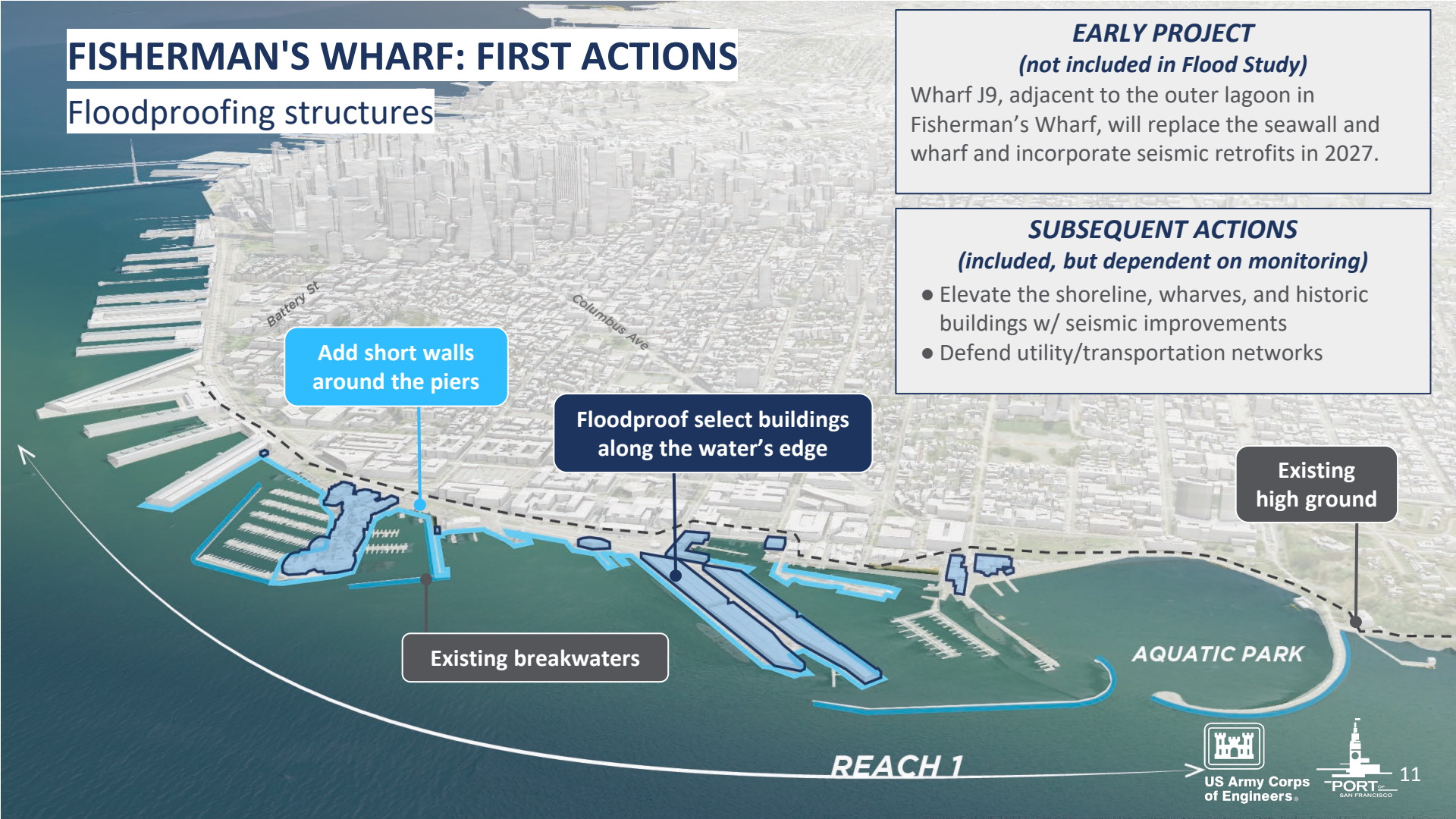


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FISHERMAN'S WHARF: FIRST ACTIONS

Floodproofing structures



EARLY PROJECT

(not included in Flood Study)

Wharf J9, adjacent to the outer lagoon in Fisherman's Wharf, will replace the seawall and wharf and incorporate seismic retrofits in 2027.

SUBSEQUENT ACTIONS

(included, but dependent on monitoring)

- Elevate the shoreline, wharves, and historic buildings w/ seismic improvements
- Defend utility/transportation networks

Add short walls around the piers

Floodproof select buildings along the water's edge

Existing high ground

Existing breakwaters

AQUATIC PARK

REACH 1



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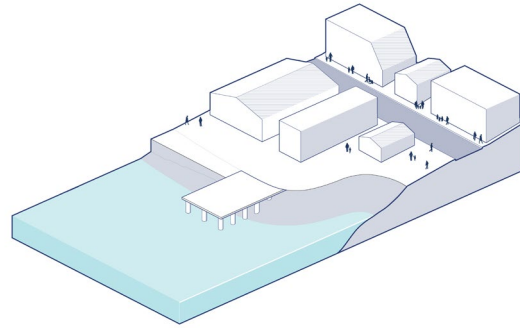
ACTIONS EXPLAINED

Floodproof select buildings

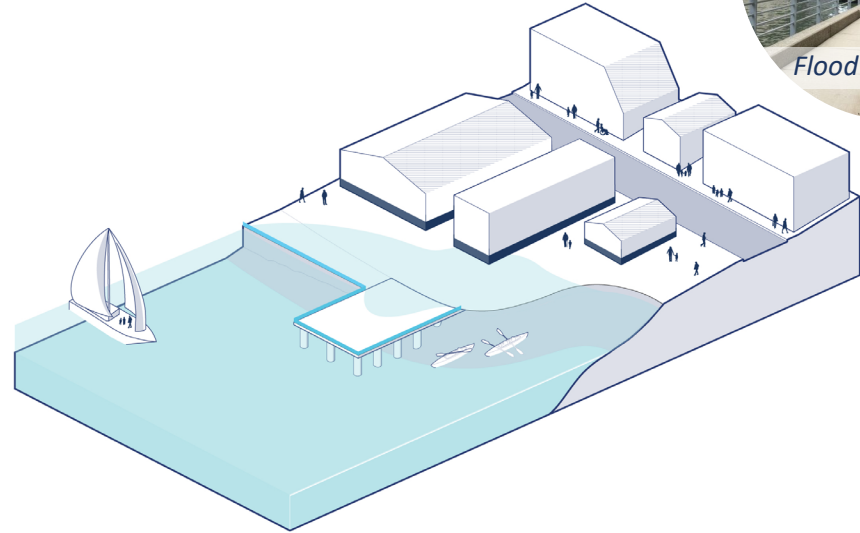
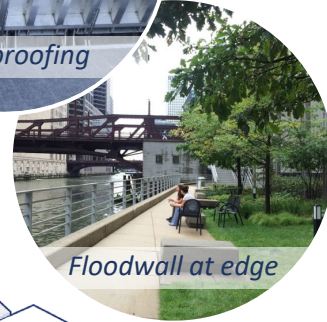
Some facilities can be modified to keep water out entirely, while others can be modified on the inside to allow water to enter and exit the facility, causing little or no lasting damage.

Add short walls around piers

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



Current condition



Future condition

EMBARCADERO: FIRST ACTIONS

Defend against **3.5 feet** of sea level rise

Raise buildings along the water's edge and raise wharves

Raise the shoreline and roadway with a gradual transition, designed to withstand a seismic event

SUBSEQUENT ACTIONS

No subsequent action currently anticipated to withstand 3.5' of sea level rise

Add short walls around the piers

EARLY PROJECTS

(not included in Flood Study)

Piers 9 & 15 Seawall Earthquake Safety Projects
Downtown Coastal Resilience Project (MUNI & BART)

← REACH 2

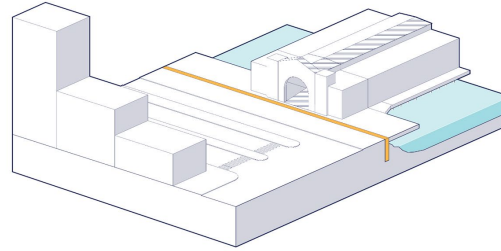
ACTIONS EXPLAINED

Elevate buildings and wharves

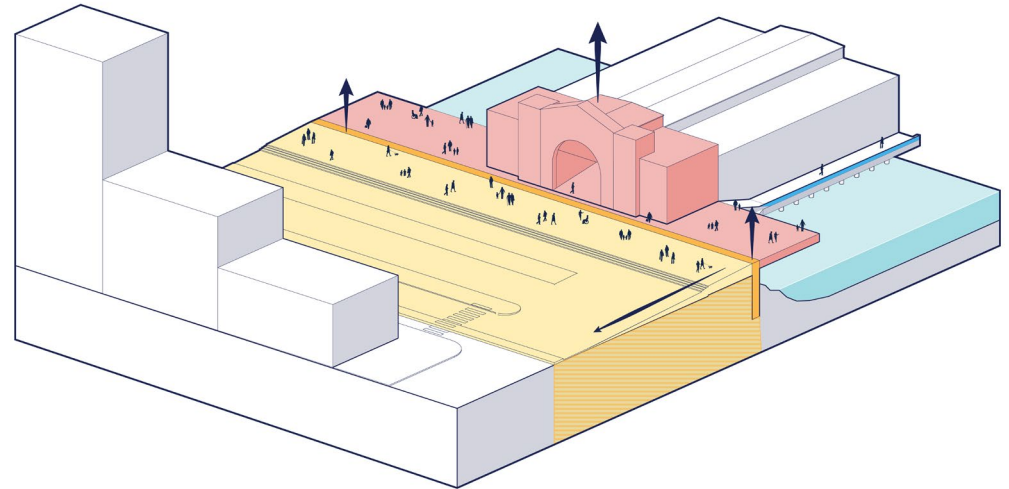
Elevate buildings and wharves along the water's edge, including the Ferry Building and historic bulkhead buildings. Enhance seismic stability for wharves and buildings.

Add short walls around piers

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



Current condition



Future condition

SOUTH BEACH / MISSION BAY: FIRST ACTIONS

Elevate the shoreline to defend against 1.5 feet of sea level rise

New park and development projects will adapt their sites to sea level rise

MISSION BAY

Berms/levees + nature-based features

Closure structures on bridges

Add short walls around the piers

Ground improvements to ensure flood defenses withstand a seismic event

EARLY PROJECTS

(not included in Flood Study)

- Pier 50 Earthquake Improvement Project
- Pier 24 ½ to Pier 28 ½ Seawall EQ Safety Project

SUBSEQUENT ACTIONS

(included, but dependent on monitoring)

Elevate shoreline to withstand 3.5' of Sea Level Rise and add nature based features

SOUTH BEACH

Elevated shoreline

REACH 3



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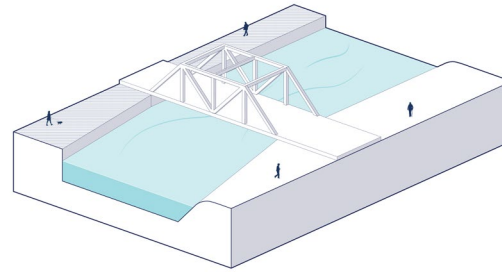


ACTIONS EXPLAINED

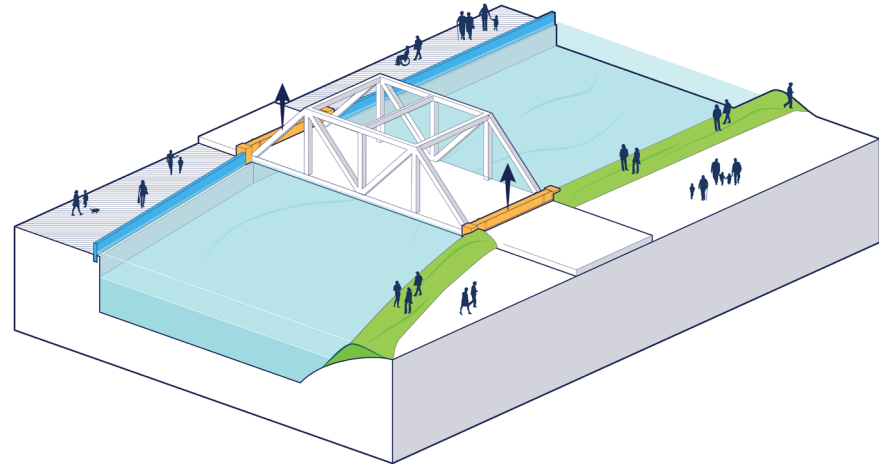
Closure structure on bridges

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.



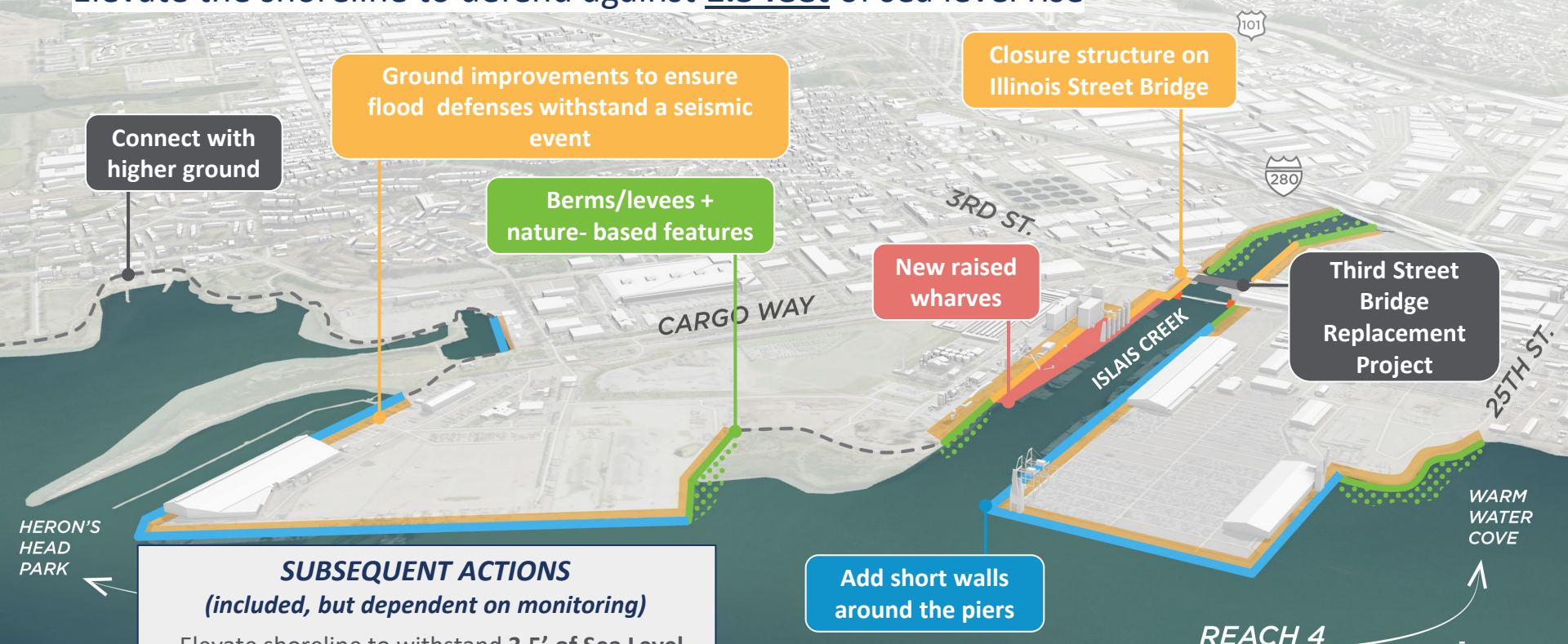
Current condition



Future condition

ISLAIS CREEK / BAYVIEW: FIRST ACTIONS

Elevate the shoreline to defend against **1.5 feet** of sea level rise



Connect with higher ground

Ground improvements to ensure flood defenses withstand a seismic event

Berms/levees + nature-based features

Closure structure on Illinois Street Bridge

New raised wharves

Third Street Bridge Replacement Project

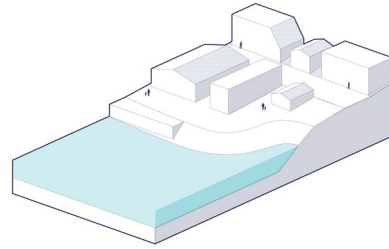
Add short walls around the piers

SUBSEQUENT ACTIONS
(included, but dependent on monitoring)
Elevate shoreline to withstand 3.5' of Sea Level Rise & add nature-based features

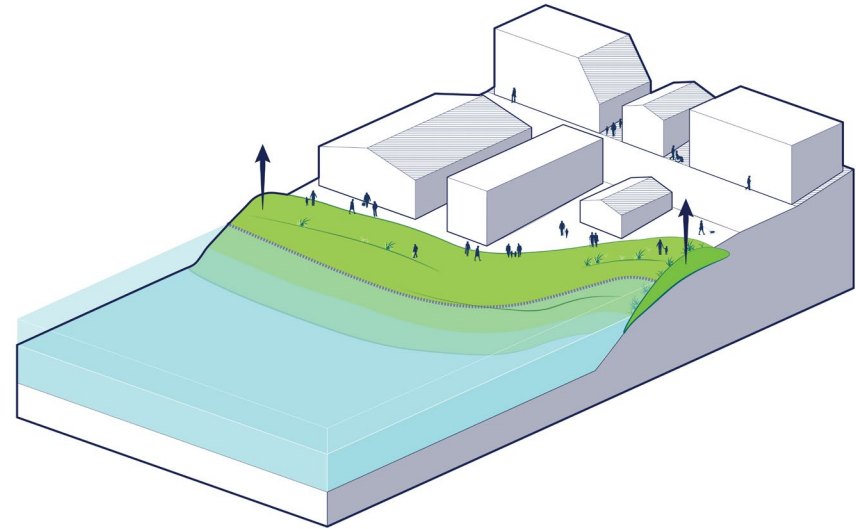
ACTIONS EXPLAINED

Berms/levees + nature-based features

Berms/levees are areas of raised ground that can help prevent flooding while maintaining waterfront access. They can include public space, such as walking or biking paths, and incorporate vegetation that support habitats.



Current condition



Future condition

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

HERON'S HEAD



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YOUR FEEDBACK IS IMPORTANT TO US AND THE PROCESS

USACE and the City are seeking public comment on the Draft Integrated Feasibility Report and Environmental Impact Statement through **March 29, 2024**.

Provide comments today:

- Comment cards are available at the tables and can be dropped in one of the boxes
- Provide verbal comments at the Court Reporter station
- Open-mic: After this presentation you can provide 1 minute of comments to the group. No questions will be answered.

Provide written comments:

- Email: SFWFERS@usace.army.mil
- Mail: U.S. Army Corps of Engineers, Tulsa District ATTN: RPEC-SFWS, 2488 E 81st St., Tulsa, OK 74137
- Online: sfport.com/wrp



Thank you

U.S. Army Corps of Engineers | SFWFRS@usace.army.mil
Port of SF Waterfront Resilience Program | wrp@sfport.com



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