SAN FRANCISCO WATERFRONT FLOOD STUDY

Draft Report and Public Feedback

January 26 – March 29, 2024

WELCOME & INTRODUCTIONS

Meeting Purpose

- Provide information about the San Francisco Waterfront Flood Study (Flood Study)[1]
- Provide information about the Draft Integrated Feasibility Report and Environmental Impact Statement
- Provide an overview of the Draft Plan
- Hear your feedback about the information shared today

1. U.S. Army Corps of Engineers and City of San Francisco, San Francisco Waterfront Coastal Flood Study 2024

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LAND ACKNOWLEDGEMENT

The Port of San Francisco acknowledges that we are on the ***unceded ancestral homeland of the Ramaytush Ohlone*** who are the original inhabitants of the San Francisco Peninsula.

As the indigenous stewards of this land and in accordance with their traditions, the Ramaytush Ohlone have never ceded, lost nor forgotten their responsibilities as the ***caretakers of this place***, as well as for all peoples who reside in their traditional territory.

As guests, we recognize that we benefit from living and working on their traditional homeland.

We wish to ***pay our respects*** by acknowledging the Ancestors, Elders and Relatives of the Ramaytush Community and by ***affirming their sovereign rights as First Peoples.***

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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**.

US Army Corps of Engineers + PORT OF SAN FRANCISCO

San Francisco Waterfront Flood Study

San Francisco Planning · ONESF Building Our Future · CLIMATESF · SFMTA · San Francisco Water Power Sewer · SF Public Works

FOUR IMPORTANT ELEMENTS TO NOTE

1

The Draft Plan is **preliminary** and **conceptual**, the USACE process includes early public comment on conceptual plans before designs are fully refined and approved.

2

Details are subject to change based on new information and **your feedback**

3

A project has **not yet been approved** or funded by the U.S. Congress or the City of San Francisco

4

There is **no impending construction** or **permitting** for a project

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WHERE TO GET MORE INFORMATION

The information in this presentation is a summary of what you can find in the Draft Integrated Feasibility Report and Environmental Impact Statement found at https://www.swt.usace.army.mil/.

Scan for the Draft Integrated Feasibility Report and Environmental Impact Statement

StoryMap Hub

ArcGIS StoryMaps is a web-based interactive application that includes maps in the context of narrative text and other multimedia content

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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: SFWFRS@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

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To stay in touch, please sign up for the Port of SF's Waterfront Resilience Program **eNewsletter and mailing list** by visiting sfport.com and clicking the Signup for e-newsletter in the footer and selecting Waterfront Resilience Program from the list in the form provided.

AGENDA

1. Waterfront Risks and Hazards
2. San Francisco Waterfront Flood Study
3. The Draft Plan
4. Public Comment

1 Waterfront Risks and Hazards

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SAN FRANCISCO IS AN ICONIC, BELOVED WATERFRONT CITY








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WHAT'S AT RISK?

Potential Sea Level Rise by 2100

San Francisco's waterfront location makes it ***vulnerable to coastal flooding*** due to ***sea level rise***

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WHAT'S AT RISK?

Flood Risk Today

Embarcadero, March 2023

Recology, Islais Creek

Third Street Bridge, Mission Creek

San Francisco's waterfront faces urgent flood risks ***today***

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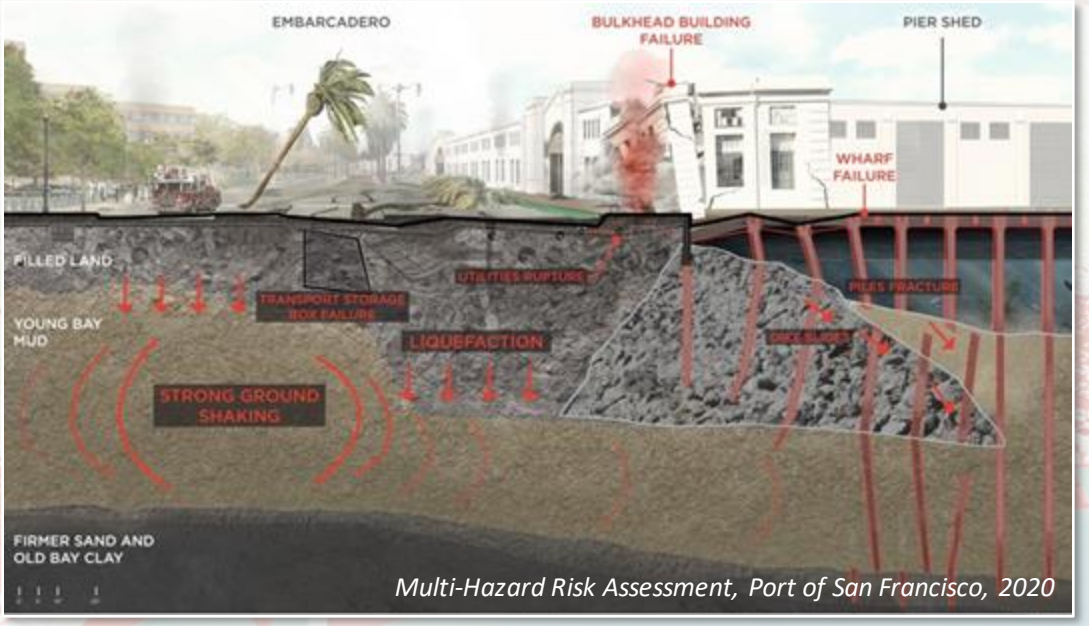
WHAT'S AT RISK?

Seismic Hazard



Multi-Hazard Risk Assessment, Port of San Francisco, 2020

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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HOW SAN FRANCISCO IS ADDRESSING THOSE RISKS

The ***San Francisco Waterfront Flood Study*** is one of several adaptation efforts by City and Federal agencies to address risks and build resilience

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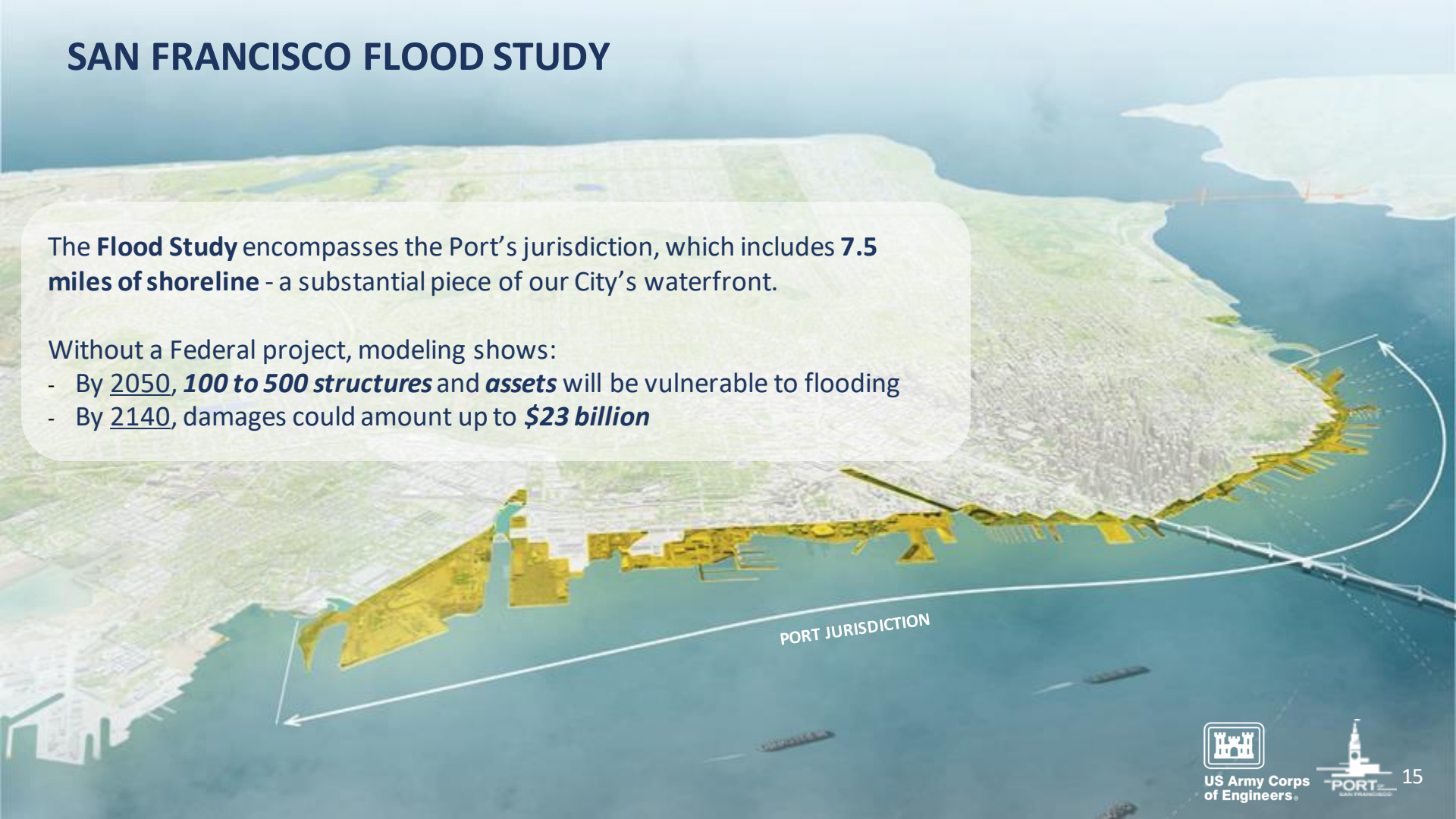
SAN FRANCISCO FLOOD STUDY

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***



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2 San Francisco Waterfront Flood Study

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WHY A FLOOD STUDY?

Congress authorized the USACE to investigate the feasibility of **providing defenses** against tidal and fluvial flooding and measures to adapt to rising sea levels in San Francisco Bay including the City of San Francisco.

Federal Agency: U.S. Army Corps of Engineers

Non-Federal Sponsor: City of San Francisco

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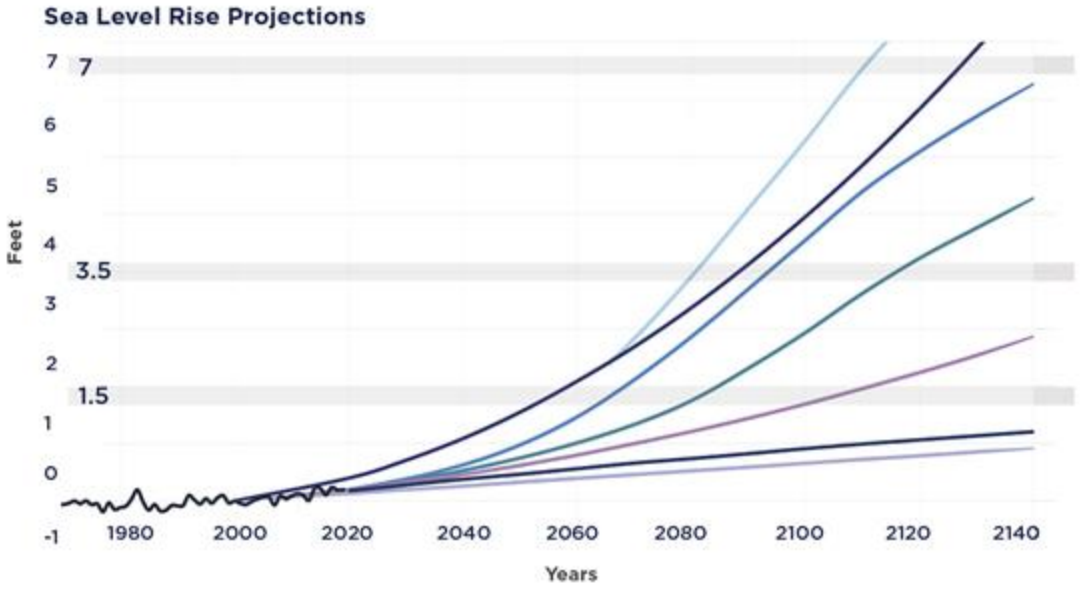
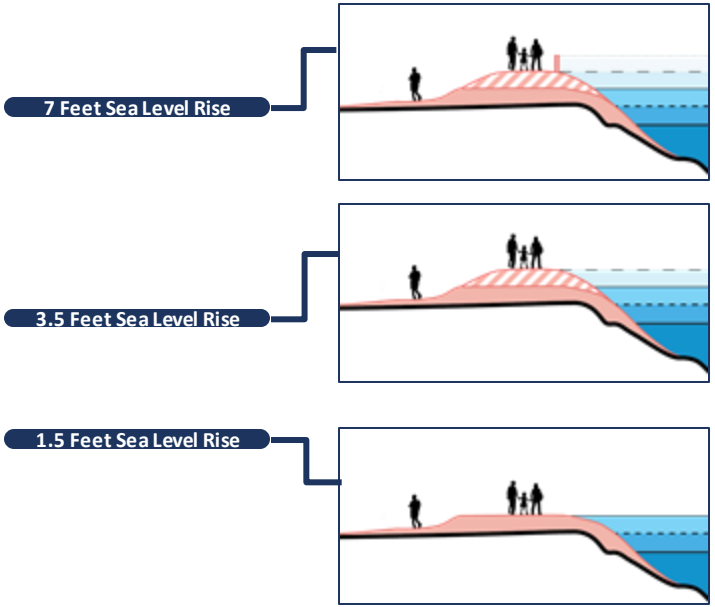
Note: Dates are approximate and subject to change. Projects will occur in phases which will extend over decades.

CONSIDERATIONS OF SEA LEVEL RISE IN PLANNING





The Flood Study manages **uncertainty** by considering the risks, scale, cost, timing, and adaptability of the flood defense system across a range of sea level rise scenarios. Modeling includes typical Bay storms.

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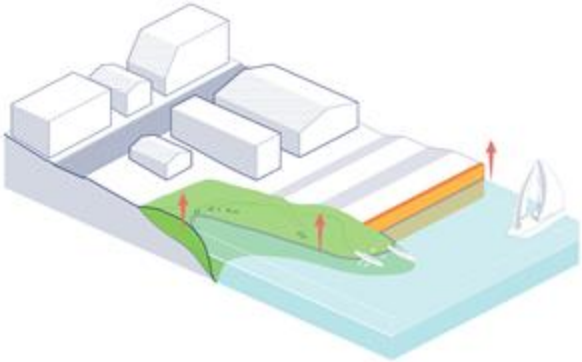
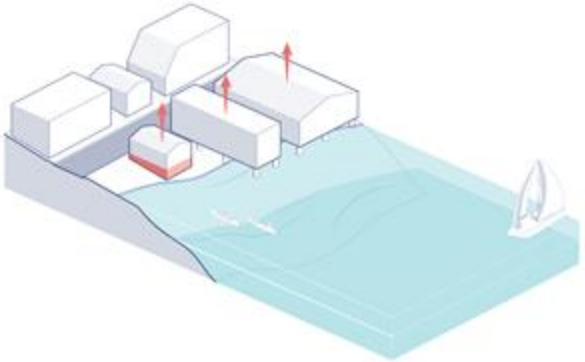
PLAN FORMULATION

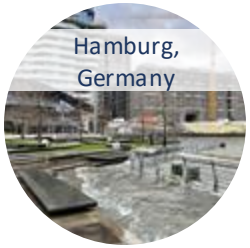
DEFEND



DEFEND against floods by raising the existing shoreline to keep water out

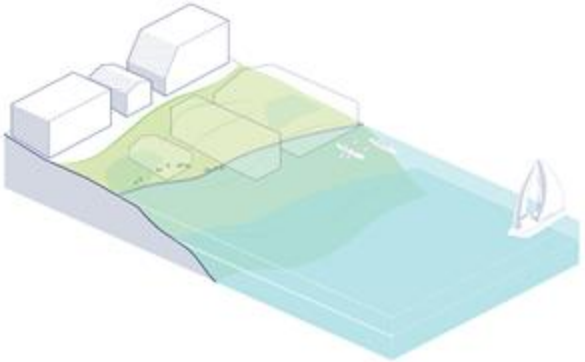
ACCOMMODATE





ACCOMMODATE flooding by letting the water in, adapting the buildings and infrastructure in place to reduce damage from inundation

RETREAT



RETREAT from the current shoreline by moving building infrastructure inland and out of frequently inundated areas

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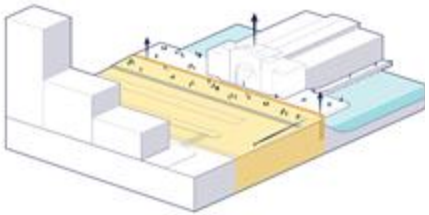
MEASURES CONSIDERED



Structural

- Berms / Levees
- Floodwalls / Seawalls
- Wharf Raising
- Water Management Structures

Nonstructural

- Floodproofing
- Retreat
- Buy-outs

Nature-based

- Marsh Restoration
- Coarse Beaches
- Ecotone Levees
- Living Seawalls

Measures <u>Not</u> Carried Forward

- Offshore seawall
- Barrier across the Golden Gate
- Offshore wave attenuator
- Full Managed Retreat

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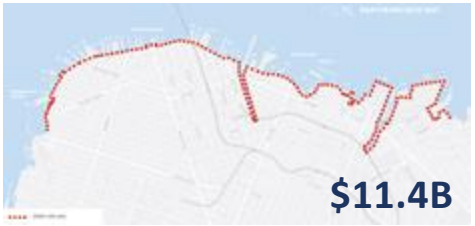
ADAPTATION STRATEGIES

Strategy A

Takes ***no actions*** to reduce flood risks beyond projects that are already approved.

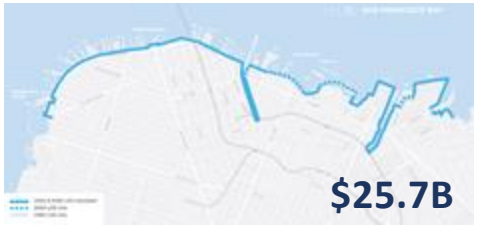
$0B

Strategy C



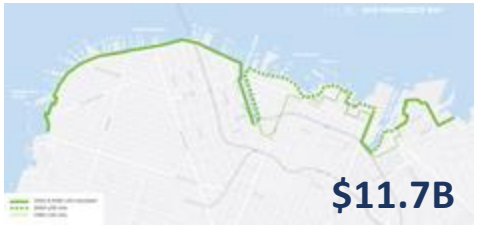
$11.4B

Strategy E



$25.7B

Strategy G

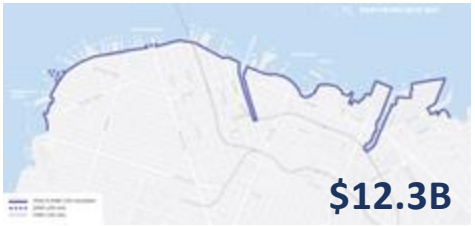


$11.7B

Strategy B

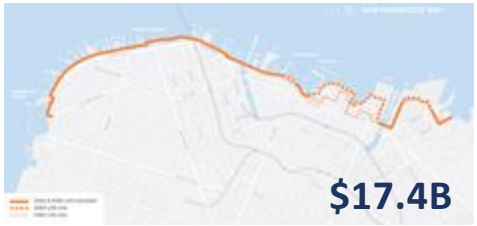
$0.4-0.9B

Strategy D



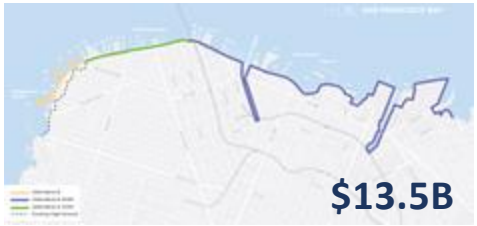
$12.3B

Strategy F



$17.4B

Total Net Benefits Plan (TNBP)



$13.5B

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KEY FEEDBACK THAT HELPED SHAPE THE DRAFT PLAN

Focus on life safety & emergency response

Put people first
Prioritize housing, disaster recovery facilities, utilities, transportation and businesses

Expand (and maintain) the City's connection to the waterfront

Prioritize nature and healing the Bay

Consider racial and social equity and environmental justice

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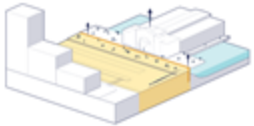
GETTING TO THE DRAFT PLAN

1. Analyzed Risks and Impacts to communities

2. Identified Opportunities & Constraints

3. Engaged Local Communities
150+ events

4. Measures



Strategies

- *A*
- *B*
- *C*
- *D*
- *E*
- *F*
- *G*

Total Net Benefits Plan

Interagency Alignment

+

Cost & Benefits Analysis

+

Public Feedback on Alternatives

The Draft Plan

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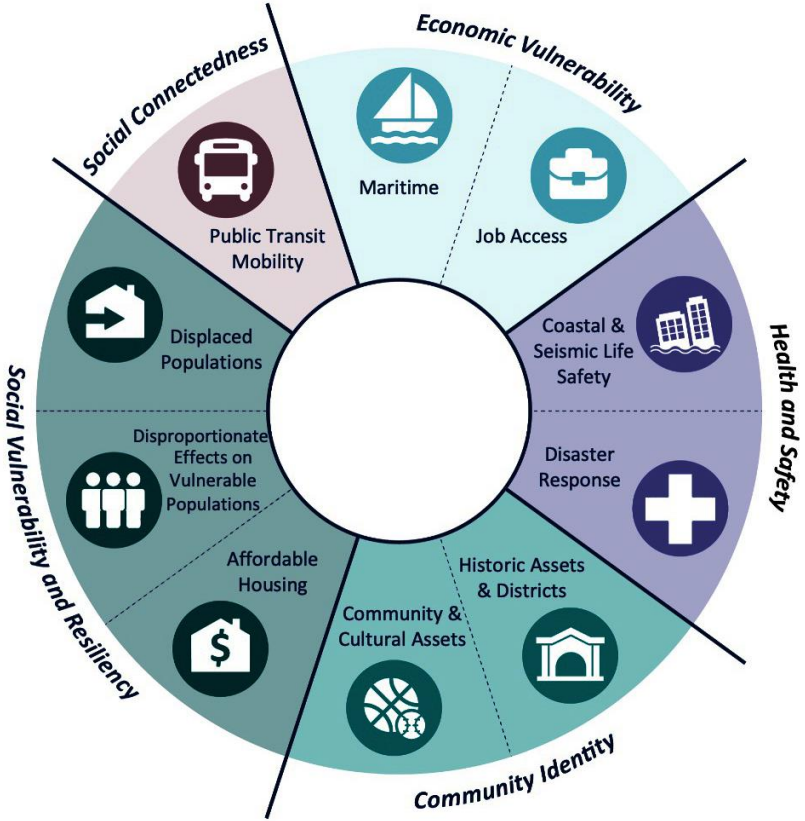
A COMPREHENSIVE COST BENEFIT ANALYSIS THAT ELEVATES EQUITY

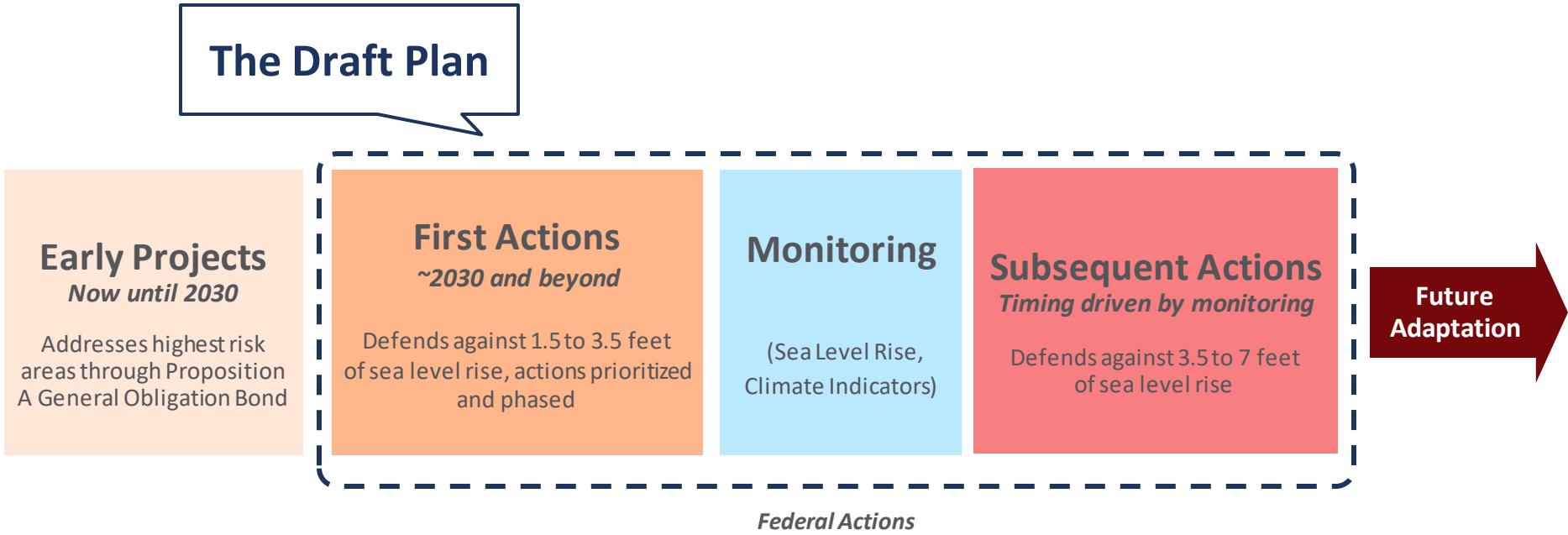
Historically, plan selection maximizes NED national economic benefits. This plan incorporates analysis across four categories:

- \+ 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.

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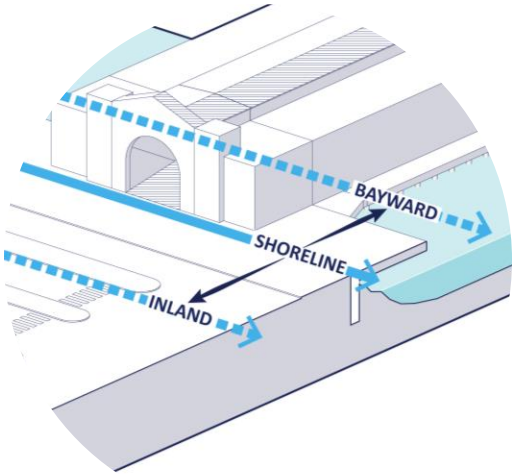
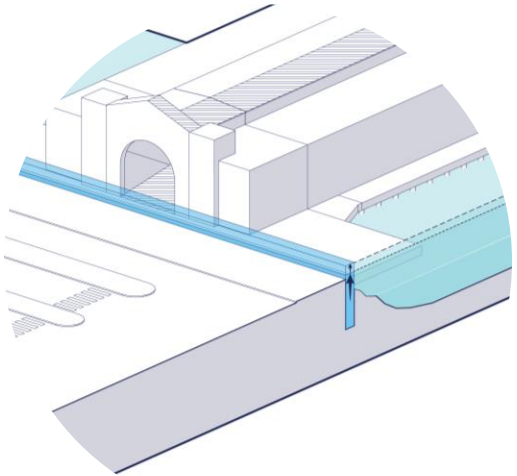
WHAT IS IN THE DRAFT PLAN?

Where to build flood defenses



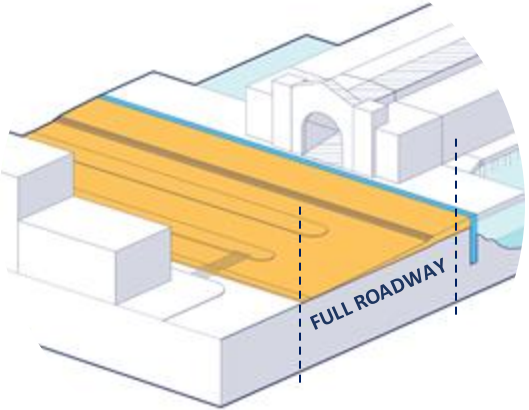
Have we located the flood defenses in the right place?

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

ENVIRONMENTAL REVIEW

Environmental consequences of the **Draft Plan** and a high-level comparison of the environmental consequences for each of the Alternatives have been assessed as described in the **National Environmental Policy Act** (NEPA) Environmental Impact Statement.

Multiple laws, executive orders, and policies, such as the Endangered Species Act (ESA), Clean Water Act, and National Historic Preservation Act (NHPA), are considered during the NEPA process.

California Environmental Quality Act (CEQA) to be done at a later date

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HOW WERE ENVIRONMENTAL IMPACTS ANALYZED?

- Approximately 50 resources assessed
- Alternatives are compared to existing conditions
- Incorporates resource agency input
- Assessed by an impact rating criteria

Unavoidable Impacts from Draft Plan

- 8.0 acres of Bay Fill and loss of subtidal habitat requires mitigation
- Long-term disruption to transportation corridors and noise disturbances from construction

Resource	Bay fill	Levee	Bridge raise	Road raising	Vertical wall	Bulkhead wall/Seawall	Cantilever wall	Pile supported	Sheetpile wall	T-wall	Elevated promenades	Wharf	Deployable flood gate	Tide gate	Shoreline extension	Ecological Armoring*	Embankment shoreline*	Naturalized shoreline*	Vertical shoreline*	Marsh*	Coarse beach*	Ecotone levee*
Commercial and Recreational Fisheries	Y	N	Y	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y+	Y+	Y+	Y+	Y+	Y+	N
Macroinvertebrates	Y	N	Y	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y+	N	N	Y+	Y+	Y+	N
Terrestrial vegetation	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	Y	Y	Y	N	Y+	Y+	N	Y	N	Y+
T&E Species - Terrestrial	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y+	Y+	Y	Y+	Y+	Y+
T&E Species - Aquatic	Y	Y	Y	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y+	N	N	Y+	Y+	Y+	N
State listed species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y+	Y+	Y+	Y+	Y+	Y+
Designated Critical Habitat	Y	N	Y	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y+	N	N	Y+	Y+	Y+	N

Y: Potential to adversely impact the resource *N: Not anticipated to adversely impact the resource*
+: Beneficial impact
This is only a subset of the complete table.

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3 The Draft Plan

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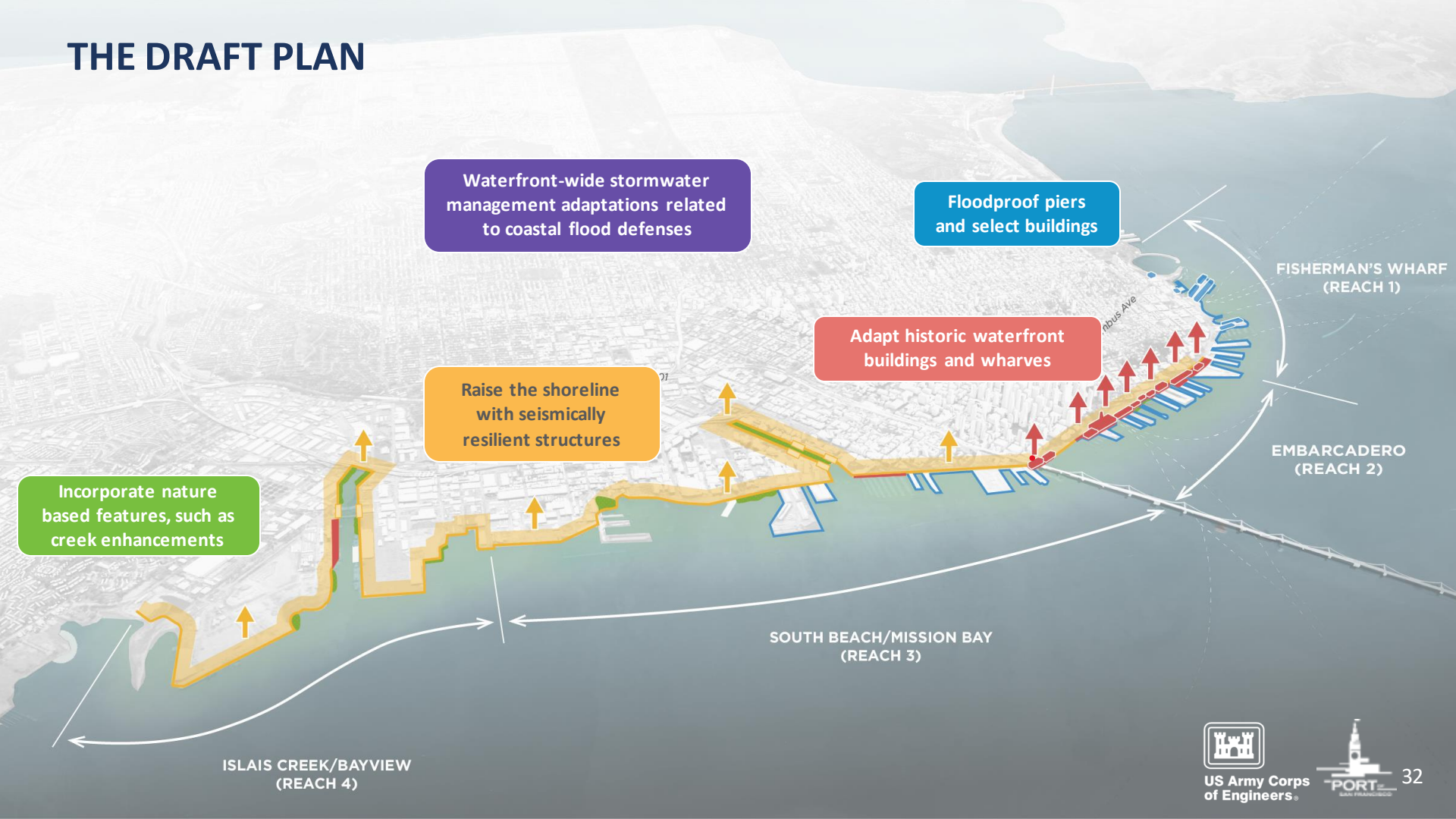
THE DRAFT PLAN



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FISHERMAN'S WHARF

Aquatic Park to Telegraph Hill
Reach 1

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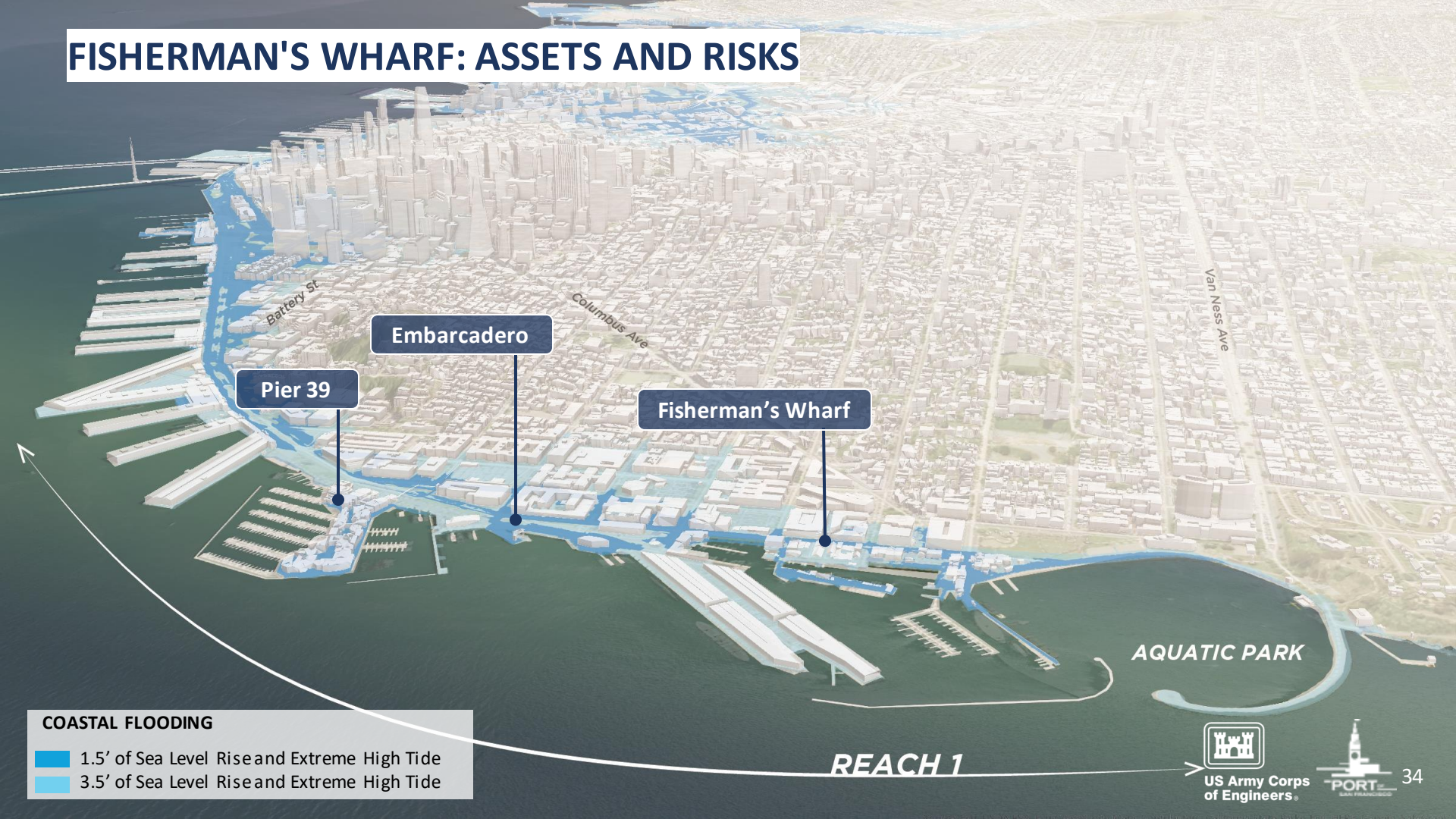
FISHERMAN'S WHARF: ASSETS AND RISKS



FISHERMAN'S WHARF: FIRST ACTIONS

Floodproofing structures

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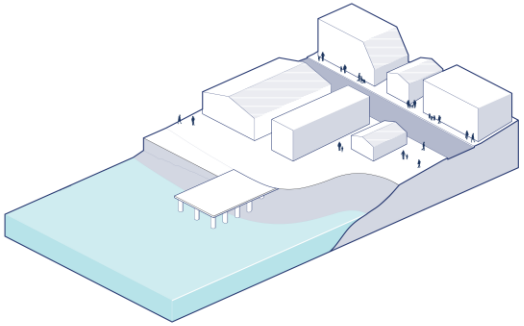
ACTIONS EXPLAINED

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

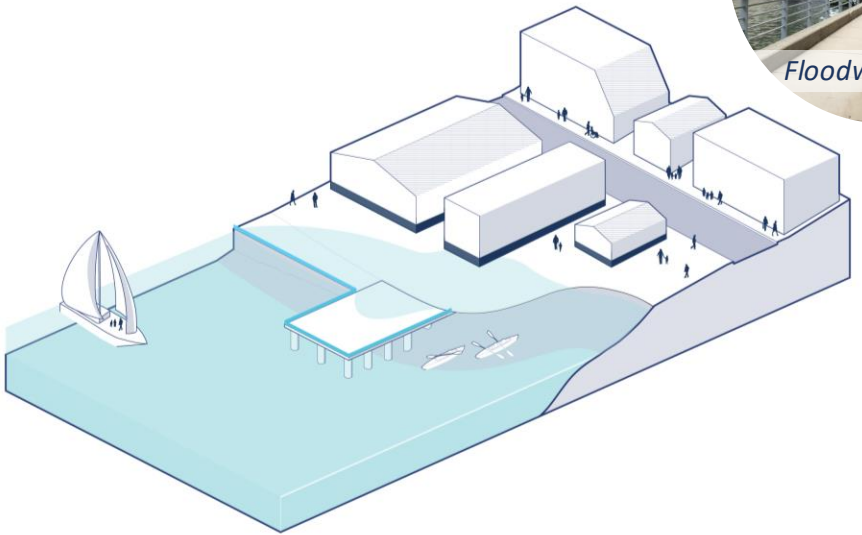
Build up to two-foot walls around piers to manage flood risks & defend against intermittent high water.



Current condition

Floodproofing

Floodwall at edge



Future condition

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FISHERMAN'S WHARF SUMMARY TABLE

1ST ACTIONS		
Coastal Flood Defense	✓	Floodproofing to withstand **near-term flood risk**
Seismic Resilience of Flood Defenses	—	*Partially addressed outside Flood Study. Draft Plan does not include seismic ground improvements given no new flood defense structure in Reach 1.*
Connection to the Waterfront	✓	Visual and physical connections **maintained**, with 2' walls along piers
Asset and System Defense	✓	At-risk buildings are defended. Transit and utility networks do not have near term risk
Nature-Based Features	—	No feasible options that also maintain maritime function in this geography

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
- Seismic ground improvements.
- Defend utility/transportation networks

EMBARCADERO

Telegraph Hill to Bay Bridge
Reach 2

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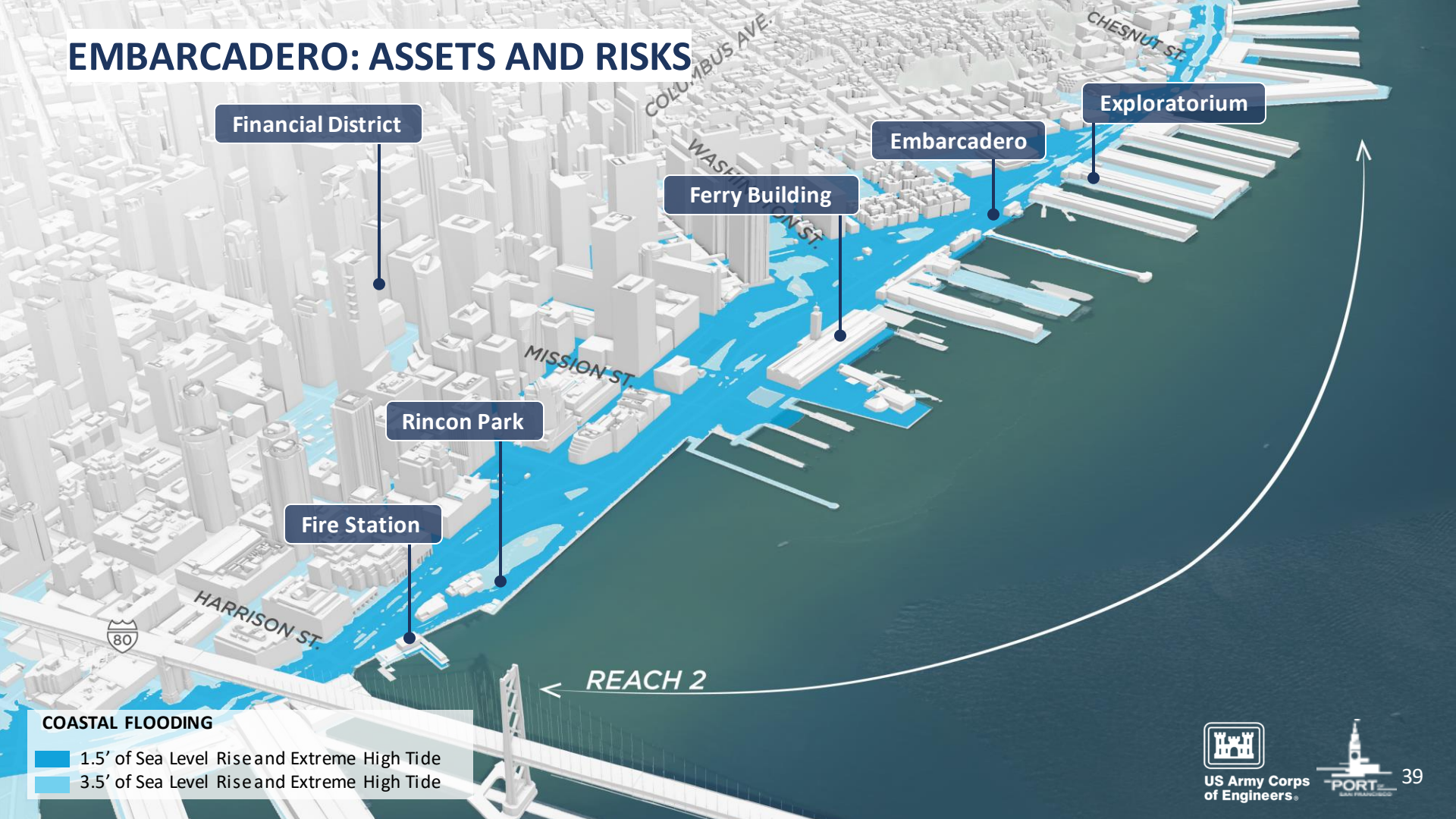
EMBARCADERO: ASSETS AND RISKS



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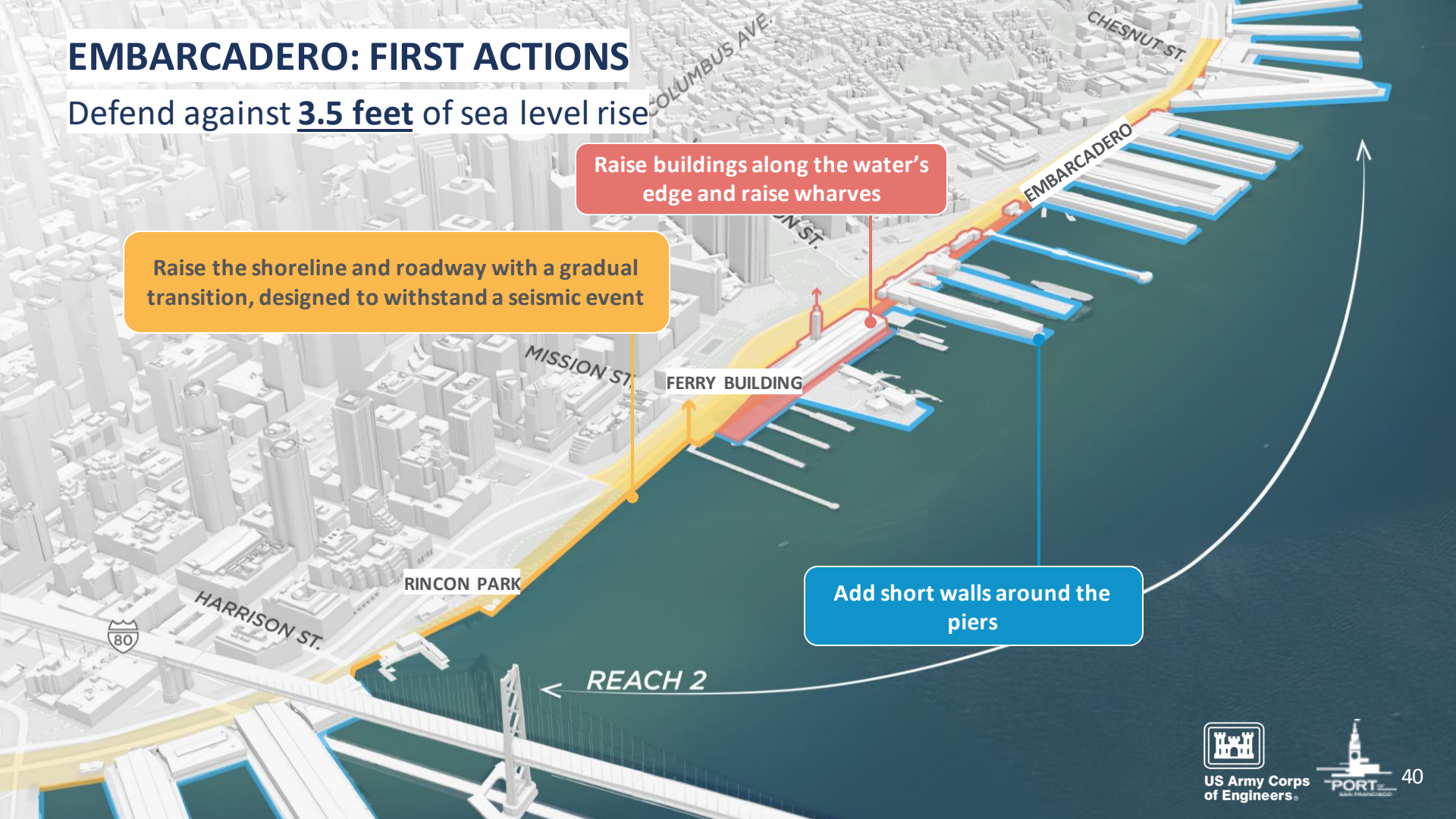
EMBARCADERO: FIRST ACTIONS

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



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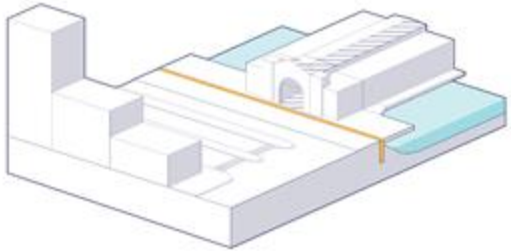
ACTIONS EXPLAINED

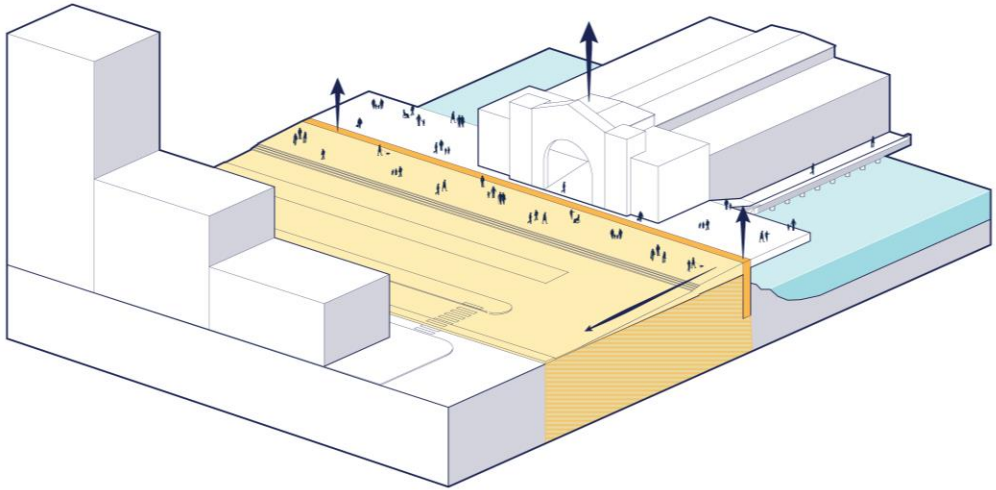
Raise the shoreline

This action will elevate the shoreline at the roadway edge and gradually slope back to existing city elevation. The action includes seismic improvements under the roadway to reduce seismic damages to flood defenses.

Elevating the shoreline presents an opportunity for new waterfront public spaces. Design details will be developed at later project phases.



Current condition



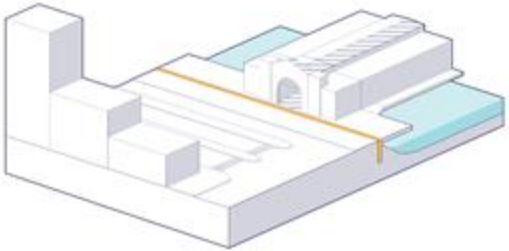
Future condition

US Army Corps of Engineers

ACTIONS EXPLAINED

Elevate buildings and wharves

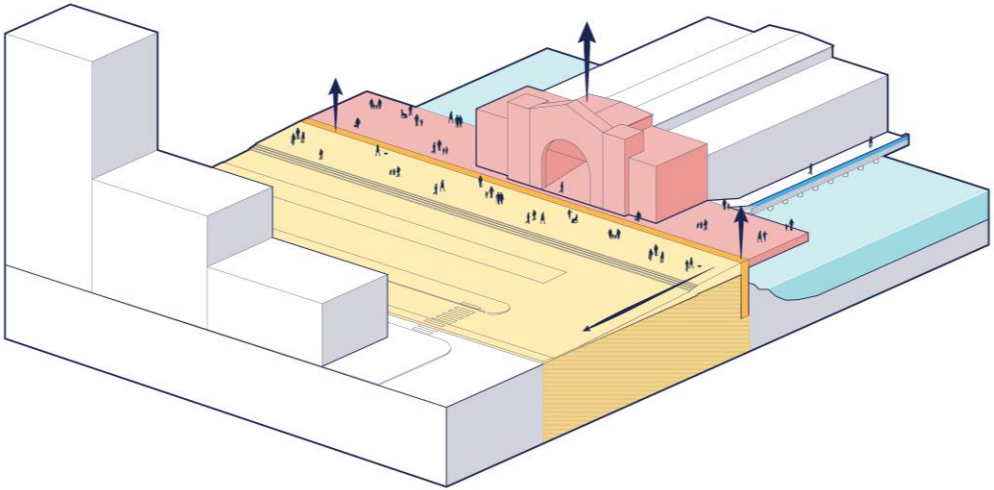
Elevate buildings and wharves along the water's edge, including the Ferry Building and historic bulkhead buildings. Enhance seismic stability for wharves and buildings.



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

US Army Corps of Engineers

EMBARCADERO SUMMARY TABLE

1ST ACTIONS		
Coastal Flood Defense	✓	Elevated shoreline to withstand **3.5' of Sea Level Rise**
Seismic Resilience of Flood Defenses	✓	**Ground improvements** under **roadway** and **structural improvements** on wharf and bulkhead buildings
Connection to the Waterfront	✓	Visual and physical connections **maintained**, with 2' walls along piers
Asset and System Defense	✓	Transit and utility networks are **defended**
Nature-Based Features	✓	Included as optional elements

EARLY PROJECT

(not included in Flood Study)

Piers 9 & 15 Seawall Earthquake Safety Projects will retrofit the bulkhead walls and wharves, Downtown Coastal Resilience Project will improve flood defenses and earthquake resilience in the Ferry Building area where flood risk exists today.

SUBSEQUENT ACTIONS

(included, but dependent on monitoring)

- No subsequent action currently anticipated to be needed to withstand 3.5' of sea level rise – subject to change depending on actual rate of sea level rise

US Army Corps of Engineers

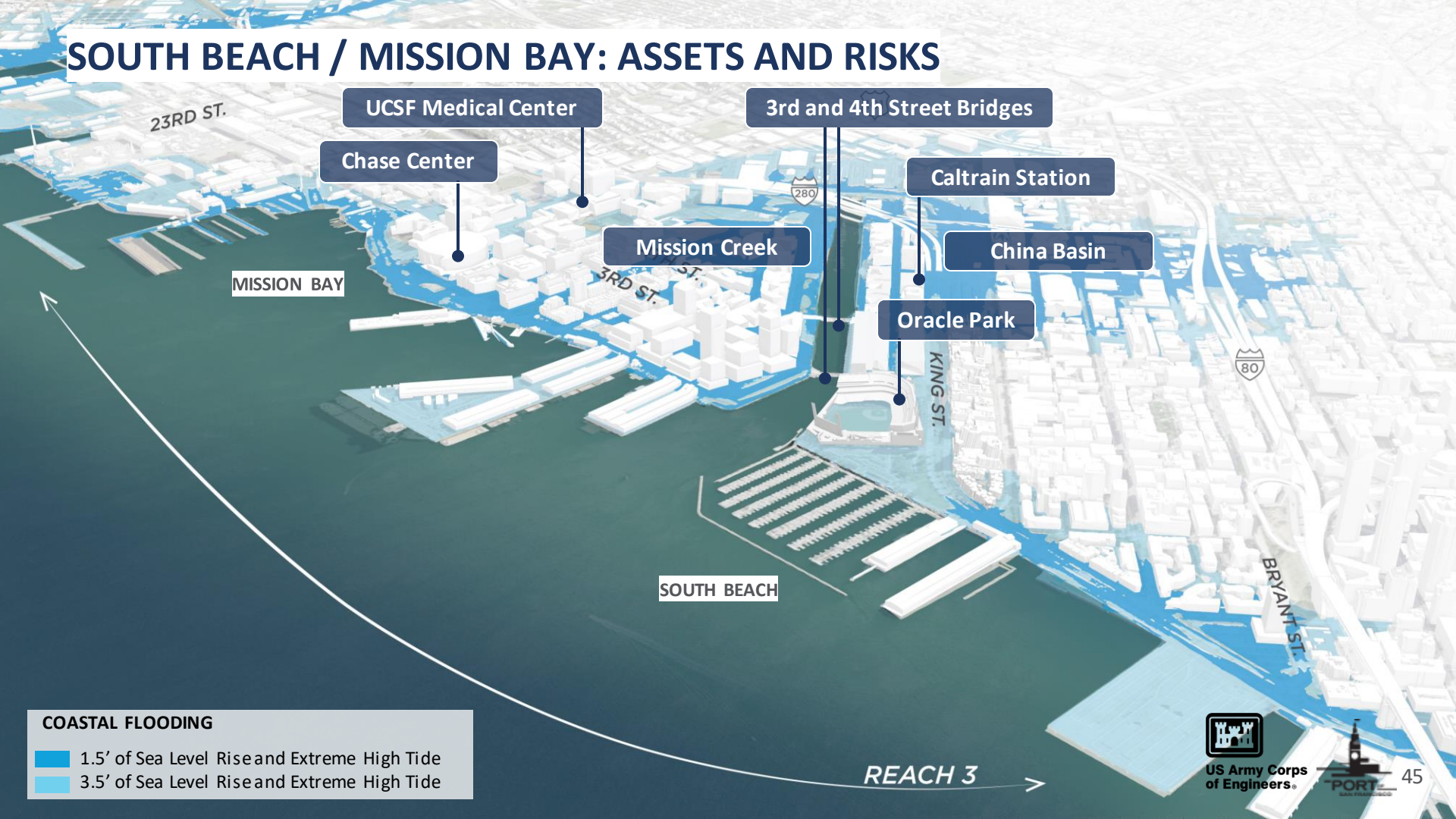
PORT San Francisco

SOUTH BEACH / MISSION BAY

Bay Bridge to Potrero Point
Reach 3

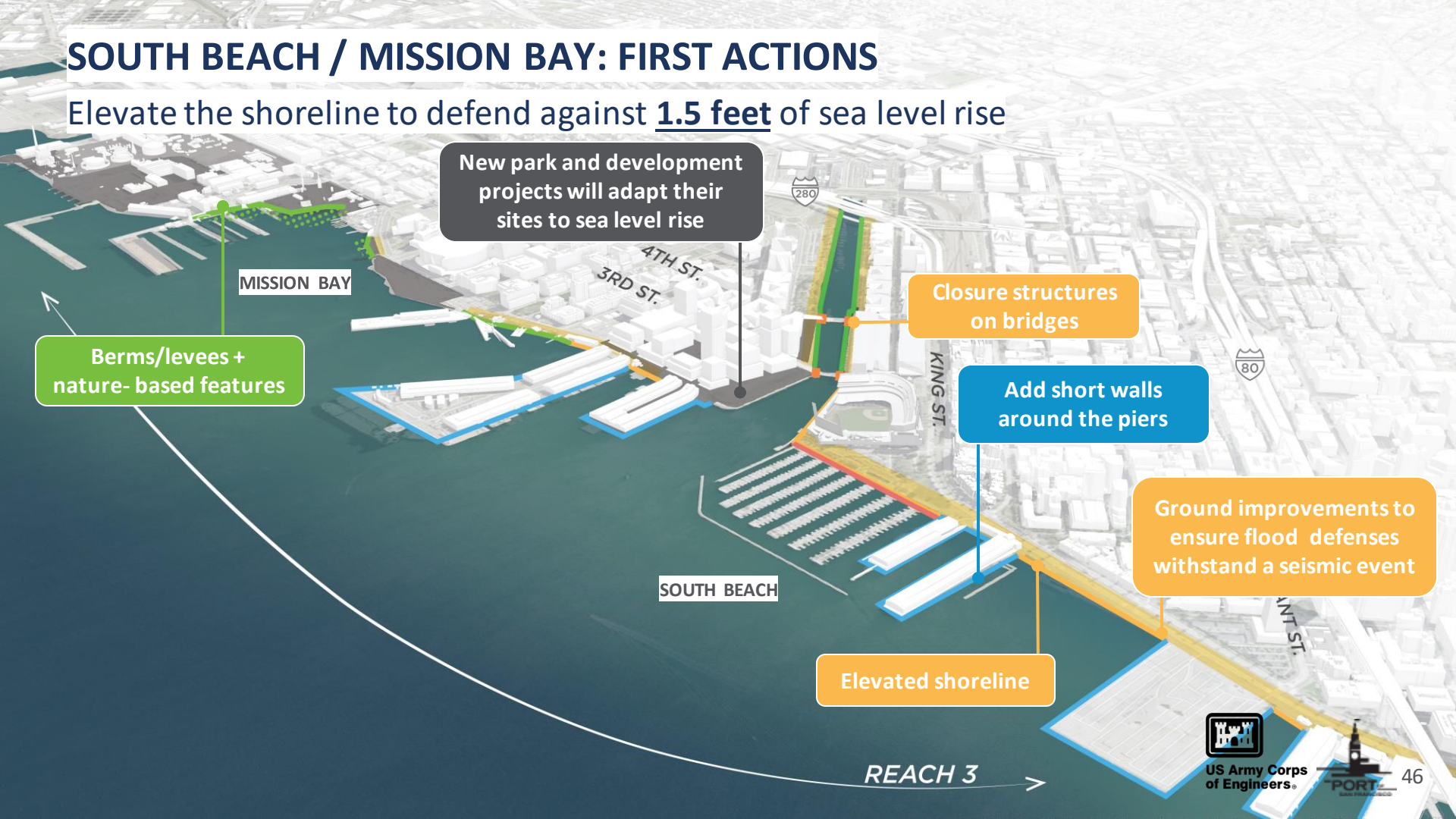
US Army Corps of Engineers

SOUTH BEACH / MISSION BAY: ASSETS AND RISKS



SOUTH BEACH / MISSION BAY: FIRST ACTIONS

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

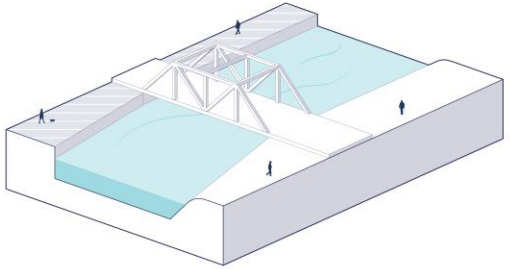


ACTIONS EXPLAINED

Closure structure on bridges

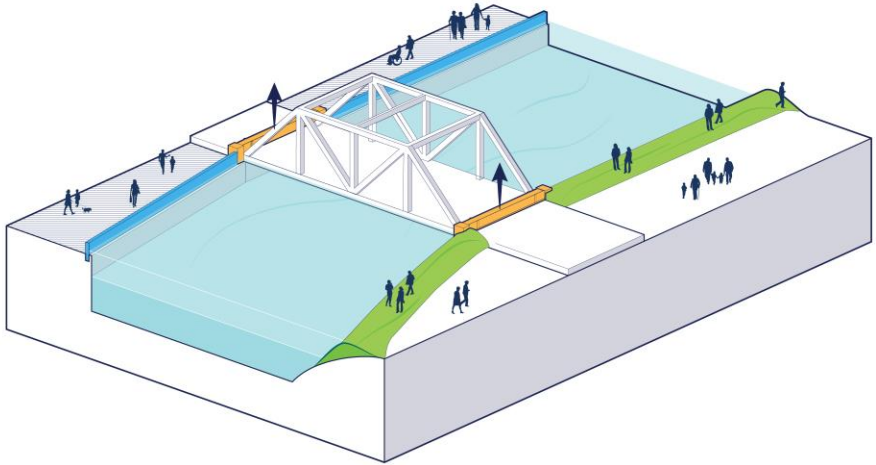
Closure structures on Third and Fourth Street Bridges will close gaps in the elevated shoreline to prevent flooding.

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

US Army Corps of Engineers

SOUTH BEACH / MISSION BAY SUMMARY TABLE

1ST ACTIONS		
Coastal Flood Defense	✓	Elevated shoreline to withstand **1.5' of Sea Level Rise**
Seismic Resilience of Flood Defenses	✓	**Ground improvements** under roadways, shoreline promenades, and open spaces
Connection to the Waterfront	✓	Visual and physical connections **maintained**, opportunities to access water on berms/levees
Asset and System Defense	✓	Transit and utility networks are **defended**, bridges remain in place
Nature-Based Features	✓	**Berms/levees with naturalized shorelines** along Mission Bay **and creek enhancements** along Mission Creek

EARLY PROJECT

(not included in Flood Study)

- Pier 50 Earthquake Improvement Project – Seismic risk assessment of existing pier and shed structures
- Pier 24 ½ to Pier 28 ½ Seawall Earthquake Safety Project – stabilizing vulnerable portions of the wall and wharf substructures supporting the Promenade

SUBSEQUENT ACTIONS

(included, but dependent on monitoring)

- Elevate shoreline to withstand **3.5' of Sea Level Rise**
- Incorporate additional nature based features along the creek and Bay shoreline

US Army Corps of Engineers

PORT

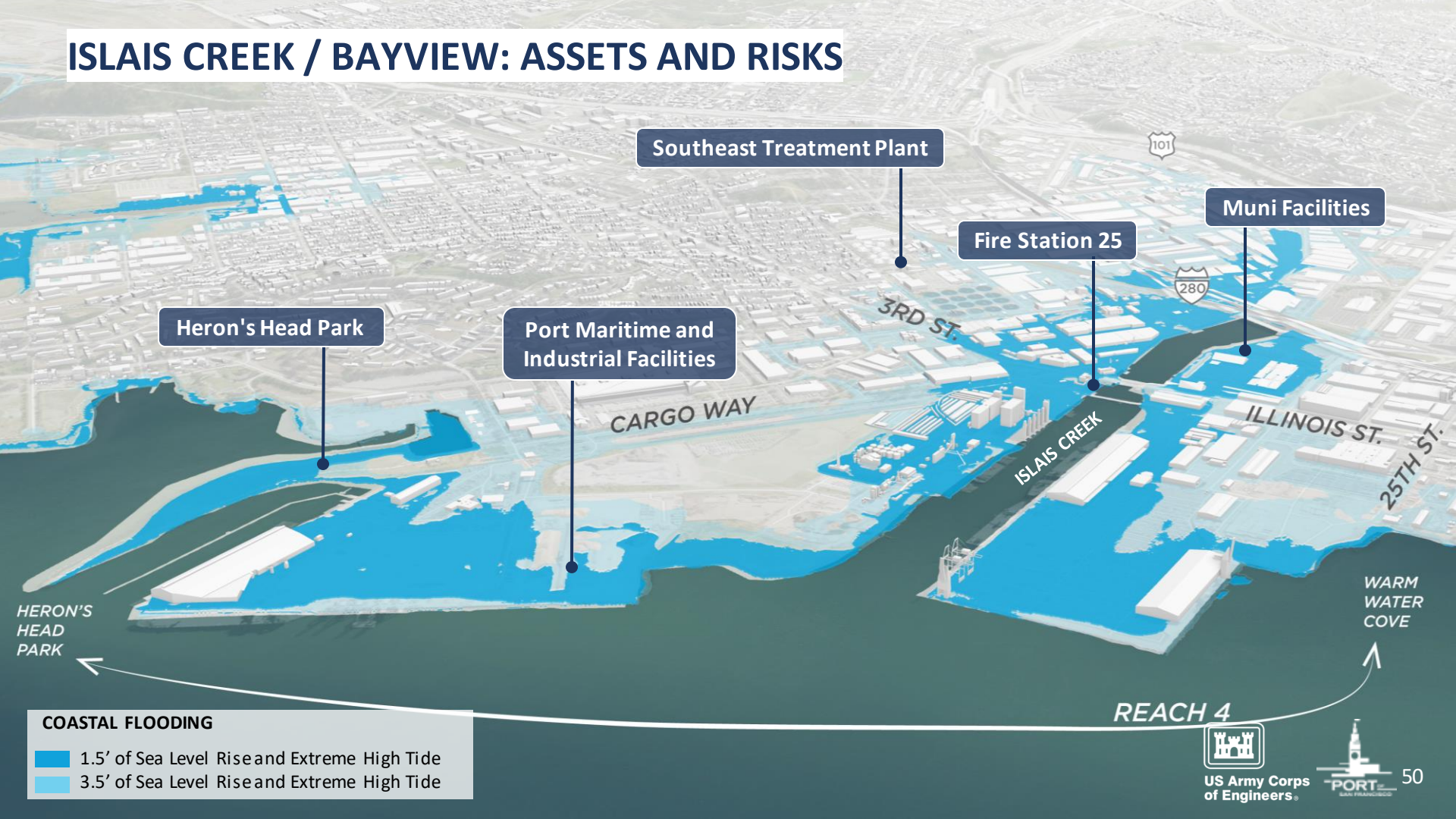
ISLAIS CREEK / BAYVIEW

Potrero Point to Heron's Head Park

Reach 4

US Army Corps of Engineers

ISLAIS CREEK / BAYVIEW: ASSETS AND RISKS



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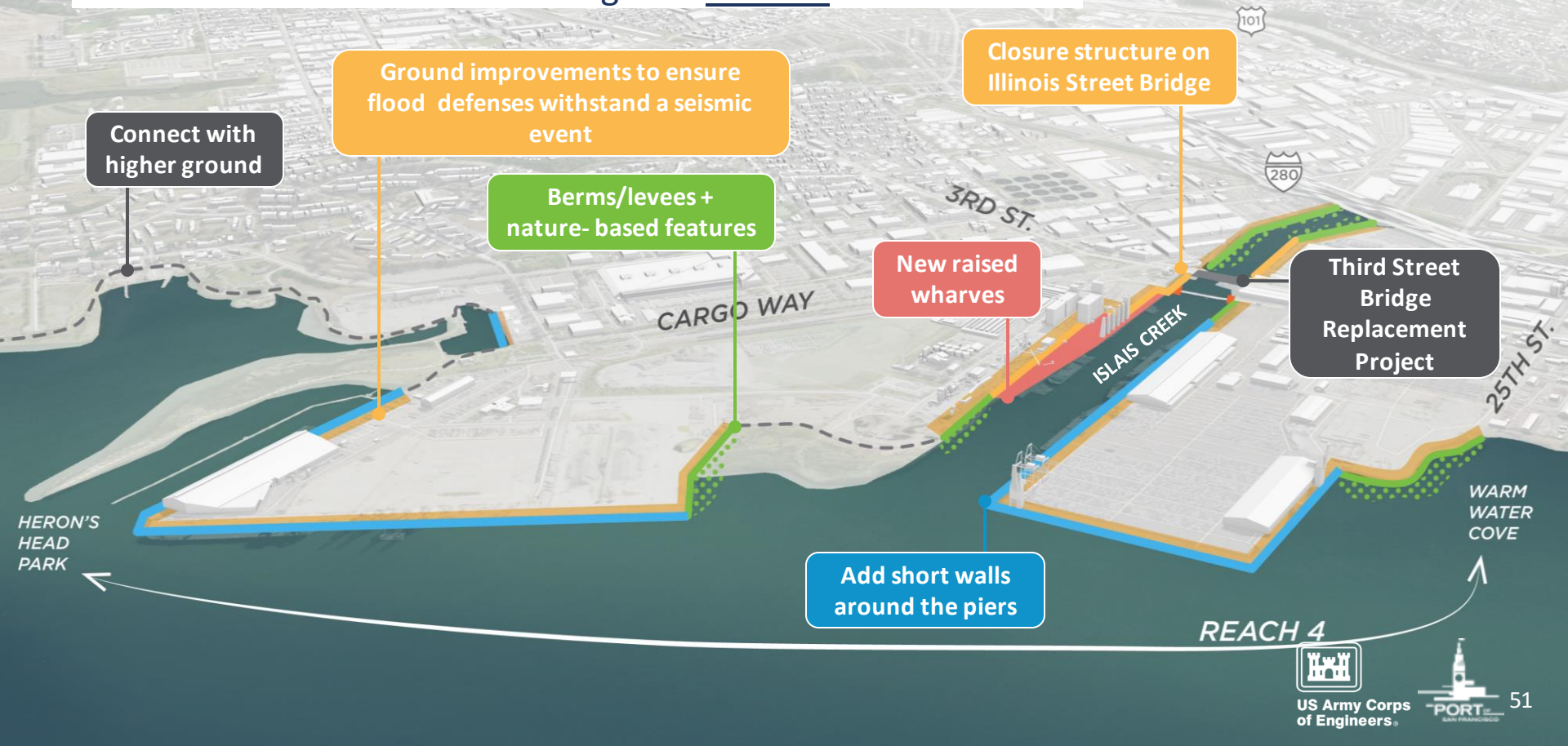
ISLAIS CREEK / BAYVIEW: FIRST ACTIONS

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



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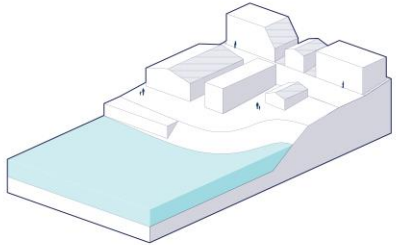
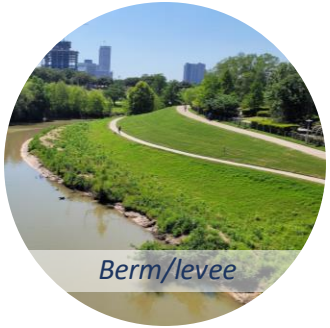
ACTIONS EXPLAINED

Berms/levees + nature-based features

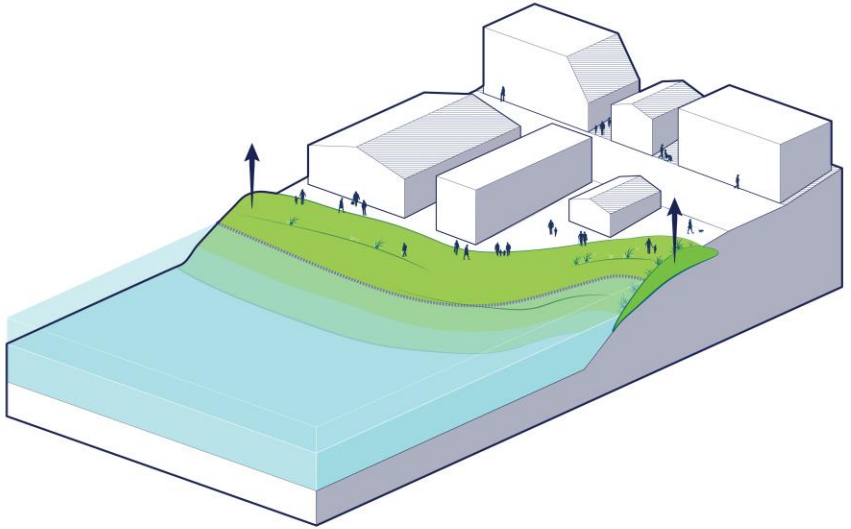
Berms/levees are areas of raised ground that can help prevent flooding while maintaining waterfront access. They can include public space, such as walking or biking paths, and incorporate vegetation that support habitats.



Current condition



Berm/levee



Future condition

US Army Corps of Engineers

ISLAIS CREEK / BAYVIEW SUMMARY TABLE

1ST ACTIONS	
Coastal Flood Defense	✓ Elevated shoreline to withstand **1.5' of Sea Level Rise**
Seismic Resilience of Flood Defenses	✓ **Ground improvements** under roadways and shoreline promenades/open spaces
Connection to the Waterfront	✓ Visual and physical connections **maintained**, opportunities to access water on berms/levees
Asset and System Defense	✓ Transit and utility networks are **defended**, bridges remain in place
Nature-Based Features	✓ **Habitat enhancements** along Islais Creek, Pier 94 wetlands, and Warm Water Cove

EARLY PROJECT

(not included in Flood Study)

SF Public Works Third Street Bridge rehabilitation project

SUBSEQUENT ACTIONS

(included, but dependent on monitoring)

- Elevate shoreline to withstand **3.5' of Sea Level Rise**
- Incorporate additional nature-based features along the creek and Bay shoreline

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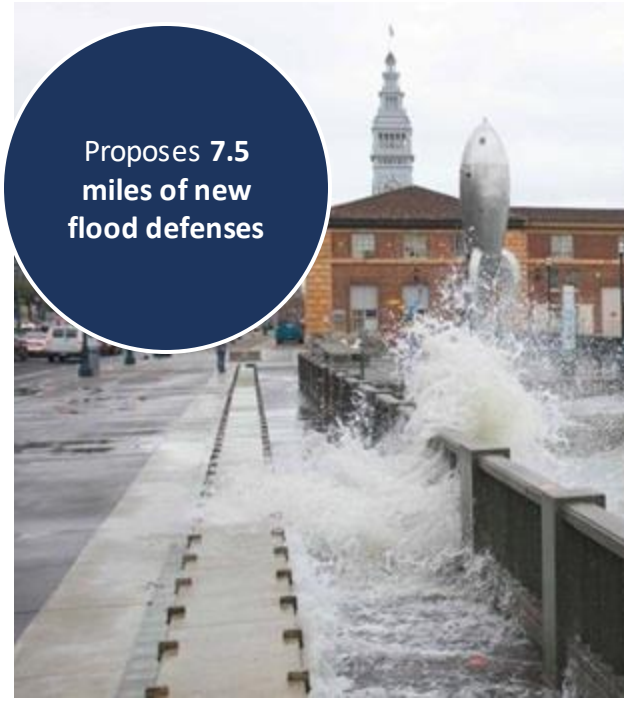
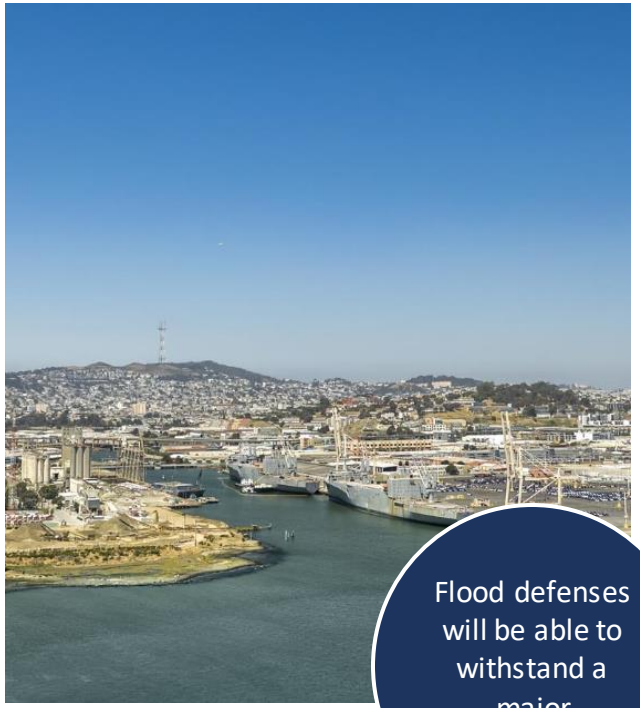
PORT SAN FRANCISCO

PUBLIC FEEDBACK:

Focus on life safety and emergency response



Proposes **7.5 miles of new flood defenses**



Flood defenses will be able to withstand a major earthquake

Reduces damages to **disaster recovery facilities**

US Army Corps of Engineers

PUBLIC FEEDBACK:

Put people first, prioritize assets and services

Keeps all housing in place: 13,500 **residents**

Defends services people depend on, such as **utilities** and **transportation**

Preserves **nearly 80 cultural** and **community assets**

PORT SAN FRANCISCO

US Army Corps of Engineers

PUBLIC FEEDBACK:

Maintain, expand, and create new connections between the city and the waterfront

Maintains **visual and physical connections**

Creates opportunities for **water recreation and access**

Enables future opportunities to **improve the public realm**

PORT SAN FRANCISCO

US Army Corps of Engineers

PUBLIC FEEDBACK:

Prioritize nature and healing the Bay

Includes options for **nature-based features** like living seawalls

Preserves **existing wetlands**

Creates **opportunities to expand habitat** in future iterations of the plan

PORT SAN FRANCISCO

US Army Corps of Engineers

4 Public Comment

US Army Corps of Engineers

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: SFWFRS@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

PORT of San Francisco

US Army Corps of Engineers

To stay in touch, please sign up for the Port of SF's Waterfront Resilience Program **eNewsletter and mailing list** by visiting sfport.com and clicking the Signup for e-newsletter in the footer and selecting Waterfront Resilience Program from the list in the form provided.

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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PORT SAN FRANCISCO

Thank you

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

PORT OF SAN FRANCISCO

Waterfront Resilience Program

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