

An aerial photograph of a waterfront industrial area. A tall, narrow building is the central focus, covered in a vibrant, multi-colored mural featuring geometric patterns and shapes in red, blue, green, and yellow. To the left, a large body of water is visible with several ships and cranes. To the right, there are various industrial structures, including a large concrete wall and a building with a corrugated metal roof. The sky is clear and blue.

# SAN FRANCISCO WATERFRONT FLOOD STUDY

Maritime Commerce Advisory  
Committee

*March 21, 2024*



# 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 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

San Francisco  
Planning

ONESF  
Building Our Future



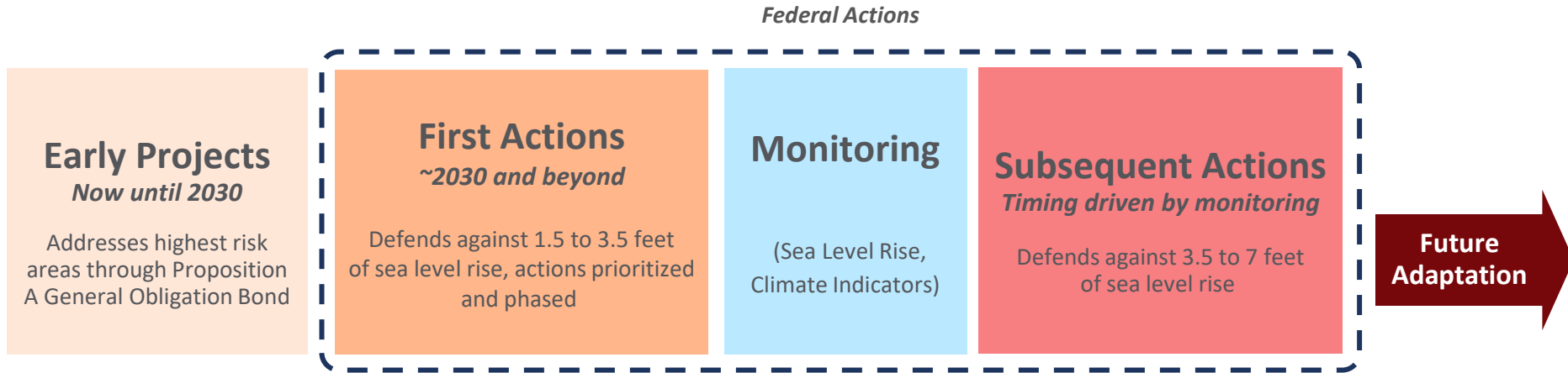
San Francisco  
Water Power Sewer



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# ADAPTATION ACTIONS OVER TIME



## COST BENEFIT ANALYSIS THAT ELEVATES EQUITY

Four categories of analysis:

- + National Economic Development (including damages prevented)
- + Regional economic impacts (including jobs)
- + Environmental quality, consequences, and compliance
- + **Other social effects (including impacts to vulnerable populations)**

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



# AGENDA

- 1 Waterfront Risks and Hazards**
- 2 San Francisco Waterfront Flood Study & Draft Plan**
- 3 Next Steps**



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# 1 Waterfront Risks and Hazards



Waterfront Resilience Program  
US Army Corps  
of Engineers



# 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***

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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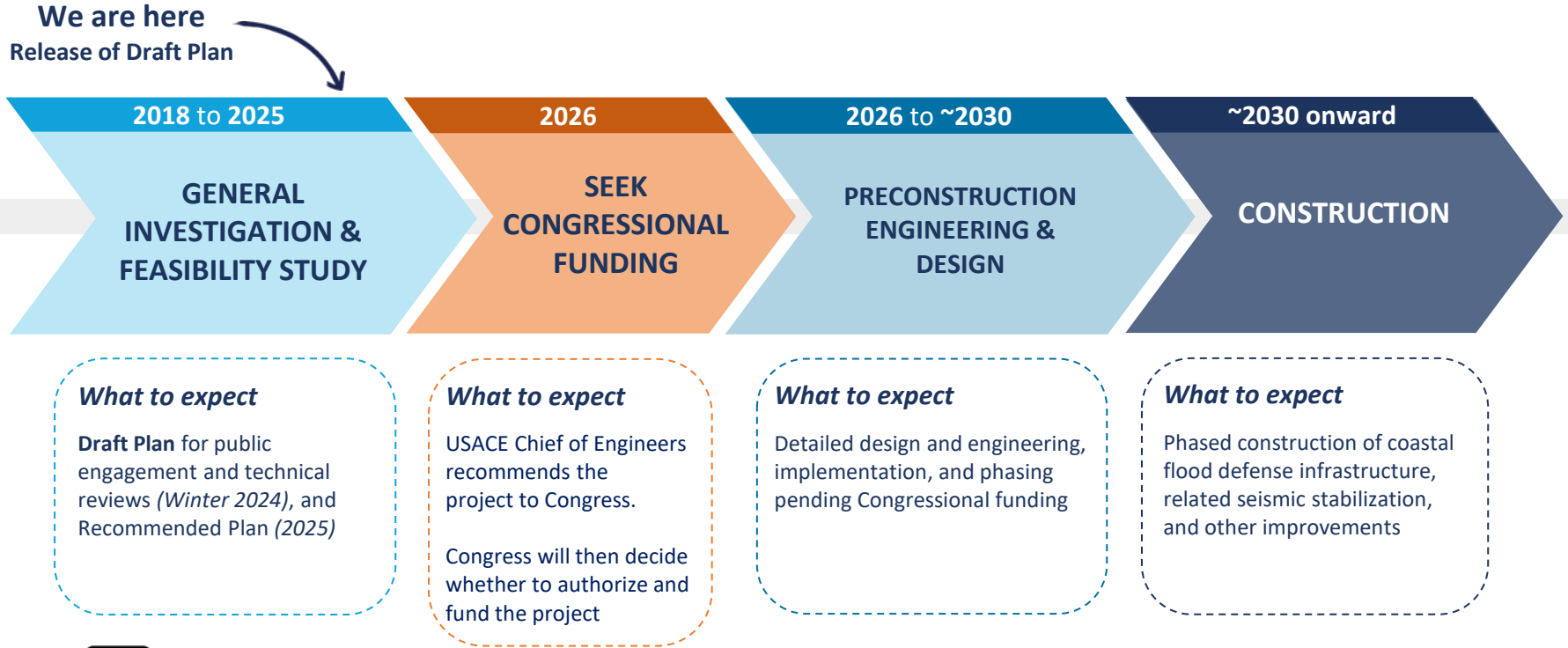


# 3 San Francisco Waterfront Flood Study & Draft Plan



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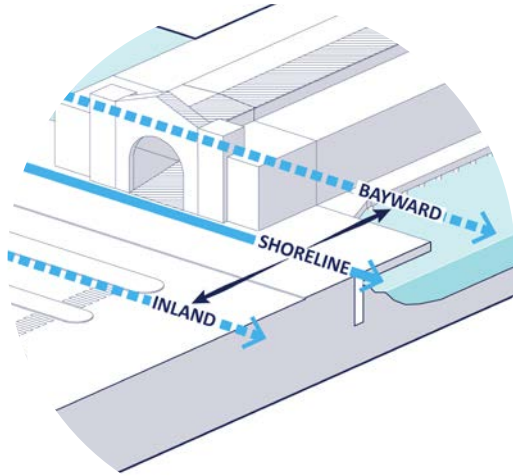
# WHERE ARE WE IN THE FLOOD STUDY PROCESS?





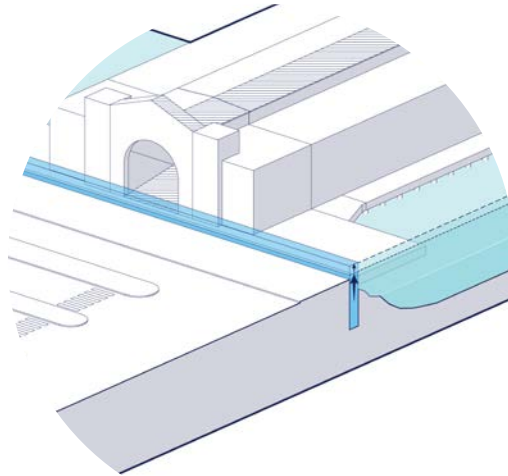
# WHAT IS IN THE DRAFT PLAN?

*Where* to build flood defenses



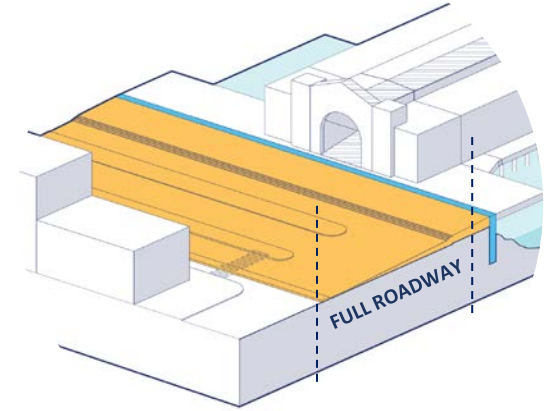
*Have we located the flood defenses in the right place?*

*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 the Embarcadero Historic District, waterfront streets, open spaces, and infrastructure
- Timing and sequencing of construction
- Funding plan

These elements will be developed during later project phases with the public. Implementation strategies will leverage other investments.

# ENVIRONMENTAL REVIEW

Environmental consequences of the **Draft Plan** and each of the Alternatives have been assessed as described in the **National Environmental Policy Act (NEPA)** Environmental Impact Statement.

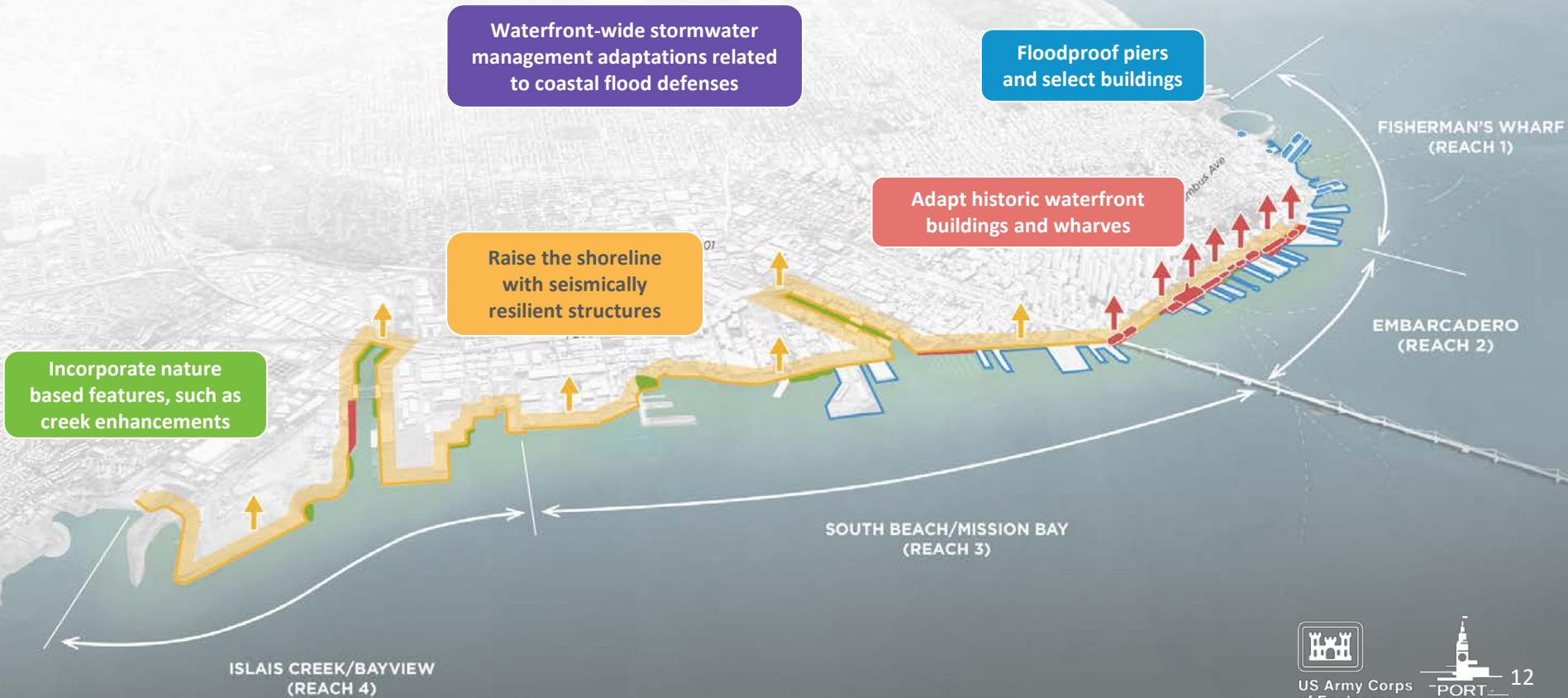
Multiple laws, executive orders, and policies, such as the Endangered Species Act (ESA), Clean Water Act, and National Historic Preservation Act (NHPA), are considered during the NEPA process.

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



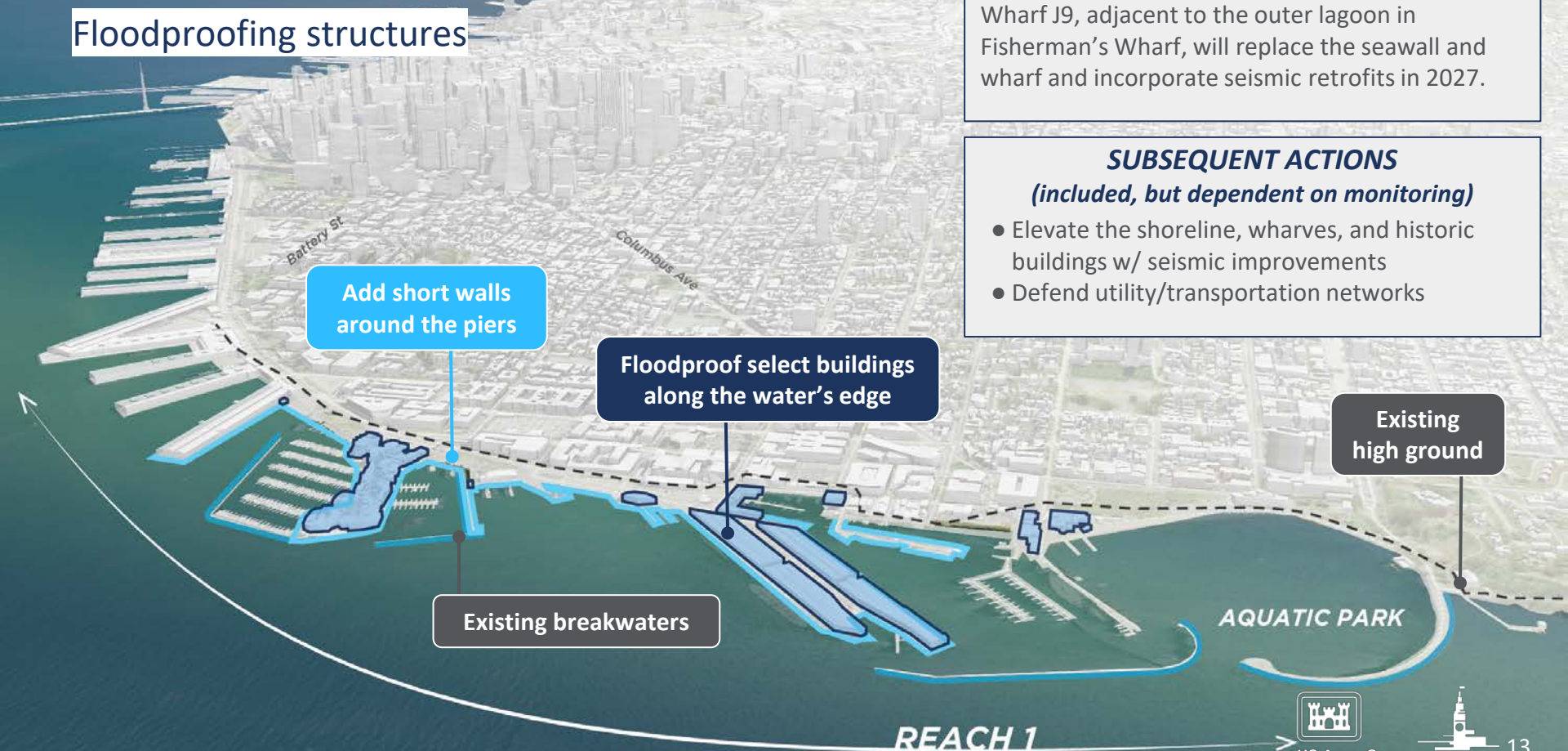


# THE DRAFT PLAN



# 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

Existing high ground

Existing breakwaters

Floodproof select buildings along the water's edge

Add short walls around the piers

AQUATIC PARK

REACH 1



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# EMBARCADERO: FIRST ACTIONS

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

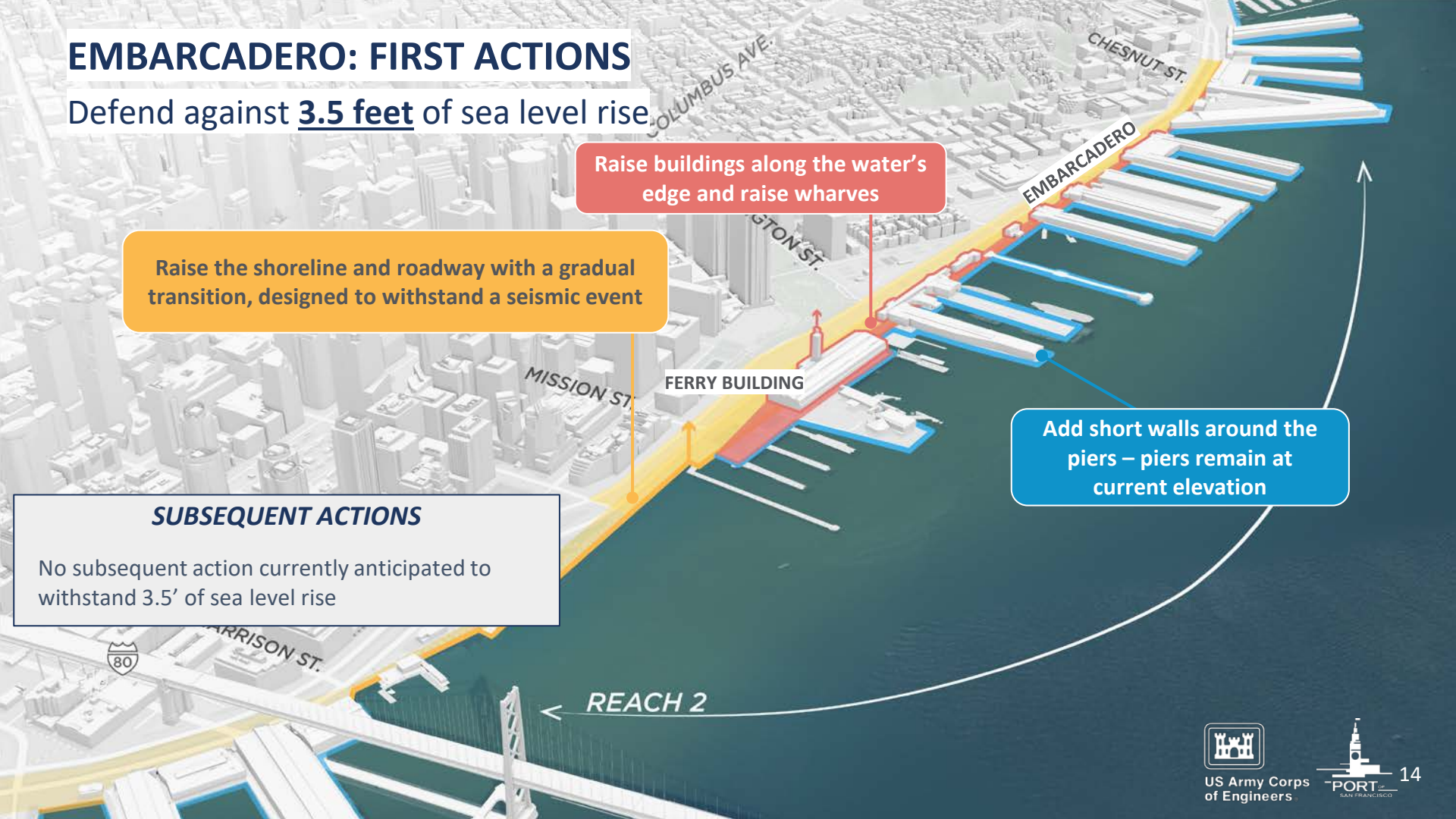
Raise buildings along the water's edge and raise wharves

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

Add short walls around the piers – piers remain at current elevation

## SUBSEQUENT ACTIONS

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



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# ACTIONS EXPLAINED

## Elevate buildings and wharves

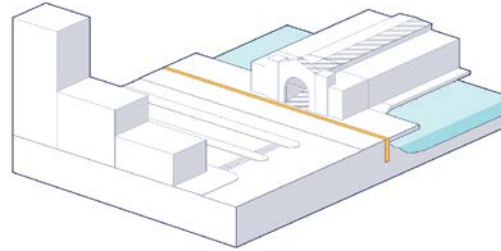
Elevate buildings and wharves along the water's edge, including the Ferry Building and historic bulkhead buildings. Enhance seismic stability for wharves and buildings.

## Add short walls around piers

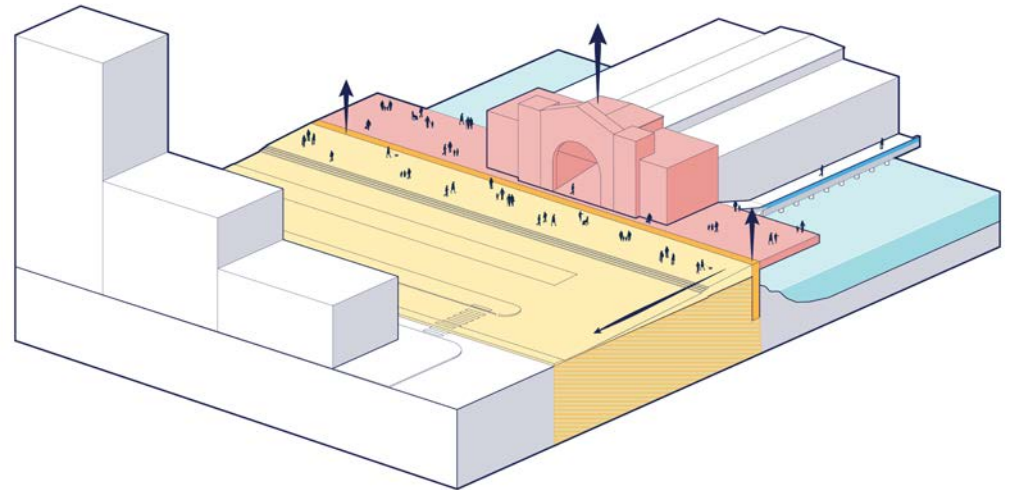
Build up to two-foot walls around piers to manage flood risks and defend against intermittent high water.



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*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

Berms/levees + nature-based features

Closure structures on bridges

Piers and wharves not elevated; add short walls around the piers

Ground improvements to ensure flood defenses withstand a seismic event

Elevated shoreline

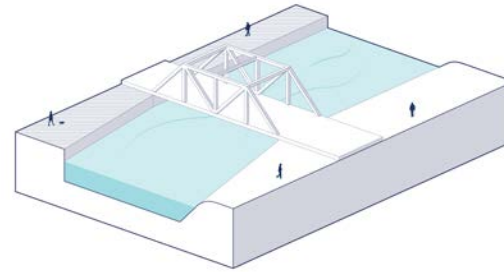
**SUBSEQUENT ACTIONS**  
*(included, but dependent on monitoring)*  
Elevate shoreline to withstand 3.5' of Sea Level Rise and add nature based features

# ACTIONS EXPLAINED

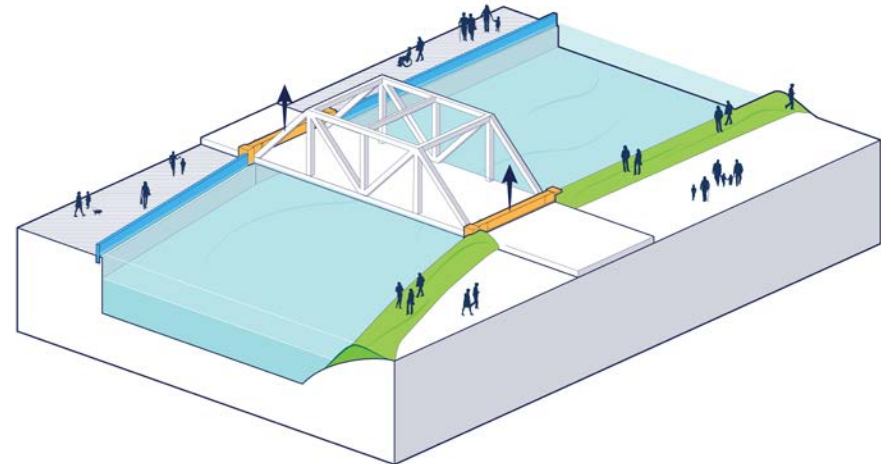
## Closure structure on bridges

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*



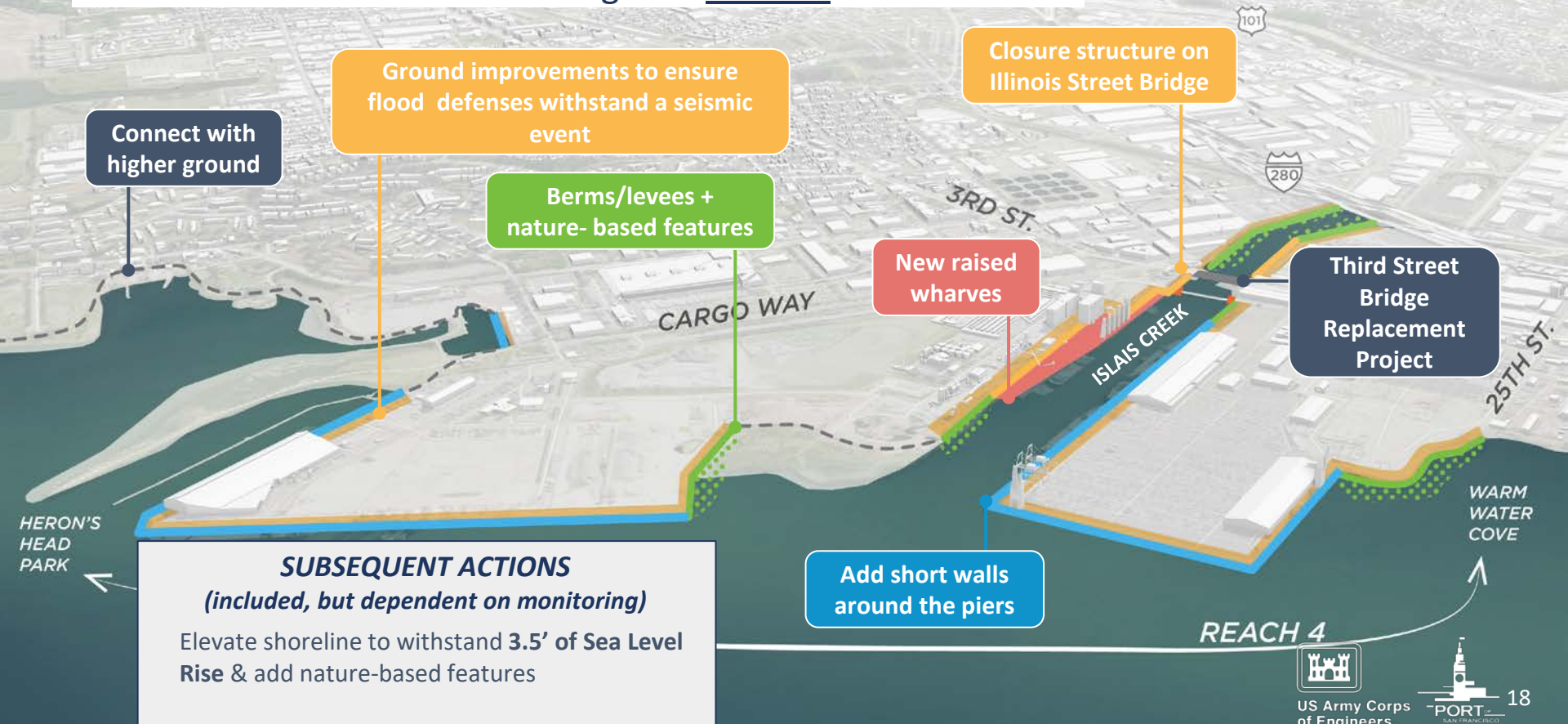
*Future condition*





# ISLAIS CREEK / BAYVIEW: FIRST ACTIONS

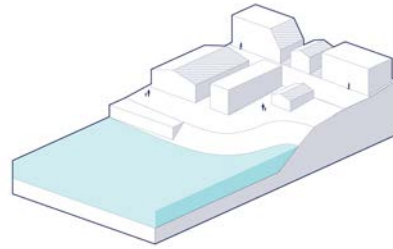
Elevate the shoreline to defend against **1.5 feet** of sea level rise



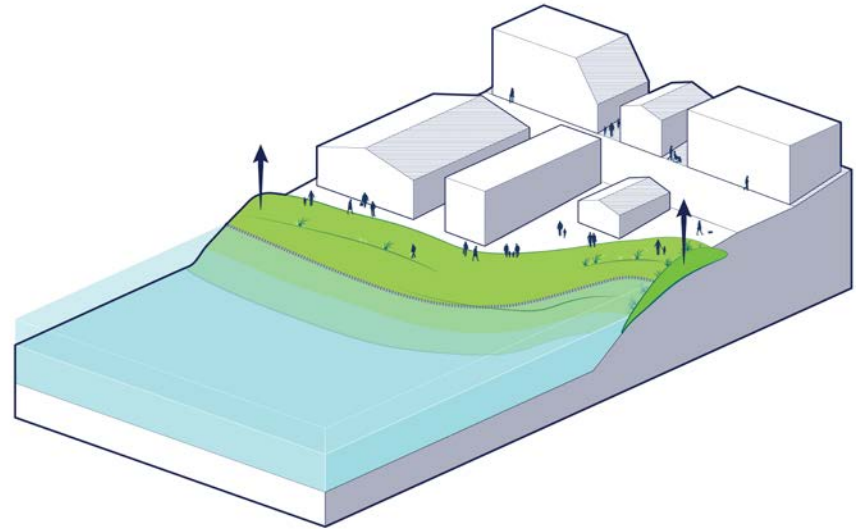
# ACTIONS EXPLAINED

## 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*



## 4 Next Steps



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# PUBLIC ENGAGEMENT

- 4 in person community workshops in English hosted along the waterfront
- 1 in person community workshop in Spanish
- 1 in person community workshop in Chinese
- 4 in person walking tours hosted along the waterfront
- 12+ Port Tenant webinars and 2 community webinars
- 20+ presentations to Community Based Organizations
- Presentations to Bay Conservation and Development Commission, CA State Lands, Planning, Historic Preservation Commission, SFMTA, SFPUC, SFUSD Climate Fellows, Youth Commission
- Engagement via StoryMaps, social media, newsletters

# HOW TO PROVIDE COMMENT

There are several ways that you can comment through **March 29, 2024**:

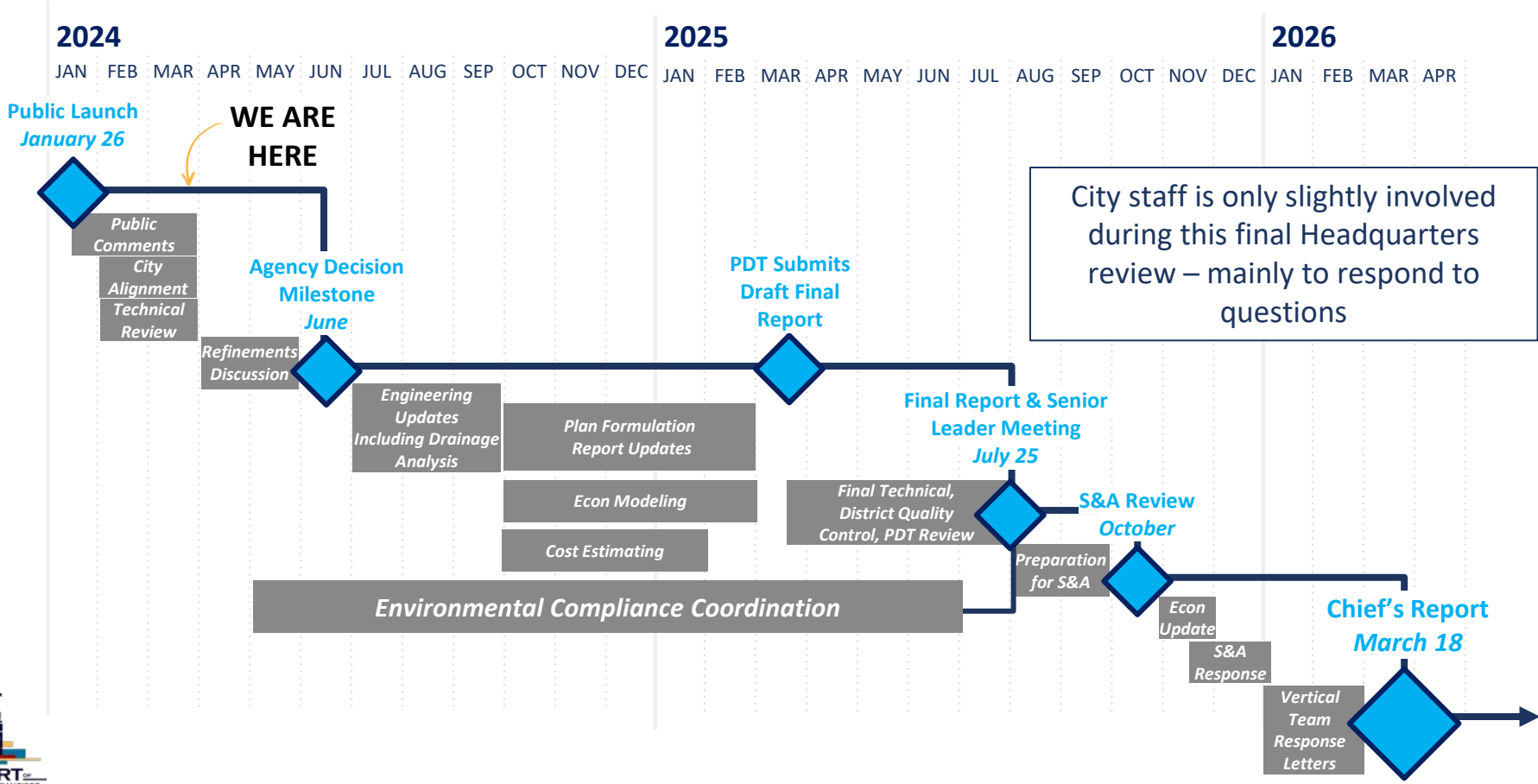
- Share written comments via email: [SFWFRS@usace.army.mil](mailto:SFWFRS@usace.army.mil)
- Share written comments via mail: U.S. Army Corps of Engineers, Tulsa District ATTN: RPEC-SFWS, 2488 E 81st St., Tulsa, OK 74137
- Share written comments online: learn more and comment online at [sfport.com/wrp](https://sfport.com/wrp)



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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](https://sfport.com) and clicking the Signup for e-newsletter in the footer and selecting Waterfront Resilience Program from the list in the form provided.

# DRAFT SCHEDULE TO COMPLETE SF FLOOD STUDY



City staff is only slightly involved during this final Headquarters review – mainly to respond to questions

A photograph of two children riding bicycles on a dirt path. The child in the foreground is wearing a red and white shirt, white shorts, and a yellow helmet. The child in the background is wearing a dark jersey with the number 30 and a dark helmet. They are riding away from the camera towards a body of water under a clear blue sky. There are some trees and a signpost on the right side of the path.

# Thank you

U.S. Army Corps of Engineers | [SFWFRS@usace.army.mil](mailto:SFWFRS@usace.army.mil)  
Port of SF Waterfront Resilience Program | [wrp@sfport.com](http://wrp@sfport.com)

