DRAFT WATERFRONT ADAPTATION STRATEGIES

Northern Advisory Committee Meeting

January 18, 2023

TODAY'S AGENDA

Presentation Overview

- Understanding the Risks
  - *What we're facing*
- Waterfront Resilience Program
  - *What we're doing*
- Community Priorities
  - *What we've heard*
- Range of Possibilities
  - *What we're considering*
- Draft Waterfront Adaptation Strategies in the Embarcadero
- Next Steps
- Q&A

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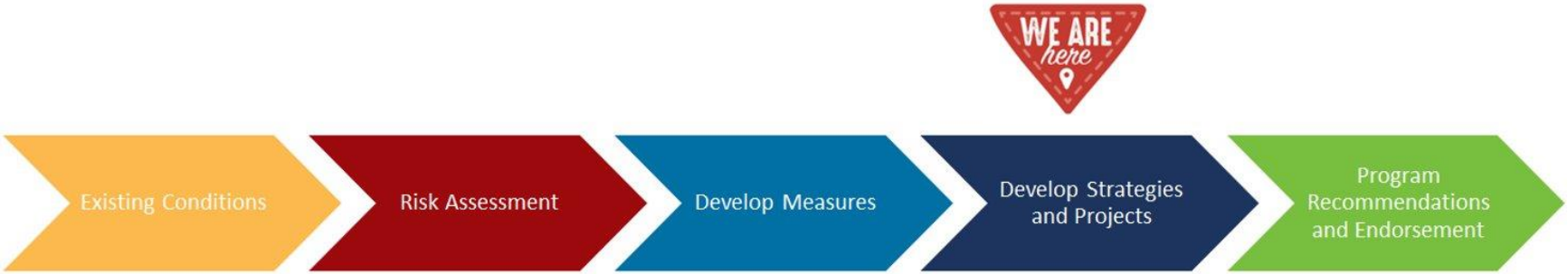
DRAFT WATERFRONT ADAPTATION STRATEGIES

Presentation Overview



The Port of San Francisco has developed seven high-level Draft Waterfront Adaptation Strategies through a collaborative interagency process and over five years of public engagement.

The draft Strategies are ready for public feedback, with a goal of reaching a Draft Waterfront Adaptation Plan by Summer 2023.

DRAFT WATERFRONT ADAPTATION STRATEGIES

Port-led, City of San Francisco Agencies, and USACE Partnered in Development Process

Understanding the Risks

What We're Facing

CLIMATE CHANGE HAS GLOBAL IMPACTS

Including Here In San Francisco

Puerto Rico, September 2022 / Alejandro Granadillo/AP

Alaska, September 2022 / adn.com

Florida, September 2022 / NYTimes.com

The New-York Times

An Earthquake in Japan Speaks to a Sea Wall in San Francisco

The challenges of climate change are everywhere but maybe no more so than in coastal cities that face dual threats of seismic activity and rising seas.

San Francisco Chronicle

BAY AREA // SAN FRANCISCO

S.F.'s Embarcadero needs to be raised as much as 7 feet to prepare for sea level rise, city says

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RISING TO THE CHALLENGE

San Francisco Faces Urgent Seismic, Coastal, and Inland Flood Risks Today

SEISMIC RISKS

San Francisco, 1906

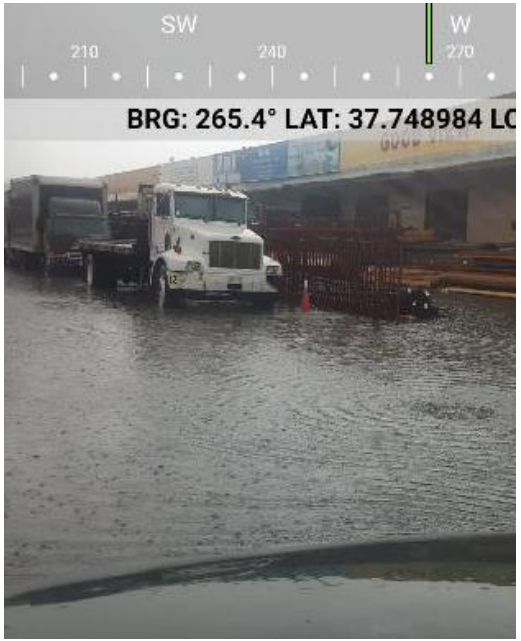
Marina, 1989

COASTAL FLOODING

Recology

The Embarcadero

INLAND FLOODING



Islais Creek outfall and Marin St.

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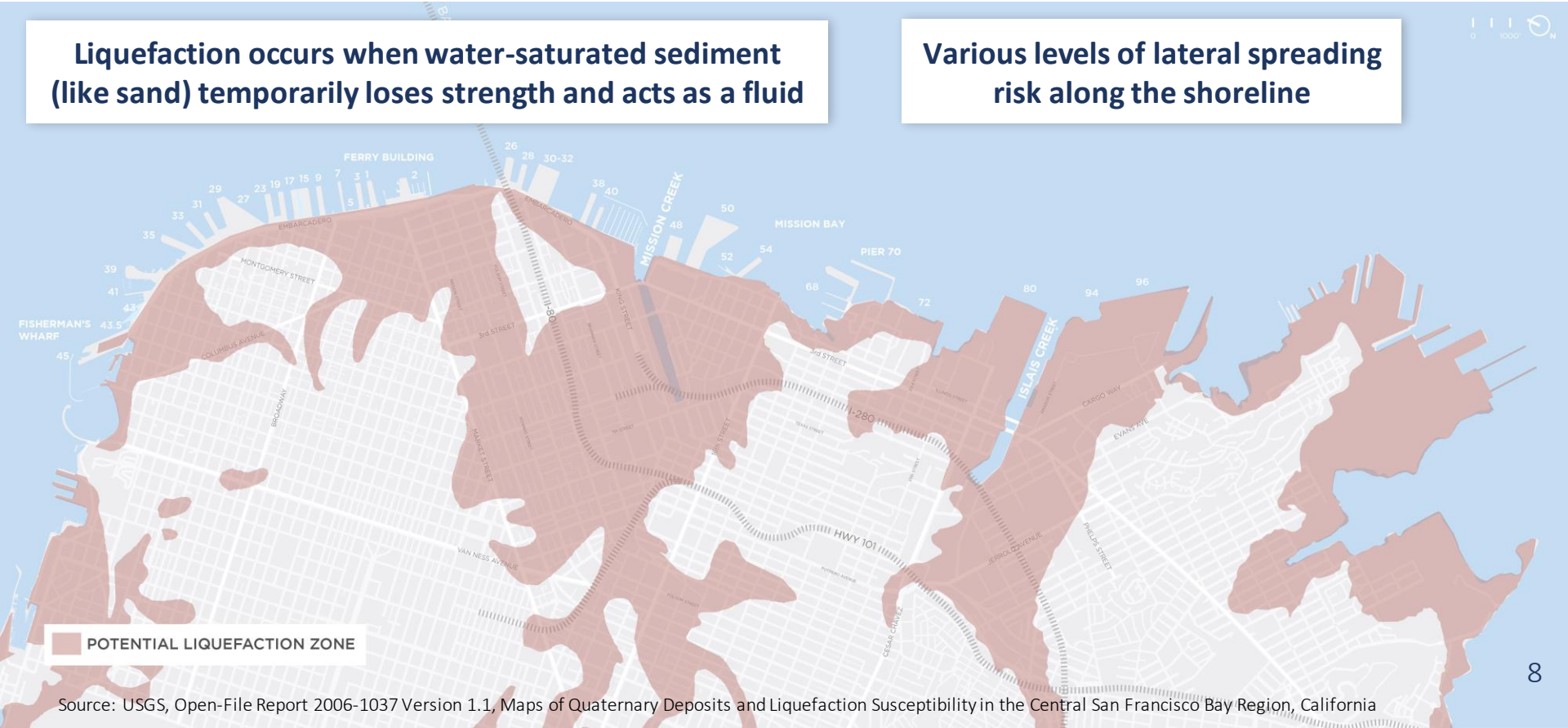
WATERFRONT WIDE EARTHQUAKE HAZARDS

Very High Earthquake "Liquefaction" Risk

Liquefaction occurs when water-saturated sediment (like sand) temporarily loses strength and acts as a fluid

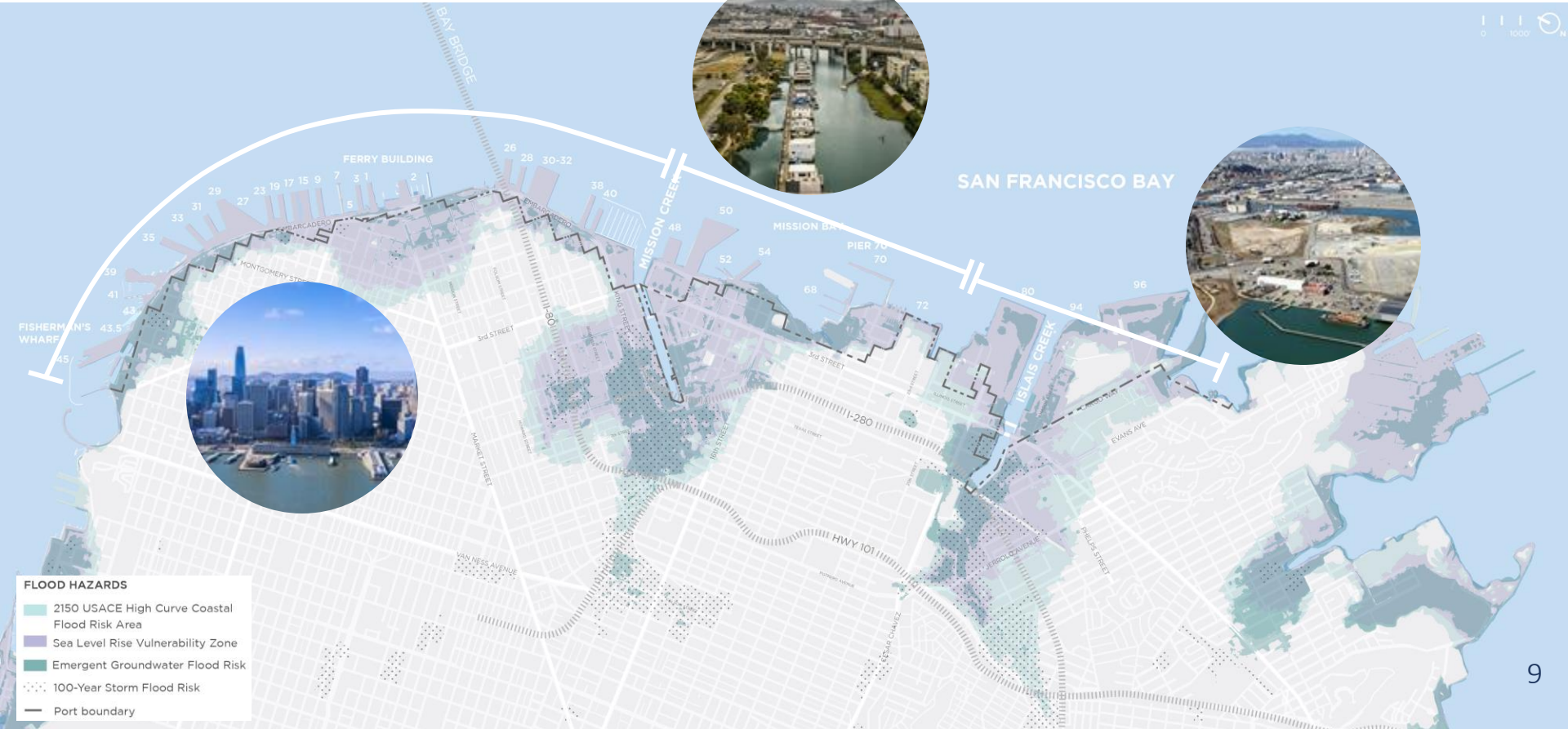
Various levels of lateral spreading risk along the shoreline



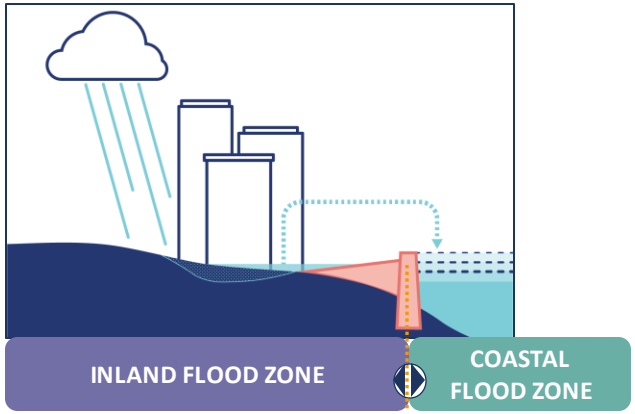
Source: USGS, Open-File Report 2006-1037 Version 1.1, Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California

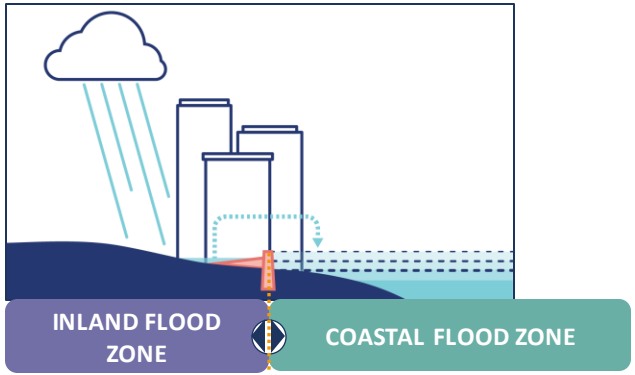
COASTAL AND INLAND FLOOD RISK

Different Geographic Impacts



COASTAL/ INLAND FLOODING, AND SEISMIC RISKS





Two related forms of flooding

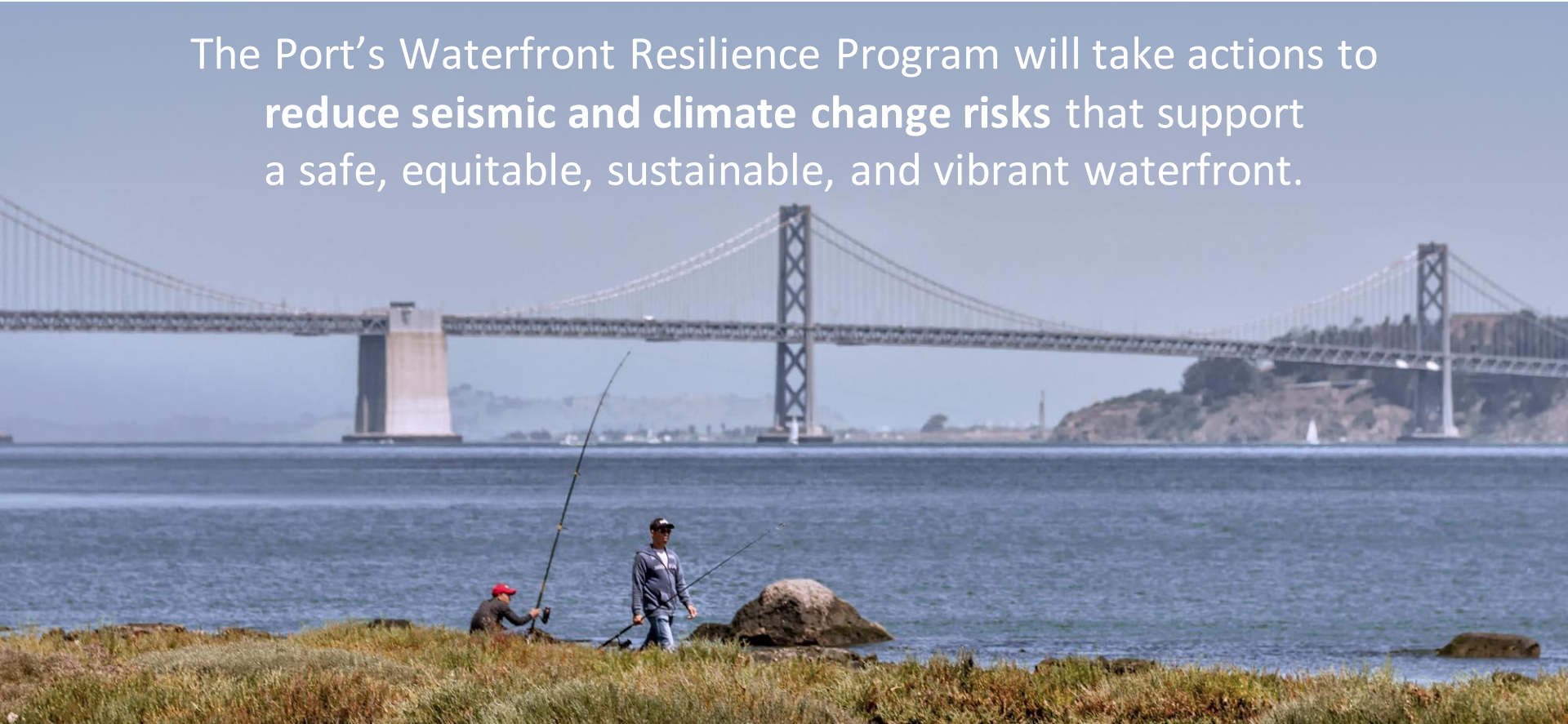
Any solution endorsed by the City of San Francisco will aim to address **all three risks:** seismic risks, coastal flooding and inland flooding.

Waterfront Resilience Program

What We're Doing

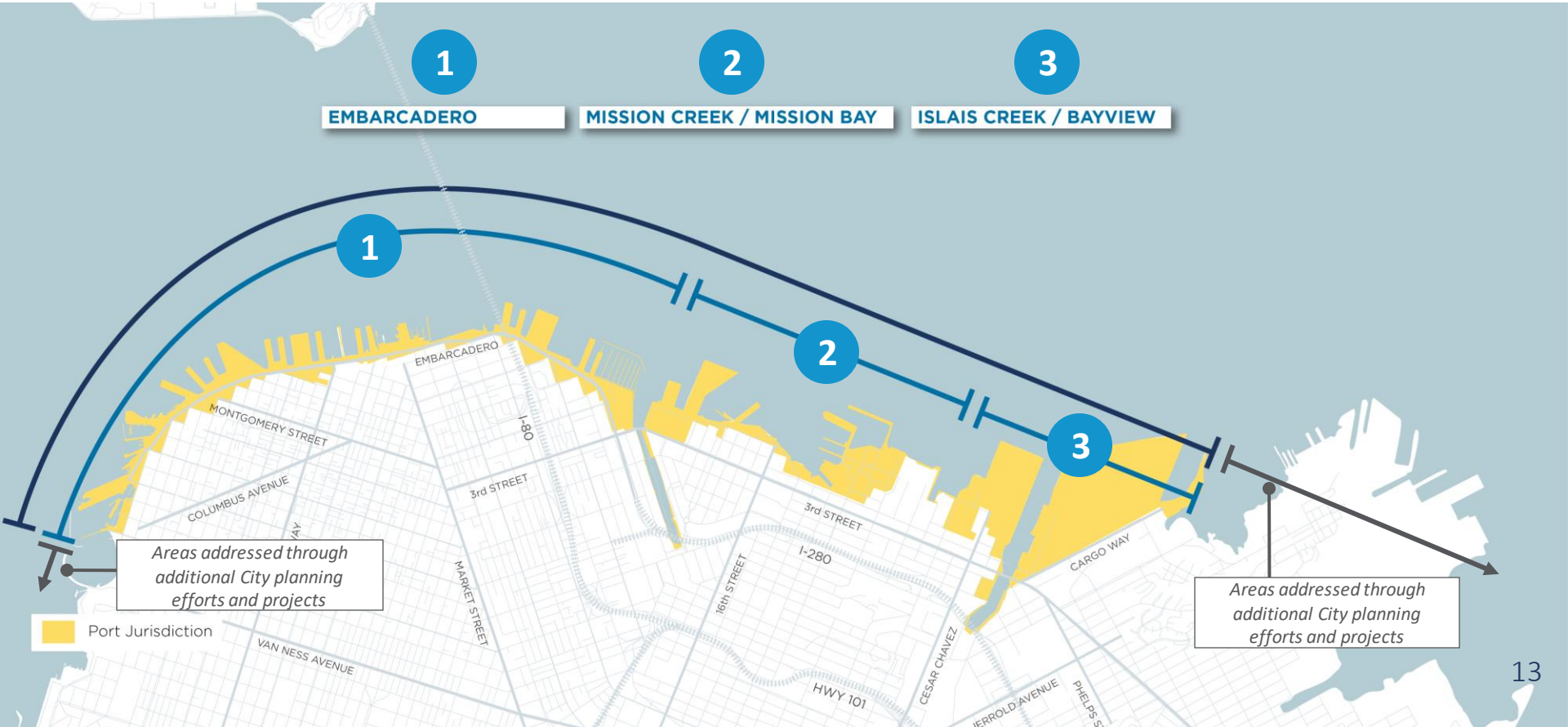
WATERFRONT RESILIENCE PROGRAM VISION STATEMENT

Affirmed through Robust Community Engagement



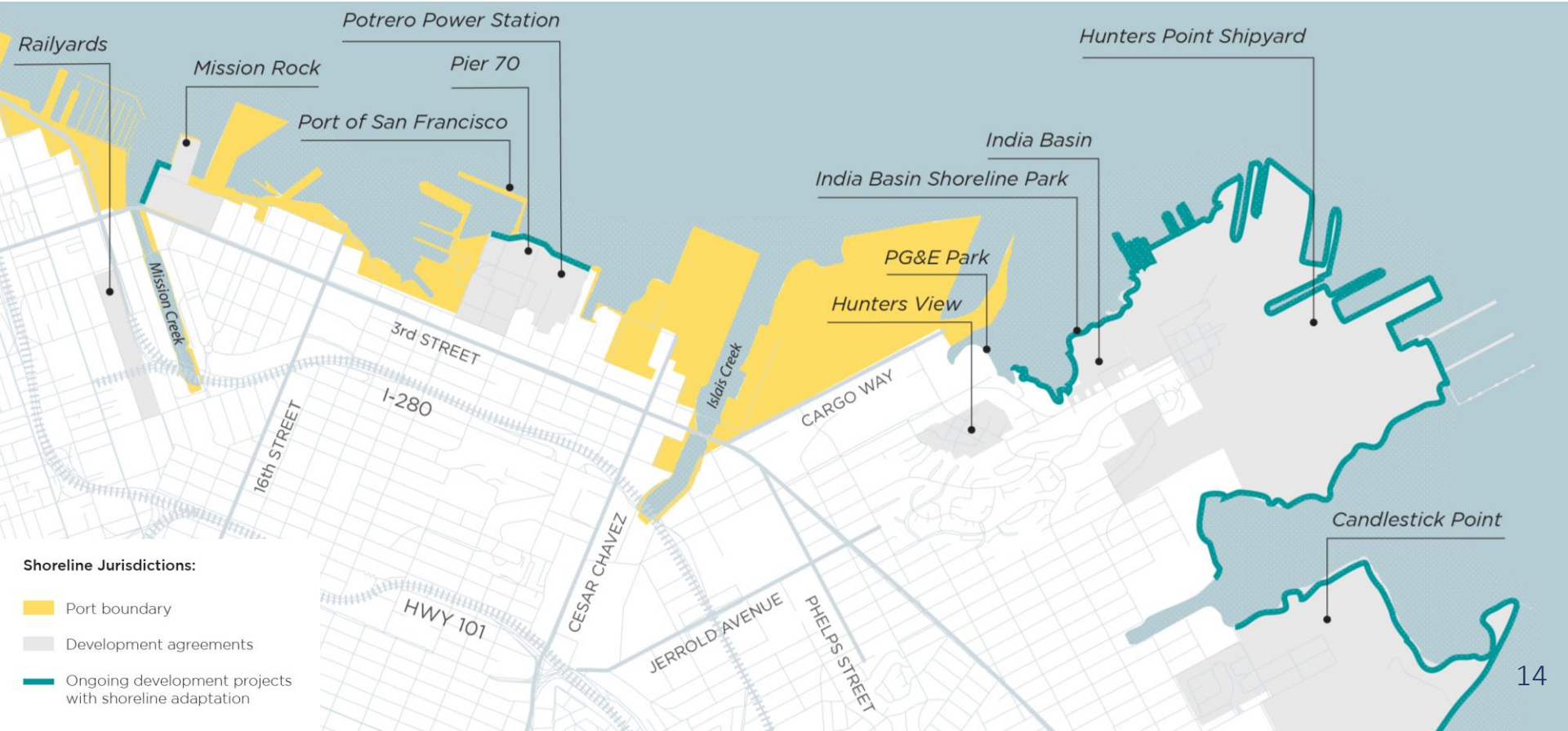
PROGRAM AREA

Focus is Conceptual-Level Strategies Within the Port's Jurisdiction



OTHER CITY ADAPTATION PROJECTS

Outside Port jurisdiction



Community Priorities

What We've Heard

DRAFT WATERFRONT ADAPTATION STRATEGIES

Community Input Helped Define the WRP

1. **Focus on life safety & emergency response**

2. **Prioritize assets most loved by the community and most important to the city**

3. **Put people first**
   Assets and services most prioritized: housing, disaster recovery facilities, utilities, transportation and businesses

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WHAT WE HEARD – EMBARCADERO SPECIFIC

Community Input Helped Define the WRP

- Key community-prioritized assets include: Muni Tunnel, Ferry Building, Exploratorium, Fisherman's Wharf
- Increased transportation options, open space and parks, and more family friendly activities
- Preserve and enhance jobs and diversity of jobs along the Embarcadero
- The Embarcadero Promenade is viewed as a critical asset and there is a strong desire to preserve and enhance it

NATURE BASED SOLUTIONS

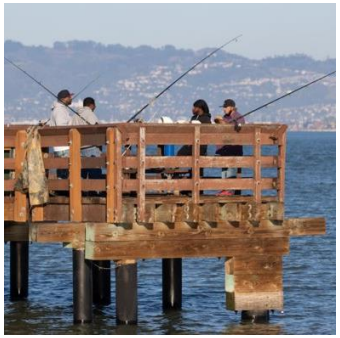
Prioritize Nature and Healing the Bay

PUBLIC SPACES

Expand Open Spaces and the City's Connection to the Waterfront









EQUITY

Center Racial and Social Equity and Environmental Justice

Range of Possible Solutions

What We're Considering

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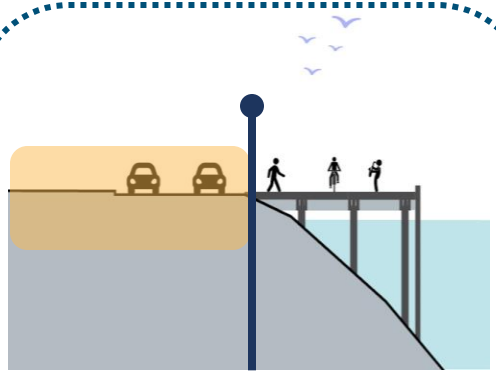
Waterfront Resilience Program

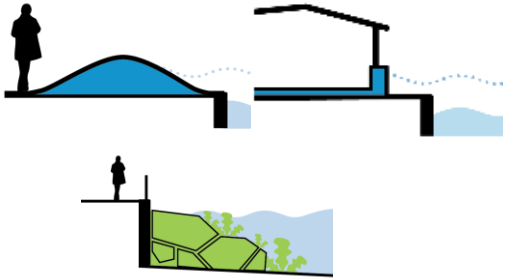
DRAFT WATERFRONT ADAPTATION STRATEGIES

Key Components



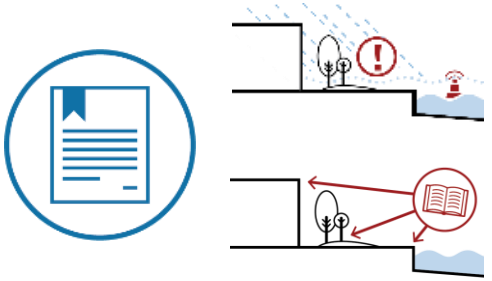
Coastal Flood Defense Location + Height

And area of elevation change



Physical Changes

Such as earthquake-resilient berms, floodproofing, and nature-based features



Policy Changes

Such as resilient codes, warning systems, and land use changes

USACE SAN FRANCISCO WATERFRONT COASTAL FLOOD STUDY

Driving Questions

What if...
we **did not adapt** to mitigate the risks?

What if...
we adapted by **floodproofing** and **moving** buildings and assets, *without* coastal flood structures?

What if...
we address flooding at **a lower rate** of sea level rise?

What if...
we address flooding **at a higher rate** of sea level rise, as recommended by **CA and SF guidance**?

USACE SAN FRANCSICO WATERFRONT COASTAL FLOOD STUDY

Draft Waterfront Adaptation Strategies

What if...
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STRATEGY A

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STRATEGY B

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STRATEGY C

STRATEGY D

What if...
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STRATEGY E

STRATEGY F

STRATEGY G

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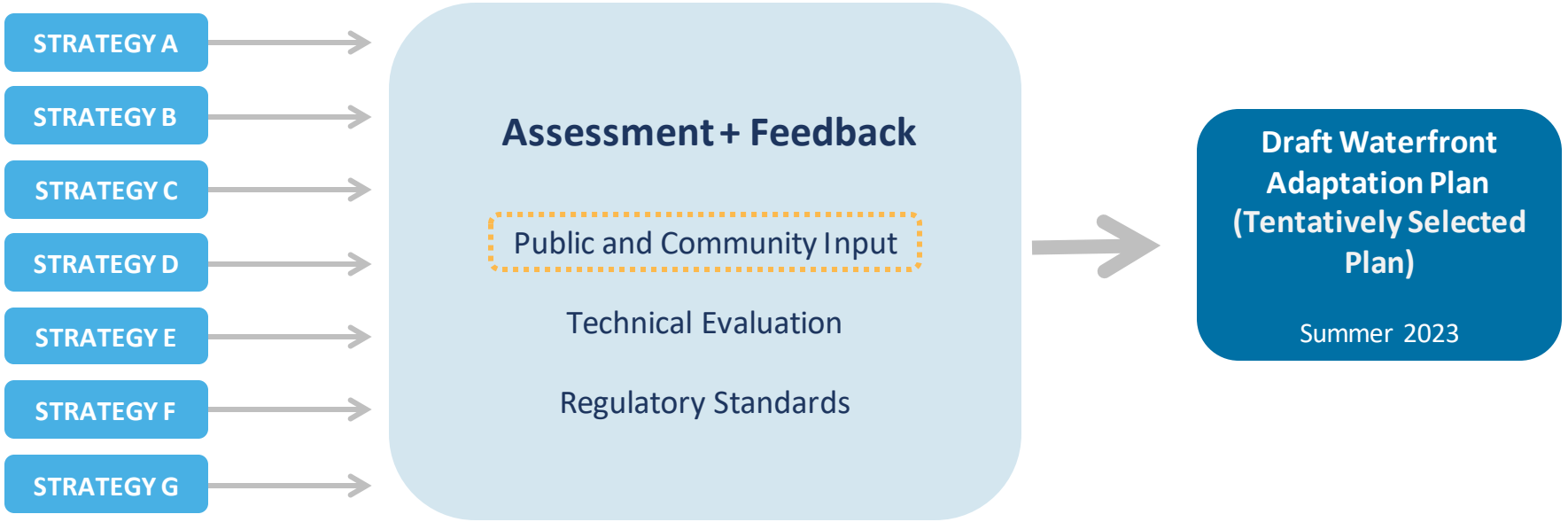
THE ROLE OF COMMUNITY FEEDBACK

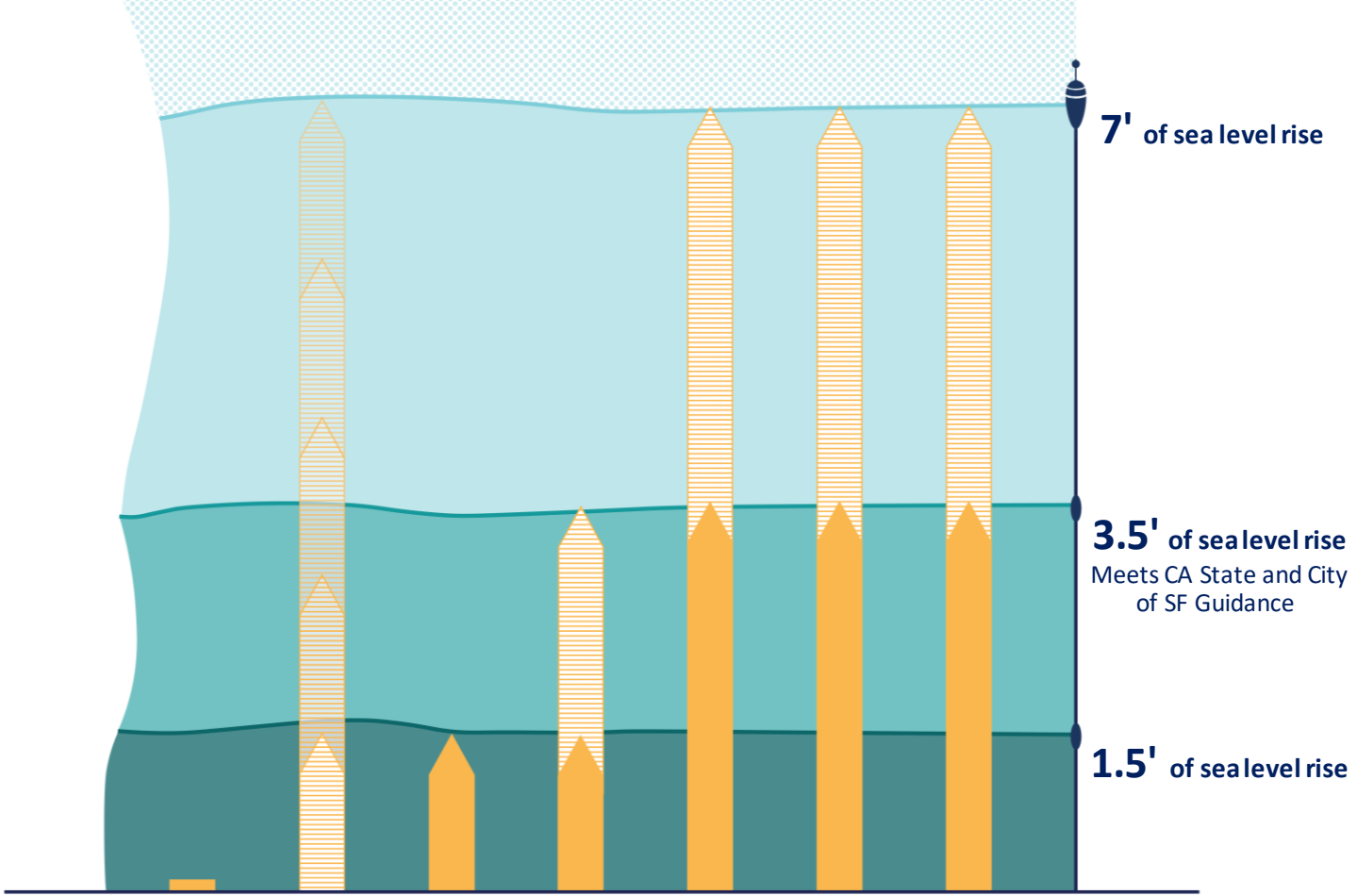
Pathway to the Draft Waterfront Adaptation Plan



Draft Waterfront Adaptation Strategies in the Embarcadero

TIME HORIZONS

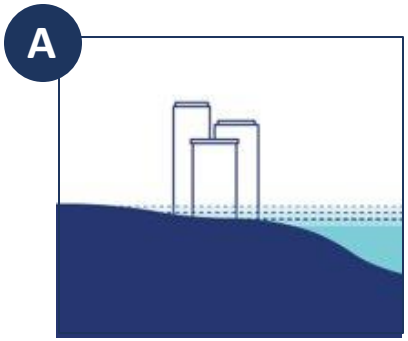
SEA LEVEL RISE



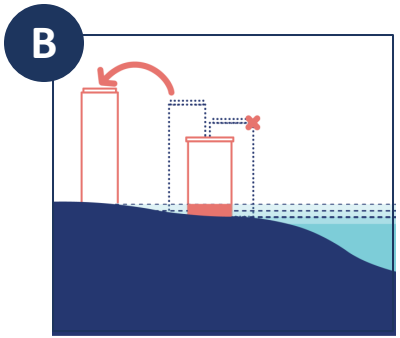
* Strategy involves phased floodproofing and relocation of assets

WATERFRONT DRAFT ADAPTATION STRATEGIES

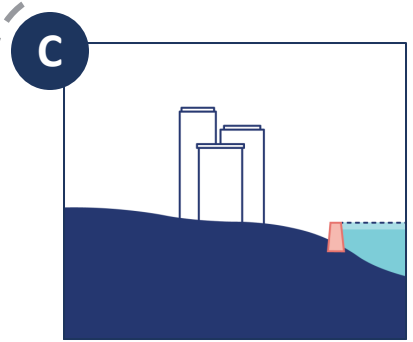
Lower Rate of Sea Level Rise



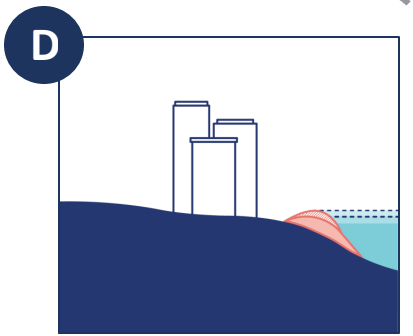
No Action



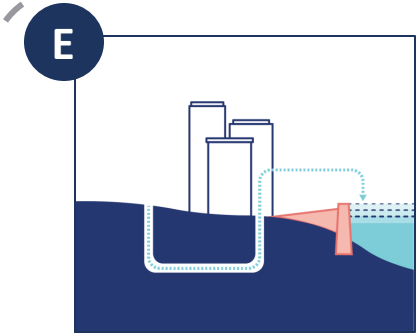
Non-Structural



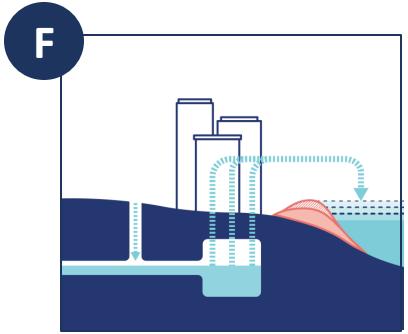
Lower Sea Level Rise



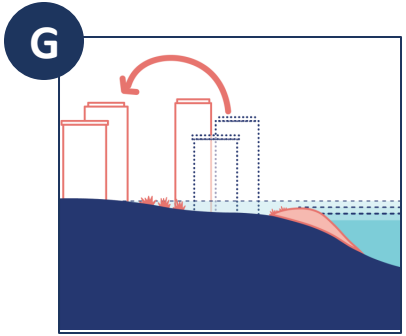
Adaptable



Hold The Line



Manage The Water



Align With Watersheds

In addition to coastal flood risks- addresses ground water, storm water, and seismic risks

Higher Rate of Sea Level Rise

USACE SAN FRANCISCO WATERFRONT COASTAL FLOOD STUDY

Focused on Strategies A-D

What if...
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STRATEGY E

STRATEGY F

STRATEGY G

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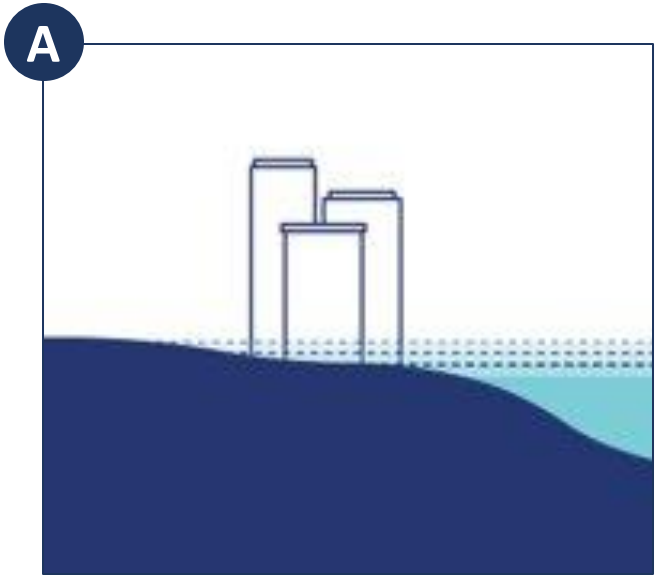
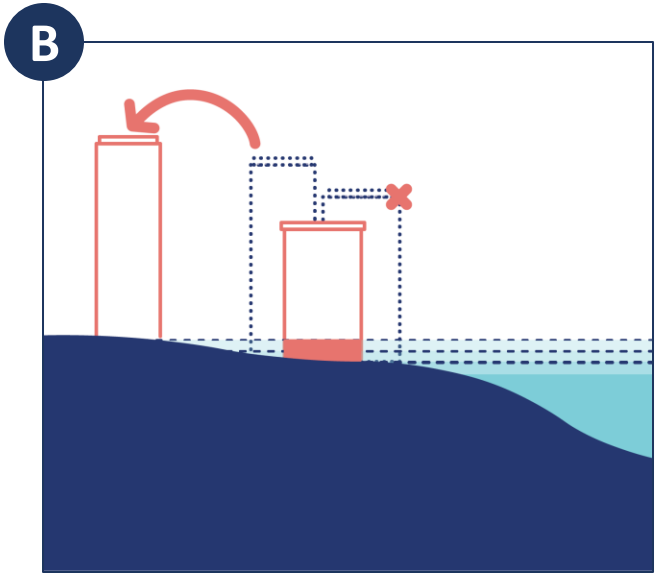
STRATEGY A – NO ACTION



This strategy takes no actions to reduce flood risks beyond projects that are already approved

STRATEGY B – NONSTRUCTURAL OPTION



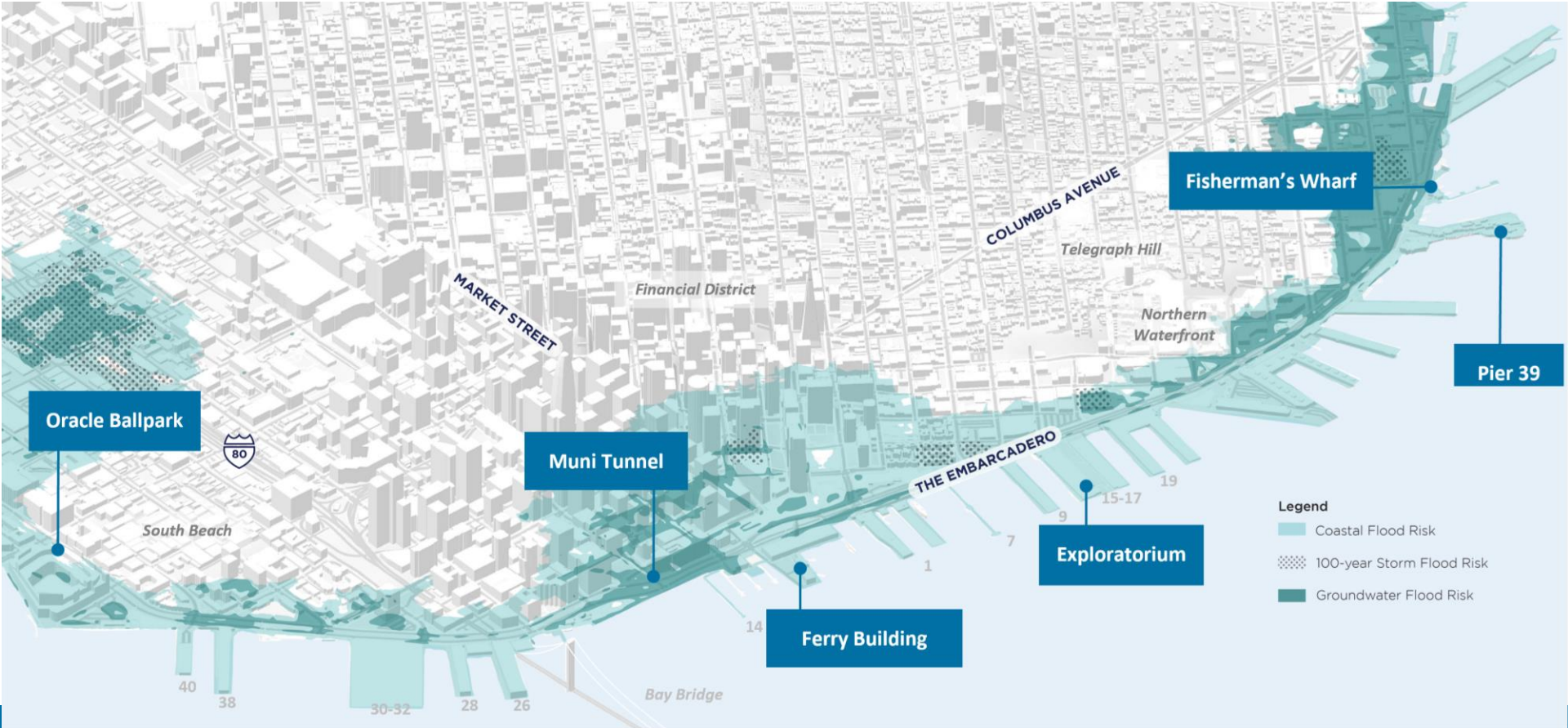
Moves people and assets away from the risk, uses nonstructural measures (such as floodproofing) to reduce risks, and allows water to go where it wants rather than constructing traditional structural solutions

STRATEGY B – NONSTRUCTURAL OPTION

Examples

- **Floodproofing**
- **Raising structure in place**
- **Floodable spaces**
- **Buyouts**
- **Warning systems**

EMBARCADERO: ORIENTATION TO THE MAPS



ORIENTATION TO THE MAPS

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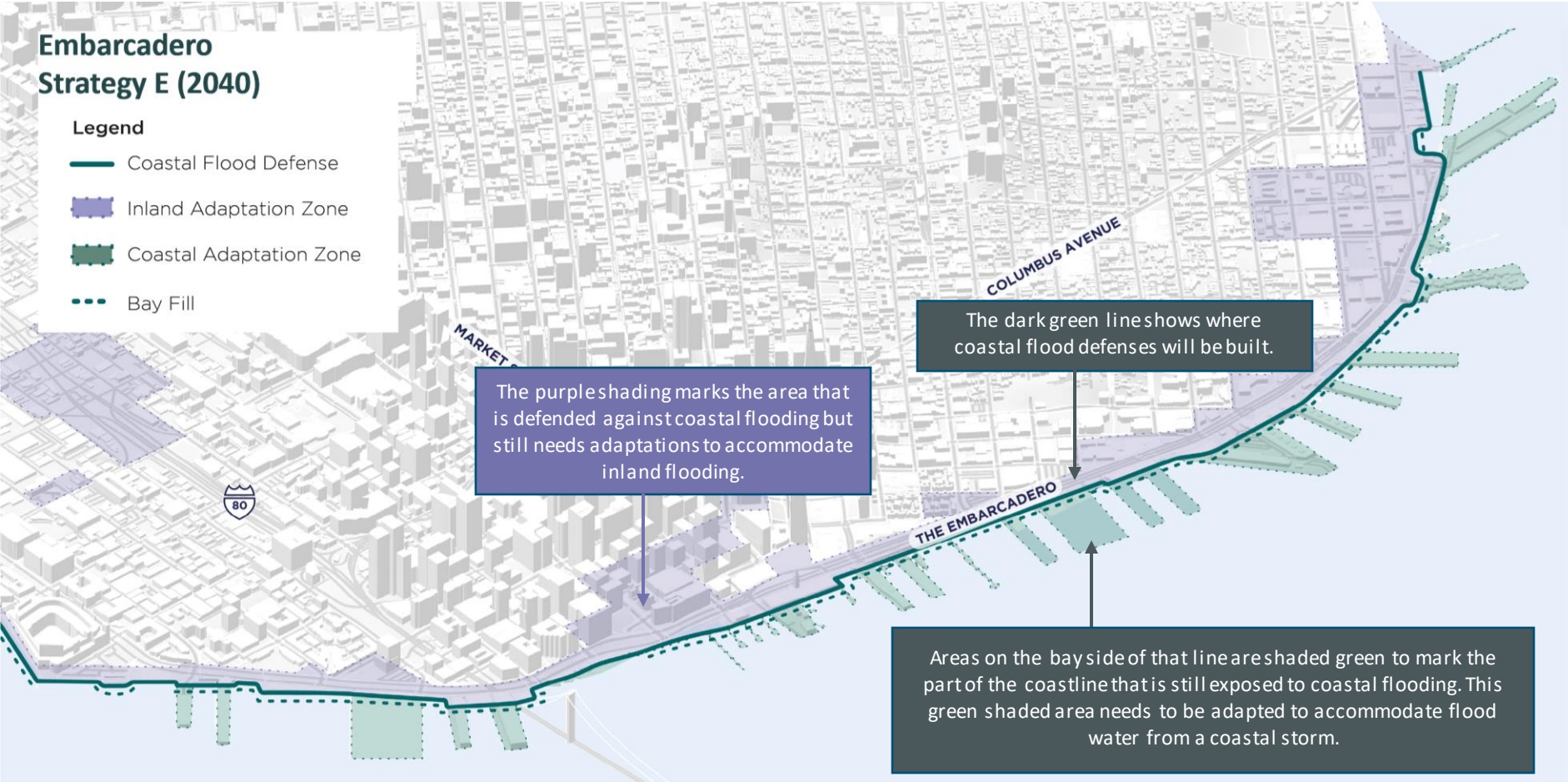

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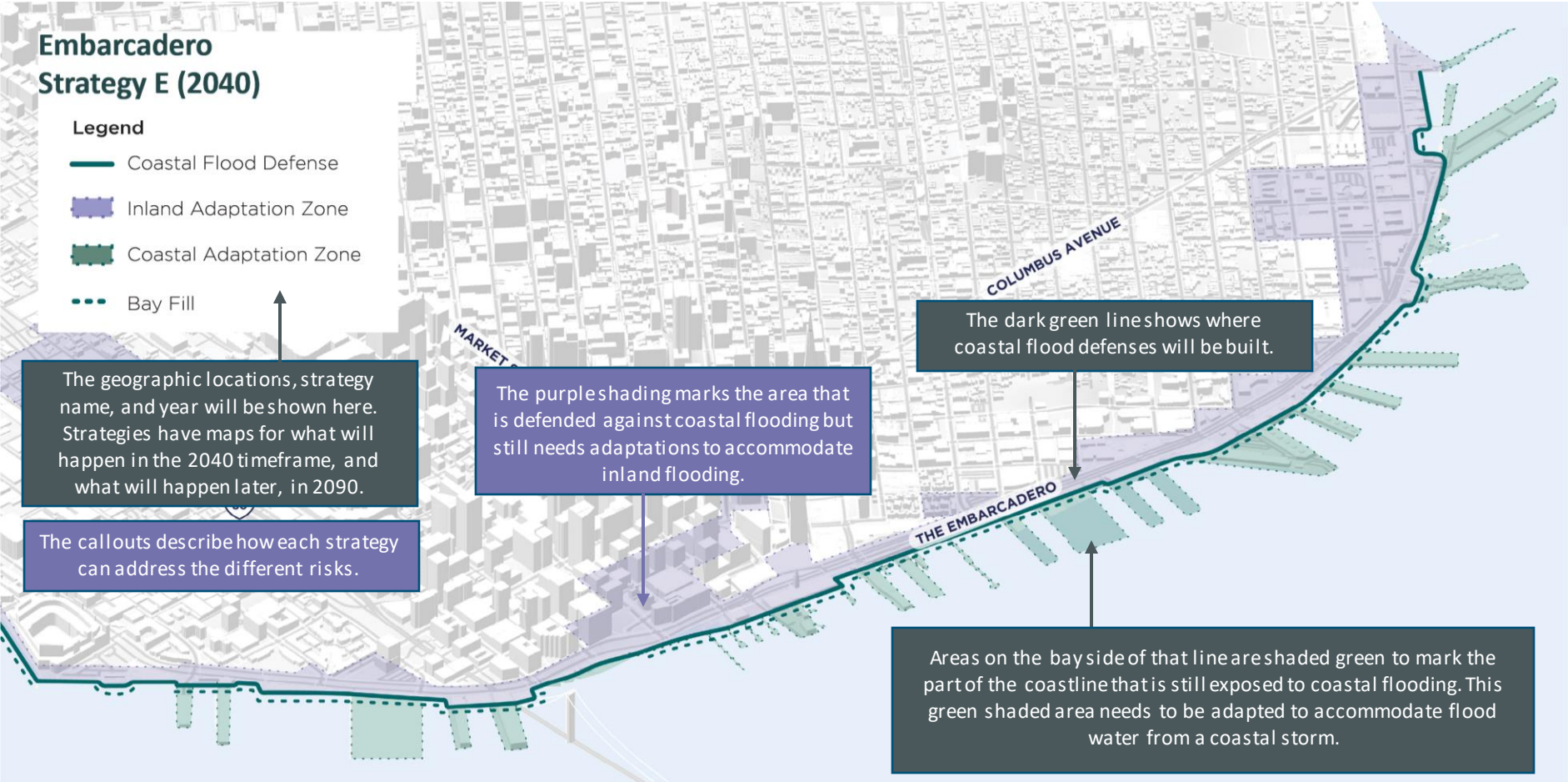

USACE SAN FRANCISCO WATERFRONT COASTAL FLOOD STUDY

Focused on Strategies A-D

What if...
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STRATEGY C

STRATEGY D

What if...
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STRATEGY E

STRATEGY F

STRATEGY G

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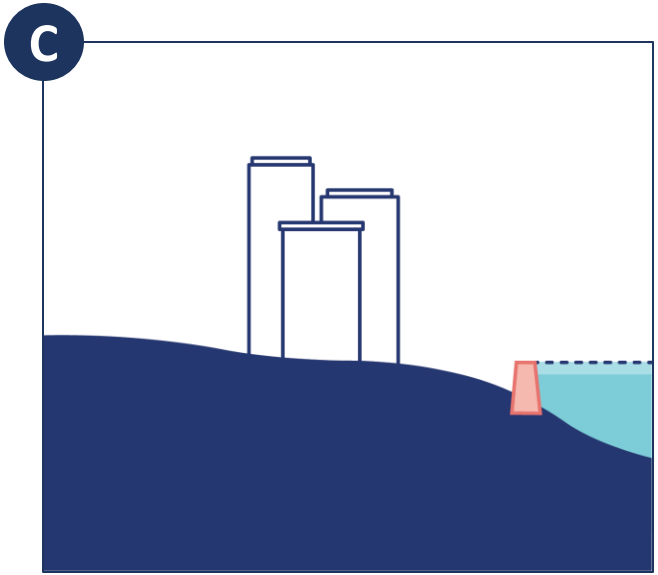
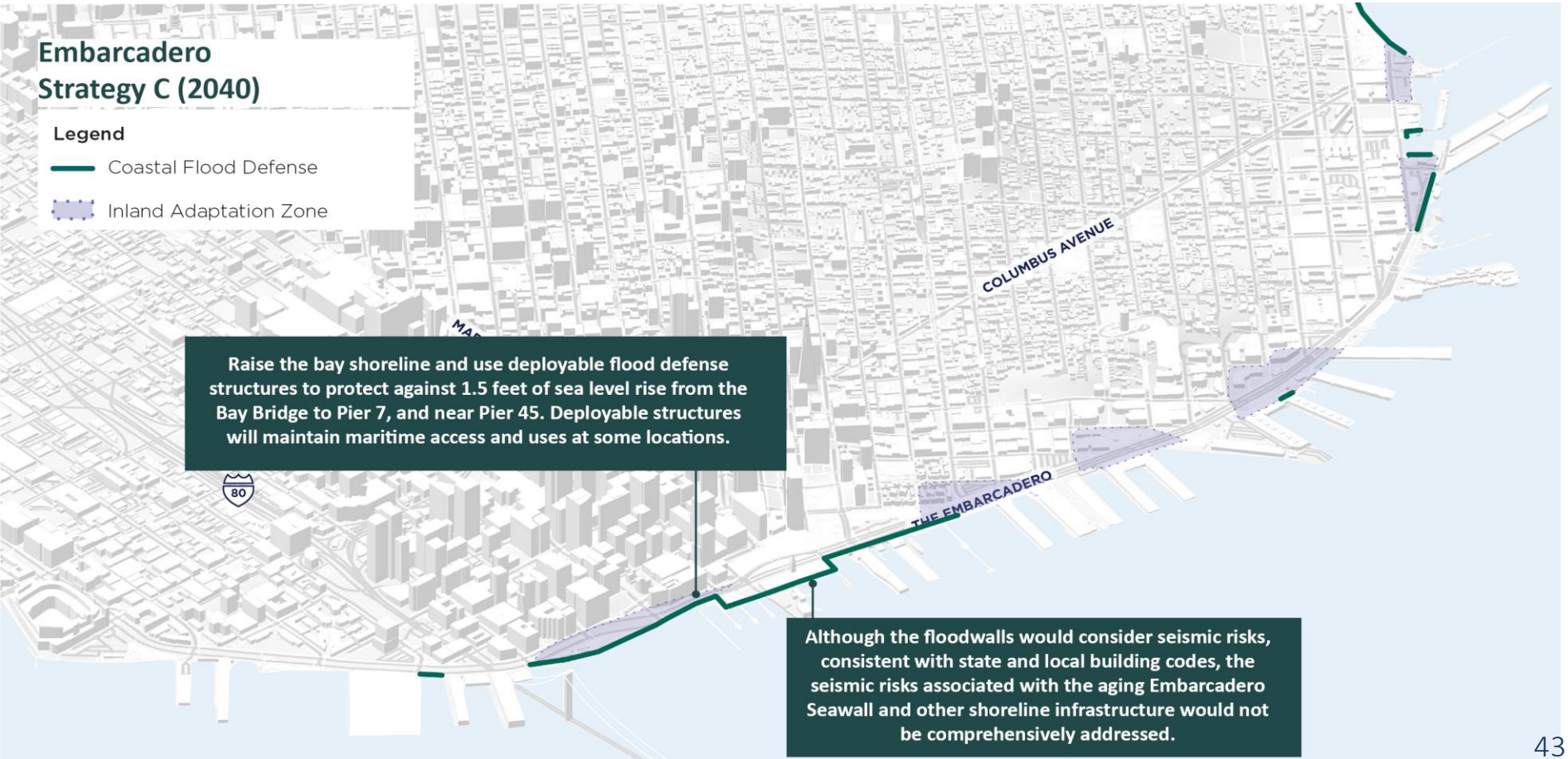
STRATEGY C – LOWER SEA LEVEL RISE



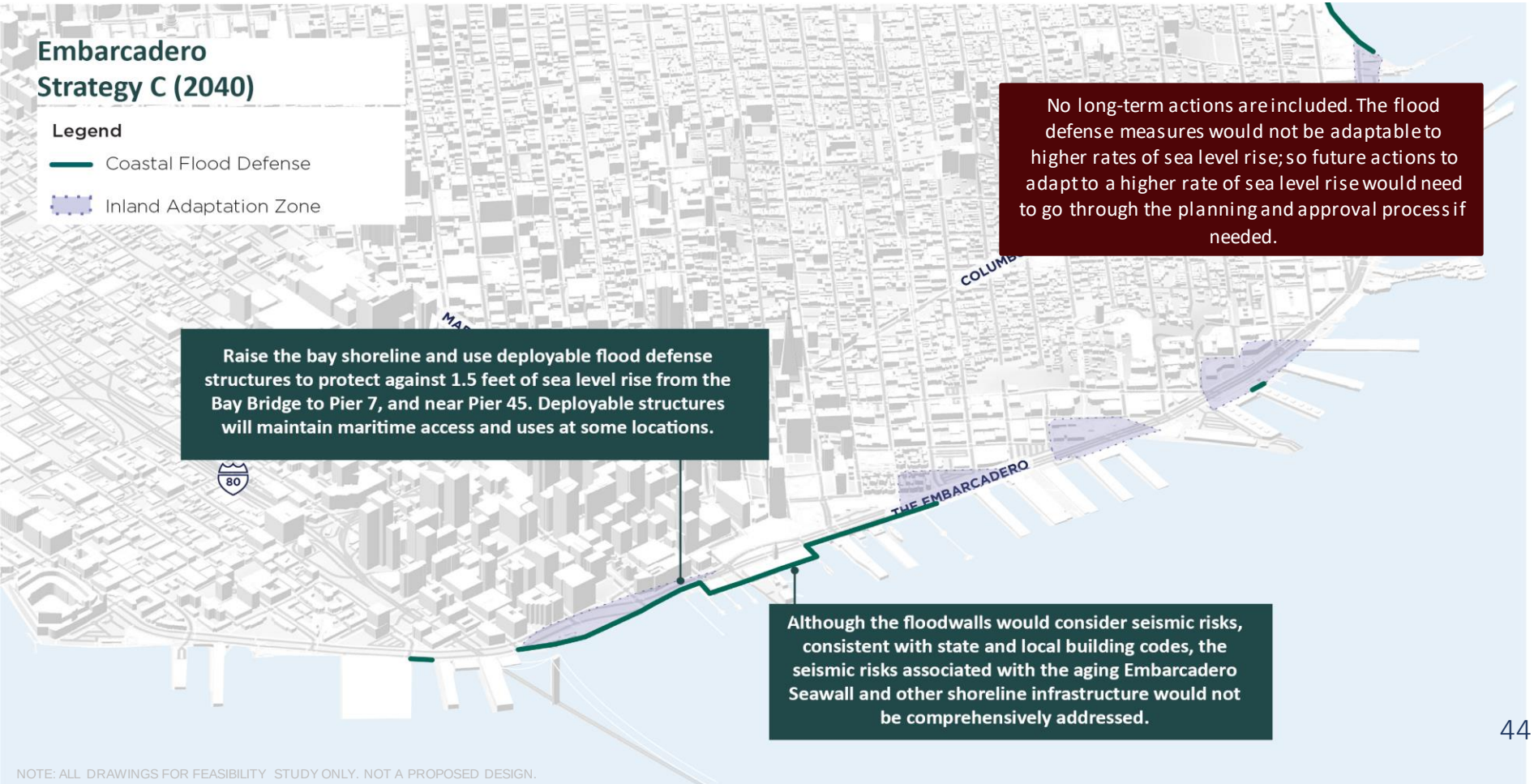
Adapts the shoreline to withstand 1.5’ of sea level rise by 2040 using a combination of structural and nonstructural measures

STRATEGY C – LOWER SEA LEVEL RISE

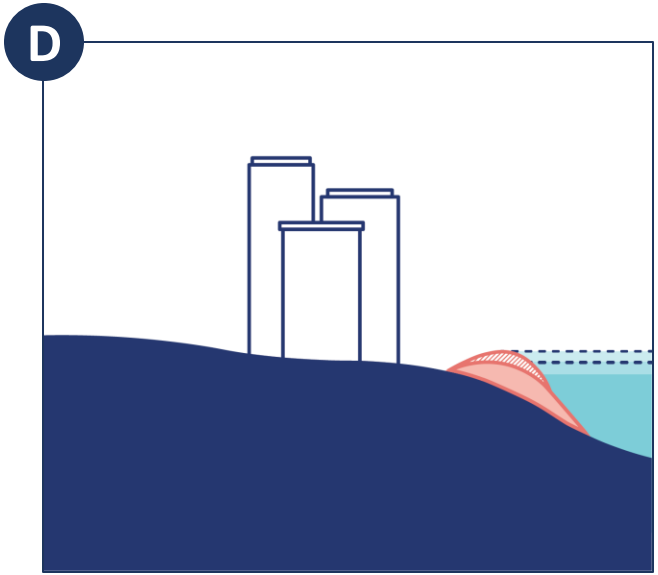
STRATEGY C – LOWER SEA LEVEL RISE



STRATEGY C – LOWER SEA LEVEL RISE



STRATEGY D – LOWER SEA LEVEL RISE – ADAPTABLE



Adapts the shoreline to withstand 1.5’ of sea level rise by 2040, with the possibility of building higher by 2090

STRATEGY D – LOWER SEA LEVEL RISE – ADAPTABLE

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USACE SAN FRANCSICO WATERFRONT COASTAL FLOOD STUDY

Focused on Strategies E, F, and G

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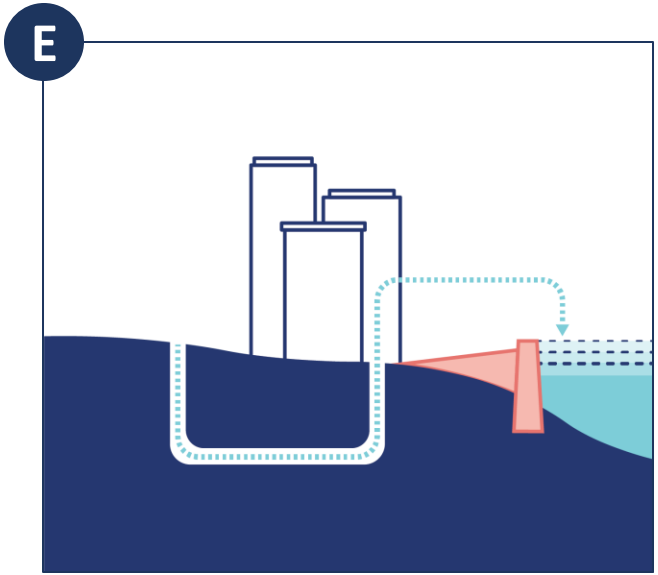
STRATEGY E

STRATEGY F

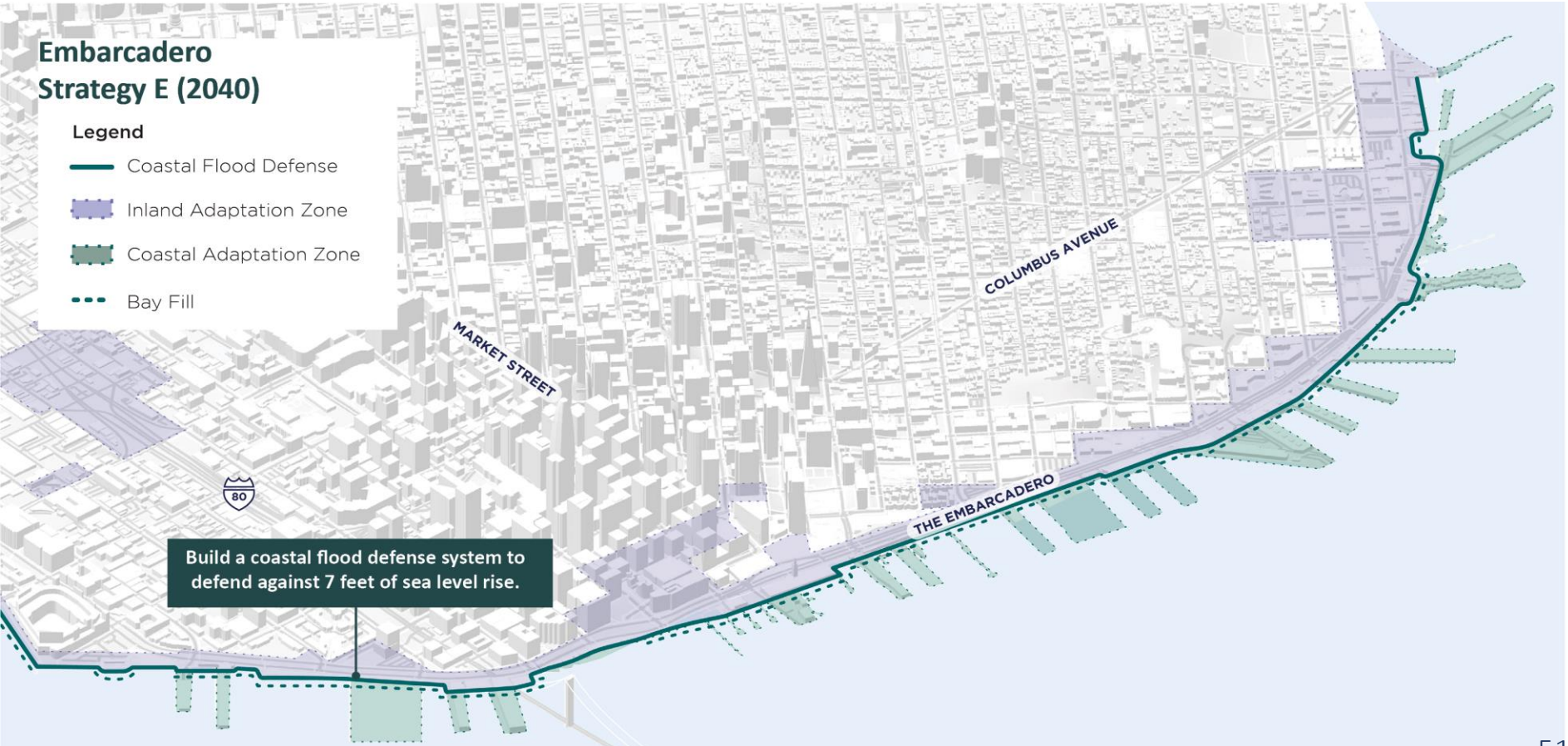
STRATEGY G

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE



Preserves a waterfront that looks and functions much as it does today by adapting the shoreline

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE



STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

NOTE: ALL DRAWINGS FOR FEASIBILITY STUDY ONLY. NOT A PROPOSED DESIGN.

STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

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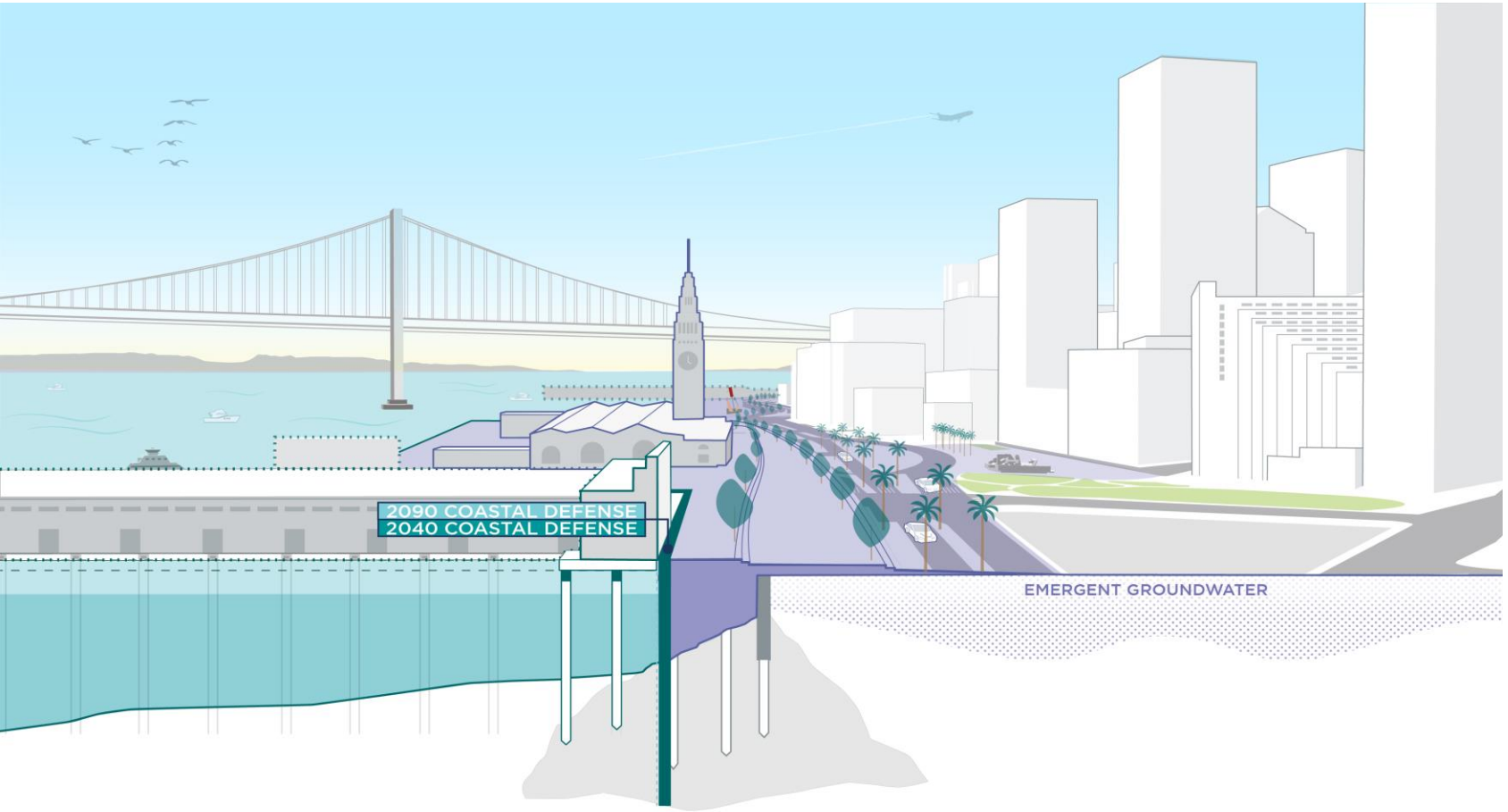
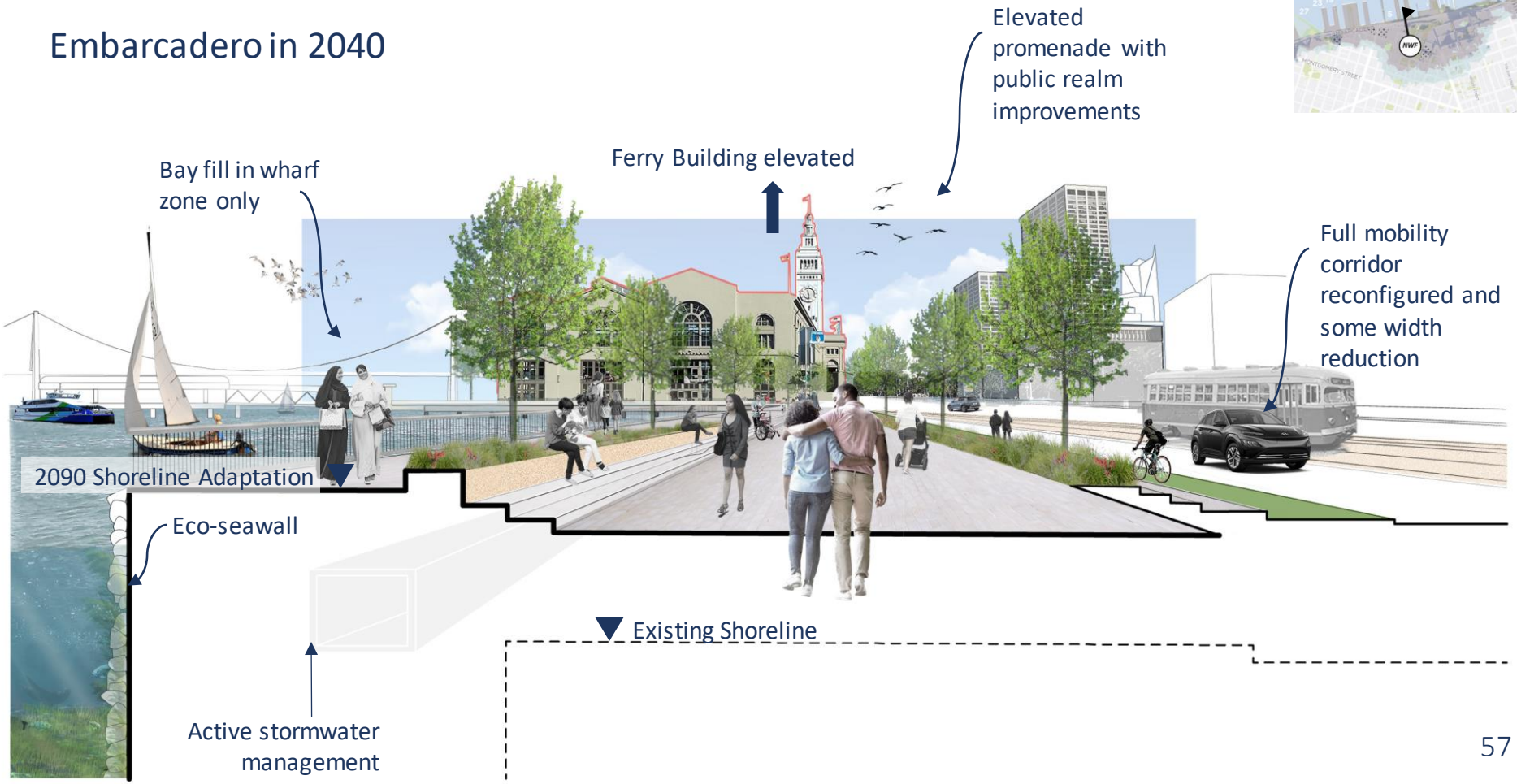
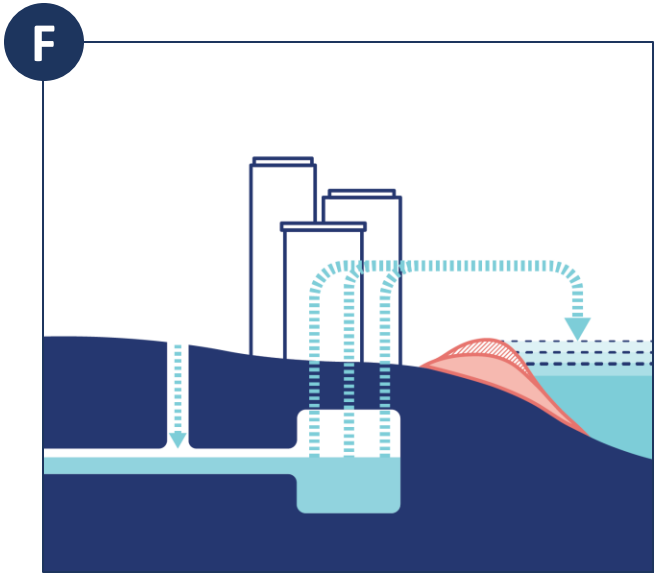


STRATEGY E – HIGHER SEA LEVEL RISE – HOLD THE LINE

Embarcadero in 2040

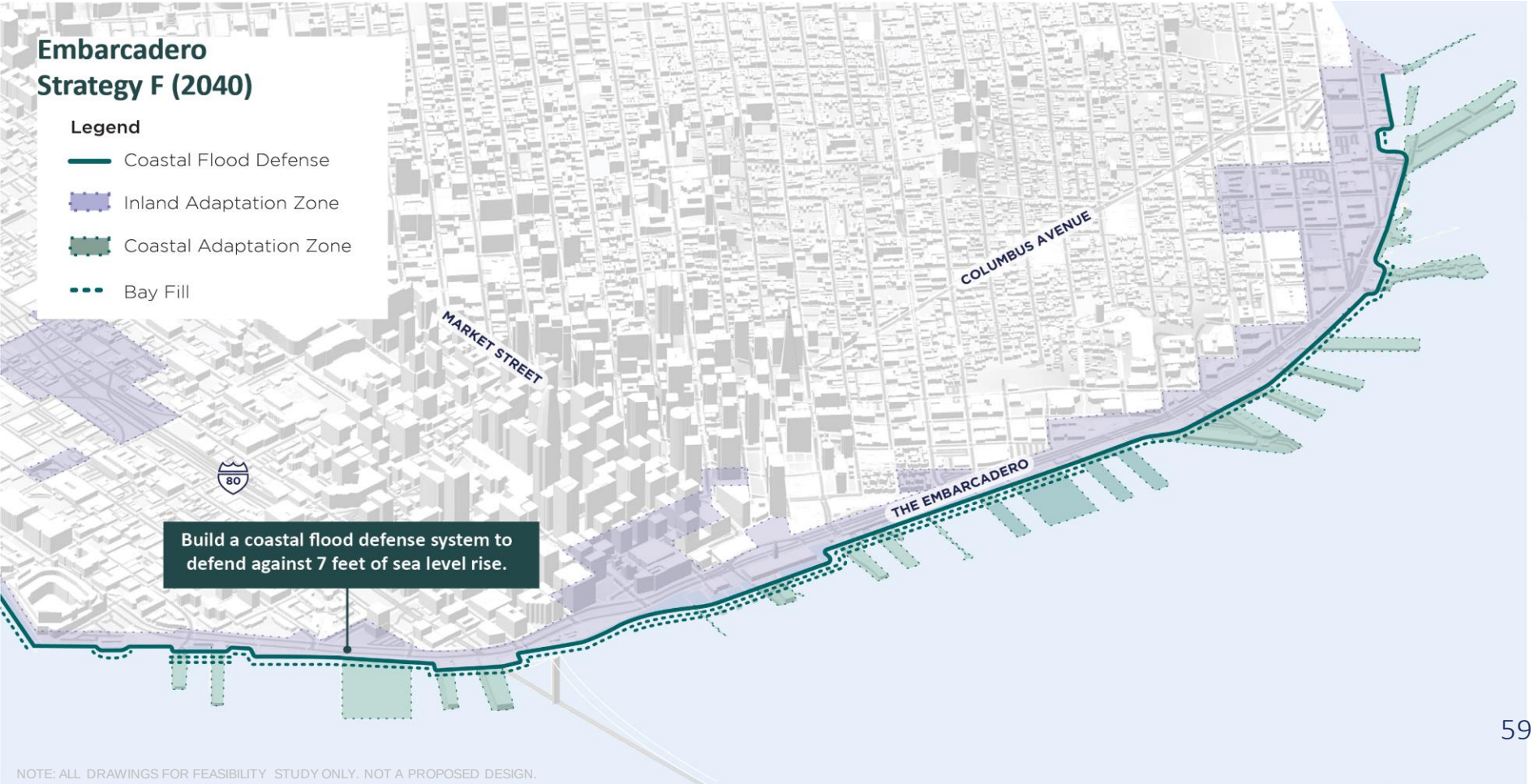


STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



Creates an active system for managing flooding by heavily relying on machinery

STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



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STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER

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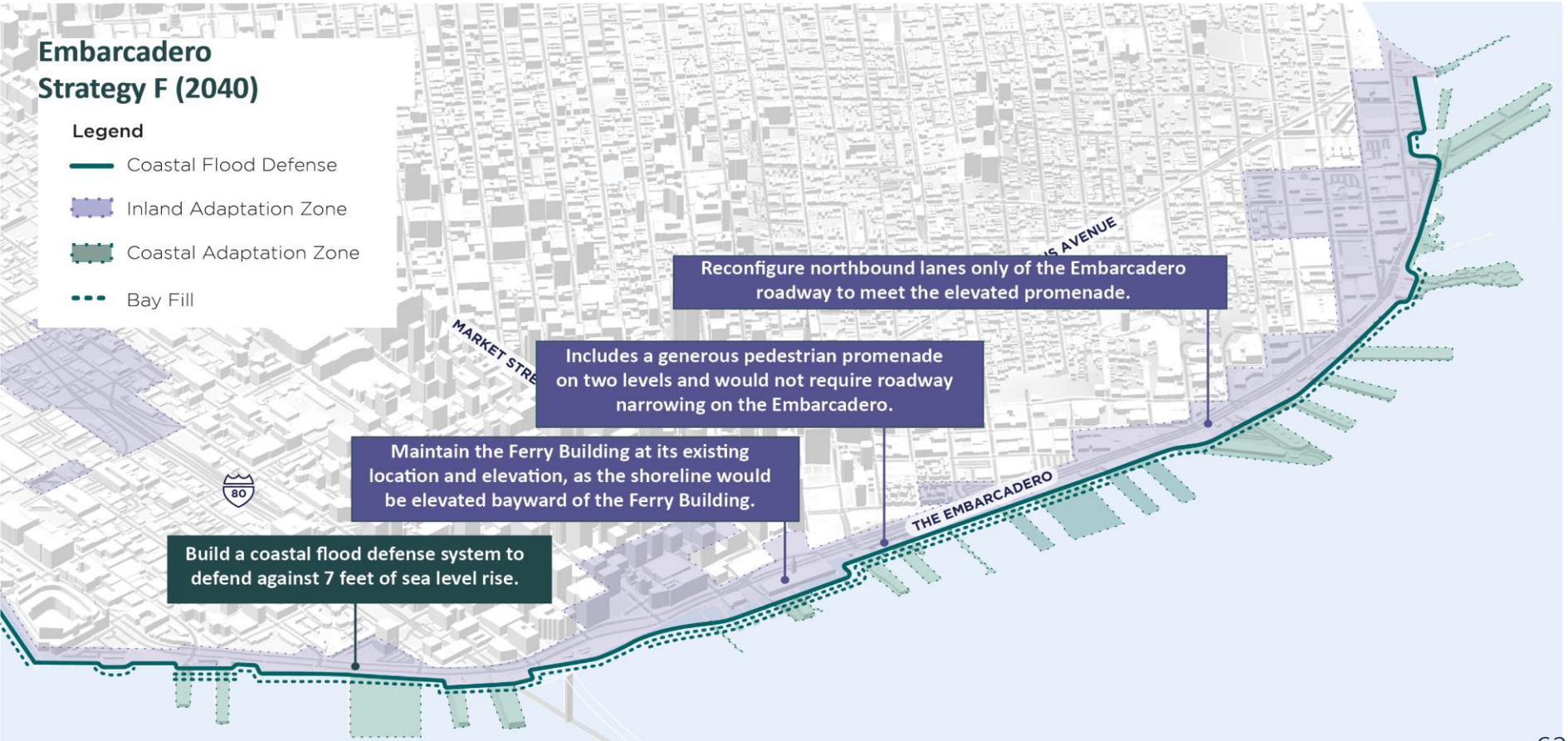
STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



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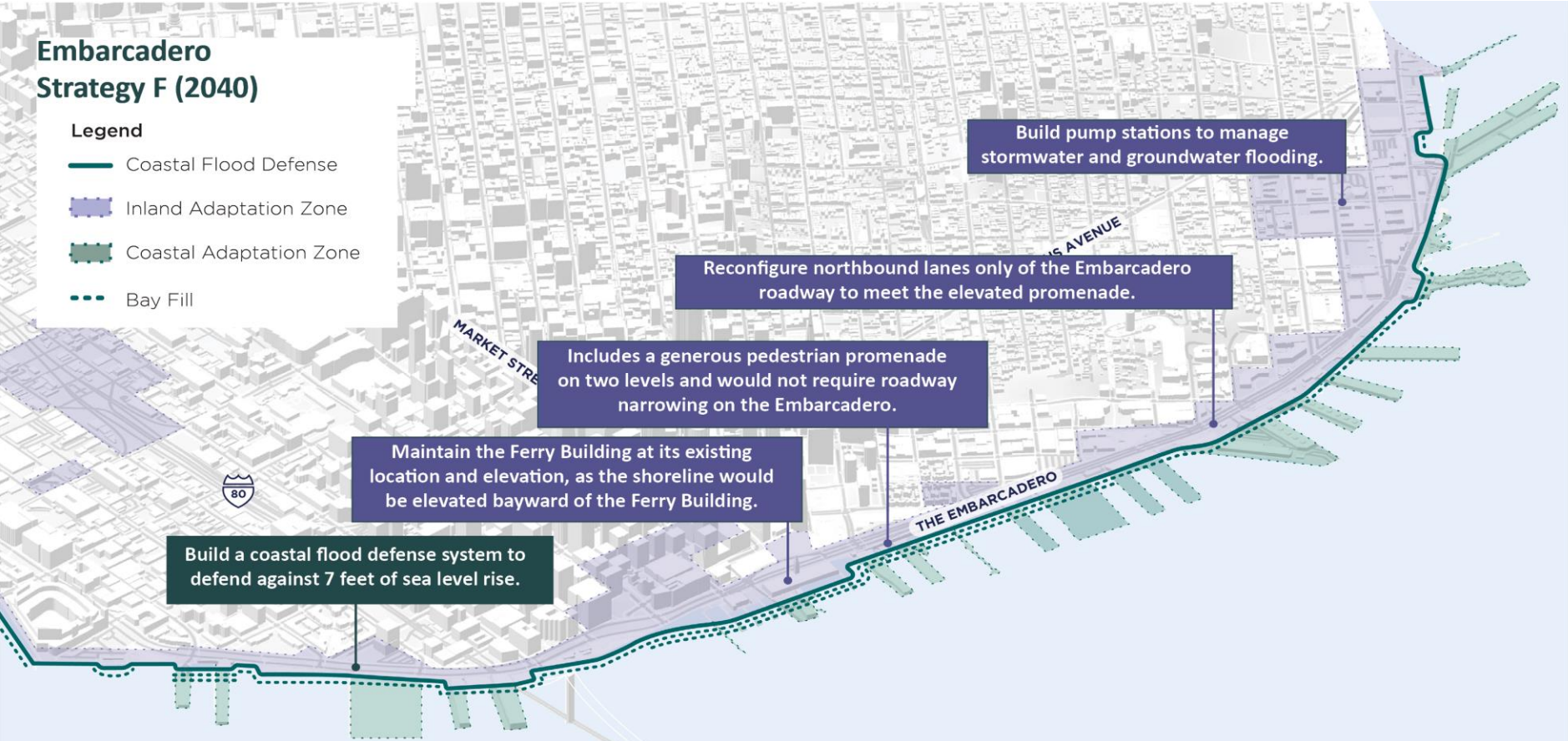
STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER



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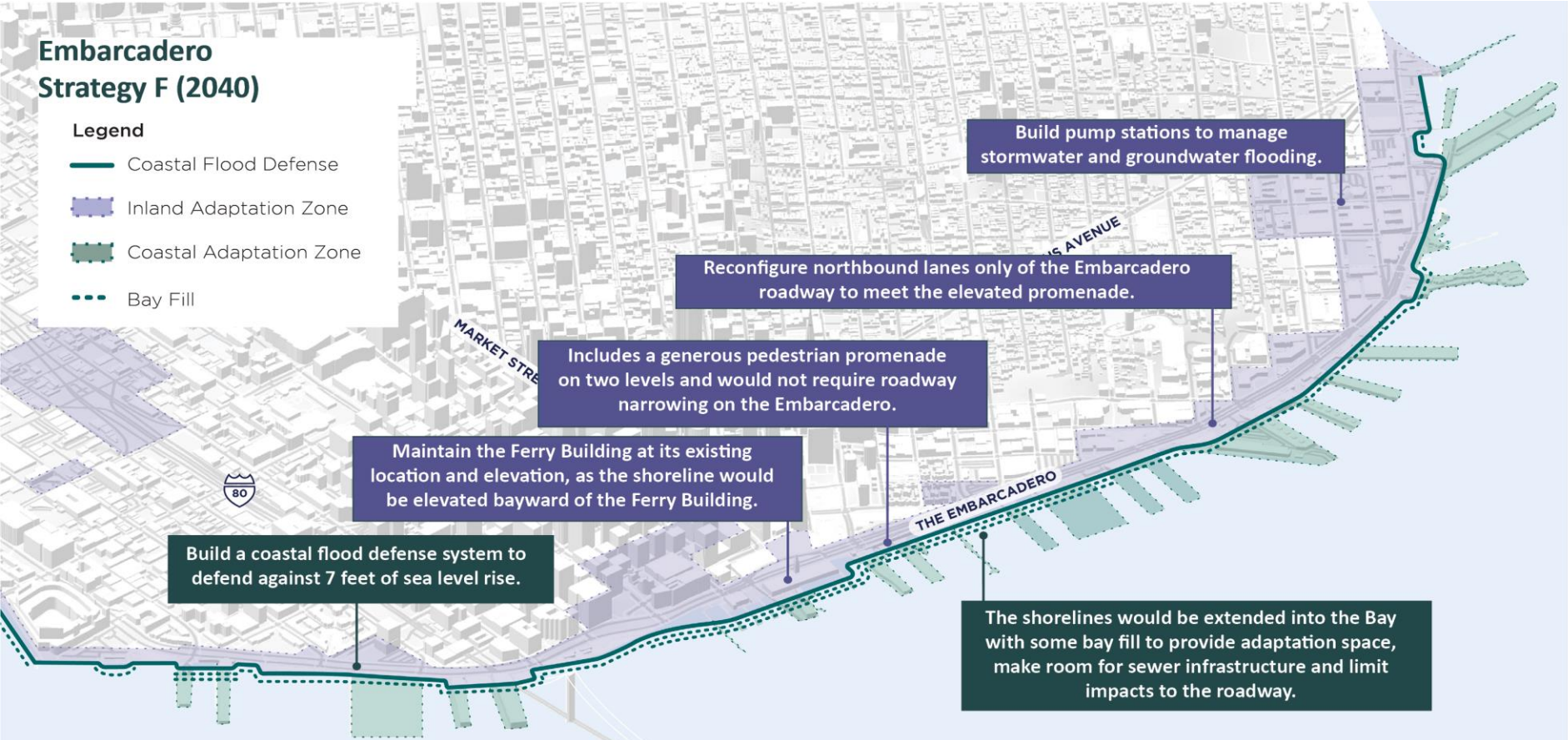

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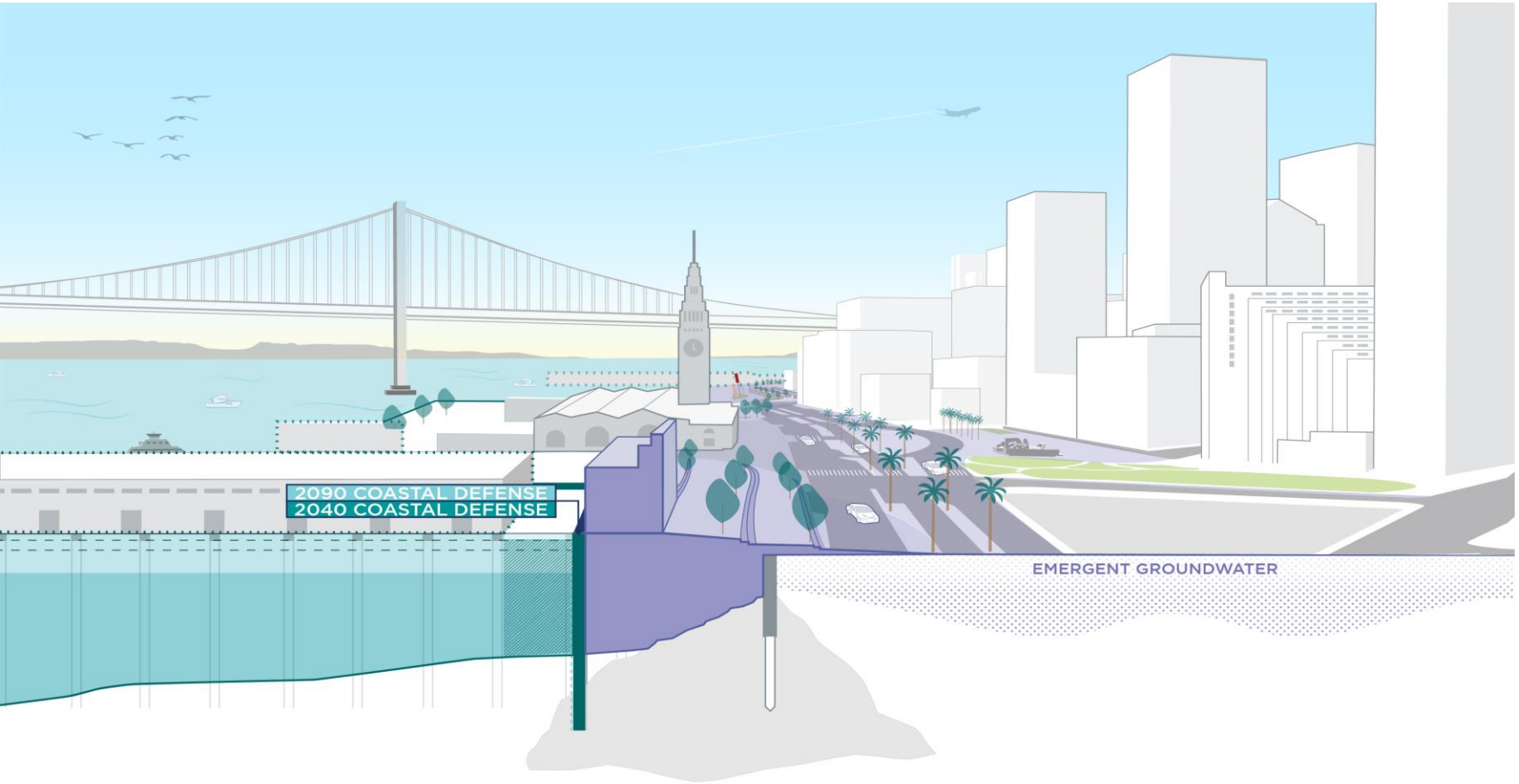
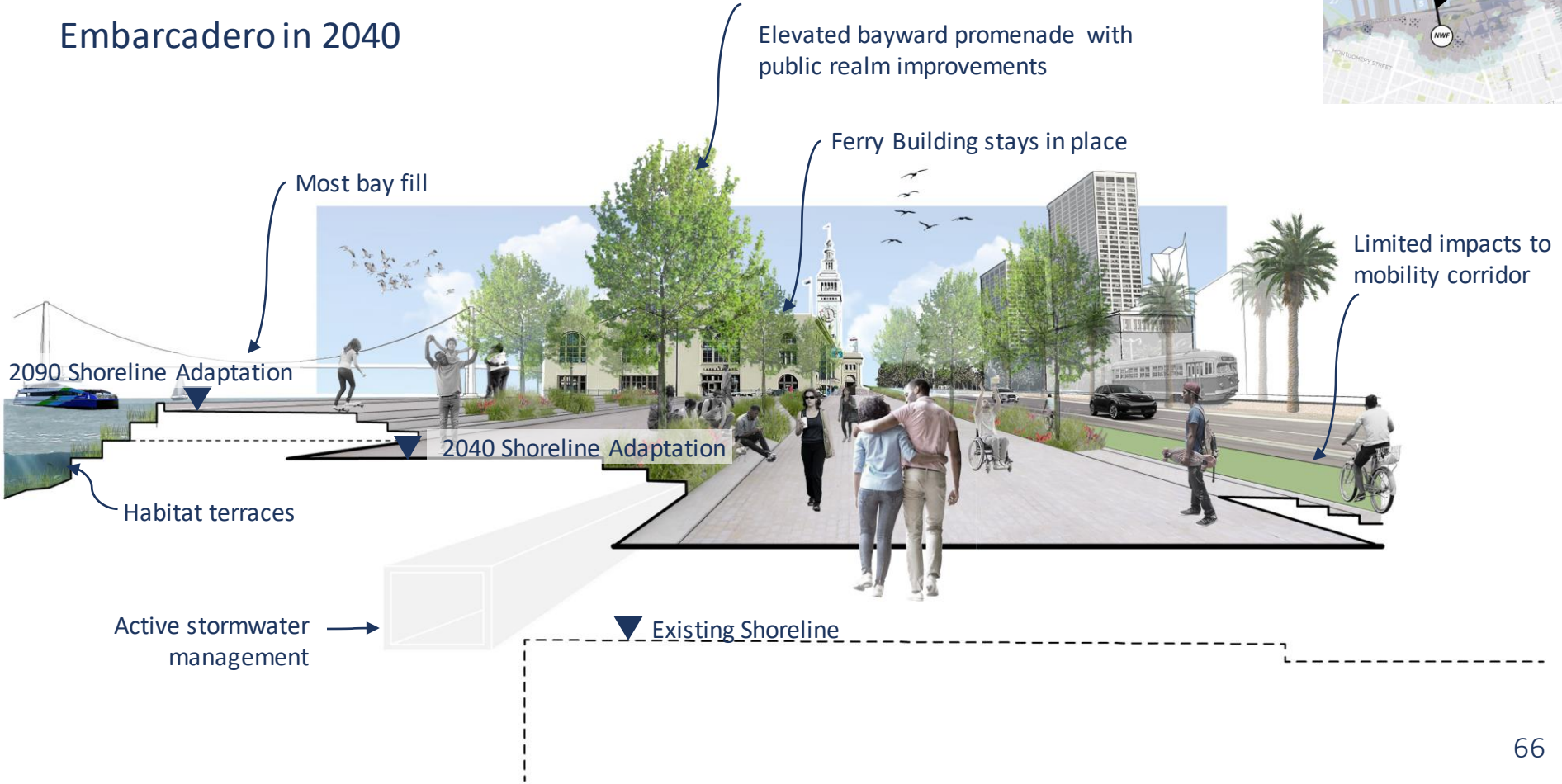
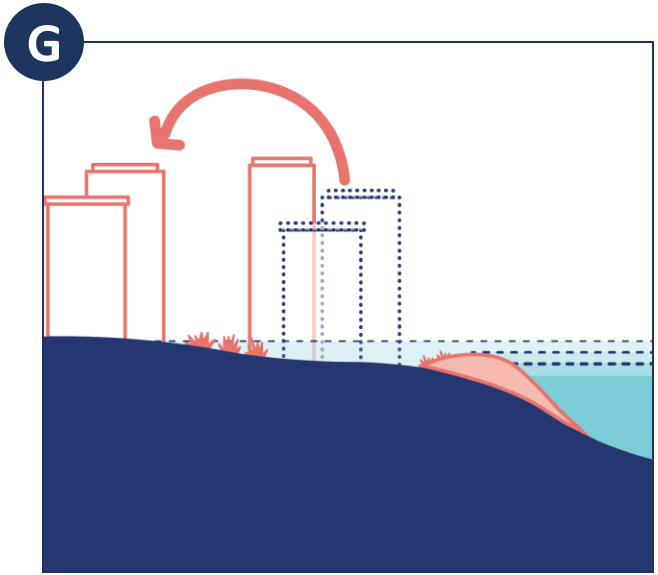


STRATEGY F – HIGHER SEA LEVEL RISE – MANAGE THE WATER

Embarcadero in 2040



STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS



Advances shoreline adaptation while working with natural inland flooding patterns to floodproof some buildings and infrastructure and move others away from the highest risk areas

STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS

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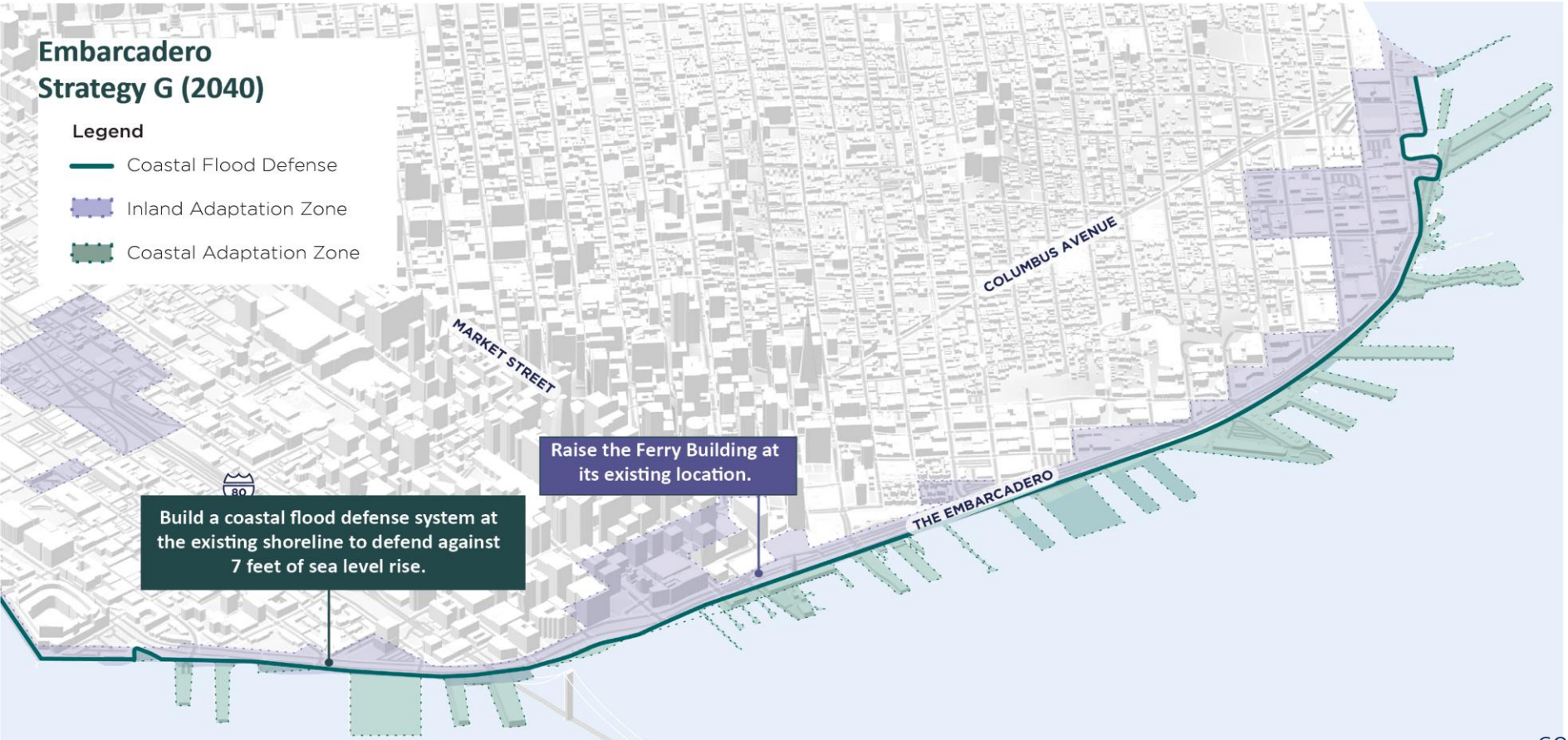

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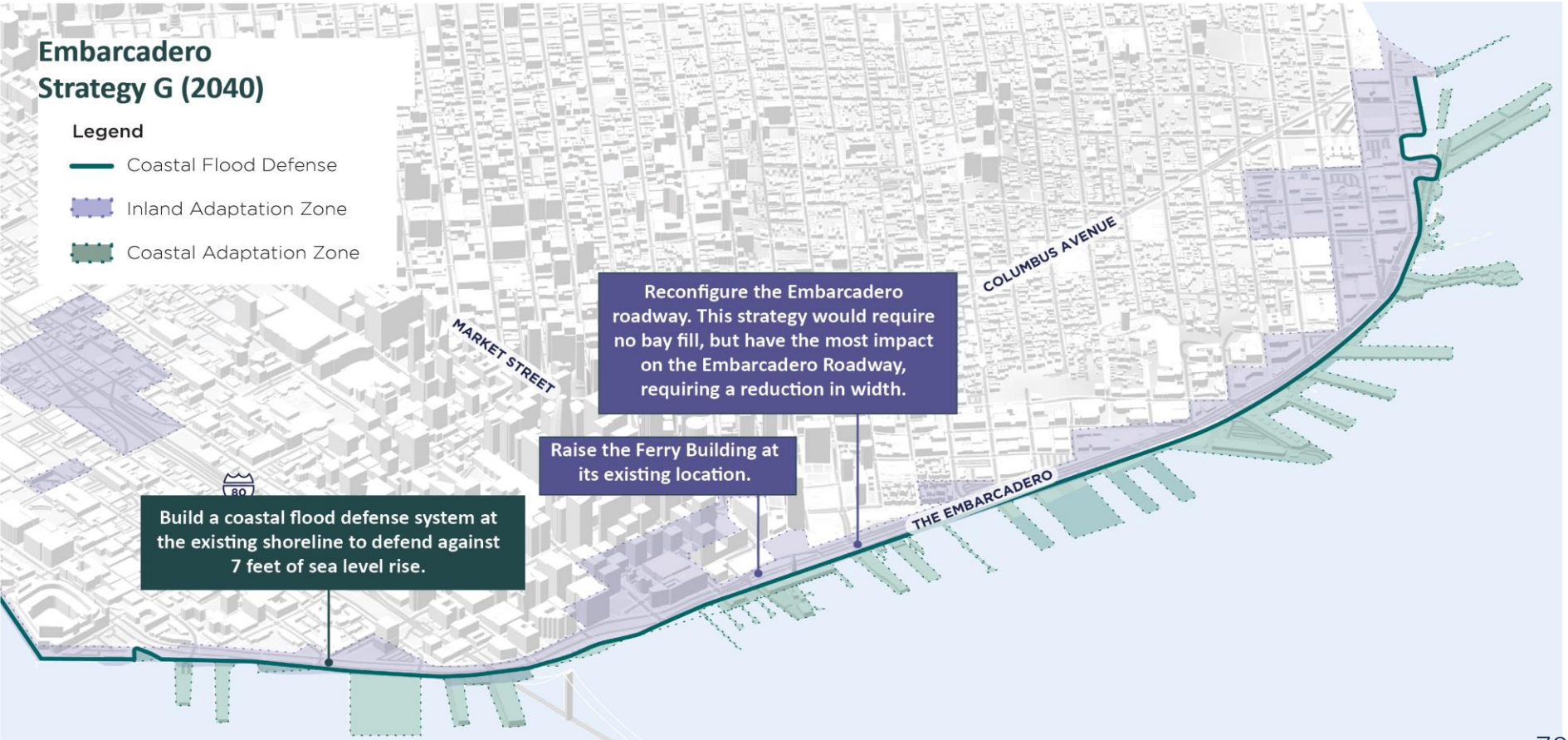

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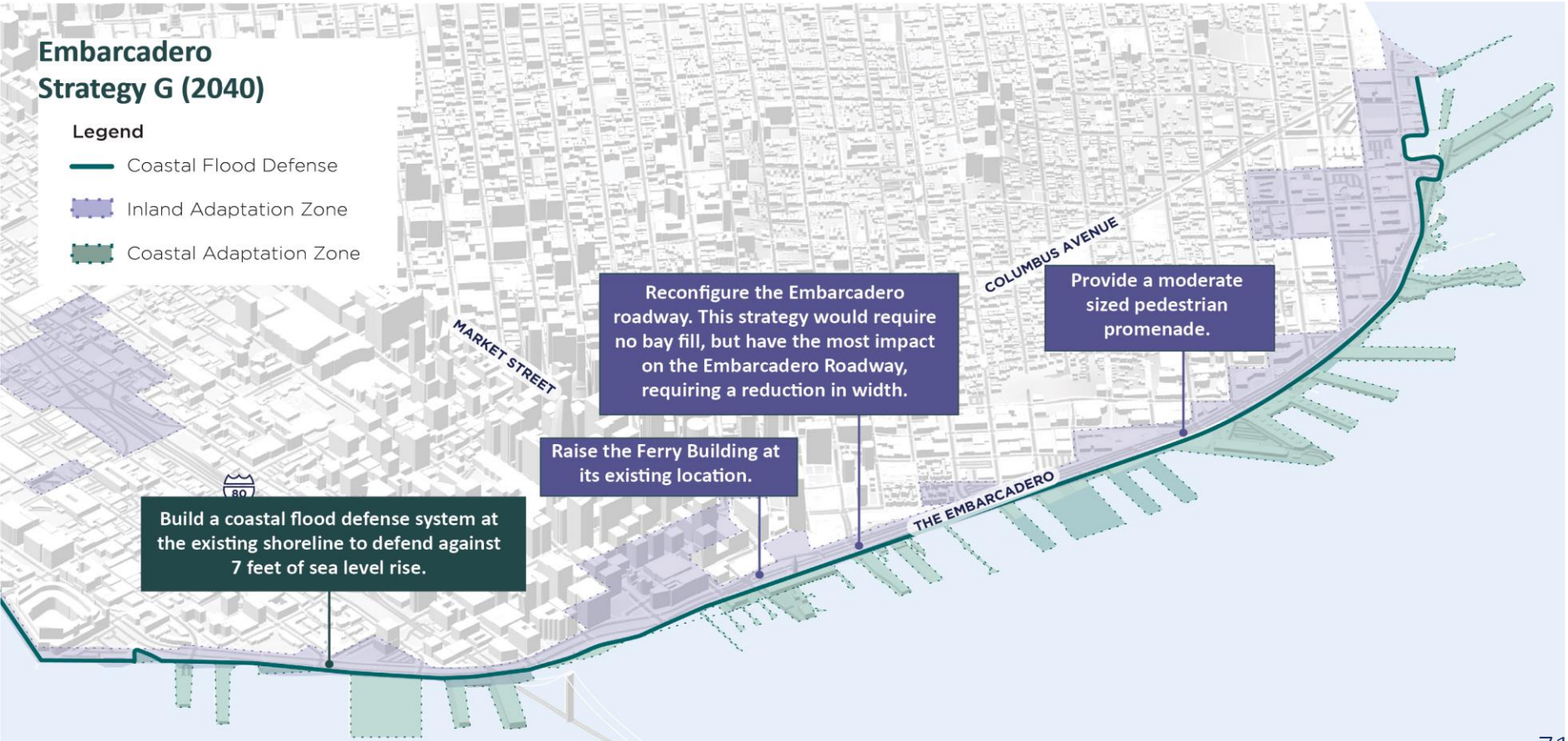

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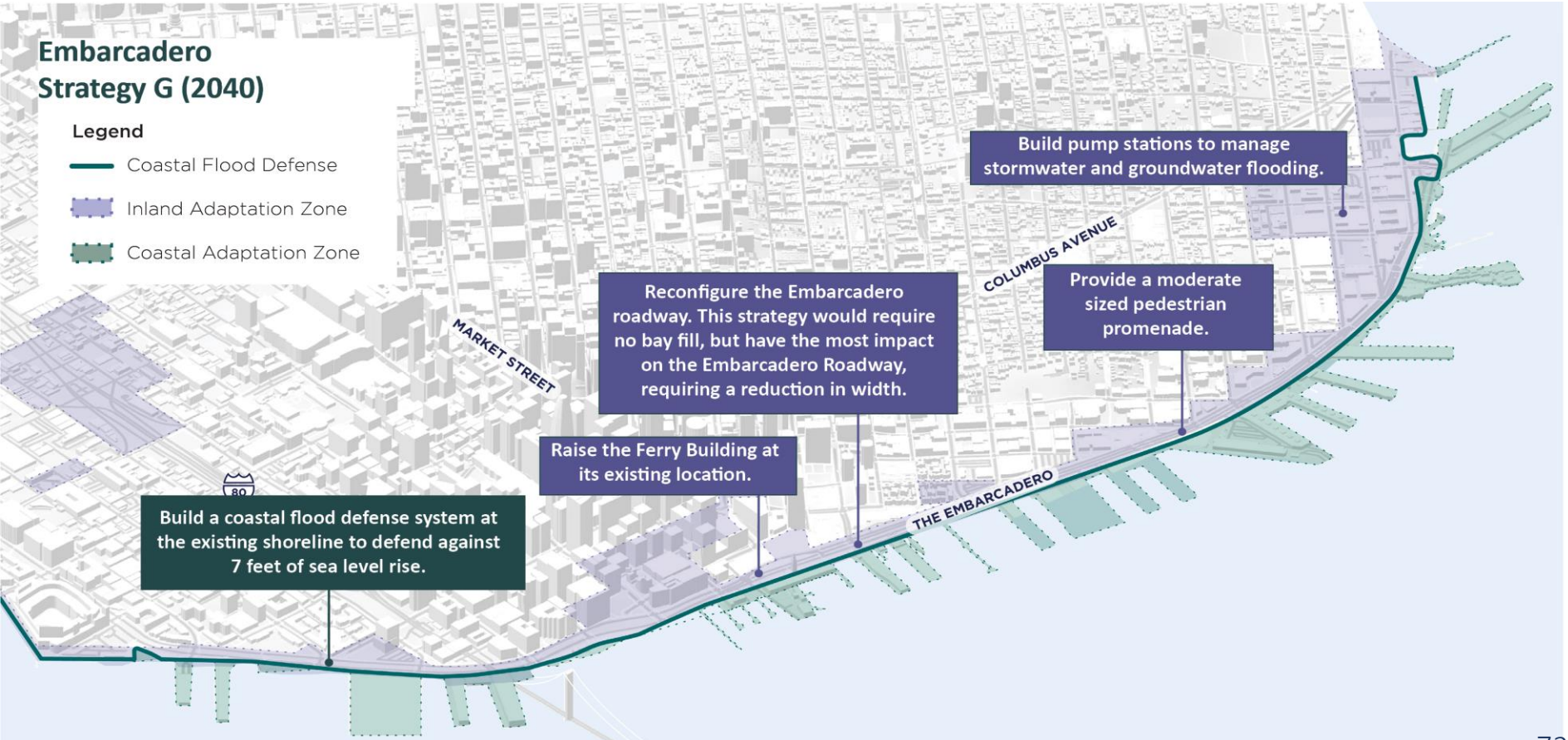

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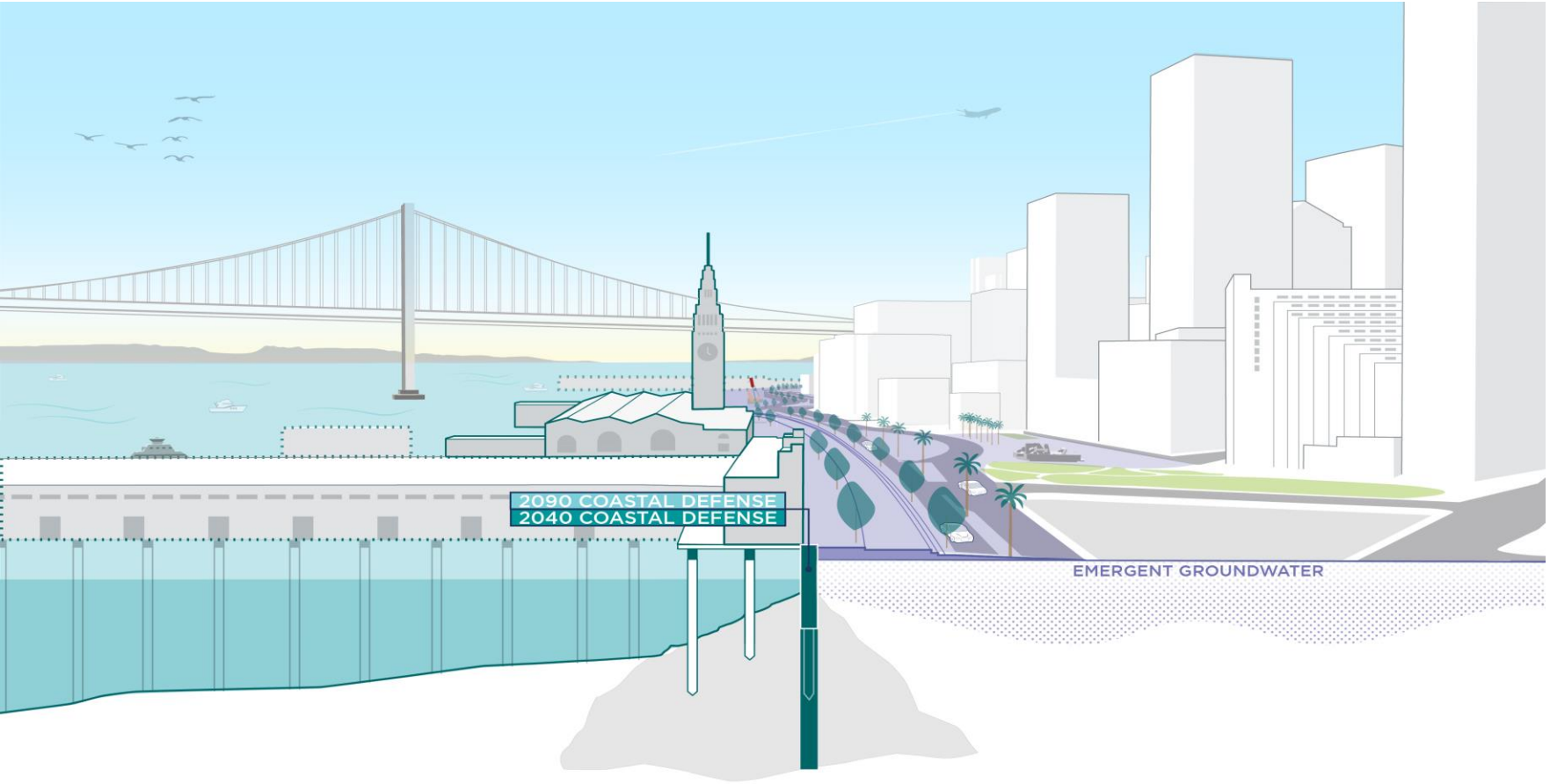
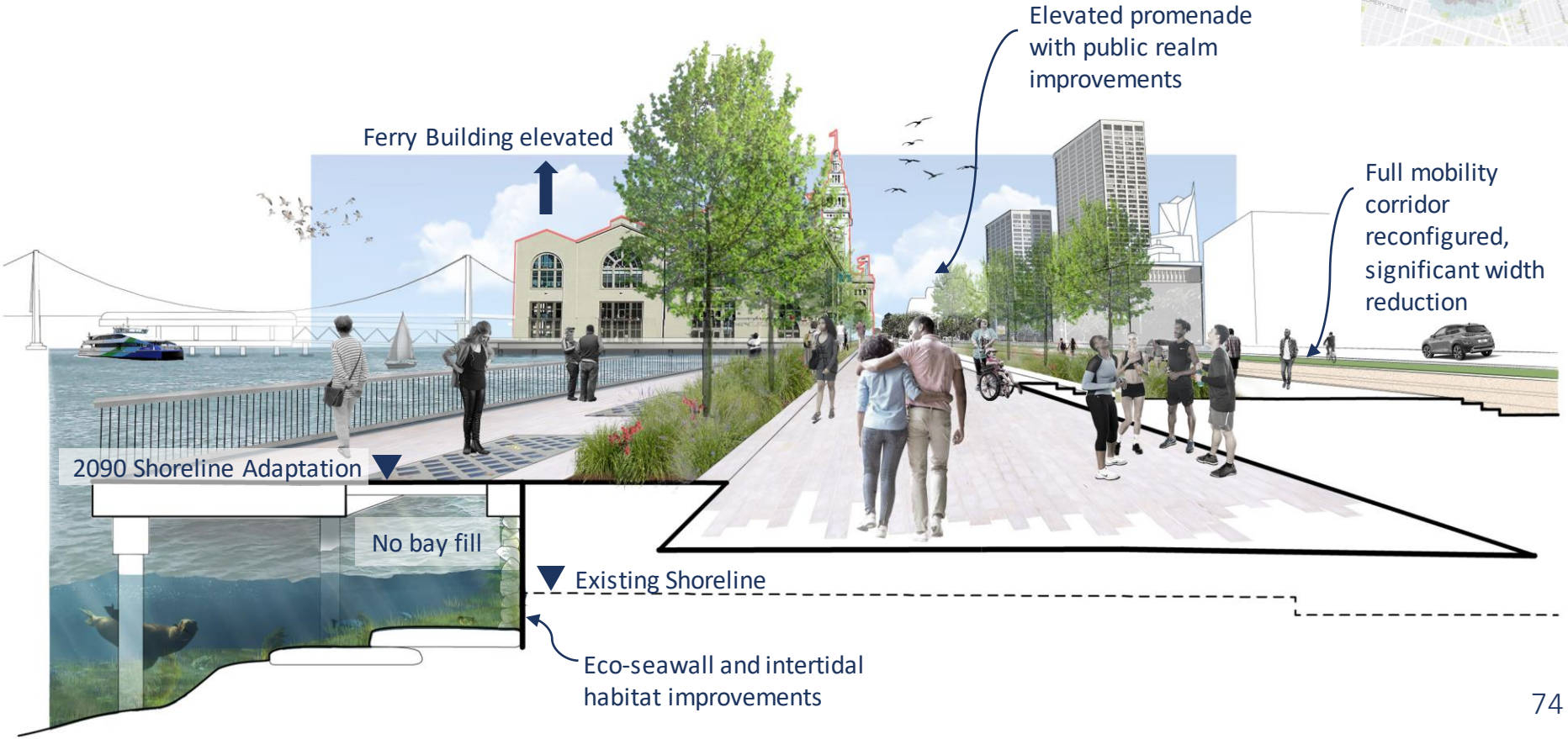


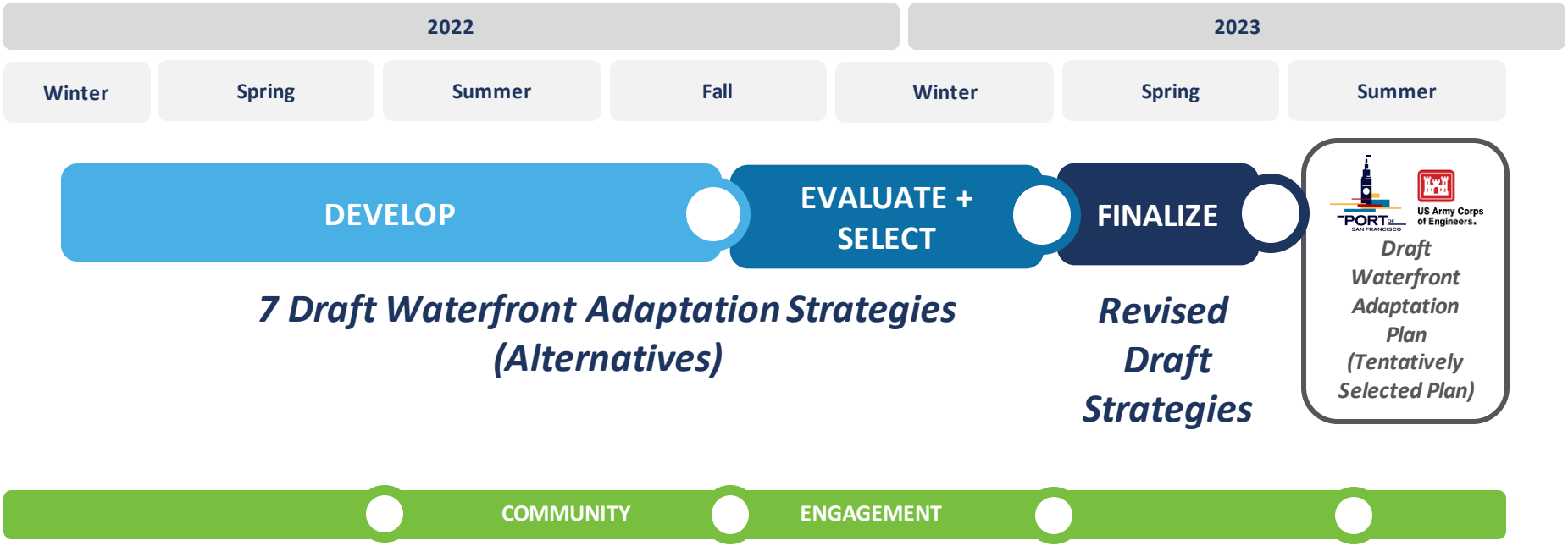
STRATEGY G – HIGHER SEA LEVEL RISE – ALIGN WITH WATERSHEDS

Embarcadero in 2040



Next Steps

DRAFT WATERFRONT ADAPTATION STRATEGIES DEVELOPMENT SCHEDULE



COMMUNITY ENGAGEMENT PLAN

OCT	NOV	DEC	JAN

- Materials Live on sfport.com/wrp
- Other Commission Meetings
- Community Workshops / Meetings
- In Person Outreach via Walking Tours and Waterfront Community Mixer
- Digital Engagement via StoryMaps
- Presentations to CACs, southern waterfront CBOs, etc.
- Focus Groups

WHAT WE'VE HEARD SO FAR

- Summer Survey of over 1000 respondents
- Openness to exploring many kinds of adaptation approaches (including more transformative options)
- Desire to preserve and expand connections between the city and the waterfront
- Curiosity about feasibility, cost, and disruption impacts

Thank You

Luiz Barata | luiz.barata@sfport.com

PORT OF SAN FRANCISCO

Waterfront Resilience Program