WATERFRONT RESILIENCE PROGRAM UPDATE

Embarcadero Community Meeting #6

September 24 + 25, 2020

PORT OF SAN FRANCISCO

Waterfront Resilience Program

WELCOME!

Zoom Meeting Etiquette

- Welcome to Embarcadero Seawall Community Meeting #6 – Zoom edition!

- Here are a few tips and tricks for this virtual meeting setting:
  - Keep your device on mute unless you are speaking
  - Try not to talk over others, and give each other time to gathers thoughts and comment before jumping in
  - The chat function is on and we're tracking any comments and feedback, but will be unable to answer all questions
  - IT Tip: Minimize lag by turning off your video during the presentation
  - Fun Tip: Choose a virtual background!

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TODAY'S AGENDA

Presentation Overview

- Key findings from the Multi-Hazard Risk Assessment (MHRA)
- Introduction to "measures" or strategies for addressing risk along the Embarcadero waterfront
- Key priorities from community and stakeholder engagement
- Describe next steps to develop Proposition A projects

POLL #1

What is your familiarity with the Embarcadero Seawall?

Familiar

Somewhat Familiar

Not Familiar

WATERFRONT RESILIENCE PROGRAM EFFORTS

Today's Focus: Embarcadero Seawall

PORT-WIDE

- Adapt Plan
- USACE Flood Resiliency Study
- Floodproofing the Piers

1 EMBARCADERO

- Embarcadero Seawall Program

2 MISSION CREEK / MISSION BAY

- Southern Waterfront Seismic Vulnerability Assessment

3 ISLAIS CREEK / BAYVIEW

- Southern Waterfront Seismic Vulnerability Assessment
- Islais Creek Adaptation Strategy

Related Port Projects

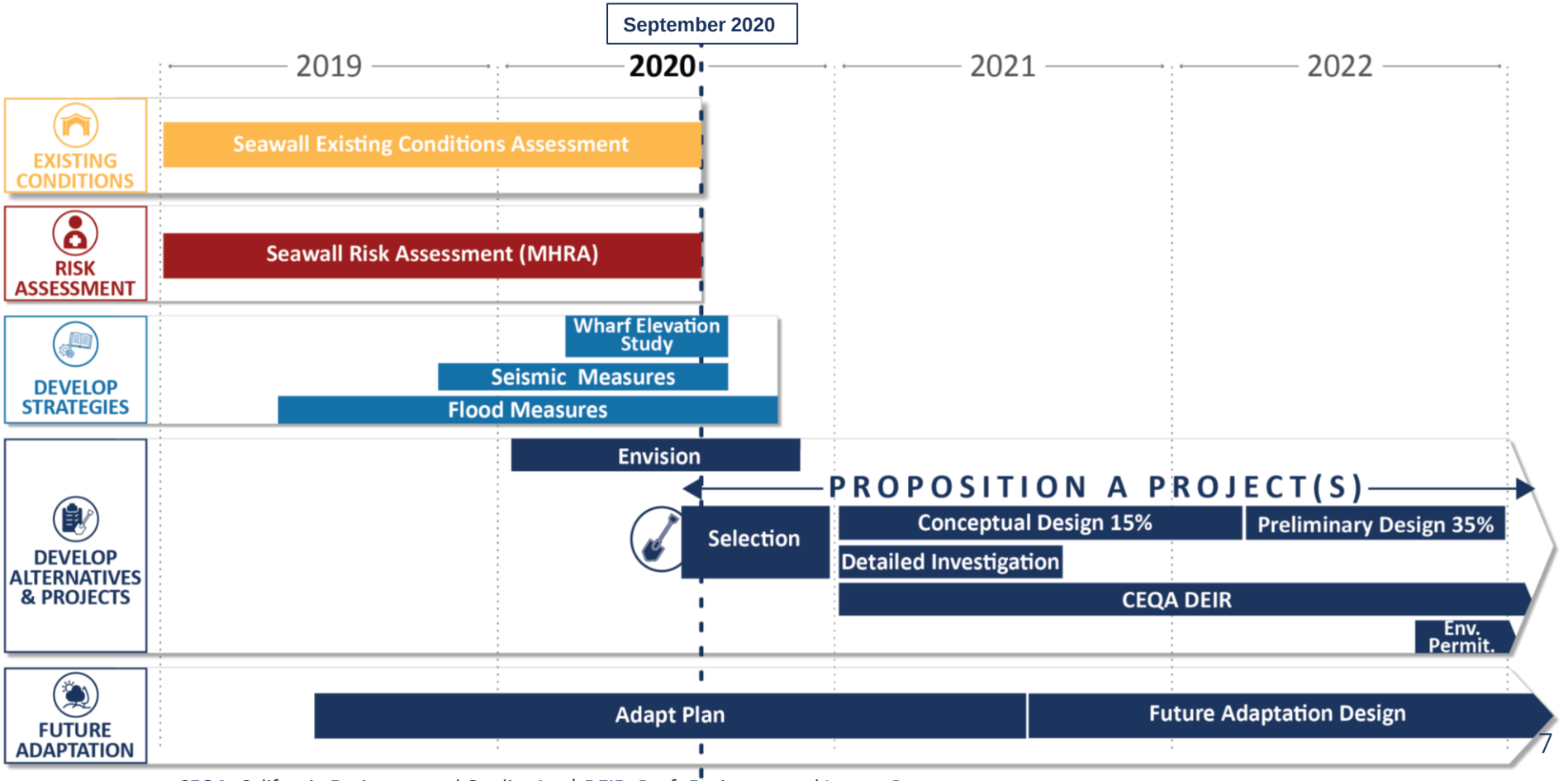
- Project SLR Adaptations
- Utilities Projects
- Waterfront Plan
- Historic Pier Rehabilitation

EMBARCADERO SEAWALL PROGRAM

Project Overview

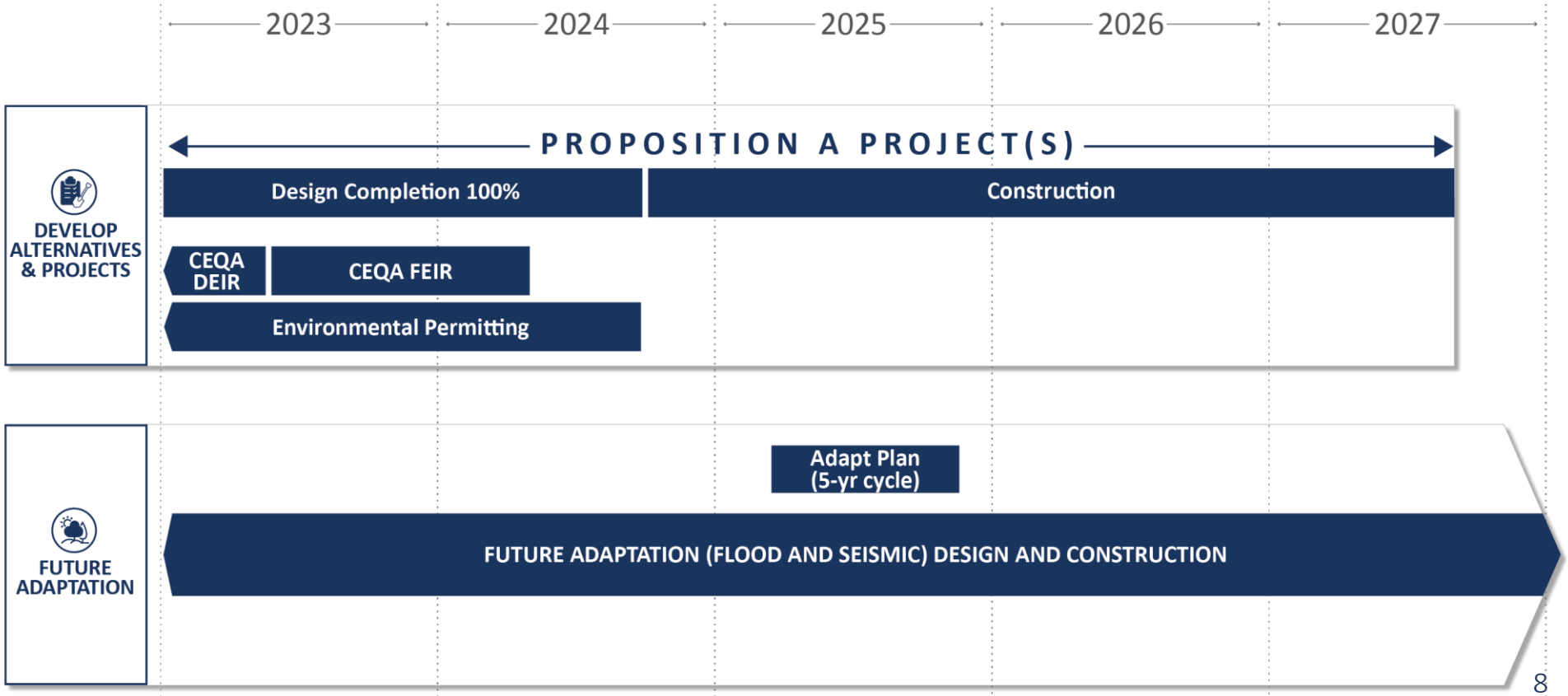
- **Project Area:** Fisherman's Wharf to Mission Creek
- **Timing:** 2017 to 2021 project planning followed by implementation / construction
- **Focus:** Seismic and flood risk associated with the Embarcadero Seawall
- **Funding:** $425 million General Obligation Bond passed in November 2018

EMBARCADERO SEAWALL PROGRAM SCHEDULE



CEQA: California Environmental Quality Act | **DEIR**: Draft Environmental Impact Report

EMBARCADERO SEAWALL PROGRAM SCHEDULE



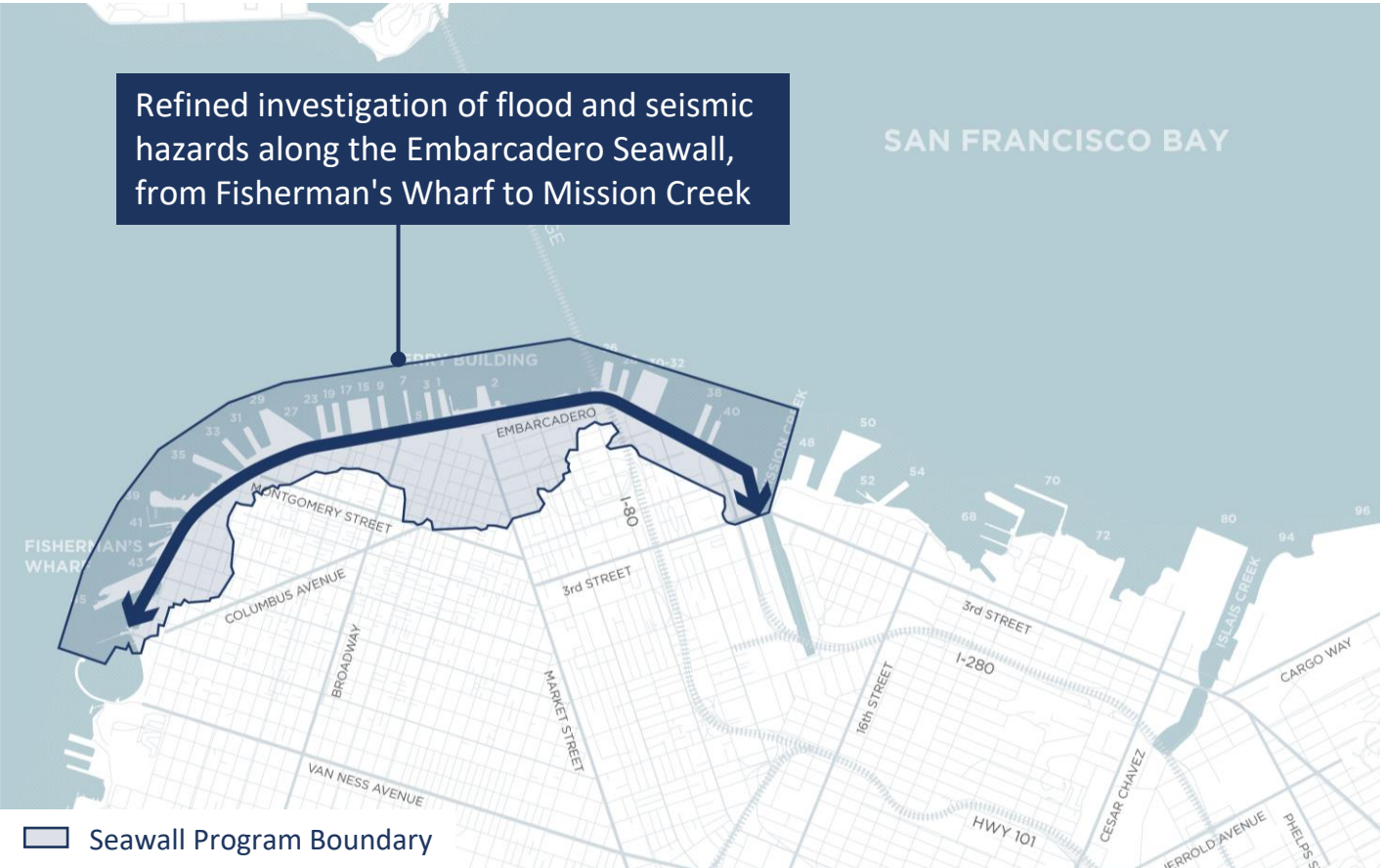
CEQA: California Environmental Quality Act | **FEIR**: Final Environmental Impact Report

What have we learned?

Key Findings from the Multi-Hazard Risk Assessment (MHRA)

WHAT IS THE MULTI-HAZARD RISK ASSESSMENT (MHRA)?

Proposition A Required a Detailed Safety Assessment of the Embarcadero

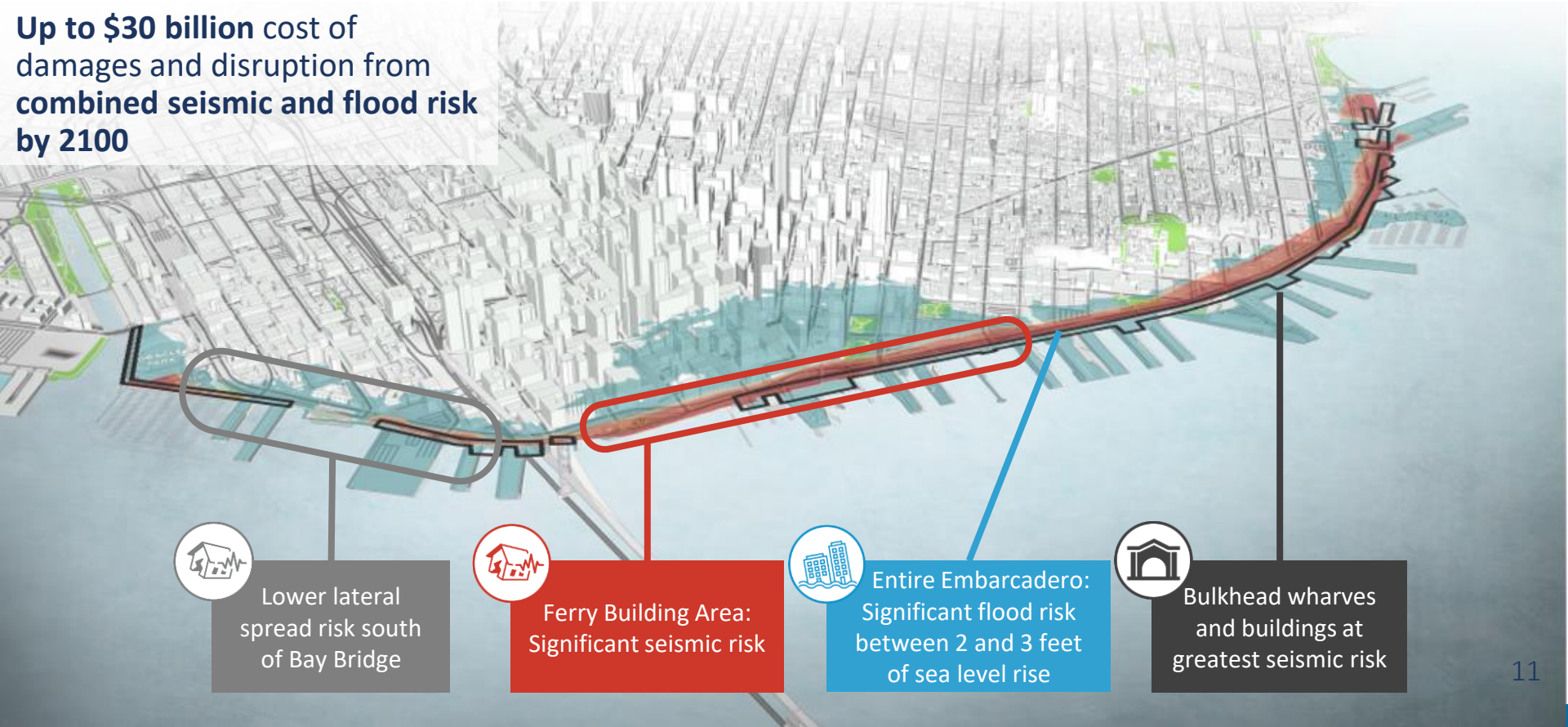


- Range of seismic hazards assessed within Embarcadero Seawall area
- Range of flood hazard scenarios assessed including impacts to critical City infrastructure
- Methodology: Bored holes and used lasers to uncover what is happening under the Bay and worked closely with agency partners to understand impacts to assets and services that the City and the region rely upon

HAZARDS AND CONSEQUENCES

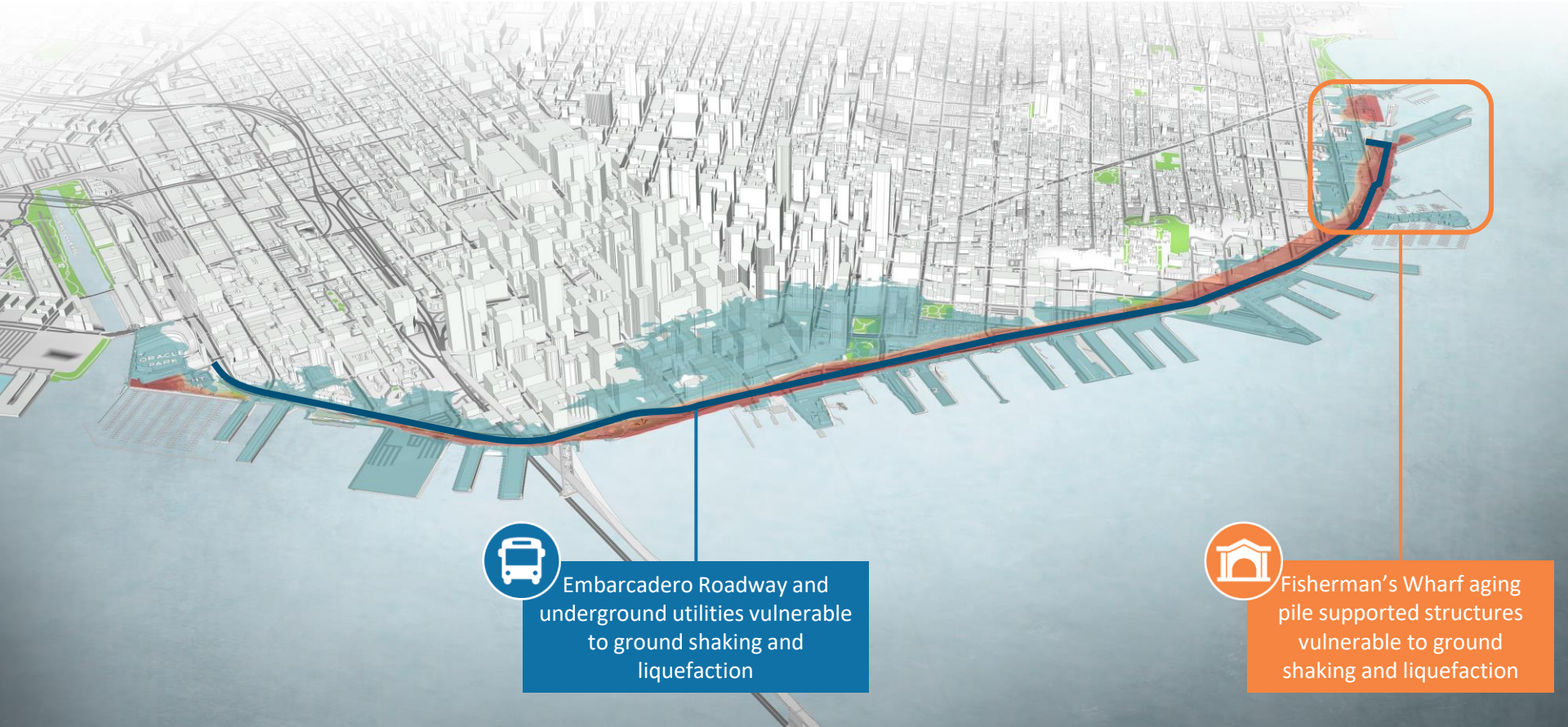
MHRA Key Findings

Up to $30 billion cost of damages and disruption from **combined seismic and flood risk by 2100**



OTHER EARTHQUAKE HAZARDS AND CONSEQUENCES

MHRA Key Findings



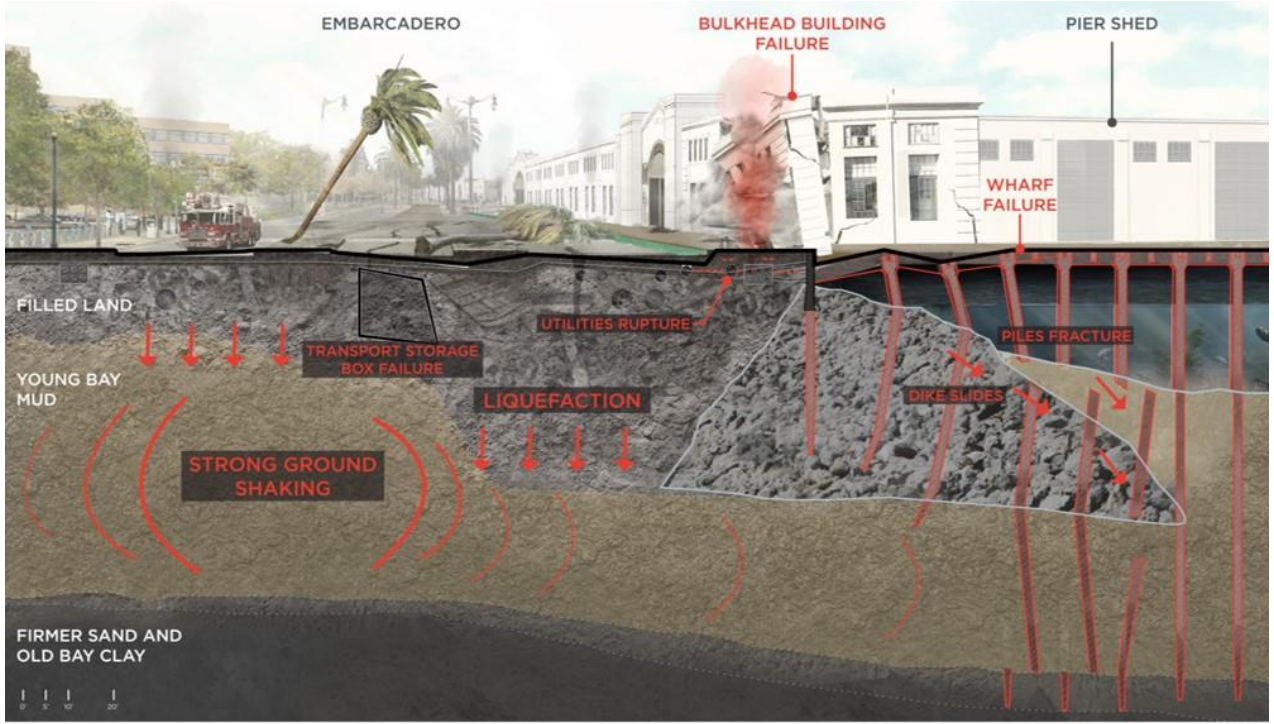
EXISTING SHORELINE

Critical Components of the Waterfront

- Seawall and Bulkhead Wharves are the city's flood protection and are highly vulnerable to seismic events

BULKHEAD WHARF EARTHQUAKE HAZARDS

MHRA Key Findings



Liquefaction induced lateral spreading at Port de Port-au-Prince

Lateral spreading cause by 1906 earthquake in San Francisco

BULKHEAD WHARF

WHARF TODAY AT CURRENT WATER LEVEL

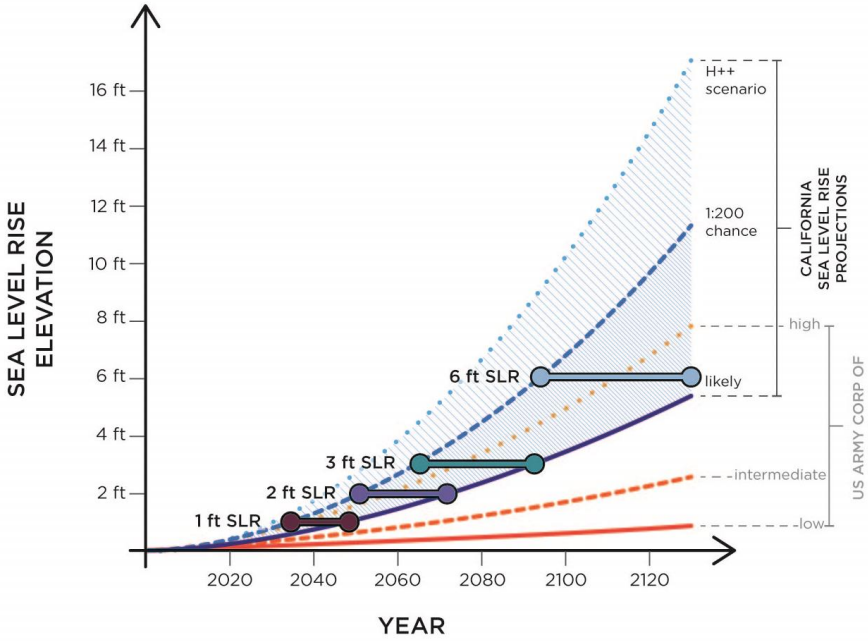
WHARF TODAY WITH WATER LEVEL SURGE

Wharf is a current protection measure – King Tide conditions today

LOCATIONS OF INTEREST

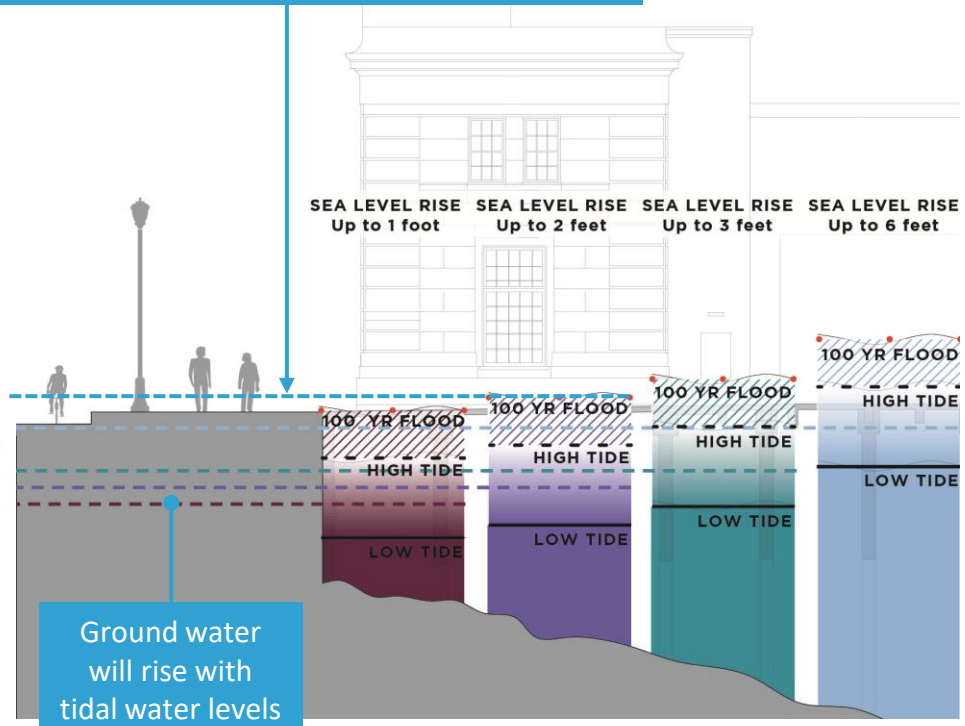
FLOOD HAZARDS

MHRA Key Findings



State of CA – Updated 2018; USACE – Updated 2013

Flood risk tipping point at 2’ of sea level rise



Ground water will rise with tidal water levels due to SLR

HOW DOES THIS ADVANCE OUR UNDERSTANDING FROM 2016?

Significantly Advanced the Port's Understanding of the Risks and Consequences, Developed Important Tools, Strengthened Partnerships

Sitewide investigation and testing of soils informed variation in earthquake behavior along the waterfront including liquefaction of Embarcadero

Developed refined engineering models of Seawall to predict earthquake stability and lateral spreading, and to test improvement concepts

Estimated earthquake and flood damage and loss to Seawall dependent marine structures, buildings, and infrastructure

Determined economic, social, and environmental consequences of likely earthquake and flood damages

Collaborated with community, stakeholders, and partners during assessment, heard what is important to them and included in process

HOW DOES THIS ADVANCE THE PORT'S APPROACH TO PROP A PROJECTS?

Findings Point to Targeted Interventions in Phase 1 of Embarcadero Seawall Program

Earthquake instability of the Seawall is high between Rincon Park & Fisherman's Wharf, but moderate to low in South Beach. Pier 14 to Pier 9 is most challenging area to improve due to very thick Young Bay Mud and deep bedrock. Solutions here may be different and more expensive than areas to the north.

Bulkhead walls & wharves are high earthquake risk due to both seawall instability and ground shaking vulnerability; these are also shoreline and flood protection structures for the City, improvements need to consider mid and long-term sea level rise strategies and how investments can be adapted over time.

The Embarcadero is at risk from Seawall instability and liquefaction of the fill, improvements to both may eventually be needed to serve as a lifeline corridor.

The Embarcadero Waterfront is very **sensitive to flood thresholds**, with major consequences by 2 feet of sea level rise, Folsom to Broadway is highest risk.

Seismic Measures Development

Introducing improvements or “measures” for consideration along the Embarcadero

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Waterfront Resilience Program

POLL #2

What is a measure?

A potential improvement to address seismic or flood risk along the waterfront

To estimate or assess the value or effect of something

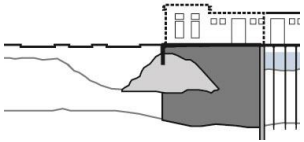
The rhythm of a piece of music

EMBARCADERO SEAWALL SEISMIC MEASURES

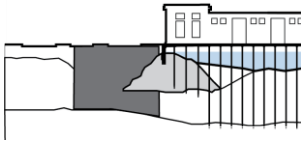
Draft seismic improvements under consideration by the Port

Seismic Measures

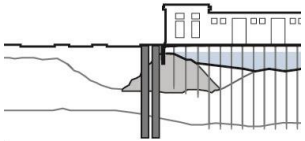
Shoreline Stabilization



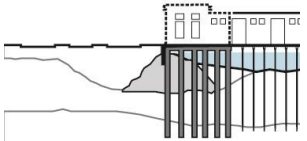
Nearshore Buttress



Landside Buttress

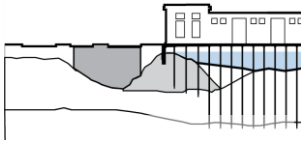


Drilled Shafts

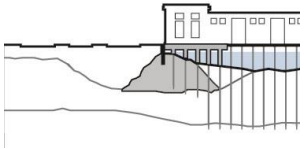


Super Bulkhead Wharf

Targeted Measures



Liquefaction Mitigation



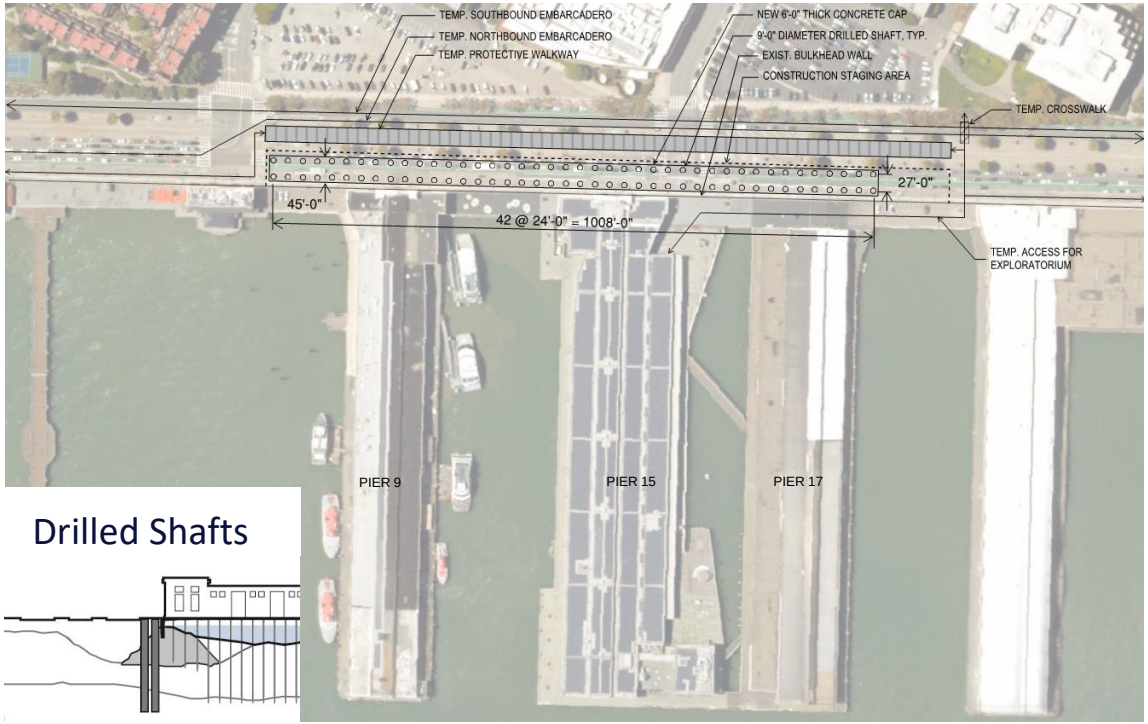
Bulkhead Wharf Retrofits

For each seismic measure:

- Preliminary Engineering
- Cost Estimates
- Production Rates
- Construction Impacts
- Feasibility
- Adaptation for Sea Level Rise

SEAWALL SEISMIC MEASURES DEVELOPMENT

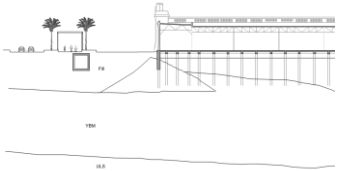
Example Measure Construction Process



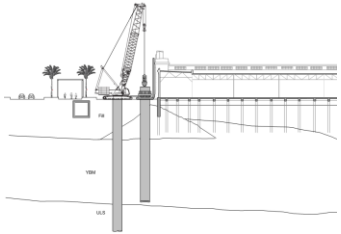
Drilled Shafts

Construction Stages

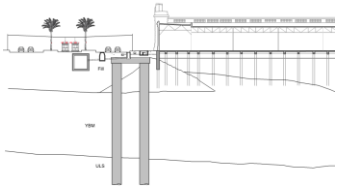
Remove / relocate utilities:



Close northbound lanes, reroute traffic, install concrete shafts:



Place slab, restore Embarcadero:



SEISMIC MEASURES

Super Bulkhead Wharf – Applicable Subareas

Flood Measures Development

Introducing improvements or “measures” for consideration along the Embarcadero

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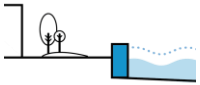
FLOOD MEASURES

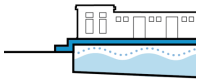
Draft flood improvements under consideration by the Port

Physical

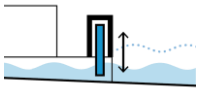
Levees



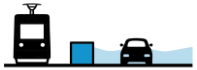
Seawalls



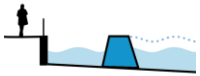
Raised Marine Structures



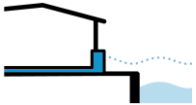
Tide Gates



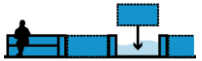
Floodwalls



Breakwaters



Building Adaptations



Deployables

Ecological

Ecological Marine Structures

Ecological Features

Aquatic Habitat

Ecological Shorelines

FLOOD MEASURES

Raised Marine Structures – Applicable Subareas

SEISMIC & FLOOD MEASURES

Super Bulkhead Wharf and Raised Marine Structures – Applicable Subareas

In some locations, seismic and flood measures can be combined

Long-Term Considerations

Envision planning helps inform Proposition A project selection and plan for the future

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Waterfront Resilience Program

WHAT IS ENVISION?

Designed to understand and address the range of State of California sea level rise scenarios (Most Likely: 3.4 feet and 1:200: 7 feet)

Preserve existing form and function of the waterfront for as long as possible

Identify opportunities and constraints associated with adapting the current waterfront to the two selected sea level rise scenarios

Determine thresholds that will require major modifications to the waterfront

Provides a way **to engage stakeholders and decision-makers** regarding adaptation planning for the waterfront

Develop pro-active, desirable visions that provide resilience to sea level rise from 2080 to 2130 and beyond

Will inform Proposition A project selection by identifying *adaptation pathways* that begin with actions taken in the next 10 years that are building toward landscape scale approaches that address much higher water levels

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ENVISION APPROACH

Technical studies
Flood measures applicable at 3.4’ and 7’ of SLR, soil conditions, seismic measures, MHRA, SLR modeling and elevation analysis

+

Public priorities
Stakeholder and decision-maker priorities, existing conditions and character, opportunities and constraints, themes

3 concepts
for the waterfront

Envision takeaways

Findings to support Prop A projects selection

Findings to support USACE Tentatively Selected Plan

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What have we heard?

Key feedback from community and stakeholder engagement











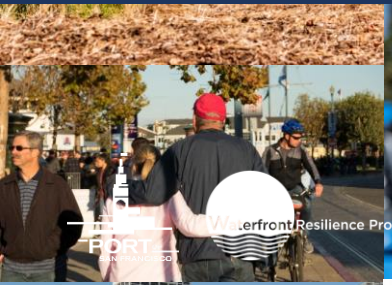



POLL #3

Have you ever participated in a Waterfront Resilience Program community meeting or event before today?

Yes

No

WRP COMMUNITY AND STAKEHOLDER ENGAGEMENT

A commitment to engaging the community and stakeholders

1. **Community / Advisory Groups** – over 115+ community and stakeholder group presentations since 2017

2. **Digital Engagement** – included asset mapping, envisioning, goals feedback, and more

3. **Street Team Outreach** – grassroots outreach at 100+ local, citywide events since 2017

4. **Engaging City Partners** – working closely with city departments to learn and share ideas

5. **Key Partnerships** – including 826 Valencia / Mission Bay, Cal Academy WorldWideWomen Girls' Festival, and more

6. **Hosted Events** – a series of free "mixers" and pop-up events in the Bayview, a free waterfront-wide boat tour, and more

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A COMMUNITY-DRIVEN WATERFRONT RESILIENCE PROGRAM

Community Meeting Series

EMBARCADERO WATERFRONT

1 June 2018 — **Introduction to the Seawall Program**

2 Sept. 2018 — **Assets & Risks**

3 Jan. 2019 — **Adaptive Framework, Goals & Tradeoffs**

4 June 2019 — **Decision-making Framework**

5 Winter 2019 — **MHRA Approach and Early Findings**

6 *Fall 2020* — ***MHRA Findings, Draft Measures***

7 *Winter 2020* — ***Alternatives, Implementation Pathways***

8 *Winter 2021* — ***Proposition A Projects, Adapt Plan***

Fall 2020

Envision Community "Labs"

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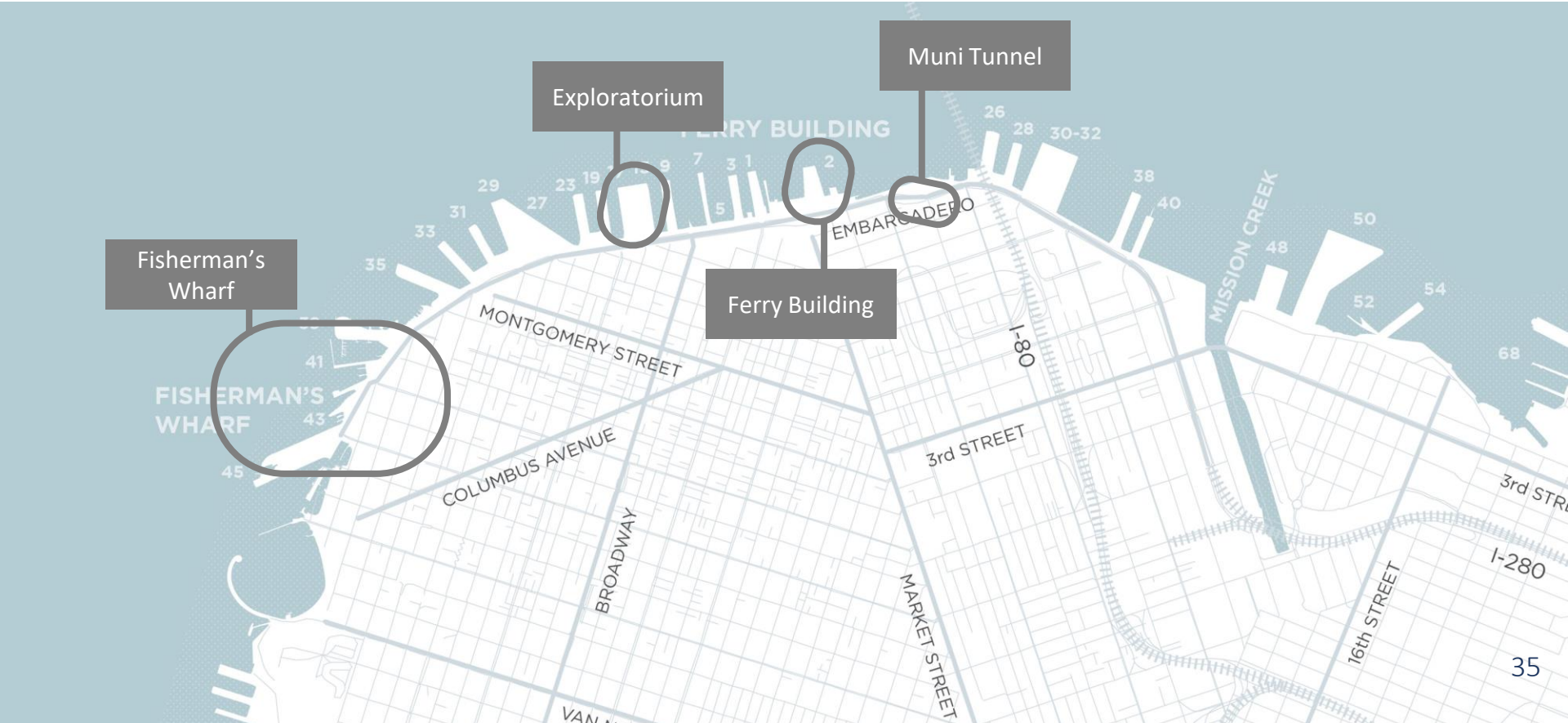
WHAT WE HEARD

Key Community Feedback on the Embarcadero Waterfront



HOW THIS ENGAGEMENT EFFORT INFORMED THE WRP

Community Input Helped Refine WRP

1

Community feedback affirmed focus on **life safety & emergency response** and offered ideas for evolving how we understand “inspiring an adaptable waterfront”:

- Connecting
- Accessible
- Supporting jobs, housing, seniors & youth

2

Community feedback affirmed the Port goals and encouraged:

- Transparency
- Accountability
- Engagement
- **Prioritize assets most loved by the community and most important to the city**
- Select projects that responsibly use tax dollars

3

Community feedback on evaluation criteria affirmed the Port’s key focus on life safety and disaster response

- **“Put people first”**
- Assets and services most prioritized: housing, disaster recovery facilities, utilities, and businesses
- Key focus on transportation assets

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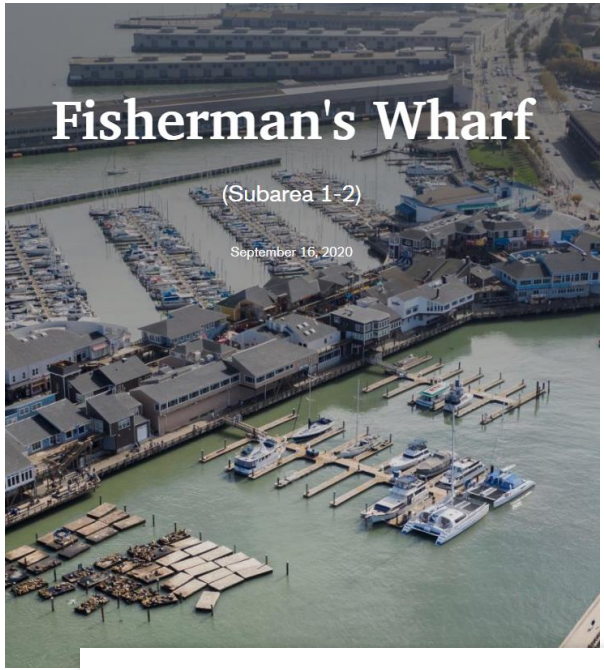
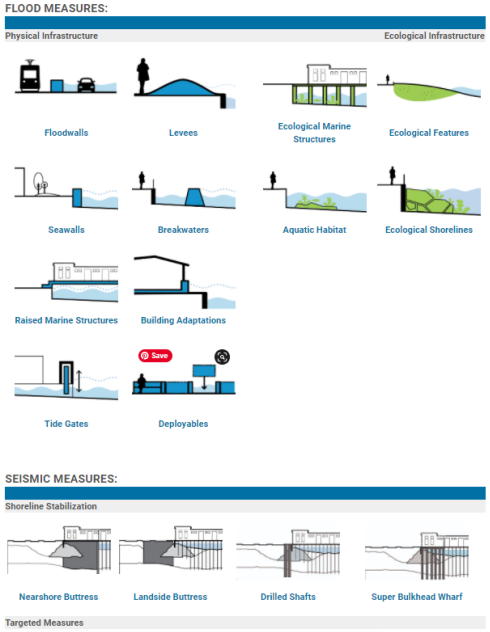
Next Steps

What’s Next for the Embarcadero Seawall Program

MATERIALS FOR PUBLIC EDUCATION AND FEEDBACK

Introducing Waterfront Resilience Story Maps and a Measures Explorer





https://www.sfportresilience.com/planning-for-our-future

- The Waterfront Resilience Story Maps provide a deep dive into what we've learned along the entire Port jurisdiction, by subarea
- The Measures Explorer shares details about solutions under consideration, and where the Port is considering implementing
- Opportunities for public feedback throughout ahead of alternatives development process

USACE FLOOD RESILIENCY STUDY

NEPA Scoping Public Comment Opportunity

Scoping comments due by **October 21, 2020:**

Submit emails to SFWFRS@usace.army.mil

Send mail to:

Ms. Anne Baker
450 Golden Gate Avenue, 4th Floor
San Francisco, CA 94102

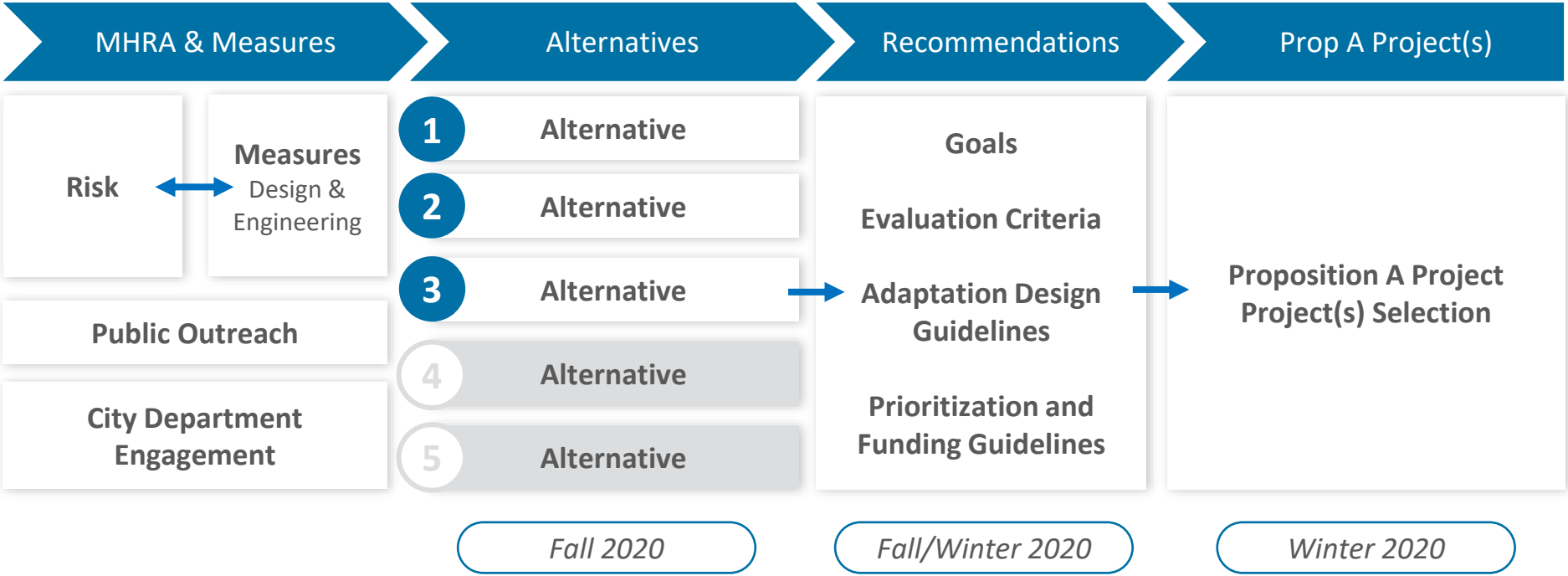
Webpage for study information:
https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-A-Z/San-Francisco-Waterfront-Storm-Damage-Reduction/

Public Review of Draft Report and NEPA Document:

- 45 day public review and comment timeframe
- Includes public meeting and concurrent agency and other reviews

ALTERNATIVES DEVELOPMENT

Embarcadero Seawall Program Proposition A Project Selection



THANK YOU!

Lindy Lowe and Steven Reel
Port of San Francisco
lindy.lowe@sfport.com and steven.reel@sfport.com
sfport.com

Engagement Exercise

Embarcadero Community Meeting #6

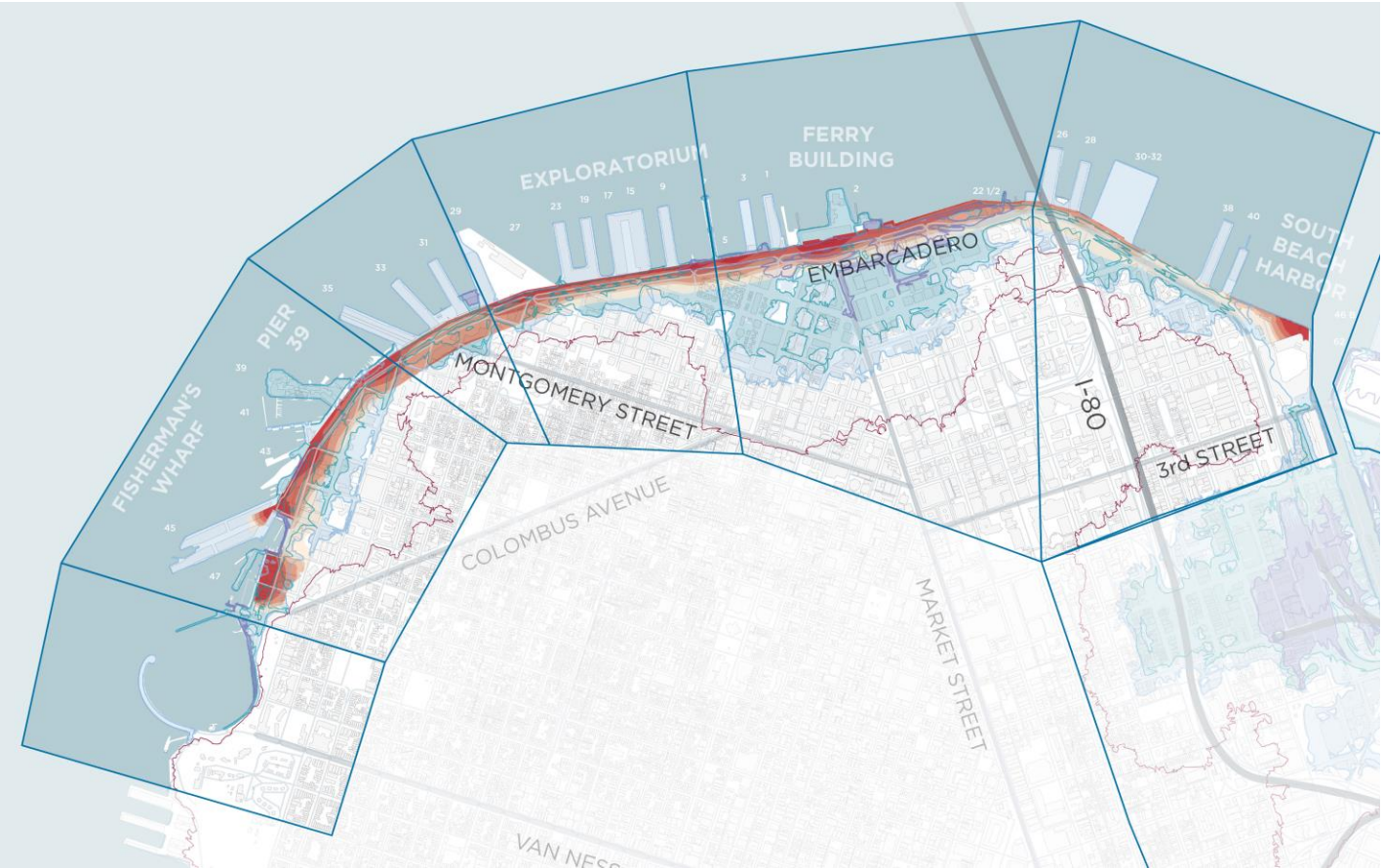
GOALS FOR TODAY'S ACTIVITY

Understanding Measures Selection

- Introduce the measures
- Share how we're weighing their **tradeoffs, characteristics, and impacts** to evaluate their use on the waterfront
- Hear **what considerations, criteria, and concerns are most important to you**
- See more about the measures on the Port's Planning For Our Future website

THE EMBARCADERO

How do we protect it?



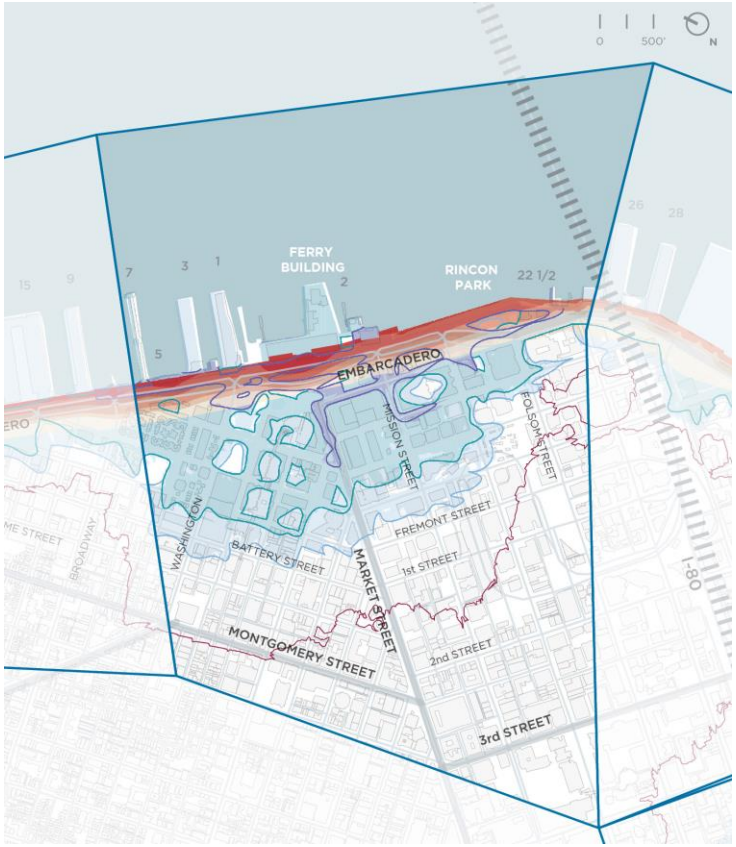
LEGEND

FLOOD HAZARDS: 100 YR Flood
- 1 ft. SLR
- 2 ft. SLR
- 3 ft. SLR
- 7 ft. SLR

SEAWALL EARTHQUAKE HAZARD ZONE
- Very Low
- Low
- Moderate
- High
- Very High

SUBAREA

Hazards



LEGEND

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- 7 ft. SLR

SEAWALL EARTHQUAKE HAZARD ZONE
- Very Low
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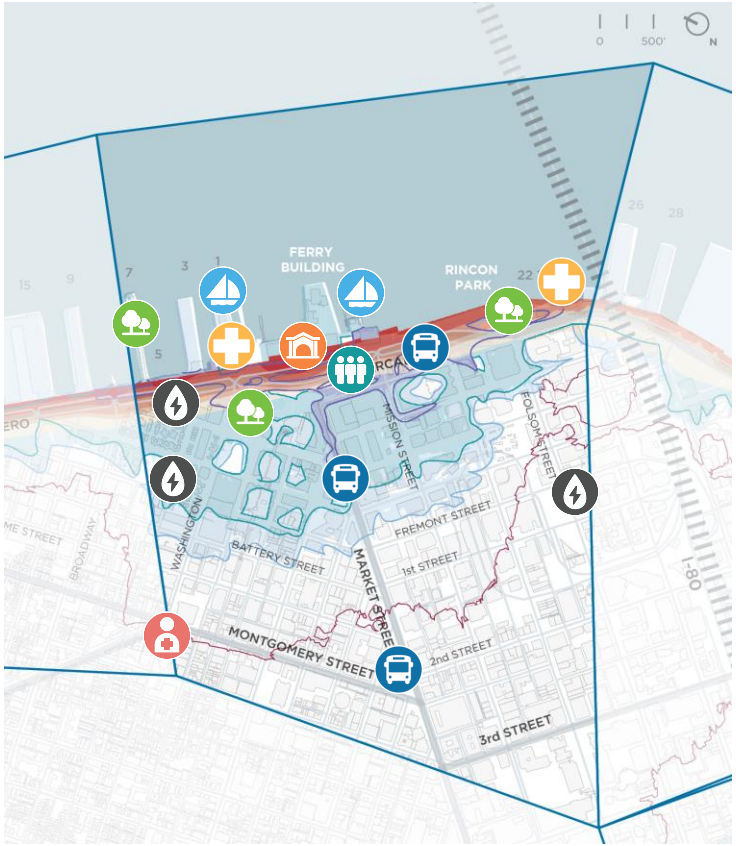
SUBAREA

Assets



Historic + Cultural

Transportation

Disaster Response

Utilities

Community Engagement

Maritime

Open Space + Ecology

Critical Facilities

MEASURES FEATURED IN TODAY'S ACTIVITY

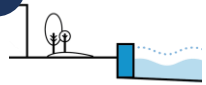
We will explore these draft measures in depth and apply them in today's exercise

Flood Measures

1

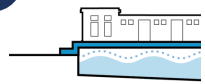
Levees

2



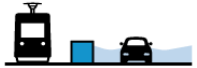
Seawalls

3



Raised Marine Structures

4



Floodwalls

5

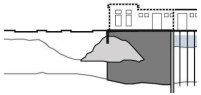
Ecological Features

6

Ecological Shorelines

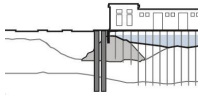
Seismic Measures

7



Nearshore Buttress

8



Drilled Shafts

9

Bulkhead Wharf Retrofit

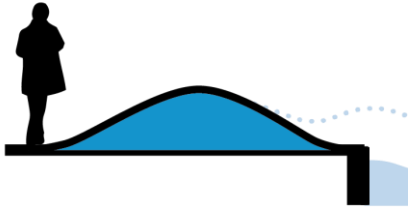
Flood + Seismic Measures

10

Emergency Preparedness

FLOOD MEASURES

1 Levees



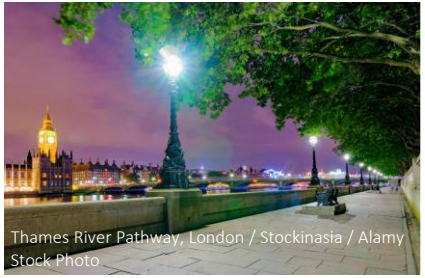
Earthen Levee

Edogawa Super Levee / Marufish / CC BY-SA 2.0

Raised Roadway

Miami Beach, FL / CC0 1.0

Raised Pathway



Thames River Pathway, London / Stockinasia / Alamy Stock Photo

SHORELINE LOCATION:

Upland

DESIGN LIFE
75+ years

ADAPTABILITY
Low

IMPACT ON THE WATERFRONT
Major Intervention

CONSTRUCTION COST
$$$$$

COASTAL FLOOD IMPACTS MITIGATED:

Sea Level Rise

Storm Surge

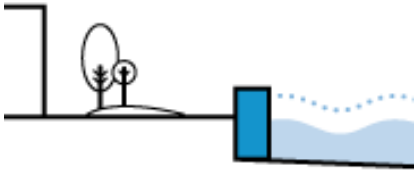
Groundwater

Waves

Erosion

FLOOD MEASURES

2 Seawalls



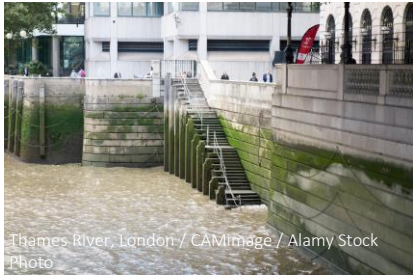
Rip Rap Revetment

Panama City, Panama / Rob Crandall / Alamy Stock Photo

New Seawall In-Place

CMG

New Seawall Bayward



Thames River, London / CAMimage / Alamy Stock Photo

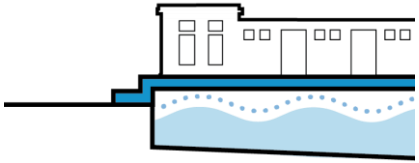
SHORELINE LOCATION:	DESIGN LIFE	IMPACT ON THE WATERFRONT
 Shoreline	50 - 100+ years	Major Intervention
	ADAPTABILITY	**CONSTRUCTION COST**
	Varies	$$$

COASTAL FLOOD IMPACTS MITIGATED:

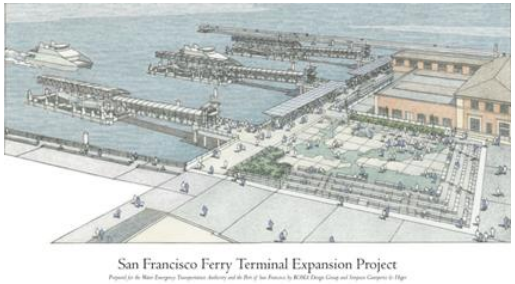
Sea Level Rise	Storm Surge	Groundwater	Waves	Erosion
				

FLOOD MEASURES

3 Raised Marine Structures

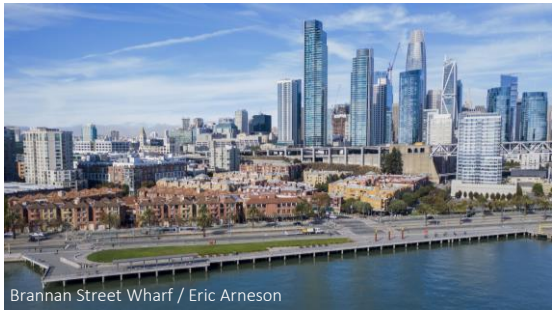


Elevated Pier



SF Ferry Terminal Expansion Project / Port of San Francisco

Elevated Wharf



Brannan Street Wharf / Eric Arneson

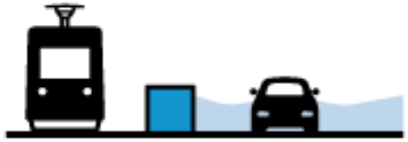
SHORELINE LOCATION:	DESIGN LIFE	IMPACT ON THE WATERFRONT
 Varies	50+ years	Major Intervention
	ADAPTABILITY	**CONSTRUCTION COST**
	Medium	$$$$

COASTAL FLOOD IMPACTS MITIGATED:

Sea Level Rise	Storm Surge	Groundwater	Waves	Erosion
				

FLOOD MEASURES

4 Floodwalls



Barrier Railing

Thames River Pathway, London / Gary Hebding Jr./Alamy Stock Photo

Raised Feature

Morecambe, UK / Atkins

SHORELINE LOCATION:

Shoreline or Upland

DESIGN LIFE
30 - 50 years

ADAPTABILITY
Low

IMPACT ON THE WATERFRONT
Minor Intervention

CONSTRUCTION COST
$$

COASTAL FLOOD IMPACTS MITIGATED:

Sea Level Rise

Storm Surge

Groundwater

Waves

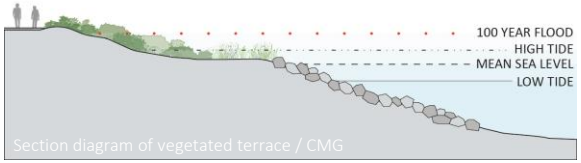
Erosion

FLOOD MEASURES

5 Ecological Features*

Beaches

Vegetated Terraces



SHORELINE LOCATION:

Varies

DESIGN LIFE

10-50+ years

ADAPTABILITY

Medium - High

IMPACT ON THE WATERFRONT

Minor Intervention

CONSTRUCTION COST

$

COASTAL FLOOD IMPACTS MITIGATED:

Sea Level Rise

Storm Surge

Groundwater

Waves

Erosion

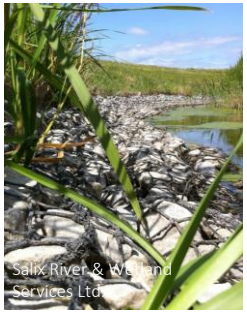
*Must be combined with other measures to provide flood protection

FLOOD MEASURES

6 Ecological Shorelines*

Stepped Slopes

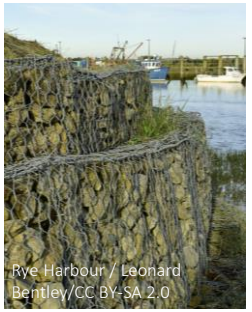
Vegetated Revetments



Vegetated Crib Walls

Natural Fiber Blankets

Gabion Baskets



SHORELINE LOCATION:

Varies

DESIGN LIFE

Decades

ADAPTABILITY

Medium-High

IMPACT ON THE WATERFRONT

Typ. Minor Intervention

CONSTRUCTION COST

$

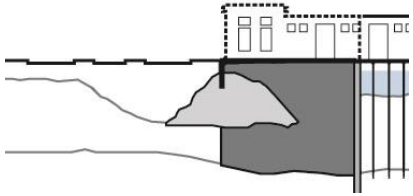
COASTAL FLOOD IMPACTS MITIGATED:

Sea Level Rise	Storm Surge	Groundwater	Waves	Erosion
				

*Must be combined with other measures to provide flood protection

SEISMIC MEASURES

7 Nearshore Buttress



Sheet pile and filling operations

SHORELINE LOCATION:

Nearshore

DESIGN LIFE	ADAPTABILITY	IMPACT ON THE WATERFRONT	CONSTRUCTION COST
100+ years	Very High	Major Waterside Intervention	$$$$$

SEISMIC HAZARDS MITIGATED:

Lateral Spreading

Liquefaction

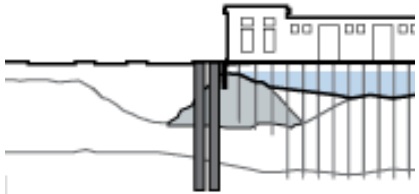
SEISMIC PERFORMANCE IMPROVED:

Structures

Utilities and Transportation

SEISMIC MEASURES

8 Drilled Shafts



Installation of drilled shafts

SHORELINE LOCATION:

Landside

DESIGN LIFE	ADAPTABILITY	IMPACT ON THE WATERFRONT	CONSTRUCTION COST
75+ years	Medium	Moderate Landside Intervention	$$$

SEISMIC HAZARDS MITIGATED:

Lateral Spreading

Liquefaction

SEISMIC PERFORMANCE IMPROVED:

Structures

Utilities and Transportation

SEISMIC MEASURES

9 Bulkhead Wharf Retrofit

Working at low tide to strengthen wharf decks and piers

SHORELINE LOCATION:

Nearshore

DESIGN LIFE	ADAPTABILITY	IMPACT ON THE WATERFRONT	CONSTRUCTION COST
30 years	Low	Minor Waterside Intervention	$$

SEISMIC HAZARDS MITIGATED:

Lateral Spreading

Liquefaction

SEISMIC PERFORMANCE IMPROVED:

Structures

Utilities and Transportation

FLOOD + SEISMIC MEASURES

10 Emergency Preparedness

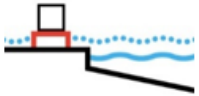
Evacuation Plans

Water Emergency Transportation Authority / Karl Nielson

Forecast Warning Systems


Warning System / Berkut_34 / iStock

SHORELINE LOCATION:

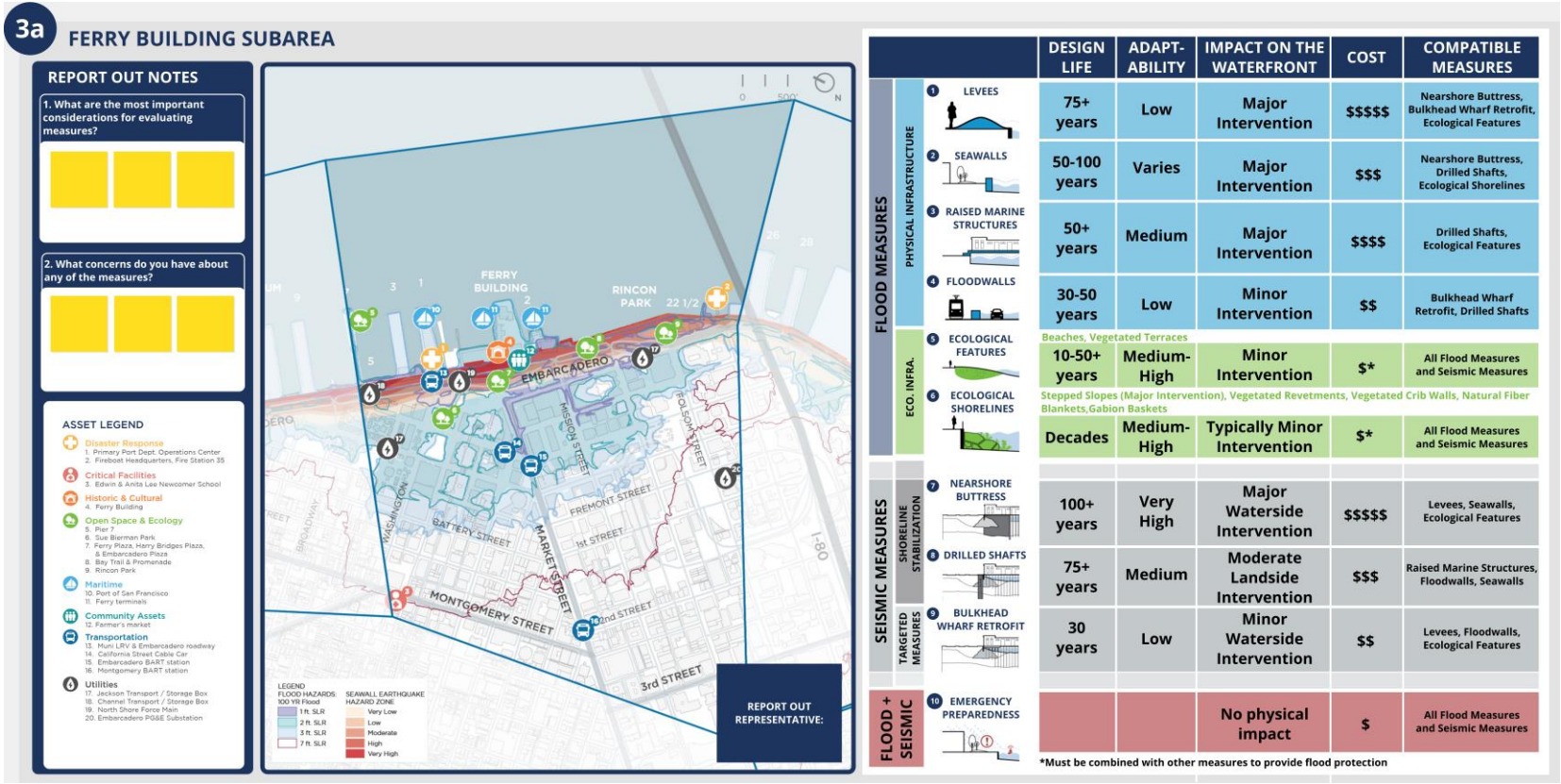


Asset Specific

LIKELY IMPLEMENTING AUTHORITY	IMPACT ON THE WATERFRONT	SYSTEM COST
City of San Francisco, SFFD, MTC, Caltrans, Cal OES, CHP, WETA, US Coast Guard, Transit Operators	No physical impact	$

BREAKOUT ROOM ACTIVITY

Understanding Measures Selection

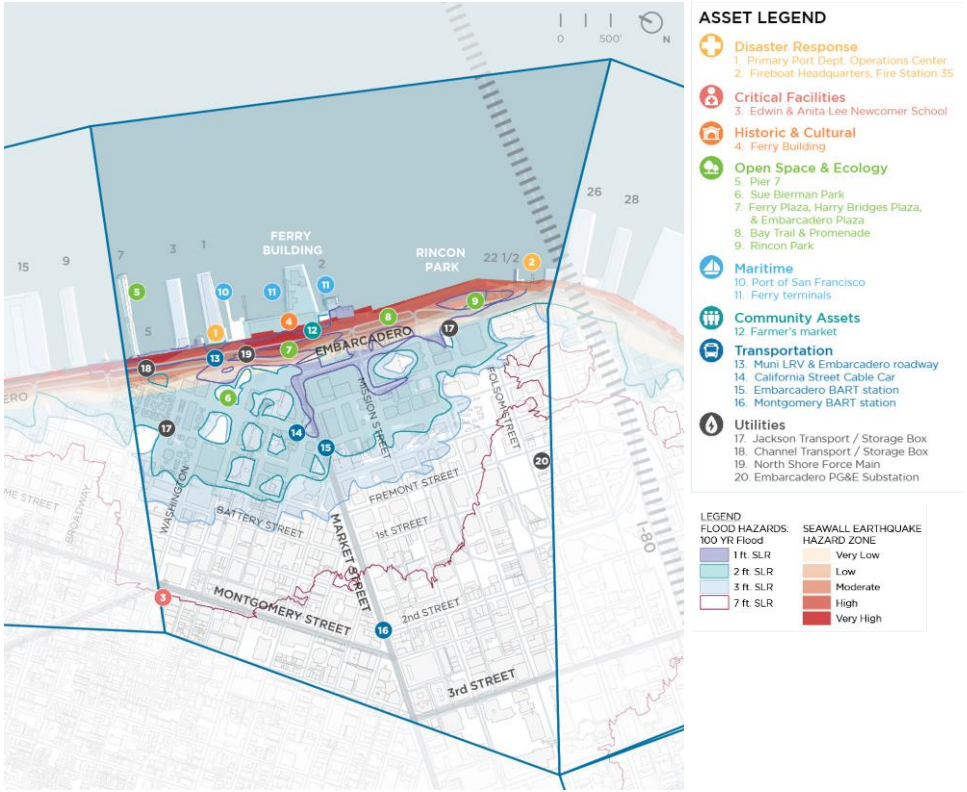


			DESIGN LIFE	ADAPT-ABILITY	IMPACT ON THE WATERFRONT	COST	COMPATIBLE MEASURES
FLOOD MEASURES	PHYSICAL INFRASTRUCTURE	1 LEVEES	75+ years	Low	Major Intervention	$$$$$	Nearshore Buttress, Bulkhead Wharf Retrofit, Ecological Features
		2 SEAWALLS	50-100 years	Varies	Major Intervention	$$$	Nearshore Buttress, Drilled Shafts, Ecological Shorelines
		3 RAISED MARINE STRUCTURES	50+ years	Medium	Major Intervention	$$$$	Drilled Shafts, Ecological Features
		4 FLOODWALLS	30-50 years	Low	Minor Intervention	$$	Bulkhead Wharf Retrofit, Drilled Shafts
	ECO. INFRA.	5 ECOLOGICAL FEATURES	Beaches, Vegetated Terraces: 10-50+ years	Medium-High	Minor Intervention	$*	All Flood Measures and Seismic Measures
		6 ECOLOGICAL SHORELINES	Stepped Slopes (Major Intervention), Vegetated Revetments, Vegetated Crib Walls, Natural Fiber Blankets,Gabion Baskets: Decades	Medium-High	Typically Minor Intervention	$*	All Flood Measures and Seismic Measures
SEISMIC MEASURES	SHORELINE STABILIZATION	7 NEARSHORE BUTTRESS	100+ years	Very High	Major Waterside Intervention	$$$$$	Levees, Seawalls, Ecological Features
		8 DRILLED SHAFTS	75+ years	Medium	Moderate Landside Intervention	$$$	Raised Marine Structures, Floodwalls, Seawalls
	TARGETED MEASURES	9 BULKHEAD WHARF RETROFIT	30 years	Low	Minor Waterside Intervention	$$	Levees, Floodwalls, Ecological Features
FLOOD + SEISMIC		10 EMERGENCY PREPAREDNESS			No physical impact	$	All Flood Measures and Seismic Measures

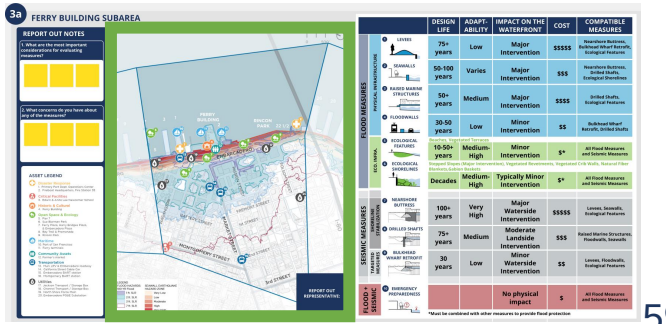
*Must be combined with other measures to provide flood protection

BREAKOUT ROOM ACTIVITY

Step 1: Study the Map



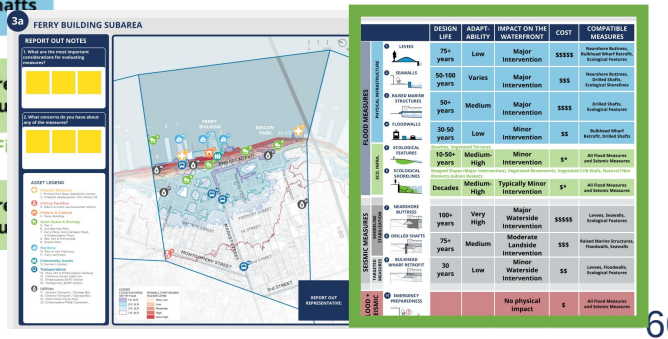
- How do flood and seismic hazards affect your subarea?
- What assets are at risk?
- What is it like on this part of the waterfront?



BREAKOUT ROOM ACTIVITY

Step 2: Explore the Measures

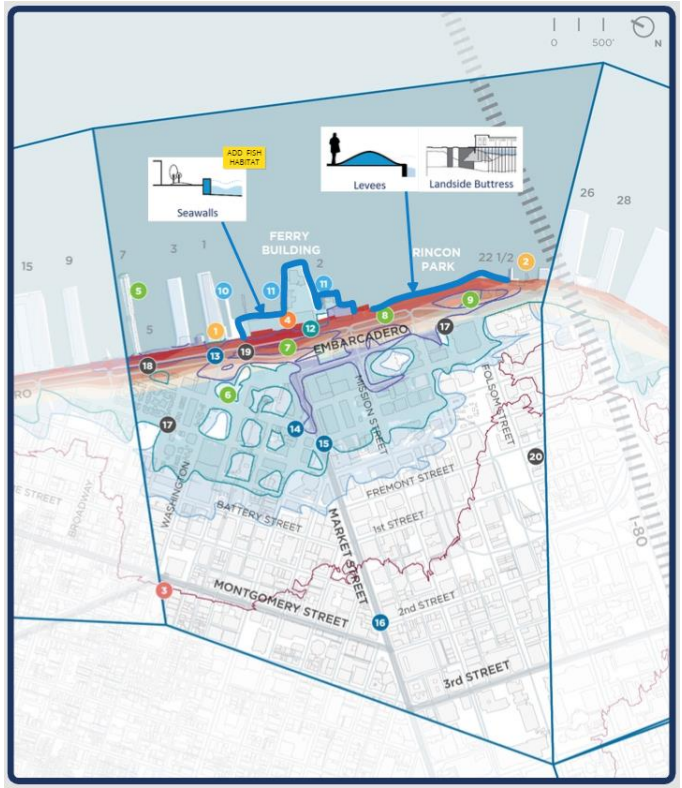
		DESIGN LIFE	ADAPT-ABILITY	IMPACT ON THE WATERFRONT	COST	COMPATIBLE MEASURES
FLOOD MEASURES	PHYSICAL INFRASTRUCTURE	1 LEVEES	75+ years	Low	Major Intervention	$$$$$	Nearshore Buttress, Bulkhead Wharf Retrofit, Ecological Features
		2 SEAWALLS	50-100 years	Varies	Major Intervention	$$$	Nearshore Buttress, Drilled Shafts, Ecological Shorelines
		3 RAISED MARINE STRUCTURES	50+ years	Medium	Major Intervention	$$$$	Drilled Shafts, Ecological Features
		4 FLOODWALLS	30-50 years	Low	Minor Intervention	$$	Bulkhead Wharf Retrofit, Drilled Shafts
	ECO. INFRA.	5 ECOLOGICAL FEATURES	Beaches, Vegetated Terraces				
			10-50+ years	Medium-High	Minor Intervention	$*	All Flood Measure and Seismic Measu
		6 ECOLOGICAL SHORELINES	Stepped Slopes (Major Intervention), Vegetated Revetments, Vegetated Crib Walls, Natural Fi Blankets,Gabion Baskets				
			Decades	Medium-High	Typically Minor Intervention	$*	All Flood Measure and Seismic Measu



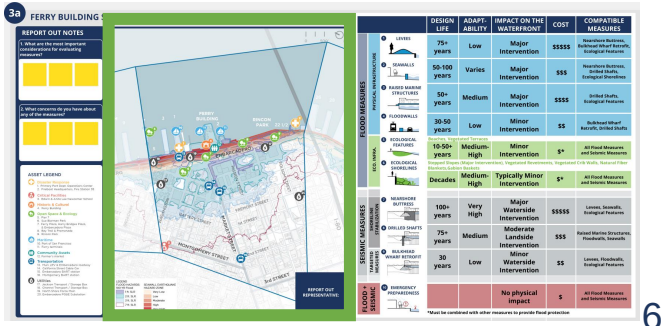
- What kinds of measures are under consideration for the waterfront?
- What characteristics are most important?

BREAKOUT ROOM ACTIVITY

Step 3: Brainstorm Possible Measure Combinations



- Which measures would you use to address risk and protect assets along the waterfront?
- What tradeoffs would you make?
- How could you combine measures?



BREAKOUT ROOM ACTIVITY

Step 3: Identify your Key Considerations and Concerns

REPORT OUT NOTES

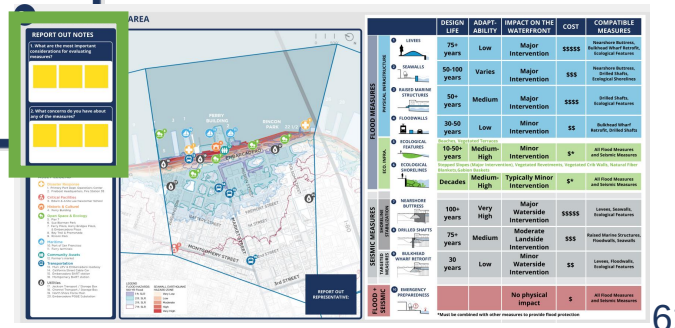
1. What are the most important considerations for selecting measures?

- COST!
- MAXIMIZE ENVIRONMENTAL BENEFIT

2. What concerns do you have about any of the measures?

- AVOID MEASURES THAT WILL NEED TO BE REPLACED IN THE NEAR FUTURE
- EQUITABLE USE OF RESOURCES
- IMPACTS TO THE ROADWAY

- What were your most important considerations for combining measures?
- What concerns do you have about any of the measures?



TIME TO BREAK OUT!

Please join your break out room now