



US Army Corps  
of Engineers®



Embarcadero Community Meeting #5  
Port of San Francisco  
December 11, 2019

# OUR AGENDA

## WE WILL COVER

- Brief summary of the Waterfront Resilience Program
- What have we been up to?
  - Program development
  - Engagement and outreach
  - Assessment and analysis
- Introduction to the Multi-Hazard Risk Assessment



# PROGRAM DEVELOPMENT



**FEASIBILITY & PERFORMANCE**



**SOCIETY AND EQUITY**



**ENVIRONMENT**



**ECONOMIC**

## WHAT IS THE PROBLEM?

- High likelihood of a large earthquake
- Current and increasing flood risk
- Aging seawall over 100 years old and not high enough
- Many assets and services at risk

## WHAT IS INCLUDED?

- Transportation assets and services
- Utilities assets and services
- Historic resources
- Homes and businesses
- Ecological resources
- People (workers, residents, visitors)

## HOW WILL WE MAKE DECISIONS?

- Program framework (Strengthen, Adapt and Envision)
- Vision, Principles, Goals
- Evaluation criteria
- Robust community and stakeholder engagement



# PORT OF SAN FRANCISCO'S WATERFRONT RESILIENCE PROGRAM



The Port of San Francisco's Waterfront Resilience Program will create a safe, equitable, sustainable, and inspiring waterfront.



# WATERFRONT RESILIENCE PROGRAM ADAPTATION FRAMEWORK



**STRENGTHEN ELEMENT**

**Objective:** Immediately implement highest priority disaster response and life safety projects along the Embarcadero Seawall.



**ADAPT ELEMENT**

**Objective:** Reduce remaining seismic and increasing flood risks, respond to changing priorities, and provide a framework for the Port to adapt over time.

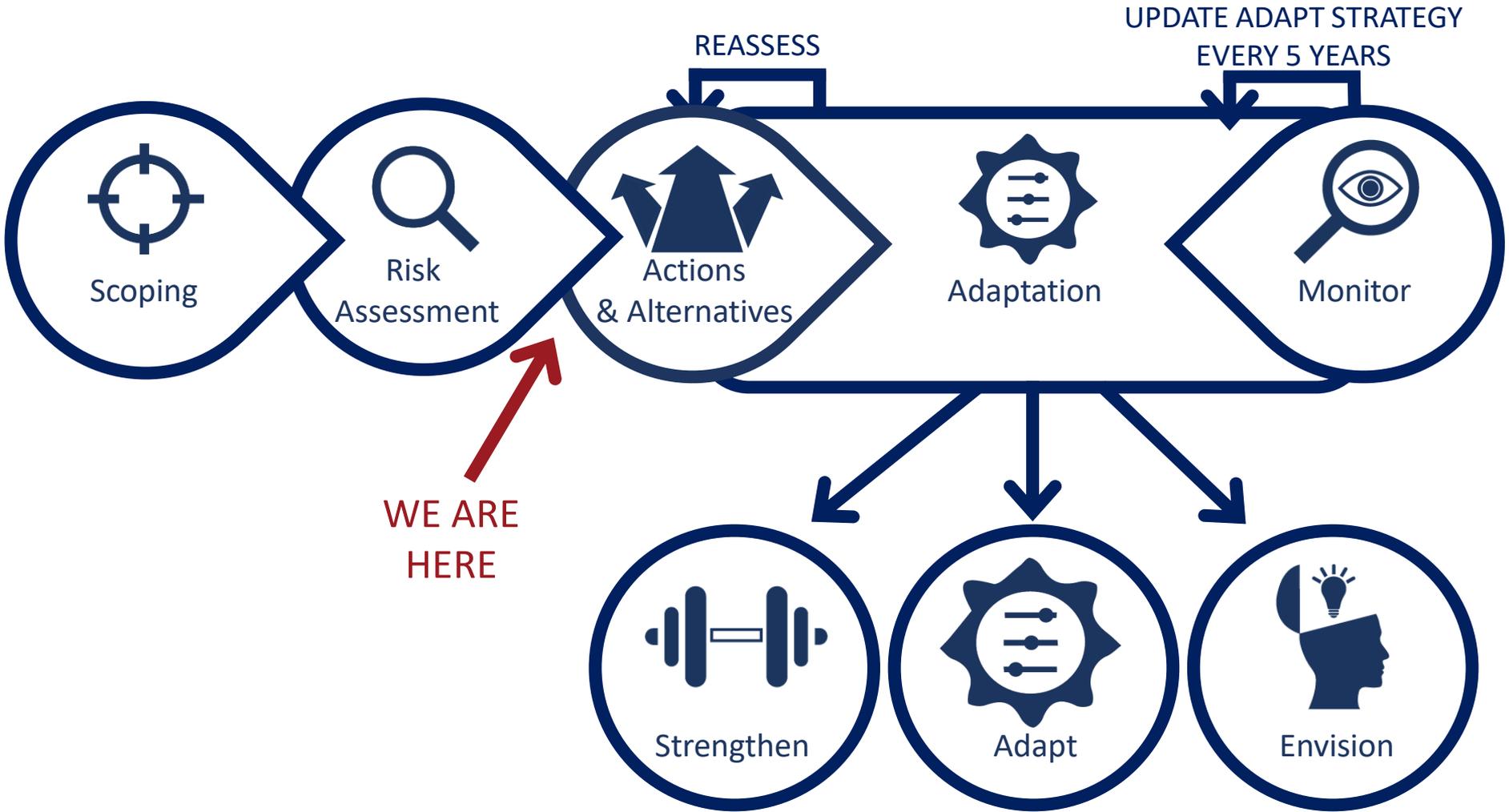


**ENVISION ELEMENT**

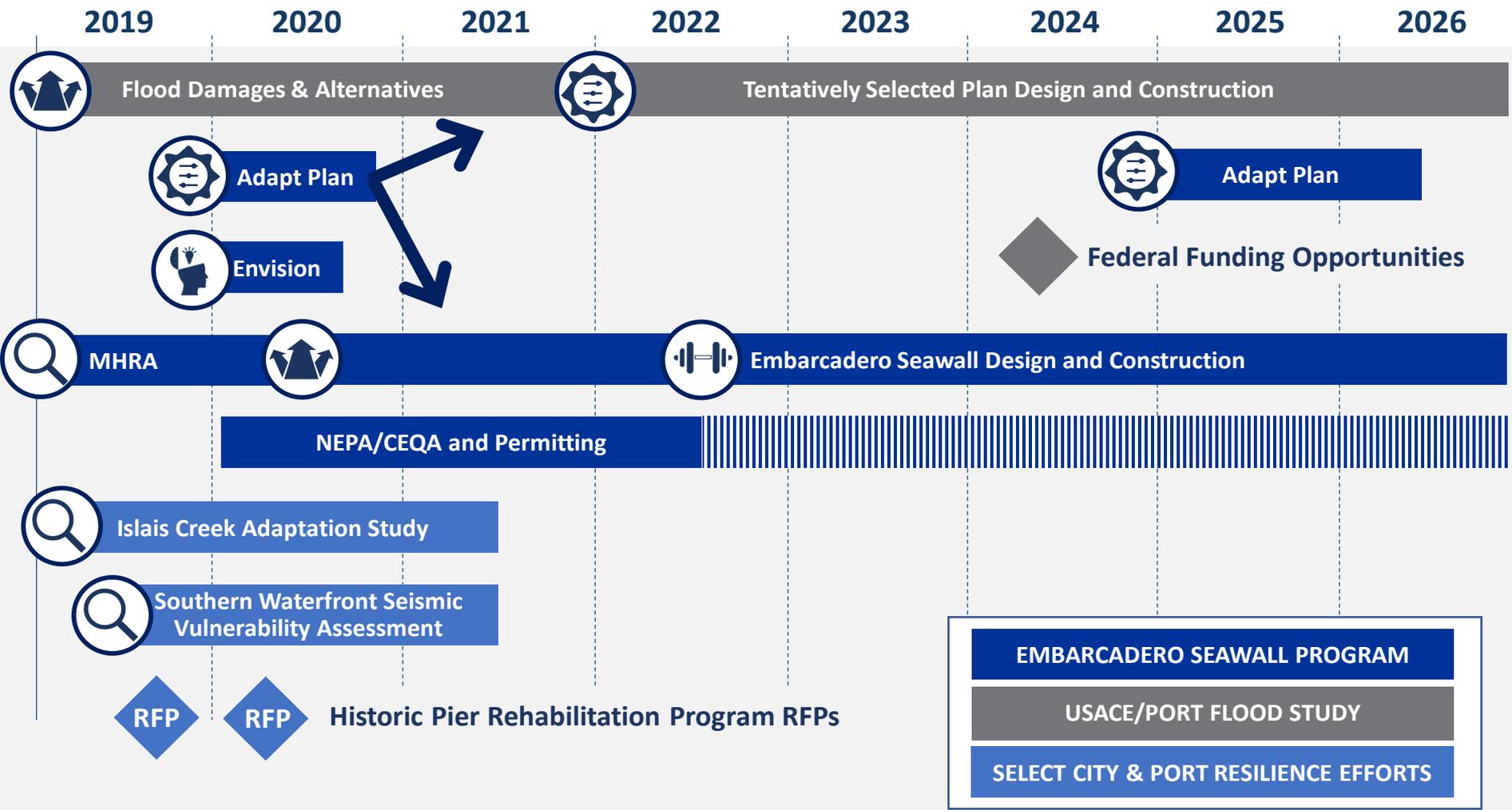
**Objective:** Develop visions that can respond to higher water levels, changes in priorities and science, and a waterfront that is resilient to 2100 and beyond.



# WATERFRONT RESILIENCE PROGRAM STEPS



# WATERFRONT RESILIENCE PROGRAM TIMELINE



# EMBARCADERO SEAWALL PROGRAM

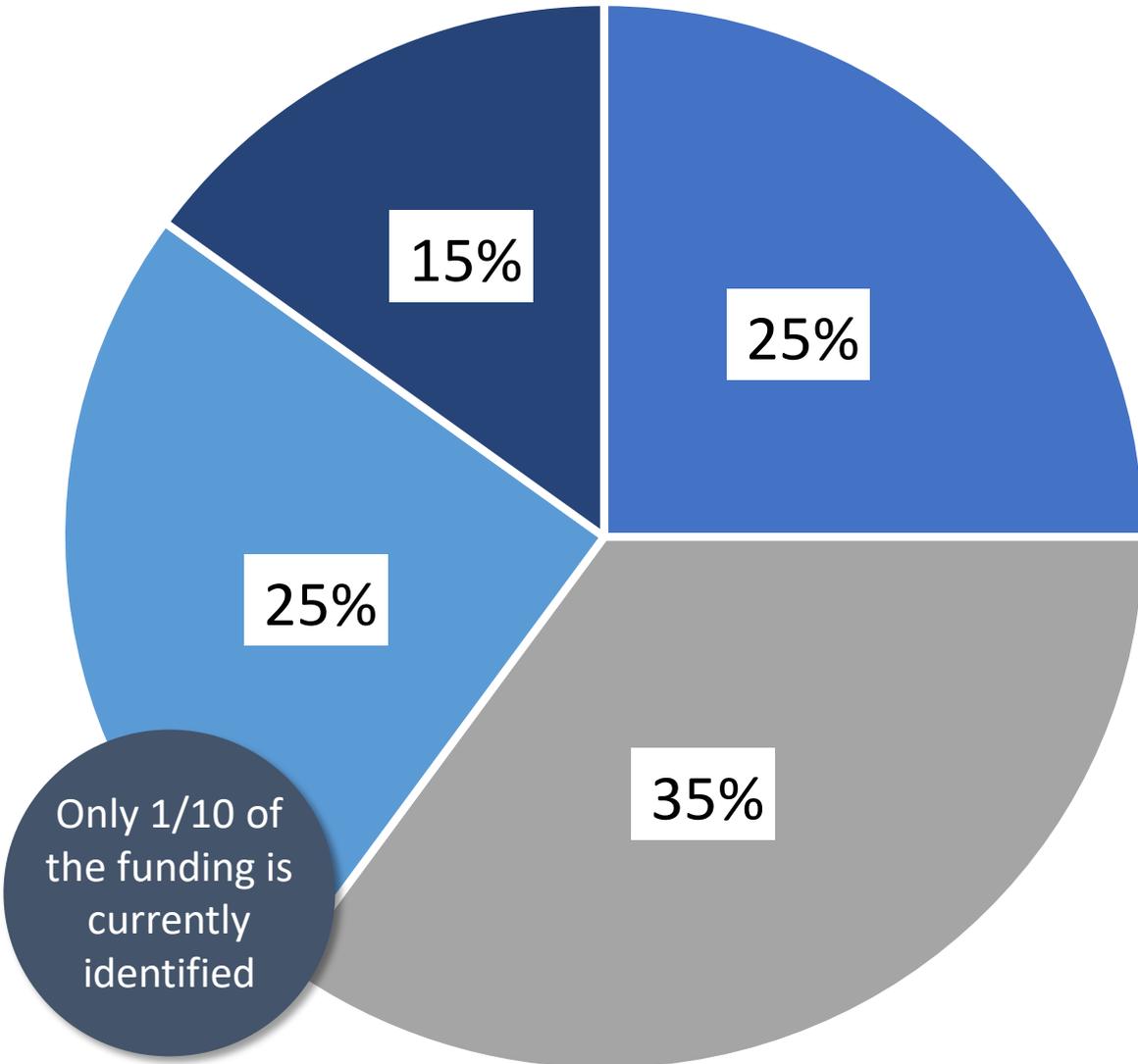


## SEAWALL PROGRAM OVERVIEW

- First priority is to protect life safety and emergency response from seismic events
- Approximately \$5 billion over 30+ years
- Funding and financing from City, state, federal and private
- Will address as much flood risk as possible and create a foundation for addressing flood risk
- Robust engagement and outreach



# EMBARCADERO SEAWALL PROGRAM FUNDING STRATEGIES



## DESIRED PROGRAM FUNDING

Full infrastructure improvements are anticipated to cost up to \$5 billion

- Local (City, GO Bond Program)
- Federal (Water Resources, Transportation)
- State (Cap and Trade, State Share of Tax Increments)
- Private (Waterfront Development Project and Businesses)

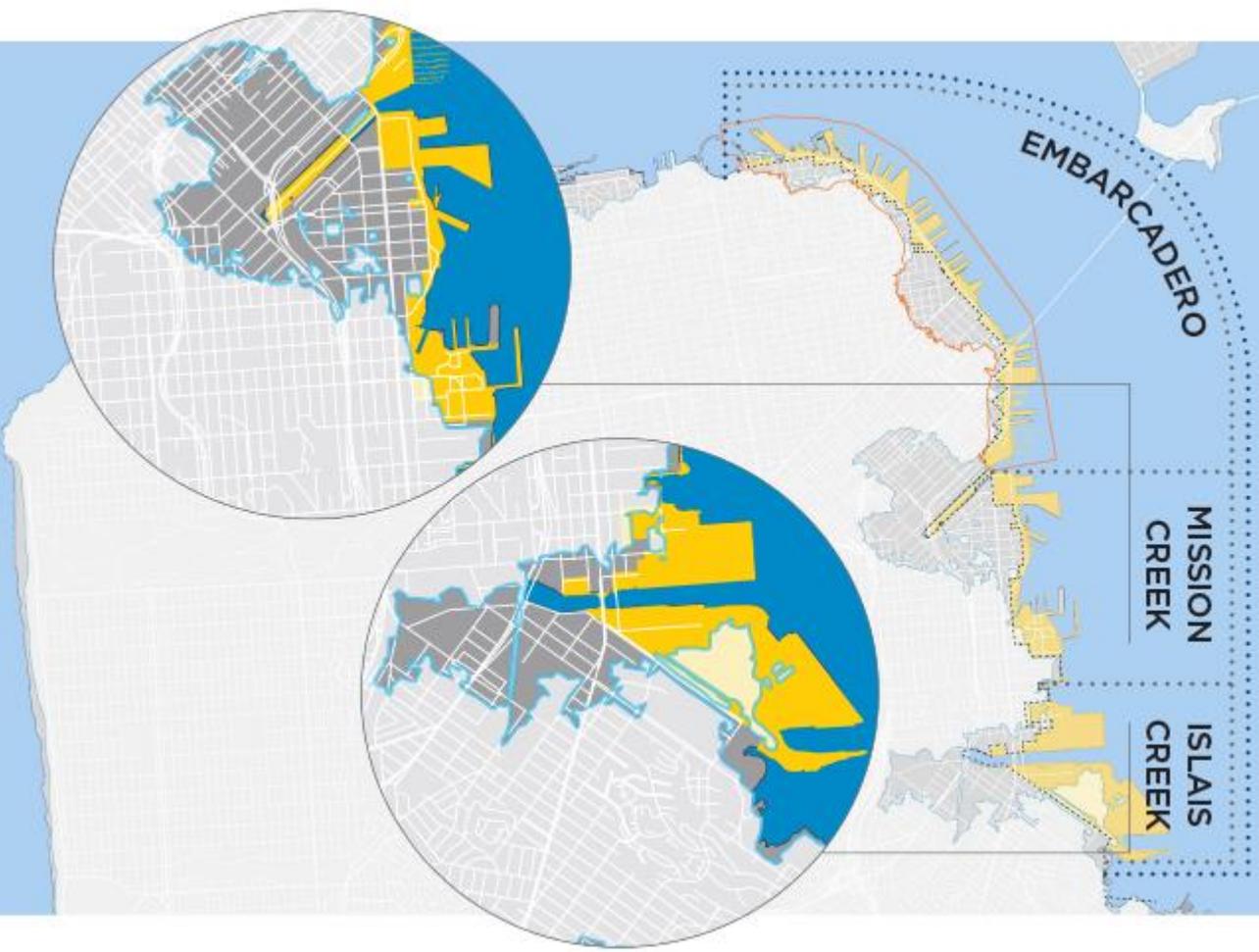
## PHASE I DESIRED SOURCES

Potential sources for Phase I (\$500 million) to address life safety:

- \$425 million City GO Bond Program
- \$55 million State (Goal, \$5M Grant)
- \$10 million Federal (New Start)
- \$8 million Port of SF
- \$2 million SFMTA



# USACE/PORT FLOOD STUDY OVERVIEW



## HIGHLIGHTS

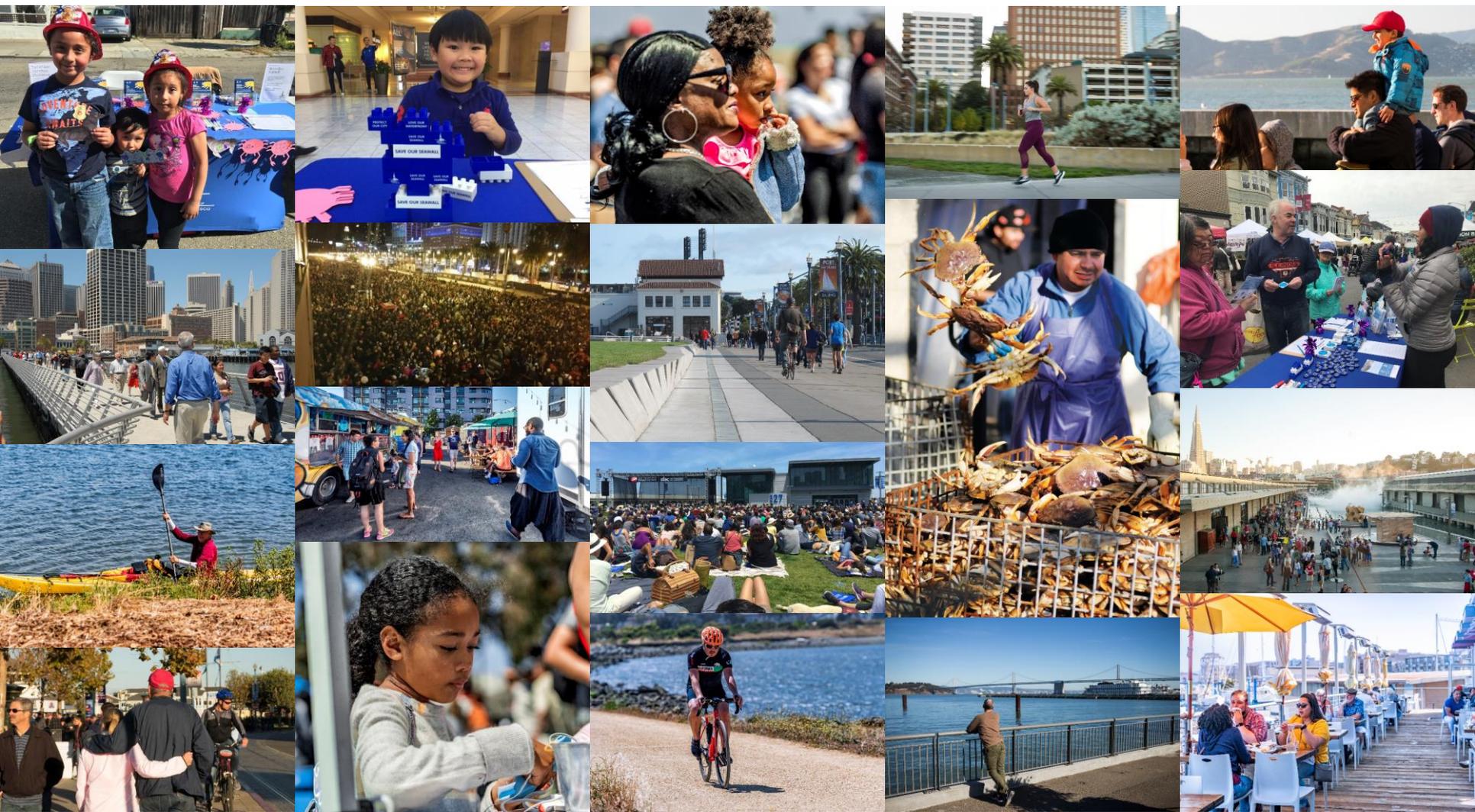
- Federal funding and expertise
- Port is the local sponsor, seeking assistance since 2012
- Flood Study is entire Port jurisdiction + Aquatic Park
- ~5 years, ~\$20M, 50/50 cost share

## STUDY OVERVIEW

- Evaluate flood risk to develop alternatives
- Culminates in a recommendation to Congress
- Design/construction of federal plan cost shared 65% fed/35% local
- Locally preferred plan can be selected, sponsor pays extra cost



# PURPOSE OF THIS WORK: PEOPLE WHO RELY ON THE WATERFRONT



# ENGAGEMENT AND PARTICIPATION



## WHAT DO YOU CARE ABOUT?

- Open space and public space
- Transportation, utilities and lifeline infrastructure
- Emergency response and evacuation
- Ferry Building
- Bay and marine life



## ARE THESE THE RIGHT GOALS?

- Focus on public assets
- Improve transit all along the waterfront
- Provide adequate, equitable redevelopment of the seawall
- Include 500-year flood event for risk management



## HOW SHOULD WE EVALUATE?

- People first
- Consider larger systems
- Protect existing residents
- Consider equity
- Environmental opportunities
- Prioritize economy



# COMMUNITY MEETING SERIES



## COMMUNITY MEETING #1

- Introduced the Embarcadero Seawall Program
- Information Boards:
  - Seismic Risk
  - Flood Risk
  - Adaptive Framework
  - Waterfront Plan Update
  - Stakeholder Engagement
- Waterfront Vision Exercise



**1** Introduction:  
The Seawall Program



# COMMUNITY MEETING SERIES

## COMMUNITY MEETING #2

After the presentations, attendees joined Port staff for an exercise to identify priorities and concerns.



**2 Assets & Risks:**  
What's Out There and What's At Stake



What do you love most about the waterfront?



What assets are the most important to the city?



If disaster strikes, what is of the most concern?



# COMMUNITY MEETING SERIES

## COMMUNITY MEETING #3

- Shared the Waterfront Resilience Program Framework and why we're phasing the work ahead
- Shared the Program goals and received feedback
- Community members used the Strengthen, Adapt and Envision Elements to prioritize action over time

### 3 Goals & Tradeoffs: Balancing Priorities & Resources



# COMMUNITY MEETING SERIES

## COMMUNITY MEETING #4

- After the presentations, attendees joined Port staff for mapping exercises
- The Embarcadero Seawall was divided into three teams, each asked to prioritize in their own geographic section using the evaluation criteria
- Teams then came together to further prioritize

**4** Framework & Vision, Principles, Evaluation Criteria



# FEEDBACK ON PRIORITIES AND VALUES

## It's Your Turn: Provide Feedback on the Seawall Program

### Goals

Help us direct priorities by weighing-in on the Embarcadero Seawall Program goals. Your insights and feedback are invaluable as we think both short- and long-term about the waterfront. Read the abridged goals below - or the full goals [here](#) - and add your comments/ideas/feedback below.

These draft goals were shared during Community #3 in January 2018. Couldn't attend but want to learn more? View the Community Meeting presentations [here](#). Want more information on the Embarcadero Seawall? Read our "[learn more](#)" page.

Thanks for participating!

#### STRENGTHEN GOALS

- Protect life safety and disaster recovery capabilities
- Protect and enhance assets where possible
- Minimize disruption to the Port and the City
- Use Adapt and Envision phases to inform strategies

#### ADAPT GOALS

- Protect the most important waterfront assets
- Enhance assets where possible
- Minimize disruption to the Port and the City
- Enhance Bay and shoreline ecology

#### ENVISION GOALS

Protect unique and critical assets



### ONLINE ENGAGEMENT TOOL

Online feedback on Program goals to date includes:

- “Consider issues on sewage treatment and energy creation along with transit and access”
- Provide adequate **EQUITABLE** redevelopment of the Seawall
- “Improve Transit all the way along the waterfront”



# MULTI-HAZARD RISK ASSESSMENT OVERVIEW



Transportation & Utilities



Disaster Response



Historic



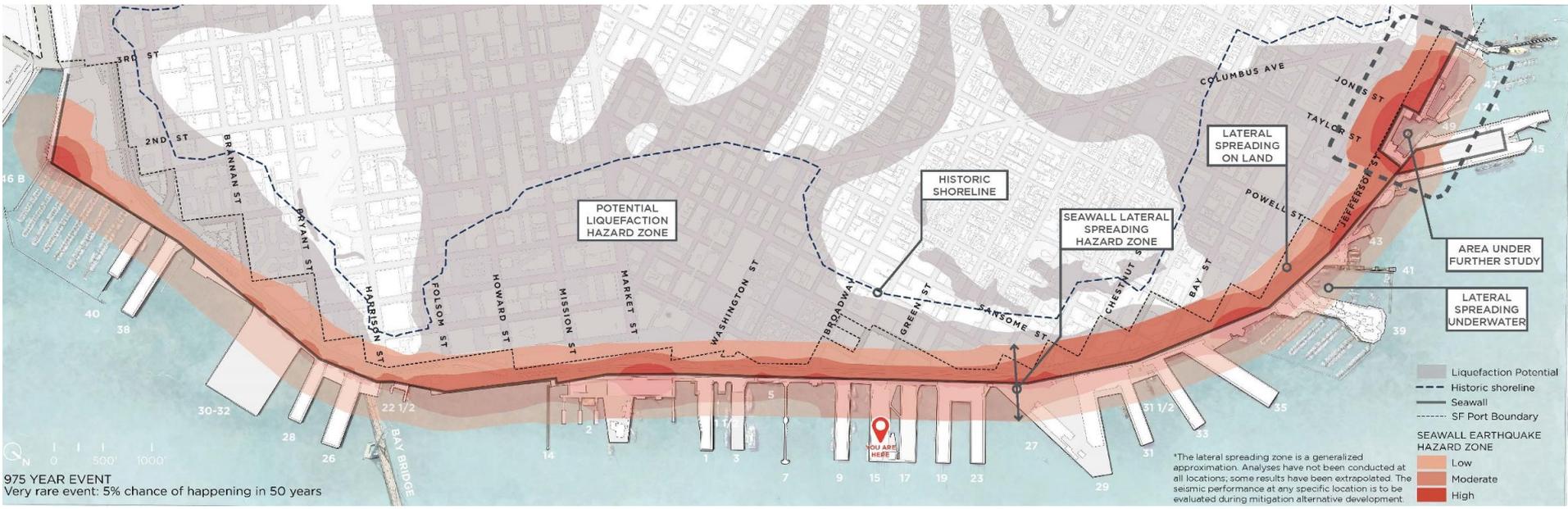
Open Space & Environment



Economic

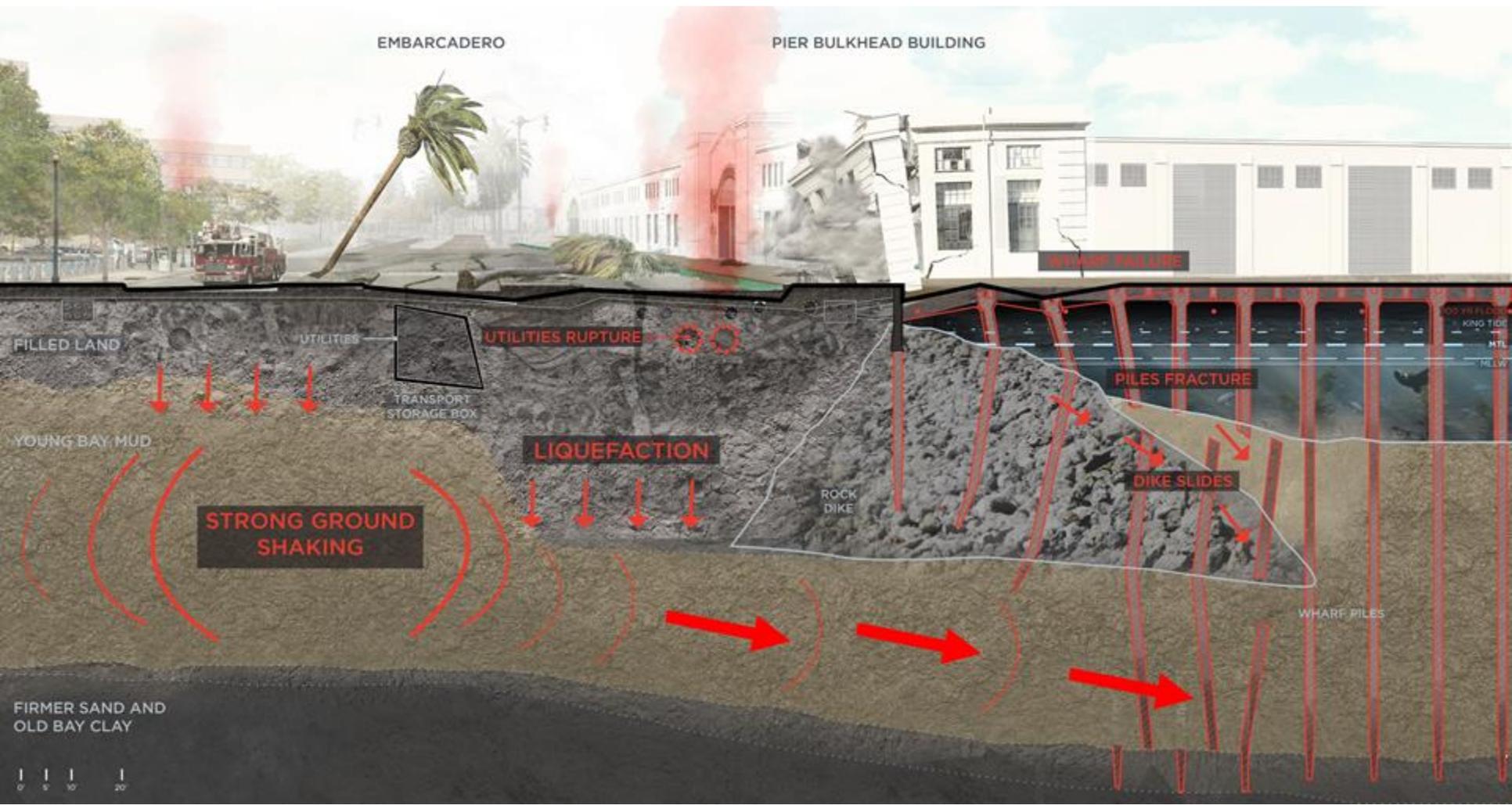
- The MHRA will characterize earthquake and flood risks along the Embarcadero Seawall and Embarcadero Roadway, measure the economic, societal, and environmental consequences of those risks.

# EARTHQUAKE HAZARD ZONE

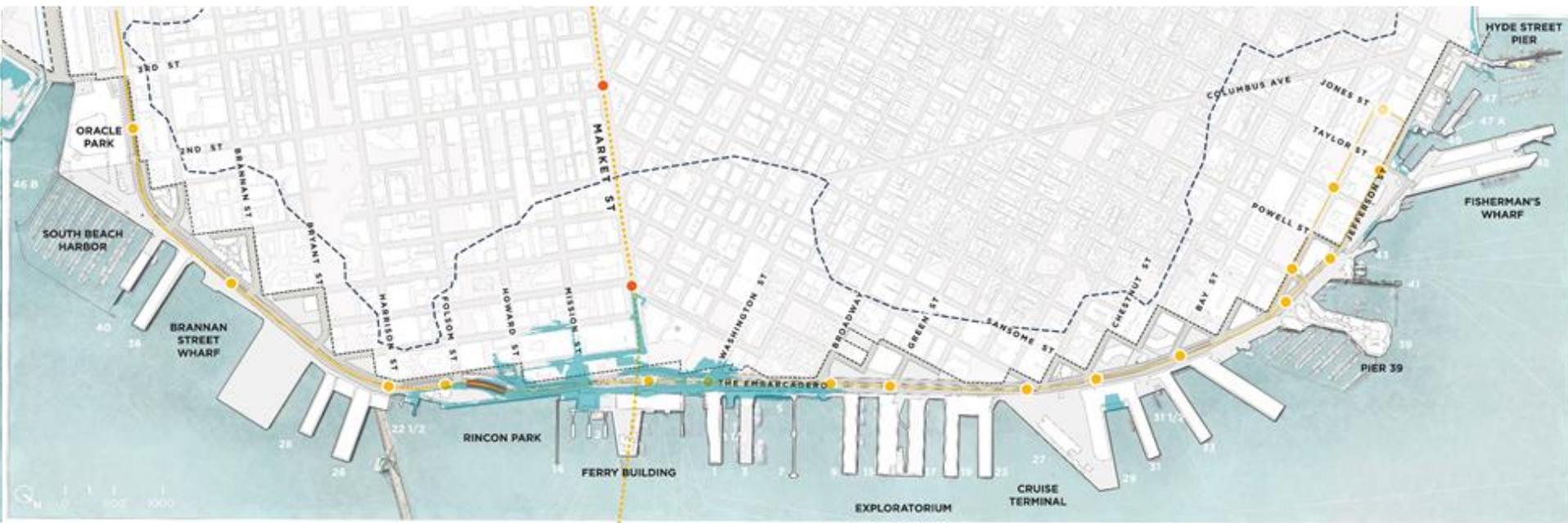


- Lateral spreading and settlement
- 200 to 300 feet behind Seawall
- 100 to 200 feet bayward of Seawall

# EARTHQUAKE HAZARD

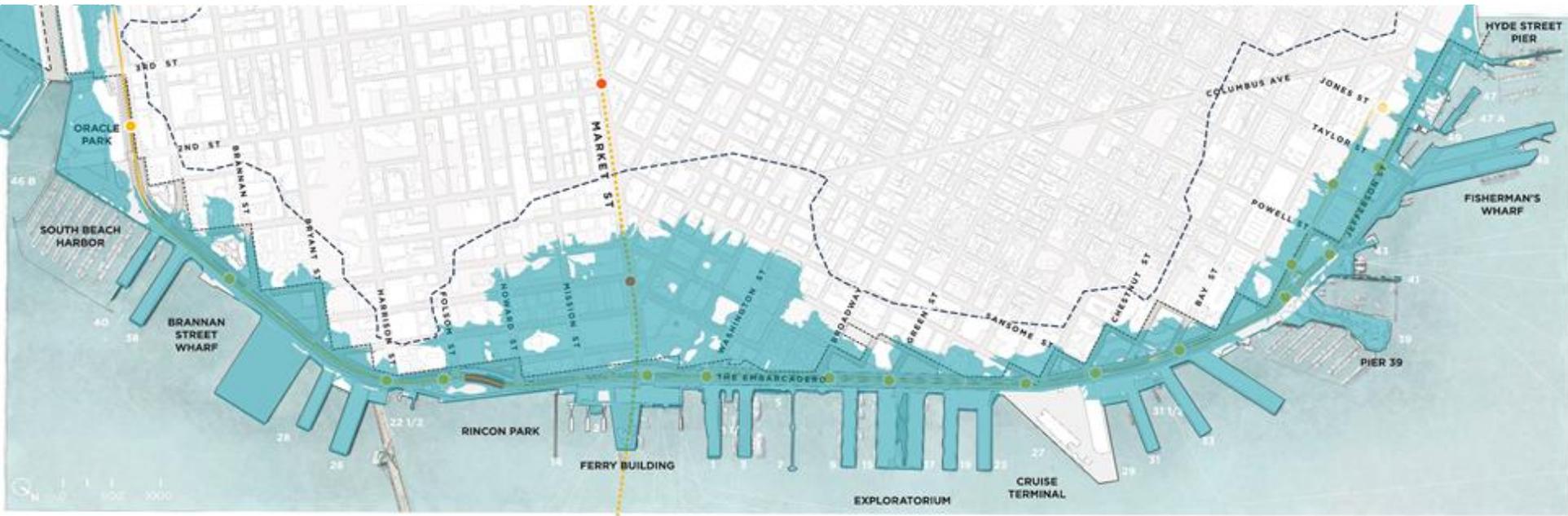


# 1' SEA LEVEL RISE + 100 YEAR FLOOD EVENT



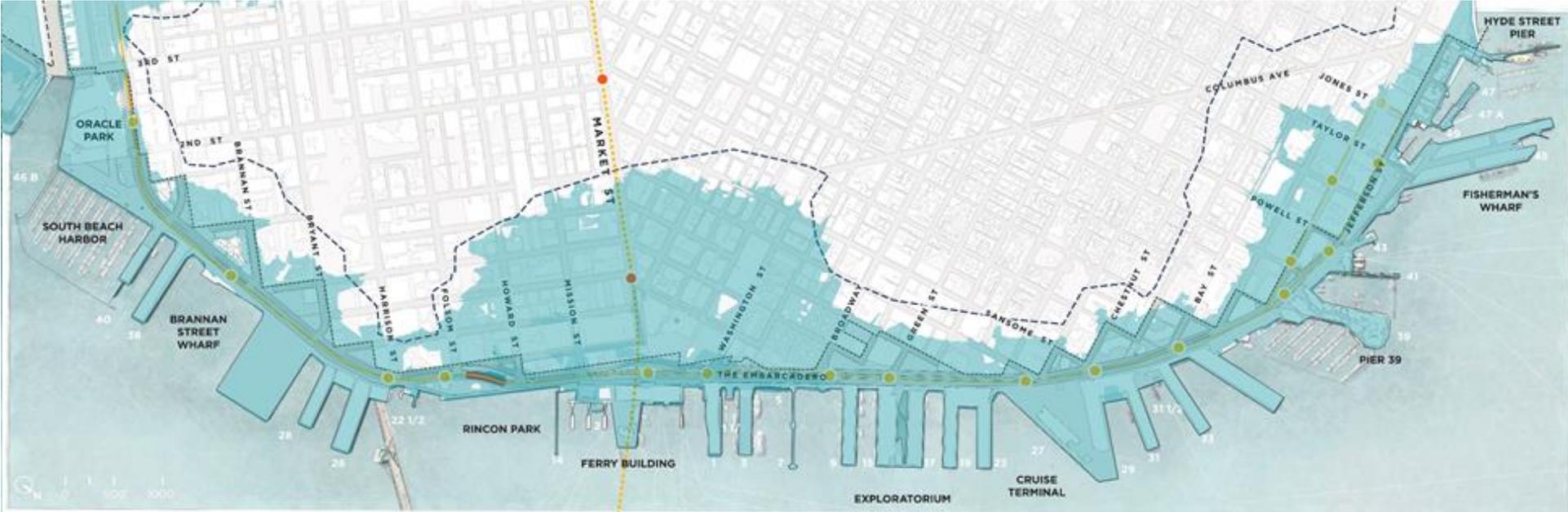
- Embarcadero between Pier 7 and Pier 22 ½
- Muni and BART underground
- Several blocks of downtown

# 3' SEA LEVEL RISE + 100 YEAR FLOOD EVENT



- Entire Embarcadero
- Ferry Building and all piers
- Parts of Downtown, Fisherman's Wharf, Giant's ballpark

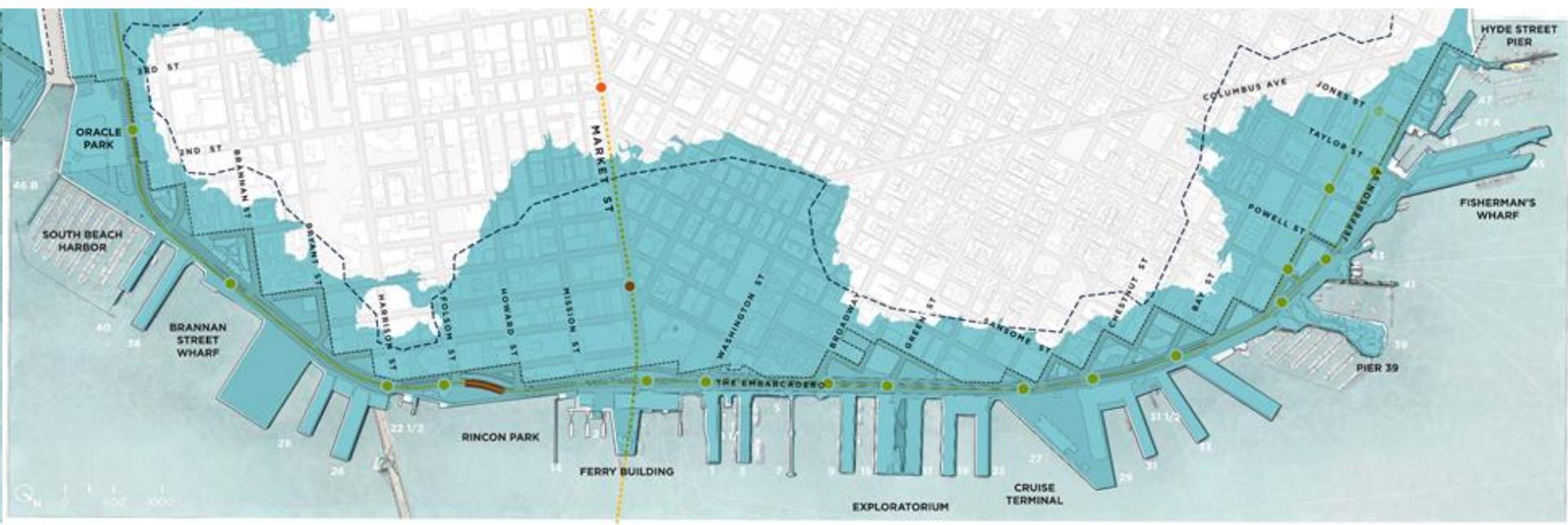
# 6' SEA LEVEL RISE+ 100 YEAR FLOOD EVENT



- All areas within the original shoreline
- Transbay Terminal to Transamerica Pyramid



# 10' SEA LEVEL RISE + 100 YEAR FLOOD EVENT

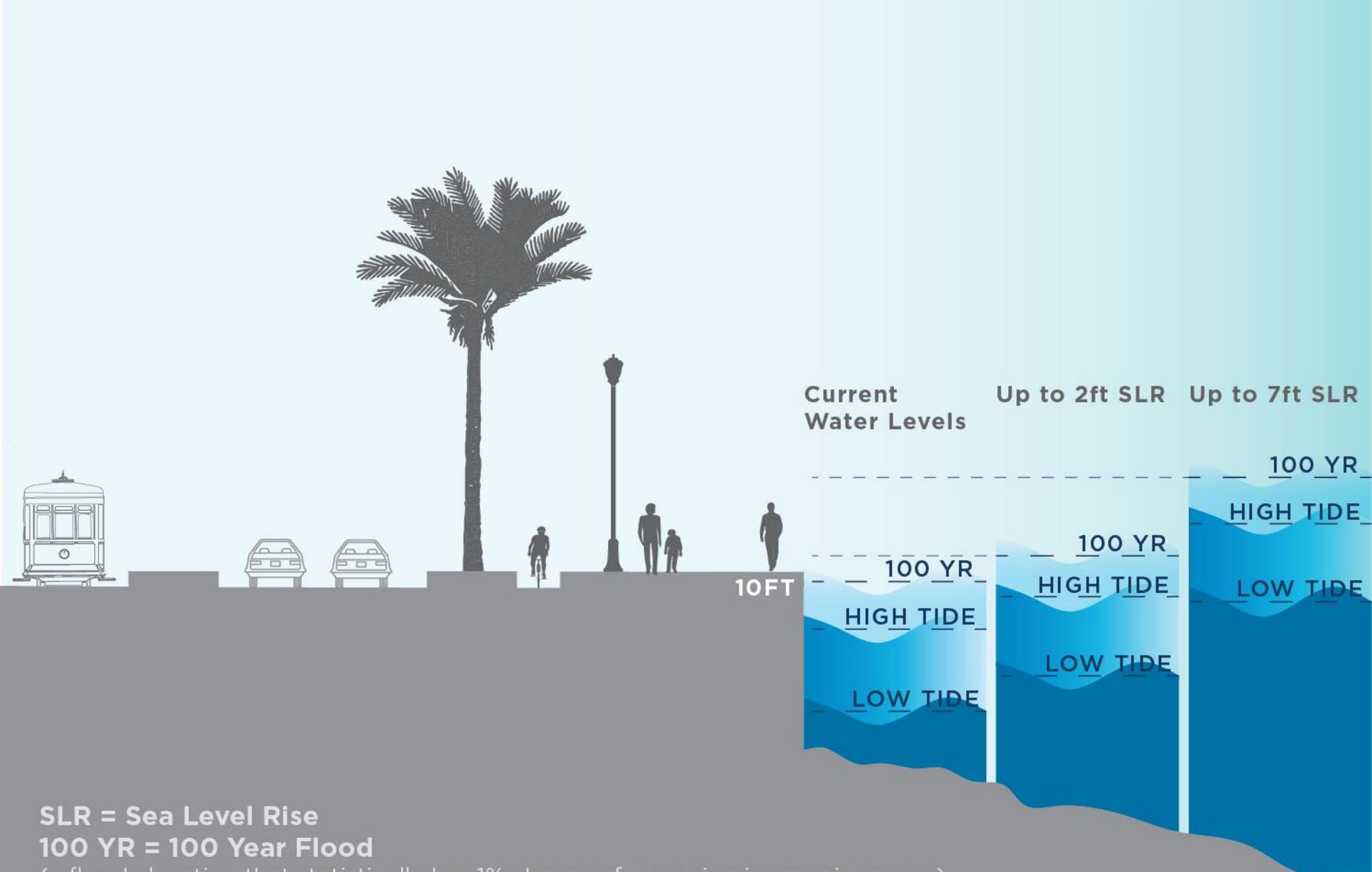


- Flooding extends beyond historic shoreline
- Additional neighborhoods impacted including SoMa and North Beach
- Chance of happening in 2130 – from City, State, and Ocean Protection Council guidance

# FLOOD HAZARD



# EXPECTED WATER LEVELS



SLR = Sea Level Rise

100 YR = 100 Year Flood

(a flood elevation that statistically has 1% chance of occurring in any given year)

# HOW WE HAVE GATHERED INFORMATION



Underwater Survey to understand flood risk



Geotechnical Explorations to understand underground soils



Collect information about existing utilities and infrastructure

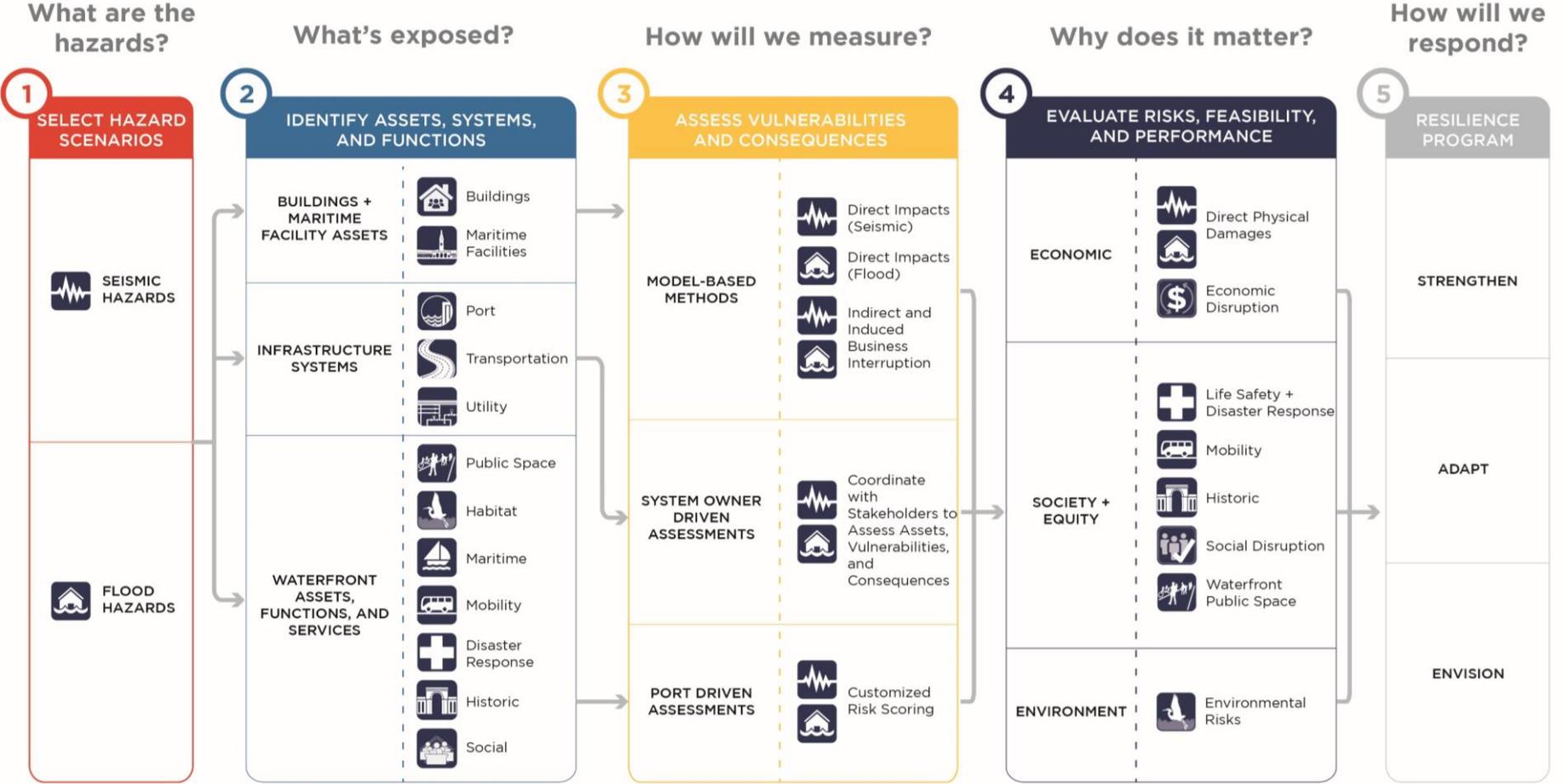


Computer Modeling of Earthquake and Flood Events (HAZUS)

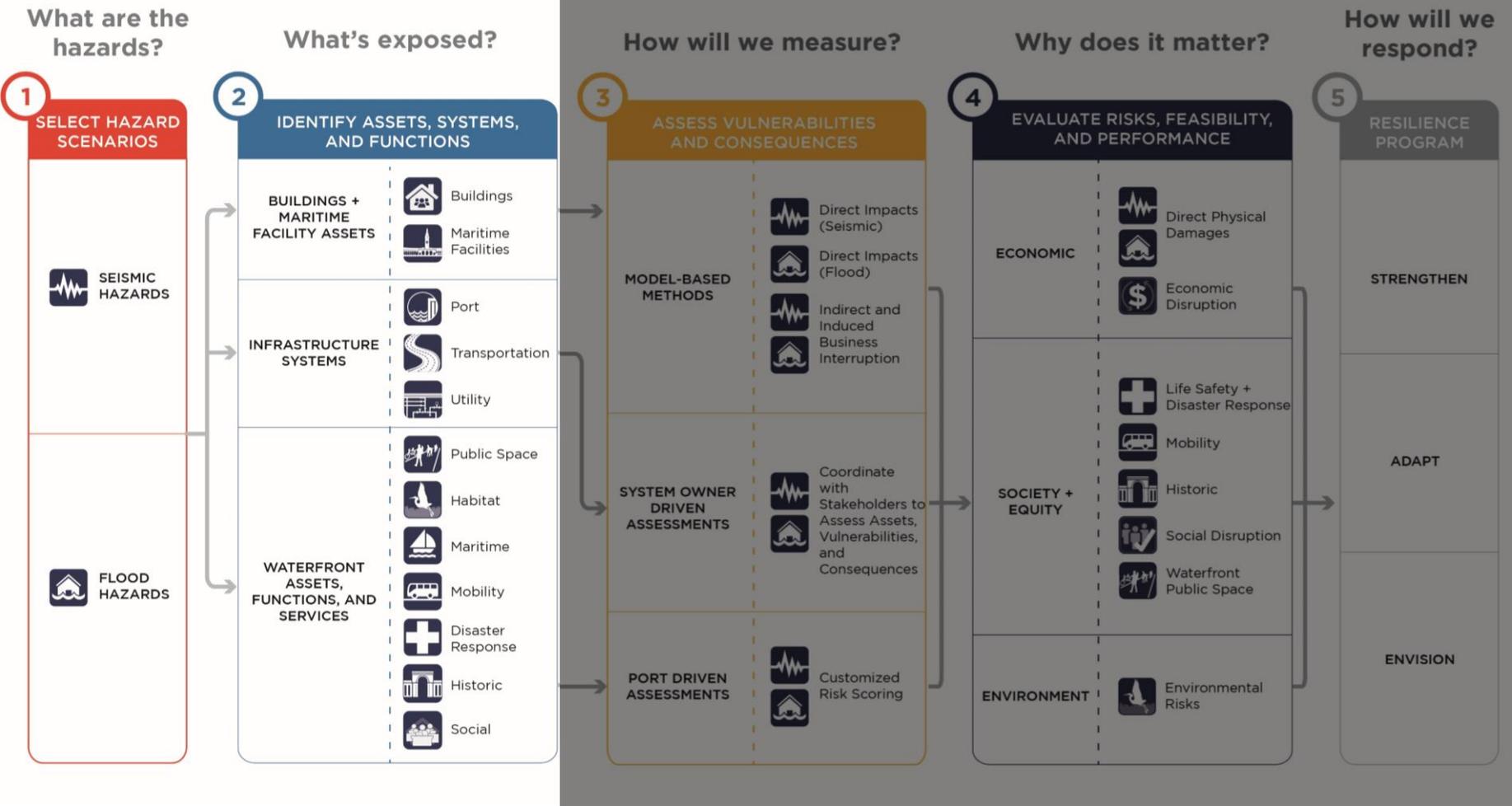


Learning from stakeholders and the community

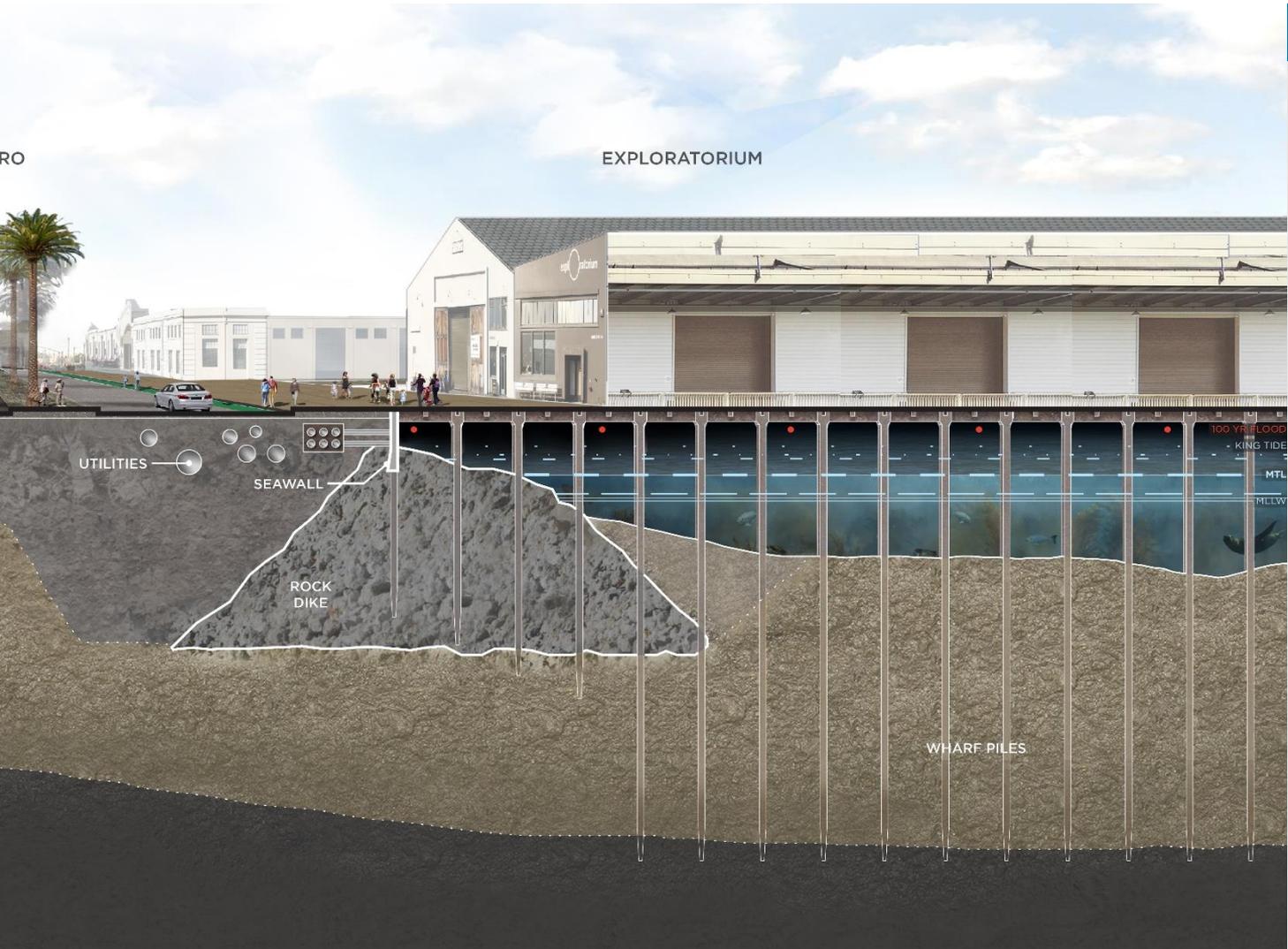
# MULTIHAZARD RISK ASSESSEMENT METHODOLOGY



# MULTIHAZARD RISK ASSESSEMENT METHODOLOGY



# BUILDINGS AND STRUCTURES



## WHAT WE KNOW NOW

### Piers and Wharves

- \$2.6 billion value

### Buildings

- \$1.3 billion value (\$1.9B if you include all Port buildings)

### Non-Port Buildings in (Flood) Hazard Zone

- 440 buildings (offices /residential/Port)
- \$16 billion value



# UTILITIES



## WHAT WE KNOW NOW

### Wastewater

- Sewage collection for 400,000 people
- Transport Storage Box- integral part of wastewater transport

### Drinking water

- Supply for 12,000 local residents
- **Emergency Fire water (AWSS)**
- 5 seawater fireboat pumping inlets / manifolds

### Gas / Electricity / Telecoms

- Serving local residents, visitors, and office workers



# TRANSPORTATION



## WHAT WE KNOW NOW

### The Embarcadero

- 94,000 vehicle passenger trips per day
- 5,200 bicycle passenger trips per day
- 200,000 pedestrian trips per day

### Local transit

- 170,000 riders daily rely on Muni turnaround

### Regional Transit

- 215,000 BART Transbay tube passenger trips per day
- 15,000 daily ferry commuters
- AC Transit 13,500 passenger trips per day

# MARITIME

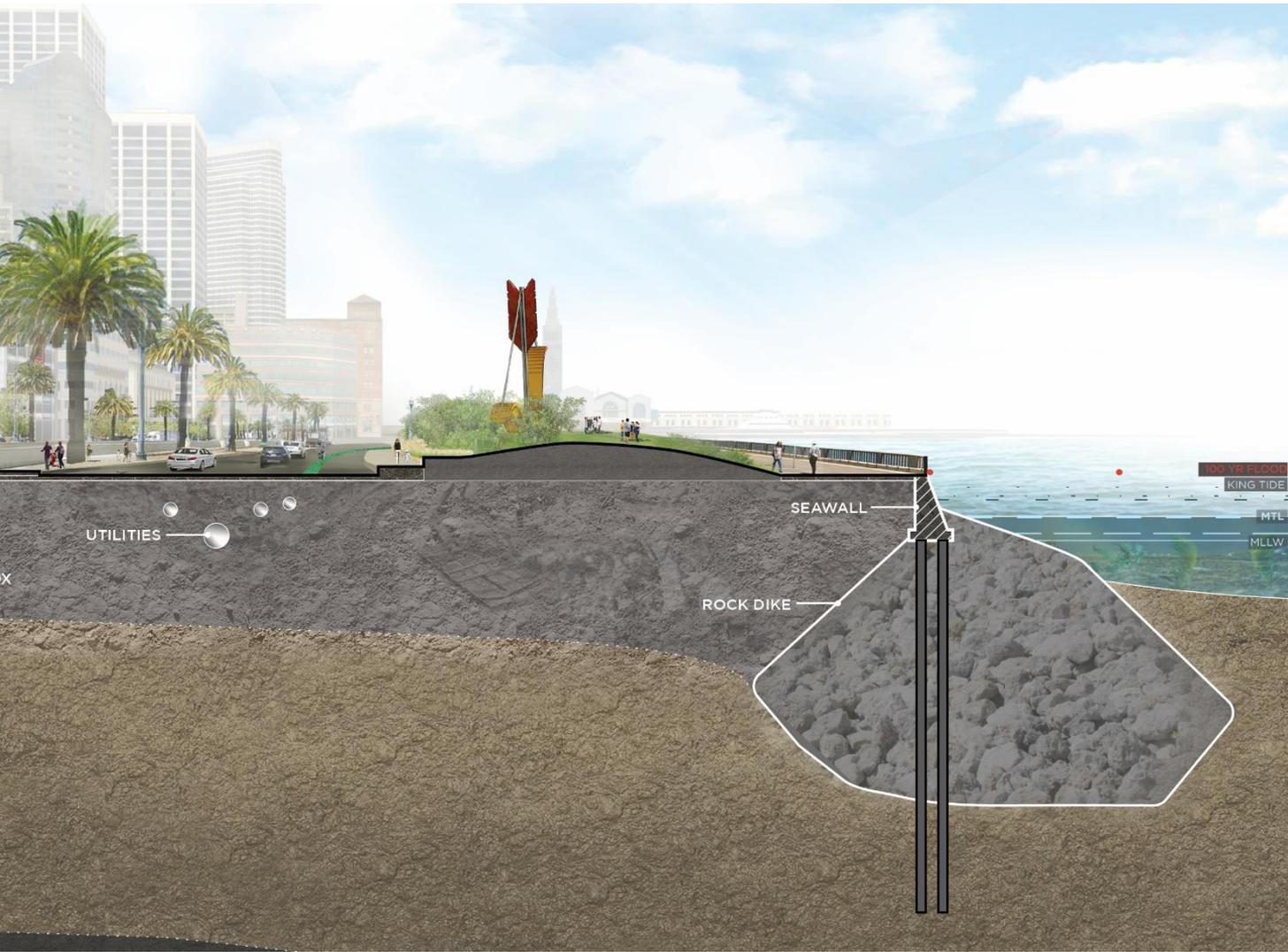


## WHAT WE KNOW NOW

- 26 active berthing locations including:
  - Ferries
  - Large vessels
  - Cruise ships
  - Water taxis
  - Tug and fire boats
  - Bar pilots serving all regional ports
- 3 marinas for small boats with multiple berths
- 10 fish processing facilities at Fisherman's Wharf



# PARKS AND OPEN SPACE



## WHAT WE KNOW NOW

### What's Out There

- 42 acres of parks, open spaces, and promenades

### EARTHQUAKE RISK

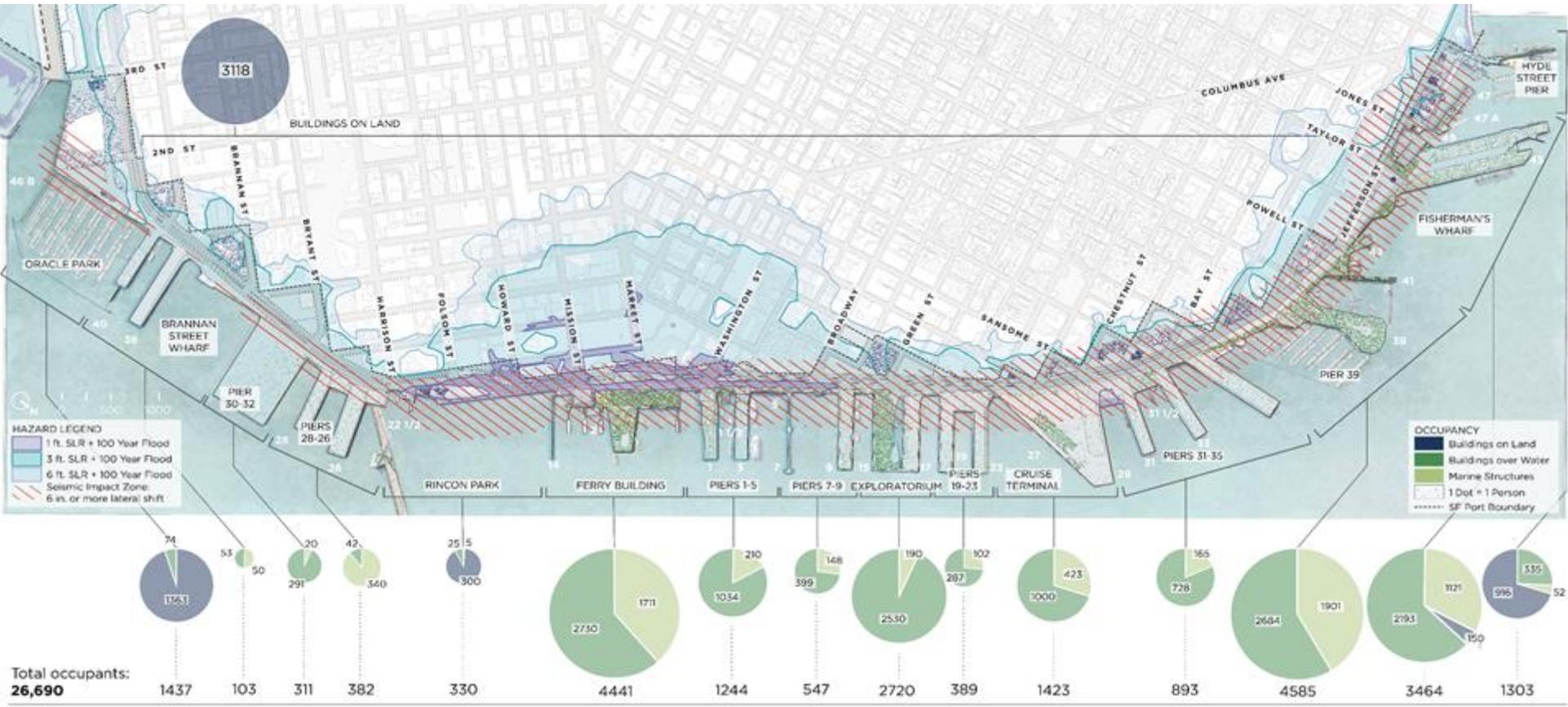
- 47% exposed to seawall earthquake hazard or located on pier structures

### FLOODING & SEA LEVEL RISE RISK

- 14% is exposed to near-term flooding, 73% to mid-term flooding, 91% to long-term flooding

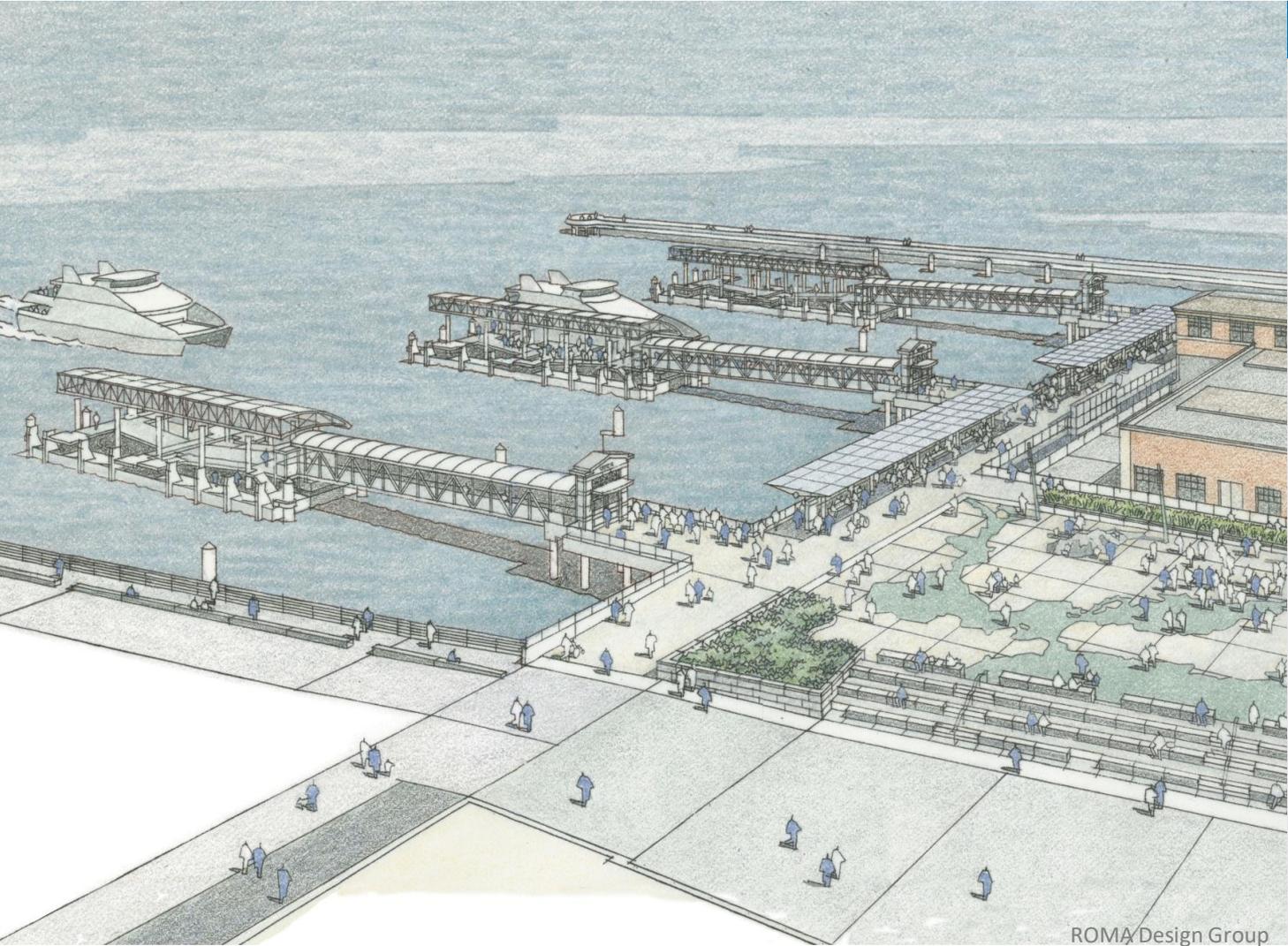


# LIFE SAFETY



- 20,500 average number of people over water
- High concentrations at Pier 39, Fisherman's Wharf, Ferry Building and Exploratorium

# DISASTER RESPONSE



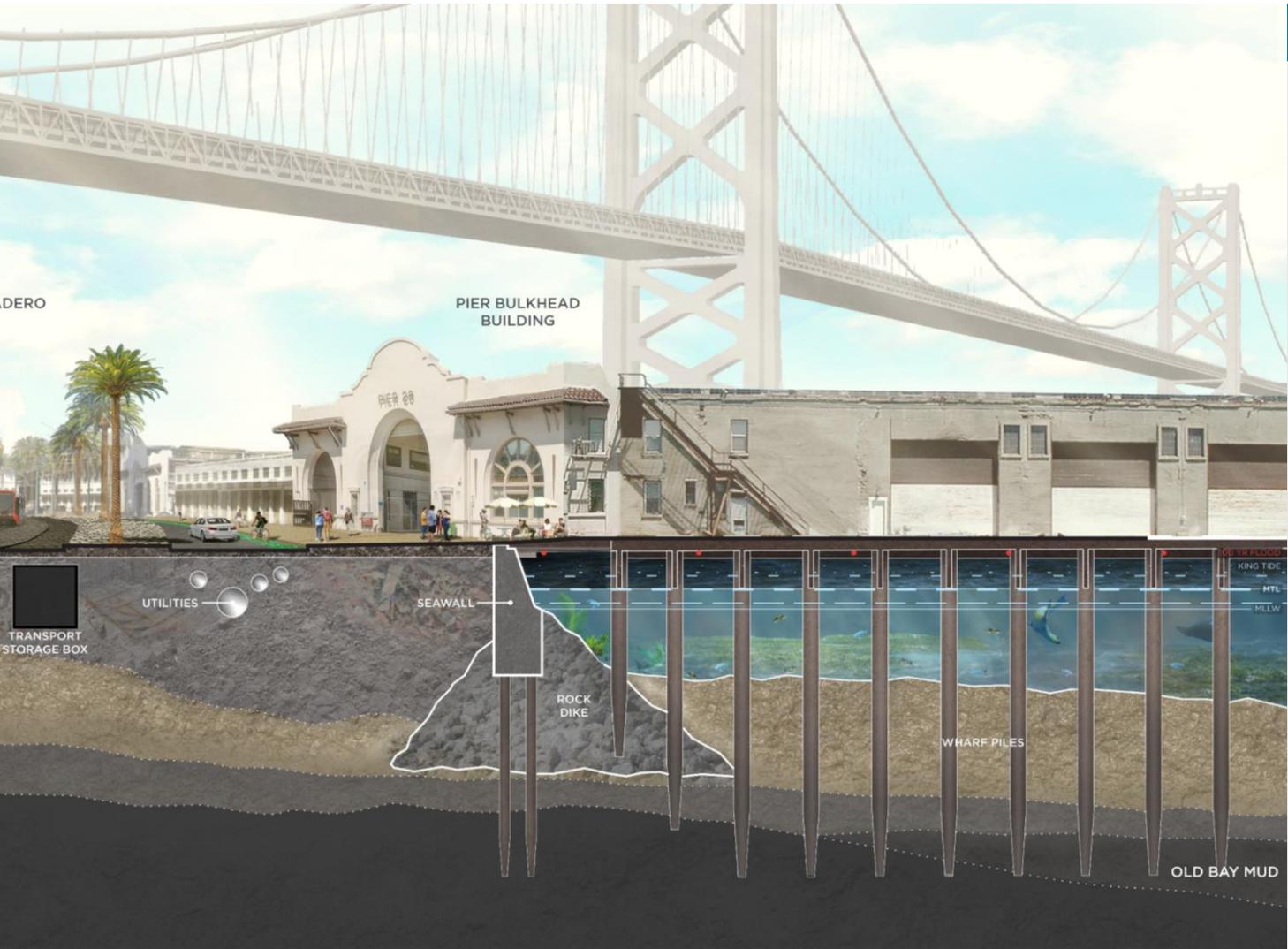
## WHAT WE KNOW NOW

- Up to 250,000 people may require evacuation in earthquake event by water transport
- Only 1 facility built to current standards (downtown terminal and fireboat house in end of 2020)
- Embarcadero roadway and ferry facilities are critical

ROMA Design Group



# HABITAT AND ECOLOGY

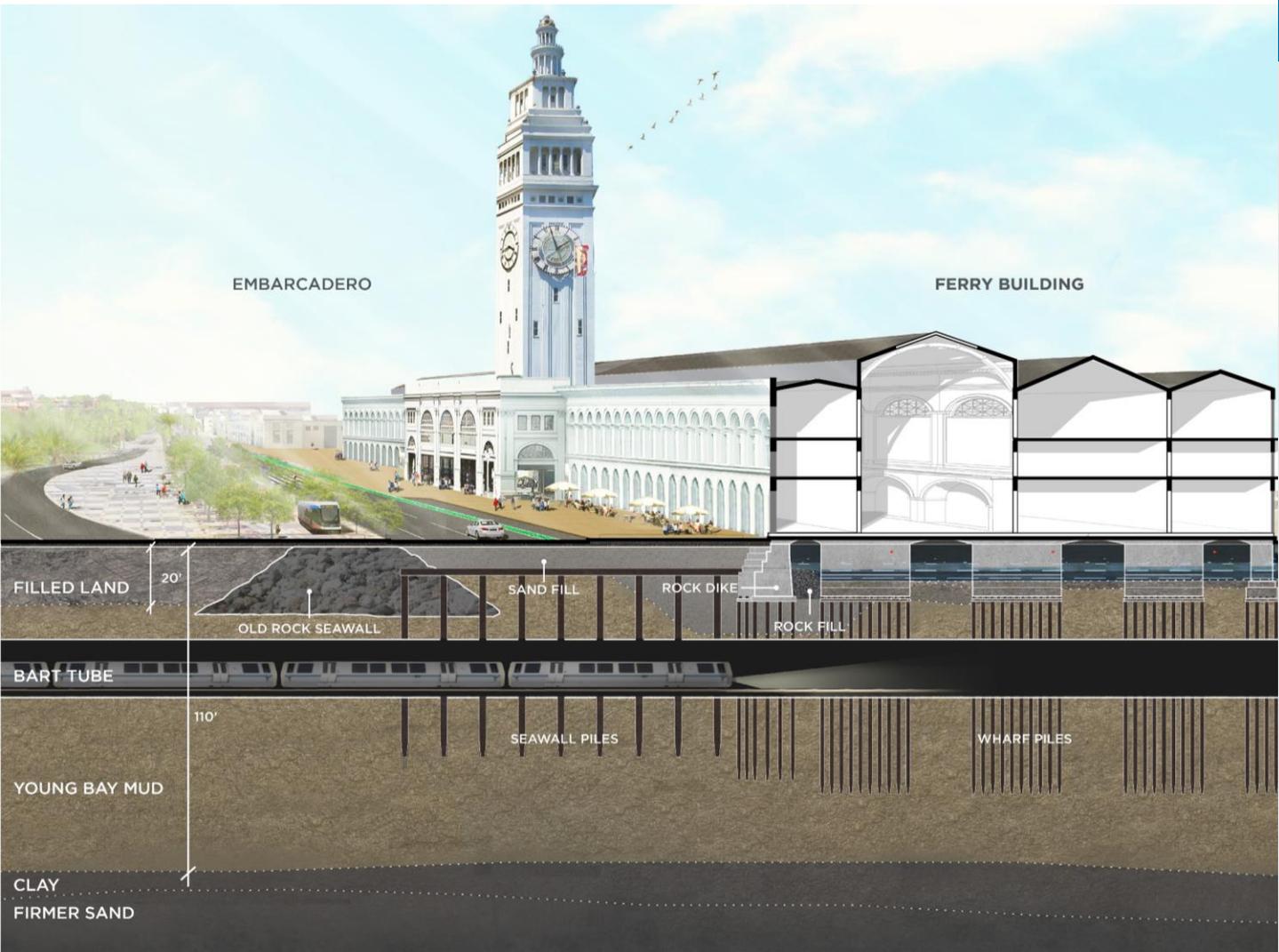


## WHAT WE KNOW NOW

- Environmental contaminants exist in groundwater and soil along shoreline
- If shoreline is impacted by earthquake, contaminants could spread into water
- Habitats/wildlife could be impacted



# HISTORIC RESOURCES



## WHAT WE KNOW NOW

- All historic resources could be impacted by earthquake/flood
- Many buildings have not been seismically improved and are vulnerable
- Near term flood risk includes Ferry Building, Agricultural Building, Piers 1 through 5



# WHAT'S NEXT?



## MHRA NEXT STEPS

- Refine data collection and modeling, particularly for key assets
- MHRA will be complete in Spring 2020
- Create alternatives for community and stakeholder input in Fall 2020

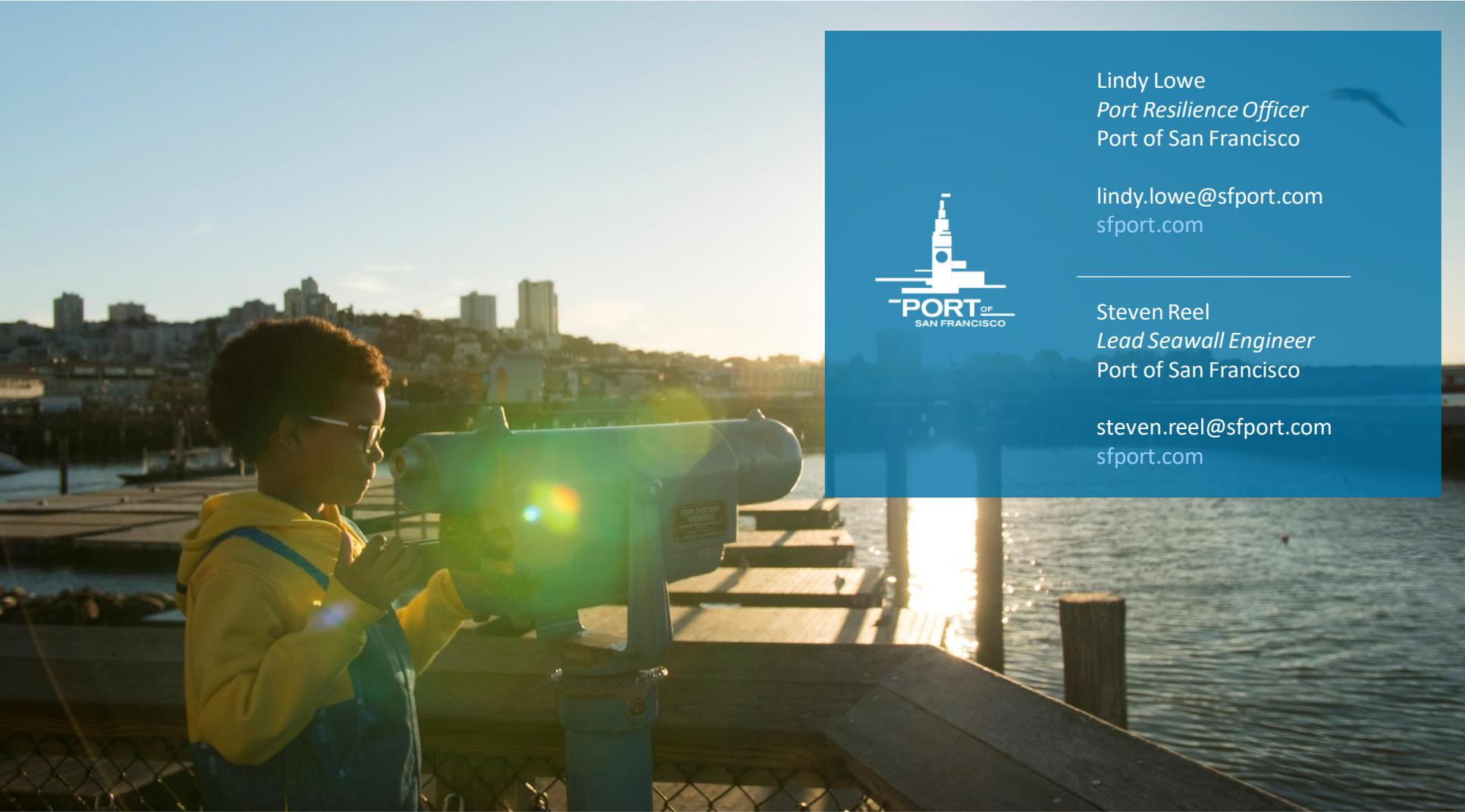
# TONIGHT'S ACTIVITY



## INSTRUCTIONS

- Review data at stations around the room
- 12 stations total, and we'll help you navigate seeing 7
- Write any feedback or comments on the “stickies” and place directly on boards
- All boards are online
- Staff are available for questions

# THANK YOU!



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