

EMBARCADERO SEAWALL PROGRAM & PORT RESILIENCE

San Francisco Bay
Conservation and Development Commission
February 21, 2018

Port Jurisdiction

Historic shoreline

Embarcadero Seawall

PORT OF
SAN FRANCISCO



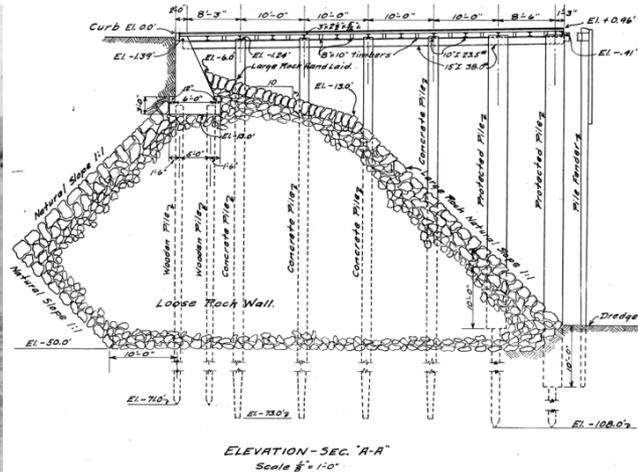
TODAY'S PRESENTATION

- Thank you for letting the Port of San Francisco join you today!
- We're excited to share:
 - Embarcadero Seawall Program:
 - History
 - What it supports
 - Program updates
 - Resilience framework
 - U.S. Army Corps of Engineers/Port Flood Study
 - Schedule
 - Funding
 - Port Resilience Efforts
 - Port Resilience Projects
 - Embarcadero Historic District Stewardship
 - Requests for engagement



UNDERSTANDING THE EMBARCADERO SEAWALL

- Built 1878 to 1915
- Rock dike & bulkhead
- Over 3 miles long
- 500 acres of filled land
- 126 acres pier & wharves today



EMBARCADERO SEAWALL TODAY

MORE THAN \$100 BILLION OF TOTAL ANNUAL ECONOMIC ACTIVITY AND PROPERTY VALUE IS AT RISK IF THE SEAWALL FAILS

The value of assets at risk is

10-40x greater

than the investment needed to strengthen the Seawall.



THE SEAWALL IS KEY TO REGIONAL TRANSPORTATION



500,000 people use transit routes every weekday that terminate downtown or along the waterfront

Bicycle counts show that nearly **900** riders use the Embarcadero every day

The Embarcadero Seawall supports **15,000** daily ferry riders

THE SEAWALL IS A CRITICAL PART OF THE CITY'S NETWORK OF EMERGENCY RESPONSE

In the event of an emergency, the City estimates that up to **250,000** people will require water evacuation

The Seawall also supports over **50** key emergency assets including Fire Station 35, which houses the fireboat

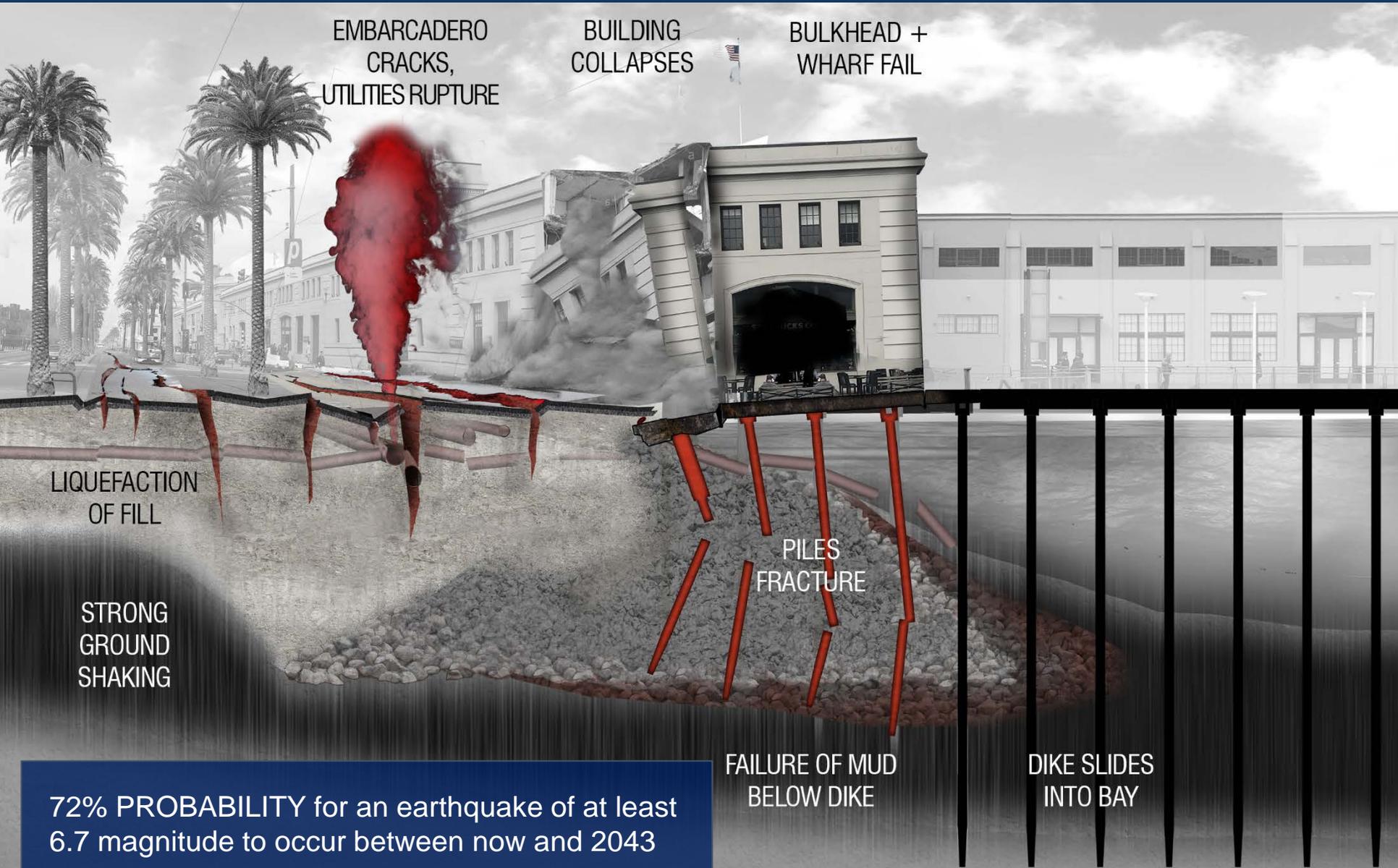


THE SEAWALL SUPPORTS AND PROTECTS IMPORTANT UTILITY INFRASTRUCTURE

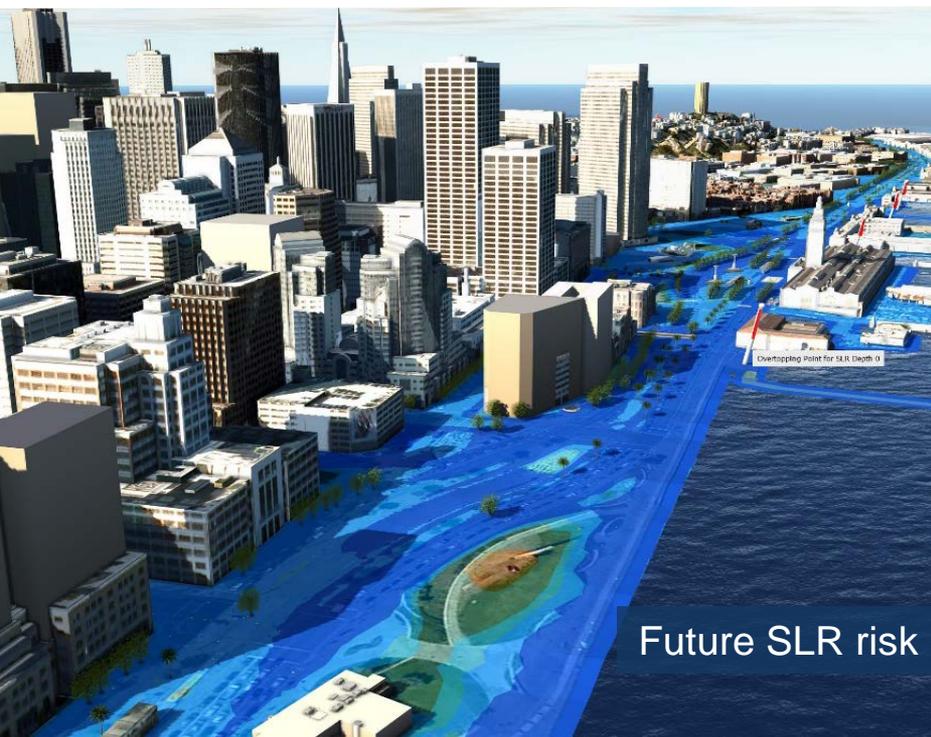
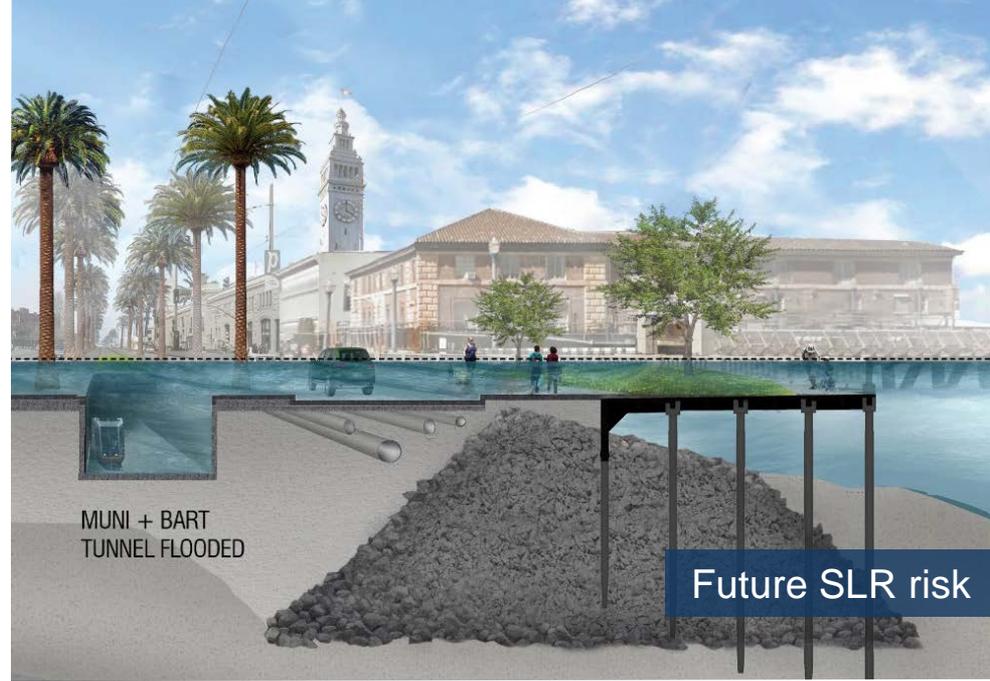
This includes major wastewater, water, auxiliary water system, and power utilities.



SAN FRANCISCO FACES URGENT EARTHQUAKE RISKS



72% PROBABILITY for an earthquake of at least 6.7 magnitude to occur between now and 2043



INCREASING FLOOD RISKS FROM SEA LEVEL RISE

- Muni and BART tunnels subject to flood risk today
- Up to 3 feet by 2050
- Up to 6-10 feet by 2100



EMBARCADERO SEAWALL PROGRAM OVERVIEW

- First priority is to **protect life safety and emergency response** from seismic events
- Up to \$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
- **Adaptive program framework** to be able to respond to changes in science, priorities and monitoring
- **Robust engagement and outreach**

SEAWALL PROGRAM YEAR IN REVIEW

DATA COLLECTION + FIELD WORK

- Existing Assets
- Bathymetric & Laser Survey
- Geotechnical Exploration

RISK ASSESSMENT

- Earthquake Risk
- Flood Risk

COMMUNITY & STAKEHOLDER ENGAGEMENT

FUNDING FOR PHASE I: IMMEDIATE LIFE SAFETY RISKS

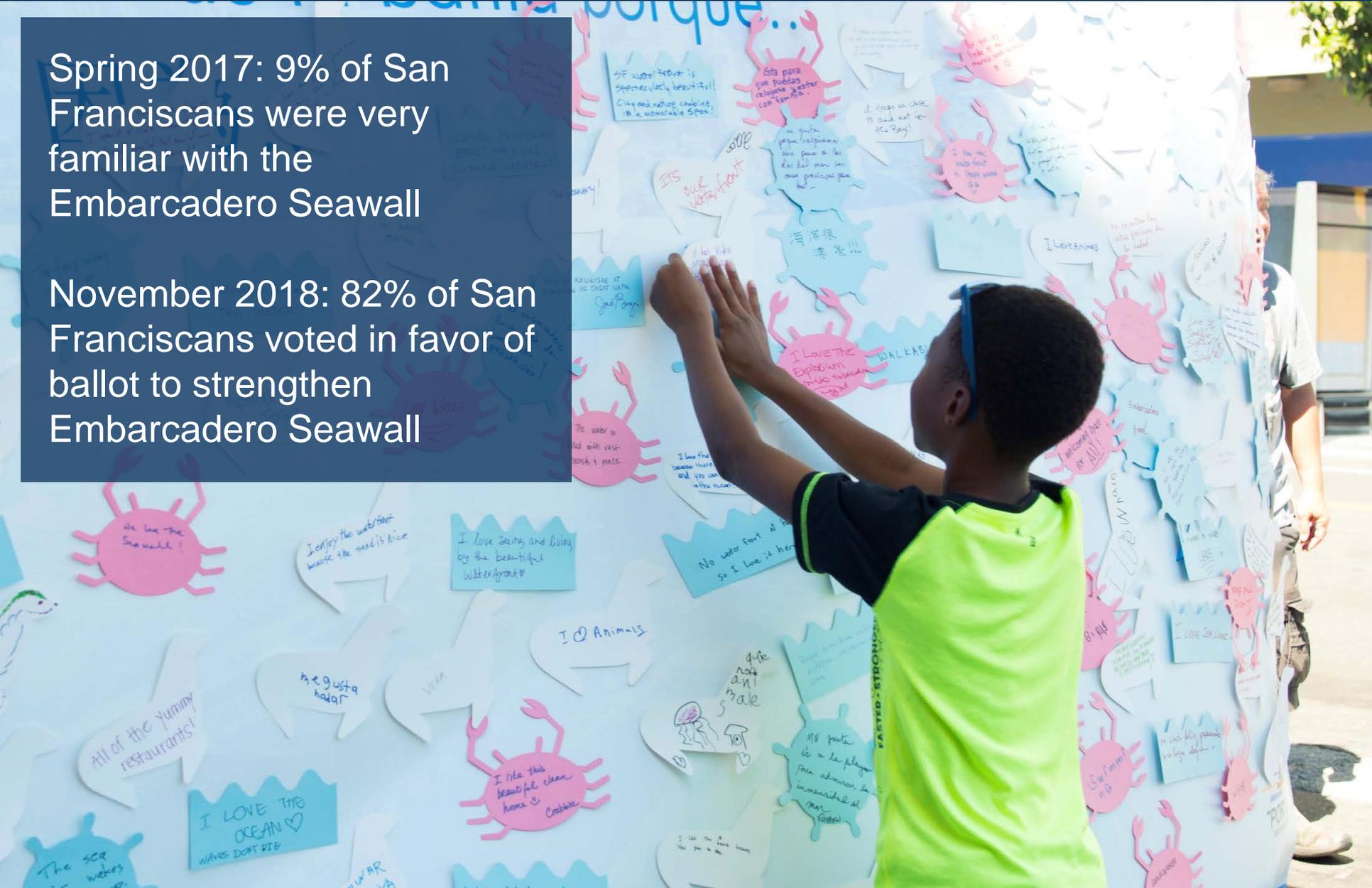
ARMY CORPS FLOOD STUDY



CITYWIDE SUPPORT FOR THE SEAWALL PROGRAM

Spring 2017: 9% of San Franciscans were very familiar with the Embarcadero Seawall

November 2018: 82% of San Franciscans voted in favor of ballot to strengthen Embarcadero Seawall



COMMUNITY & STAKEHOLDER ENGAGEMENT

EDUCATION OUTREACH

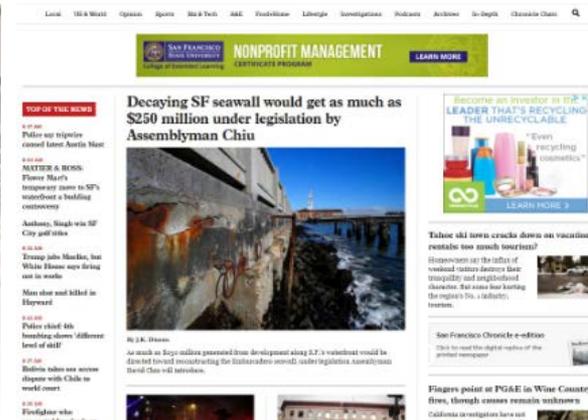
- 100+ Stakeholder Presentations
- 60+ Community Outreach Events
- 11+ Seawall Walking & Bike Tours
- 8 eNewsletters
- 1M + Impressions on Seawall Website, Social Media
- In-Language Activities Prioritized
- Port Tenant Outreach
- Community Meetings #1 and #2

INNOVATIVE ENGAGEMENT

- “Makers” Partnerships with Black Hammer Brewing and Ritual Coffee
- Partnerships with California Academy of Sciences, the Exploratorium, etc.
- Twitter “Chats” with Oracle Park, BART, Fisherman’s Wharf, Ferry providers, Muni, etc.

MEDIA

- 100+ Media Hits in 2018
- 3 Op-Eds
- Radio and TV Segments



DATA COLLECTION: EXISTING ASSETS



The Port collected information on existing assets with City agencies, partners, and community stakeholders

INFRASTRUCTURE



URBAN AND CULTURAL



PARKS AND ECOSYSTEMS



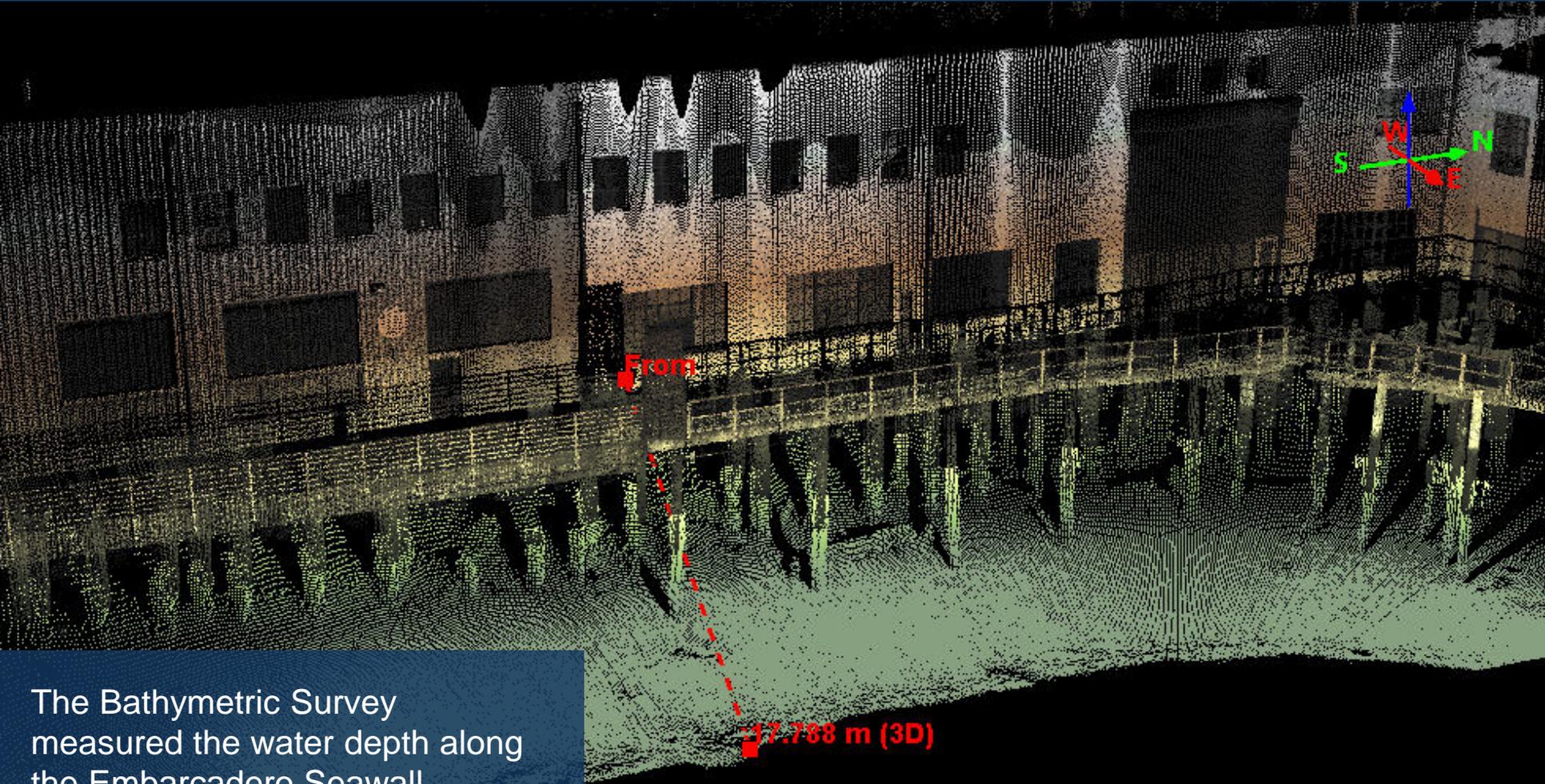
MARITIME



DISASTER RESPONSE

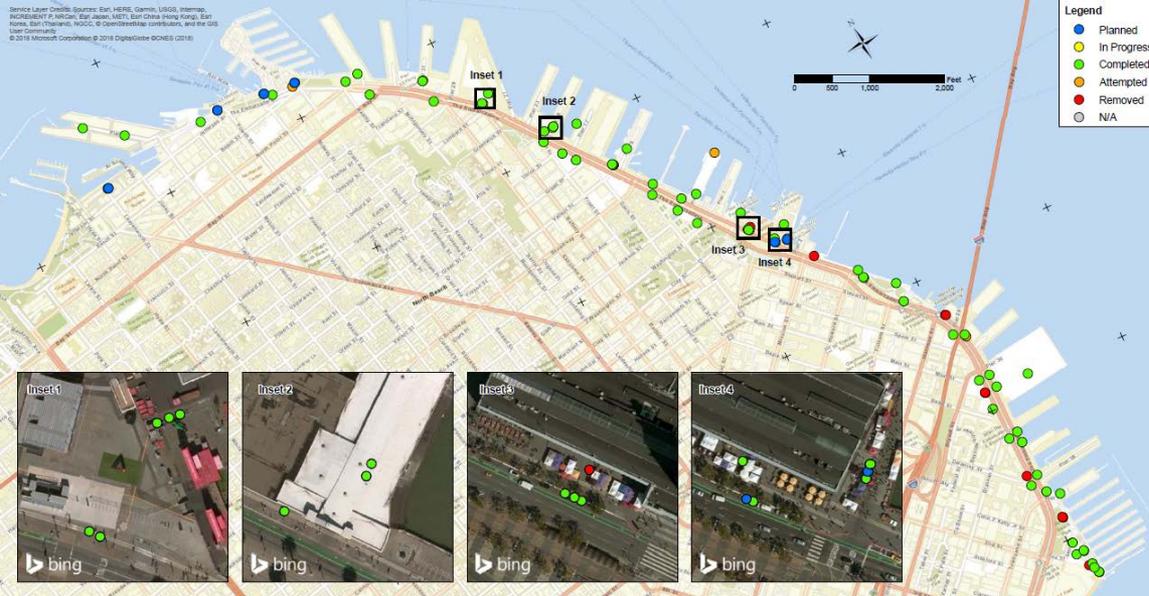


FIELD WORK: BATHYMETRIC AND LASER SURVEY



The Bathymetric Survey measured the water depth along the Embarcadero Seawall.

Survey results will inform the seismic and flood analysis modeling for the Seawall.



- Legend**
- Planned
 - In Progress
 - Completed
 - Attempted
 - Removed
 - N/A

FIELD BORING LOG							BORING NO.	
PROJECT		CLIENT	DATE	LOGGER	REVIEWED BY		Sheet 2 of 3	
REMARKS								
DEPTH	SAMPLER	SAMPLE	MATERIAL DESCRIPTION					OTHER
	TYPE	TOP DEPTH (feet)	DRIVE (ft)	RECORD (ft)	BLOWS (Pressure)	TYPE	TOP DEPTH (feet)	LITHOLOGY
25								<p>GEOTECHNICAL UNIT G/L FORMATION LENGTH RANGE IN FEET <small>For use ONLY IF SAND, GRAVEL, OR SILT CONTAINS MORE THAN 25% FINE GRAIN AND CONTAINS NO COBBLES OR Boulders. For use ONLY IF SILT OR CLAY CONTAINS MORE THAN 75% FINE GRAIN AND CONTAINS NO SAND OR GRAVEL. For use ONLY IF SILT OR CLAY CONTAINS MORE THAN 75% FINE GRAIN AND CONTAINS NO SAND OR GRAVEL.</small></p> <p>1:05 - 1:20 - Drill in casing from 19 ft to 29 ft Drive casing to 29 ft Difficulty drilling casing @ 25 ft and below. Casing chatter + bounce</p> <p>Cuttings @ 28 ft</p> <p>1:25 Soil in casing @ 27 ft Begin drilling out. Similar cuttings - grayish sandstone</p> <p>1:50 Lost circulation @ 29 ft (Bottom of casing)</p> <p>1:58 - 2:00 Drill in casing to 37 ft. Drive in casing to 39 ft</p>
30								



FIELD WORK: GEOTECHNICAL EXPLORATION

- Completed approximately 100 exploratory borings along the Embarcadero Seawall
- Borings help to better understand subsurface conditions and evaluate potential earthquake effects

MULTI-HAZARD RISK ASSESSMENT: ADVANCED EARTHQUAKE + FLOOD HAZARD

FLAC (Version 8.00)

LEGEND

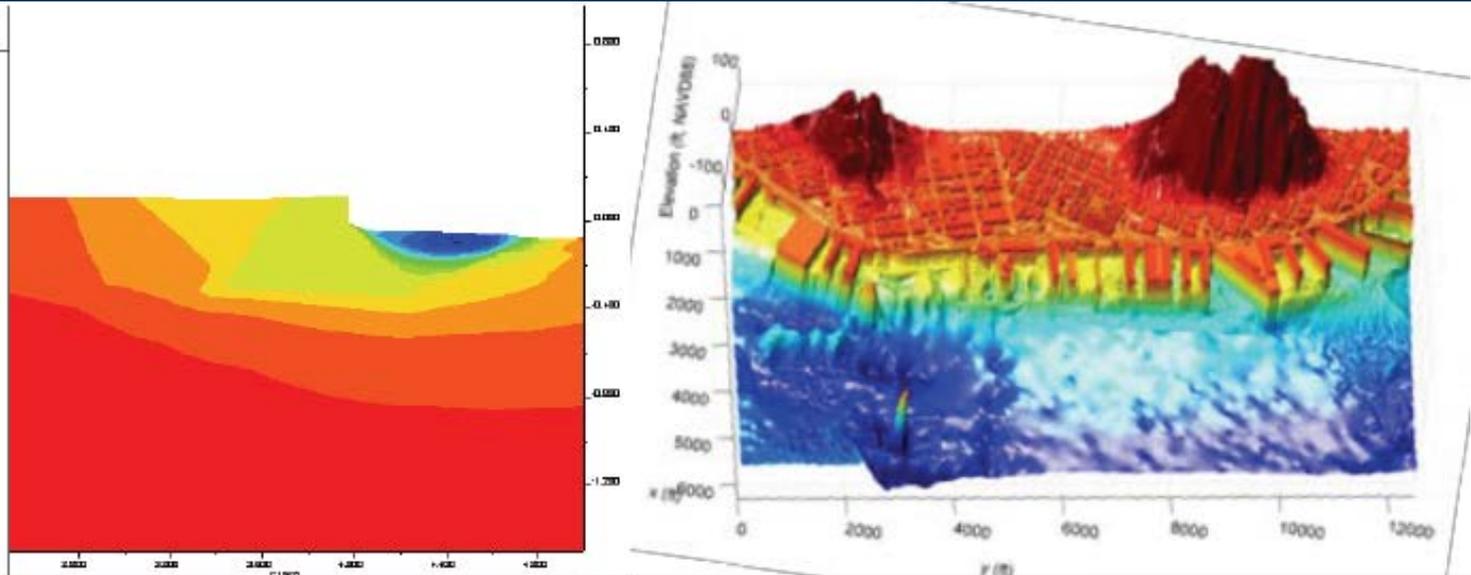
5-Dec-18 13:07
step 196436
Dynamic Time 8.0000E+01
2.500E+02 <=x< 5.000E+02
-1.500E+02 <=y< 1.000E+02

X-displacement contours



Contour interval= 5.00E-01

Figure
Walnut Creek, California



EARTHQUAKE RISK ASSESSMENT (IN PROGRESS)

- Advanced soil-structure modeling using new geotechnical exploration results to determine extent of lateral spreading and liquefaction hazards, and predict damage to the Seawall and adjacent assets.

FLOOD RISK ASSESSMENT (IN PROGRESS)

- Evaluate extent of coastal flood hazard to estimate damage to exposed assets. Flood hazard will consider wind-wave joint probability analysis and level rise projections.

PORT AND SEAWALL RESILIENCE FRAMEWORK

PHASE

1

STRENGTHEN ELEMENT

STRENGTHEN THE SEAWALL FOR PUBLIC SAFETY

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

Planning and Implementation Horizon:
2018 – 2026

Priorities:
Current Seismic & Flood Risk

Geographic Focus:
Embarcadero Seawall

PHASE

2

ADAPT ELEMENT

ADAPT TO MID-CENTURY RISKS

Objective:
Identify policies and projects that will result in a Port that is resilient to seismic and increasing flood risks and that can respond to changing priorities. Projects will be integrated into city, regional, and private actions, resulting in coordinated actions to increase waterfront resilience.

Planning and Implementation Horizon:
2018 – 2050, Plan updated every five years

Priorities:
Seismic Risk and Future Flood Risk

Geographic Focus:
Entire Port Jurisdiction

PHASE

3

ENVISION ELEMENT

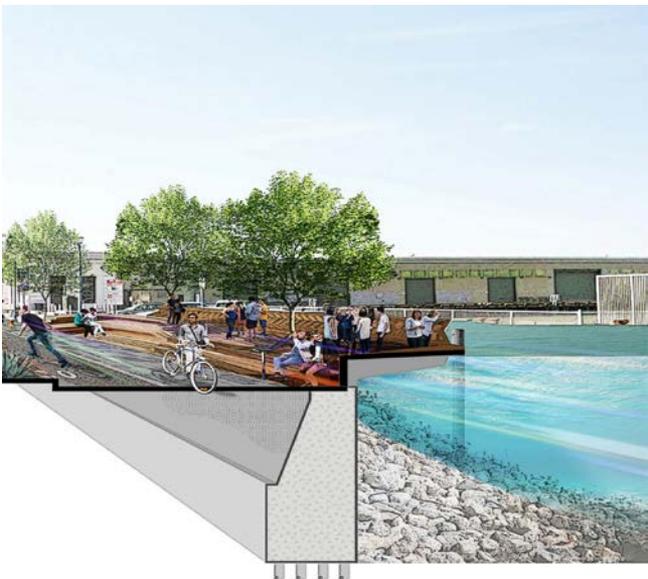
ENVISION THE WATERFRONT IN 2100

Objective:
Develop visions that can respond to remaining seismic risk and increasing flood risks and have an ongoing public conversation about the trade-offs of different options.

Planning and Implementation Horizon:
2018 – 2100, Vision Element updated every 10 years

Priorities:
Seismic Risk and Future Flood Risk

Geographic Focus:
Entire Port Jurisdiction





HIGHLIGHTS

- Federal funding, expertise, partnership
- Port is the local sponsor, seeking assistance since 2012
- Flood Study is entire Port jurisdiction
- No limit to the scale, extent or cost of projects
- Suspend CAP 103, use prior work in GI

STUDY OVERVIEW

- Estimate 4-1/2 years & \$6M, 50/50 cost share
- Evaluate flood risk to entire Port, develop and evaluate a wide range of alternatives
- Culminates in a recommendation to Congress to authorize and fund design & construction of selected plan.
- Design/construction of federal plan cost shared 65% fed / 35% local
- Locally preferred plan can be selected, sponsor pays extra cost

PHASE I SCHEDULE



SEAWALL PROGRAM FUNDING NEXT STEPS

The Port is currently pursuing local, state, federal, and private funding sources to fully fund infrastructure improvements anticipated to cost up to \$5 billion:

LOCAL

- City GO Bond Programs
- Other

FEDERAL

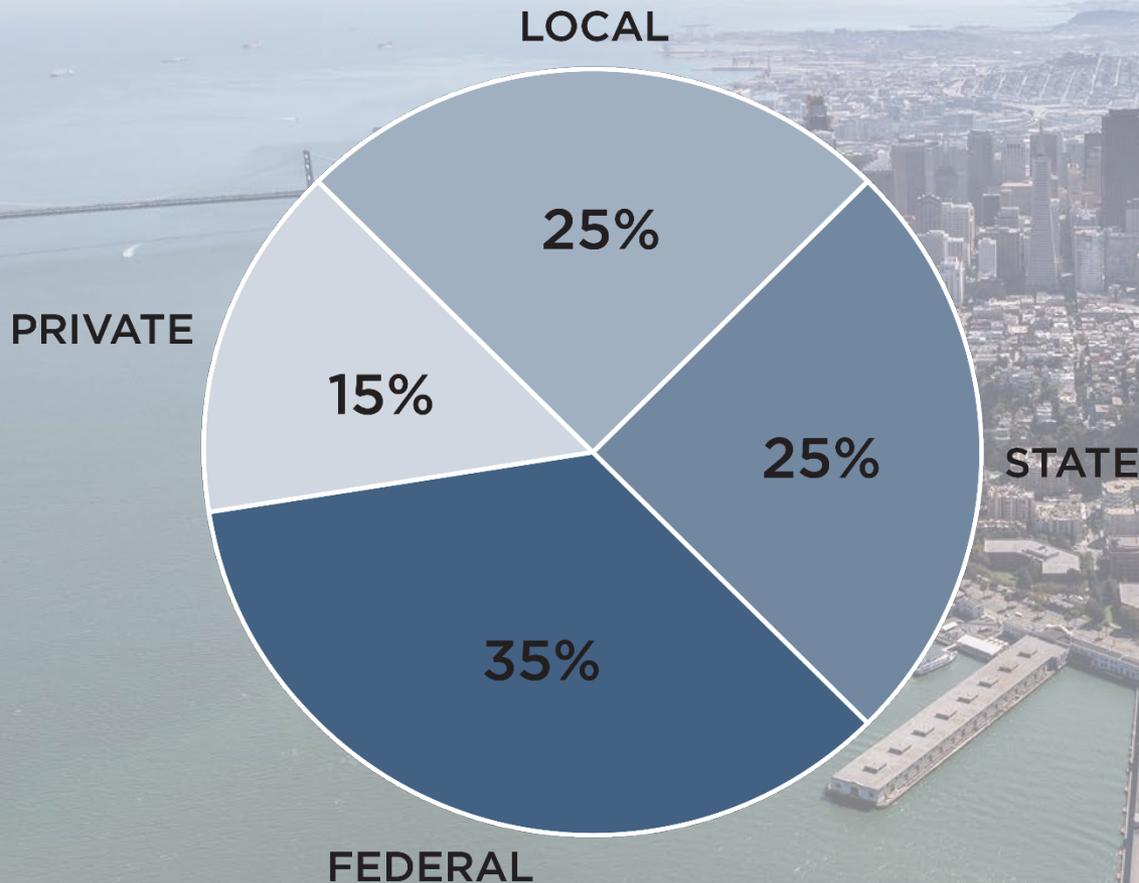
- US Army Corps of Engineers – USACE/Port Flood Study
- Water Resources
- Transportation

STATE

- Cap and Trade
- State Share of Tax Increments

PRIVATE

- Waterfront Development Project
- Businesses



PORT RESILIENCE EFFORTS



PORT WIDE

FLOOD PROOF
PIERS

PORTWIDE
RESILIENCE

ADAPTIVE
FRAMEWORK

UTILITIES
PROJECTS

PROJECT
ADAPTATIONS

EMBARCADERO

FLOOD
STUDY

SEAWALL
PROGRAM

RFI

MISSION BAY

FLOOD
STUDY

SOUTHERN
WATERFRONT
ASSESSMENT

ISLAIS CREEK/ BAYVIEW

FLOOD
STUDY

ISLAIS CREEK
FLOOD STUDY

SOUTHERN
WATERFRONT
ASSESSMENT

RESILIENCE PROJECTS

DOWNTOWN FERRY TERMINAL

- New Pier and Terminal Expansion under construction
- 3 feet higher than prior terminals due to SLR
- Massive steel piles to withstand up to 6 feet of lateral spreading



MISSION BAY FERRY LANDING



- Design accommodates Sea Level Rise through 2070 with resilience and future adaptability beyond
- Designed to appropriate California Building Code Risk Category for first response and evacuation in the event of a catastrophe

PIER 70 & MISSION ROCK

PIER 70

- To deliver up to 3,000 homes, nine acres of parks, and significant sea level rise protections such as elevating the site and buildings to accommodate up to six feet inches of sea level rise
- The project will generate an estimated \$88 million to be used for Port-wide sea level rise adaptation

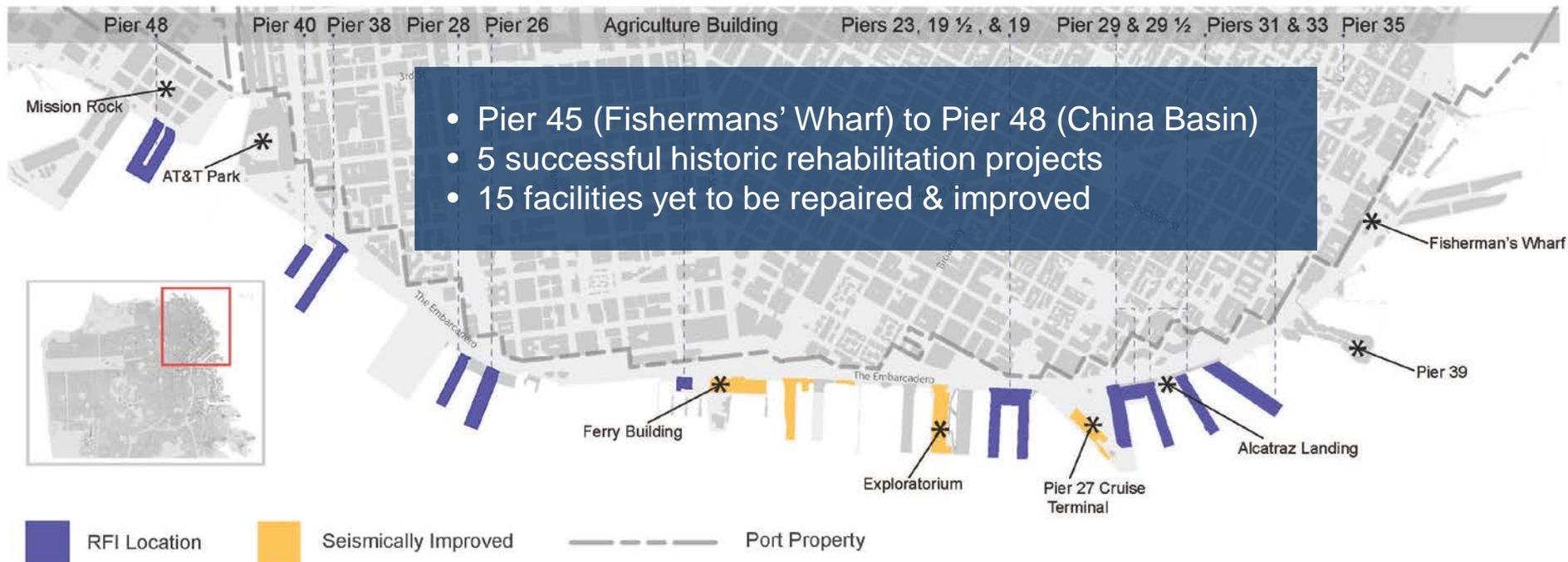


MISSION ROCK/PIER 48

- To deliver new homes, raise the site to withstand up to 6 feet of sea level rise, and transition China Basin Park to allow flooding in low-lying park areas
- The project establishes an ongoing Shoreline Protection revenue stream



EMBARCADERO HISTORIC DISTRICT STEWARDSHIP



- Pier 45 (Fisherman's Wharf) to Pier 48 (China Basin)
- 5 successful historic rehabilitation projects
- 15 facilities yet to be repaired & improved

LEVERAGE SEAWALL IMPROVEMENT TO OPEN MORE HISTORIC PIERS TO THE PUBLIC

- The Embarcadero Historic District is a result from Port & BCDC collaboration in 2000
- People love the Ferry Building, Exploratorium and Piers 1-5 and seek more pier rehabilitation
- The Port received 52 responses with diverse ideas for public-oriented uses
- Embarcadero Historic District Public Trust Objectives recommended in Waterfront Plan Update
- Collaborate to develop a shared BCDC + State Lands + Port strategy



REQUESTS FOR BCDC ENGAGEMENT

RESOURCE & REGULATORY AGENCY WORKING GROUP PARTICIPATION

- Help inform the Embarcadero Seawall Program and the Flood Study

COLLABORATE ON LOCAL & REGIONAL RESILIENCE EFFORTS

- Adapting to Rising Tides Program
- Public engagement around Sea Level Rise
- Current and upcoming Bay Plan amendments

PUBLIC ENGAGEMENT EFFORTS

- Help us reach new voices



THANK YOU!

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