



Port of San Francisco

# Seawall Resilience Project

SPUR 10/12/2016



# Seawall Resilience Project

Building the Seawall

Earthquake Risk

Sea Level Rise & Flood Risk

Impacts

Mitigation Concepts

Advancing the Project

Building The Seawall - California Board of State Harbor Commissioners

# Chapter 306 of the Statutes of 1863



# Building The Seawall

## Extent of the Seawall – 1879 to 1916



1850's Shoreline

Fisherman's Wharf

Mission Creek

Pre-1906 Seawall

1906-1916 Seawall

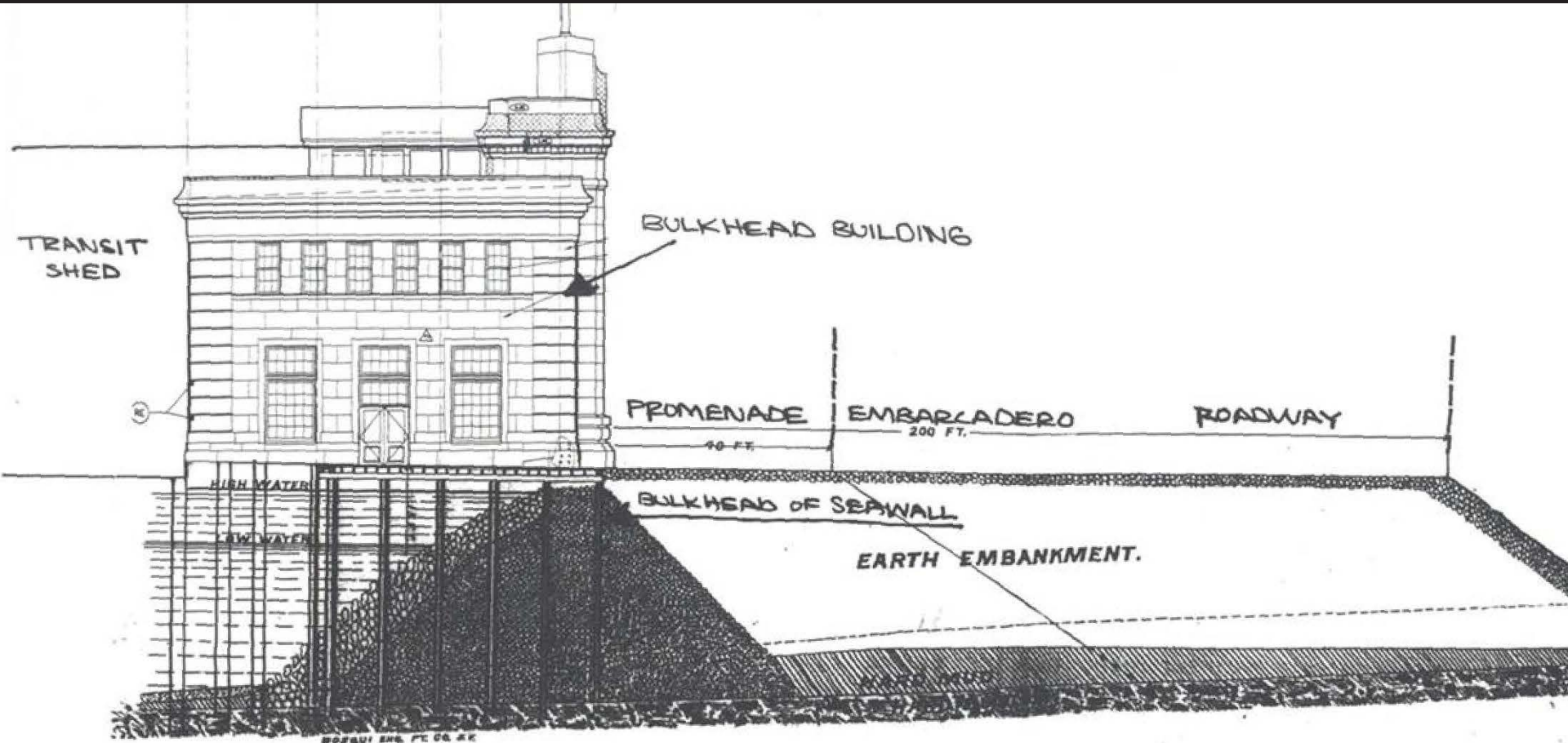
Building The Seawall

# Pier 34 & Pier 36 in 1909



Building The Seawall

# Typical Early Construction



**TRANSVERSE SECTION of SEA WALL and THOROUGHFARE.**

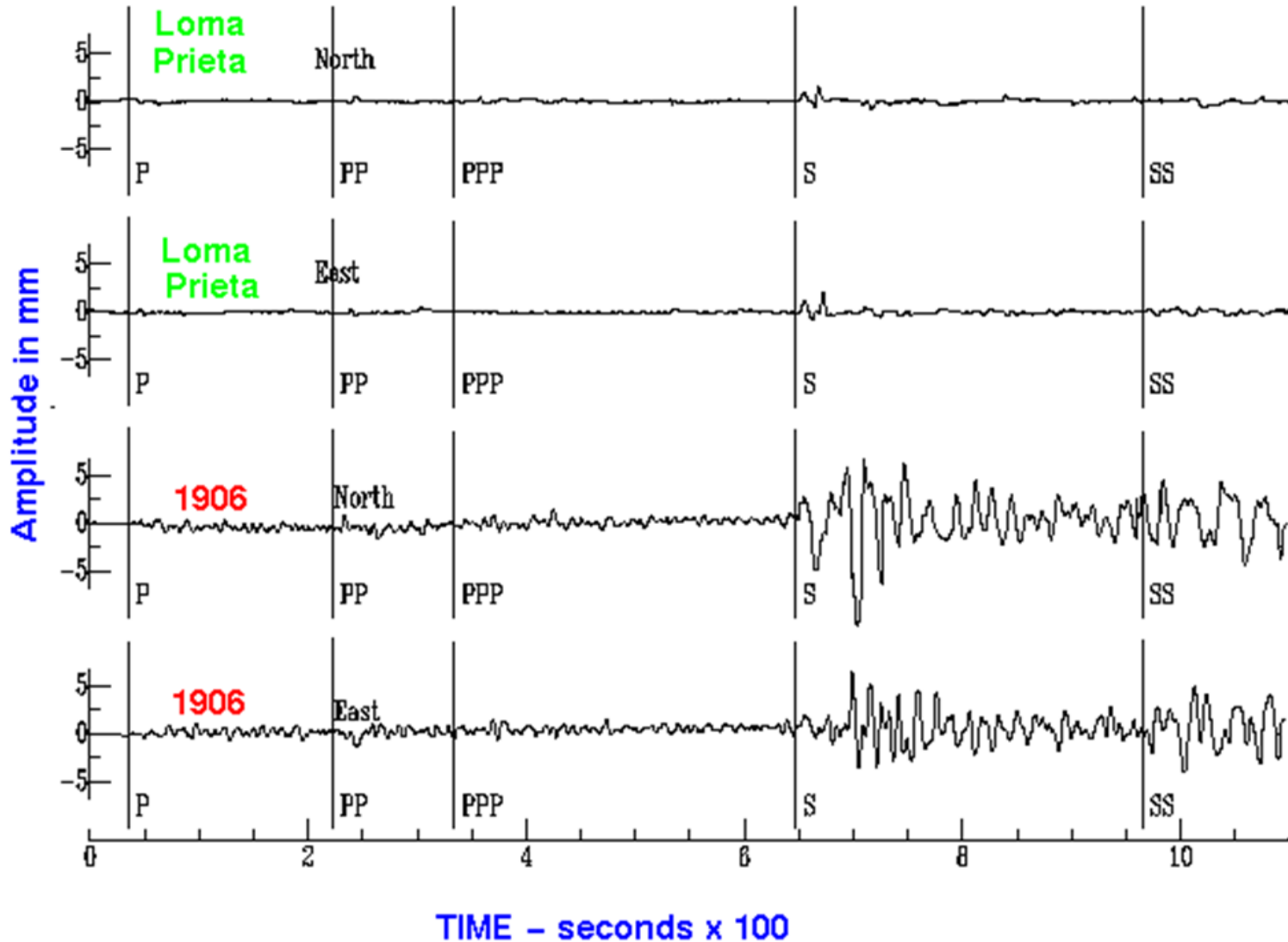
SCALE 20 FT. = 1 INCH.

# Earthquake Vulnerability

72% Probability of Major  
Earthquake by 2044

# Comparison of 1906 and 1989 Earthquakes

Comparison of 1906 and Loma Prieta records at Gottingen, Germany





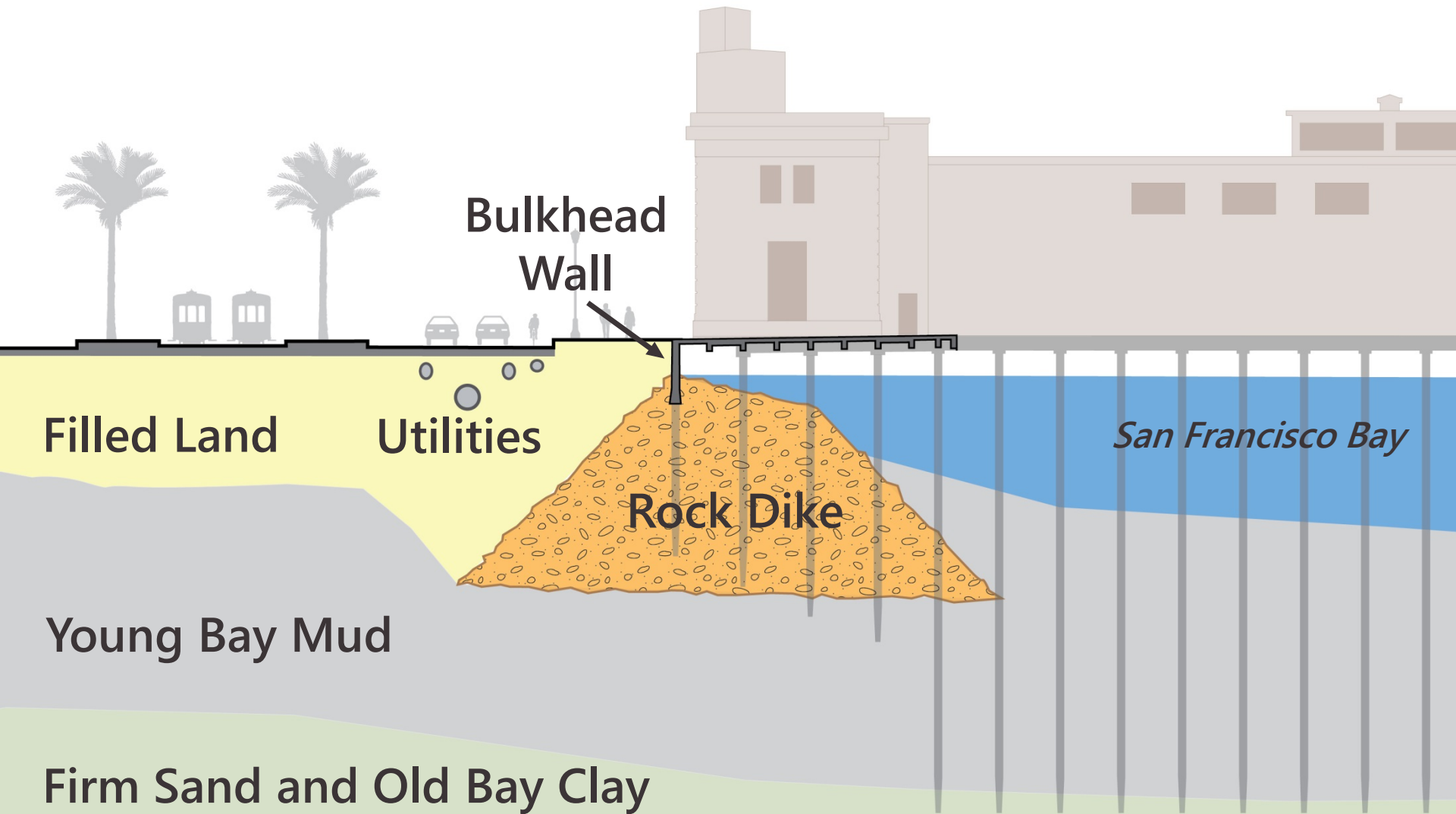
## Earthquake Vulnerability

# 1906 Earthquake: Embarcadero near Lombard



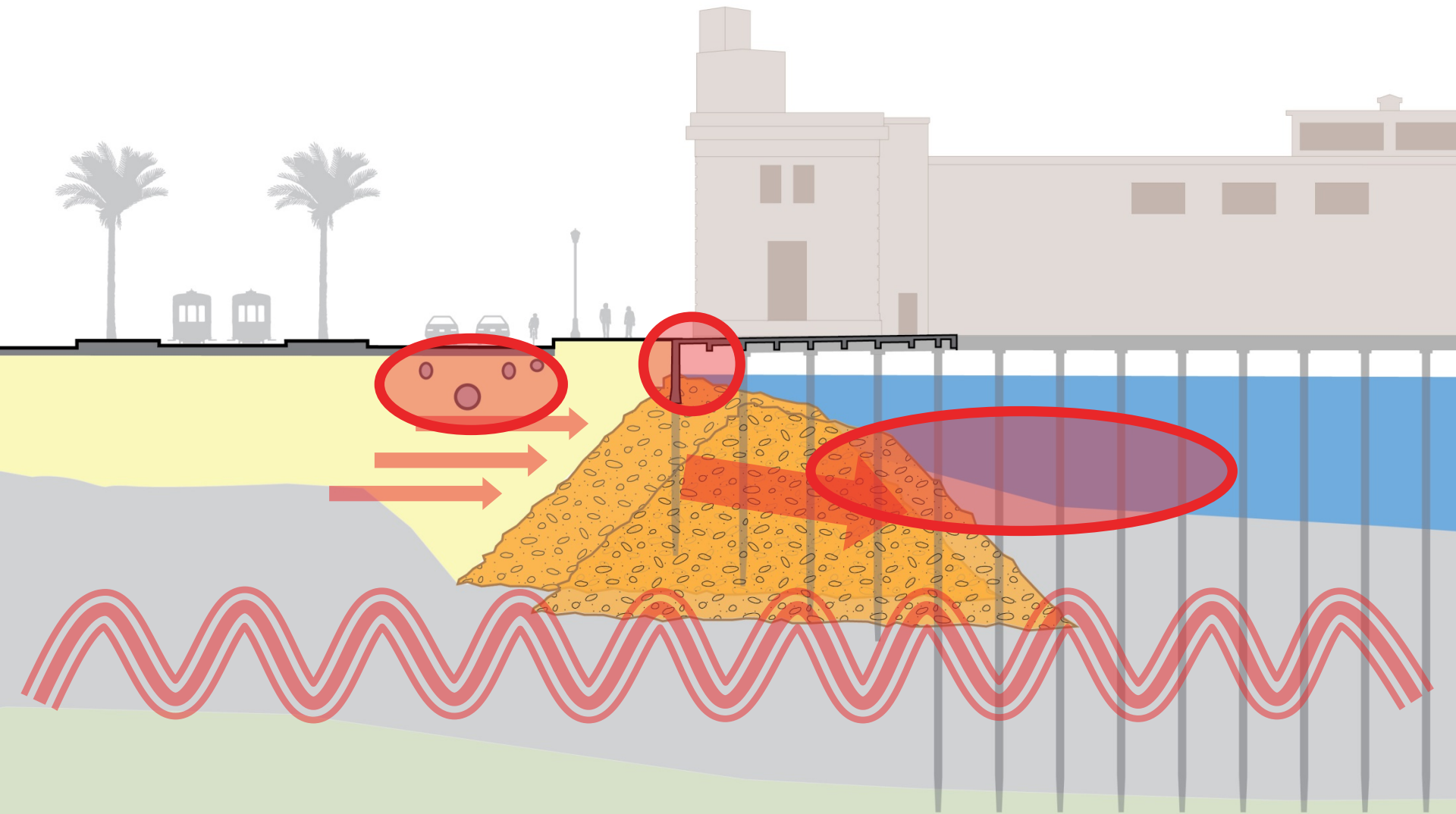
# Earthquake Vulnerability

## Existing Conditions



## Earthquake Vulnerability

# In the Event of An Earthquake



# Sea Level Rise & Flood Risk

Sea Level is Expected to  
Increase

12-24 Inches by 2050

36-66 Inches by 2100

Sea Level Rise

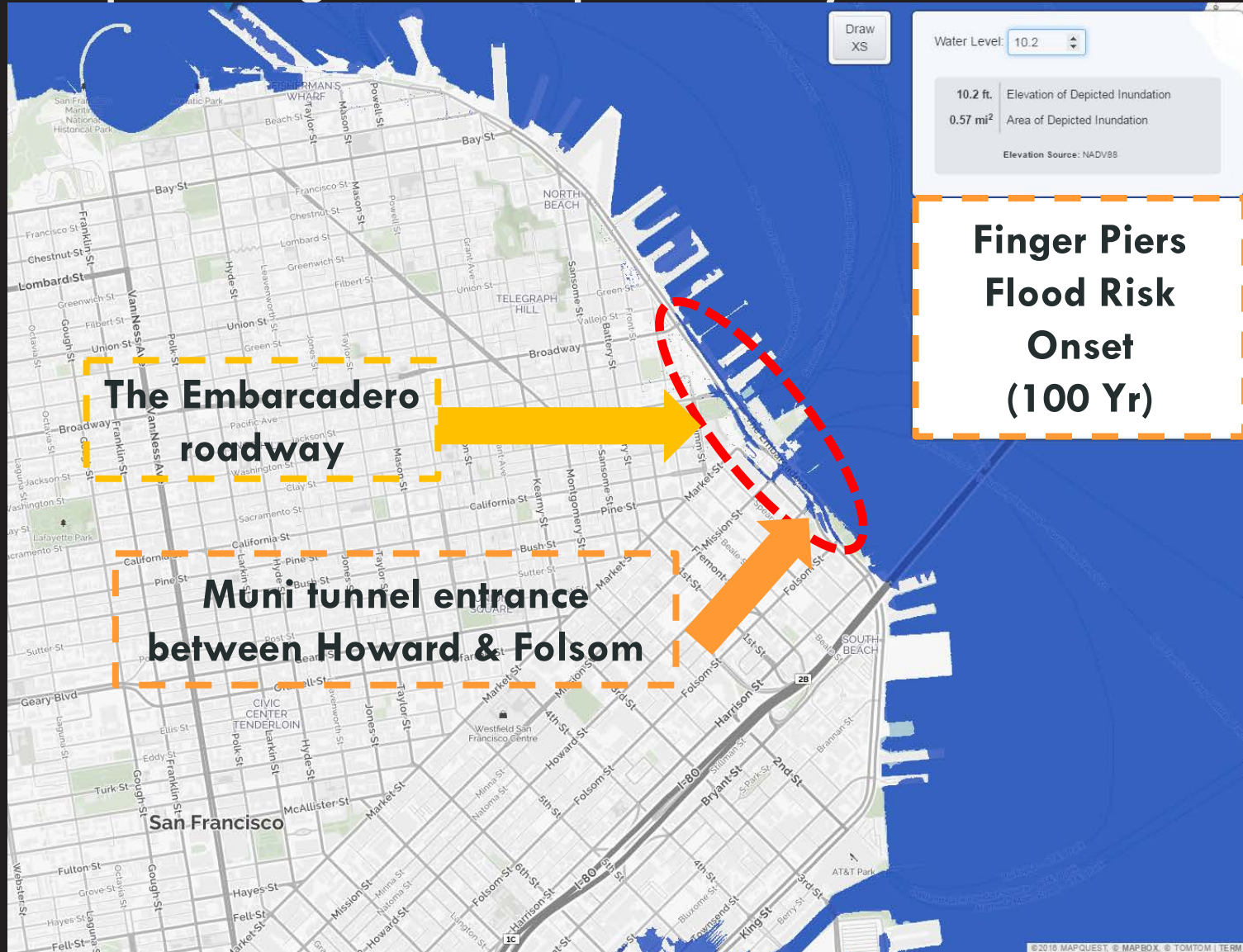
# Pier 14 in King Tides Today



# Sea Level Rise

# 100 Year Flood Vulnerability

+6 inches | 2017 High Scenario | 2031 Likely Scenario



Sea Level Rise

# 100 Year Flood Vulnerability

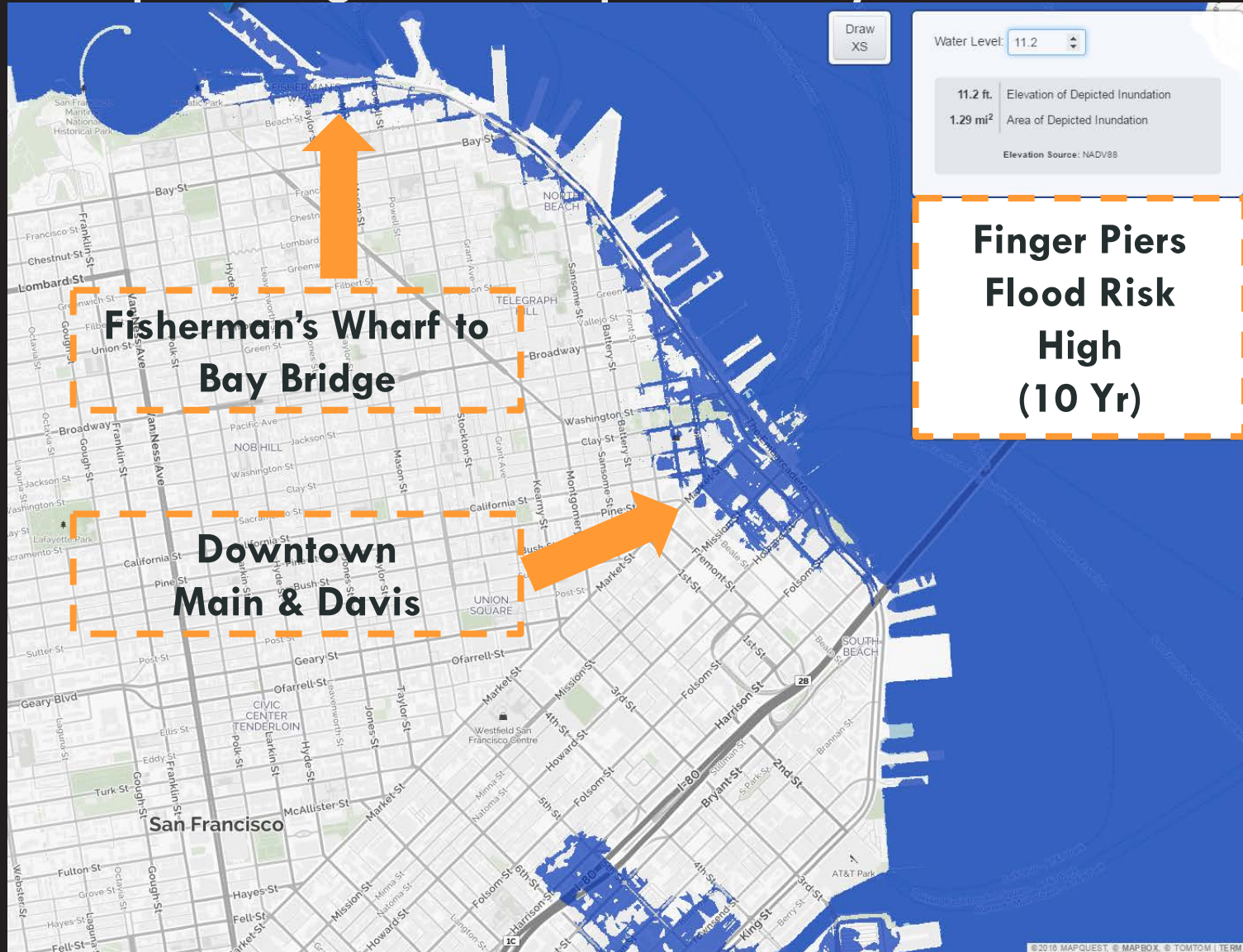
+12 inches | 2030 High Scenario | 2050 Likely Scenario



Sea Level Rise

# 100 Year Flood Vulnerability

+18 inches | 2040 High Scenario | 2068 Likely Scenario

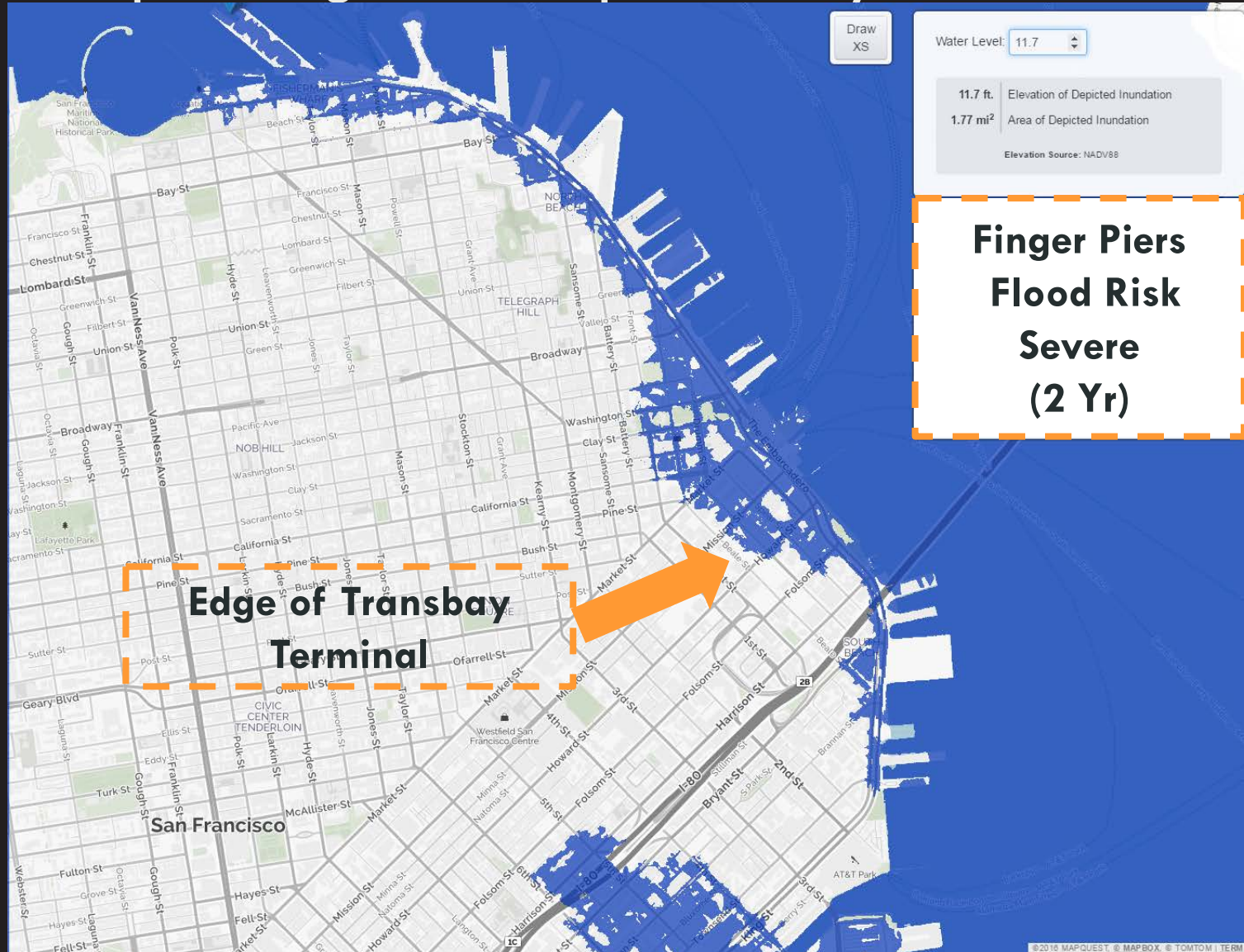




Sea Level Rise

# 100 Year Flood Vulnerability

+24 inches | 2050 High Scenario | 2081 Likely Scenario

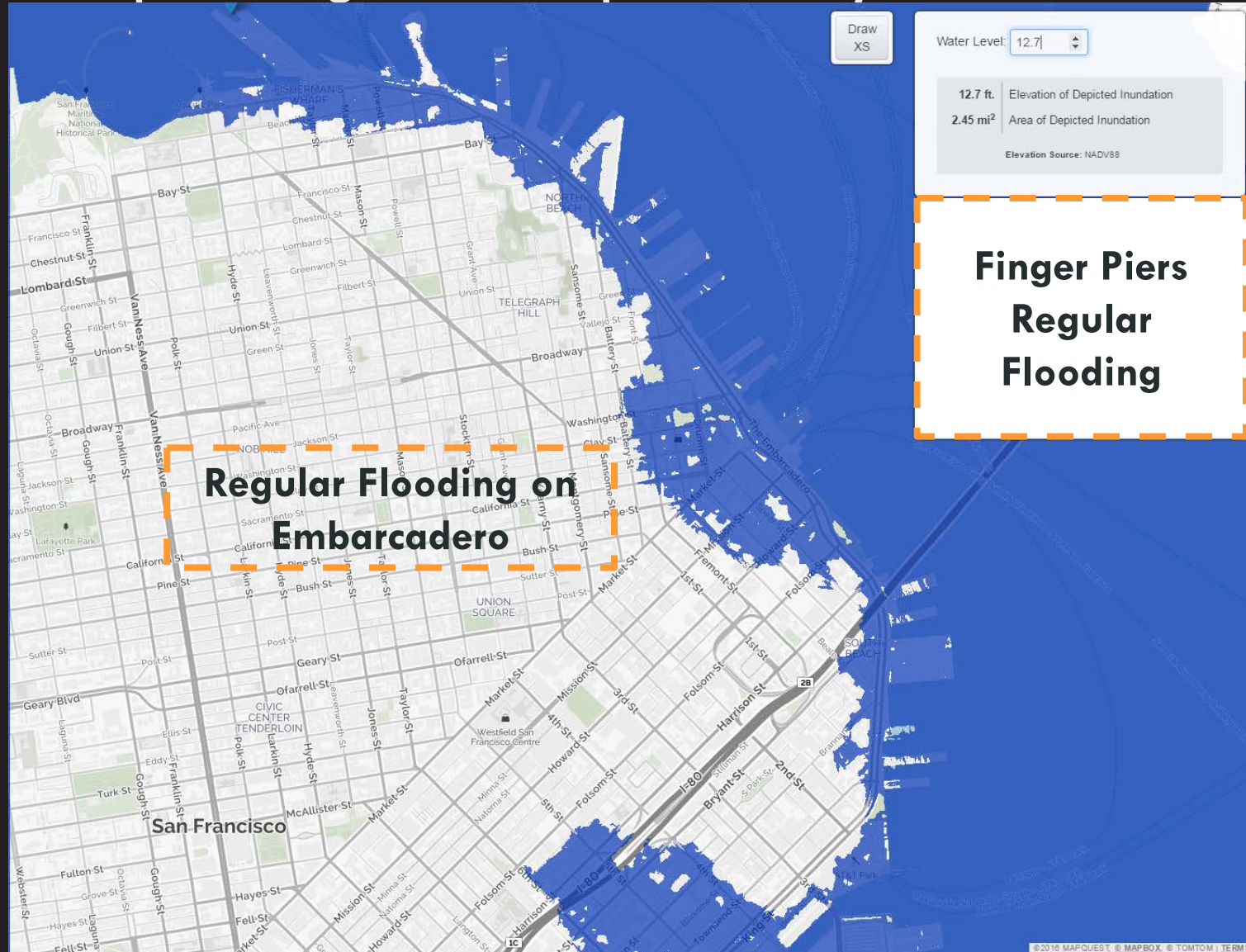


**Finger Piers  
Flood Risk  
Severe  
(2 Yr)**

Sea Level Rise

# 100 Year Flood Vulnerability

+36 inches | 2067 High Scenario | 2100 Likely Scenario

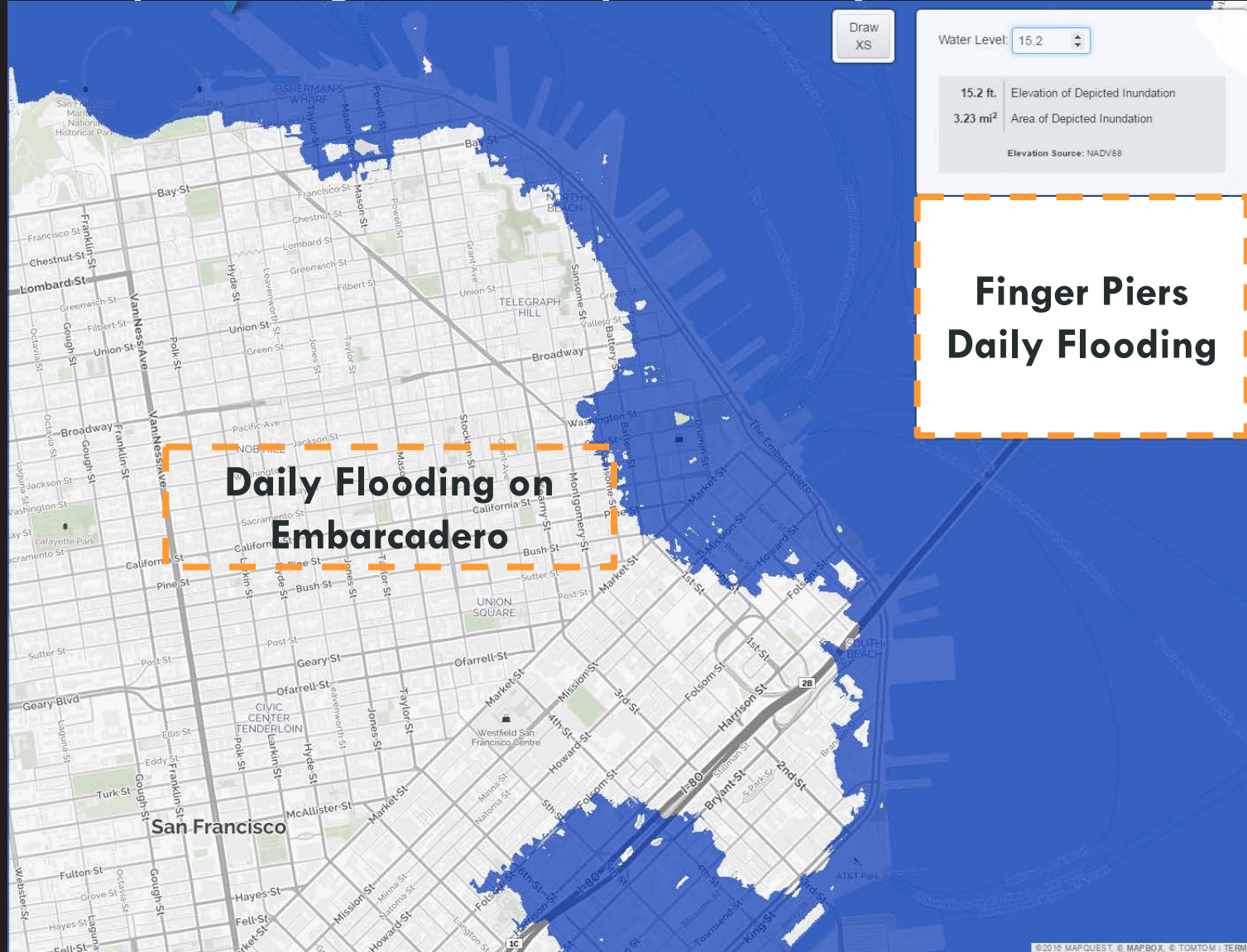


**Finger Piers  
Regular  
Flooding**

Sea Level Rise

# 100 Year Flood Vulnerability

+66 inches | 2100 High Scenario | 2160 Likely Scenario



# Impacts

Life-Safety Risk

Damage to Port & City Infrastructure

Disruption to Port, City, & Region

Impacts – Life Safety Risk

# The Embarcadero & Bulkhead Buildings



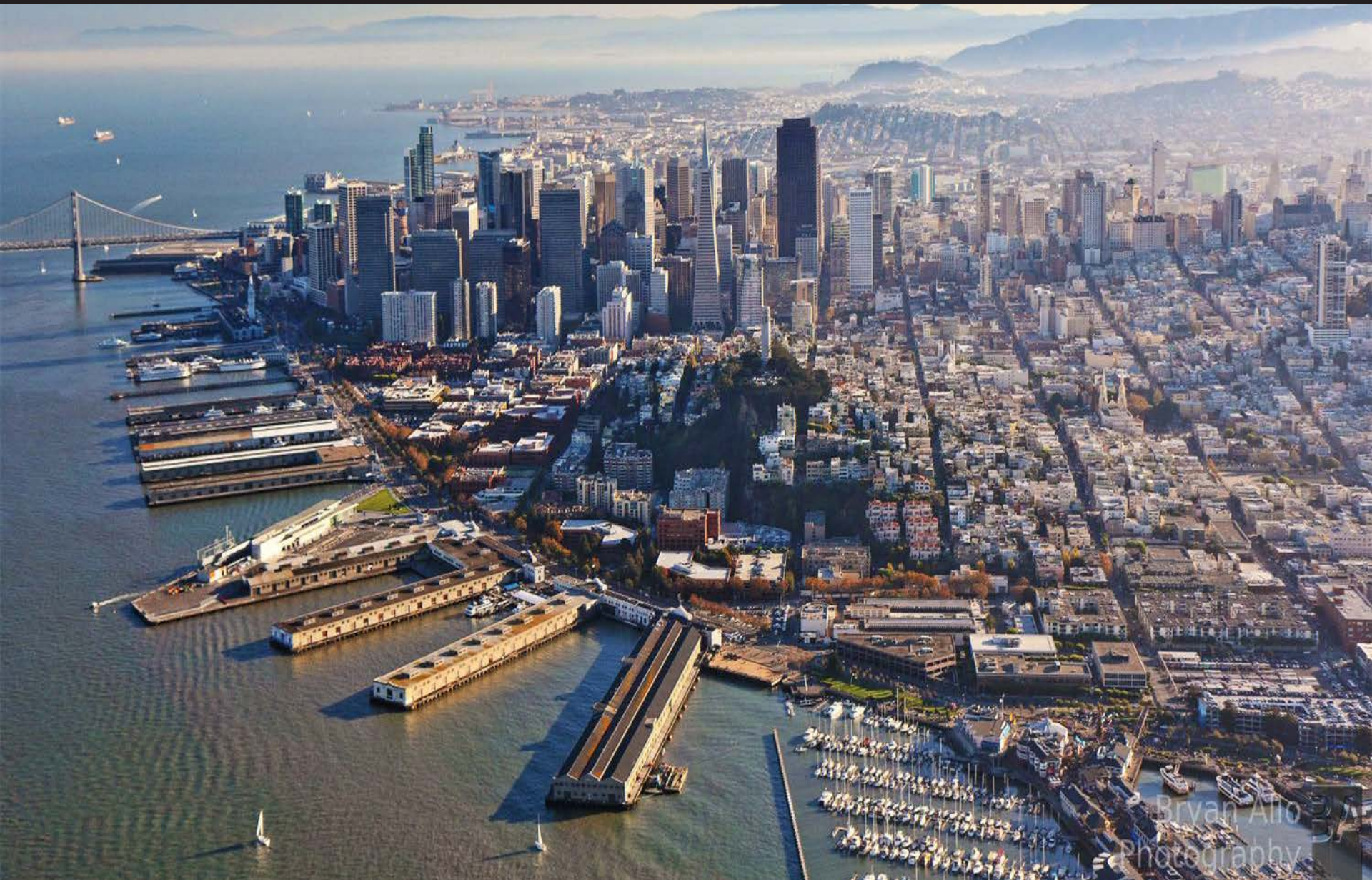
Impacts – Life Safety Risk

# Breakdown of Emergency Response



Impacts - Damage

# Embarcadero Historic District



Bryan Alio  
Photography

Impacts - Damage

# Utility Infrastructure





Impacts - Damage

# Ground Transportation Facilities



Impacts – Disruption

# Economic Loss



Impacts - Disruption

# Disruption of Maritime Service



# Impacts - Disruption

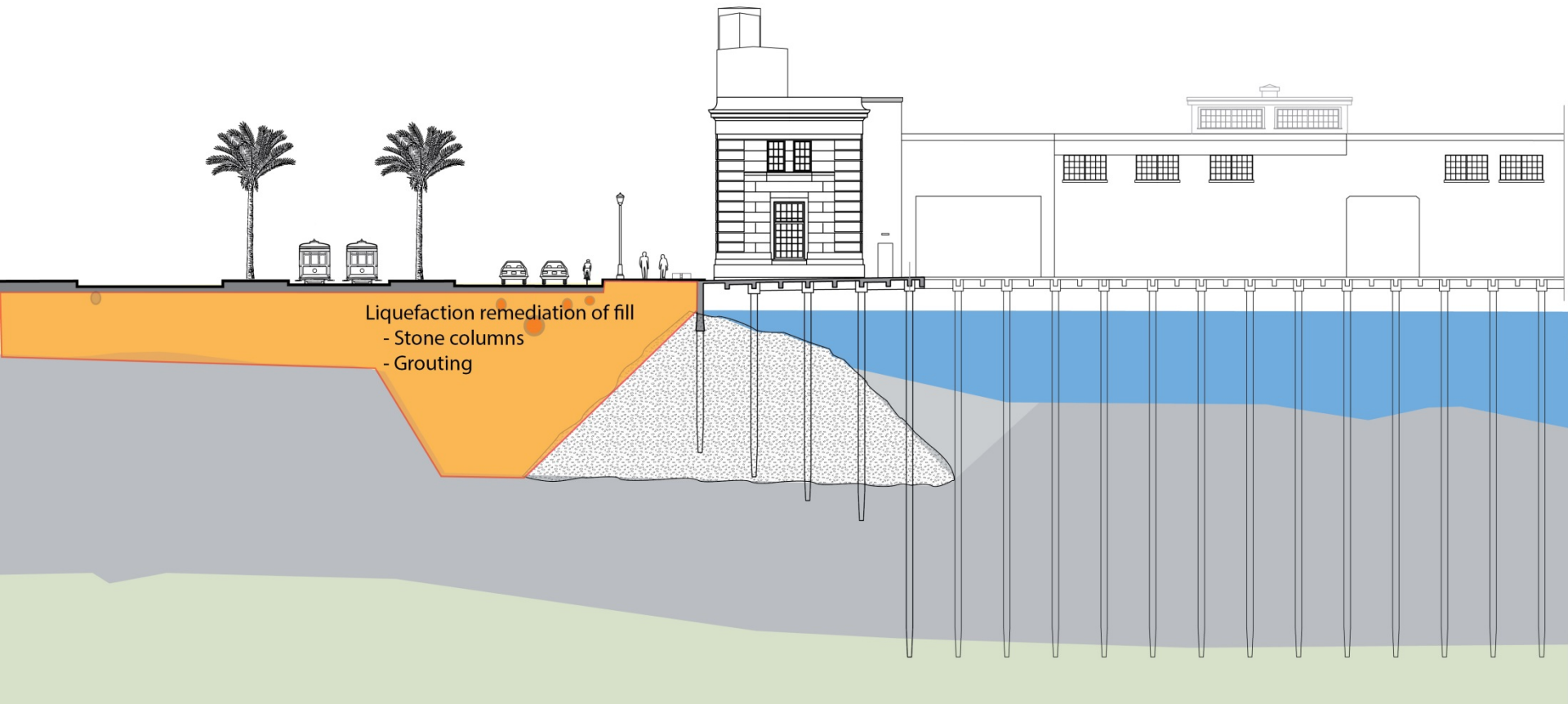
## Quality of Life



# Solutions

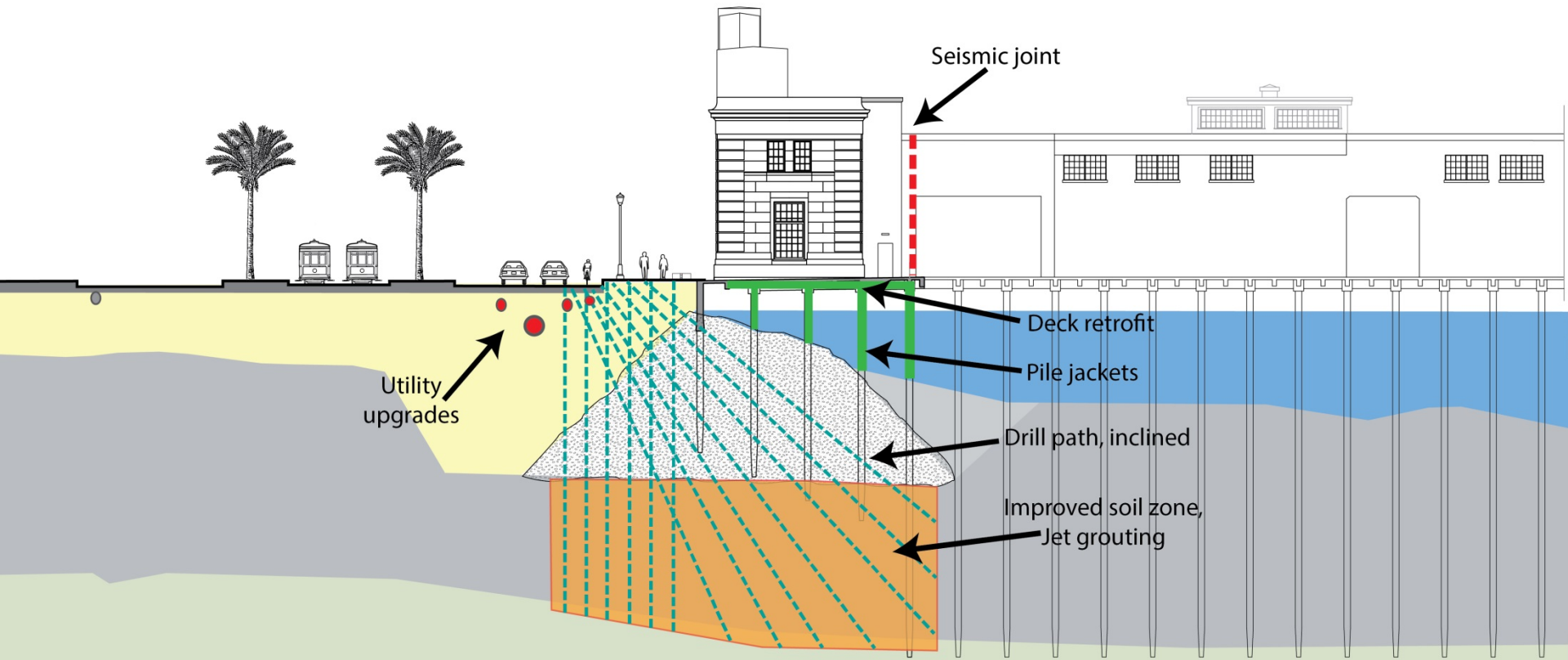
Initial Concepts

# Option 1: Liquefaction Remediation of Fill

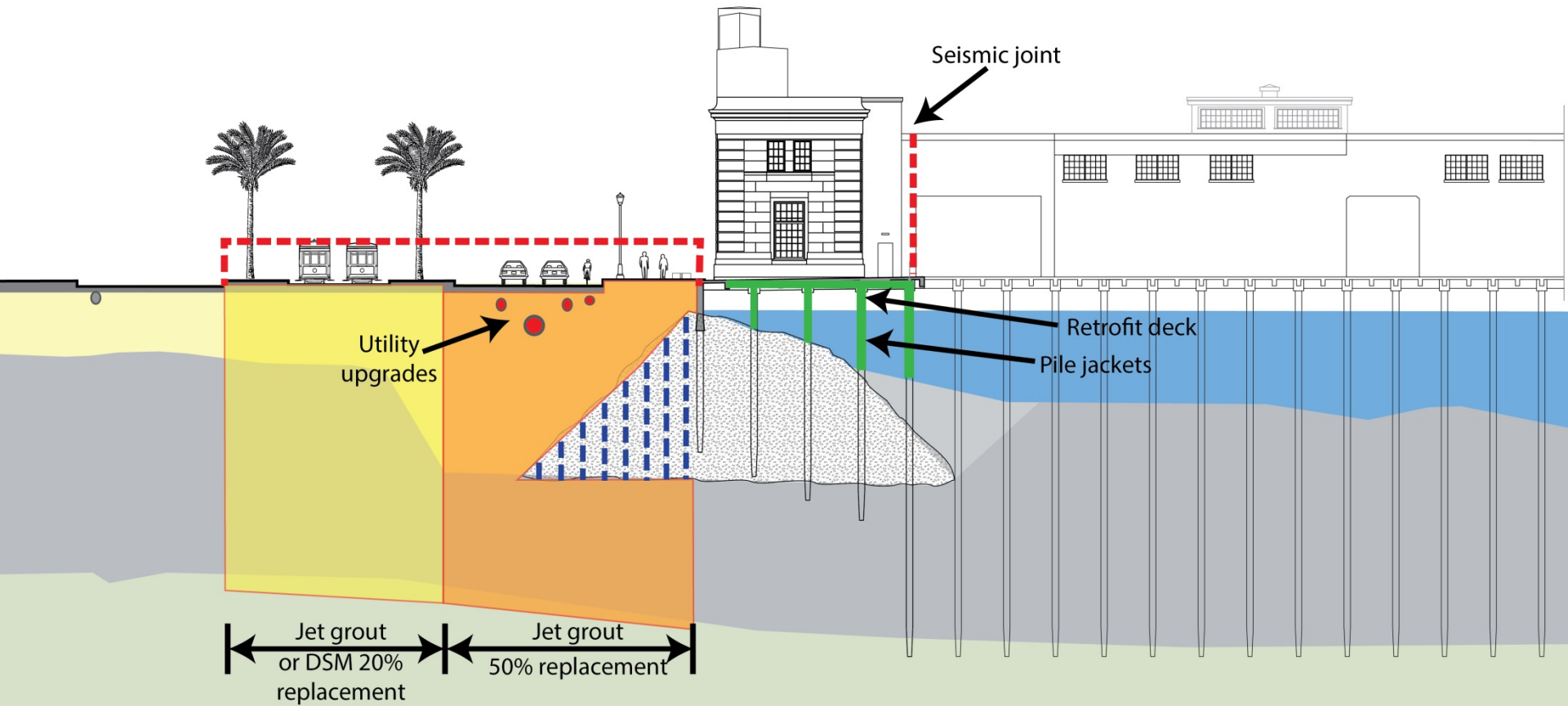


# Solutions

## Option 2: Ground Improvement Under Seawall

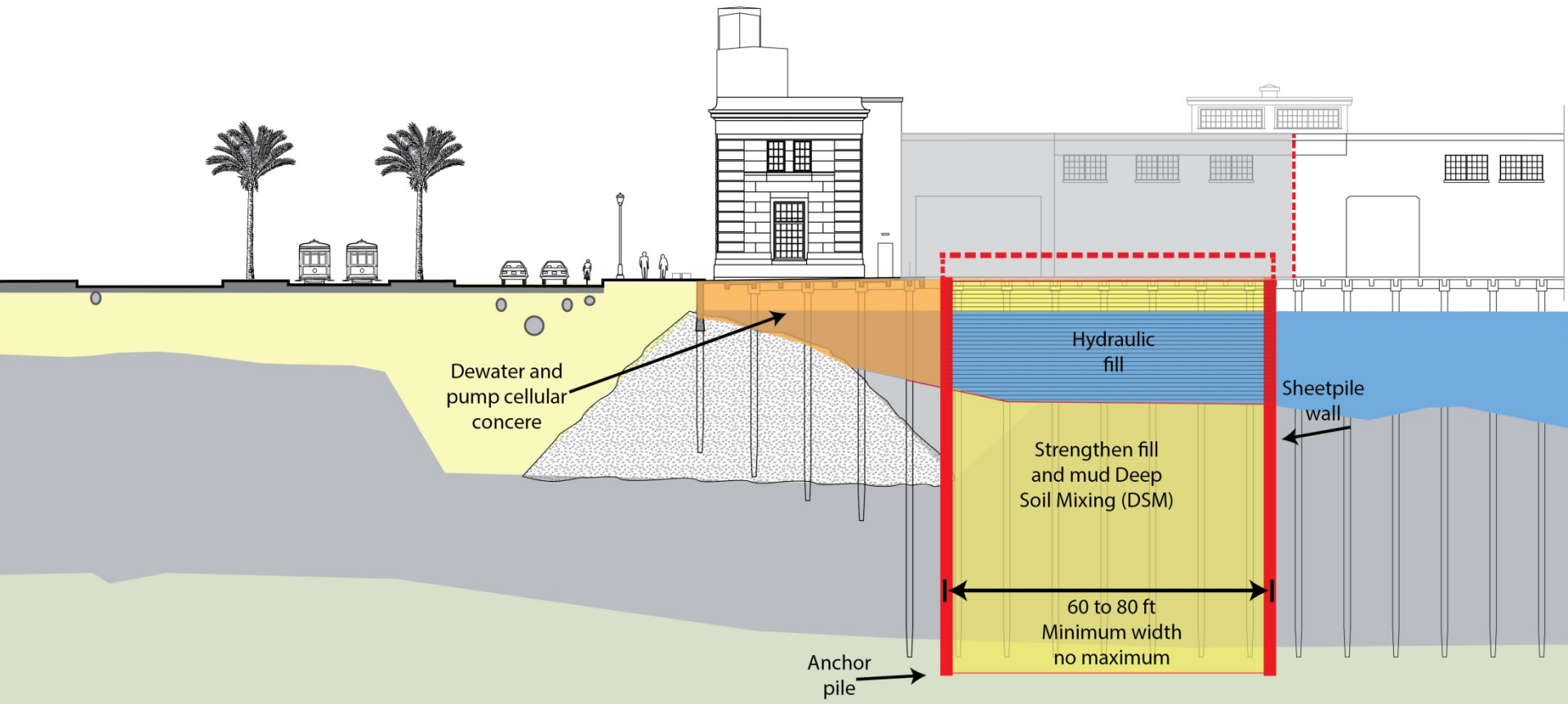


# Option 3: Ground Improvement Landside





# Option 4: New Bayward Seawall



# Action Plan

## Project Goals

- **Improve Earthquake Safety without Delay**
- **Reduce Earthquake Damage and Disruption**
- **Lower Flood Risk**
- **Enhance San Francisco Bay**
- **Create a Stable Foundation for SLR Adaptation**
- **Respect San Francisco's Iconic Waterfront**

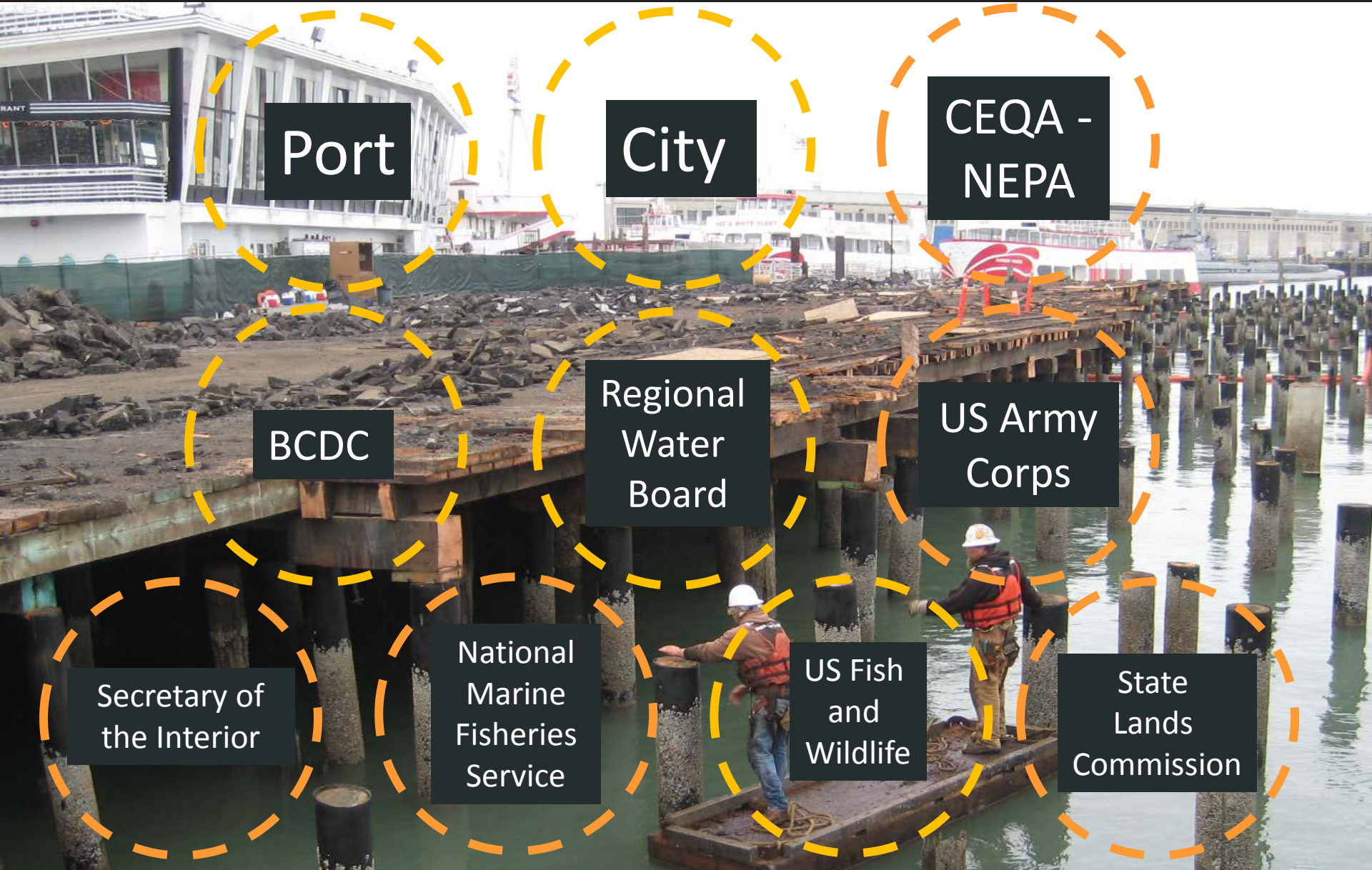
# Action Plan

## Project Strategies

- **Plan for Long Term Adaptation**
- **Limit Disruption During Construction**
- **Maximize Local Business Opportunities and Jobs**
- **Transparency and Public Accountability**
- **Local, State, Federal and Private Funding Sources**

Going Forward

# Regulatory Permitting



Port

City

CEQA -  
NEPA

BCDC

Regional  
Water  
Board

US Army  
Corps

Secretary of  
the Interior

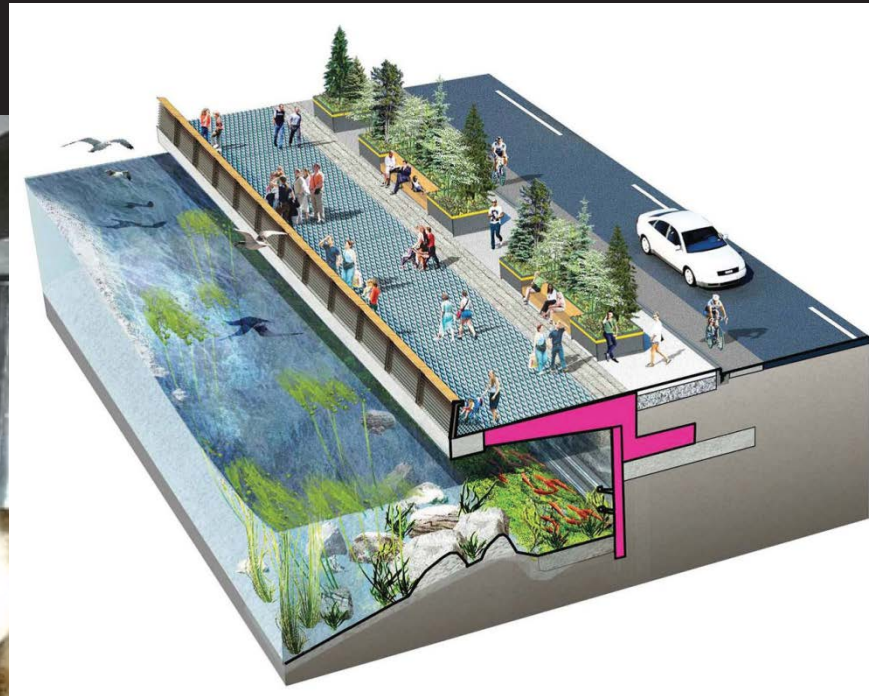
National  
Marine  
Fisheries  
Service

US Fish  
and  
Wildlife

State  
Lands  
Commission

Interagency Coordination

# Improving San Francisco Bay



**Elliot Bay Seawall Strategy**

Interagency Coordination

# Embarcadero Enhancement Project



# City and Port Capital Funding

CITY AND COUNTY OF SAN FRANCISCO

BUDGET AND APPROPRIATION ORDINANCE



File No. 160628 Ordinance 145-16

FISCAL YEAR ENDING JUNE 30, 2017 and  
FISCAL YEAR ENDING JUNE 30, 2018

Edwin M. Lee, Mayor



## Financing Tools

# Living Cities, City Accelerator



**LIVING CITIES**

INNOVATE • INVEST • LEAD

**Our Work** / Living Cities works with cross sector leaders in cities to build a new type of urban practice to dramatically improve the economic well-being of low-income people.



**CITY  
ACCELERATOR**

**City Accelerator** / The City Accelerator, an initiative of Living Cities and the Citi Foundation, works within and across cities to advance and promote the spread of promising innovations that will have a significant impact in the lives of residents.

[Learn more about this work →](#)



Financing Tools

# General Obligation Bonds



# Seawall Lot 324 – Teatro Zinzanni Infrastructure Financing District



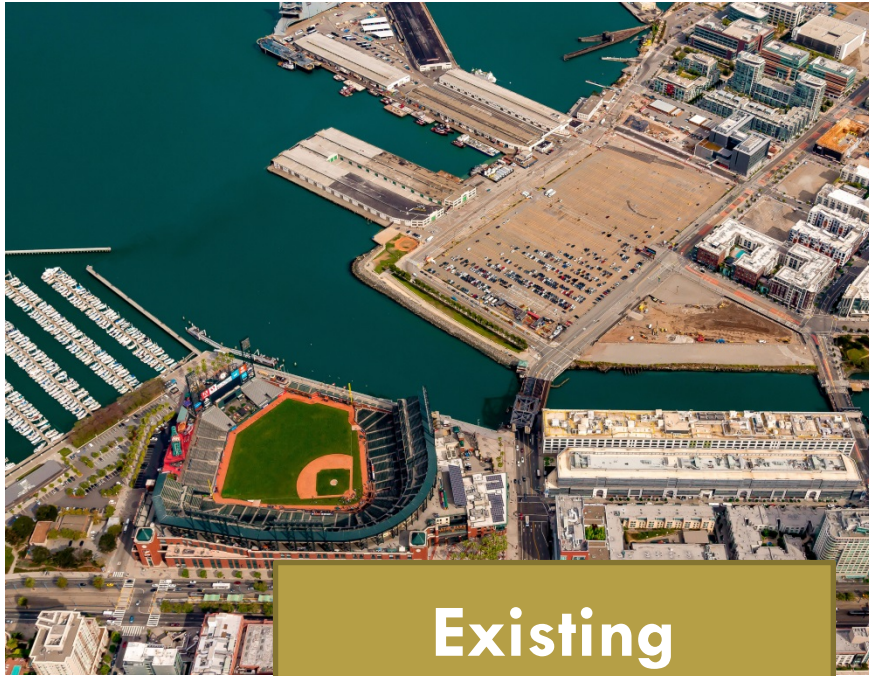
**Existing**



**Proposed**

**Generates approx. \$40m**

# Mission Rock - Seawall Lot 337 and Pier 48 Infrastructure Financing District



Existing



Proposed

Generates approx. \$200m

Financing Tools

# Federal - Historic Tax Credits



Office of Historic  
Preservation



# Federal – Water Resource Development Act (WRDA)

114TH CONGRESS  
2D SESSION

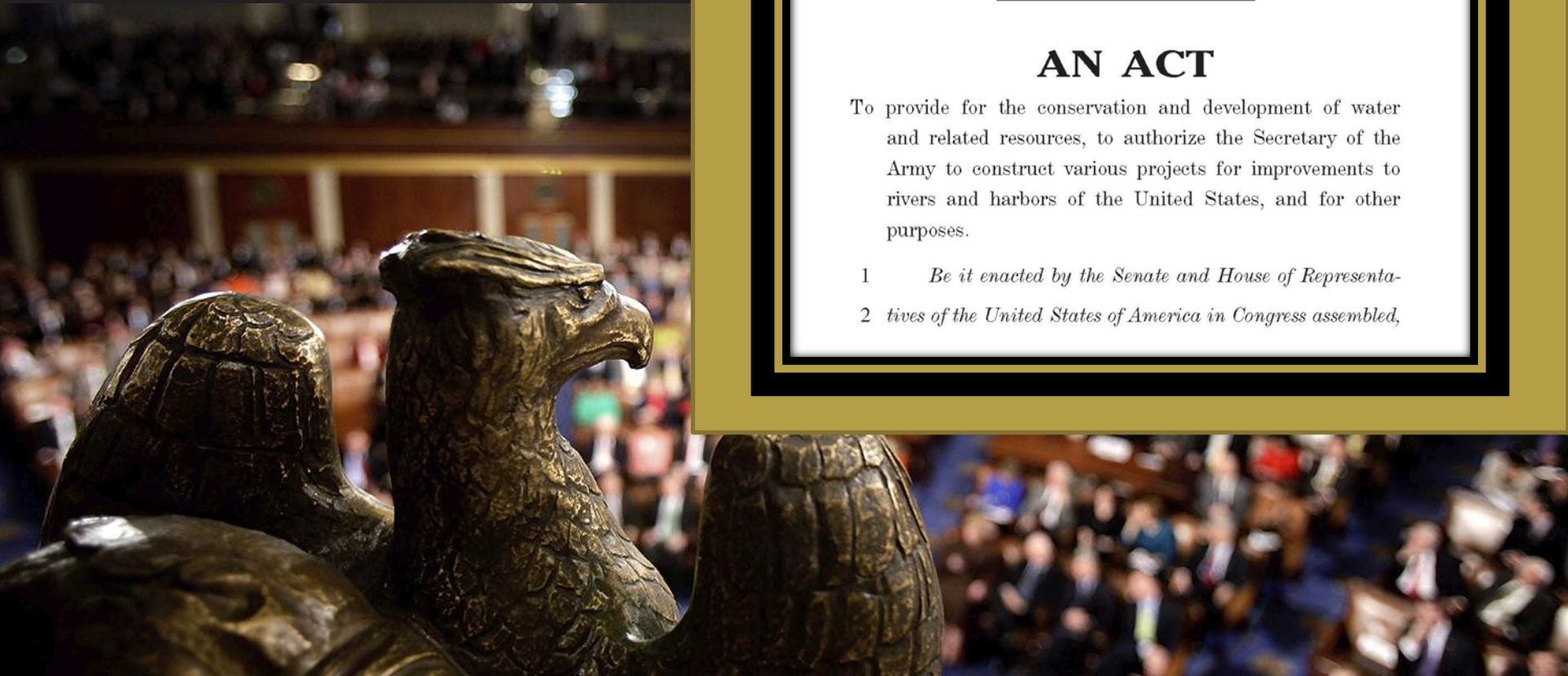
**S. 2848**

---

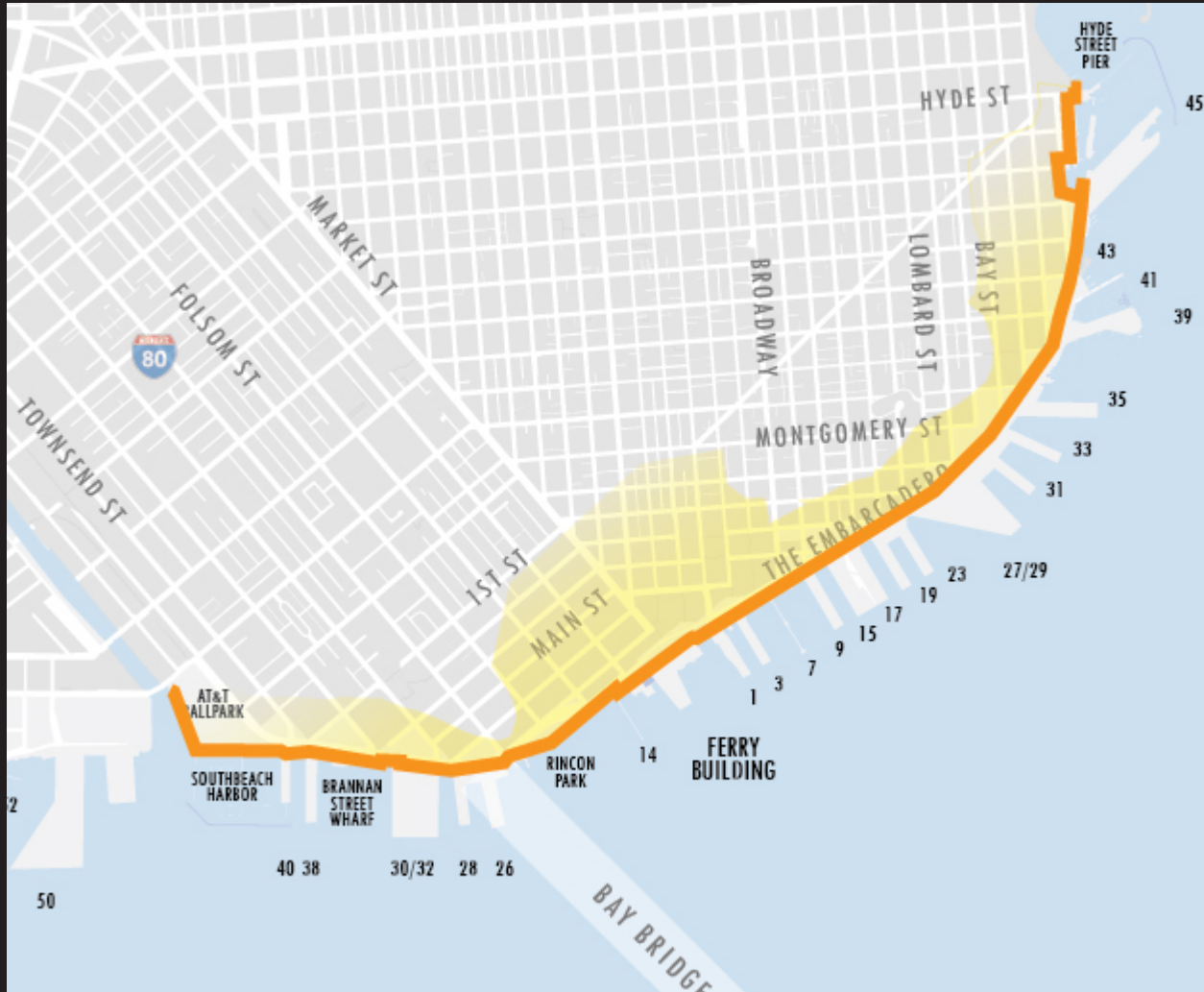
## **AN ACT**

To provide for the conservation and development of water and related resources, to authorize the Secretary of the Army to construct various projects for improvements to rivers and harbors of the United States, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*



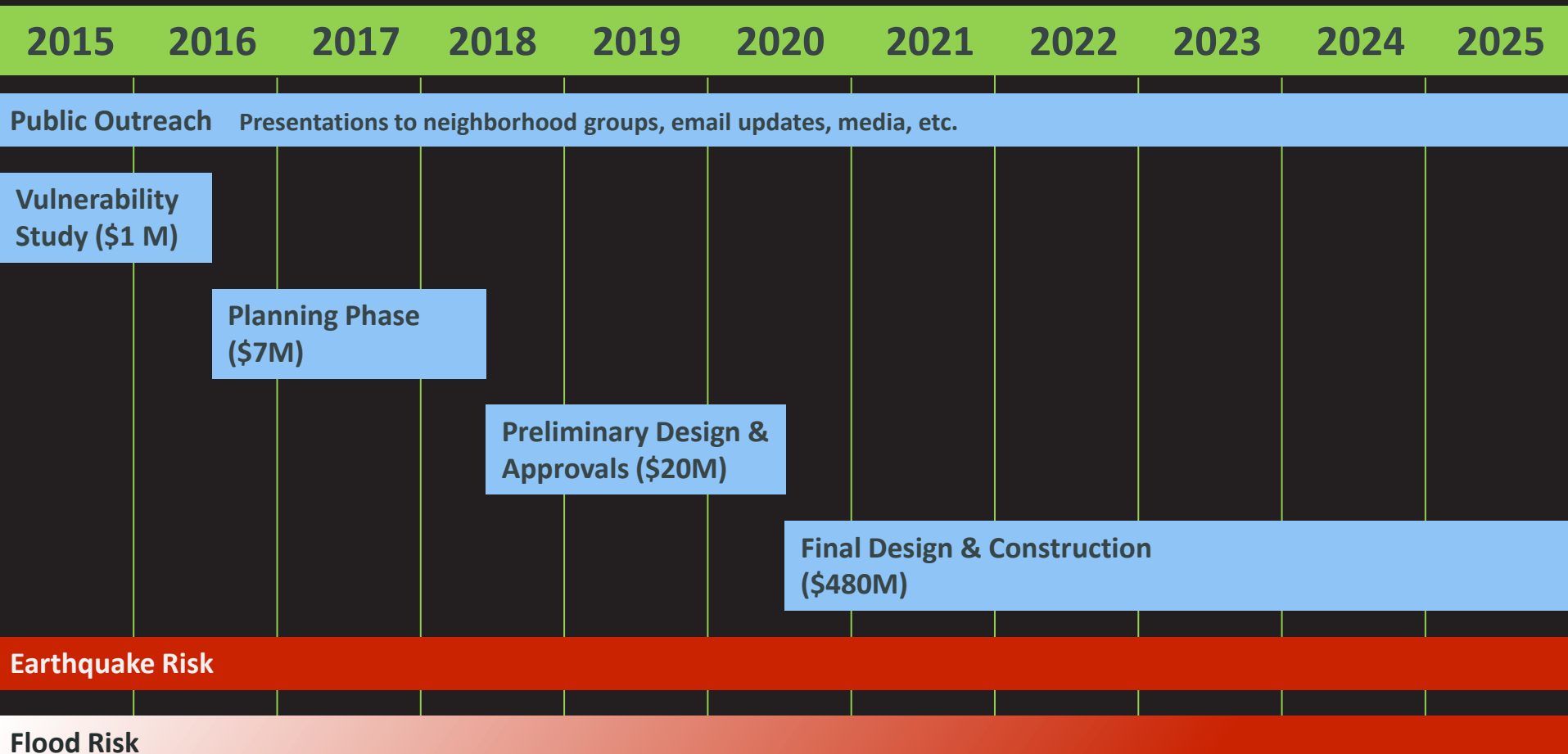
# Community Facilities District Bonds



# Going Forward

## Action Plan

### Schedule & Budget



# Action Plan – Related Efforts

## **Resilient San Francisco**

A City strategic vision for Resiliency

## **Waterfront Plan Update**

Land Use and Urban Design Policies

## **Mayor's Sea Level Rise Committee**

Sea Level Rise Action Plan

## **Living Cities Infrastructure Cohort**

Grant Program to focus on innovative financing approaches



## **Action Plan – Next Steps**

- **City Collaboration**
- **Technical Advisory Panel**
- **Project Management Plan**
- **Consultant Selection Process**
- **Financing Strategy**
- **Legislative and Policy Strategy**
- **Waterfront Plan Update**
- **Public Engagement**
- **Port Commission Updates**



Questions?

