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MISSION CREEK

SEA LEVEL RISE ADAPTATION STUDY
WATERFRONT STRATEGIES FOR LONG TERM URBAN RESILIENCY



PREPARED FOR:
SPUR



Port of San Francisco



San Francisco Bay Conservation and
Development Commission



Delta Alliance



San Francisco Public Utilities
Commission



San Francisco Public Works



San Francisco City Administrator/
Capital Planning



San Francisco Planning Department



PREPARED BY:
Arcadis US, Inc.



CallisonRTKL



Wageningen University and Research Centre

IN COLLABORATION WITH:

SF Environment

SF Office of Community Investment &
Infrastructure

Mission Creek Conservancy

- **GOALS + APPROACH**
- **MISSION CREEK HISTORY**
- **INUNDATION ASSESSMENT**
- **PROJECT DESIGN**
- **MULTIPLE LINES OF PROTECTION**
- **CREEK + BAY SHORELINE CONCEPTS**
- **PREPARING RESILIENT PIERS**
- **FINAL KEY MESSAGES OF THIS REPORT**

PROJECT GOALS

Provide conceptual design solutions to reduce flood risks to a neighborhood, based on a high-level vulnerability assessment

G1

Build capacity in San Francisco to understand and manage these risks in the long term

G2

PROJECT APPROACH

Mapping the hazard and consequences of flooding

A1

Developing adaptation alternatives to reduce risk in the Mission Creek area

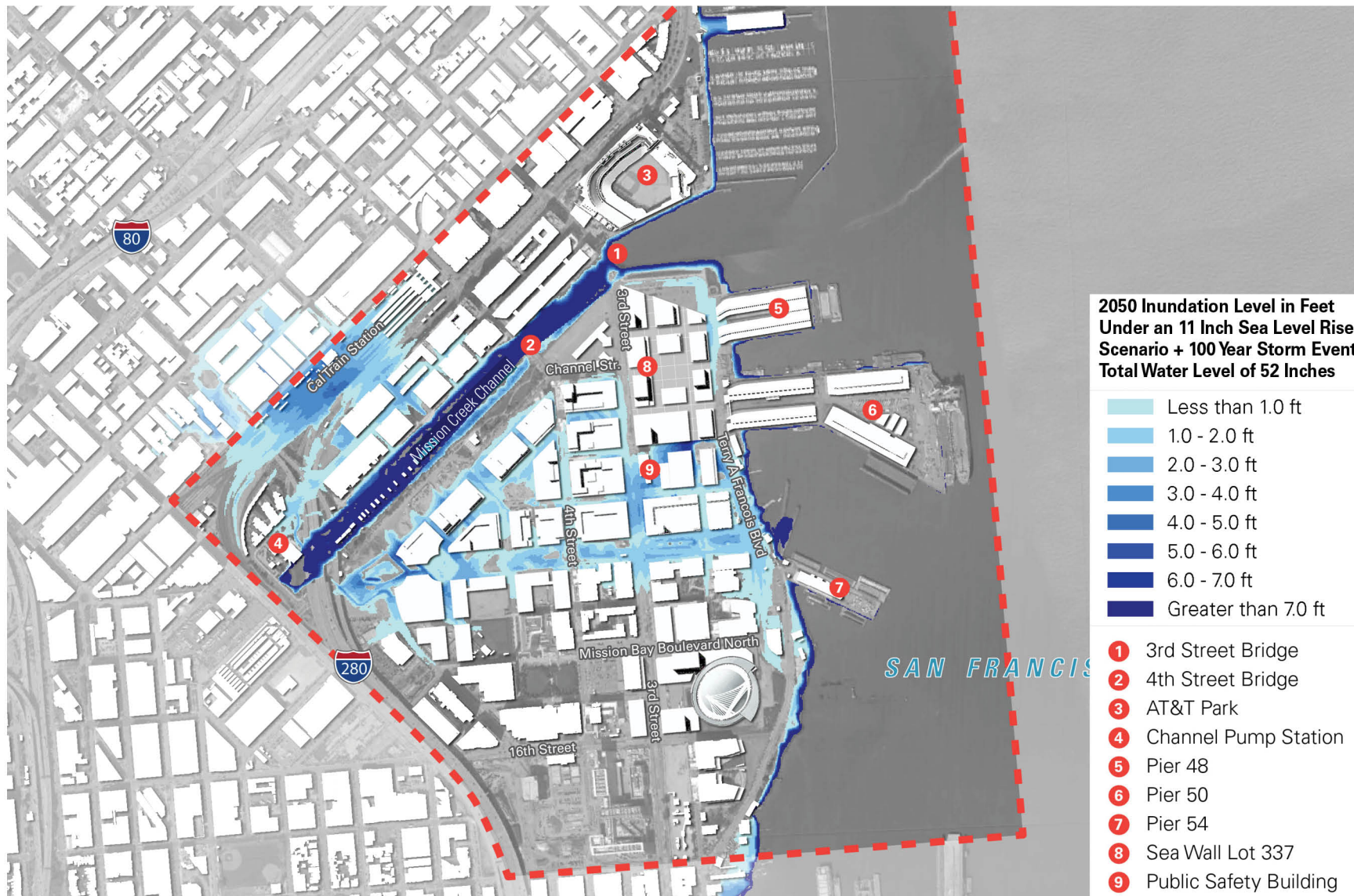
A2

Continuing the exchange of knowledge and information between the Netherlands and California

A3

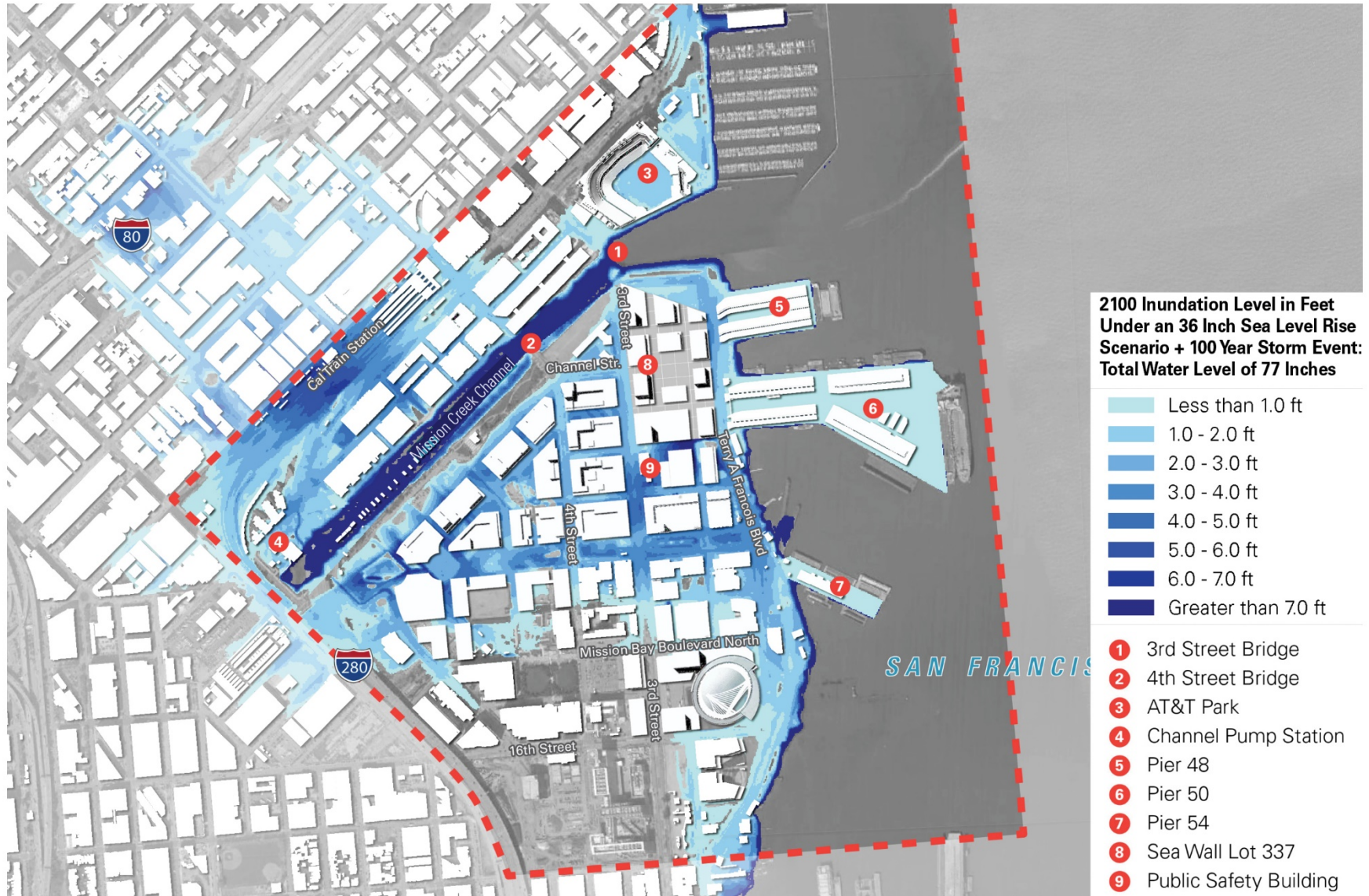
INUNDATION ASSESSMENT

2050 INUNDATION LEVEL



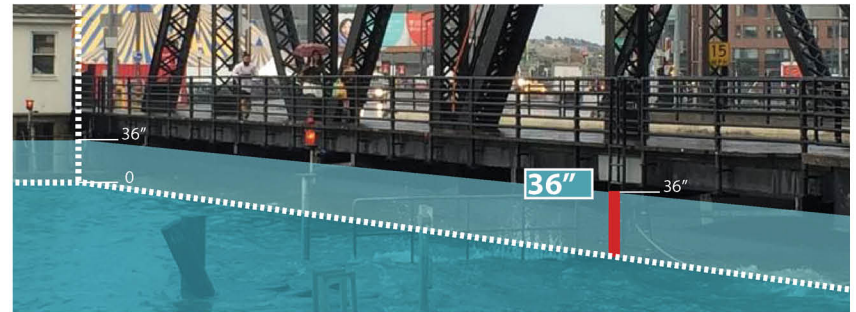
INUNDATION ASSESSMENT

2100 INUNDATION LEVEL



INUNDATION ASSESSMENT

ILLUSTRATION OF 3RD STREET BRIDGE SEA LEVEL AND STORM IMPACTS



PROJECT DESIGN OBJECTIVES

Focus on the development of a range of concepts for both the creek and the bay shoreline, without selecting a preferred alternative.

01

Engage in an imaginative exercise envisioning what living with future sea level rise could look like.

02

Strive for multipurpose solutions that integrate flood protection into the urban fabric for an attractive and economically viable city.

03

Seek opportunities for natural ecosystem and habitat development to enhance the environmental qualities of the waterfront.

04

Consider future adaptability as criteria in adaptation measure selection. All design concepts should be able to cope with at least 36 inches of sea level rise - in other words, suitable for 2100 water levels.

05

MULTIPLE LINES OF PROTECTION

CREEK CONCEPTS:

- 1 Perimeter Shoreline Protection
- 2 Tidal Barrier
- 3 Mission Lake

BAY CONCEPTS:

- 1 Perimeter Shoreline
- 2 City Levee

- 3 Elevated Third Street
- 4 New Waterfront



Note: This image depicts a conceptual idea and is not intended to be authoritative regarding proposed intensity of development or preferred mitigations regarding sea level rise. Further study and coordination between interested parties will be required to further refine these concepts toward a viable proposal.

CREEK CONCEPT 1: PERIMETER SHORELINE PROTECTION

PROS:

- ✓ Maintains tidal flow
- ✓ Adaptable as sea level rises
- ✓ Channel remains navigable
- ✓ Sewer overflow system remains intact

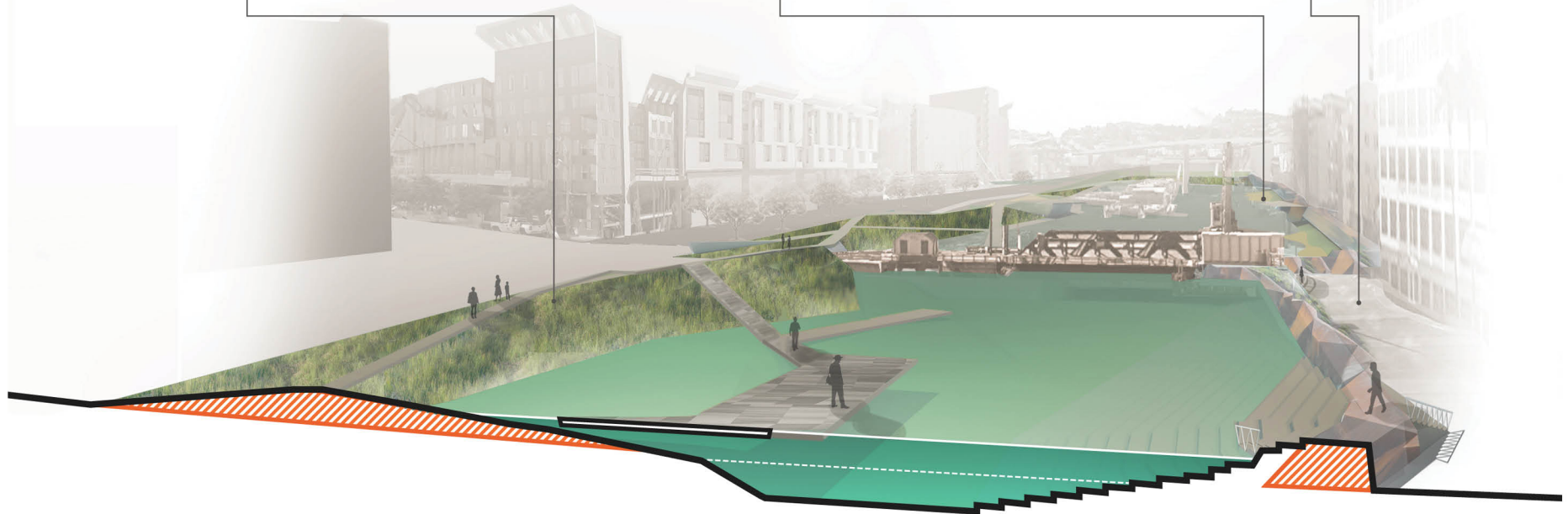
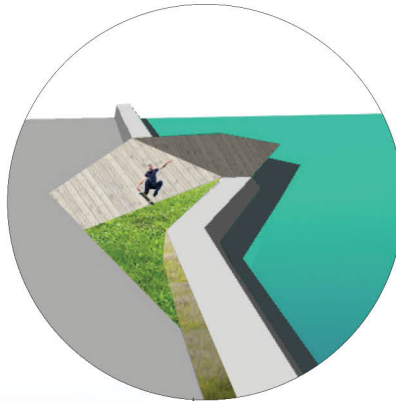
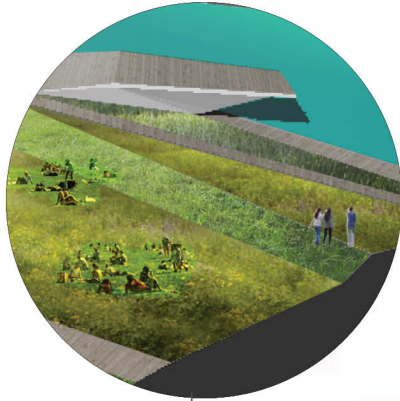
CONS:

- ✗ Bridges will have to be raised or replaced in the longer term
- ✗ Long line of defense
- ✗ Need for modification of Mission Bay interior drainage
- ✗ Less able to meet “multipurpose objective”; potential visual barrier at AT&T Park



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CREEK CONCEPT 1: PERIMETER SHORELINE PROTECTION



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CREEK CONCEPT 2: TIDAL CONTROL

PROS:

- ✓ No need to increase height of flood protection around the creek
- ✓ Maintains tidal flow
- ✓ Maintains channel navigability
- ✓ Bridges protected, no modifications needed

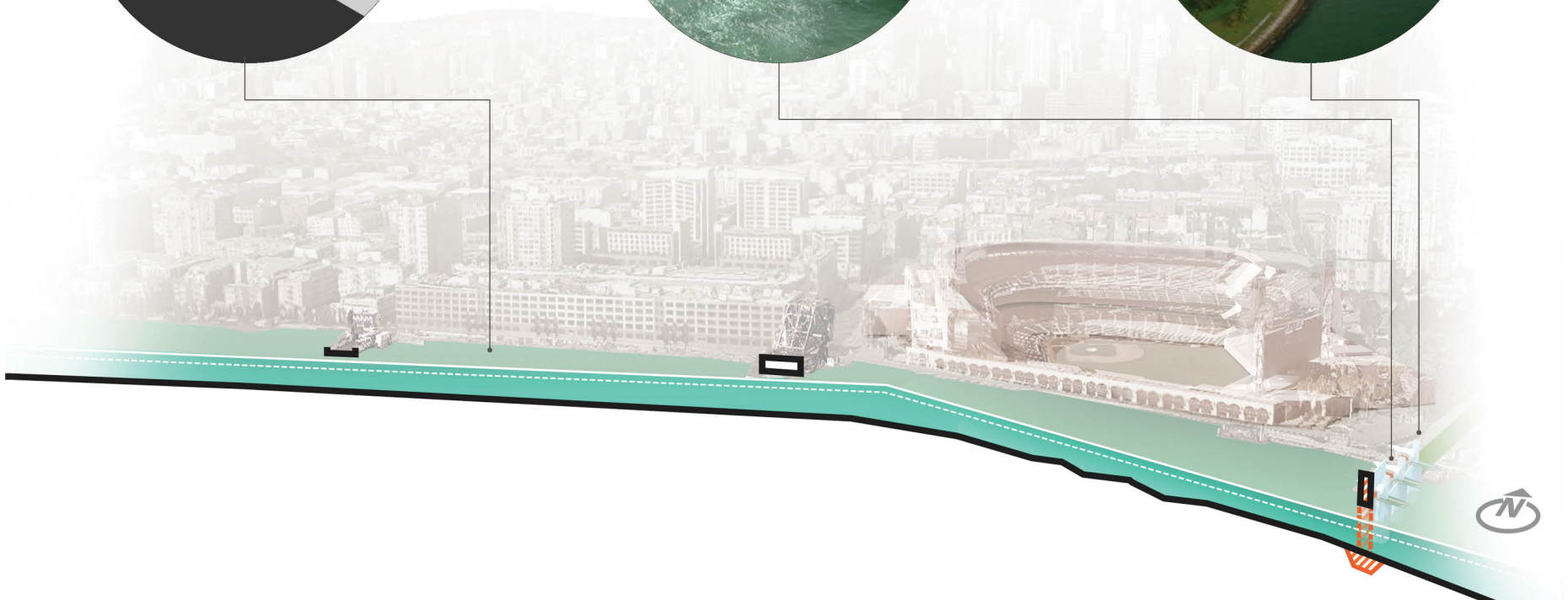
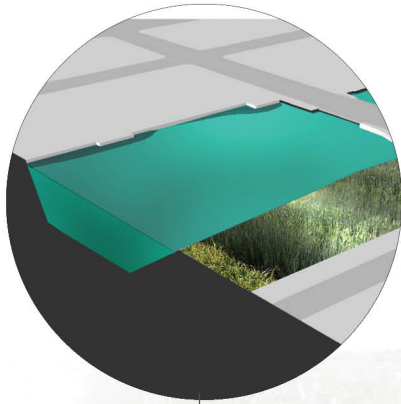
CONS:

- ✗ Will require more frequent operation as sea level rises, eventually leading to permanent closure.
- ✗ Risk of operational failure
- ✗ Conspicuous location out in waterway



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CREEK CONCEPT 2: TIDAL CONTROL



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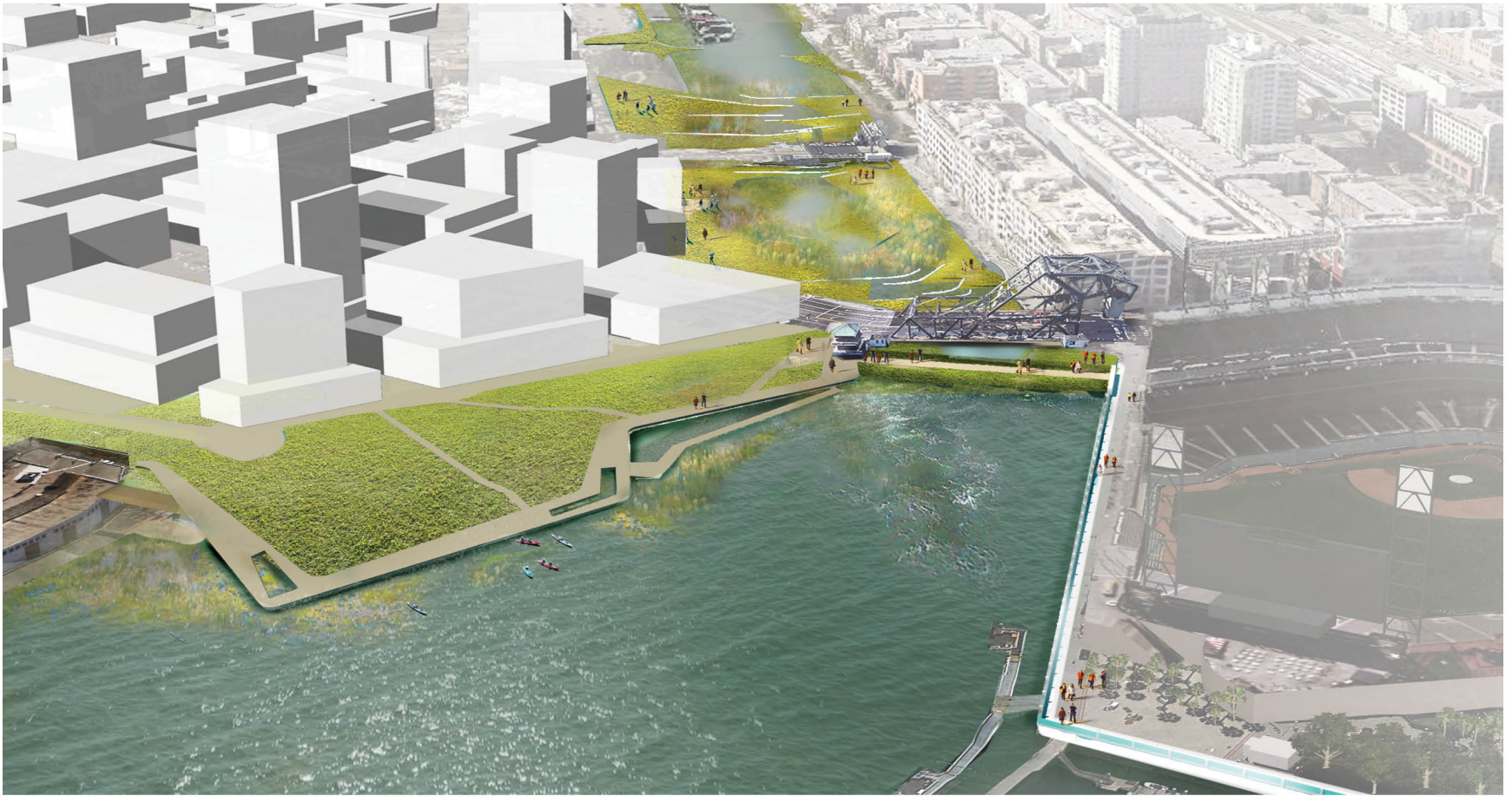
CREEK CONCEPT 3: MISSION LAKE

PROS:

- ✓ Controlled water level in Mission Creek Channel
- ✓ New habitat, recreation and destination opportunities
- ✓ Robust and proven concept
- ✓ Short line of defense

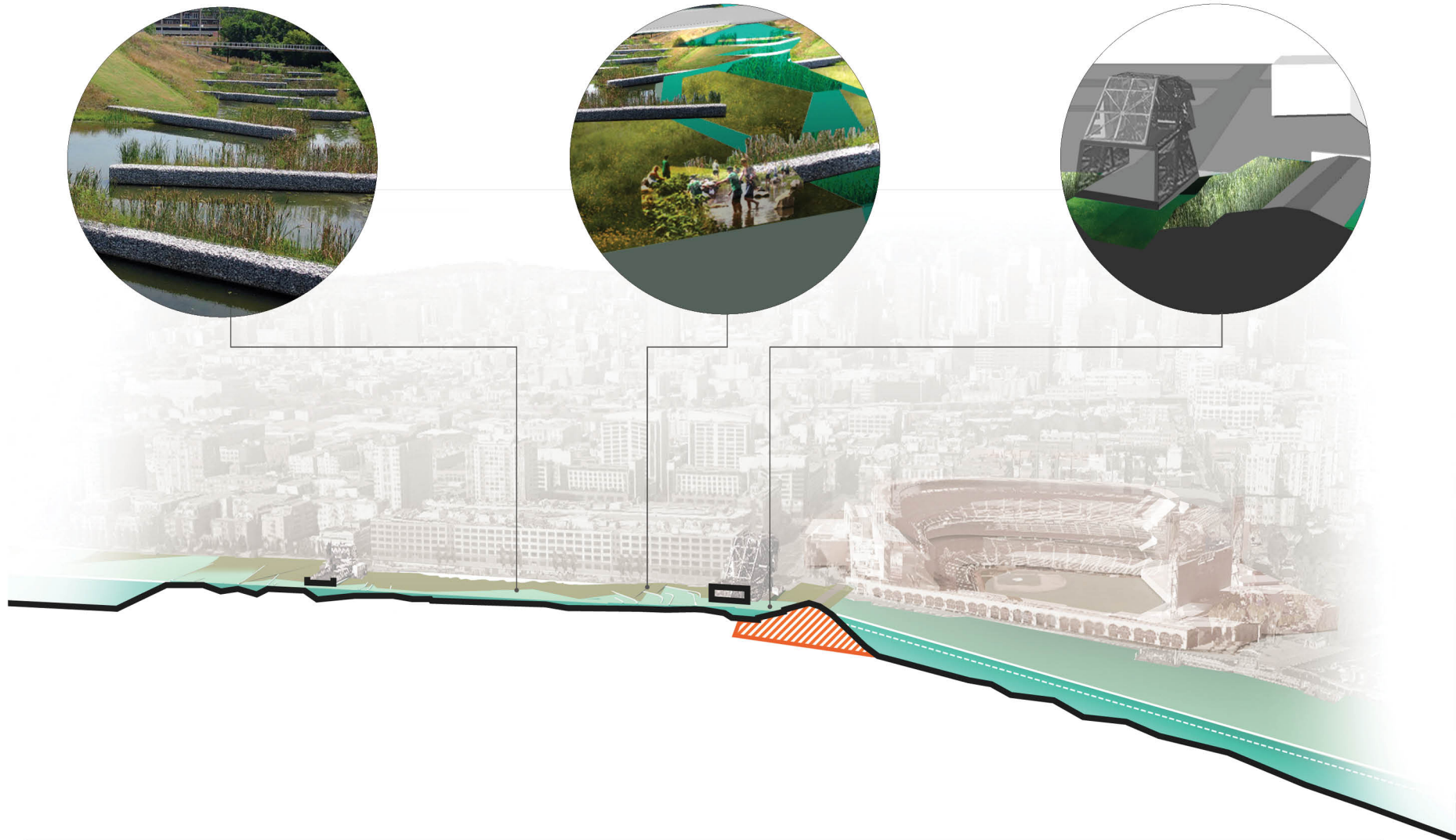
CONS:

- ✗ Will alter tidal regime
- ✗ Uncertain water quality
- ✗ No navigation on Mission Creek Channel
- ✗ Major alterations to sewer system overflow needed
- ✗ Pumped Mission Bay drainage system



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CREEK CONCEPT 3: MISSION LAKE



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BAY SHORELINE CONCEPT 2: CITY LEVEE

PROS:

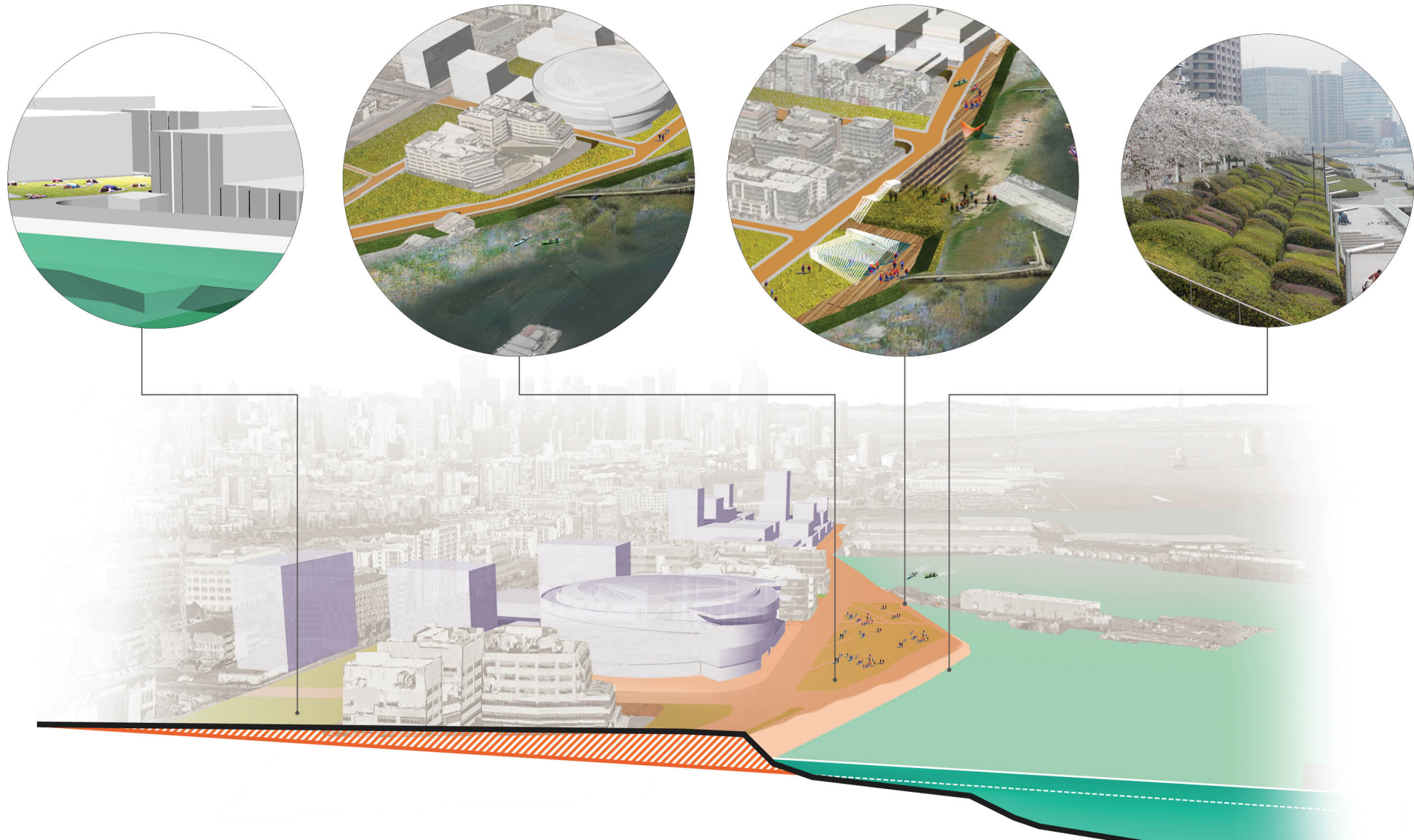
- ✓ Fail safe
- ✓ Creates opportunities for return on investment for dual functions (development and protection)
- ✓ New Bayfront residential development possible

CONS:

- ✗ Expensive to implement
- ✗ Piers not protected
- ✗ Need to integrate with existing buildings



BAY SHORELINE CONCEPT 2: CITY LEVEE



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BAY SHORELINE CONCEPT 3: ELEVATED THIRD STREET

PROS:

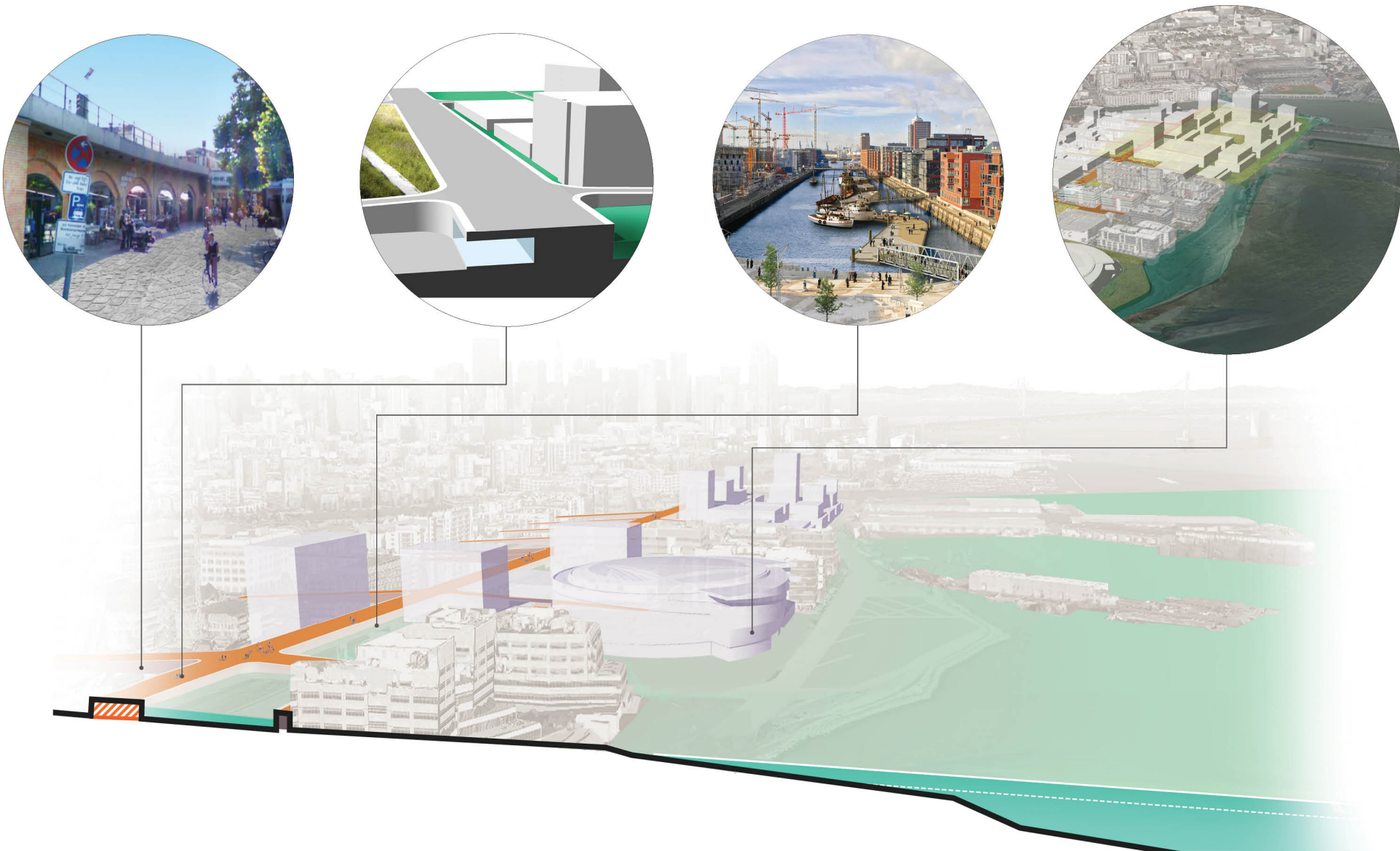
- ✓ Precedent for 'living with water'
- ✓ Unique residential and commercial waterfront development opportunities
- ✓ Third Street transit lines can be embedded within elevated roadway-barrier.

CONS:

- ✗ Bridges will have to be raised or replaced in the longer term
- ✗ Long line of defense
- ✗ Need for modification of Mission Bay interior drainage
- ✗ Expensive and complicated to Implement



BAY SHORELINE CONCEPT 3: ELEVATED THIRD STREET



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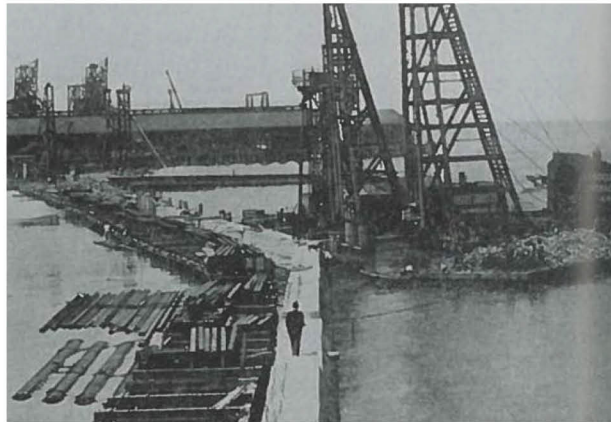
BAY SHORELINE CONCEPT 4: NEW WATERFRONT

PROS:

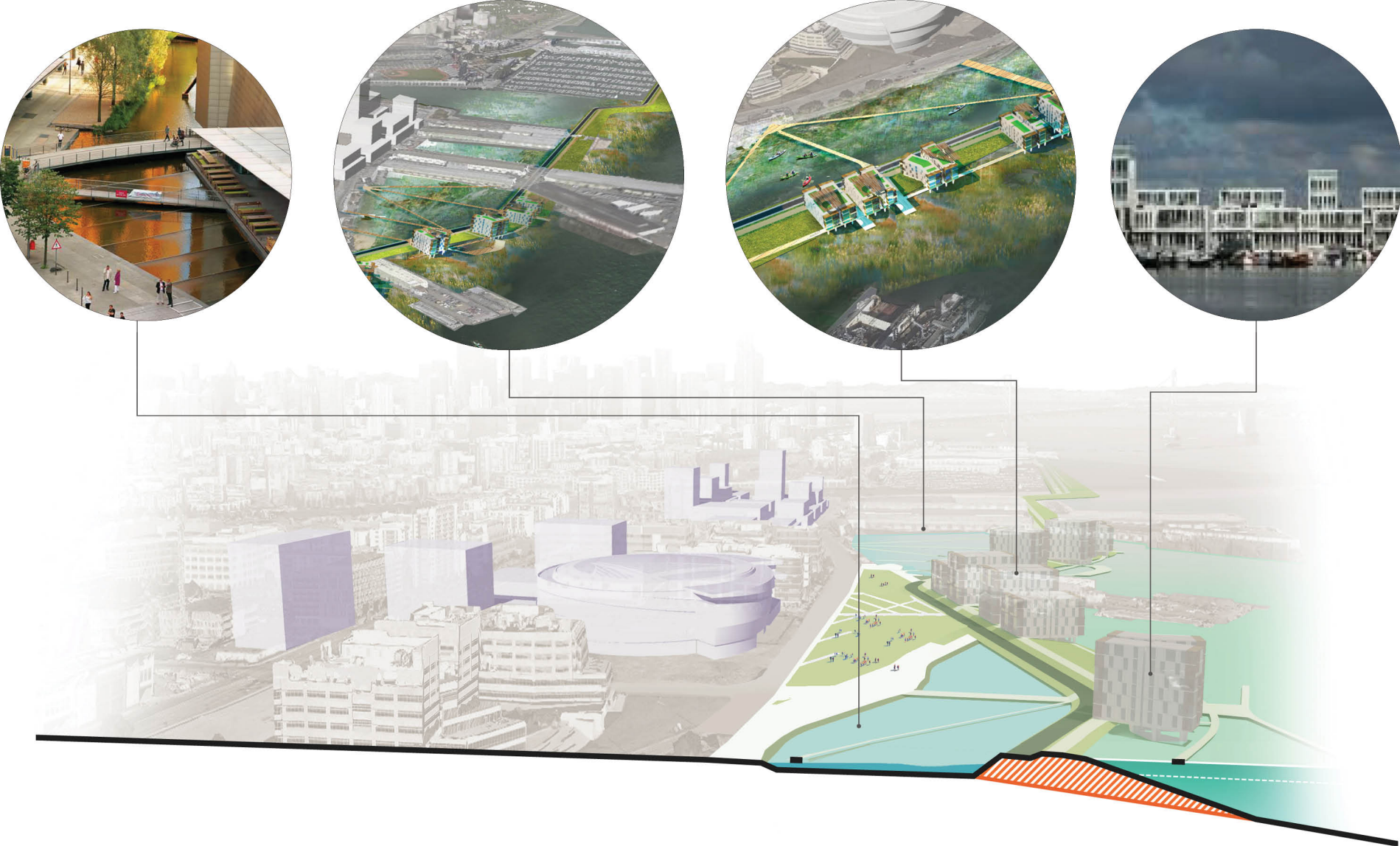
- ✓ New ecological transition zone
- ✓ Opportunity for public private partnerships for funding of sea level rise adaptation
- ✓ New waterfront commercial and residential development opportunities
- ✓ Could provide protection to the piers
- ✓ Limited failure risk

CONS:

- ✗ Expensive and complicated to implement
- ✗ Requires filling of the Bay



BAY SHORELINE CONCEPT 4: NEW WATERFRONT



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KEY MESSAGES OF THIS REPORT



VIABLE OPTIONS

There are many different ways that Mission Creek and Mission Bay can be protected from future sea level rise.

L1

MULTIPLE BENEFITS

Well-designed adaptation can not only protect our city, but can also enhance public enjoyment of our waterfront.

L2

ANTICIPATION

Planning and adaptation now will be much less expensive than incurring damages in the future.

L3

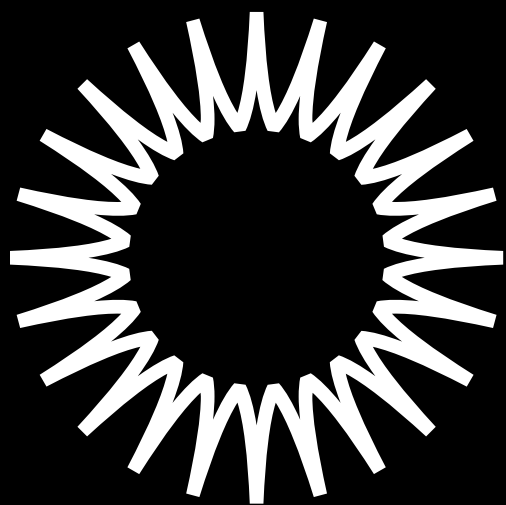
GOING FORWARD

The alternatives presented suggest a variety of public realm preferences and implementation methods that will require further evaluation.

L4

An aerial photograph of the Mission Creek area in San Francisco. The image shows a dense urban environment with various multi-story buildings, some with flat roofs and others with more complex structures. A prominent feature is a large body of water, Mission Creek, which runs along the left side of the frame. Several bridges and walkways cross the creek. In the background, a large railway yard with numerous tracks and trains is visible. The overall scene is captured from a high angle, providing a comprehensive view of the urban landscape and its proximity to the water.

THANK YOU



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