

MULTIPLIED GROUND

A NEW LENS FOR THE NORTHEAST EDGE OF SAN FRANCISCO

A composite image showing a lighthouse on a pier being hit by waves. The central part of the image is a dark, semi-transparent overlay containing text. The background is a photograph of a white lighthouse with a red roof and a black lantern room, situated on a wooden pier. Large, white-capped waves are crashing against the pier and the lighthouse. The sky is overcast and grey. The overall mood is dramatic and emphasizes the impact of extreme weather events.

CLIMATE CHANGE

Climate change is a global issue that influences worldwide.



COASTAL CITIES

Its impacts are expected to be particularly severe on coastal cities, in where lives the majority of the world populations.

The image is a collage of three photographs. The leftmost photo shows a tall, modern skyscraper with a white grid facade. The middle photo shows a dense city skyline with various skyscrapers, including the Transamerica Pyramid and the San Francisco City Hall. The rightmost photo shows a waterfront pier with a long, white building featuring a series of arches, likely the Embarcadero Ferry Building. The water is visible in the foreground of all three photos.

WATERFRONTS

Waterfronts, in between the land and the water, are even more vulnerable to coastal flooding, the rising seas and more frequent storms.

Image Source: Waterfront pier near the Embarcadero San Francisco, http://www.photoeverywhere.co.uk/west/usa/san_francisco/slides/city_bay_embacardo5587.htm

MAIN CONCERNS

AS THE EARLY RESPONDERS TO THE SEA LEVEL RISE AND STORM SURGE, HOW WILL THE URBAN WATERFRONTS ACCOMMODATE WITH CLIMATE CHANGE AND ITS LONG-TERM IMPACTS?

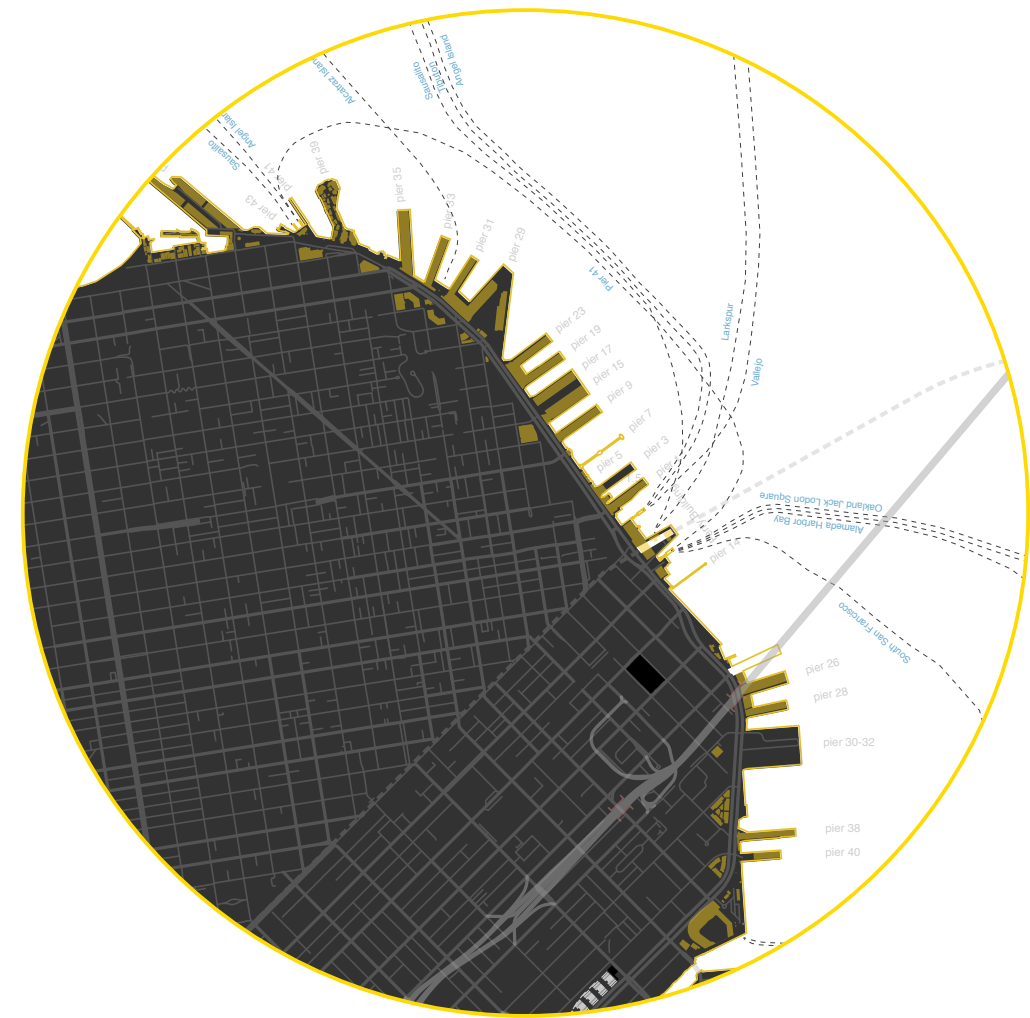
UNDERSTANDING SITE AT 3 SCALES



SAN FRANCISCO BAY



PORT OF SAN FRANCISCO



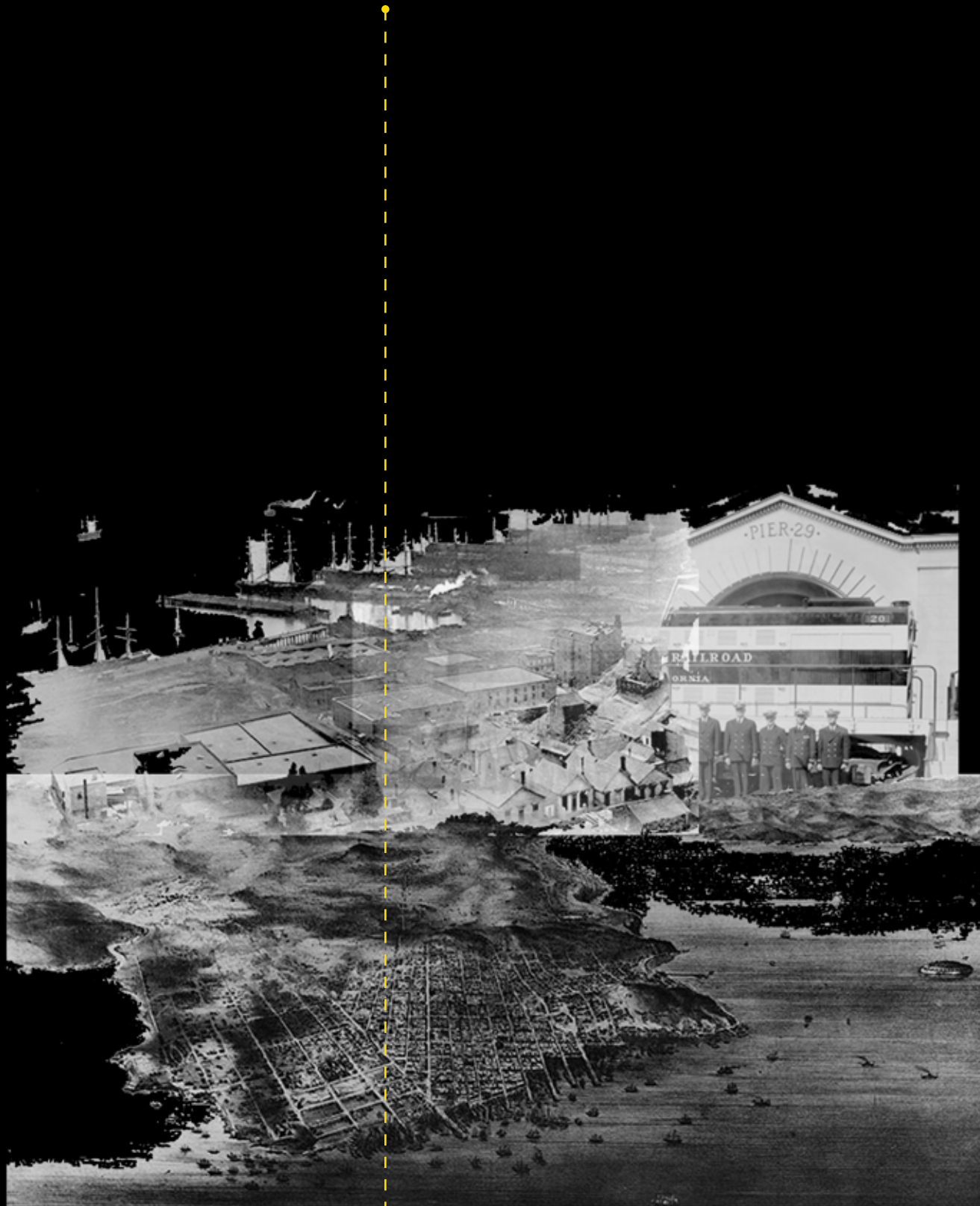
EMBARCADERO

**MACRO-SCALE:
Bay Area**



TRANSFORMATION

BUSTLING PORT TOWN



1850s

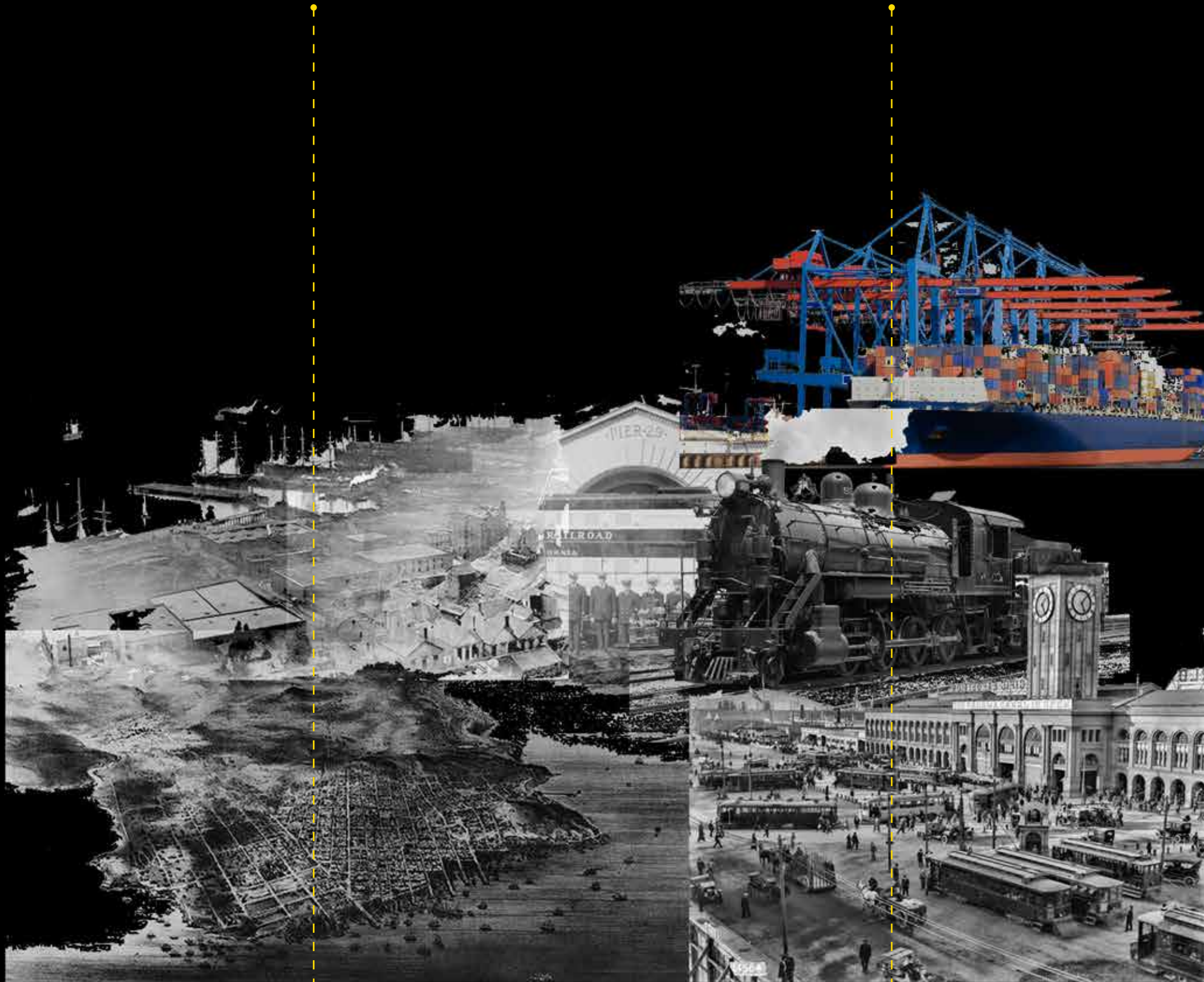
1950s

1960s

TRANSFORMATION

BUSTLING PORT TOWN

TECHNOLOGY INNOVATION



1850s

1950s

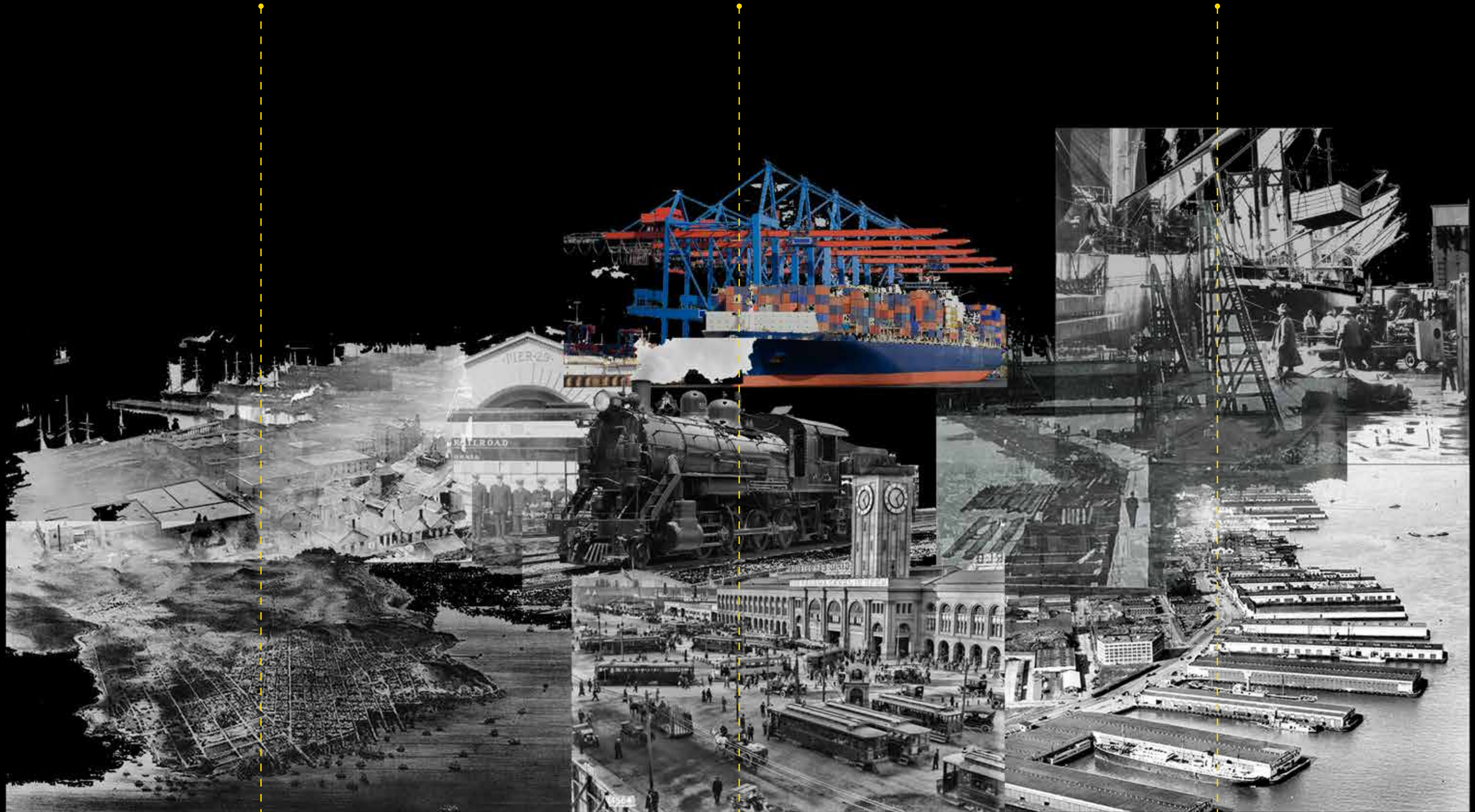
1960s

TRANSFORMATION

BUSTLING PORT TOWN

TECHNOLOGY INNOVATION

WATERFRONT DECLINE

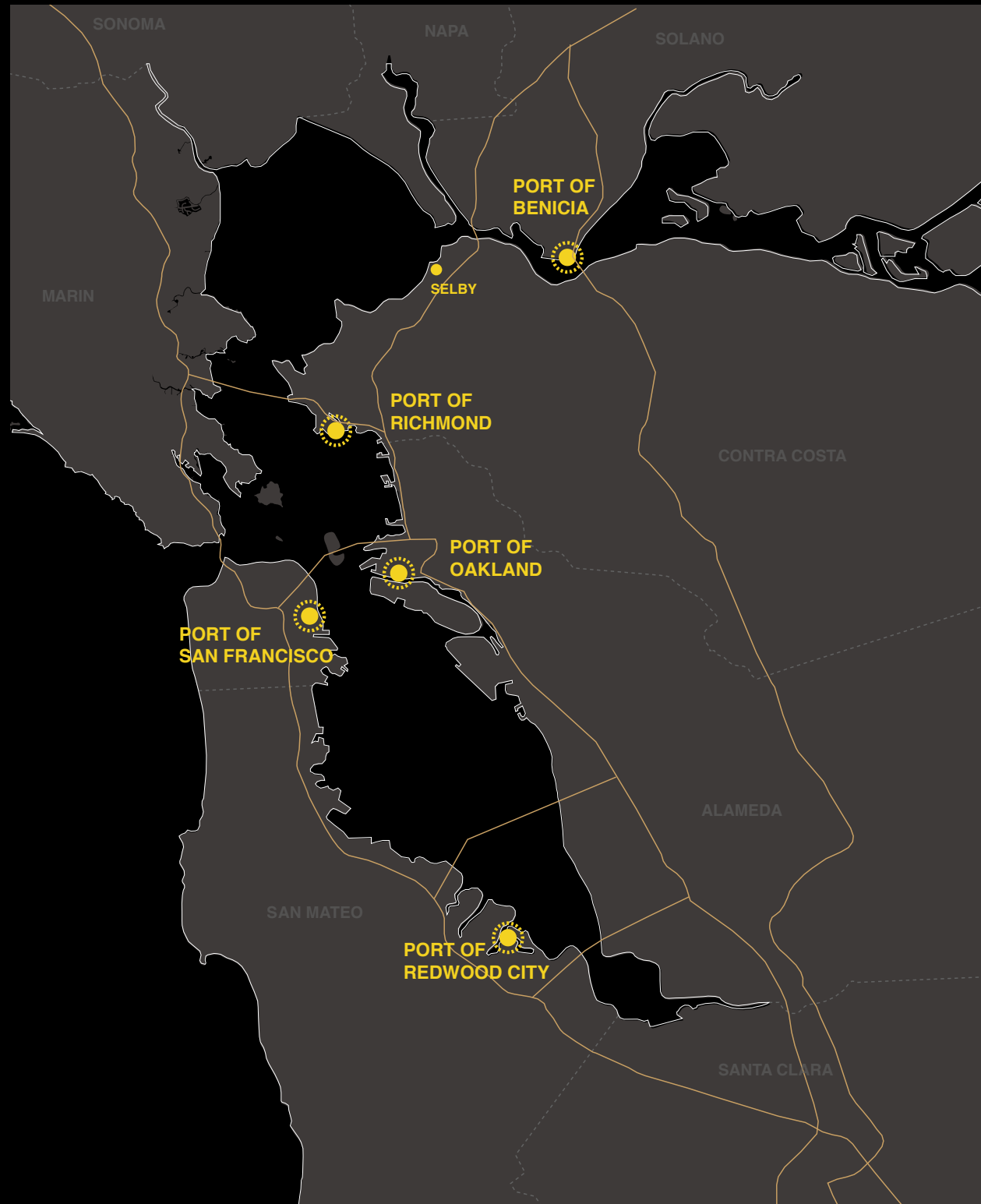


1850s

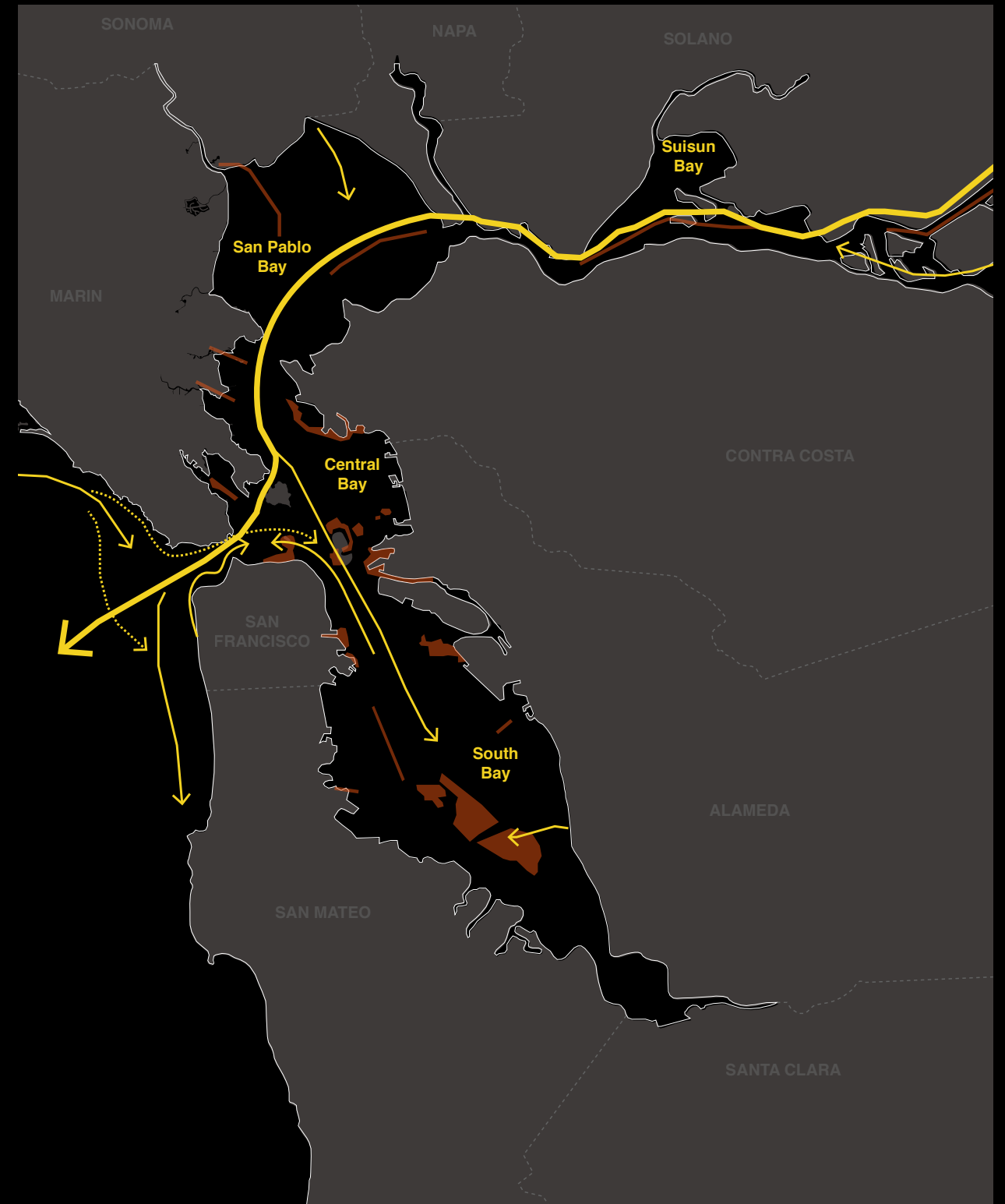
1950s

1960s

PORT in Bay Area

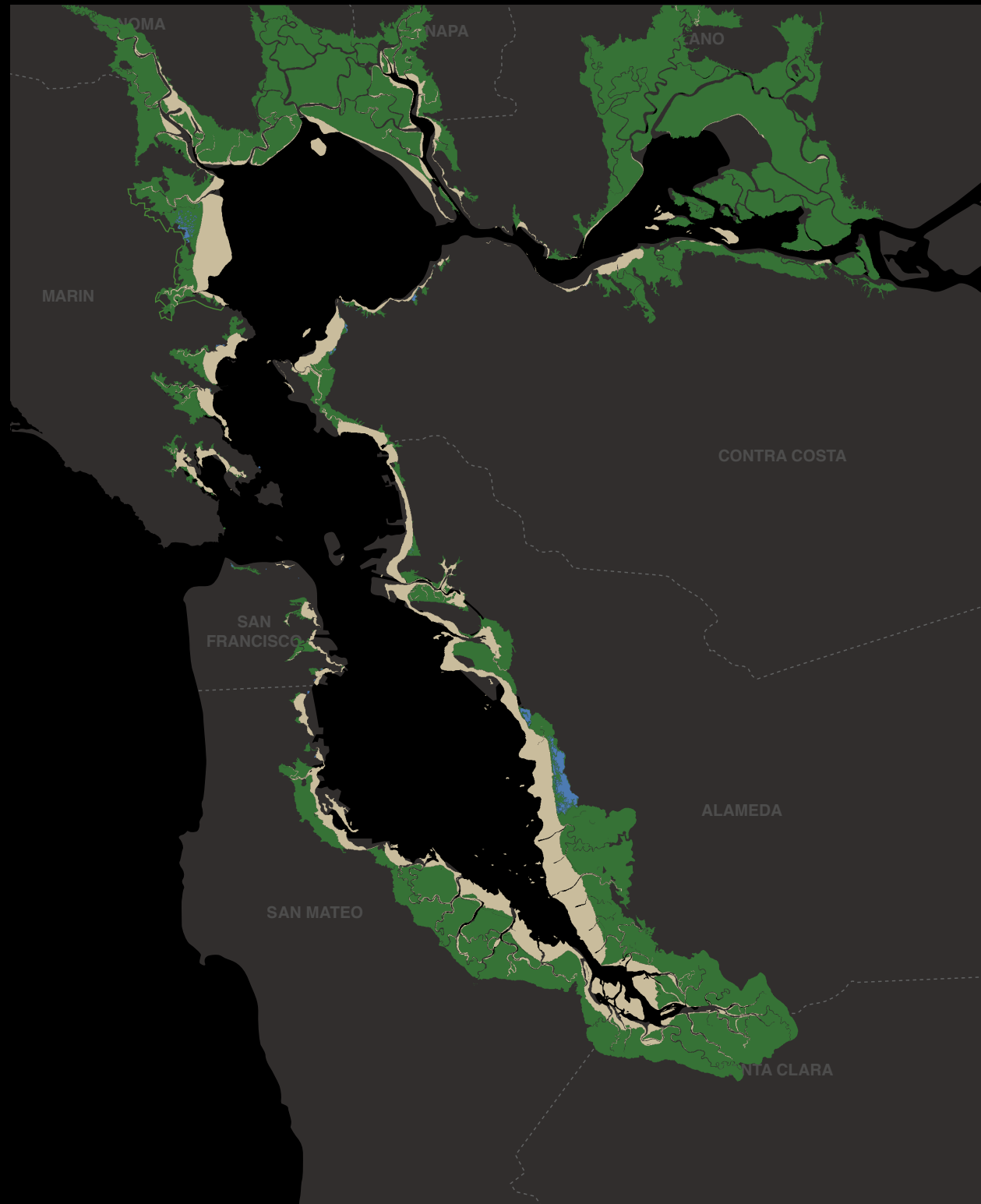


SAN FRANCISCO BAY AREA PORTS

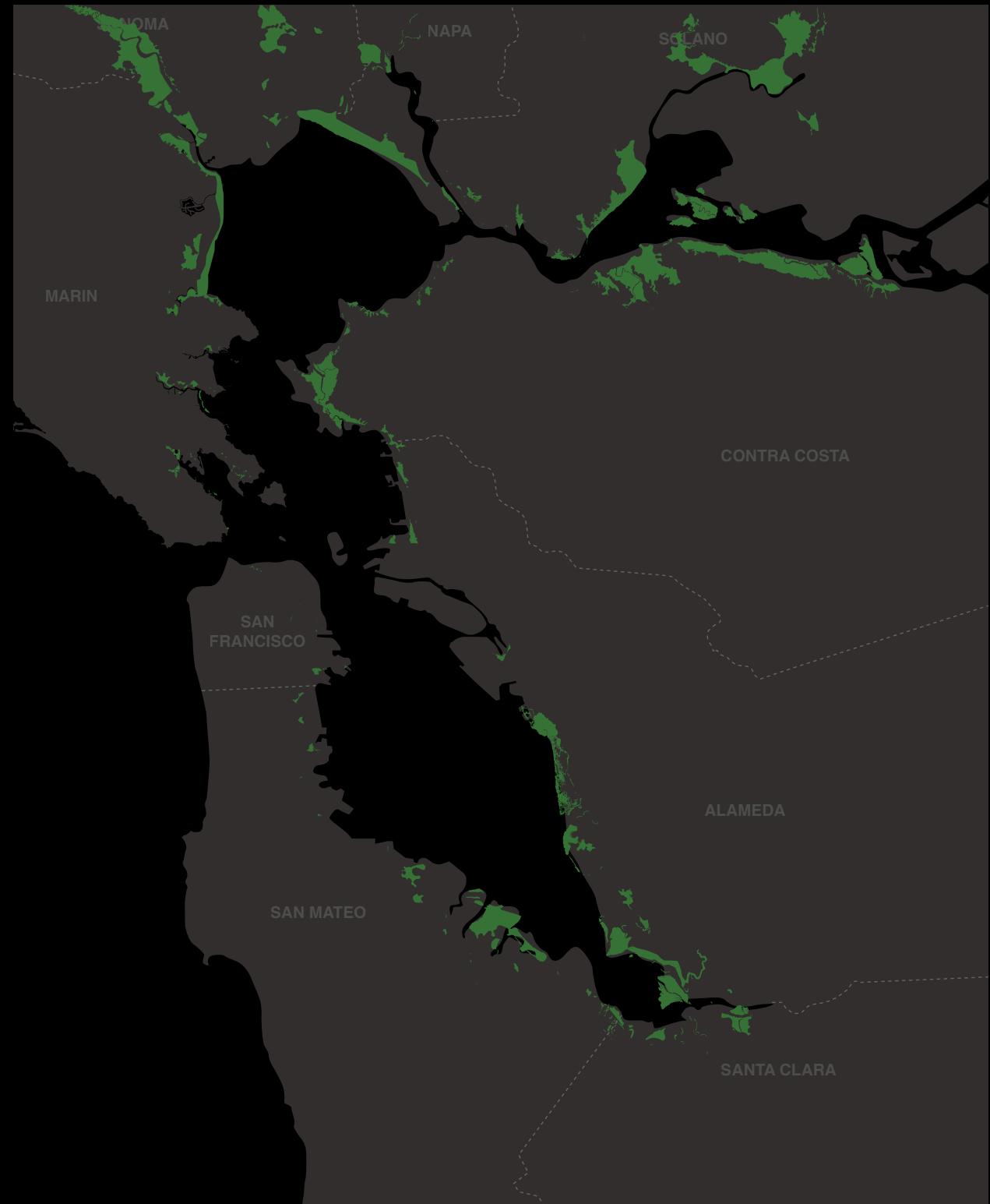


MAJOR DREDGED AREA

BAYLANDS in Bay Area



HISTORICAL BAYLANDS, 1850



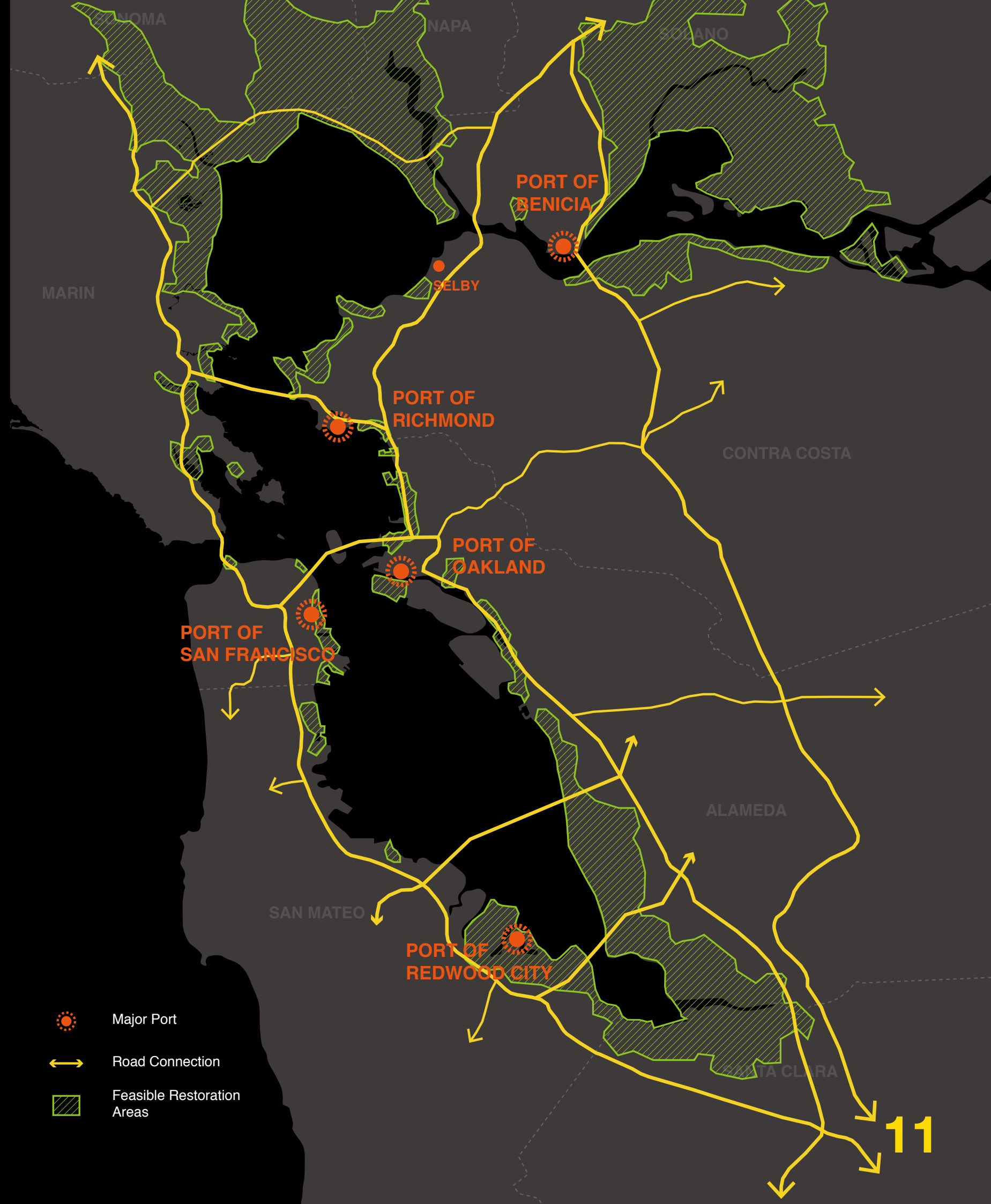
MODERN BAYLANDS, 2016

DESIGN CONCEPT

1. Improve and integrate surface transportation facilities to ensure a continuation of San Francisco Bay port system as a major world port and contributor to the economic development.

2. Encourage the restoration and enhancement of Baylands to maintain a healthy shoreline.

Enrich the Bay Area's economy and its quality of environment.

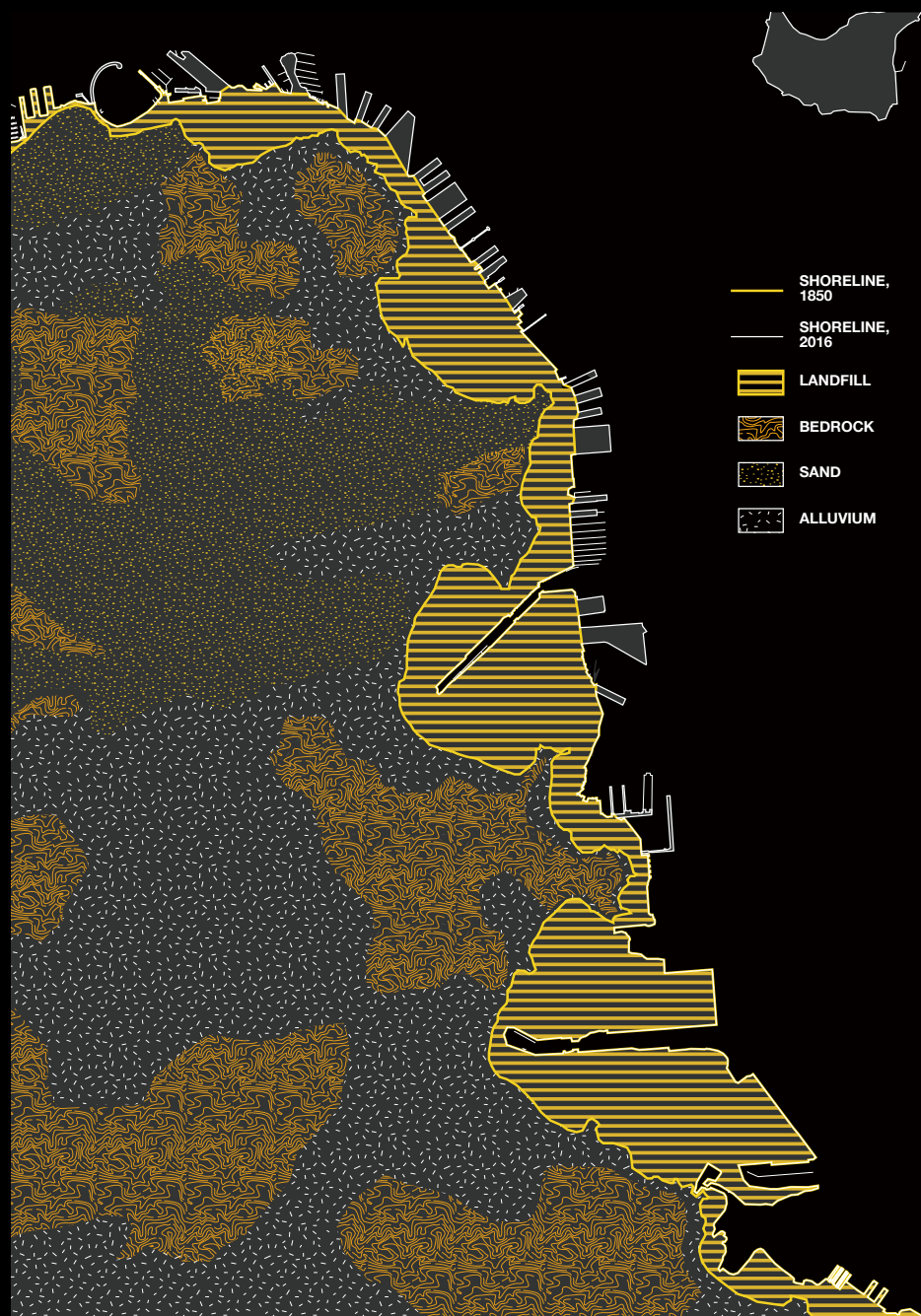


- Major Port
- Road Connection
- Feasible Restoration Areas

**MESO-SCALE:
Port of SF**



1. STABLIZATION



RISK ZONE

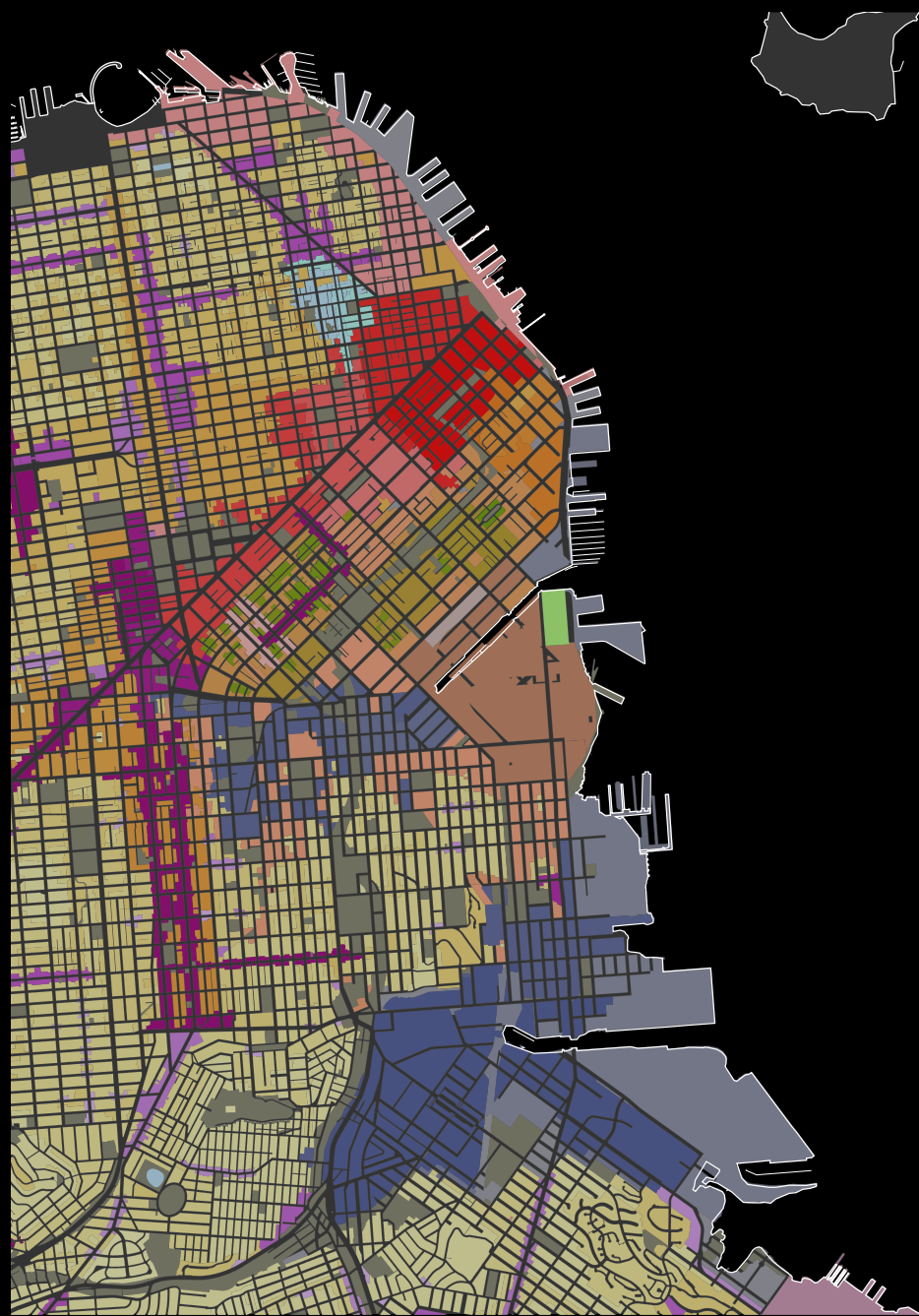


SHORELINE CONDITION

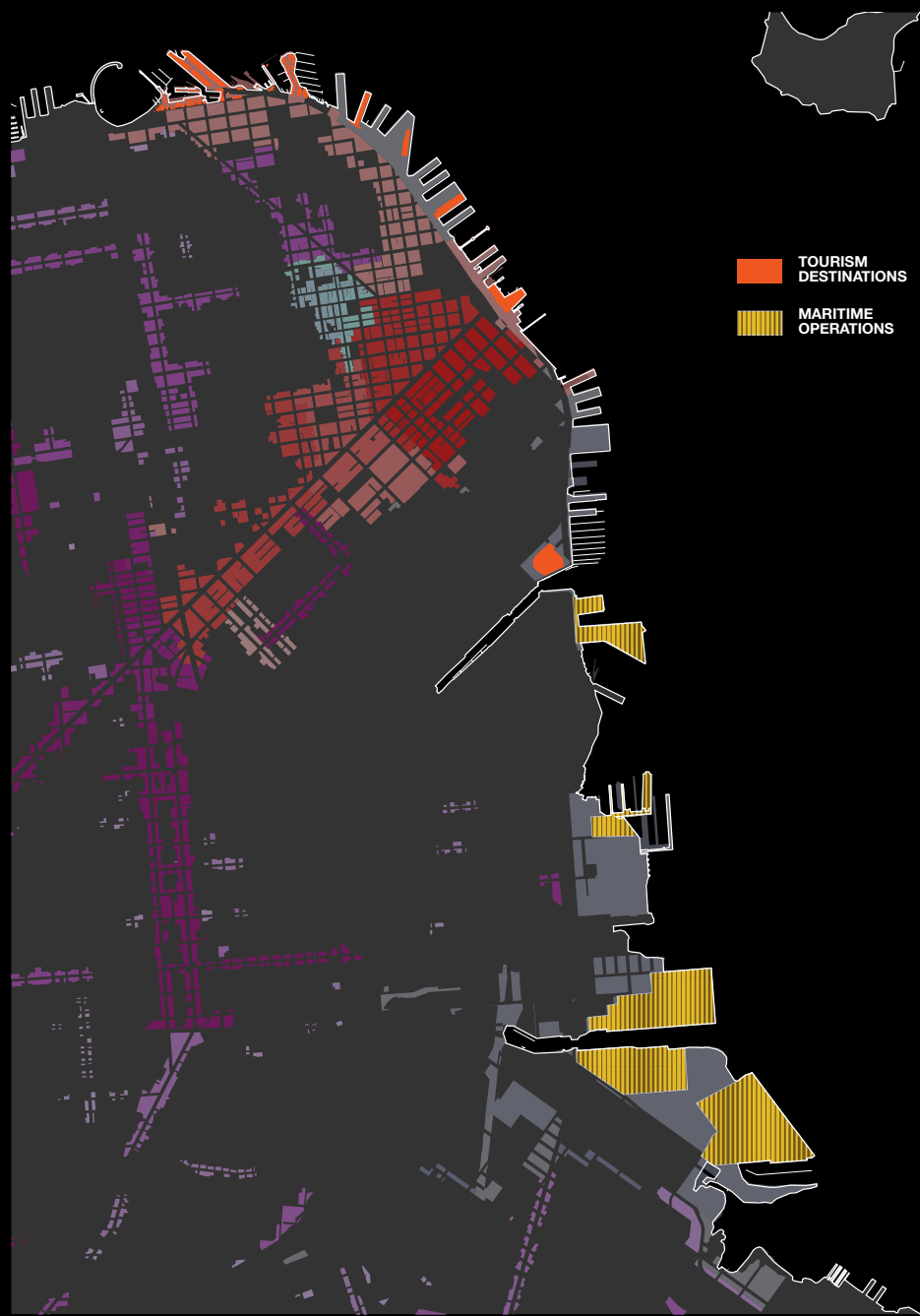


STABLIZATION

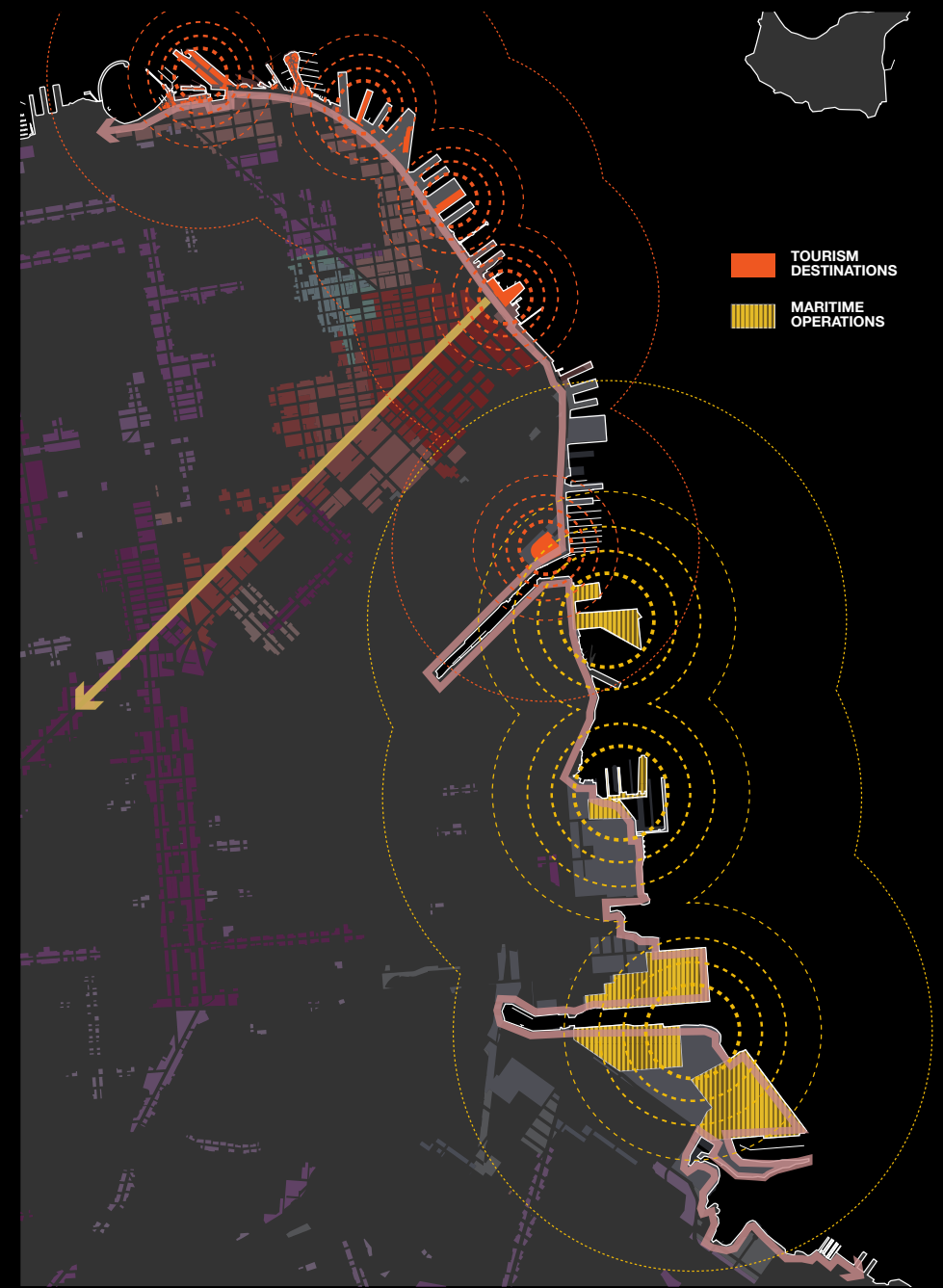
2. ECONOMIC ENGINE



LAND USE



INITIATIVES

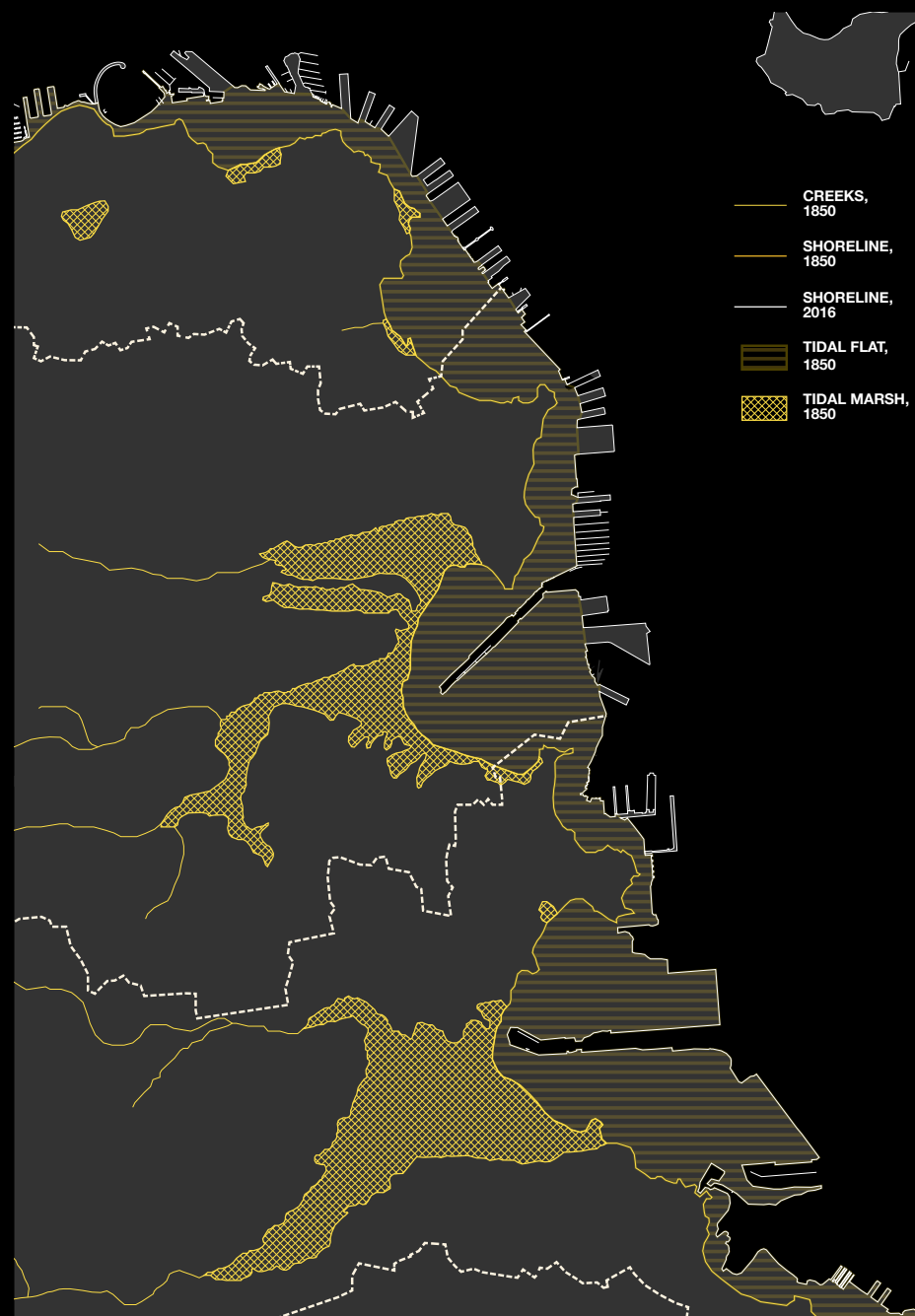


ECONOMIC ENGINES

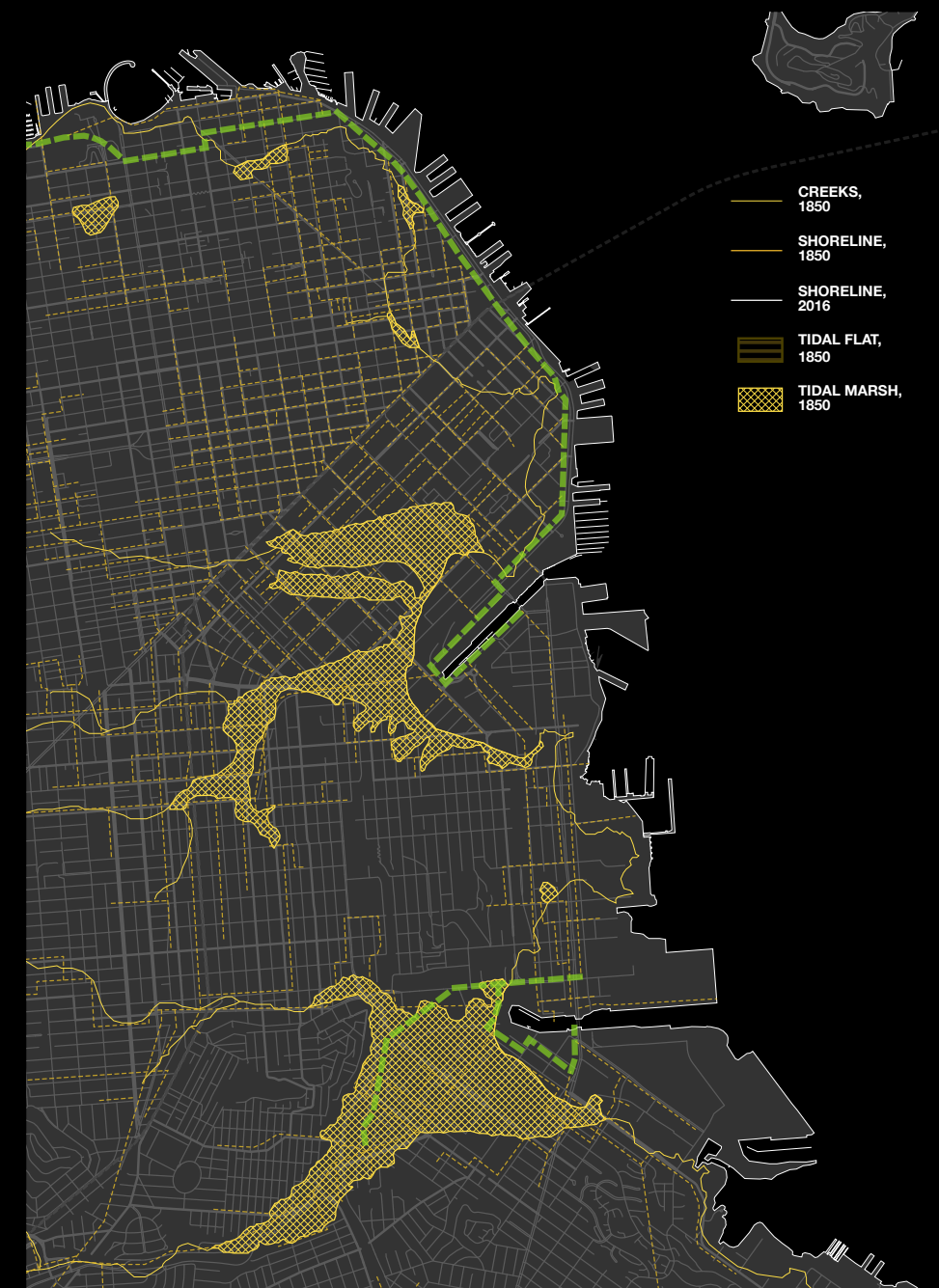
3. PUBLIC HEALTH & ENVIRONMENT



EXISTING SEWAGE INFRASTRUCTURE



HISTORIC WETLANDS



DIFFERENT SOLUTION

4. GREEN NETWORK



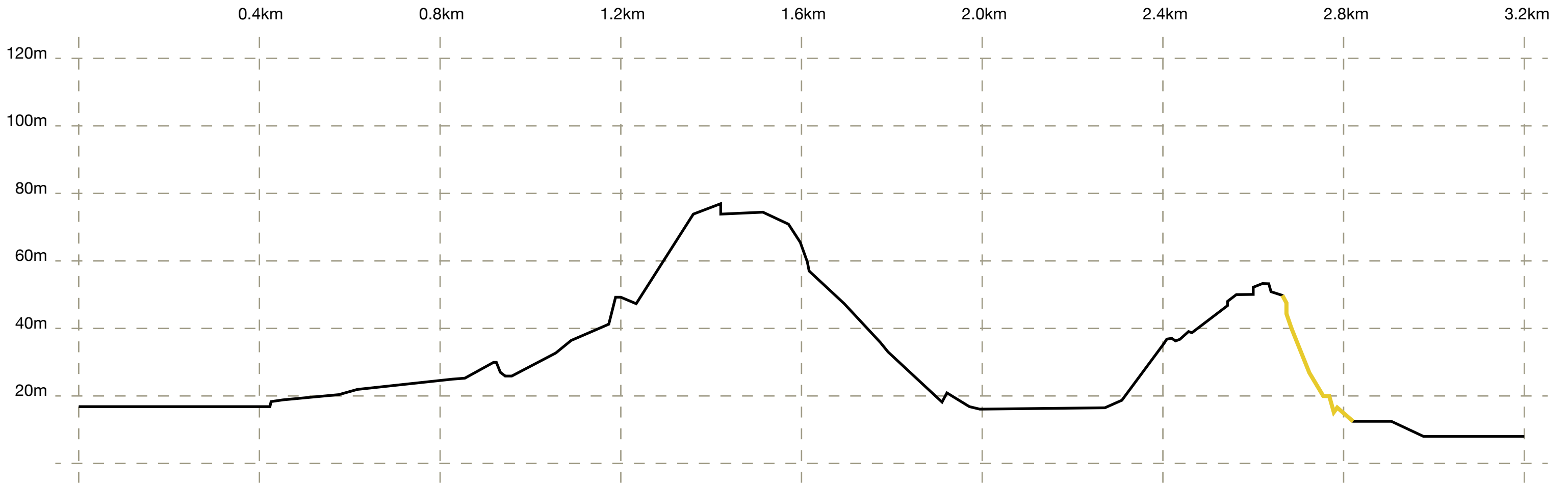
EXISTING OPEN SPACE



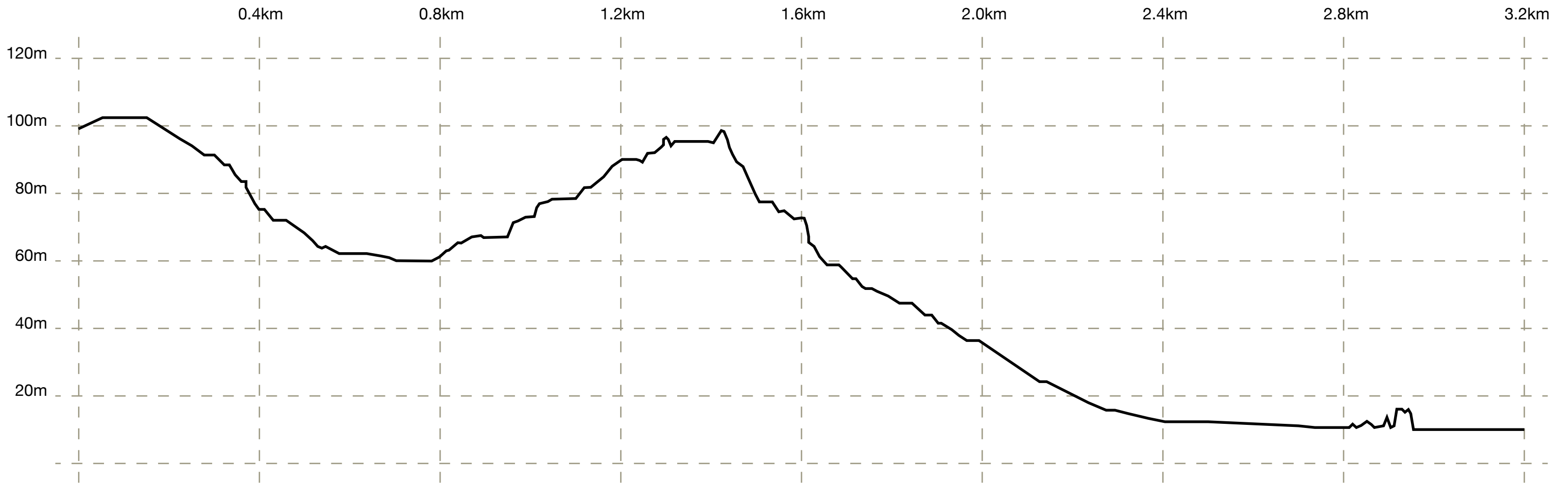
POTENTIAL GREENWAY



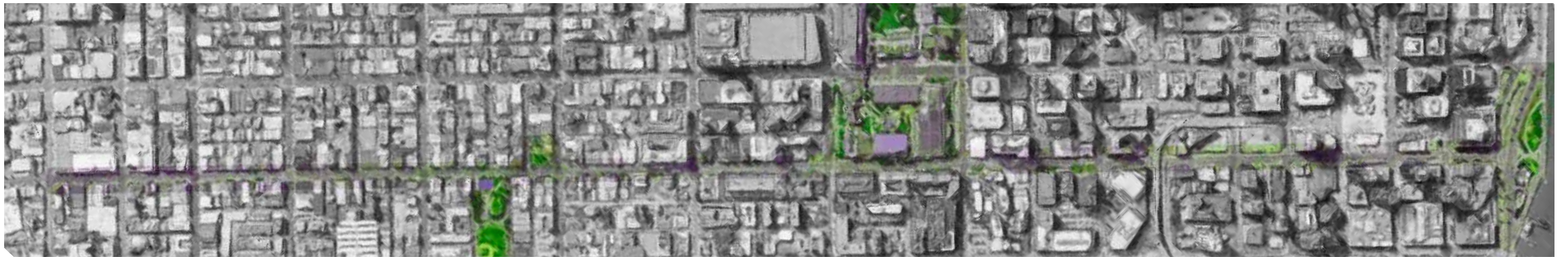
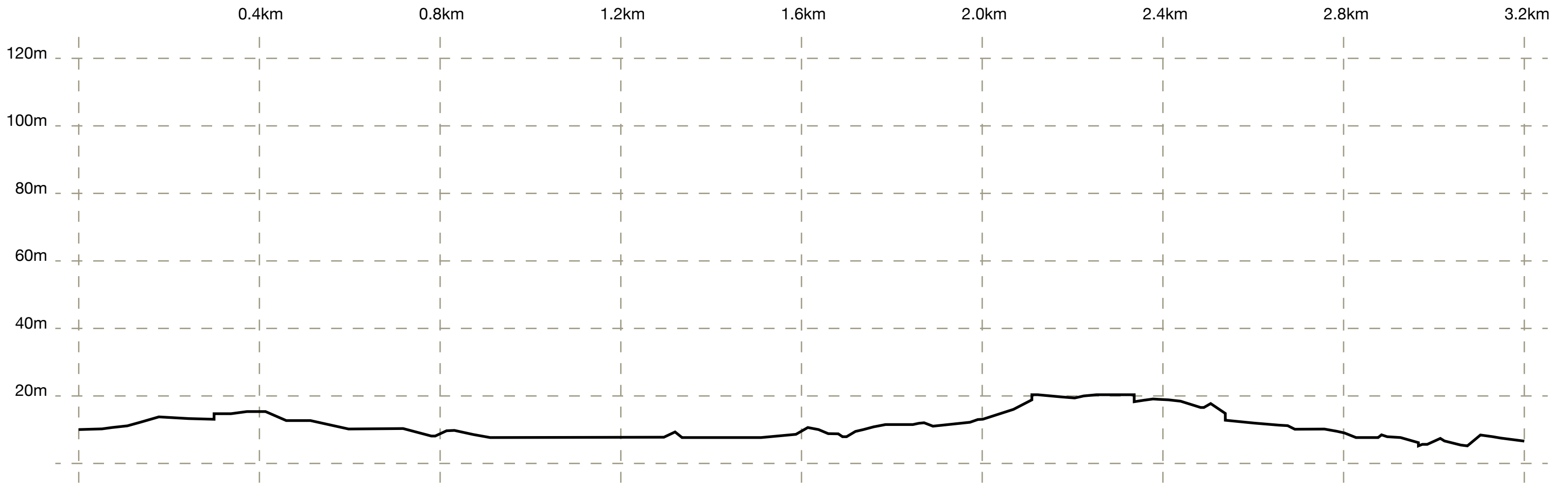
PROPOSED GREEN NETWORK



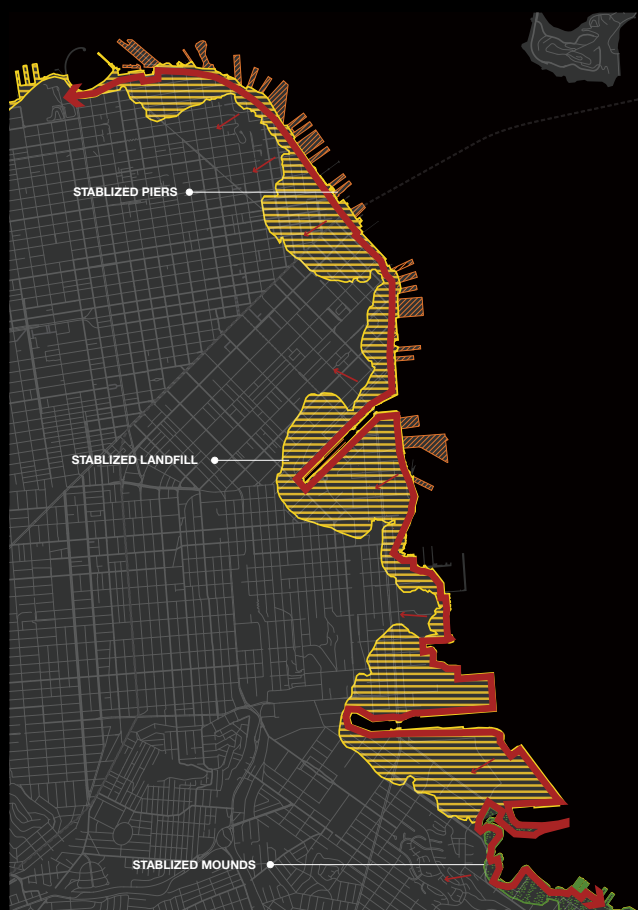
Lombard Street



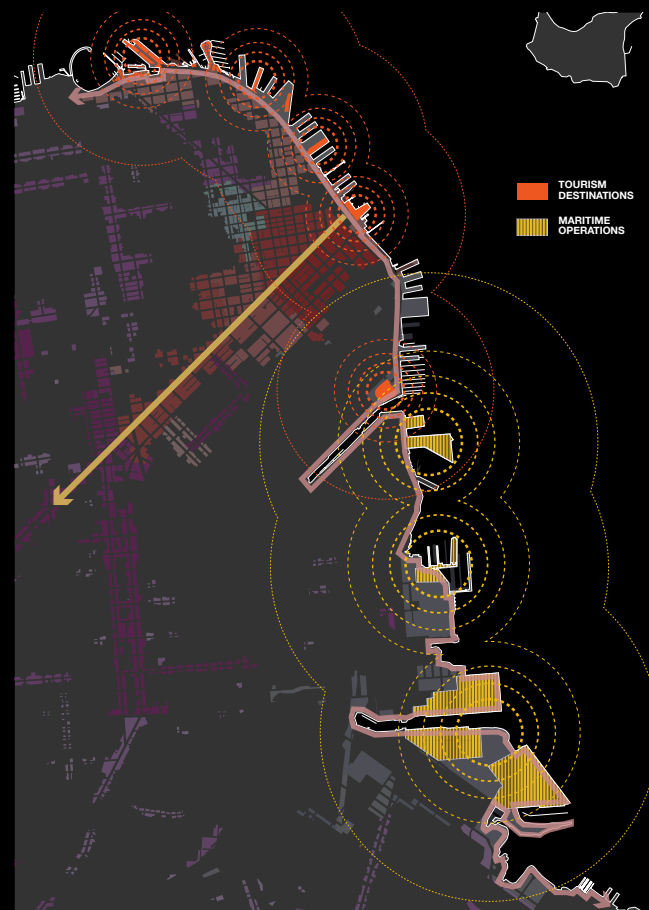
Washington Street



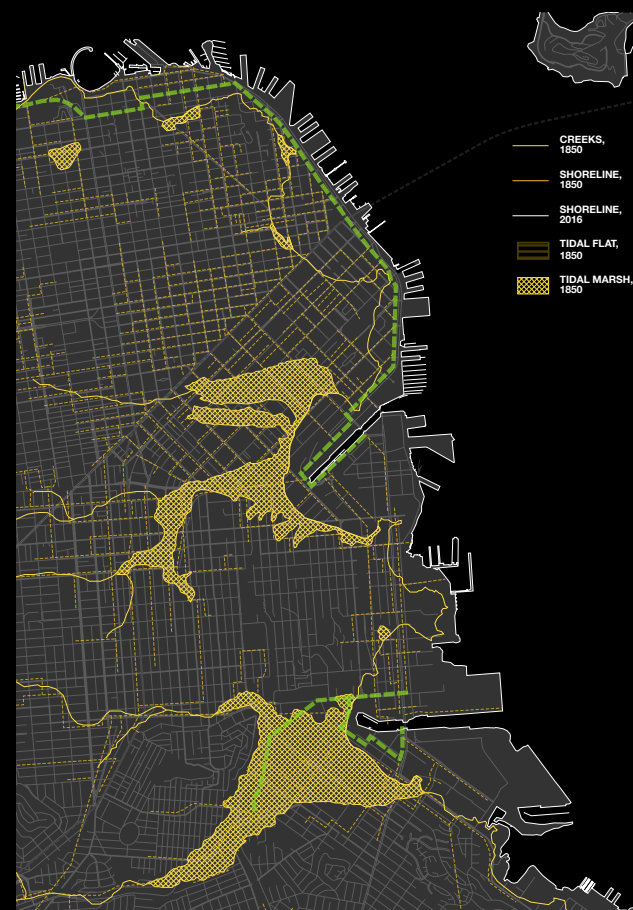
REFORMULATE AS POTENTIALS



The shoreline can be developed to stabilize the land fill.



The shoreline can act as economic engine.

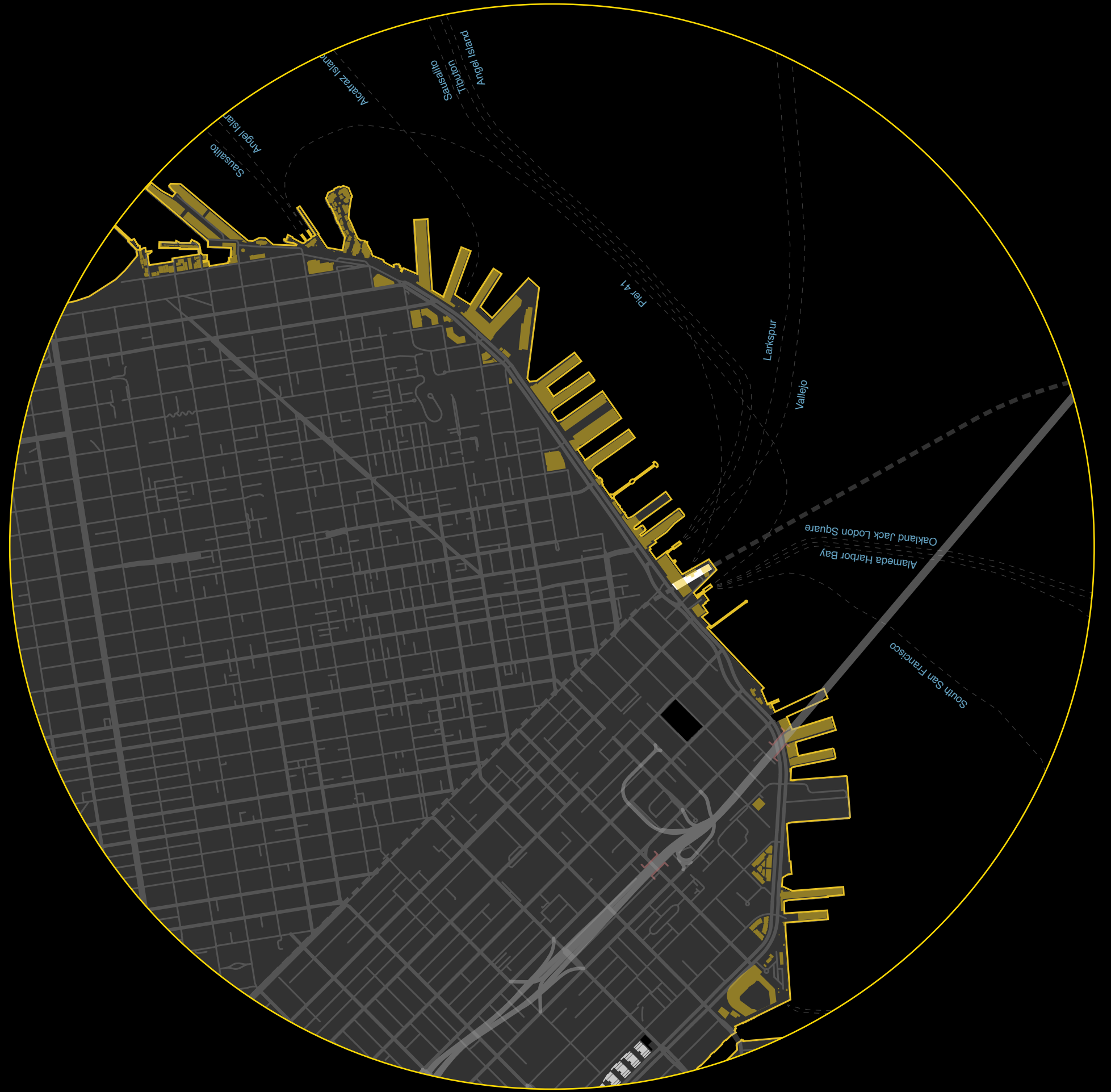


The shoreline can foster a variety of landscape-based solution for water treatment.



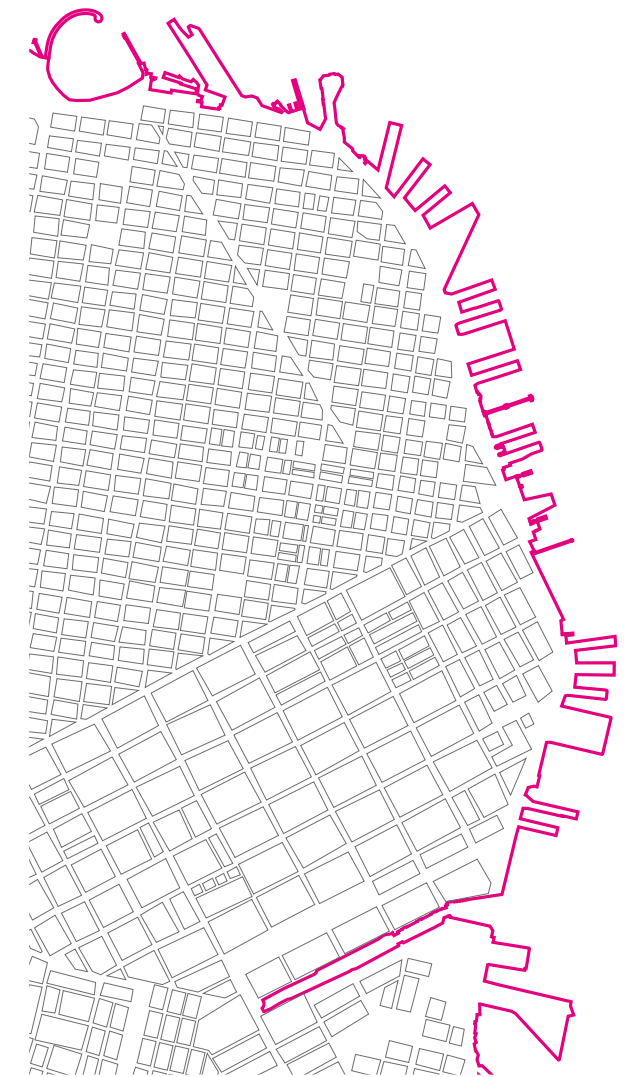
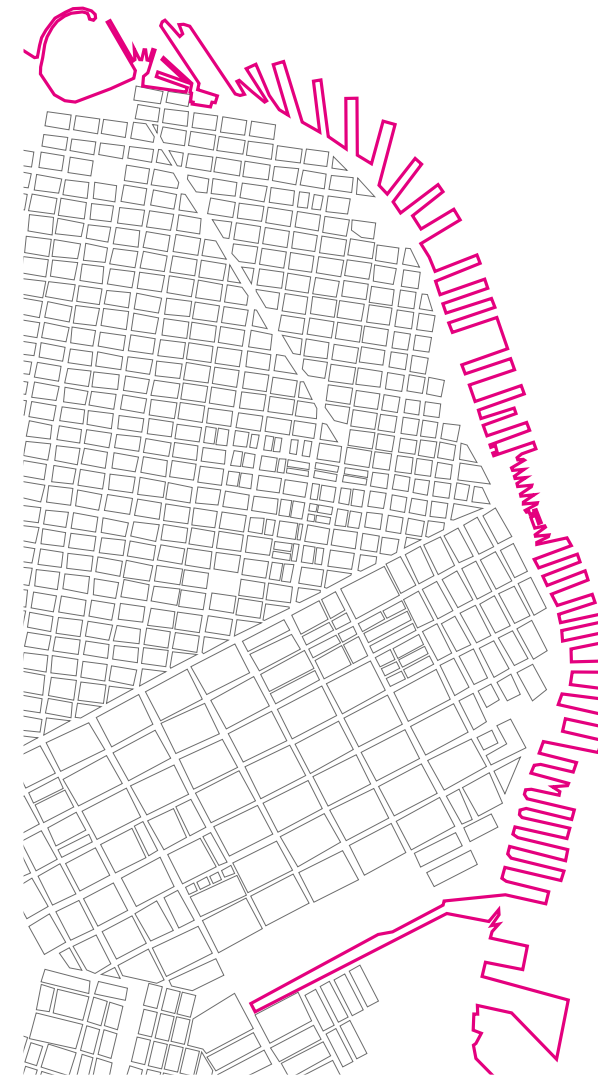
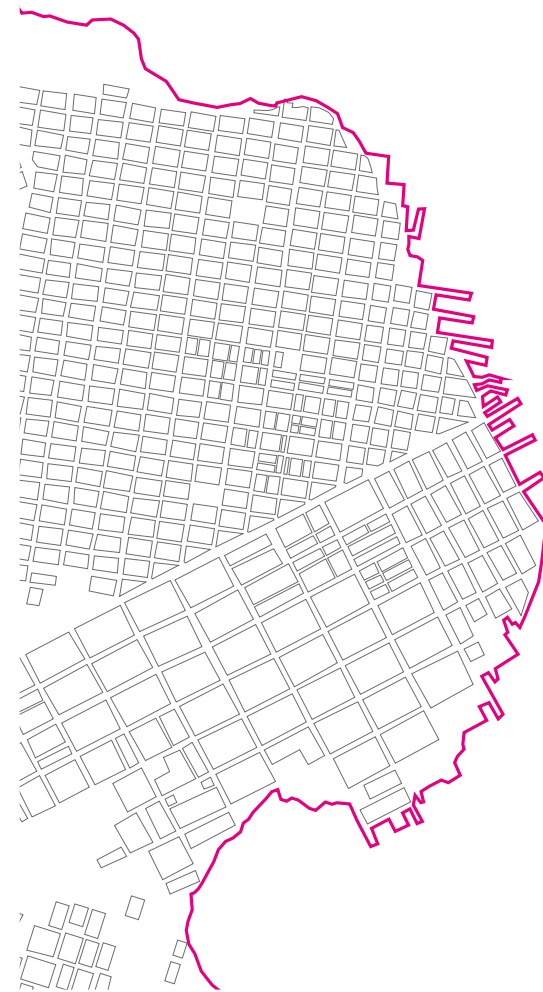
The shoreline can unify the open space and connect to the landscape network.

**MICRO-SCALE:
Embarcadero**



PHYSICAL TRANSFORMATION

This northeast side of San Francisco witnessed the prosperity of the island throughout history. In the past, Embarcadero was not only featured as a vibrant place of shipment and trade, but also as location for seaport industries. However, the technology, industrialization and shipping method had shifted this urban waterfronts to a stretch of public space.



1850, Bustling Port Town

Originally, this area served as a beachhead for men seeking their fortunes in the goldfields and as early center of commerce that grew to support the Gold Rush. The Gold Rush has dramatically transformed San Francisco into a bustling port town, exploding with new people and construction.



1890, State Belt Railroad

In 1890, the harbor commission built the State Belt Railroad, designed to improve the flow of goods and materials up and down the waterfront by serving the earliest orderly constructed piers and wharves, and linking them with the outlying commercial warehouses and railroads.



1957, Elevated Freeway

Construction of the Embarcadero Freeway began in 1953, and was originally intended to directly connect the Golden Gate Bridge to the Bay Bridge. But it creates a concrete wall along the waterfront from Folsom Street to Broadway. For 30 years, much of these waterfronts was separated from downtown.

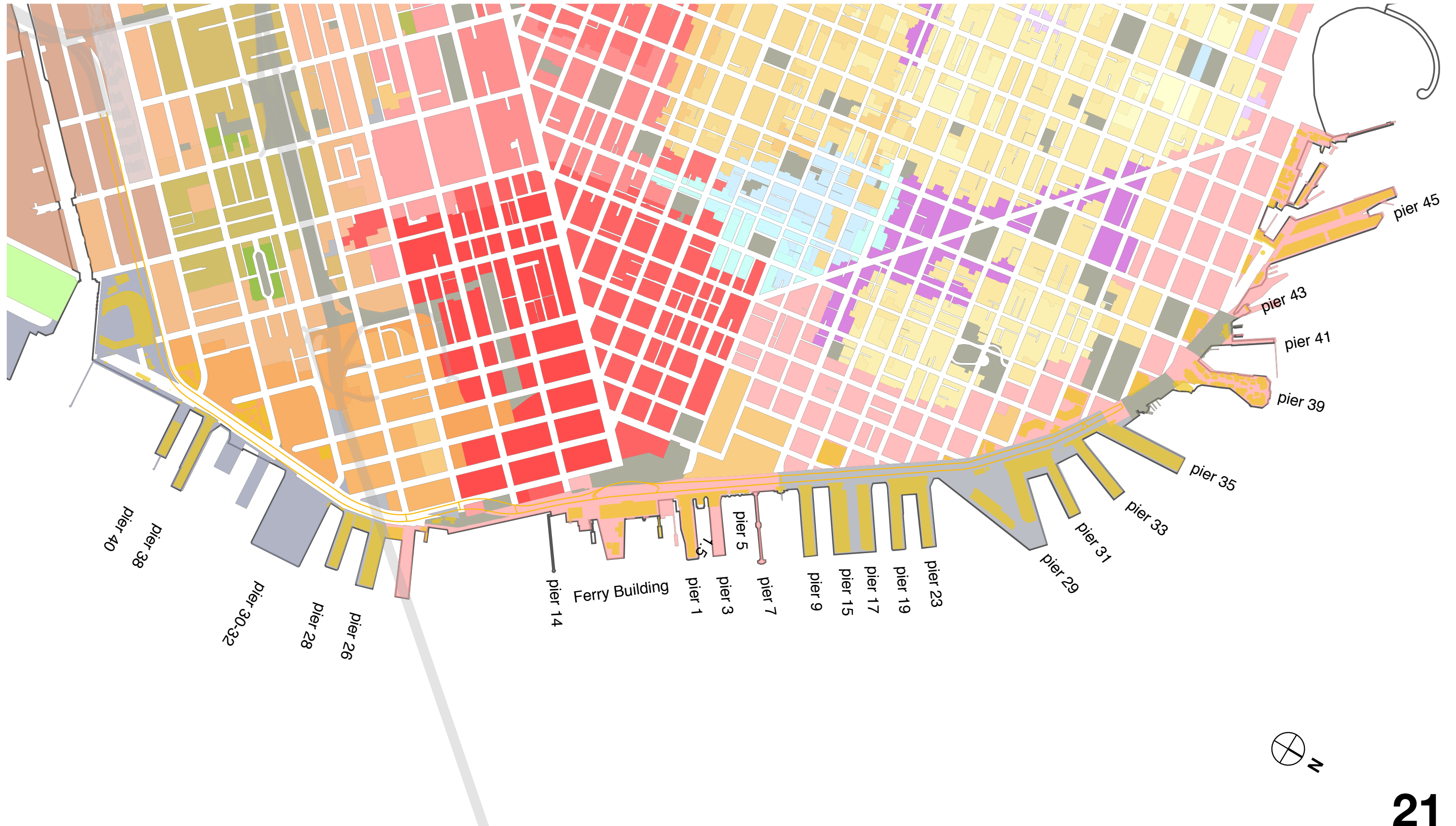


2001, Embarcadero Boulevard

Following the 1989 Loma Prieta earthquake, the Embarcadero Freeway was permanently closed to traffic and made its removal. A new project proposed to replace it with an elegant waterfront road and paths gained traction politically, which also facilitated a greatly enhanced ferry service.

Current Land Use

Embarcadero is mix-used.
This integrated mix of land uses makes Embarcadero quite vibrant and appealing.



Current Infrastructure System

Embarcadero has negative relation with its waterfront.
A car-driving road with large traffic volumes.



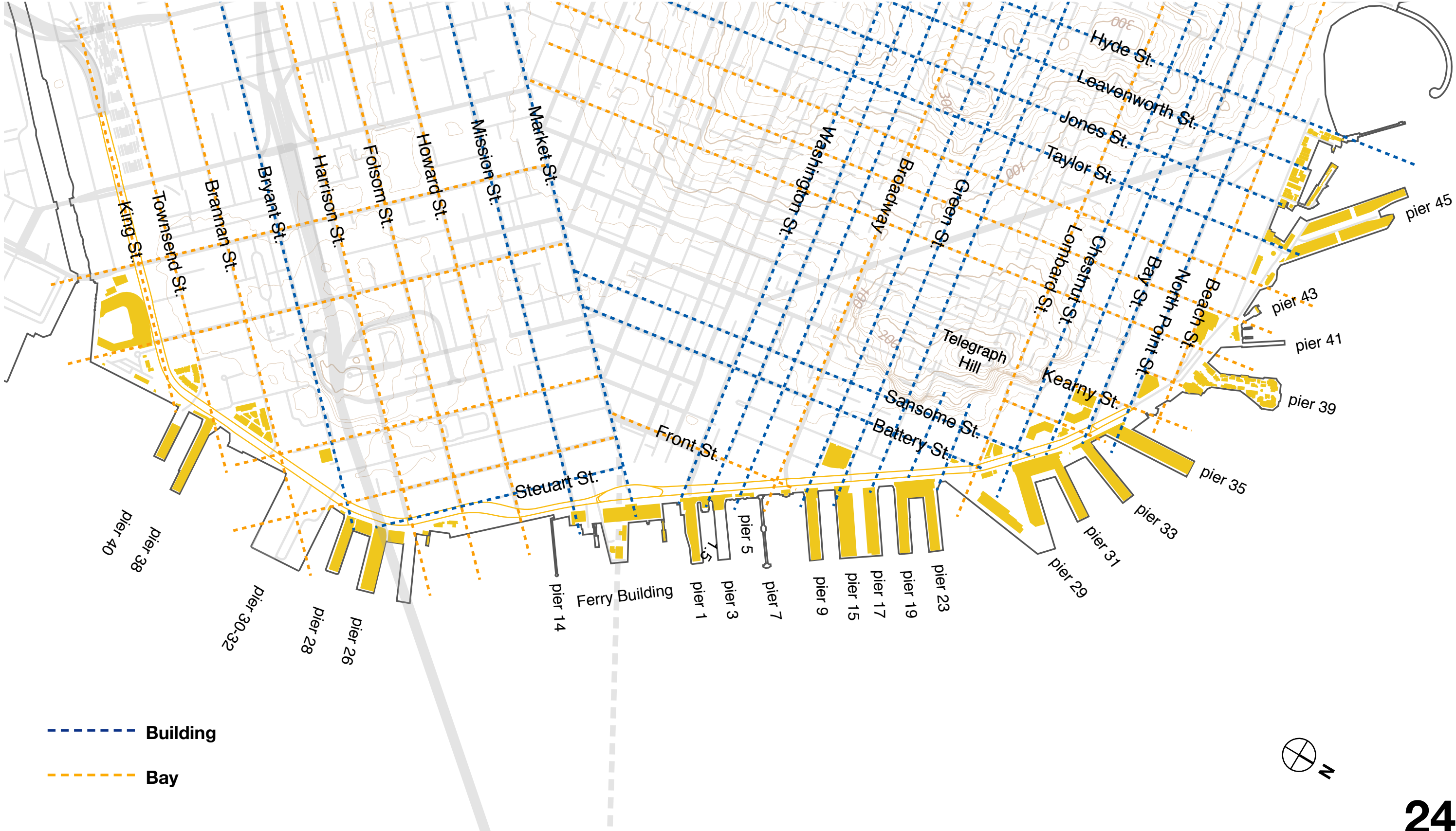
Current Open Space

Embarcadero has little desirable open space.



Current View Corridors

Embarcadero has splendid street view corridors.



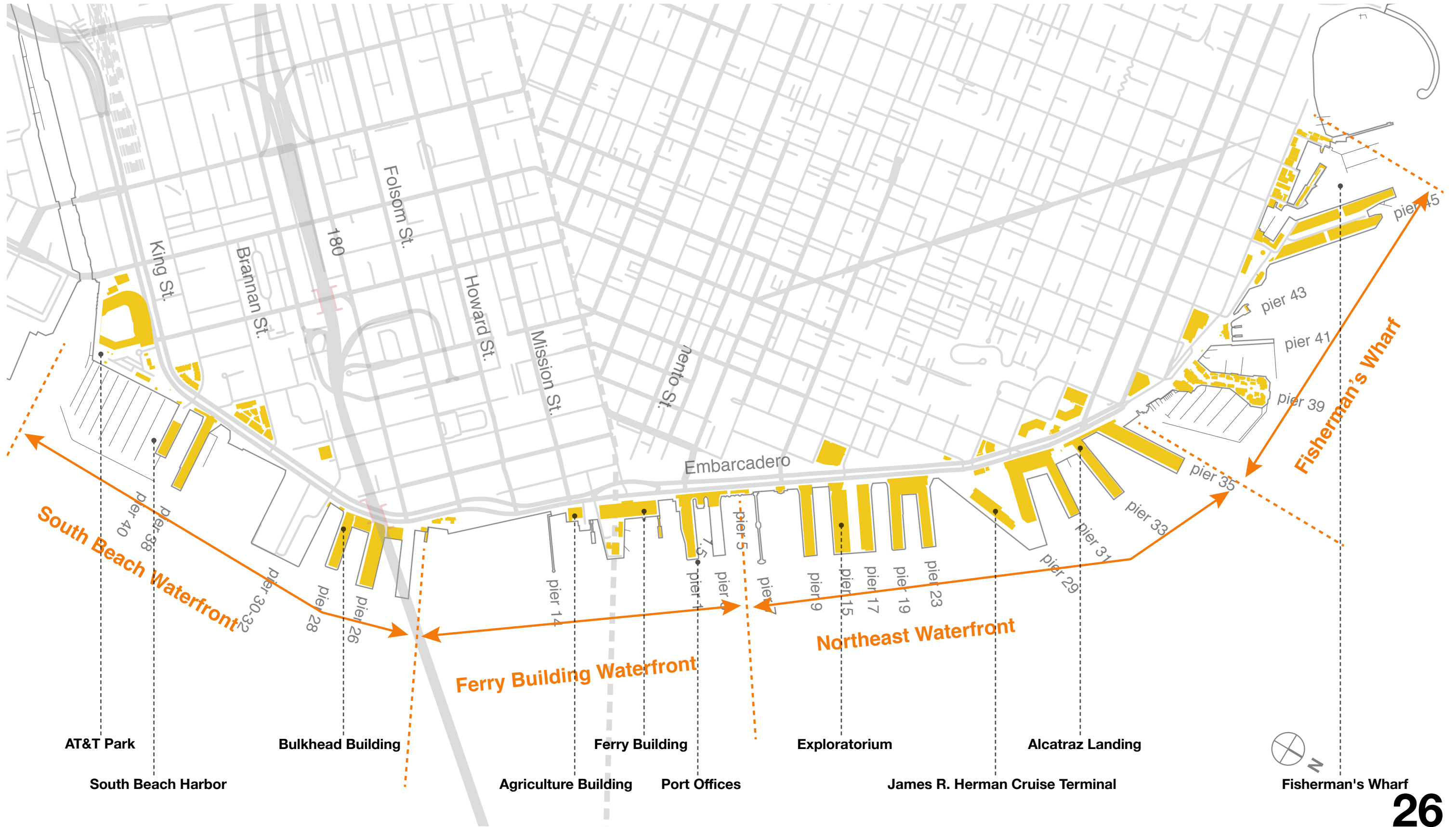
Current Elevation

Embarcadero is relatively low-lying.



Current Character Zone

Embarcadero is diverse.



1. Fisherman's Wharf



The Fisherman's Wharf Waterfront subarea extends from the swimming club docks at the east end of Aquatic Park to the east side of Pier 39. In the past 17 years, the Port has reinstated Fisherman's Wharf as **a major fishing industry center on the west coast**, based at Pier 45 and the Hyde Street Fishing Harbor.



Pier 39 Concourse



Pier 43 Ferry Arch



Wild Wave Sportfishing



Fisherman's Wharf



Hyde Street Fishing Harbor

1. Fisherman's Wharf



- **NEW WATER BASIN** to provide more water-related recreational activities
- **Create a PEDESTRIAN FRIENDLY AREA**

2. Northeast Waterfront



The historic sheds and bulkhead buildings located between Pier 35 to Pier 9 are the richest segment of the Embarcadero **Historic District**. Port efforts are now focused on ways to provide public-friendly uses in some of these structures vacated by the America's Cup festivities.



Pier 7 A long, skinny pier



The Exploratorium



Cruise Ship Terminal



Alcatraz Landing



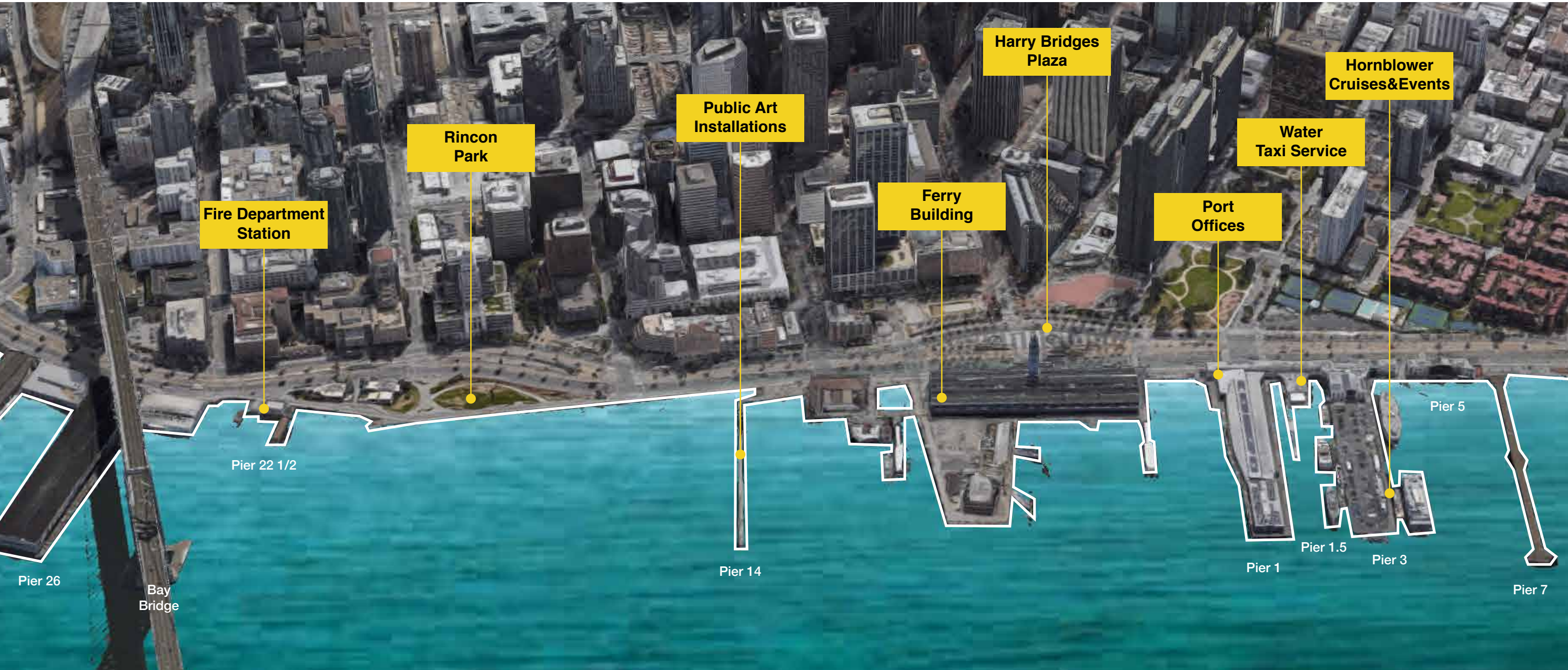
Pier 35 Bulkhead Building

2. Northeast Waterfront



- Enjoy the valuable culture
- Enhance visual and physical access to the bay

3. Ferry Building Waterfront



Transition Zone: The Ferry Building has become San Francisco’s new living room, where San Franciscans, commuters and visitors from around the world are all welcome. These projects, together with the expansion of ferry landings at the Downtown Ferry Terminal and the creation of Pier 14 public access pier and Rincon Park, have created a homecoming of sorts.



Rincon Park



Public Art Installation



Ferry Building



Harry Bridges Plaza



Pier 1 Bulkhead Building

3. Ferry Building Waterfront



- EMPHASIZE this critical city axis
- IMPROVE this critical important transition zone

4. South Beach Waterfront



As one of the largest ports in the world, the northeast side of San Francisco witnessed the prosperity of the island during industrial age. Meanwhile, the island has also suffered from the heavy transportation infrastructure which blocked the waterfront from the city. The ending of those road grids never had touched the waterfront because of the city's reliance on shipping industry. The circulation of the pier, road and railway made it impossible for San Franciscoers to enjoy the waterfront.



AT&T Park



South Beach Park



South Beach Harbor



Pier 30 Parking



Pier 28 Bulkhead Building

4. South Beach Waterfront



- INCREASE COMMUNITY FACILITY to interact with inner neighborhoods.
- NEW WATER BASIN to maximize public access.

Spatial Framework

Combined with all four sub areas, this strategic map depicts the concept is to formulate a network of open space, integrated with transportation improvements to enhance public access and enjoyment.

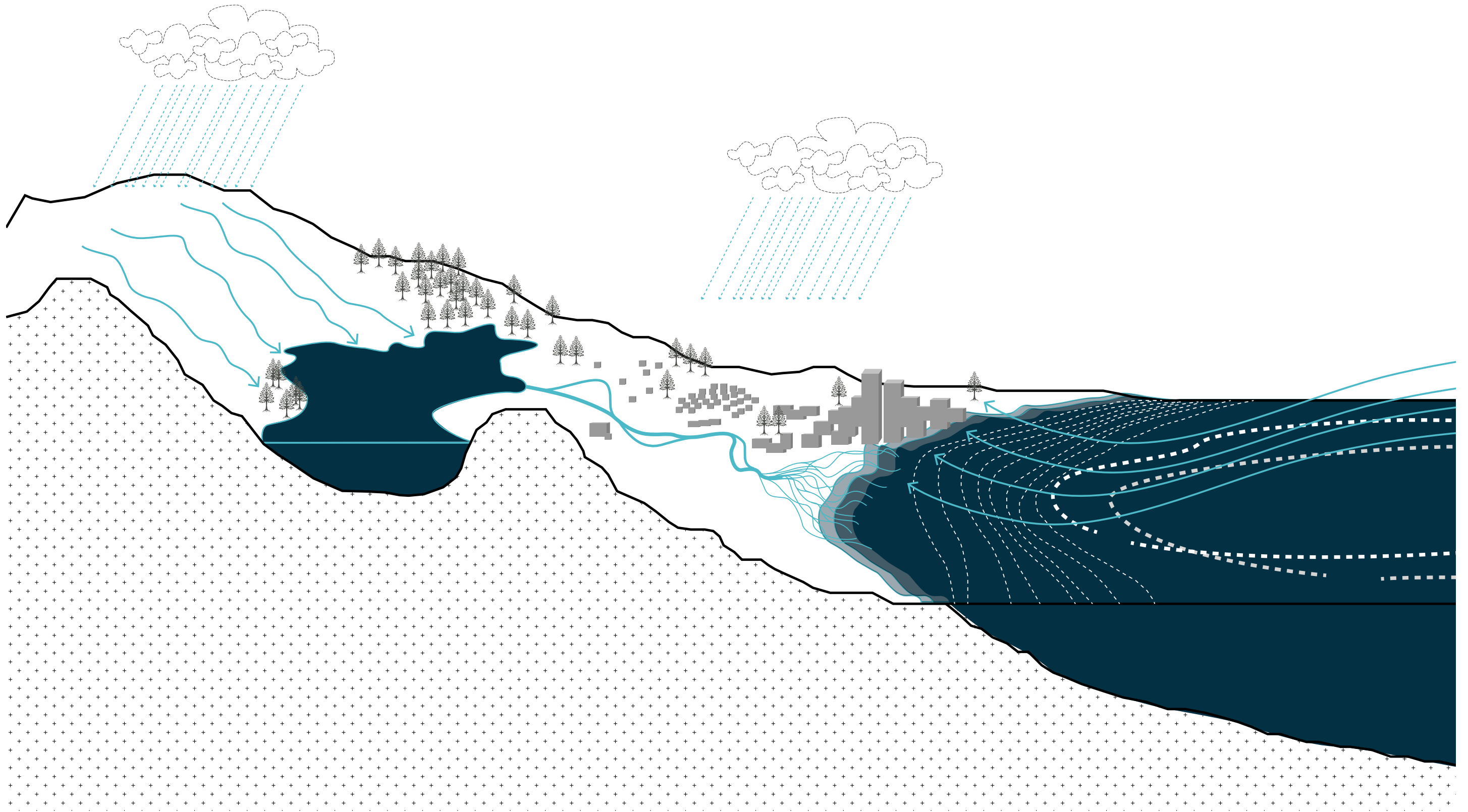
The construction of this PEDESTRAIN FRIENDLY PROMENADE with a tailored set of subarea programs will reflect adjacent neighborhoods and bay area, balanced with broader City and regional needs. Along this network, there are a diverse array of maritime, commercial, entertainment, civic, open space and recreation activities for San Franciscans and visitors. This means that it aims to respect the waterfront's historic character, while also create new opportunities.



**DESIGN
PROPOSAL**

Design Principles

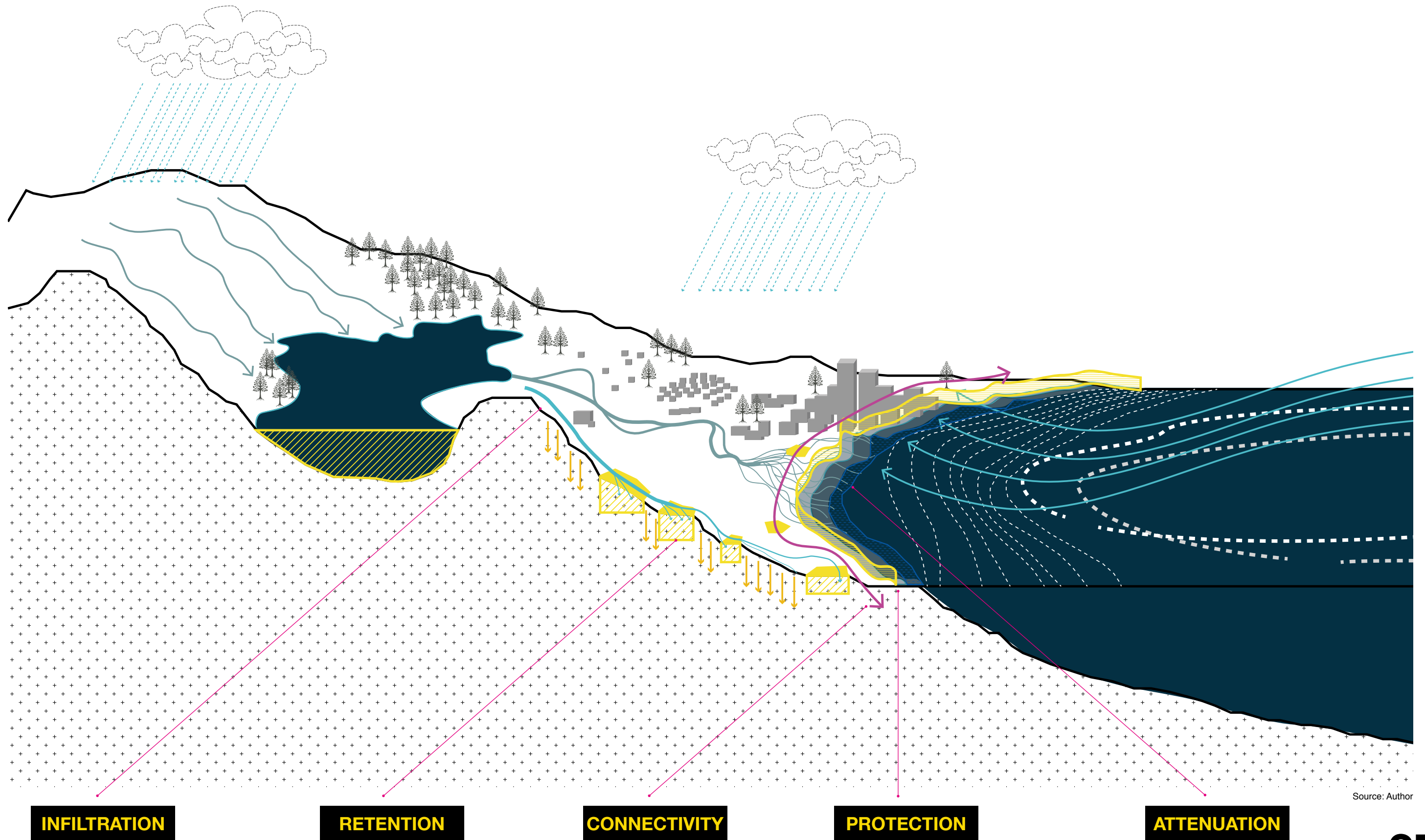
The Embarcadero, in-between the land and the water, is vulnerable to present day flooding from the Bay, urban stormwater runoff, and future sea level rise.



Source: Author

Design Principles

While it is impossible to ever fully eliminate risks from flooding, there are many strategies available to manage and reduce those risks. In this case, I establish five design principles to not only moderate the force of storm surge, but also to ameliorate the impact of upland rainwater runoff.



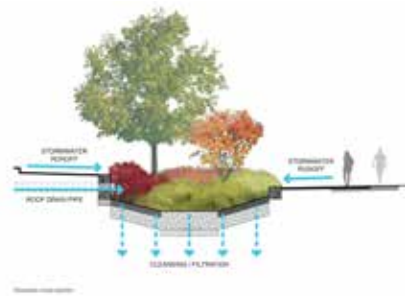
Source: Author

Design Principles

INFILTRATION

Treat as much stormwater as possible on site and reduce stormwater flowing into sewer system.

BIOSWALES / RAIN GARDENS / PERMEABLE PAVEMENT



Source: <http://www.lwa-architects.com/sustainable-design/>

Soft canyon can partly infiltrate the rainwater, but it moves surplus water towards downstream areas. It is called soft canyon because it is not limited by street form but consists of spaces inside the blocks and streets network. This method allows to create bigger and more integrated spatial system, reacting on water volumes in the same way and at the same time performing in accordance with its urban surroundings.

RETENTION

Public space is an important resource to be actively considered for the utilisation as stormwater retention area.

PLAZA / PARKS / CONSTRUCTED WETLAND



Source: Copenhagen Strategic Flood Masterplan, <http://www.landezine.com/>

Retention areas serve as a storage zone for the rainwater running from the surrounding streets or the city runoff from upstream area. It is used mainly during heavy rains and cooling the overall area in dry periods. Designed as network of public space, this storage system has also public function and can contribute to overall quality of urban environment, apart from its main function of water storage.

CONNECTIVITY

An integrated network of active open space and transportation lines, interacting with adjacent roads and programs.

POROUS PAVEMENT / PEDESTRAIN FRIENDLY PROMENADRDE



Source: <http://www.archdaily.com/550810/take-a-walk-on-the-high-line-with-iwan-baan>

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PROTECTION

A system of multi-purpose flood protection structures, consist of infrastructural and recreational components.

INFRASTRUCTURAL & RECREATIONAL COMPONENTS



Source: New BIG-Designed Neighborhood to Activate Aarhus' Waterfront, <http://www.archdaily.com>

Historically most infrastructure, has been built for one purpose only—to hold back floodwaters. In densely built urban areas, multi-purpose flood protection can provide additional value by integrating flood protection with other urban functions, like transport, waste water management, housing, recreation, nature and tourism. Multi-purpose flood protection infrastructure can improve the urban ecosystem and enhance living conditions for local communities.

ATTENUATION

A natural edge, composed of wetlands and marsh, is an ecological habitat, buffer, and indispensable resource.

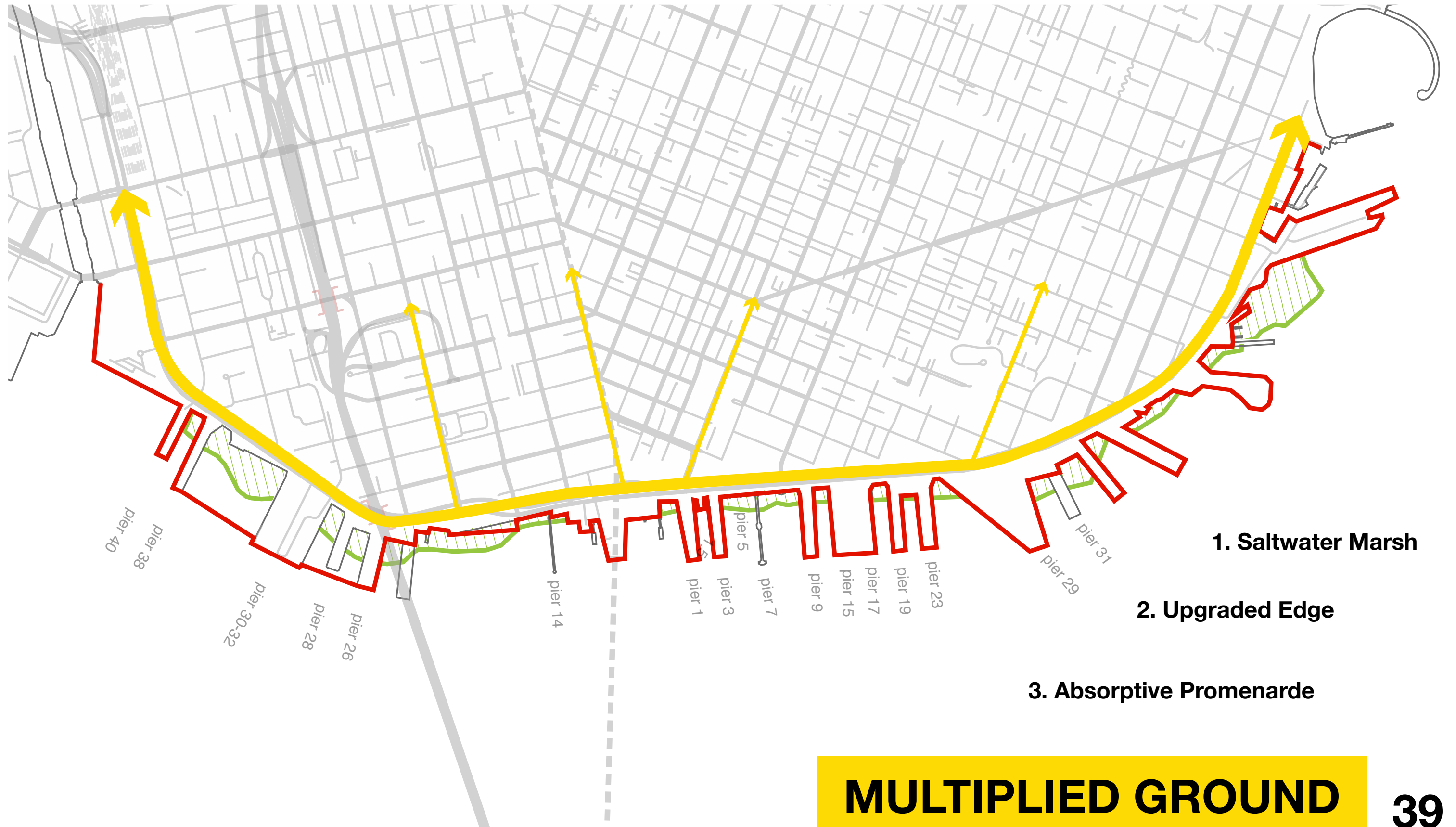
FLOLATING WETLANDS / SALT WATER MARSH



Source: <http://www.archdaily.com/53736/ris-ing-currents-at-moma>

Retention areas serve as a storage zone for the rainwater running from the surrounding streets or the city runoff from upstream area. It is used mainly during heavy rains and cooling the overall area in dry periods. Designed as network of public space, this storage system has also public function and can contribute to overall quality of urban environment, apart from its main function of water storage.

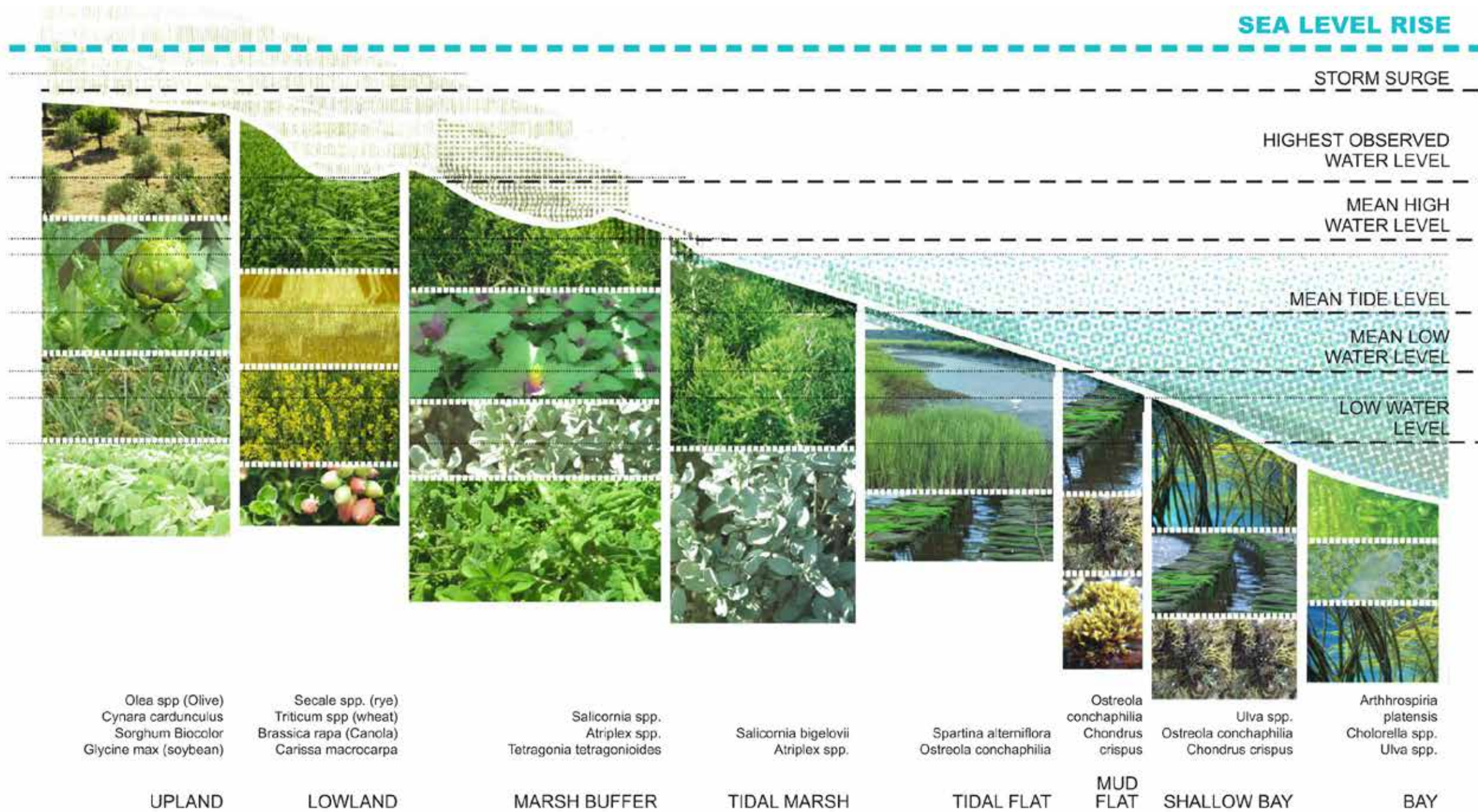
Design Concept

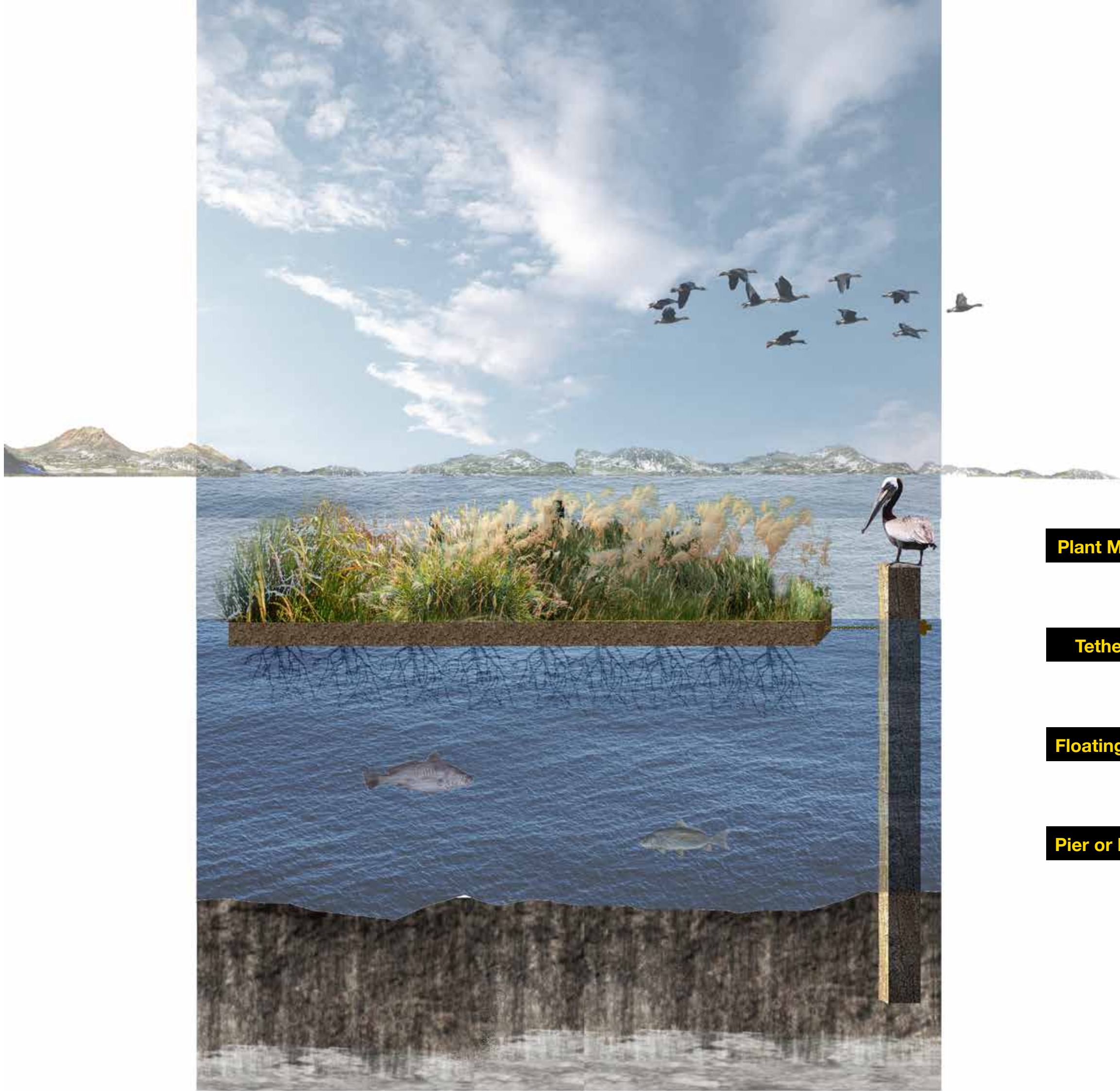


1. Saltwater Marsh



Source: TLS Landscape Architecture,
Richmond Bayway





Plant Material

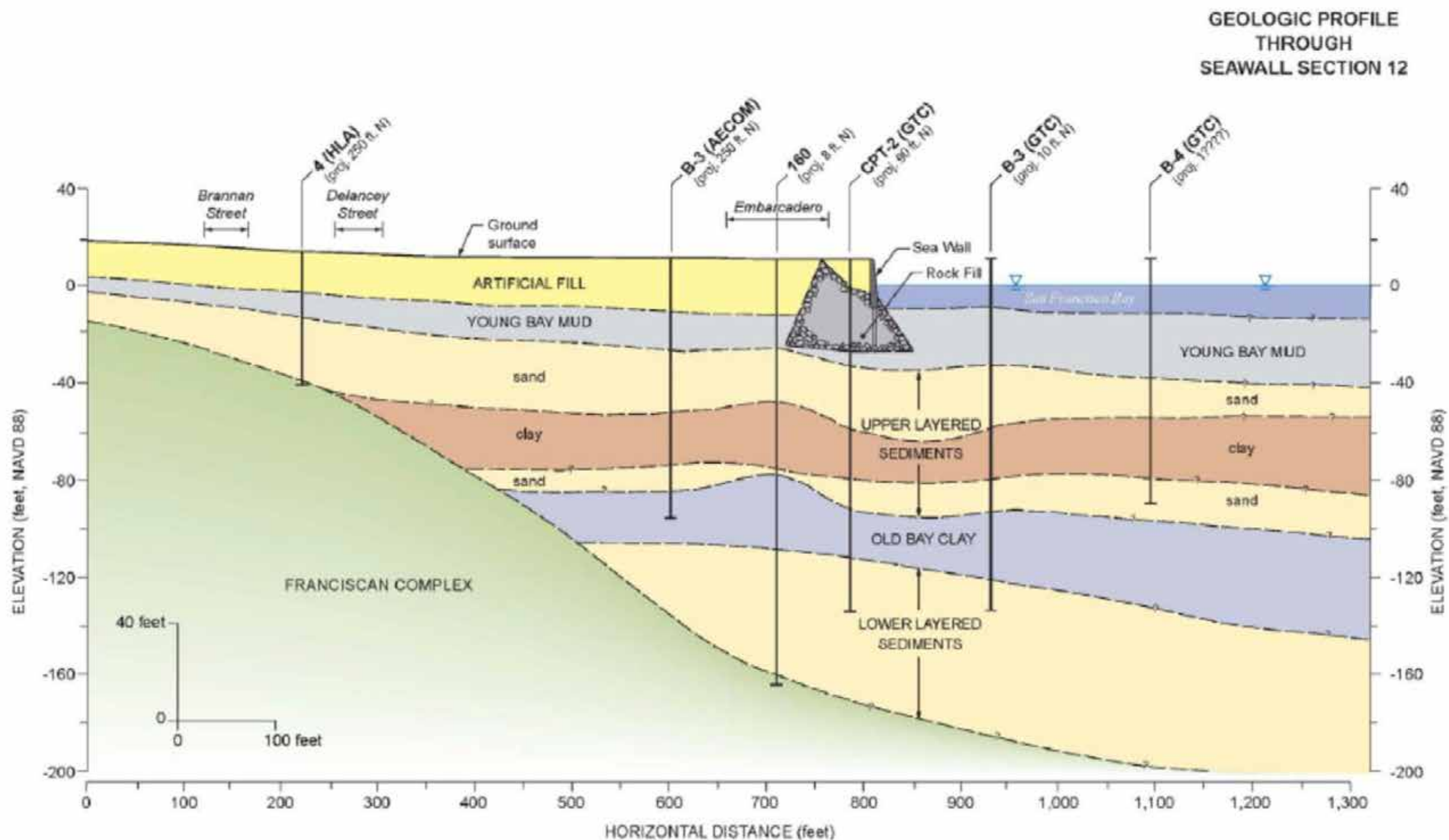
Tether

Floating Island Matrix

Pier or Pile

2. Upgraded Edge

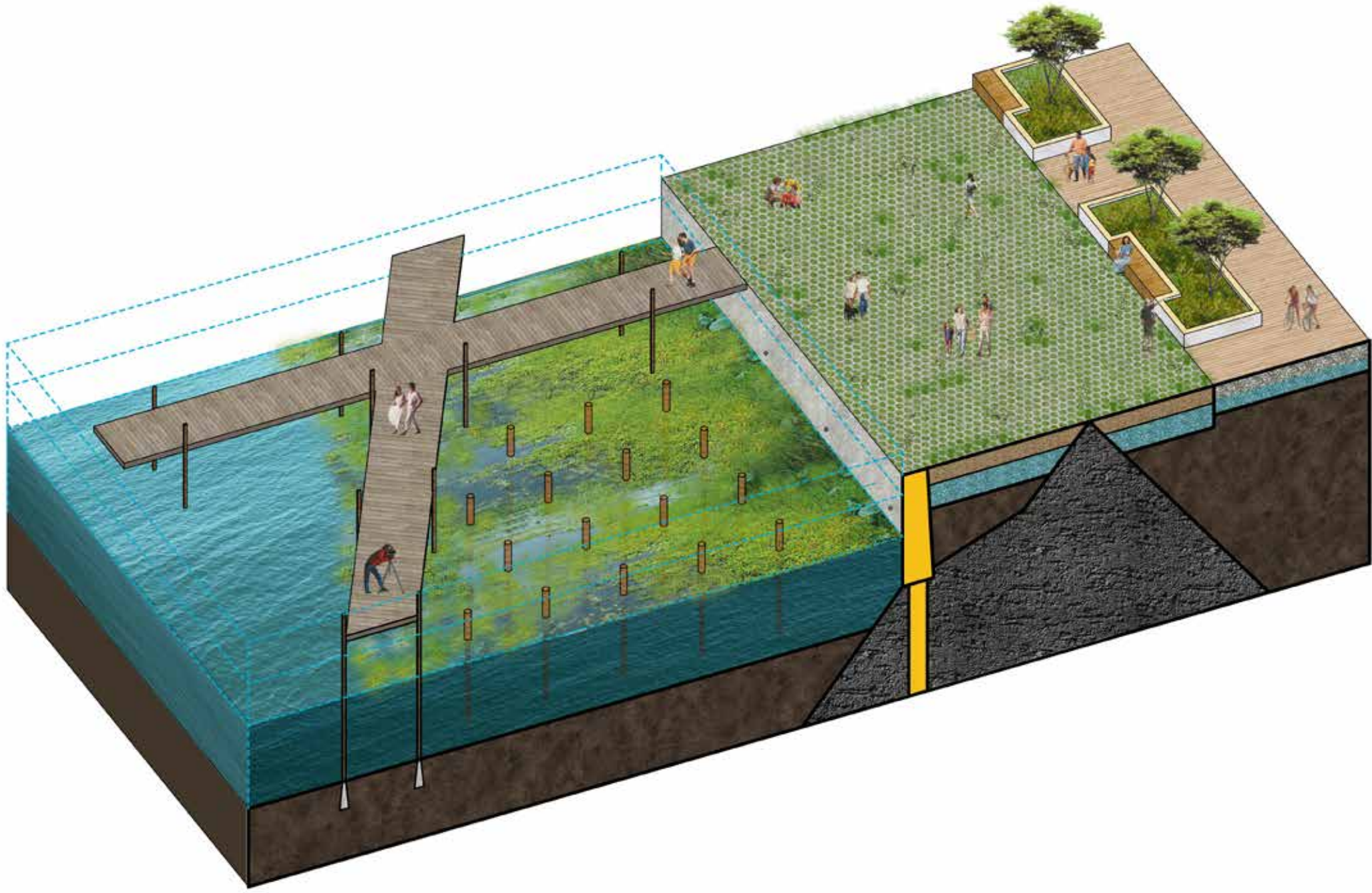
The map shows the typical geotechnical section of the Embarcadero, which is composed of artificial structure and natural condition. According to the vertical dimensions from NAVD (North American Vertical Datum) 1988 and the projection of sea-level rise by 2100 (max.108 inch), it can conclude that by 2100, a 0.8-meter-height structure along the edge is required to prevent San Francisco from flooding.



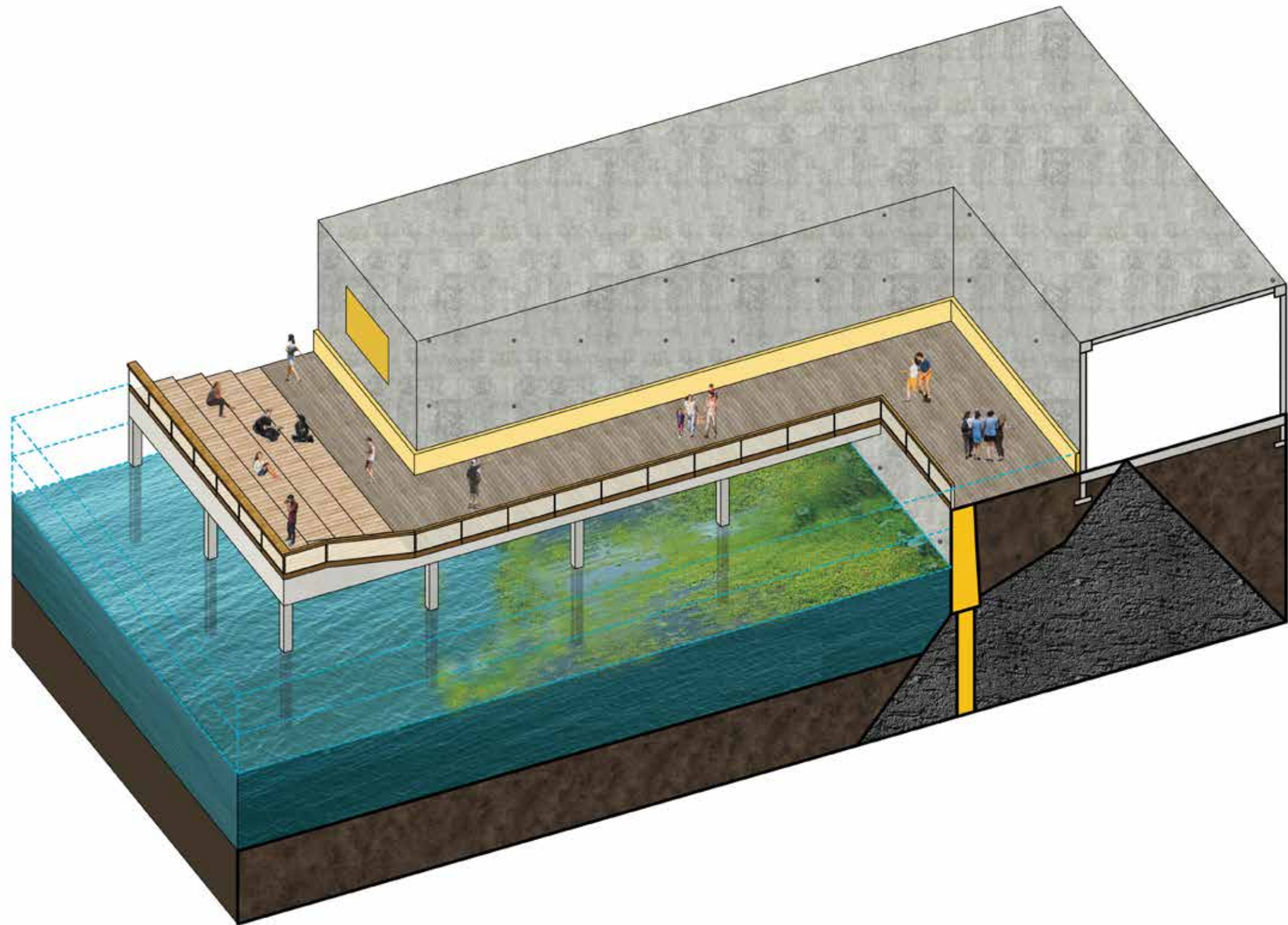
1. ELEVATED PLATFORM



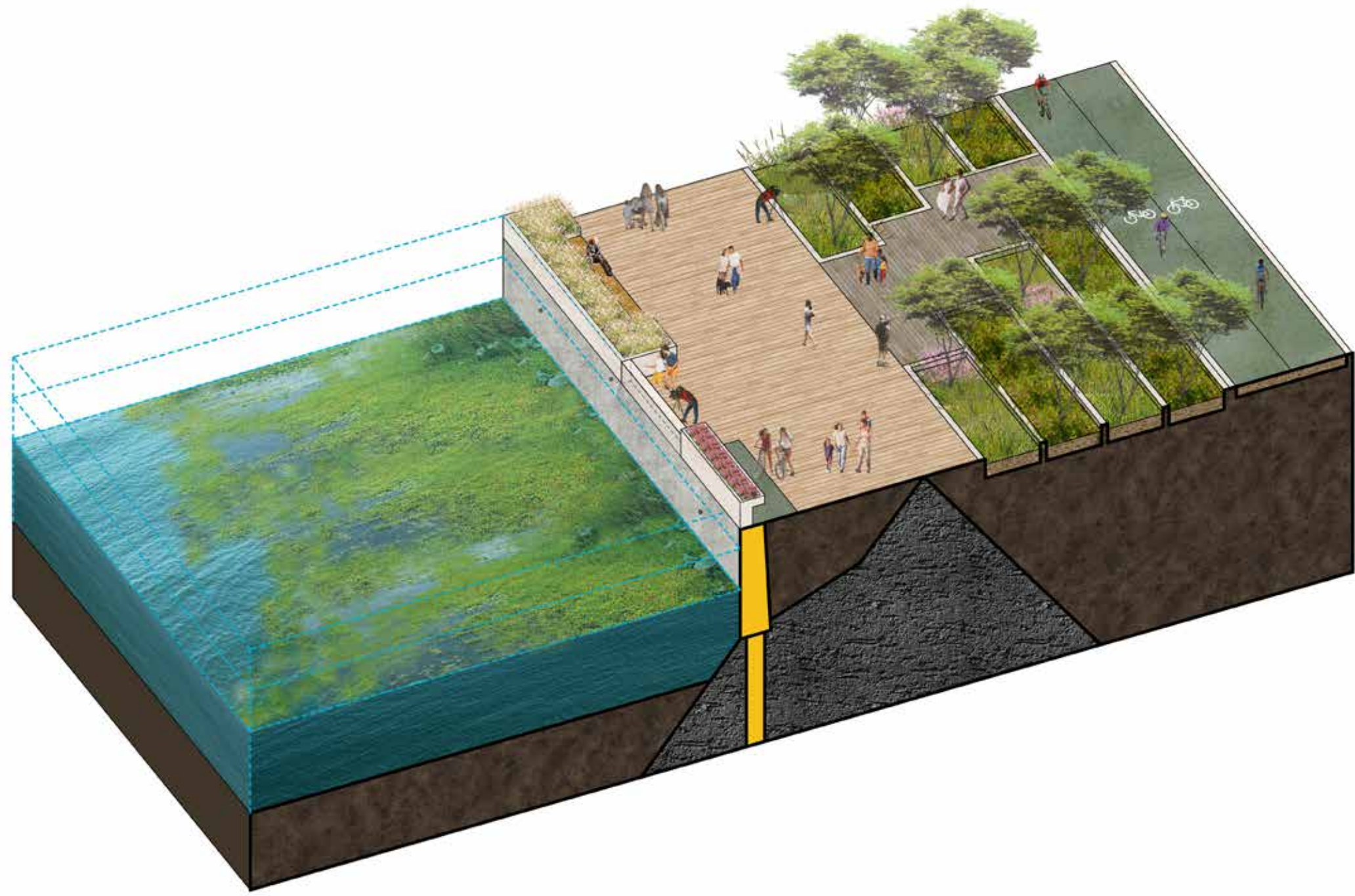
2. BROADWAYS



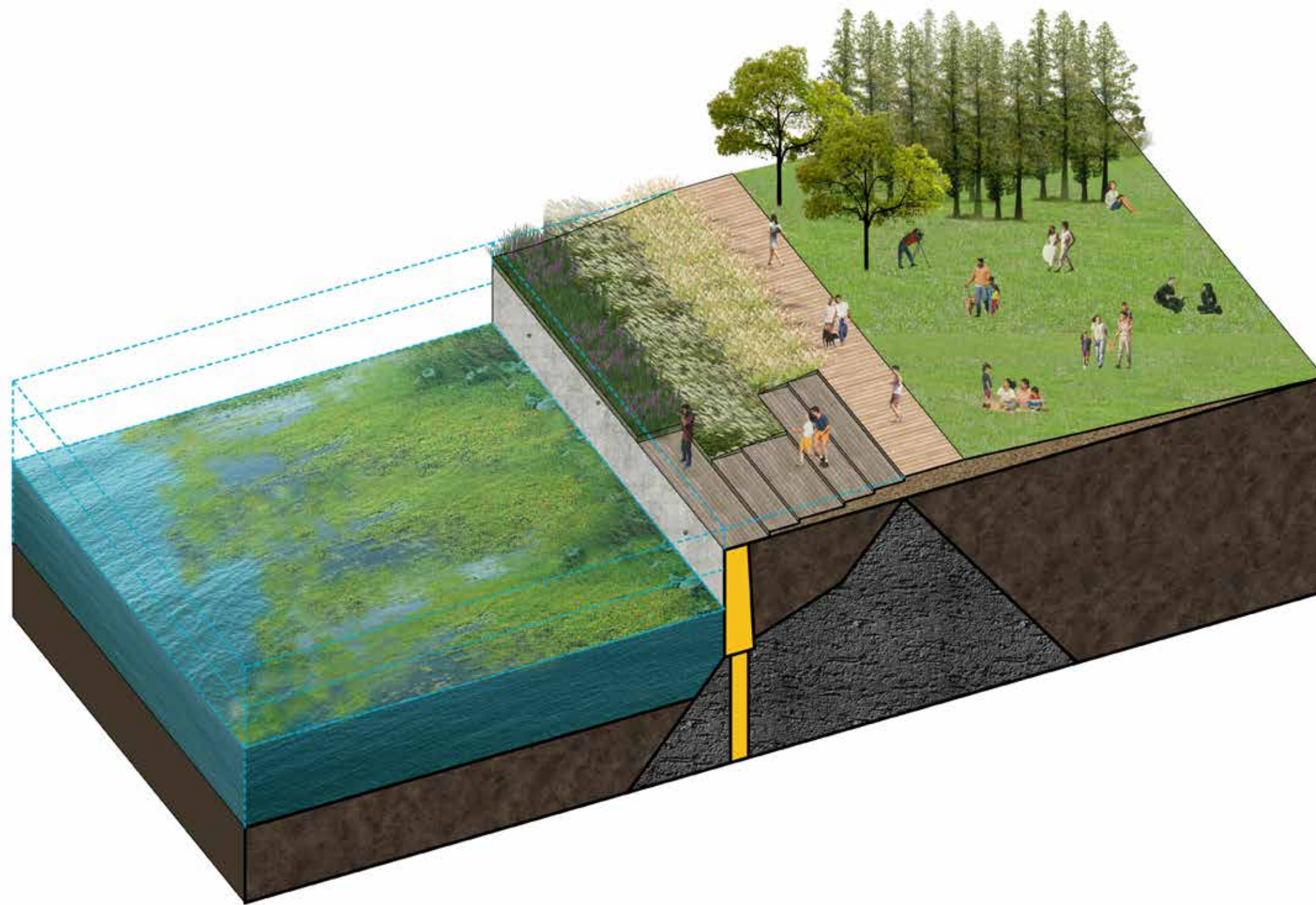
3. EXTENDED PIER



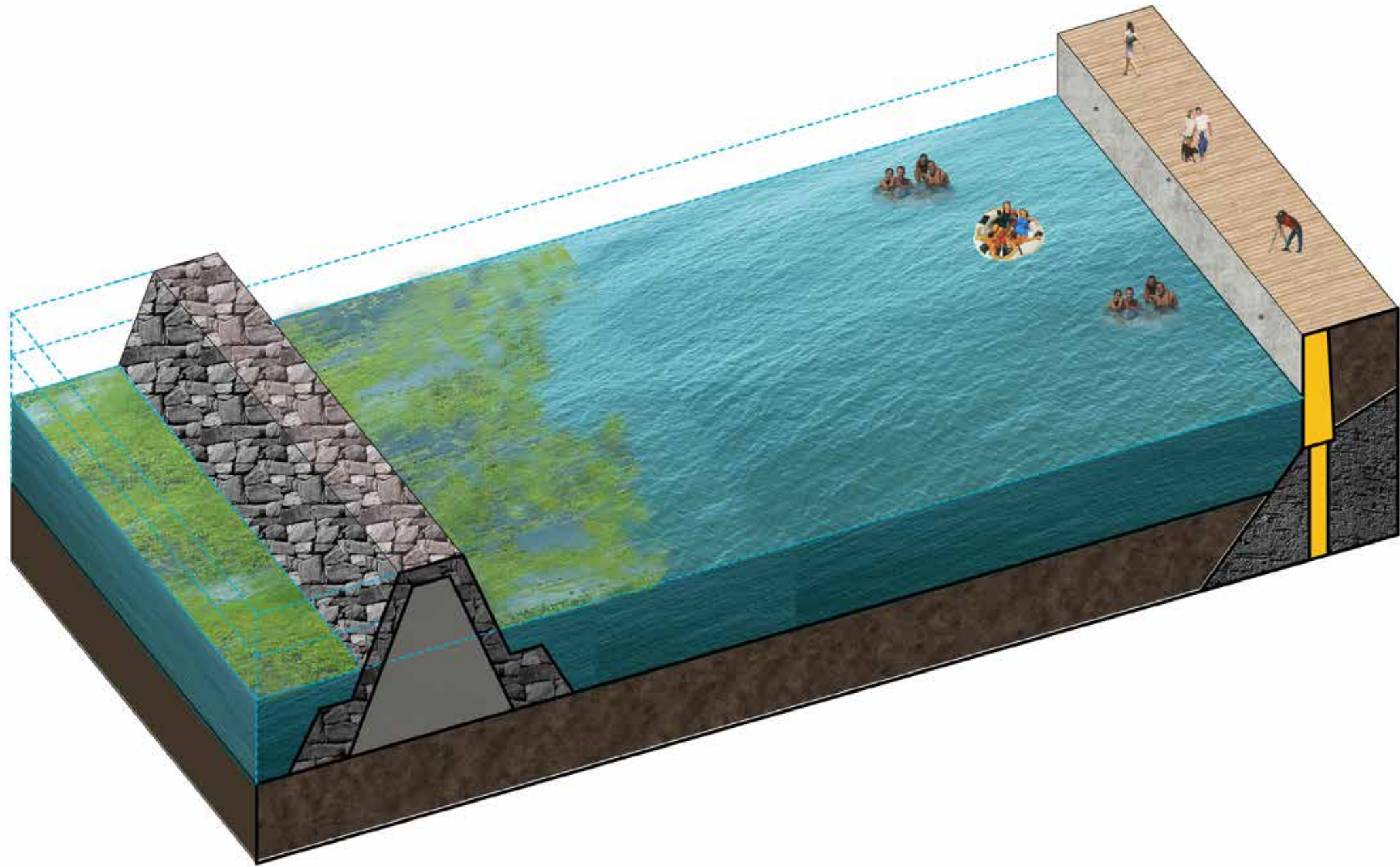
4. SELF-RISING WALL



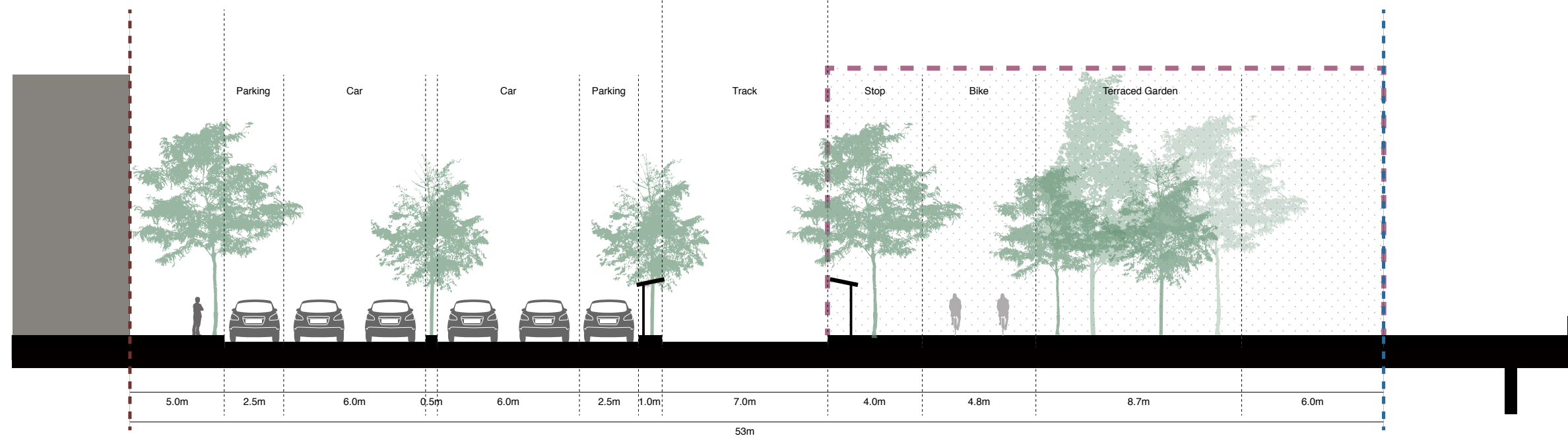
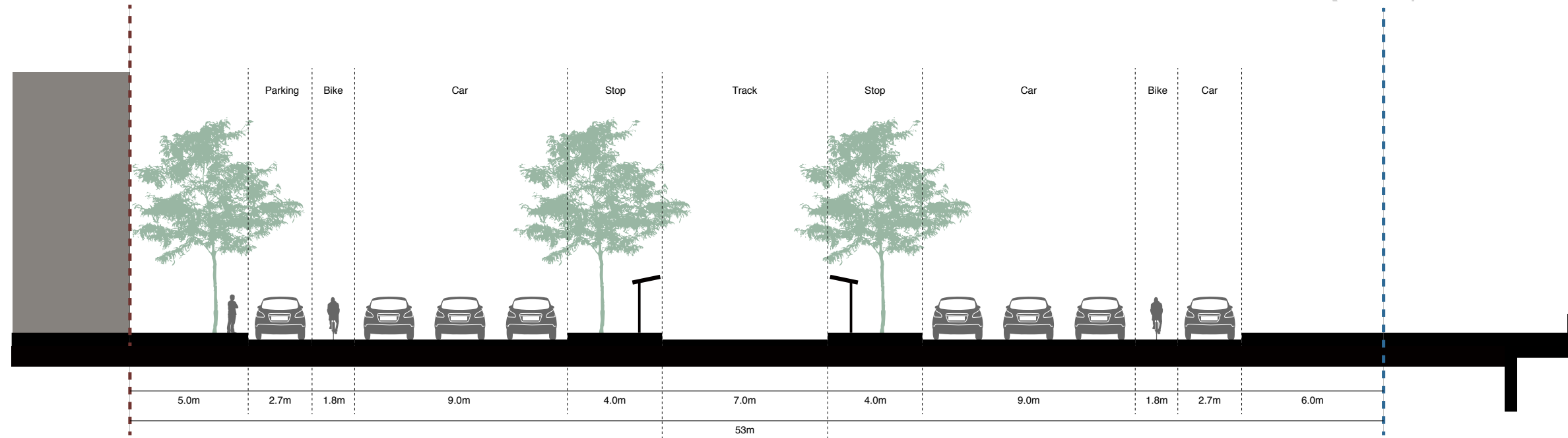
5. PLANTED SLOPE



6. OUTLYING SEAWALL



3. Absorptive Promenade



Adjacent Road



Site Plan



1. Fisherman's Wharf



1. Fisherman's Wharf



1. Fisherman's Wharf



2. Historic Pier Walk



2. Historic Pier Walk



2. Historic Pier Walk



3. Ferry Building Plaza



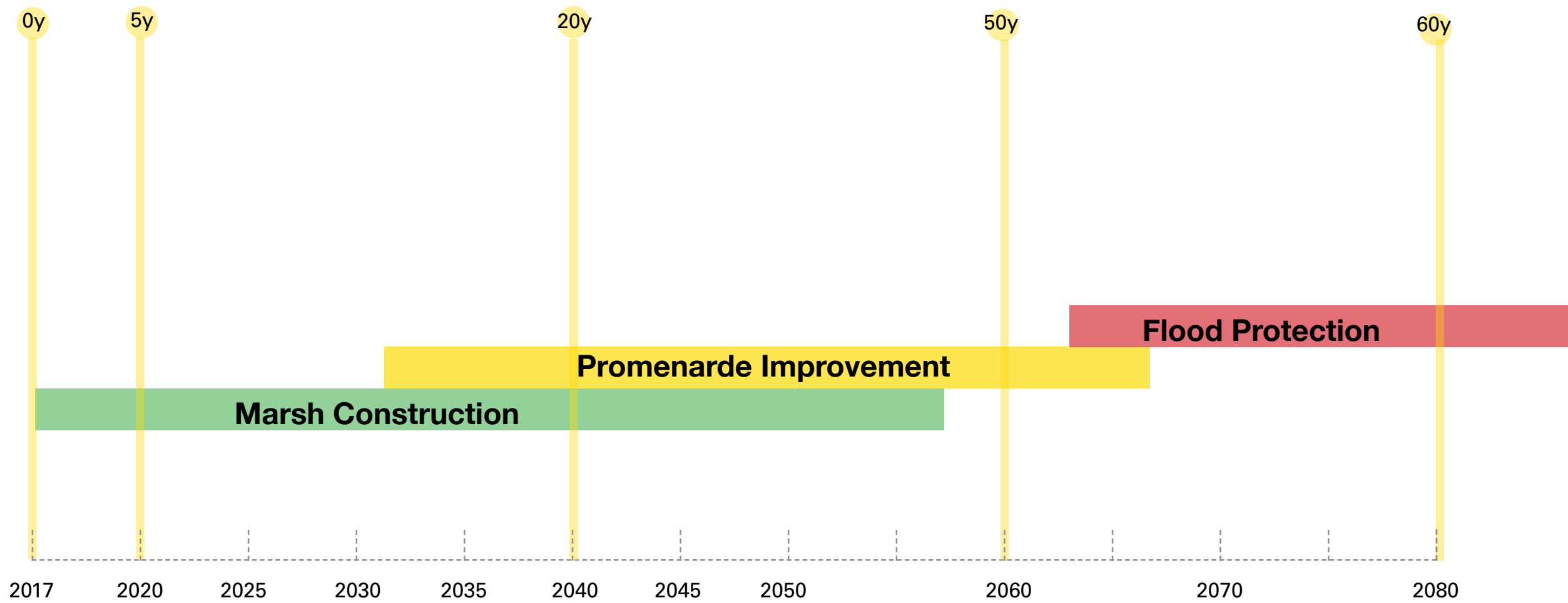
3. Ferry Building Plaza

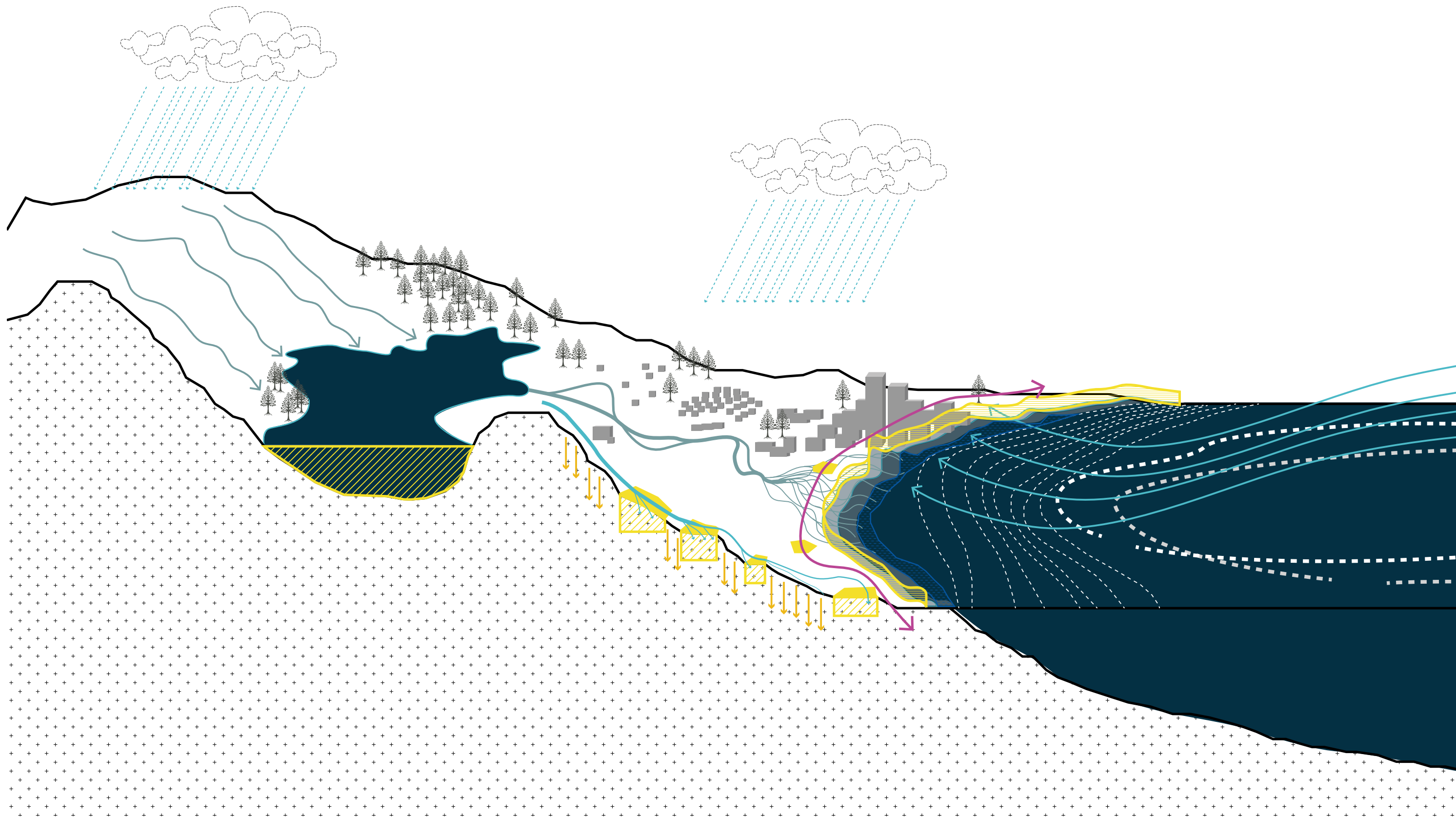


4. Community Center



Future Scenario





MULTIPLIED GROUND

A NEW LENS FOR THE NORTHEAST EDGE OF SAN FRANCISCO

THANK YOU.