

Forgotten Prosperity

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ABSTRACT

This project aims to discover the potential of redeveloping the inner part of the Richmond shipyard by understanding how to redevelop an underutilized industrial port into a public green space. Expressing how public green space can benefit the surrounding communities and city by providing the ecological resilience and sociological improvement. The project first focuses on understanding the history of the Richmond, the critical social problem, and the challenge of climate change. The second part explores ways to redevelop Richmond shipyard into a public green space with a balance between man-made and nature that will benefit both native species and humans.

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This research design and my education would not have been possible without the support of many other people.

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Lastly, I would like to thank my friends and family, without their encouragement, and support I could not have finished my research design and my education.

INTRO



ISSUE

The study of retrofitting this post-industrial port area involves a variable subject of studies, such as the history of the site, climate change adaptation, ecological restoration, and sociological impact. Case studies show that the process of waterfront revitalization has become more common in European countries and North America as the environmental issue started to rise. My primary research question focuses on how post industrial port re-development can benefit the surrounding communities and city by providing ecological resilience and sociological improvement. My sub-question focuses on understanding the post-industrial society in Richmond, how ecological resilience and public green space development can benefit native species and human.

According to Rosalind Greenstein's article, vacant land can provide an opportunity for the urban city. However, it often attracts illegal activities such as drug dealing and trash dumping. The effect of illegal activity not only affects the property value of surrounding housing but also the economic development of the surrounding city. Brownfields are the most challenging vacant lands for redevelopment, These sites are land that has been used for industrial use and usually contain polluted elements that affect the surrounding environment. However, vacant land and underutilized spaces can provide new design opportunities in various scales such as urban development, supporting local artists, and expressing

the city's culture (Greenstein 2004).

Today most of the major cities in North America have a connection between waterfronts. According to Tim Sieber's article, "70 percent of the 415 cities in the United States is located on the edge of a river, lake, bay, or ocean". The development of industrial ports can be seen in most of the west coast like Seattle, Vancouver, Los Angeles and San Francisco. According to Paul W. Rhode, during World War II, military industry had attracted a significant amount of working labor from the nation into the west coast region without a strong root. At the end of the war, the city's population and labor force were significantly larger than before and created various type of social problem. (2008). Since World War II a significant amount of military factory was built along the west coast to supply the war (Sieber 2008). Due to the need for water transportation for raw materials, a large amount of shoreline has been converted into heavy industrial ports to support military products such as automobiles, shipyard, steel, and oil. Habitat has been converted into concrete floor filled with polluted elements. Not only the native species lost their habitat, but also the people that lived near the shore lost the connection with the waterfront.

The end of World War II and the technological advancement in transportation have caused the manufacturing activity to decline on west coast United States. In the late 20th century, a large number of corporations shifted their factories to overseas locations. A significant amount of heavy industrial ports that were built during World War II are facing a

critical problem of vacancy and underutilization. Deindustrialization reduced many job opportunities and created serious social and economic problems in coastline cities.

Richmond, California, is one of the heavy industrial based cities, in which a significant amount of the industrial and population immigrate into the city during World War II. A majority of the industrial production was based on creating supply for the war. The preassembly technology that was discovered during world war II allows people from any background to work in the factory. Many unskillful labors immigrated into Richmond and held a large percentage of the city population. As the war ended a majority of the military industrial decline and land have been transferring into vacant or underutilize brownfield. The vacant or underutilized land had created safety and environmental issue to the city. As the sea level continues to rise, Richmond will be forced to deal with critical issues such as land loss, and the functionality of the public infrastructure.

Richmond shipyard is one of the biggest military shipyards in the west coast United States during the World War II. However, since the World War II shipyard has forced Richmond resident to los their primary view of the San Francisco Bay and the opportunity to enjoy waterfront recreation near the urban city. Redeveloping the waterfront brownfield into a green open space and reintroducing it to the city could create a potential for sociological improvement. The improvement could increase of safety to the surrounding neighborhoods, the beauty improvement

to the city could increase people's willingness to live in an urban area and attract various types of development for the city.

According to the GIS data, as sea level continues to rise, portions of the west coast cities will be challenged. Major infrastructure such as airports, highways and industrial ports will be flooded. Without a proper adaptation, the functionality of the city will be affected by the flood, the toxic elements that are in the industrial port will then be flush into the ocean and cause a serious health issue to both species and humans (Sieber 2008). However, the problem of sea level rise creates both opportunities and constraints in Richmond and the location of the shipyard. This project explores the potential of redeveloping Richmond shipyard to bring back the waterfront green space to the communities. At the same time, it creates awareness of the critical issue of sea level rise and educates how waterfront green space can benefit the surrounding communities and city in terms of ecological resilience and sociological improvement.

RICHMOND CALIFORNIA



SITE ANALYSIS



THE CONTEXT OF RICHMOND SHIPYARD

Richmond is one of the major cities in Contra Costa County, California. Richmond is in the East Bay region of the San Francisco Bay where two major highways (highway 580 and highway 180) intersect. The city has a long history of heavy industrial since World War II. According to the general plan from Richmond, 20 percent of the land in Richmond is still being used by the industry which hold the same percent of land use as residential. The high percentage of industrial land has challenged the living quality of Richmond residents.

Richmond shipyard is a military shipyard that has been built during World War II with approximately 725 acres of land located at the south shoreline of the Richmond. Today the Richmond shipyard has 187 acres of land that are being used to store liquid chemicals and imported vehicles and another 180 acres of the land have been transformed into low-density houses in the late 20th century. Base on the site analysis my design will be focusing on redeveloping the inner part of the Richmond shipyard area.

From Left To Right

- 2.1 Old Ford Assembly Plant
- 2.2 California Map
- 2.3 Bay Area Map
- 2.4 Richmond Map



California



Bay Area



Richmond

LAND USE

From Left To Right

- 2.5 Light Industrial
- 2.6 Residential
- 2.7 Infrastructure
- 2.8 Commercial
- 2.9 Heavy Industrial



WHY A RISK?

Richmond shipyard has a long history of heavy industrial since World War II after the decline of military shipyard the city has its first economic transition from military-industrial land into private businesses which included the Ford assemble factory and Standard Oil Company now is called the Chevron oil. Currently, the site has been underutilized as temporary storage for the imported vehicles and various petroleum products. Since the World War II shipyard has built along the south coast of Richmond, the city lost its primary view of the San Francisco Bay. Residents lost their opportunity to enjoy waterfront recreation near the urban city.

As the climate change continues to accelerate many bay area cities will be forced to deal with sea level rise problem. According to the data from John King, the average high tide will rise 66 inches higher in the bay area between now and 2100. As sea level continues to rise a portion of the Richmond shipyard will be cover by water. The rise of sea level will also influence the public structure such as wastewater treatment plants and highways in Richmond. As sea level continues to rise Richmond Wastewater treatment plant that used tide change to flush out the treated wastewater will then be forced to use a significant amount of pumping to flush out the wasted water (King).

The threat of sea level rise will provide the

opportunity to redevelop and repurpose the shipyard to protect and improve the surrounding communities.

Behind the shipyard is home to approximately 21,000 people. Affected by the long history of industrial society, this area contains some of the most critical issues in the San Francisco Bay area. Richmond has a crime rate that is higher than 93 percent of the American cities. Gang, robbery, and murder have frequently occurred in the area. Richmond City has one of the highest murder rates among mid-size cities in the United States. Another problem Richmond communities are facing is the polluted land. After the war, many hills and shoreline have been used for storing gas and toxic element. The resident has been forced to live with the massive gas tank. Health problems and the safety issues became a critical problem in the communities. According to the data from "Richmond Health Equity Report," the area contains over 2,800 affordable housing units. More than 45 percent of the households live below 200% of the Federal Poverty Level (FPL) in the critical area. 59.8% of the families that live below the federal poverty level are currently employed. In the critical area, over 32.58 of the population is under the age of 18 which is higher than the state average of 24.58, the young people (under 18 years). Young people are more likely to live in poverty area than the residents that are 65 years and older. According to the study from "The American Journal of Family Therapy" teenagers that lived in low-income families have a higher potential of getting involved with gang activity.

A majority of teenagers that got involved with the gang were seeking protection, money, self-assurance, and peer recognition.

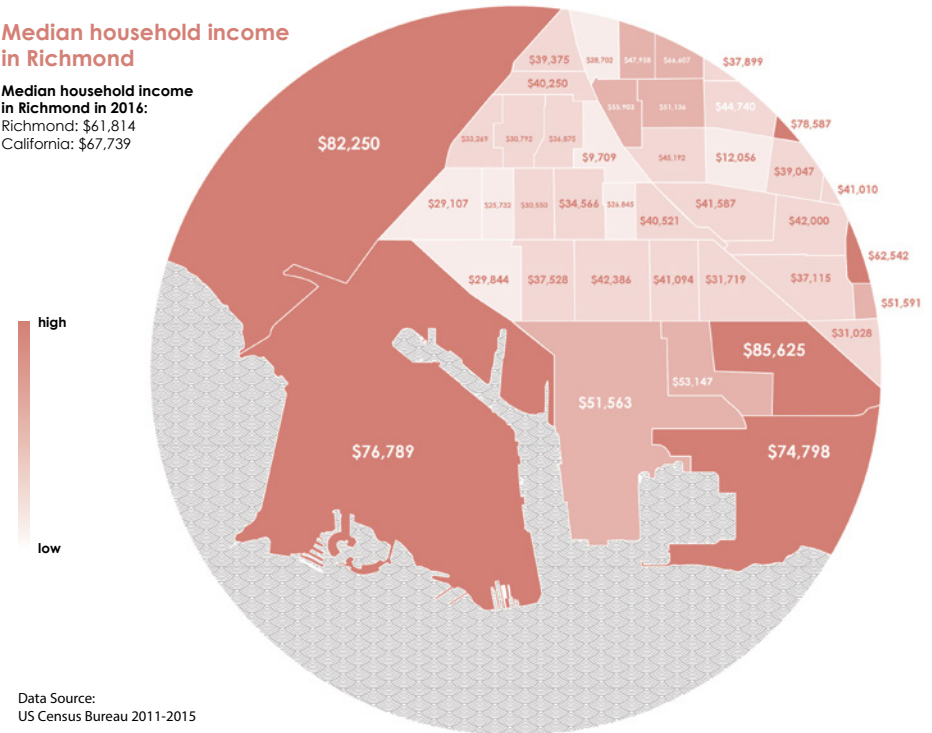
The city also has a high contrast of public green space between the wealth and the poor communities. Comparing the ratio of population and green space to the wealthy communities which has a ratio of 1 acre per 22 resident, the poor communities have a ratio of 1 acre per 615 residents creating an unbalanced amount of green space between the communities. In Richmond's 2030 general plan for the parks and green space, the document mention the city goal of green space and recreation is to expand green space to reach the service goal with a minimum of three acres of community parkland per 1000 resident before the year of 2030. However, the major development in Richmond's specific plan was still focusing on developing and improving the wealthy communities such as the new commercial center planned at the old Ford factory, and the new green park and mix-used community at the south-west part of the city next to the shoreline communities.

From Left to Right

- 2.10 Median Household Income
- 2.11 Population Below 200% Of The Federal Poverty level
- 2.12 Population Over Age 65
- 2.13 Population Distrubution
- 2.14 Population Under Age 18
- 2.15 Crime Rate

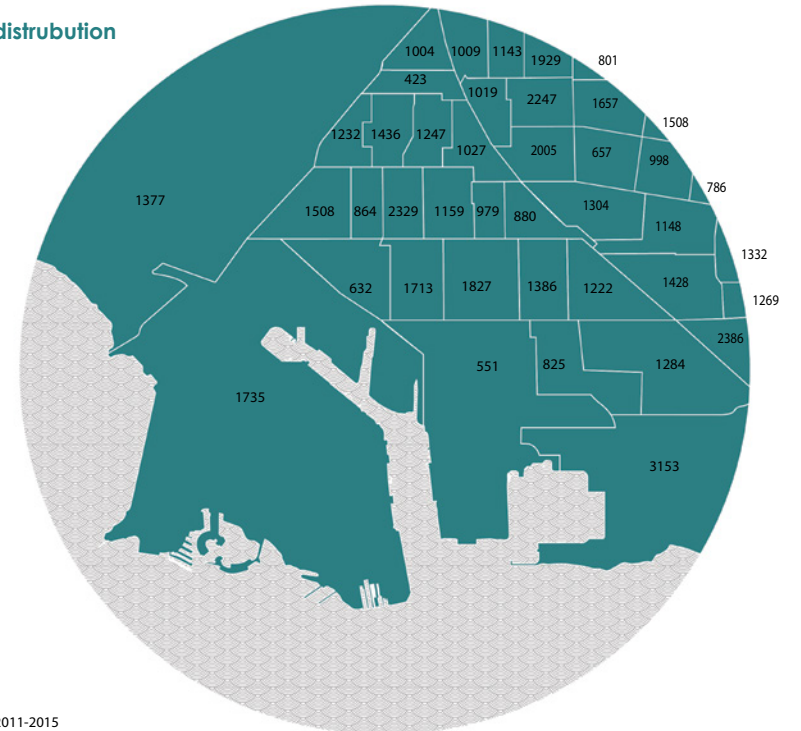
Median household income in Richmond

Median household income in Richmond in 2016:
 Richmond: \$61,814
 California: \$67,739



Data Source:
 US Census Bureau 2011-2015

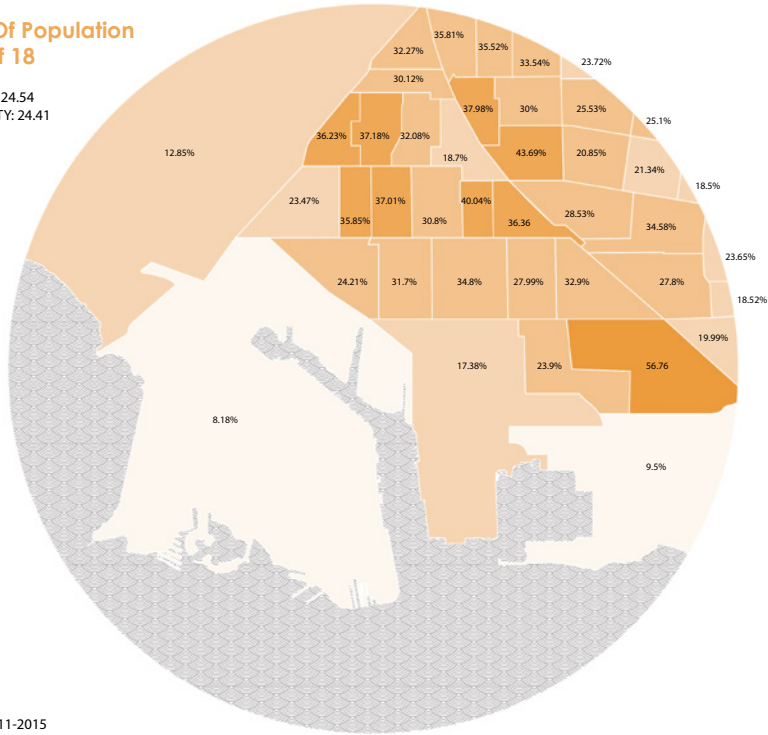
population distrubution



Data Source:
 US Census Bureau 2011-2015

Percentage Of Population Under Age Of 18

CALIFORNIA AVERAGE: 24.54
CONTRA COSTA COUNTY: 24.41

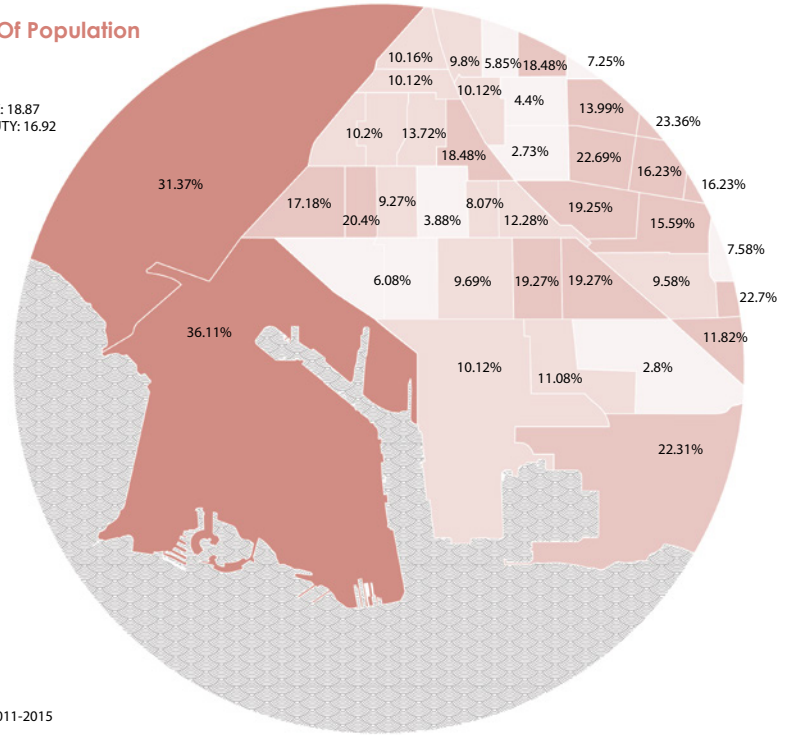


high
48.1-60%
36.1-48%
24.1-36%
12.1-24%
0-12%
low

Data Source:
US Census Bureau 2011-2015

Percentage Of Population over Age 65

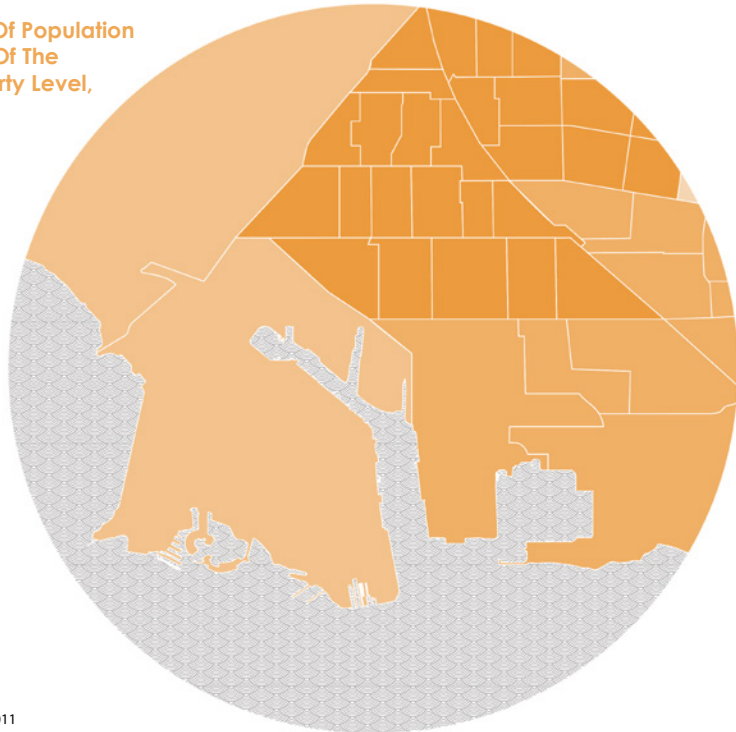
CALIFORNIA AVERAGE: 18.87
CONTRA COSTA COUNTY: 16.92



high
32.1-40%
24.1-32%
16.1-24%
8.1-16%
0-8%
low

Data Source:
US Census Bureau 2011-2015

Percentage Of Population Below 200% Of The Federal Poverty Level



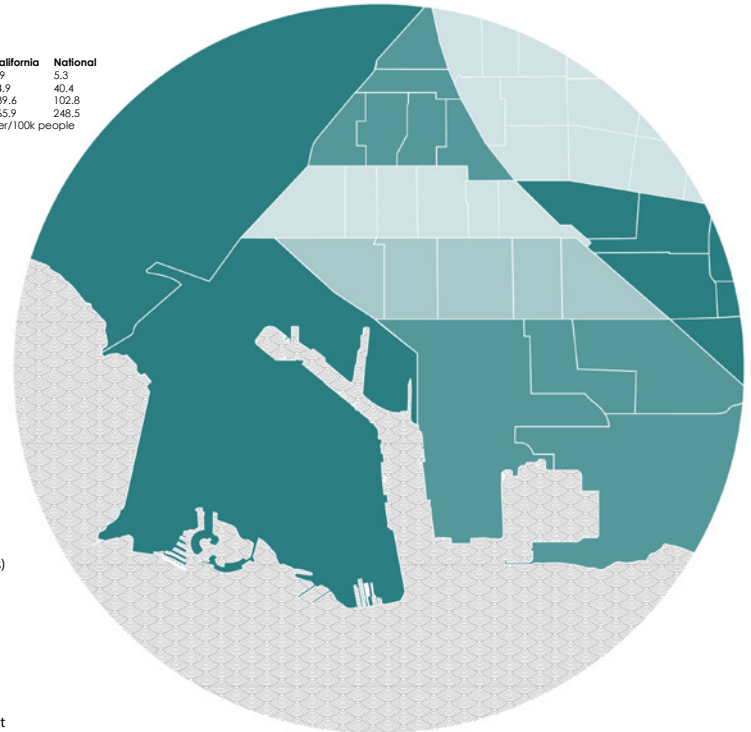
high
45-64%
32-44%
21-31%
12-20%
0-11%
low

Data Source:
Census Tract 2007-2011

Crime Rate

	Richmond	California	National
Murder	18.9	4.9	5.3
Rape	64.9	34.9	40.4
Robbery	328.3	139.6	102.8
Assault	506.9	265.9	248.5

per/100k people

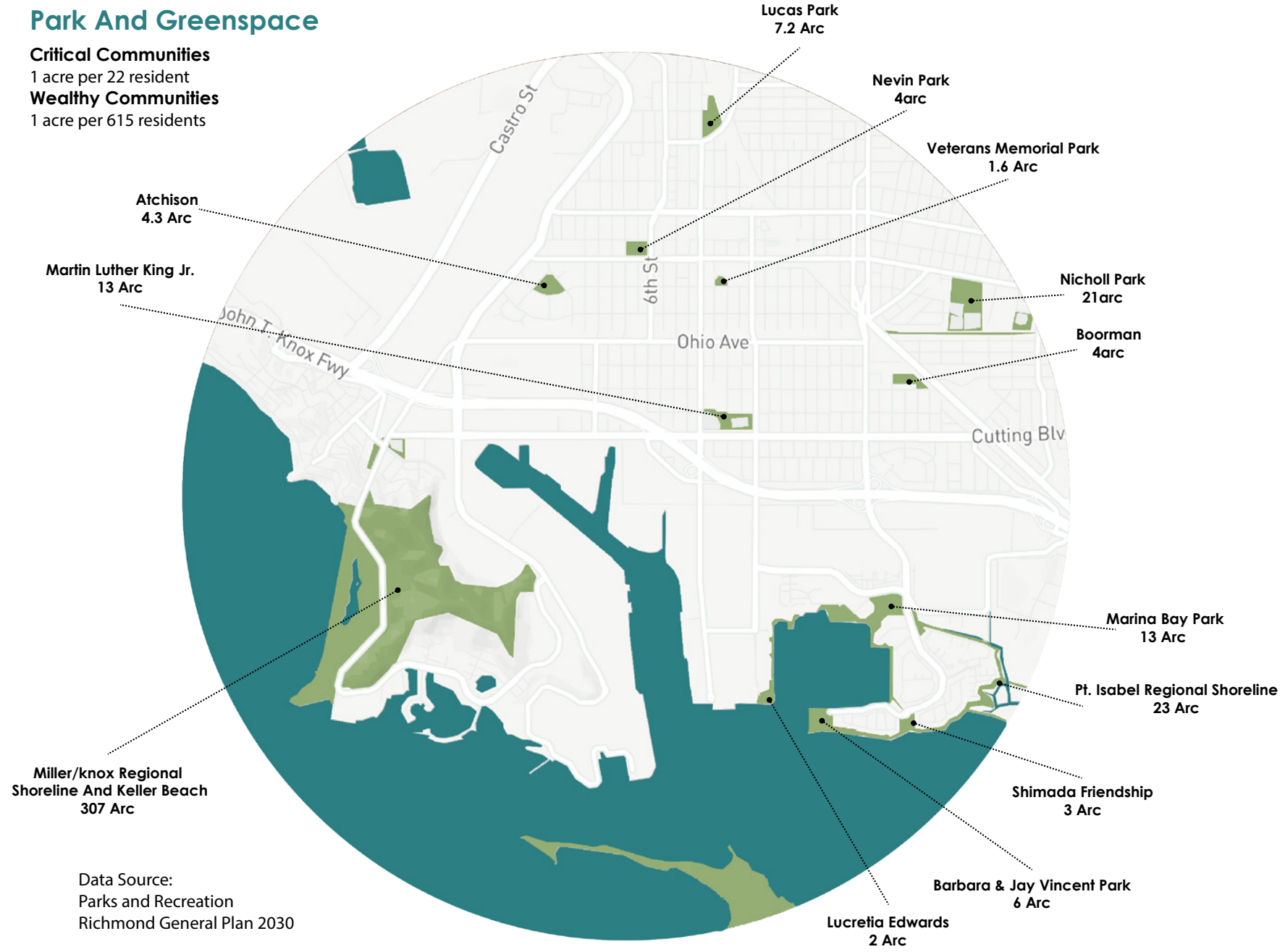


low 9.71
high 67.7
(per 1,000 residents)

Data Source:
Neighborhoodscout

Park And Greenspace

Critical Communities
1 acre per 22 resident
Wealthy Communities
1 acre per 615 residents



Data Source:
Parks and Recreation
Richmond General Plan 2030

MAJOR DEVELOPMENT



South Shoreline Mixed-use Community



Richmond Ferry Terminal & Activity Center

Data Source:
- Richmond, California South Shoreline Specific Plan
- City Of Richmond, Planning and Building Services Department
Overview of Pending Development and Planning Activities

SEA-LEVEL RISE



Oroginal Sea Level
2018



Sea Level Rise 48"
2070



**Sea Level Rise
protected**

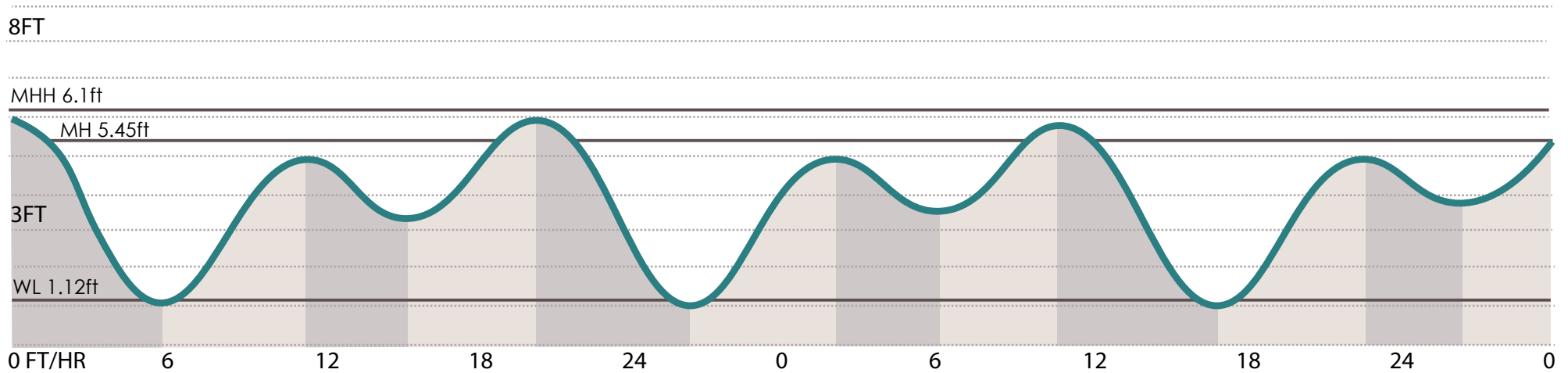


Sea Level Rise 66"
2100



Sea Level Rise 84"
2120

TIDAL

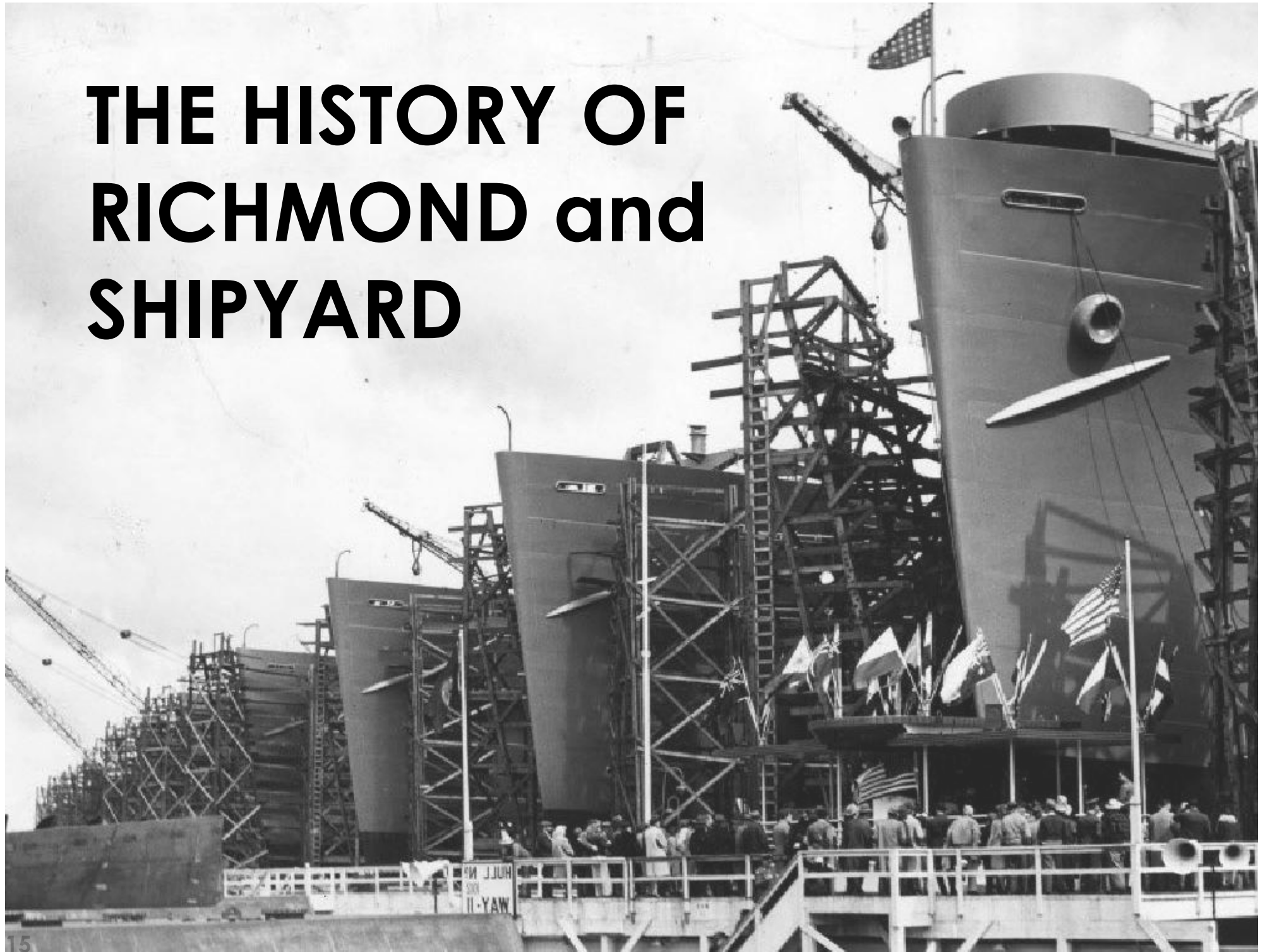


As shown in the graphic above the tidal flux for Richmond have a mean high high water of 6.06 ft, a mean low water of 1.12 ft, and the mean range of tide is 4.32 ft difference. The dramatic change of tide will be an essential factor to create a new habitat for the local species and also an important consideration while designing the infrastructure to dealing with the sea-level rise and even the element to concern while planning the connection for the community with the waterfront.

From Left to Right

- | | |
|-------------------------|------------------------------|
| 2.18 Original Sea-Level | 2.21 Sea Level Rise Potected |
| 2.19 Sea Level Rise 48" | 2.22 Sea Level Rise 84" |
| 2.20 Sea Level Rise 66" | 2.23 Tidal Chart |

THE HISTORY OF RICHMOND and SHIPYARD



According to the historical data from the city of Richmond, Richmond Shipyards were built during the beginning of the World War II, due to the large demand on military supply Richmond shipyard quickly became the biggest shipyard that operated on the West Coast. The shipyards quickly covered much of the land in the South Shoreline harbor area, requiring extensive additional tideland filling. During the time the population in Richmond grew explosively. The new pre-assembly technique attracted a large population of unskilled workers to rush into the town without a strong root. Richmond's population increased dramatically from 23,600 in 1940 to over 93,700 in 1943 as tens of thousands of new populations migrated from the economically depressed South and Southwest to work in the shipyards. A significant amount of workers were living in temporary structures. The boom of industry and the working labor created long-term effects in the City (Richmond Shipyards). The shipyard soon declined after the war ended and was officially closed in 1945. Tens of thousands of unskilled workers were forced out of their jobs and created a serious of safety and poverty to the city.

The population of the city has continued to decline since 1960. Middle and higher-class people began moving out of the city to neighboring counties looking for newer housing, safer neighborhoods and better schools for kids. Richmond's population had declined by over 20 percent from around 250,000 in

1970 to 194,000 in the mid-2000s. In the last ten years, the city of Richmond has worked hard on new development to create population growth (Lombard 2015). According to the data from the city of Richmond, the city is currently undergoing a second major transition from a heavy industrial city toward more high technology and light industrial companies with new business parks accommodating light industrial and "office/flex" land uses (history of Richmond).

HISTORICAL PICTURE

From Left to Right

2.25 Richmond Shipyard In Action

2.26 Richmond Shipyard Yard

2.27 Producing Warship

2.28 Large Population Of Labor Leaving Shipyard





VISION



Shorelines and riversides are often the first lines of defense against major flooding and the impacts of sea level rise. Parks and open spaces can create the opportunity to adopt natural disaster and climate change. Shoreline parks can create more recreational infrastructure and green space to reach the city of Richmond's adopted service goal with a ratio that is higher than the minimum of three acres of community parkland per 1,000 residents.

CREATE PARK TO INCREASE HOME VALUE

Frederick Law Olmsted conducted a study finding that quality parks can increase the value of surrounding home and property. He did a case study of how New York's Central Park affected adjacent property values a century ago. Over a 17-year period, he found out that there was a \$209 million increase in the value of the property influenced by the park. His study was not unique in finding that quality parks could often increase the home and property's value.



PARK COULD INCREASE MUNICIPAL REVENUE

The increase of property values also helps the cities to collect higher municipal revenue from property taxes. Tax revenues can also increase more retail activity and tourism-related development in future to increase more city revenue.



PARK COULD ATTRACT BUSINESSES AND JOB

Parks and the recreational site can enhance the living quality and help attract both businesses and job opportunities. The increase in jobs and business can create more wealth and economic growth for the communities. The increase of job and economic can also create more revenue for the city.





2.30 Bird Eye View Of Richmond Shipyard And Location Of The Potential Redevlopment



PRECEDENT



BIG U

Project name: BIG U

Location: Lower East Side,
New York City

Date: future

Client: The City of New York

Designer: BIG (Bjarke Ingels
Group) with One Architecture,
Starr Whitehouse, James Lima
Planning + Development, Green
Shield Ecology, AEA Consulting,

The BIG U is located at the shoreline of the Manhattan in New York City. After the disaster that Hurricane Sandy brought to the city of New York, the city became aware of the importance of creating an infrastructure that could protect the city from both natural disaster and climate change. The design concept of Big U is to protect the Lower Manhattan from floodwater, storms, and the impact of sea-level rise. The project is ten continuous miles of tailored protective system around the low-lying topography of Manhattan beginning at West 57th Street, going down to The Battery, and then back up to East 42nd Street. Behind that 10 miles of coastline is home to approximately 220,000 people and the central business districts in the country.

Manhattan is also one of the most tourist locations of the city, more than 52 million people visit the city every year. The area also contains iconic sites such as the 9/11 memorial, The Battery, and Wall Street, or the ferries that bring people to the Statue of Liberty and Ellis Island. According to the data from "The Big U" The area also contains 35,000 affordable housing units, with over 950,000 low-income, elderly, and disabled residents in the area. During the research, the team discovers that the history of resiliency planning had focused on the condition of the city and failed to consider the change of climate, natural growth and the transformation of communities. The team also noticed that the majority of the urban infrastructure in the United States are mostly highly engineered with a traditional design ideal which lacks social engagement and public interaction. Therefore, the team proposes to rethink infrastructure as an amenity to create a space for public interaction. The design of infrastructure has not only aim to protect the city and neighborhood from the natural disaster, but it also been designed to respond community-desired amenities of open space. In the design, multiple green spaces and infrastructure such as bike trails, cultural institutions, lounge areas, commercial areas and sports parks were placed carefully to support the need for the local communities.

Learning from this project, I created a levee with the idea of creating public interaction and applying the theory of landscape as infrastructure to deal with the future sea-level rise. This landscape will also serve as a public open space that benefits both the communities and native species.

HUNTERS POINT

Project name: Hunters Point
Shipyard

Location: San Francisco,
California

Date: 2003-present

Client: Lennar Urban,
city of San Francisco

Designer: GMC Architecture in
the first phrase.

Hunters Point Shipyard a site that is located in the southeast portion of the San Francisco. The site is along the waterfront with the view of San Francisco Bay and has a total of 702 acres of land that has been left undeveloped. After the decline of the shipyard on the site, it has been isolated from the surrounding urban city and city grid. The redevelopment is a perfect example of a revitalized brownfield near the ocean; the design process took into account multiple considerations including race, space, waste, and communities. Hunters Point Shipyard was an industrial and contaminated property that been abandoned by U.S navy in 1974 after World War II. The site has been heavily operated to produce warships for 20 years. The shipyard contains highly toxic elements

and houses hazardous waste due to the long period of shipbuilding and repair, and radiological lab that operated on the site. While it operated, the shipyard provided a significant amount of job opportunities to the surrounding community. The city's economy had been affected badly by the closure of the shipyard. Hunters Point Shipyard redevelopment project created an improvement and connection with the site and the surrounding community which created new job opportunities that increased the surrounding community's economic activity.

The project also took advantage of the location, creating a significant shoreline park in the city to balance the development and environmental conservation. The park not only created a new public connection with the waterfront, but it also restored the old Yosemite Slough watershed, which created a new habitat to restore the ecology. The project also took the concern of historic preservation, keeping remains of the shipyard to acknowledge the history of the site. The redevelopment also took concern of promoting public art on site to support the local artists.

Learning from this project, instead of only focusing on the site itself, I will be taking concern of the surrounding community and creating a park and design that can benefit the communities in a variety of aspects.



OFFENBACHER HARBOR

Project name: Offenbacher harbor
Location: Frankfurt, Germany
Date: 2007-2020
Client: Mainviertel Offenbach GmbH & Co. KG
Designer: Ramboll Studio Dreiseitl

Offenbacher harbor is located on the River of the main river. The site is a 290,000 square meter area on the waterfront with a strong industrial background, which forces the project to face several environmental challenges. For the last century, the site has been used for transporting oil, gas and, coal. The goal of the project was to convert a highly polluted industrial port into a sustainable urban district and maintain a relationship with the ecological system. In this redevelopment landscape architecture is the key player of this redevelopment project which the relationship of the landscape, ecology and the site elements have been carefully planned out on the site. Abandoned industrial sites are often considered

as the primary cause of critical public safety and public health problems to the surrounding neighborhoods. The Offenbacher harbor project presents the design idea of reconnection and reintroduces the vacant land back to the community.

The essential design elements that project includes are climate adaptation, storms. To carry on the idea of sustainable development landfill of the site, the design is based on the recycled elements, which includes rubble from the war and debris for a dam deconstruction project. The project also includes a clear bike and waterfront pedestrian circulation to provide relaxation and visual enjoyment of the waterfront ecosystem.

Learning from this project, I will be taking into account climate change, flooding, and community problems and applying the design to solve these problems. Also, I will be implementing the design ideal of creating an attraction point on the site to provide location to invite people to interact with the natural element.



THEORY



LANDSCAPE AS INFRASTRUCTURE

book Project name: Landscape
as infrastructure
author: Pierre Belanger
publish year:2016

Belanger's book discusses the theory of using landscape and ecological infrastructure in the urban city that was published in 2016. Ecological design can be a new way to overturn the historical thought of urban design in which land development is based on the economic value of production, and every issue is solved in a highly engineered solution. In the explanation of his theory, he mentions that today's cities have removed most of the historical landscape and replaced it with buildings and infrastructure.

Plants and animals in the city have become

unfamiliar to interact with the wildlife. Most of the landscape designs in the city were designed to create beauty and lack functionality. Infrastructures have often been seen as unpleasant in the city. However, combining infrastructure and landscape design to generate a purpose to the landscape could reduce the unpleasant scene in the city. The author writes that we should abandon the outdated thought of urban form in which the city should be formed to be tightly settled and organized with people, activity crowded into a small space, and separated from the non-urban area. The ideas of over-planning, over-regulation, and over-engineering have become the problem in today's urban city. With the thought of design and engage ecology and landscape in the urban city can create more overlap between the urban cities. The overlap between nature and urban can create a better living quality for humans, to resolve the critical issue in urban city condition with a flexible strategy.

I apply the theory of using landscape as an infrastructure, which creates the landscape to remove the contaminated from the site. Instead of a levee, using landscape design as a new infrastructure to deal with sea level rise could avoid creating another unpleasant structure to the city.

DESIGN



DESIGN GOALS

- 01** Create connection for critical communities with the waterfront.
- 02** Create infrastructure to prevent the city and communities from flooding and sea level rise.
- 03** Create a new tidal marsh to provide ecological system to the native species.
- 04** Create new green space to support the need of local communities and tourist attraction.
- 05** Improve communities street treatment for pedestrian and bicycle connections to encourage non-vehicular modes of transit between communities and waterfront green space.

DESIGN ELEMENT

According to the data from site analysis, the design of this project will aim to develop a waterfront park and bring back the view of San Francisco bay that has been gone for a century for the city. The public green space also Create connection from critical communities to waterfront. Inspired by the shape of water flow and the geometry of the industrial land, the form of Richmond waterfront park will be designed with integration of two different types of dynamic lines, the curve line represented the flow of water and the other angular line expressed the feeling of industrial structure. Richmond waterfront park will be repurposing the inner part of the Richmond shipyard which has a higher potential to be affected by the flood and sea-level rise. The project will also improve communities' street treatment to encourage non-vehicular modes of transit between communities and waterfront park.

The park design will be focusing on applying the theory of landscape as infrastructure with an idea that not only shields and protects the city against floods and sea-level rise but also provide social and environmental benefits to the adjacent communities

and encourage public interaction. The other design focus for the waterfront park will be offering public infrastructure base on the need of the communities and city's goal for park and recreation. The park will expand recreational services and enrichment opportunities to serve people of all incomes, cultural backgrounds, ages and levels of physical capability.

The park will provide infrastructure that support culture and art, recreation, leisure and sports activities to the communities, which according to the book of "community-based rehabilitation" the infrastructure will benefit the communities including improving the health and well-being of individuals and promoting economic development to the communities. The data that provided by the "National Alliance for Youth sports" shows that sports participation has the positive benefit to children. Moreover, statistics collected by "National Alliance for Youth sports" also show that youth sports participants will also be less likely to be involved in crime, violence, drugs and other unsafe activities. Providing sports infrastructure to the communities could create a dramatic decrease in the crime rate in the communities with a high percent young population and make it a better place to work, live, play and raise families. the park will provide various type of sports infrastructures such as soccer field, baseball field, basketball field and tennis court base on the data from Richmond recreational center which provide the most commonly sports activities that been enjoyed community's member.

INSPIRATION

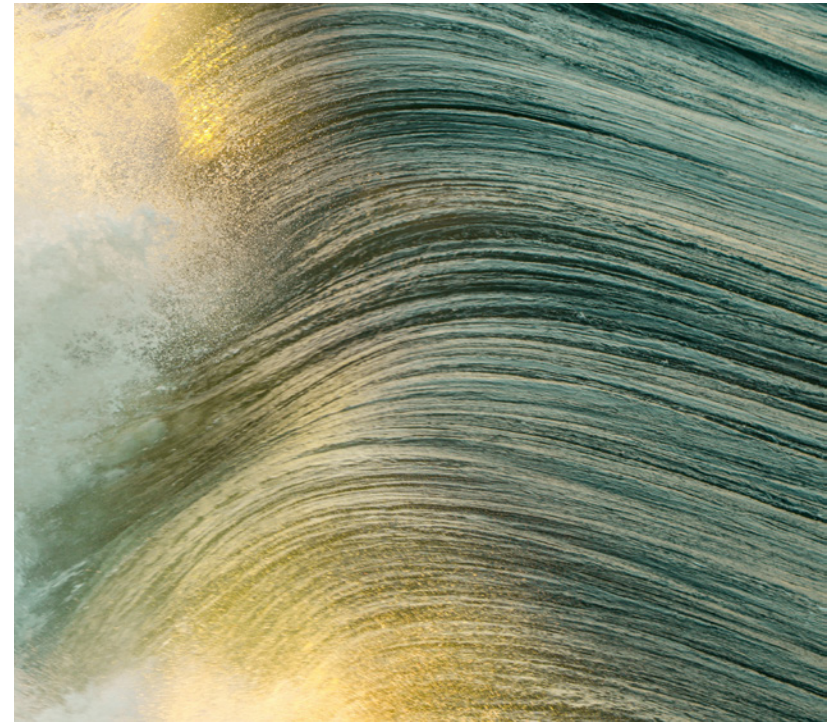
FORM

From Left to Right

4.2 wave

4.3 water splash

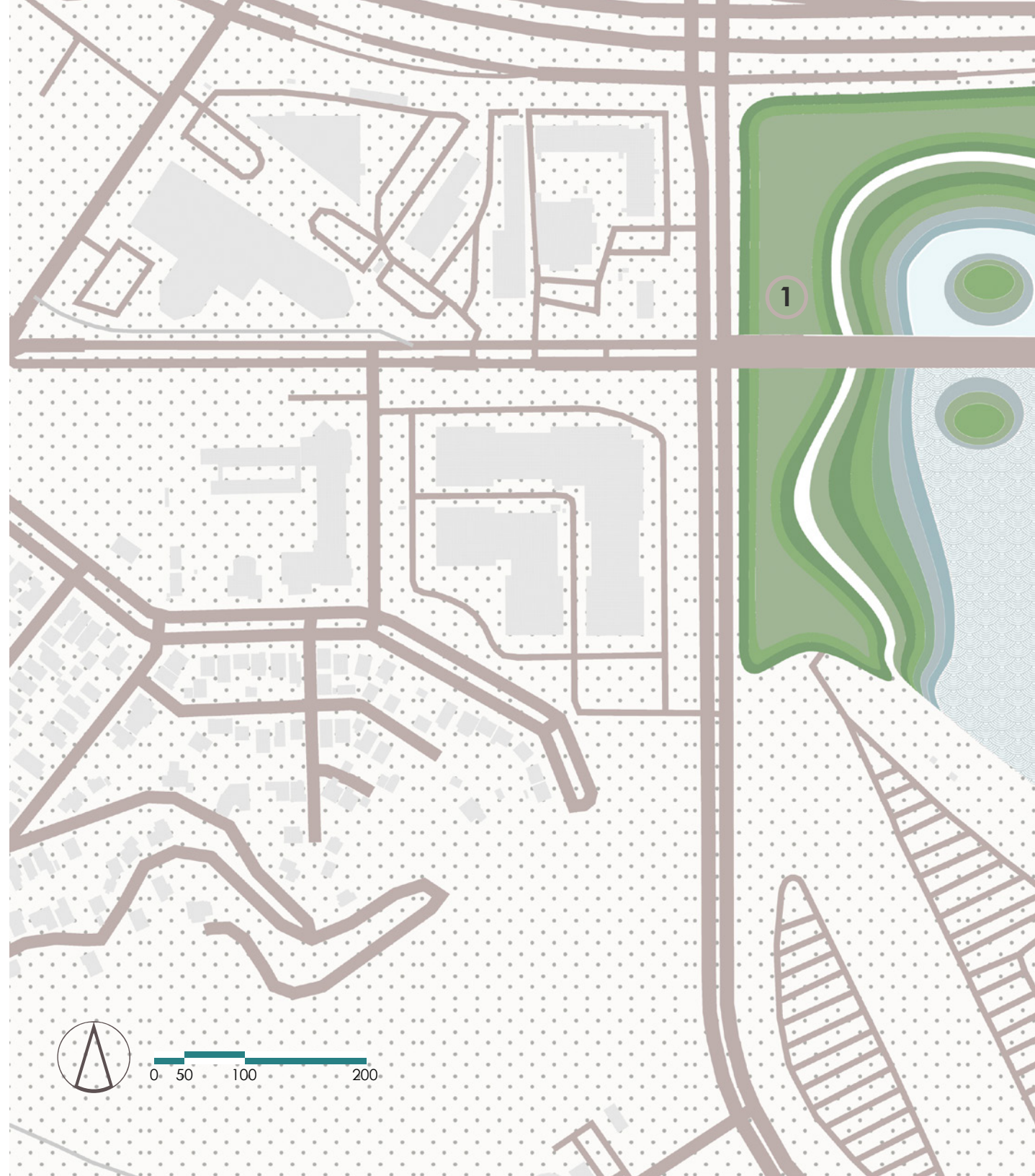
4.4 industrial structure



PLAN

1. Tidal Marsh
2. Stair Levee
3. Amphitheater
4. Picnic Area
5. Baseball Field
6. Community Center
7. Tennis Court
8. Basketball Field
9. Soccer Field
10. Waterfront Center
11. Connection Point
12. Children Playground
13. Public Art

4.5 Richmond Waterfront
Site Plan





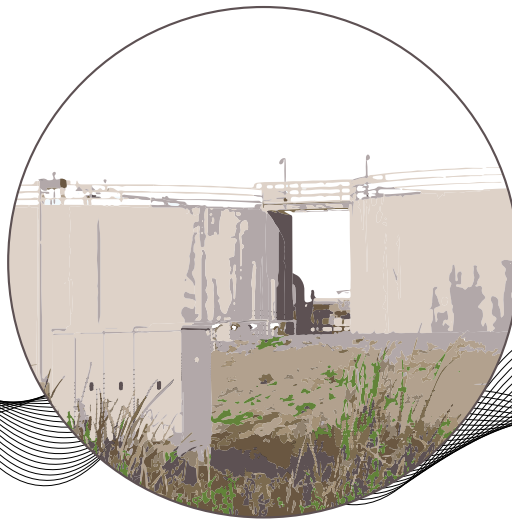
BAY TRAIL



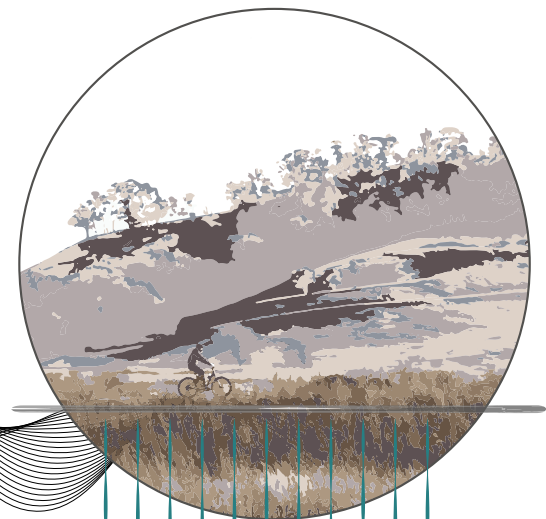
TREATED WATER



Treated Wastewater From
Nearby Water Treatment
Plan



Collecte treated
wastewater In The Old Oil
Tank



Provide A Resource To
Irrigate The Vegetation
That Is On The Site And
Stair Levee

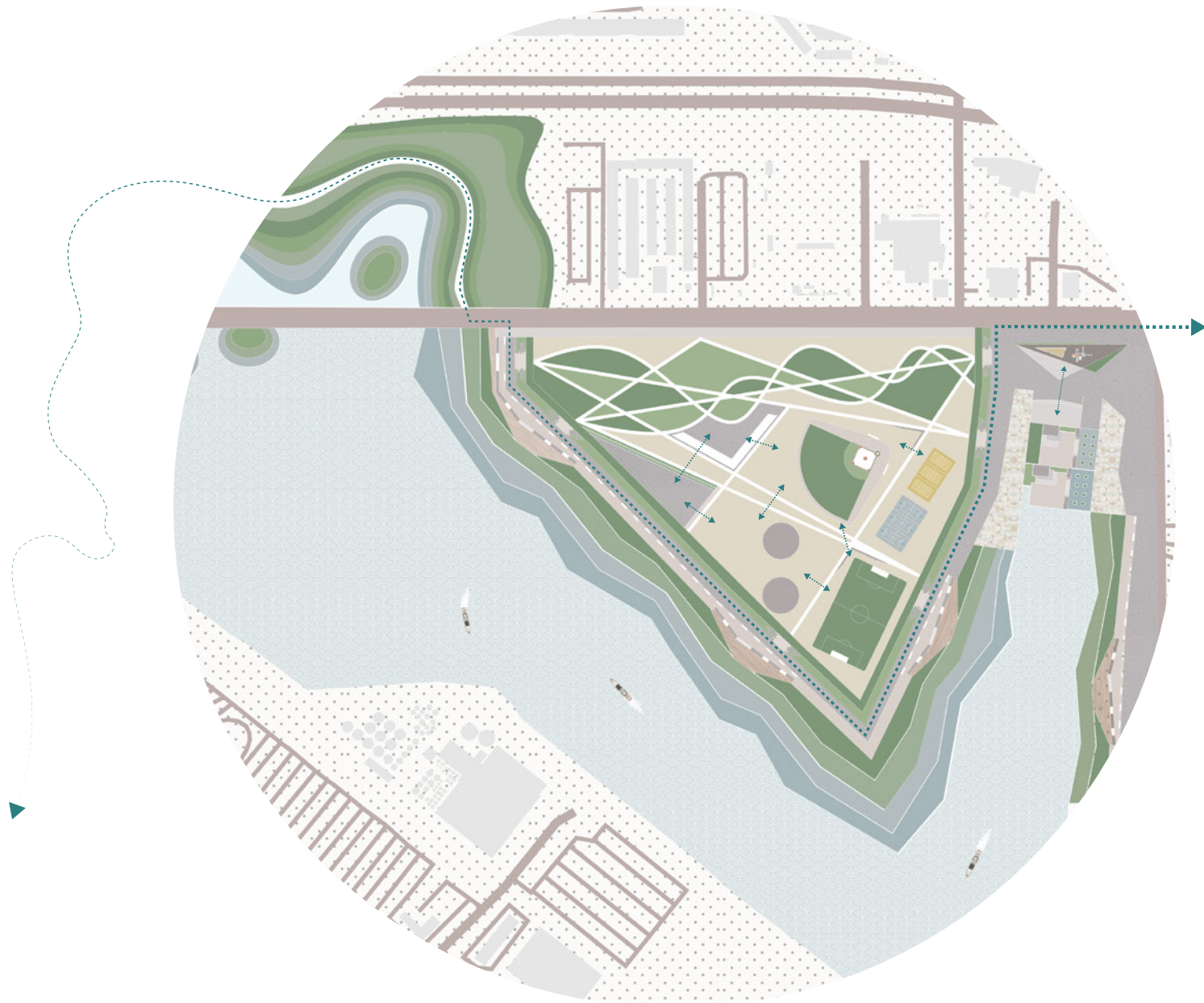
From Left To Right

- 4.7 Everyday Water Use
- 4.8 Oil Tank
- 4.9 Treated Water Flush
Onto Levee And Tidal
Marsh

In the design, a portion of the contaminated tank will be kept, clean and repurpose to store the treated wastewater from nearby water treatment plan. The gas tank will also act as and filter to remove portion of the polluted element to provide a resource to irrigate portion of the onsite vegetations to reduce the use of water and created a sustainable site. The process also reduces the need of pumping wastewater as sea-level continues to rise.

PEDESTRIAN CIRCULATION

The design has created a close distance between each sports infrastructure, and community center to provide the visitor the convenience of pedestrian circulation between each infrastructure. The bay trail was designed to pass through tidal marshland, and stair levee, the connection of two sites will provide people to sense the different between human-made levee and nature like levee while they were jogging or biking through the park. The children playground will be placed right behind the waterfront launching area to provide availability for kids to the switch and enjoy both infrastructures in a small distance.



PARK INSIDE PERSPECTIVE

Provide 81 Acres Of public Green Space





COMMUNITY CENTER

Repurpose The Oil Tank





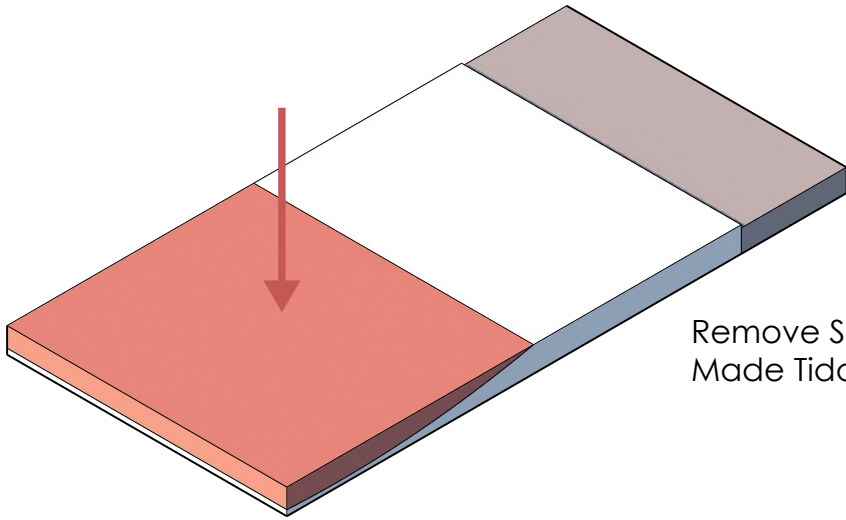
01 NEW TIDAL MARSH

Creating an onsite ecological infrastructure that could prevent the major infrastructures such as highway 580, Amtrak rail line and high vulnerability communities that are located behind the site to be affected by the flood and sea-level rise. The north part of the site will be repurposed as a new tidal marshland to create more natural habitat land for the native species. The current elevation for the northern part of the site and portion of highway 580 is 8 feet. However, the current mean high high water for Richmond is 6.02 ft and as sea-level continues to raise the mean high high water will be at 9.38 feet in 2050. The design will focus on manipulated with the cut and fill on the site which removes 2 to 4 feet of the soil on site to allow water to flush into a portion of the site. soil that has removed will be transforming to create a 14 feet mount that has a slope between 1% to 5% as an ecological levee. The small slope levee will provide more friendly access to the native marshland species. The levee will also use treated wastewater for nearby water treatment plan as a resource to irrigate the vegetation, and the design will prevent wastewater to flush directly in the ocean and reduce the pollution.

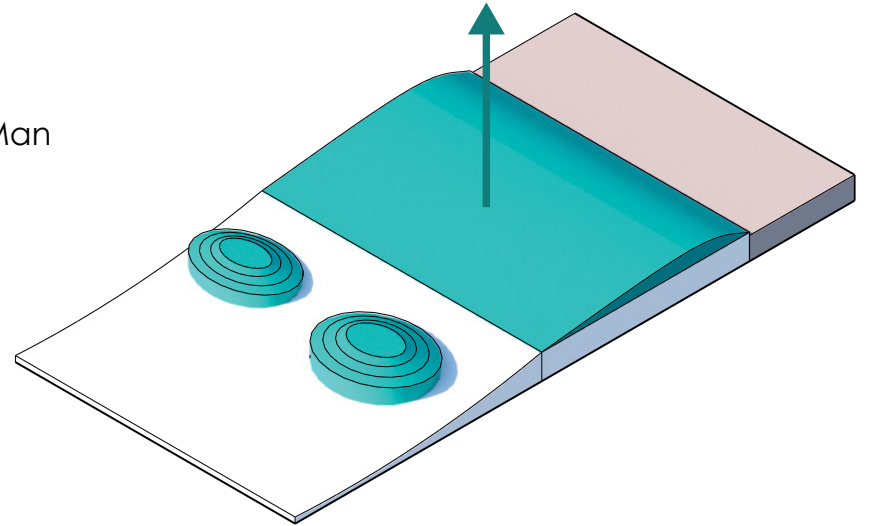








Remove Soil To Create Man Made Tidal Marsh Land



Use The Removed Soil To Create A Levee That Can Prevent Sea-Level Rise To Flood Highway 580 And The Communities Behind.

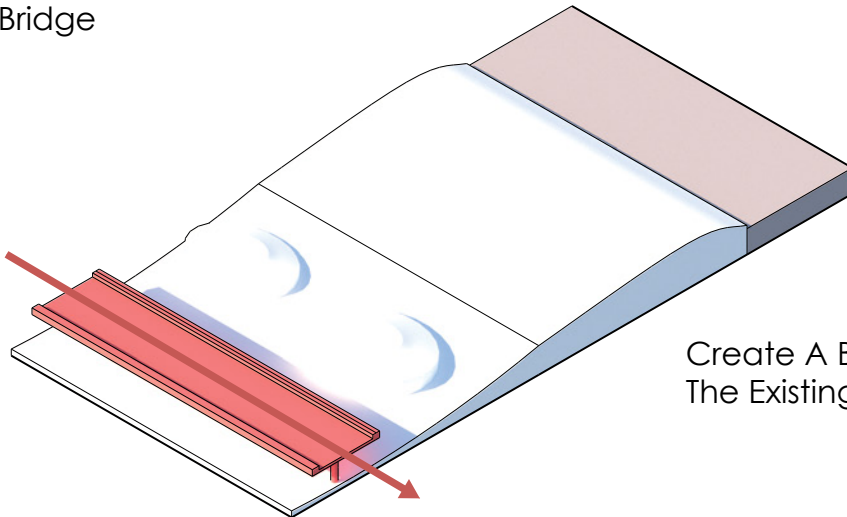
PROCESS

From Top To Bottom

4.15 Soil Remove

4.16 Create levee

4.17 Create Bridge



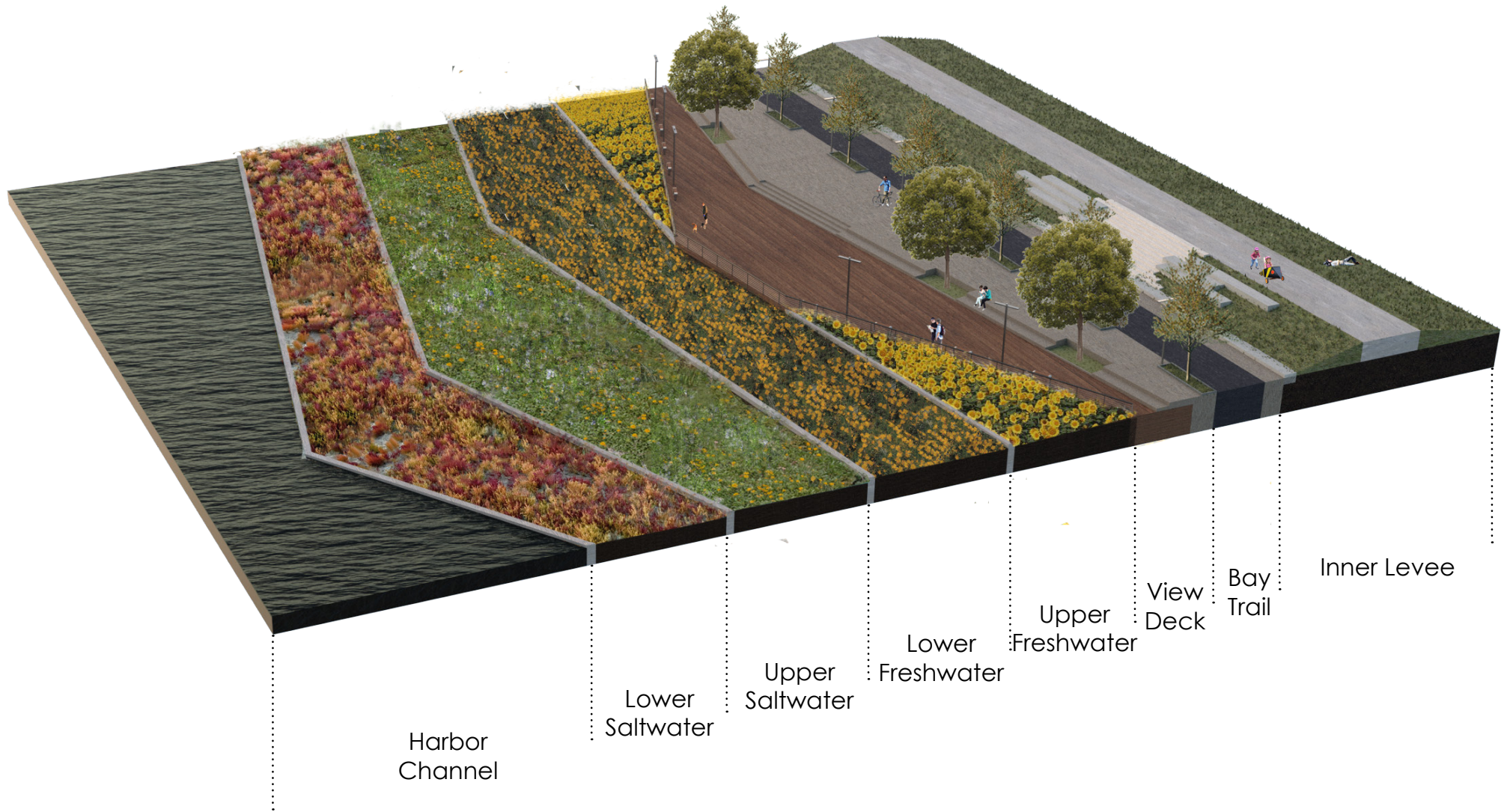
Create A Bridge To Replace The Existing Road

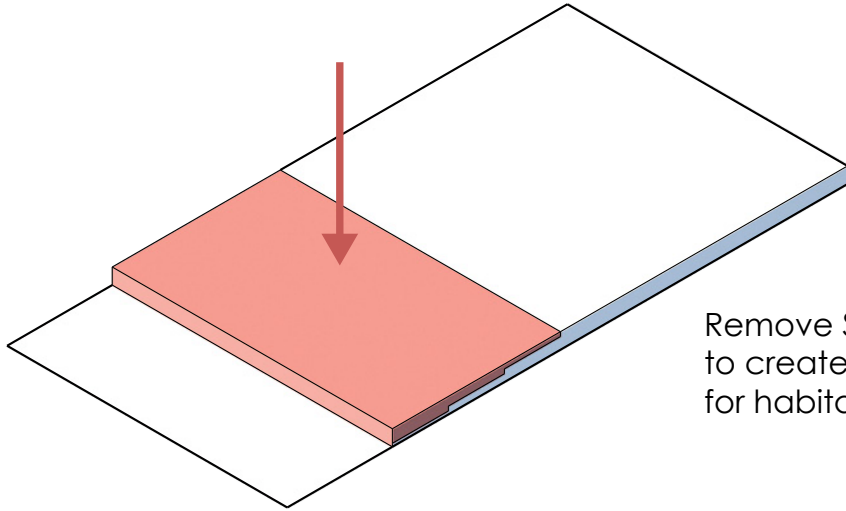
02 STAIR LEVEE

Inspired by design from the case study The Big U, shoreline part of the park will be converted into a stair-like levee which would prevent the Richmond shoreline park to be affected by the sea-level rise. Levee will be designed into four stairs with four different elevations which the lowest part of the levee will be 4.5 feet, and the highest section of the levee will be 8.5 and 1 ft between each stair. Each stair will be designed for the different purpose which starting from the lower stair will be the lower saltwater, upper saltwater, lower freshwater, and the freshwater. The first two step will create a humanmade habitat to the tidal marsh species. The upper two steps will be designed to capture the stormwater runoff. The design will Also prevent the contaminated element such as oil spill to be flush directly into the San Francisco Bay. The plant will be carefully selected base on the tidal and the elevation of the stairs which on page 51 of the report will explain more detail about the design. The plant selection in each stair will continue to shift and change as the sea level continues to rise. Behind the levee the site will be elevated by the soil that has been removed by the level design, with an elevation of 14 feet will be designed to prevent major flood and a vista viewpoint of San Francisco Bay.

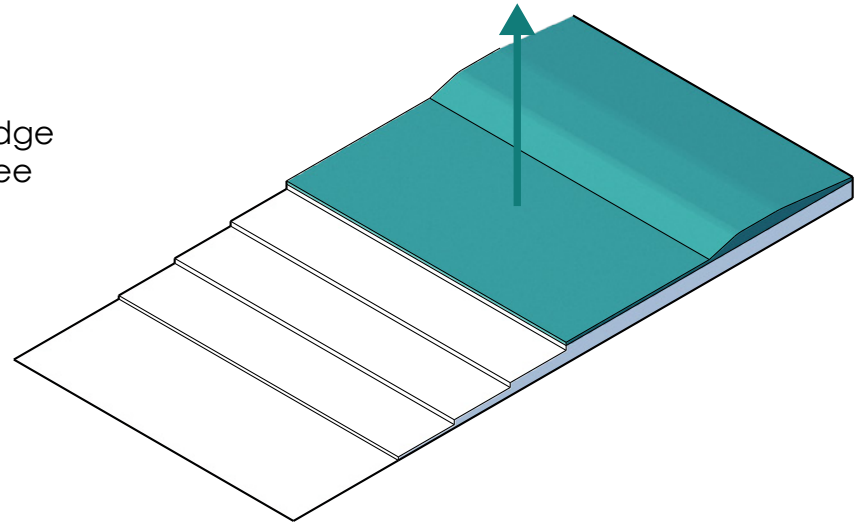








Remove Soil from the edge to create a stair like levee for habitat

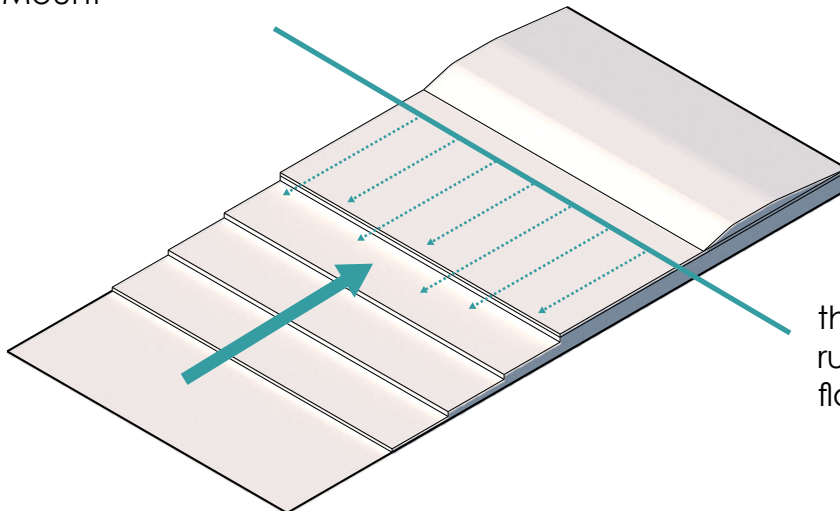


Use The Removed Soil To rise the edge of the site 1ft and create rim of mount to prevent sea-level rise and flood

PROCESS

From Top To Bottom

- 4.20 Soil Remove Create Stair Levee
- 4.21 Create Mount
- 4.22 Runoff



the levee could also prevent the urban runoff and on-site pollution to be flood directly into the ocean

STAIR LEVEE VEGETATION

Converting a levee into a human-made tidal marshland have not only created a new habitat to the native species, but it also provides an educational opportunity to the visitor about the tidal marsh. The plants have been selected differently in each elevation for a different purpose, plants like sunflower and Indian mustard that can remediate and more tolerate to the contaminated element will be planted at the highest elevation of the levee to filter the runoff. Native tidal marsh plants will be planted on the levee base on its habitat elevation with pickleweed, Saltmarsh dodder, Jaumea and Salt bird beak will be planted at the lower elevation of the levee. Marsh rosemary, gum plant, and halberd-leaved salt brush will be planted at the lower elevation of the freshwater. Pickleweed will change color in the different time of the year, and various plants will bloom and recede in different seasons. Affect by the plants the color and texture of the levee and shoreline will constantly be changing in every different time of the year.

From left To right

- | | |
|------------------------|----------------------------------|
| 4.23 Pickleweed | 4.28 Marsh Rosmeray |
| 4.24 Salt Marsh Dodder | 4.29 Halberd-Leaved Salt
Bush |
| 4.25 Soft Bird's Beak | 4.30 Indian Mustard |
| 4.26 Jaumea | 4.31 Sun Flower |
| 4.27 Gum-Plant | |



Pickleweed



Salt Marsh Dodder



Soft Bird's Beak



Jaumea



Gum-plant



Marsh Rosmeray



Halberd-leaved
Salt Bush



Indian Mustard

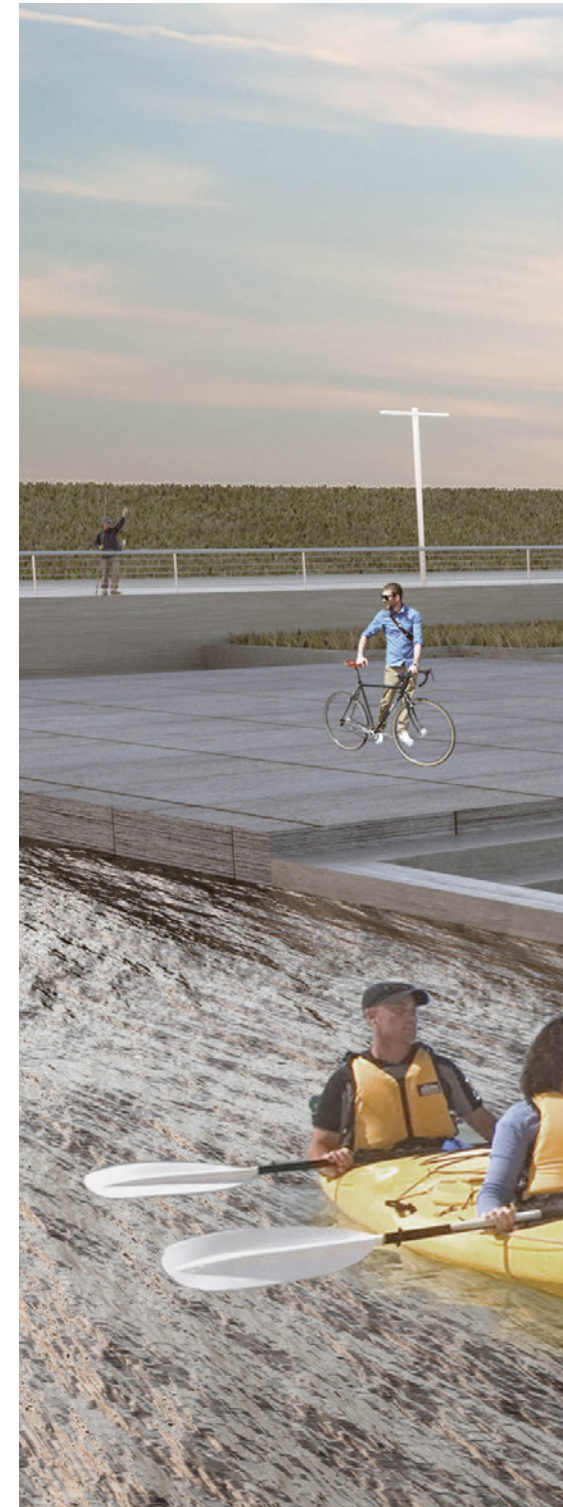


Sunflower

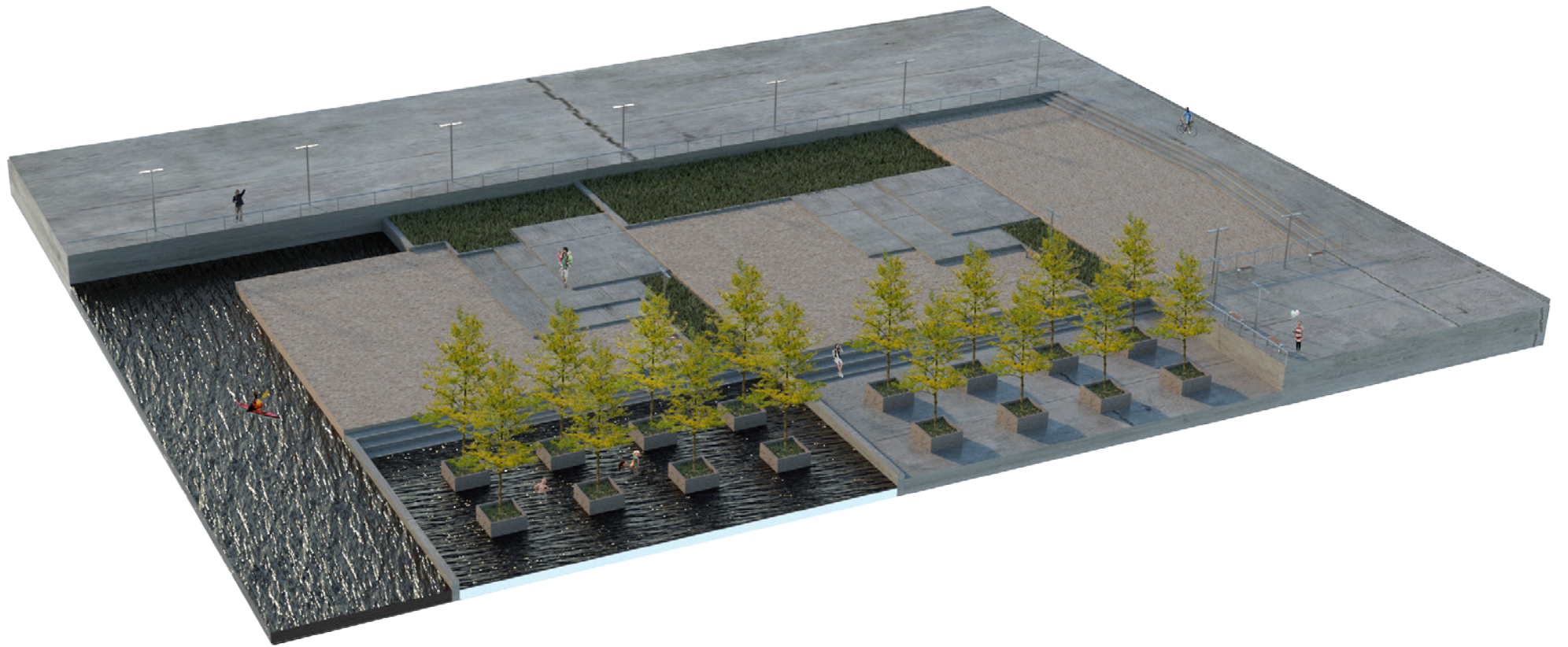
03

WATERFRONT LAUNCH AREA

Inspired by the case study Offenbacher harbor and followed the shoreline development guideline from the city of Richmond's 2030 general plan for park and recreation, the waterfront launching area will be designed as an attraction point, which provides the location to invite people to interact with the natural element. This location will enhance public access to the waterfront and encourage the development of water-dependent sports and recreation activities such as kayaking, sailing, sail and kite-boarding, and fishing. The site has been designed into two elevations: the elevation for the upper site will be 9 feet and the elevation of the lower part will be 6 feet. The lower part of the site will provide a location for people to launch their water-dependent sports equipment. The design will Take advantage of the dramatic tidal change as a design element to create an interactive water location in both elevations with a floor elevation of 3 feet at the lower portion and 5 feet at the upper elevation. During the high tide, the lower portion of the site will collect water with the depth of 3 to 4 feet and a depth of 1 to 2 feet at the upper portion of the site. During the low tide water will flush out of the upper portion site and the lower portion of the site will has water with a depth of 1 to 2 feet. This design will allow children to interact with the water in a safe and secure location, the tidal will also refresh the water every tidal change to create a fresh and clean water for the children.

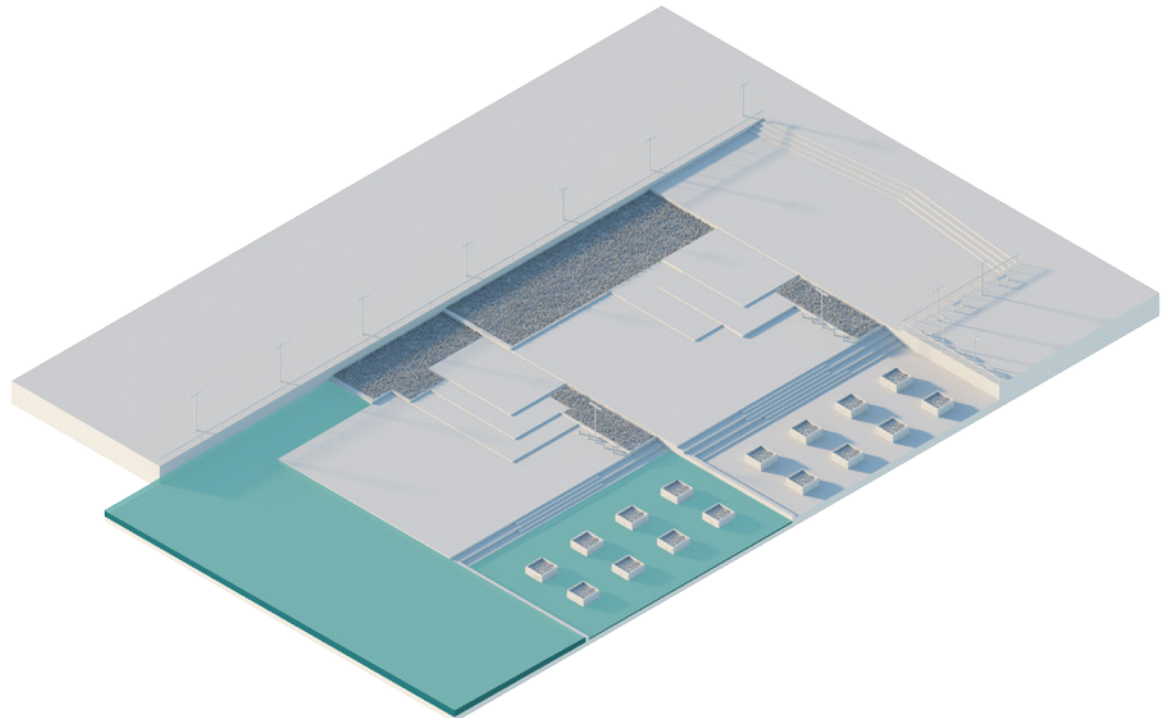




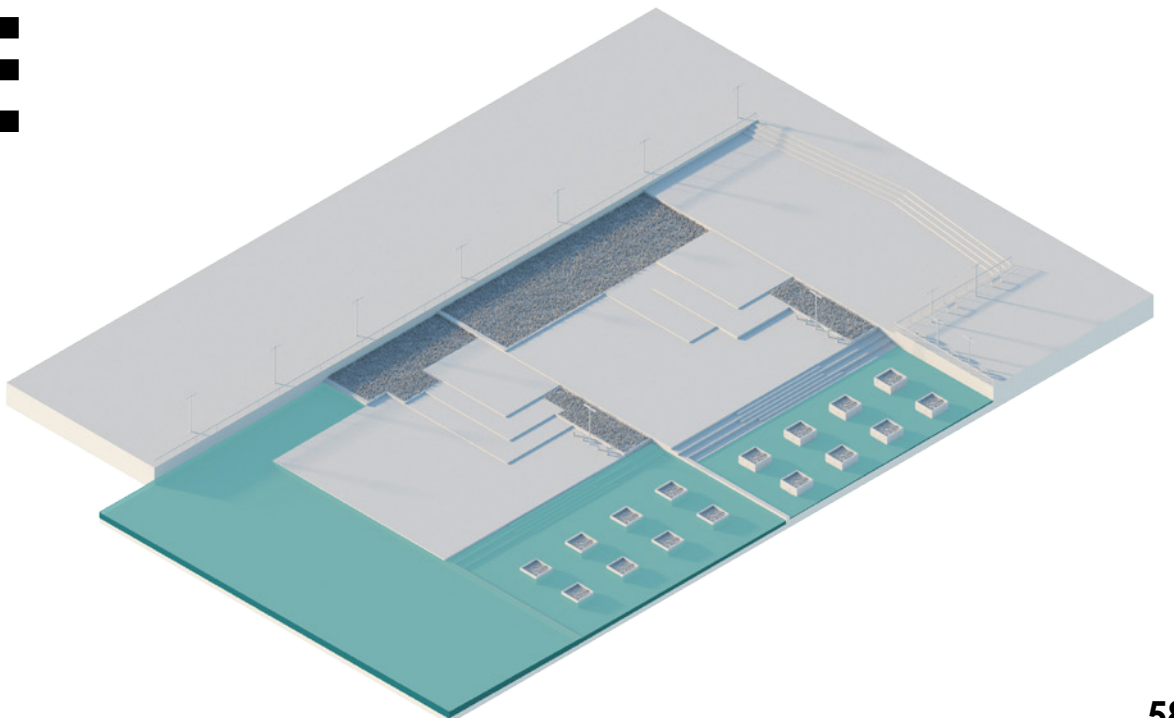


TIDAL CHANGE

Low Tide



High Tide



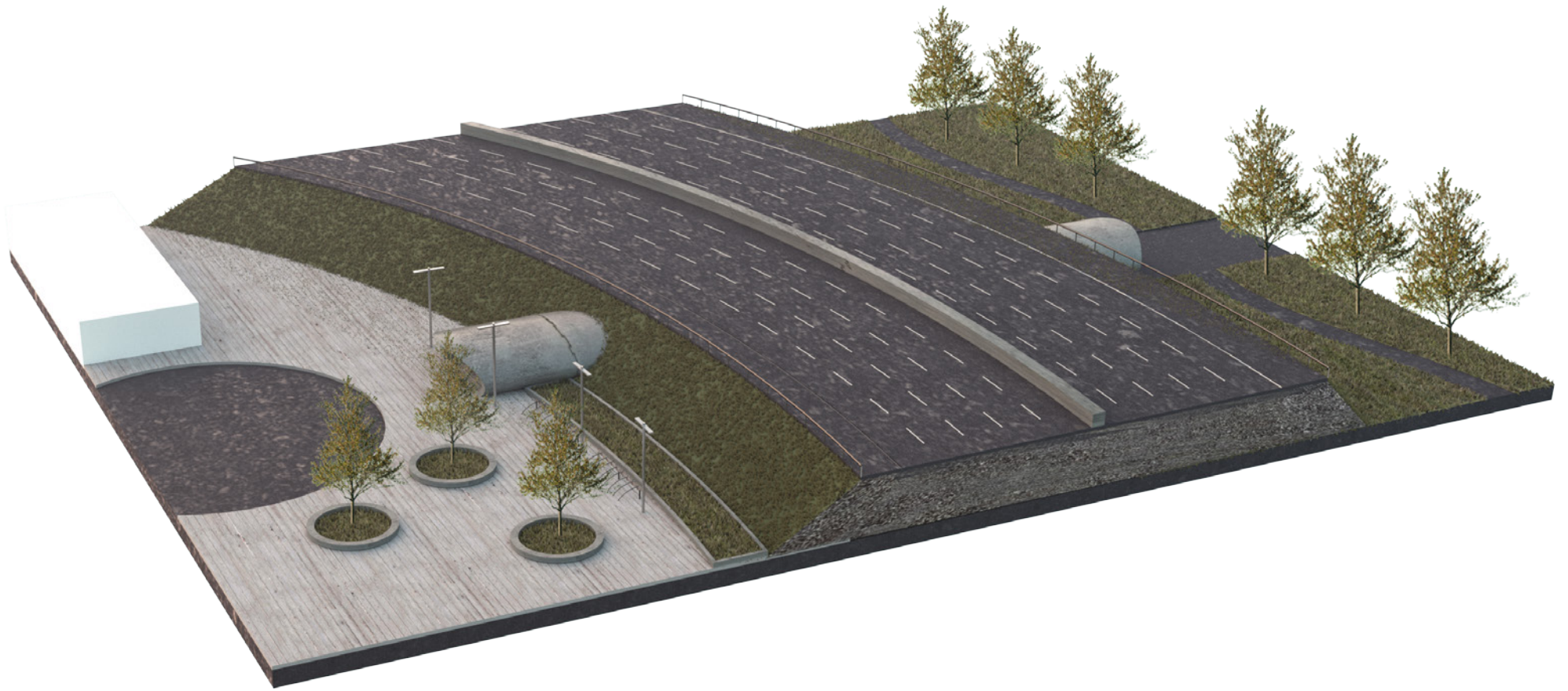
From Top To Bottom
4.34 Low Tide
4.35 High Tide

04 CONNECTION POINT

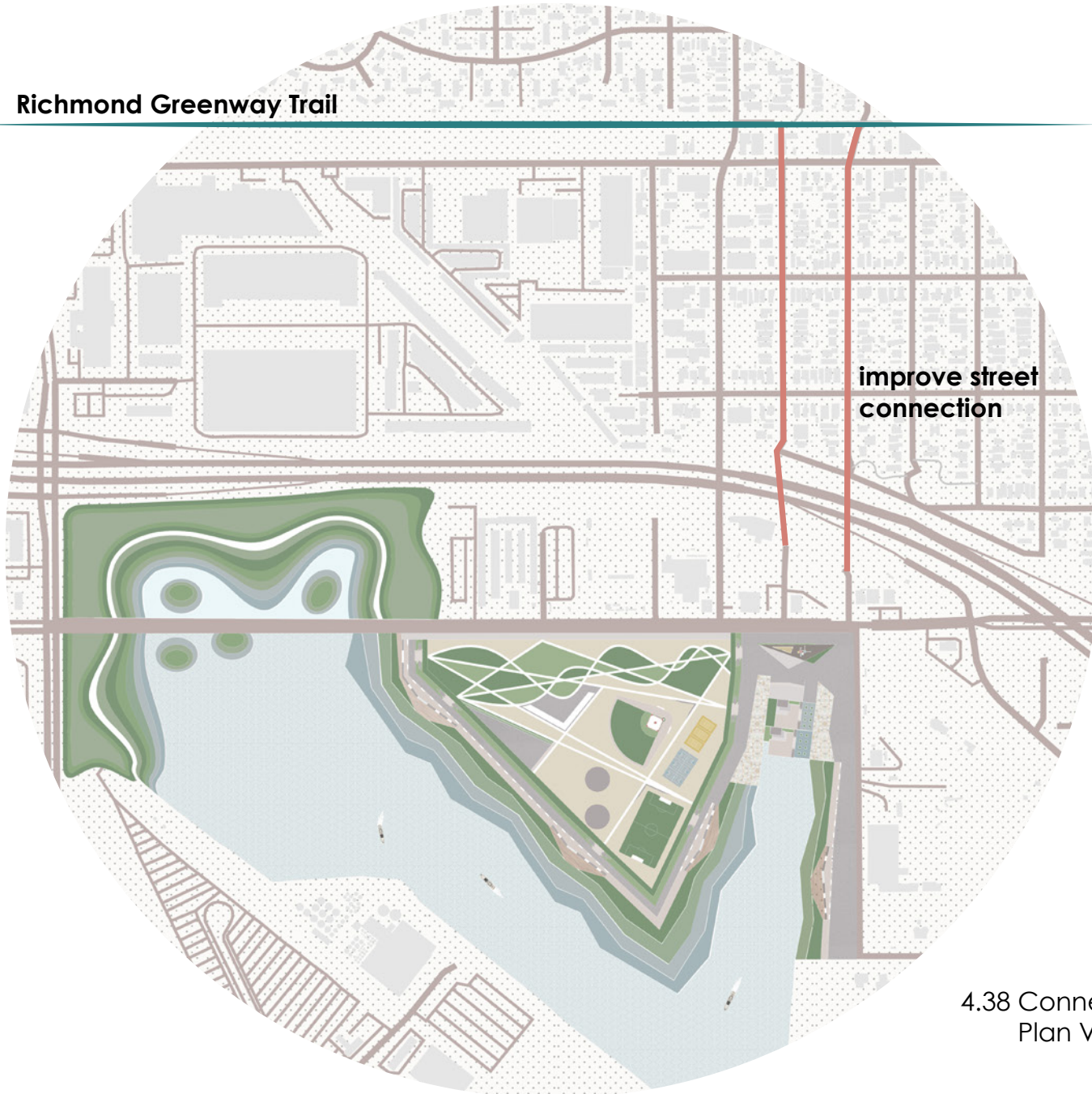
This design is mainly focusing on solving the major problem of the indirection connection between waterfront park and the communities. The park and the communities have been split by the highway 580 are created an indirect pedestrian and bike connection between each other. The design will be building a pedestrian and bike tunnel through the highway to establish a direct link between the communities to the site. The design will be located on south 3rd street and south 4th street. The design also included street treatment improvement which creates a road that is more pedestrian and bike friendly to encourage non-vehicular modes of transit between communities and waterfront green space. The street treatment will be extended a quarter mile long to the center of the Richmond city and connecting with the Richmond green bikeway.







Richmond Greenway Trail



**improve street
connection**

4.38 Connection Point
Plan View

CONCLUSION



As the sea level rise continues to accelerate cities all around the Pacific rim will face an urgent issue of how to plan out our shoreline to protect our land when sea level. Amount those cities Richmond is also dealing with the critical issue of 66-inch sea level rise. As the sea level continues to rise not only the communities that were near the shoreline will be cover by water, but some of the brownfield and industrial that located near the shoreline will also be affected by it. Moreover, without a proper way to solve the critical social problem such as poverty problem and illegal activities in Richmond, the negative effects will continue to influence the local communities. The sea level rise created an opportunity to recreate the shoreline that is covered by the heavy industrial; redevelop the site into a public green space could recover the value and health of the shoreline as a vast ecosystem that can support the growth of the cities and prevent the critical issue of sea level rise. Richmond shipyard holds the high value to be rethought, repurpose and reintroduce to the public. The city of Richmond is also in a significant transition from a heavy industrial city toward more high technology and light industrial. The design will provide the opportunity for the city to rethink how to deal with the critical social problem and the sea level rise.

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- 3.2 CMG Landscape Architecture
- 3.3 Ramboll Group
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- 4.2 Onsplash

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