

Productive Public Space:

Wetland Waterfront Reconnecting to the City in Mobile, AL

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Abstract

Mobile is a port city on the Gulf of Mexico, and is the oldest city in the State of Alabama as well. The convenient location and land-river transportation link gave the city great strategic importance, which fostered its development at the last centuries. However, the growth of its railroad and highway systems formed a barrier between the city and waterfront, which has left few opportunities to create a livable river's edge.

This thesis project intends to reconnect Mobile's waterfront to the city by an approach to landscape planning and design that makes of it a productive public space. It is clear that public space is essential to any city, but not all the public spaces that are created are fully used in our daily lives. Instead of requiring more and more lands in the urban area to create these public spaces, multi-functional public space could be more productive in limited areas, and increase the value of public space especially in urban precincts.

By redesigning the existing waterfront park and its surrounding areas, this research will not only break the boundary of the transportation strip, making the waterfront accessible, but also increase the effective use of public space along the waterfront and other vacant space. The aim of the research is to reclaim the waterfront from its industrial-use or vacant buffer zone to an area with diverse functions which raises the economic value and brings local social life back to the river's edge.

Key words: Waterfront, Productive public space, constructed wetland design

Chapter 1 Introduction

Globalization and consequent expansion of port area and hinterland in the maritime industry have redefined the functional role of ports in supply chains and have generated a new pattern of freight distribution. Influenced by these changes, people in port cities are realizing the great importance of rethinking the value and function of the space in today's city edges. This space, which used to be facilities or warehouses, is not only an inseparable part of the city, but also a unique linear space connecting the city to the water. Thus, many planners, developers and designers have been practiced in port cities by a variety of solutions to the waterfront. In most cases, although their methods are different, the goal of accommodating the function of the waterfront to the current city turns out

to be the same. As time passed by, some waterfront projects are proved to be successful, while others are not for some reasons. Therefore, planners and designers are still facing the challenging task.

How can Mobile's Waterfront be reconnected to the city by an approach to landscape planning and design that makes of it a productive public space?

In this project, the city of Mobile on the Gulf of Mexico, the oldest city in the State of Alabama, is deliberately chosen as the site of interest. Except for the richness of history and culture, Mobile, like other port cities, is characterized by its elegant location and land-river transportation link.

Encouraged by the great strategic importance, the development of the city is fostered at the last century. However, the growth of railroad and highway systems somehow formed a barrier between the city and the waterfront, which inhibits the creation and development of a livable city edge.

In order to reconnect the waterfront to the city, the existing public waterfront park is redesigned to be a productive public space. Such multi-functional space in the urban area not only increases the value of the land but provide the civic goods for people as well. Therefore, the aims of this research includes: (a) to transform the waterfront from industrial use or park of little usage to a diverse, functional and vital area; (b) to stimulate the economic development

development in the waterfront; (c) to bring social life back to the river's edge; (d) to develop an ecological network in the city.

The main idea and the design process will be discussed in detail in the following chapters. In Chapter Two, literatures relating to the theoretical foundation of this project are reviewed. In Chapter Three, the context of the project site, the critical position of the design and the overall idea of the design are presented. In Chapter Four, some comments and analysis of this project are discussed.

Chapter 2 Literature and Precedent Reviews

The main concerning issues in this project are briefly reviewed in this chapter. Firstly, the influence of city form on the economy, transportation and public space is revealed. Then, the evolution of the port city during the last century is investigated. Lastly, several waterfront cases are studied to understand the approach to the implement of design framework.

Section 1. City Form - Grid System

Grid is a very simple geometric shape, but it is also the most common urban form used as either a tool to facilitate orderly settlement or an instrument of modernization for centuries. The grid system is used in most cities in America, e.g. New York, NY. Such simple organization of the built environment is able to help the city to grow and expand rapidly. Although the grid system is often criticized by its naturally ugly looking from an aesthetic point of view, it is considered as a network that affects the interrelation of all the elements in the city, such as economic, transportation and public space.

Economics and Transportation

Economics and transportation are two key elements for analysis of grid

urban form. The economics is so crucial to the development of city that it is the the invisible flow throughout the city. While, transportation is the other visible and physical flow that stretches out through the city. It offers the streets and roads a hierarchical organization which could reflect on the grid system. Thus, it is much easier to promote the economical increase and transportation accessibility by taking advantage of the interrelationship between city form and the two important elements.

After analyzing the cities by mid-east and west coast of America, John Reps created a “Grid Assertion” theory, which explains how city grows and why it expands. He claimed that the economics was the only reason for the development and expansion of a

city. He also scrutinized the evolution of the “towns-by-the-trucks” and successfully proved the influence of economics and transportation on city form and its grid system. According to his theory, in the early twentieth century, the existence of the railroad became the prime motivation of economic development and thus resulted in the growth of the towns and cities near the economic corridor formed along the railroad. Interestingly enough, these towns and cities were literally formed and followed the grid pattern. (Reps, 1965)

The completion of highway system in the mid nineteenth century again validated John Reps’ theory. Highway provided an alternative opportunity for a city to extend its boundary and boost another

economical growth. In contrast to the railroad, highway has even a profound influence on American cities because it spreads all over the country with an even higher density. However, most importantly, the framework of railroad and highway network defined the form of a city according to a grid pattern.

In the book “How Cities Work”, Alex Marshall pointed out that “The structure of a human settlement (the city or the built environment) rests on a three-legged stool of politics, economics, and transportation.”(Marshall, 2000: x) Marshall believed that these three elements created the characters of the city. He claimed that transportation “is the most visible and active in shaping a place”, and “determines the character of the city” (Marshall, 2000: xi); while

the economics, on the other hand, was “the nature of what cities are” (Marshall, 2000: xi). Thus, transportation is “the cornerstone of cities’ ability to create wealth” (Alex Marshall, 2000: xiii). In his book, the author clearly explained the connection between the transportation and economics in a city and their relationship to the form of the city. Above all, the grid system helps the city to develop efficiently and sustainably. (Alex Marshall, 2000)



City Form, Mobile Downtown , AL

Public Space

The notion of public space from J.B. Jackson's view is that it is political landscape that "distinct from the natural landscape or the economic landscape or the private landscape" (Zube, 1970: 153). He also suggested that the public landscape has its own function and endures for keeping the state physically intact and promoting civilization that every organized community has to have. In cities, the public landscape is formed by the grid system which determines its size and distribution. In his article "The Public Landscape", the elements of public landscape could be boundaries, roads that are related to the transportation system; or could be public places as well. Different from linear public landscape along the highway, the square shaping public

space in the built environment plays its own role in the cities. Necessarily, each public space has certain function such as parks for the community, playgrounds for children, or pre-empted by public buildings and parking lots. Jackson also believed that "a properly functioning public landscape allows the private landscape to specialize and achieve individuality" (Zube, 1970: 154). Not alone, in "Parade Der Passantern",



Bienville Saquare in Mobile downtown, AL

Jan Oosterman identified five different characters of public space in urban society: public space as sacredspace, as secure space, as democratic space, as commercial space, and as heterogeneous traffic space. (Meyer, 1999)

Though the functions of the public space changes and varies over time and space, the notion of public space as space for the city's public realm remains the same. But the question is what kind of function the new public space fulfills in the twenty-first century and the future, as the form of the city grows slowly. Han Meyer claimed that the modern public space has the ability to fulfill various functions simultaneously. He noted that "it was precisely this universal character of modern public space that formed the condition for the many different

meanings and types of use of public space."(Meyer, 1999: 28)

Economics, transportation and public space are three main concerns in urban design. In this project, these three concepts macroscopically orientate the design in order to achieve the goal of reconnection the city to its river edge in proper way.

Section 2. Port City

As mentioned in the previous chapters, the functional role of the port cities is redefined by the globalization. In the last several decades, lots of port cities have experienced a rapid growth due to the great location and mature transportation network. On the other hand, each port city, has its unique character and should be discussed case by case.

In the article “A Tale of Asia’s World Ports: The Spatial evolution inglobal hub port cities”, the difference in “sex” is clearly summarized by a diagram including the port cities ranging from North America, Western Europe to South and East Asia (Figure 1). According to the author, the diagram not only presents the “idea of how global forces are facing regional specificities that shape port systems into major market areas, and encompasses the spatial pattern of port systems at various regional scales”(Sung-Woo Lee, 2008: 3), but also implies that the evolution of the port cities is various from region to region.

In this article, the author also reviewed and summarized the major concerning issues for American port cities during the past half century. As

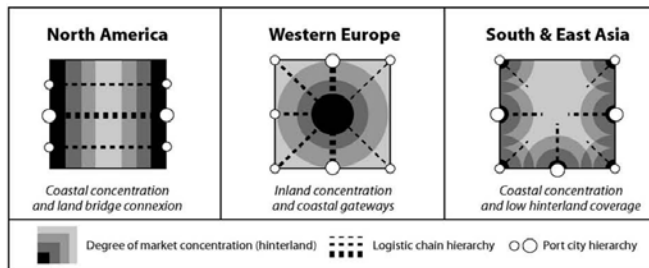


Figure 1. Regional Patterns of hinterland connections. (Sung-Woo, 2008)

early as 1950, Han Meyer started to pay attention to the competition among ports by investigating hinterlands. In 1960, Weigend studied the relationship between forelands and the port. After them, several experts such as Kenyon and Hayuth drew more focus on the economical values, spatial changes and accessibility in ports area. (Sung-Woo

Lee, 2008)

And such interest continues until Han Meyer's book "*City and Port*" was published at the end of the century. By studying four port cities, this book examines the change of the port and urban spatial structure. Han Meyer introduces the "long-wave theory" created by economist Kondratieff to

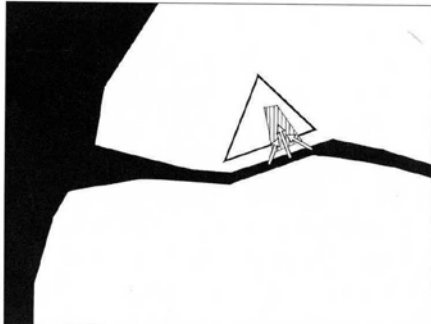


Figure 2-1. Entrepot Port: port within an enclosed city.
Goods are stored and traded in the city.

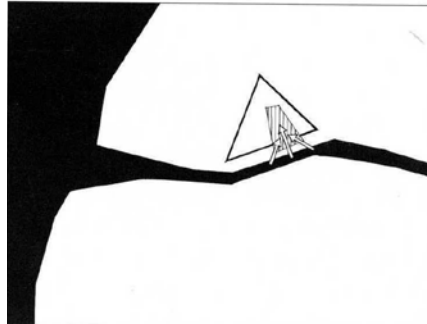


Figure 2-2. Transit port: port alongside an open city.
Flow of goods passes the city.

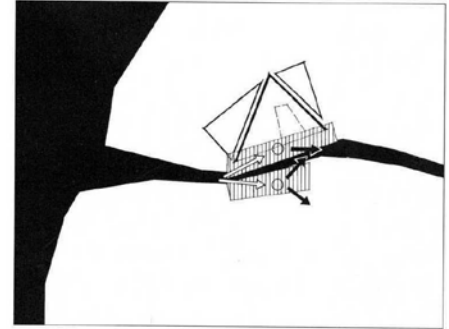


Figure 2-3. Industrial port alongside a functional city.
Goods are processed in the port area.

classify the structure of the port into five phases (Figure 2). Most American port cities experienced the first three phases, and staying in the fourth phase (the industrial port) or transforming to the last phase (distribution port). The evolution of the structure of city port results the tension between two diverse spatial system, which function on two

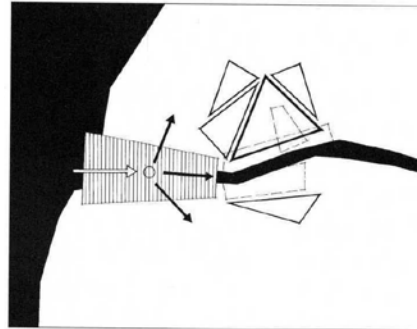


Figure 2-4. Distribution port and network city.
The port is rediscovered by the city as a part of the urban landscape. (Meyer, 1999)

extremely different scales; on the one side it was used to store the goods and build the facilities requiring large scale of space, and on the other side it need to accommodate the urban scale for social life. Therefore, the space in the port area, or say the waterfront need to reshape according to its new position in the city. Han Meyer thinks that the waterfront still needs to be public space where any people can access: “What is needed, therefore, is not only an institutional framework for civic culture, but also a concrete urban planning practice capable of designing the public domain: the space perfectly suited to the expression of civic culture.” (Meyer, 1999: 52) This is the challenge for all planners and designers dealing with the waterfront projects.

Section 3. Case Studies

The waterfront design projects have blossomed considerably in the last century. However, the approaches and methods to solve the problems that are concerned varied from one to the other since each site has its own unique character. Roy B. Mann summarized the trend in waterfront design: large scale mixed-use development; open edge and access improvement; lessening of highway encroachment; small stream and canal backside development; historic restoration and imitation; blossoming of the people-place / market place; world exposition development on the waterfront; integration of environmental art and lighting; the growth of festivals and other ephemeral events; and the increase in the regulation of waterfront site development characteristics (Mann,

1988). Surely enough, not all of the waterfront projects will follow or apply the design rule mentioned above, but most of them actually do validate the idea proposed by Mann. In this section, two typical waterfront projects are studied to understand the trend of today's waterfront design.

Battery Park City, NY

The site of Battery Park City was originally landfill from the World Trade Centre. In 1979, the original plan was drafted to develop a 92-acre residential and commercial development. The vision for the plan was to create a physical space for people to work, shop, eat, play, relax, and live. Thus it established an urban fabric of mixed uses that brought new life to lower Manhattan. The design also encompasses a public open space system, including a 1.2 mile riverside esplanade, several miles of streets, and over 30 acres of parks and squares. The idea is to make the new development related to its context by studying the existing local park system. The design of Battery Park City emphasized the role of the public space in the riverside. Also, the new mixed use development,



Plan of Battery Park City, NY (OLIN)

was another approach to make a diverse urban environment. (ASLA website)



Left: Bird eye view of Battery Park City
Middle: Aerial view of Battery Park City
Right: Views from the riverside park

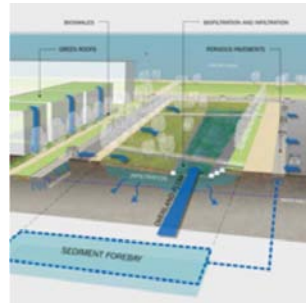
Southworks Lakeside Chicago Development, Chicago

The City of Chicago organized a competition for the design of the Southworks Lakeside in the late twentieth century. The Southworks site is about 575 acres and located ten miles south of the Chicago Loop on Lake Michigan. The site used to be a USX Steel manufacturing plant. Sasaki, in collaboration with Skidmore, Owings & Merrill is developing a master plan for Southworks. The development of the site takes the advantage of the existing urban infrastructure and transportation systems to build an urban fabric. The master plan calls for several thousand residential units; a regional retail center; neighborhood retail and commercial uses; civic and cultural uses and an extensive system of open space and recreational facilities. The design also aims to build a sustainable development

by incorporating the rainwater management to the park system.



Overview of existing condition of Southworks Lakeside, Chicago



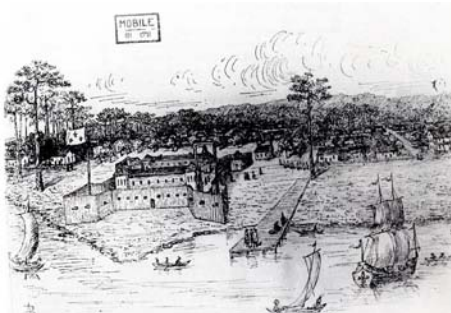
Left: Master Plan of Southworks Lakeside Development by Sasaki
Top: Sustainable development concept

Chapter 3 Design Studies

In order to redesign the waterfront in Mobile by an approach of landscape planning and design, a careful review of literature and precedent work has been done in the previous chapters. In this chapter, the main idea of “how the waterfront is reconnected to the city and transformed to be a productive public space” will be discussed in further detail.

Section 1. The History and Background of Mobile, AL

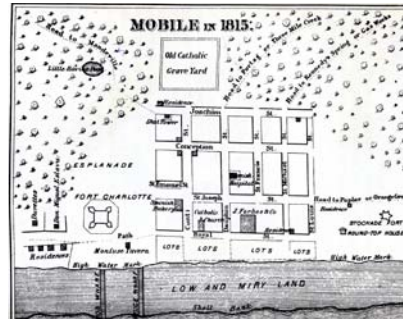
Mobile is the oldest city in the State of Alabama, and is the only seaport in the state. It is located at the junction of the Mobile River and Mobile Bay on the northern Gulf of Mexico. Ranked as 9th largest port in America, the port of Mobile has rendered the city to be the trading/shipping hub in the southeast of America.



View of Mobile in 1711 (Thomason, 2001)

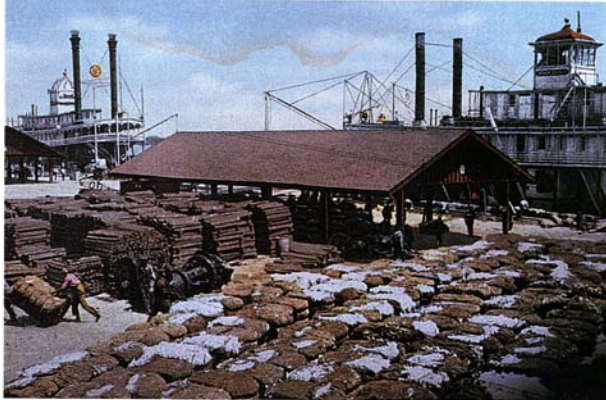
General History of Mobile Growth

Founded in 1702, Mobile has been under the control of the French, English, Spanish, Sovereign Alabama, Confederate States of America and the United States. Initially, it was only a French fort on the west bank of the Mobile River and moved twenty-seven miles south to its current location in 1711 as a settlement. Over 100 years



Mobile in 1815 (Thomason, 2001)





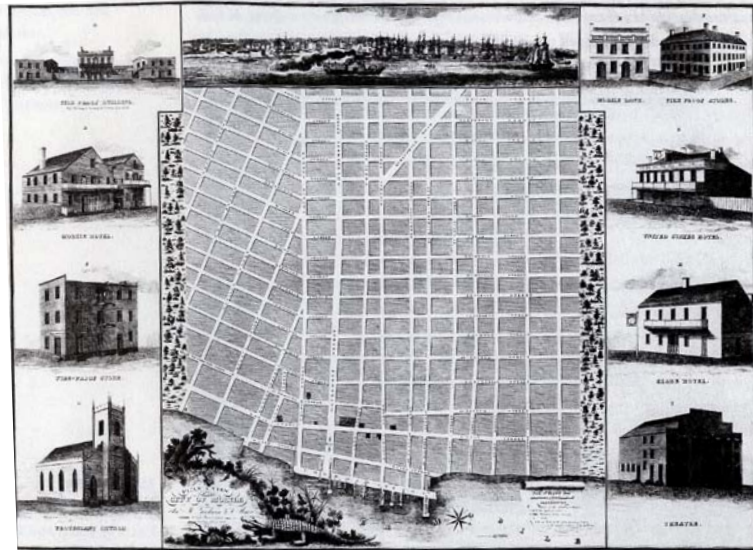
Cotton docks at Mobile (Thomason, 2001)



Mobile looking south from Conti St., 1884 (Thomason, 2001)

of colonial rule, Mobile was a territory with little growth. It became a city in 1819. Niles' Register reported in 1822 that "Mobile is becoming a place of great importance, and it is possible, may soon be one of the most populous of our southern cities" (Thomason, 2001: 65). Mobile became the second leading cotton exporter in South, and thus was named "the Cotton City" during the mid nineteenth century. By 1860, the population in Mobile had increased dramatically to thirty thousand. In the last quarter of the nineteenth century, however "Mobile had experienced dramatic changes as it adapted to postwar conditions and reacted to the technological and economic changes moving across America" (Thomason, 2001: 86), Mobilians suffered a lot and the city restrained to develop. (Thomason, 2001)

The new century brought a more progressive hope to the Mobile. By 1900, timber, instead of cotton, had become the dominant exporting goods in Mobile. In 1916, Alabama Dry Dock and Shipbuilding Company (ADDSC) was founded. “The city continued its long transition from a cotton port into a more diversified importing and exporting center, and railroads gained added importance” (Thomason, 2001: 156). The significant transformation led to a considerable growth of Mobile in the early twentieth century: the population gained a twenty-thousand increase in the first two decades. However, such development didn’t make Mobile a metropolitan in America. Although Mobile used to be the “South’s eighth largest city in 1880” (Thomason, 2001: 105) other port



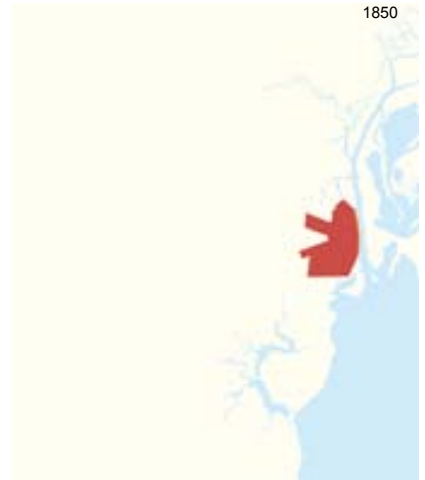
Mobile Downtown in 1824 (Thomason, 2001)

cities along the Gulf Mexico, such as New Orleans and Tampa, grew ahead and consumed Mobile's civic leaders. During World War I and World War II, Mobile experienced another significant economic development. Many industrial projects were underway

after 1920. In 1927, the Alabama State Docks opened into service. After the war was over, Mobile recovered from the downturn of the postwar soon and grew even more rapidly. By 1945, the population of Mobilians expanded to 125,000, and the annexation nearly tripled size of city. After 1960, the city boundary again extended due to the newly-built highway connection and the tunnels across the river. Yet, Mobile and Mobilians recognized that the city still needed to develop, especially the redevelopment of downtown area. But in the mean time, the preservation of historic homes and buildings are already on the way, too. (Thomason, 2001)



Mobile Downtown in 1929 (Thomason, 2001)



Mobile City and Port Area Development



Recently, the government in Mobile has approved “A New Plan for Old Mobile: An Urban Planning, Design, and Economic Development Plan”. (Mobile Official Website) The expectations of the proposed plan are summarized as following:

- Strengthen the pedestrian link between the cruise terminal, Fort Conde Village, and Downtown;
- Develop specific provisions for a designated pedestrian/bicycle link from Wet Mobile to link Government and Dauphin Street corridors;
- Analyze the current and future market potential that promote a healthy mix of land uses within the Downtown core, including the need for additional open space;

Since the waterfront locates at the beginning of the downtown area, the thesis project also takes the accessibility

and walkability into account. Besides, the sustainable development in the design site is another main issue which means that both the private and public space needs to connect the city and has economical value to the city.



Black Mobilians held their first Mardi Gras parade in 1938



Mardi Gras, 1884



Mardi Gras float in 1936

Bottom: New festival called First Night, 1991
 Right: Big concert at Bayfest, 1997



Significant in Mobile

Mobile is a city rich in culture and history. It is recognized as celebrating the first-known American Mardi Gras in 1703. When the celebration starts in the Mobile, “the streets of downtown Mobile are filled with the sights and

sounds of live marching bands, brilliant-colored floats and of course teeming crowds of parade goers.” (Mobile Official Website) In this project, the redesigned waterfront is expected to be involved in this annual celebration and even become the start of the whole celebration.

Sadly enough, although Mobile has a three-hundred-year-long history, only a few historical buildings are well maintained due to the two significant disasters occurred in the history of the city: fire and hurricane. The fire in 1823 wiped out almost two-thirds of business and the hurricane occurred in 1979 damaged led to a great loss of historical treasures. In this project, a new idea for food-prevention will be proposed to protect the city from the potential threat of hurricane.

Study Area: Existing Conditions

The site of interest in this project is located along the Mobile River and annex to the downtown of Mobile. With a total area of 23.6 acres, it consists of a waterfront and a small community surrounded by the ramp of Interstate Highway I-10.

The waterfront area is a public park along the Mobile River. It starts from the parking garage of a cruise terminal and extends till a convention center in west adjacent to downtown Mobile. With a 1,460-foot-long river bank in North, the park is “double-fenced” by a railroad together with Highway I-10 from south. Due to the low accessibility caused by unsatisfying landscape design, the waterfront park is scarcely visited by Mobilians in daily life although it is the only public space by

the river edge. Additionally, the space underneath the elevated highway is now zoned as the largest free public parking lot near downtown area. Hundreds of parked vehicles array like an annoying barrier, which reduce the walkability and visitors’ desire to go to the park. (Fig. 3)

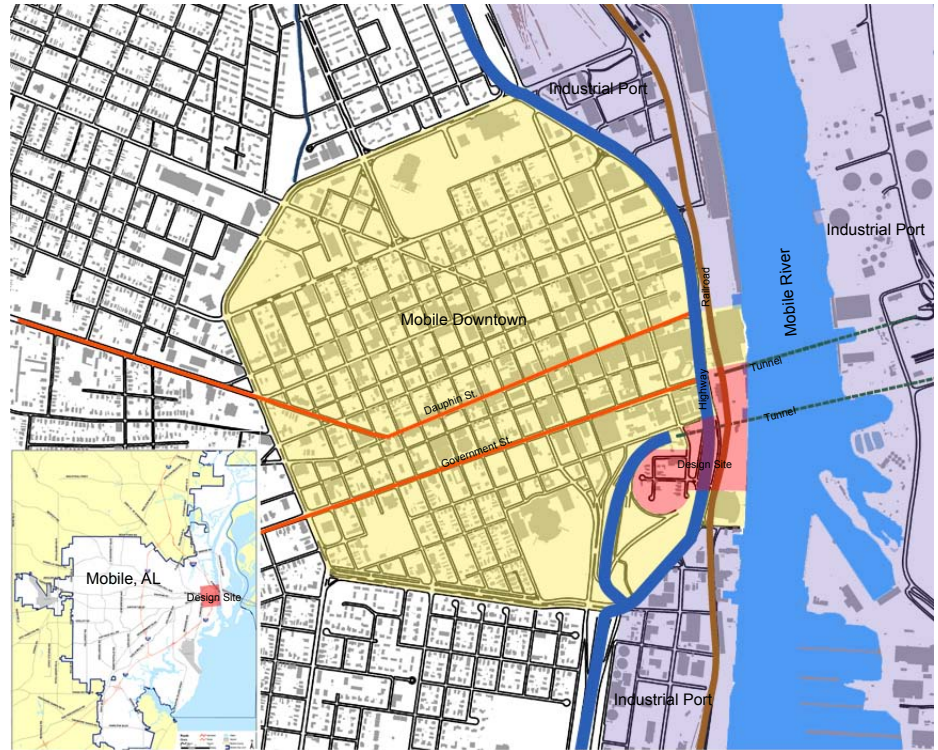


Figure 3. Condition in Mobile Downtown, AL

Beside the parking lot there is a small community, which is isolated from the downtown and waterfront park by the highway on-ramp. Although it is just next to Fort Conde, one of the most famous historical building in Mobile, half of the community is vacant or under construction. Only a few residents and small business and offices are still trying to survive from the “isolated island”. The only advantage of the community is that free trolleys and bus routes to downtown are still available by the edge of the neighborhood. (Figure 4)

In summary, the site of interest in this project has great potential to become the highlight in Mobile, if careful yet appropriate urban design is implemented. In order to revitalize the “dying community and waterfront”

in Mobile, the urban framework of the site, including the layouts of transportation and land-use will be built according to city form. In addition, productive public space will be designed to achieve a sustainable development.

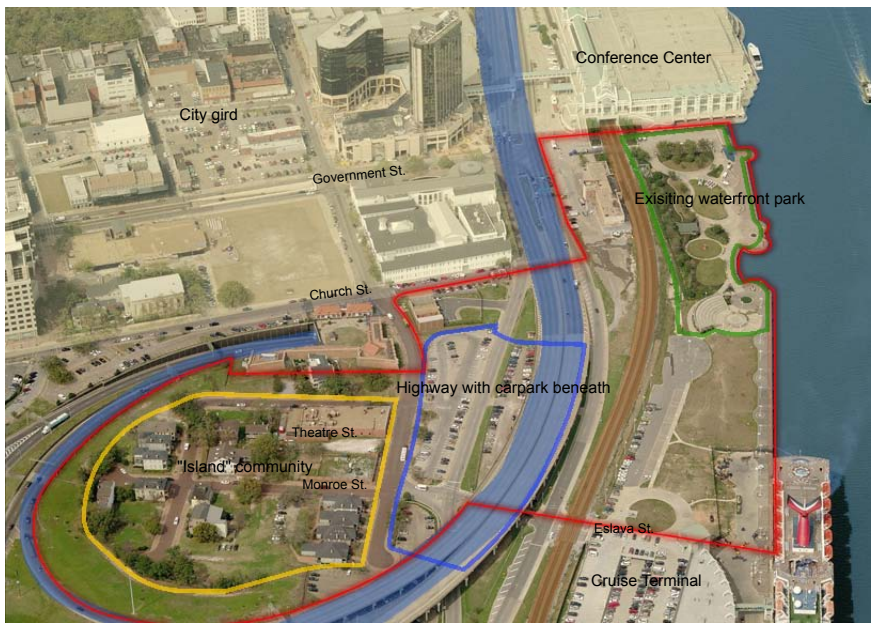


Figure 4. Existing Condition in design site

Section 2. Concept Plan for Waterfront

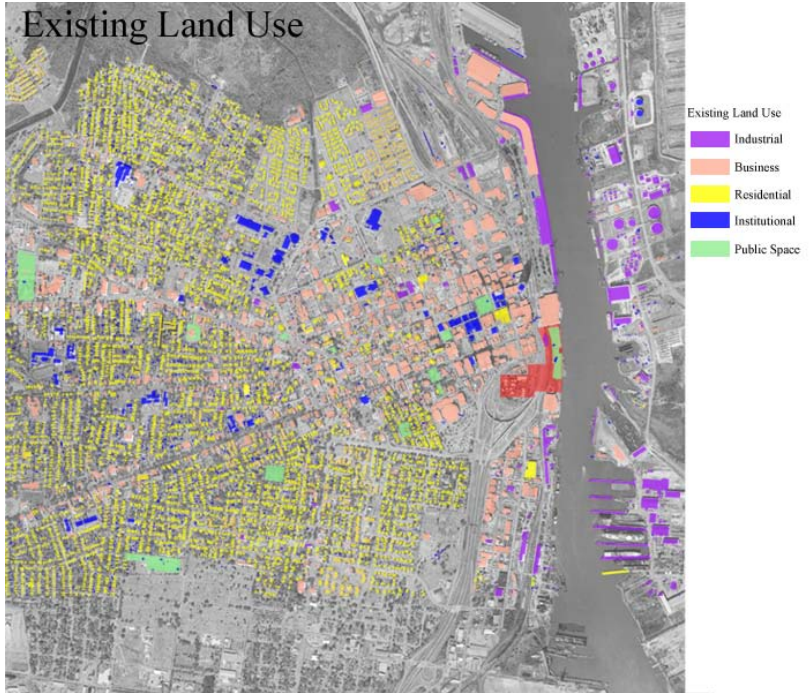
As mentioned in the previous sections, the desired design outcomes include:

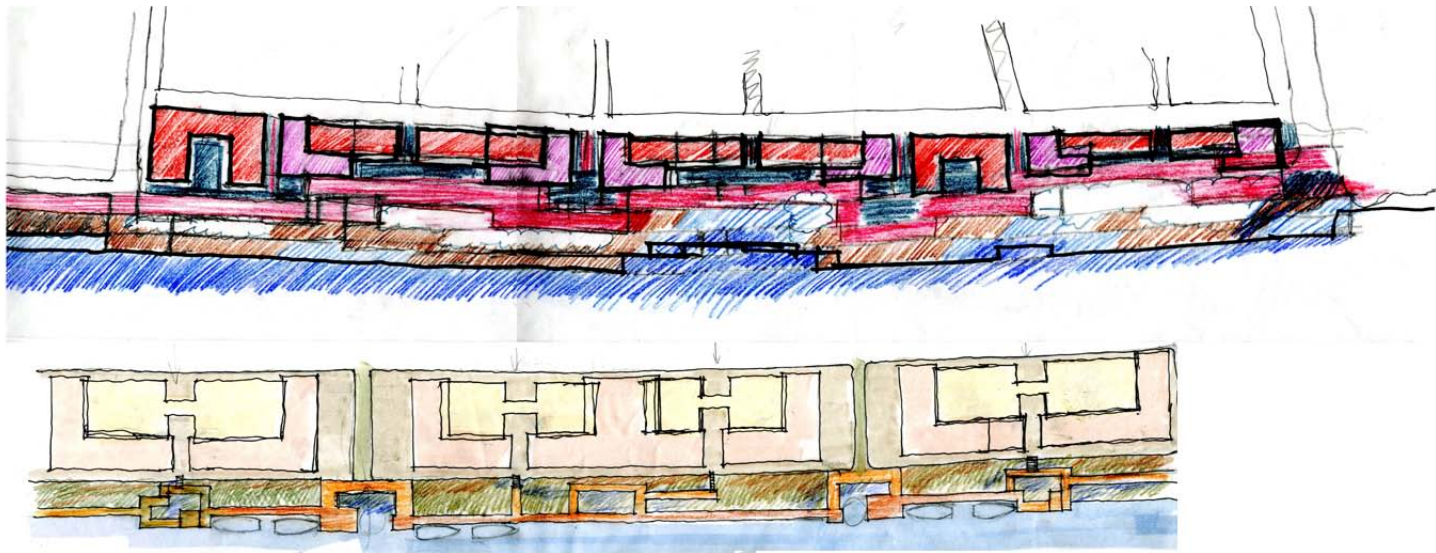
(a) rebuild a more accessible and functional waterfront

(b) create productive public space to achieve a sustainable development

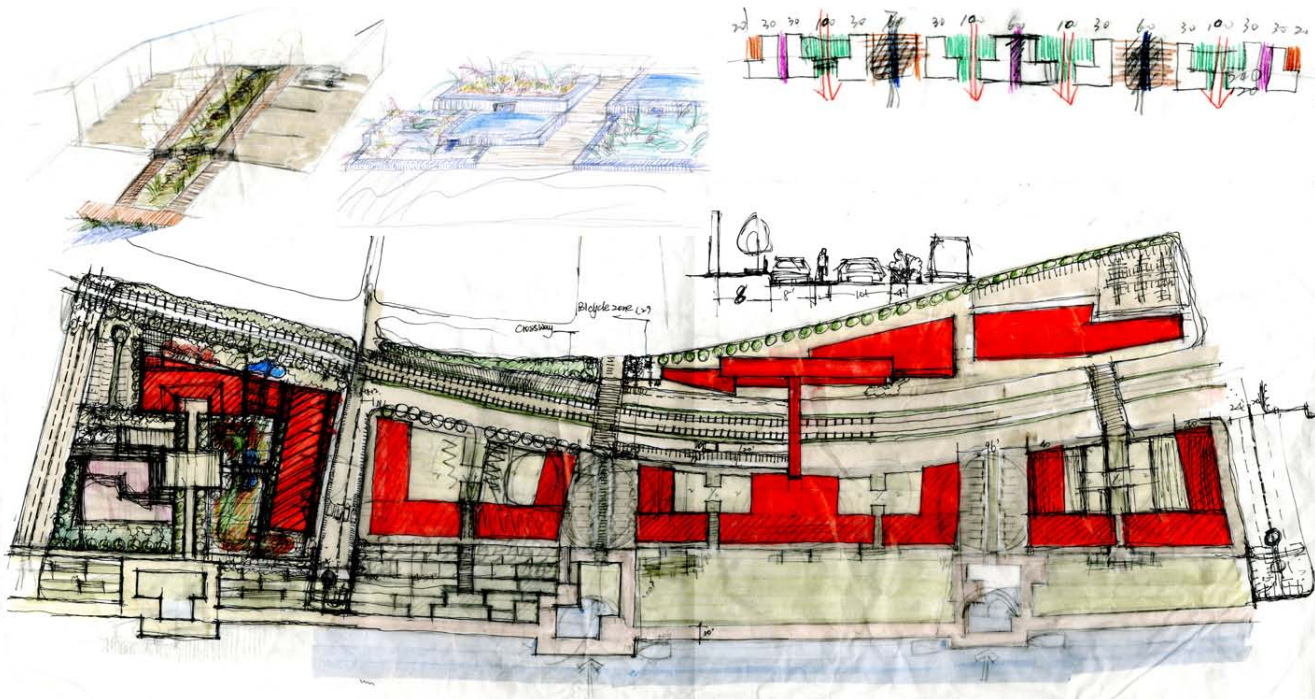
Firstly, in order to increase the accessibility of Mobilians to the new waterfront, Government Street, Theatre Street and Eslava Street will be extended to the river's edge. The concept of grid system will be used to obtain the same fabric as the city of Mobile when designing the road network near the waterfront. Additionally, free bus or trolleys routes will be introduced to build the connection between downtown Mobile and waterfront. Moreover, several cycle-ways are paved along the waterfront to provide a

bicycle-friendly environment. With the support of reasonable road network and diverse transportation system, the new waterfront will also be designed as a culture and civic center in Mobile, for example, Mobilians could celebrate the traditional Mardi Gras here in winter, or enjoy the Bayfest in summer. Lastly, most streets that designed in the site will provide roadside parking for residents and visitors.





Design Process



In this project, mixed-use buildings will be proposed near the waterfront area. These buildings will provide retail and commercial services as well as mid/high-wealth apartments. In the book “The Death and Life of Great American Cities” Jane Jacobs claimed that the city needs eyes on the street, which means that residents and strangers are needed for both safety and social and economic activities (Jane Jacobs, 1992). Actually, the residents in these mixed-use buildings will not only be the guards of the waterfront, but also the frequent visitors to that area.

Most public space by waterfront is always a byproduct of planning; in this project, however, it will be made up of a different story. The redesigned waterfront will be a multi-functional public space. The former parking lot

under the highway will be turned into an exhibition plaza surrounded by several studios. Thus, it will not only diversify the social activities to the waterfront, but also become a focal point in Mobilian’s cultural life. Close to the river bank, the



City form with new development

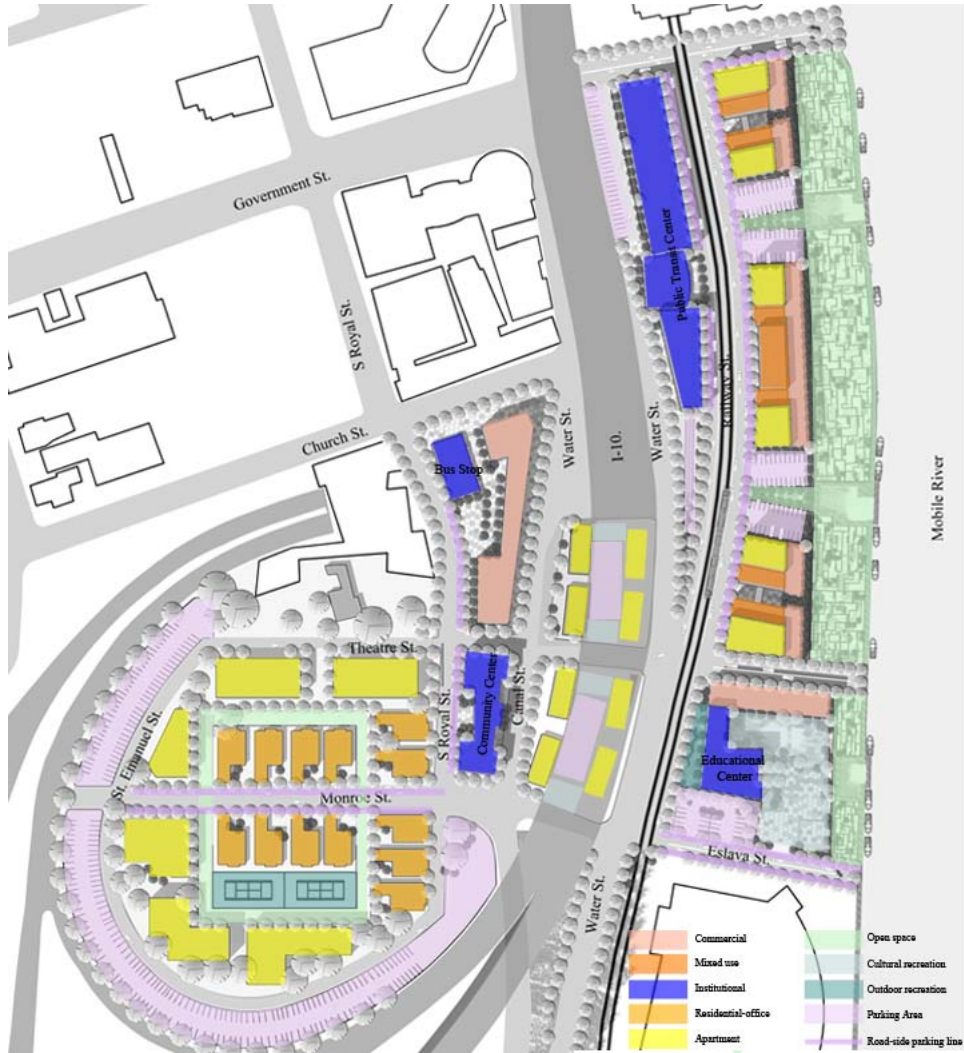


constructed wetland park will provide a natural ecological “reserved area” for Mobilians. Just as Washington, D.C proposed a new waterfront planning to bring the forgotten river back to the city, the waterfront in Mobile will also be planned to have the following strategies: restore, clean and active river; breaking down barriers; create a riverfront park system; celebrate cultural destinations; and strong waterfront neighborhoods. Besides five functions mentioned above, the redesigned waterfront will also have a food-prevention function, which will be discussed in detail in the following section.



Educational Center plan





Land-use in Design site

Free Bus Route



Mardi Gras Parade Route

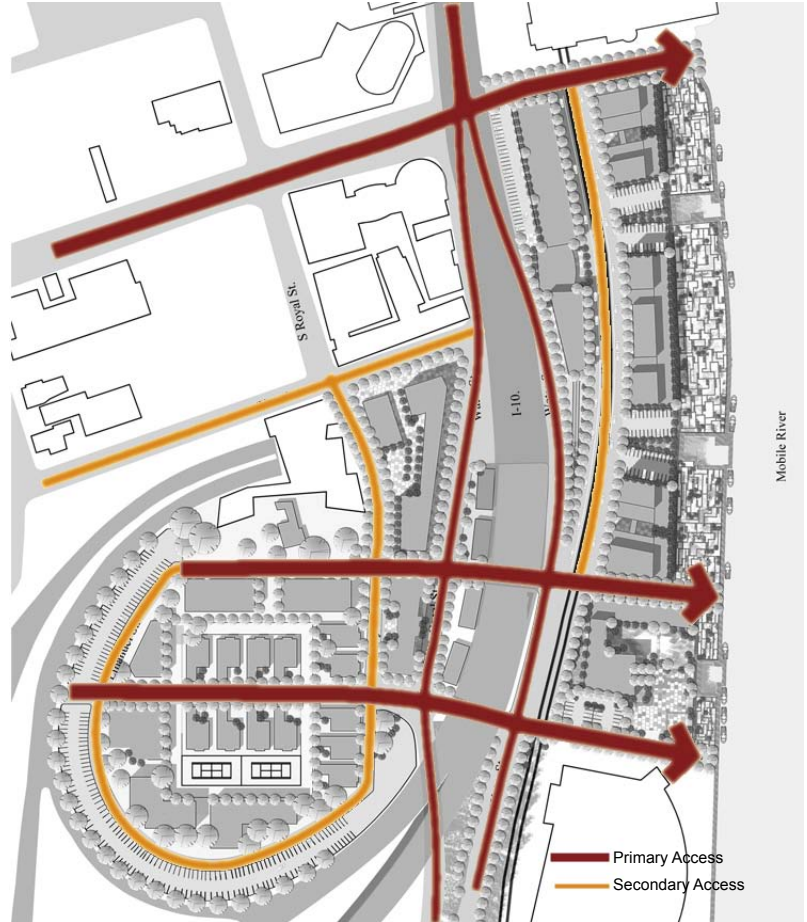


Bike route

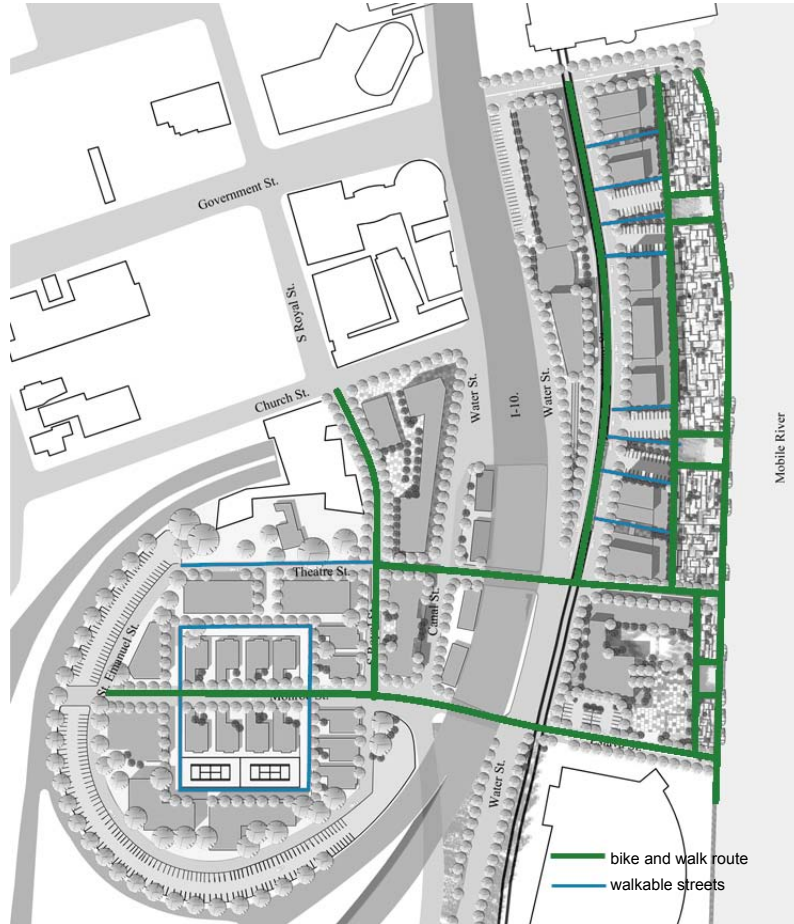


Existing Condition

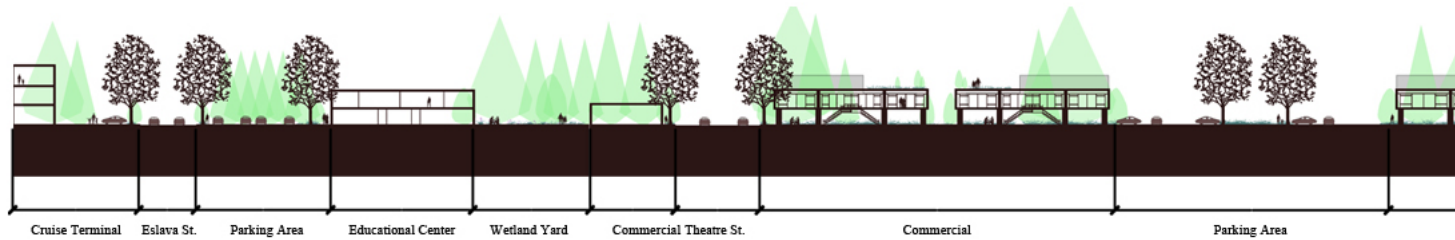
Proposed Public Transit



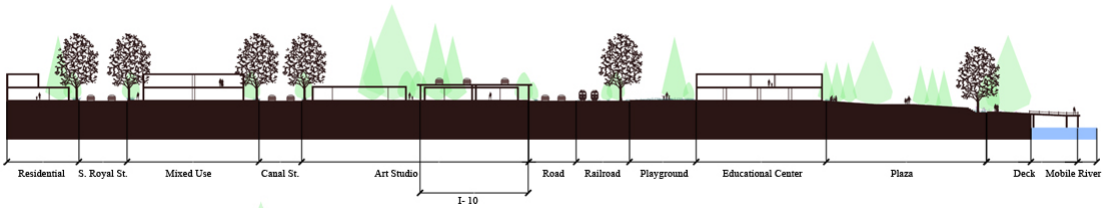
Transportation in plan



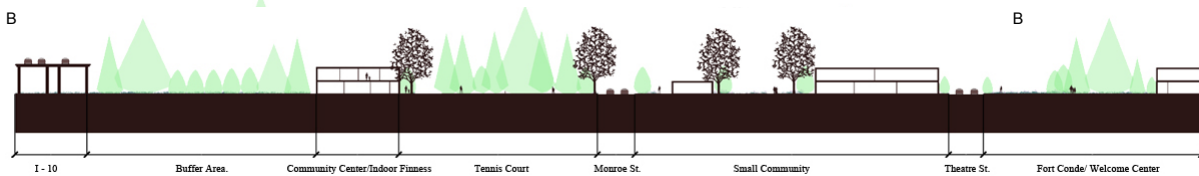
Transportation in plan



A

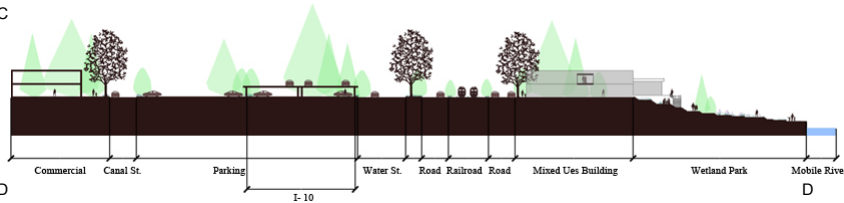


B



C

C

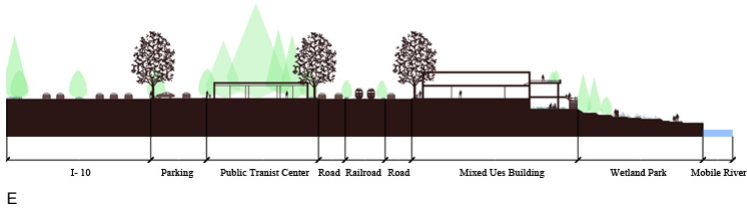
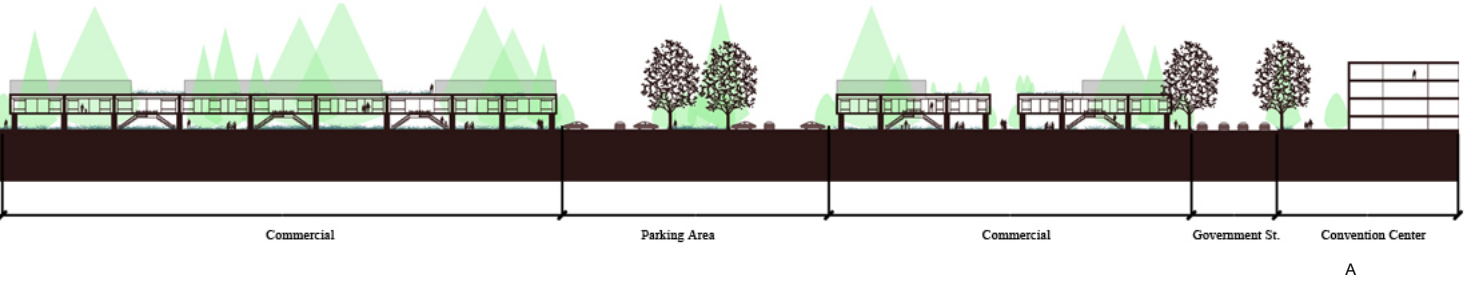


D

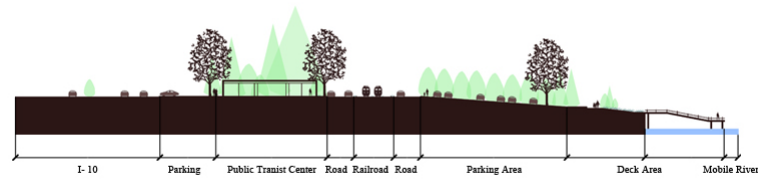
D

0 5 10 20 40Feet

Sections



E



F

F



E

Section 3. The Constructed Wetland Waterfront

In late twentieth century, ecological approach was recognized as a new method in the field of landscape design. Lawrence A. Baschar and Robert D. Brown in their article, “An Ecological Framework for the Planning, Design and Management of Urban River Greenways”, pointed out the importance and value of importing nature resources to urban development and relating ecosystem to the urban design (Baschar and Brown, 1995). In fact, ecologically based landscape design has been widely adapted in western countries. In 1992, the Royal Commission on the Future of Toronto’s Waterfront introduced “what was heralded as a new era of progressive, holistic, environmentally-based planning for Toronto’s Waterfront and the ecosystem of which it is a part” (Laidley,

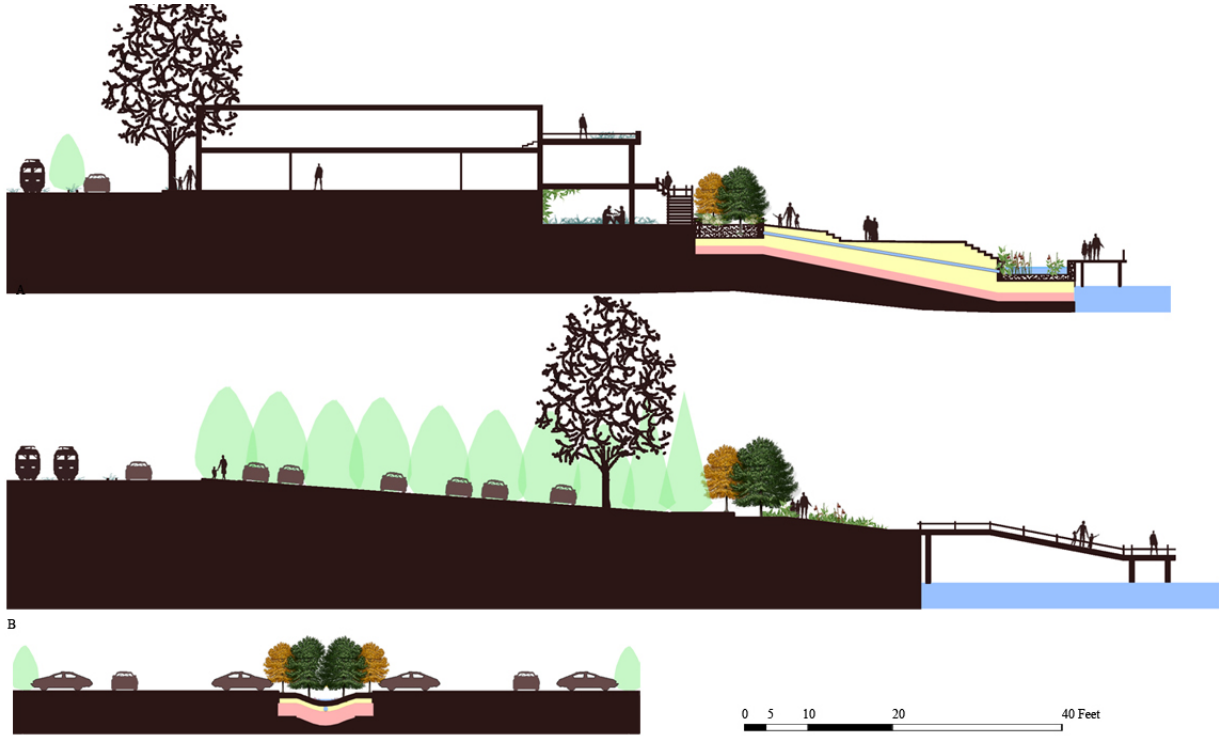


Constructed wetland waterfront park detailed plan

2006). Constructed wetland, as one of the important elements in ecological approach, is a specifically-designed land in urban design for its ability to filtering the water and protecting certain types of animal habitats in the ecosystem. For example, the Point Fraser Wetland in Perth, Western Australia, is designed within its urban context, purifying water and providing recreational use at the same time (Water: Design and Management, 2007).

In this project, an 8-acre constructed wetland based waterfront is designed in a functional yet “urban” way: for Mobile, a special array of wetland blocks in the waterfront are not only a water filter system to purify the waste water from both residential and Central Business District (CBD), but also a small reservoir which is able to

minimize the food damage to the city induced by the hurricane; for Mobilians, the waterfront will provide them a recreational resting area.



Sections in Wetland waterfront



Overview of the wetland waterfront



Perspectives of the wetland waterfront

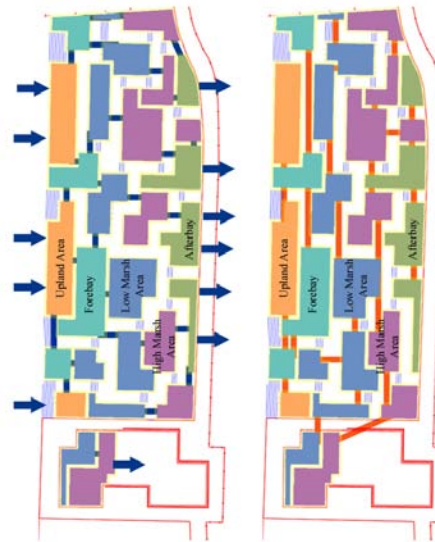


“Ecological-based Water Treatment Plant”

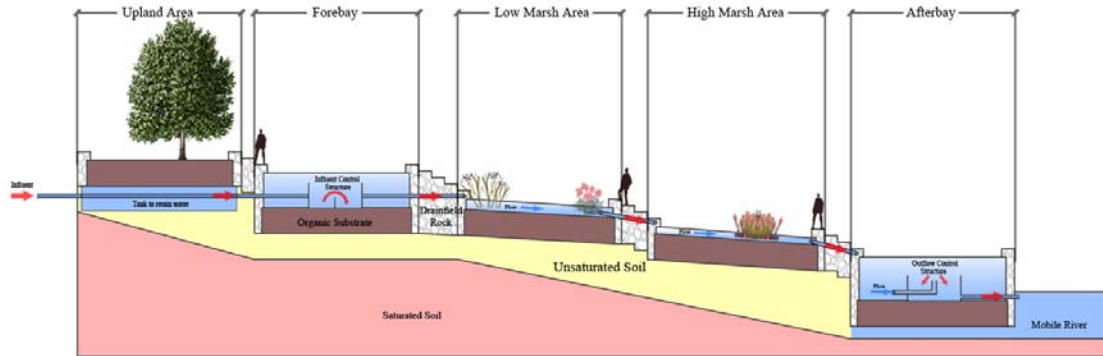
In this project, the wetland system will be connected to the drainage system in Mobile to purify the waste water coming from the city and thus avoid the pollution to the Mobile River. In this wetland system, the planting beds are classified to five phases: upland area; forebay area; low marsh area; high marsh area and afterbay area. Each of them has its own specific strength in treating the waste water. Therefore, the whole wetland system can be regarded as an additional natural water treatment plant in Mobile.

Function of Wetland Waterfront

Iteration



The water will filter from the city through the wetland to the Mobile River
 Each steps of the wetland bedings will be connected to each other;
 The same types of bedings will also link together



The water will be cleaned from the upperland area to the Afterbay. The Forebay area starts the function of the filtration, and the Low Marsh and High Marsh Areas have more plants. Each of the five steps have different treatments in the beddings to clean the pollutants. At the end of this system, the afterbay area is connected to Mobile River. The wetland waterfront is proposed as a self-sufficient system that enough water will applied from either the river or the city.

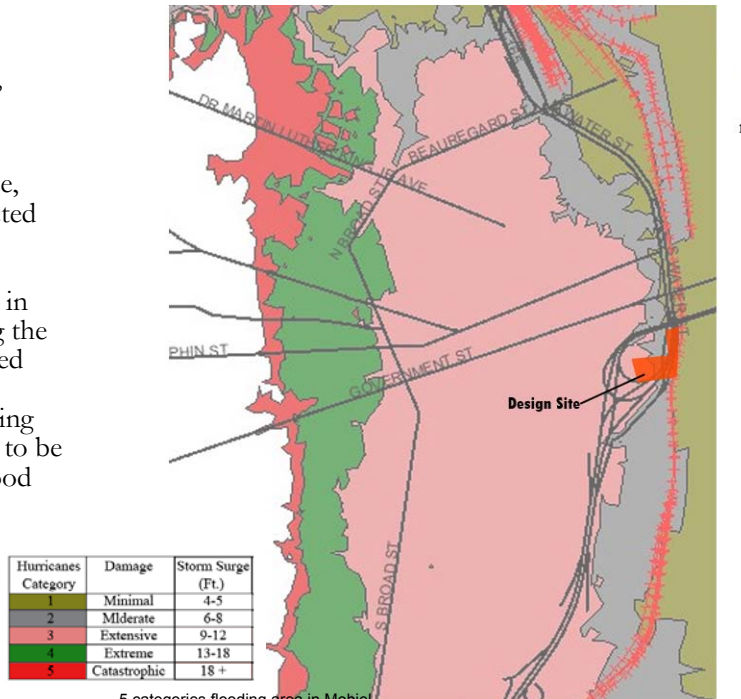
Suggested Wetland Plants

Upland Area	Low Marsh Area	High Marsh Area	Afterbay
Sycamore	Giant Bulrush	Flageo Marshhay Cordgrass	Halifax Maidencane
River Birch	Arrowhead	Was Myrtle	
Willow Oak	Pickereel Weed	Hibiscus	
May Haw	Canna Lily	Gulf Muhlenbergia	
Fetter Bush	Blue Flag Iris	Elephant Ear	
Button Bush			

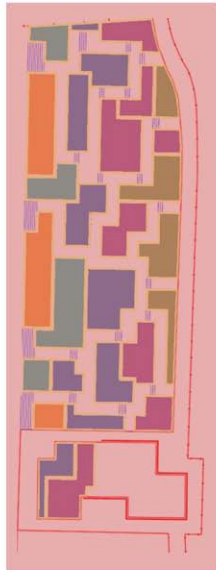
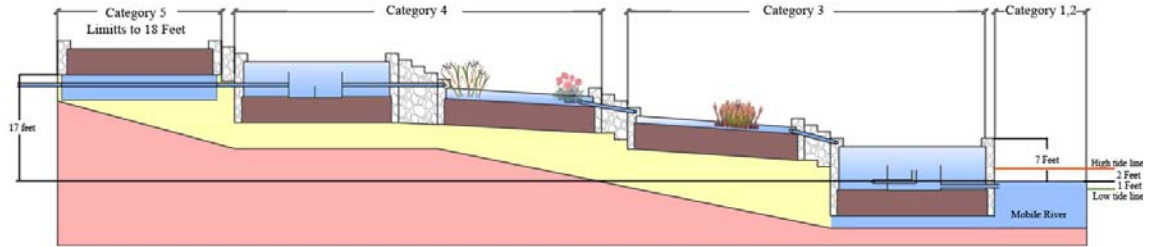
Capacity of containing Water:
 about 336,000 gallons for one part of wetland waterfront
 about 1,680,000 gallons of water for all wetland in design site

“Natural Flood-control Reservoir”

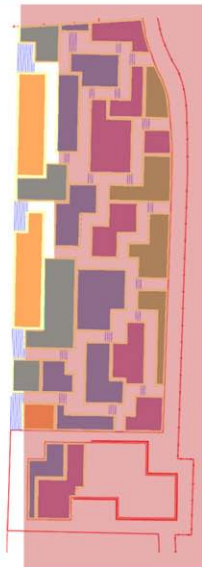
Since the wetland is reported to have an ability of water storage three times better than public space, it is reasonable to use the constructed wetland system as a nature barrier against floods. It is estimated that the designed constructed wetlands in waterfront is capable of protecting the city of Mobile from the flood caused by Hurricane Level 4. In all, the constructed wetlands and the parking lots in the waterfront are expected to be the first defensive line when the flood occurs.



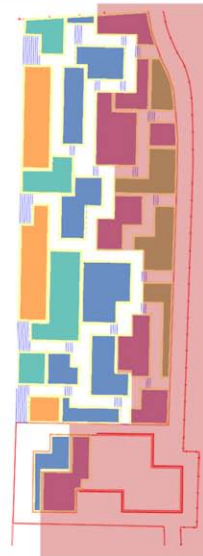
5 categories flooding area in Mobile



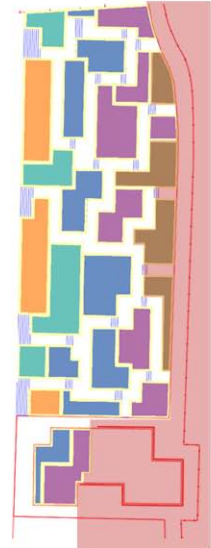
Category 5



Category 4

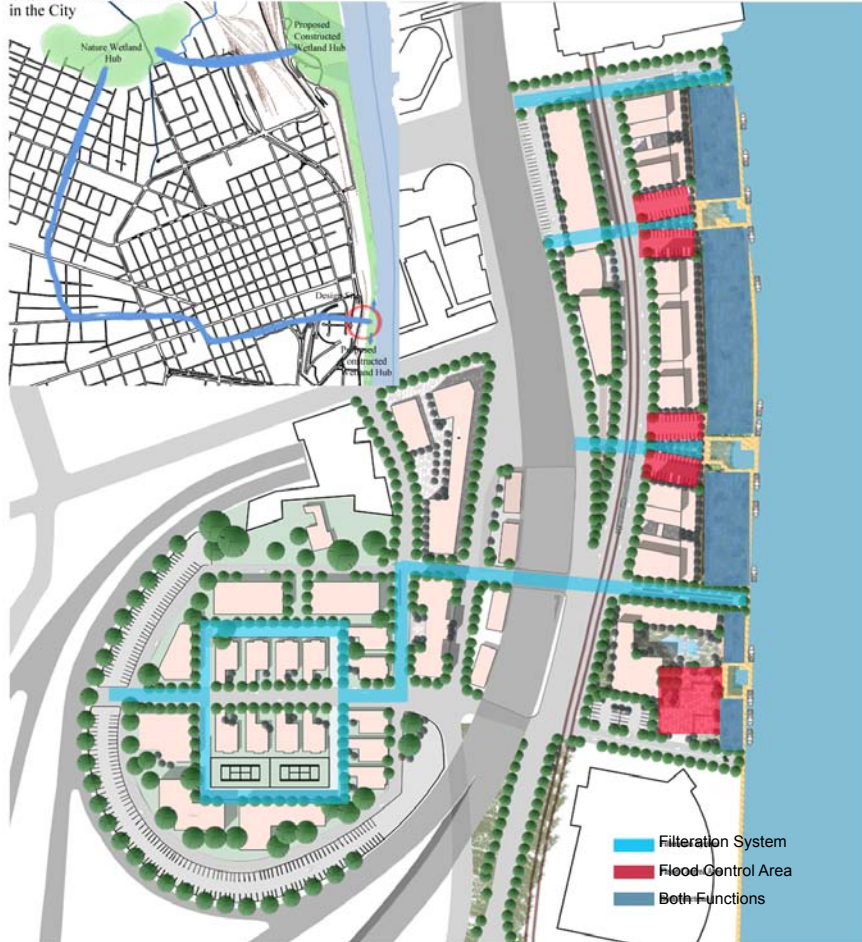


Category 3

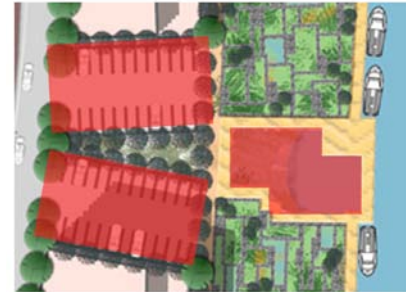


Category 1, 2

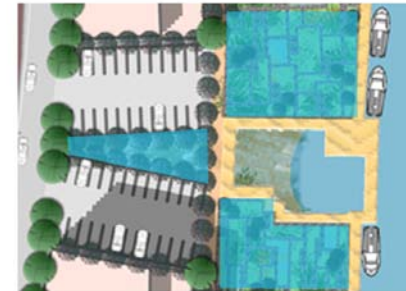
Proposed Ecological Network in the City



The ecological function of filtration and flood-control in the desing site



Flooding in parking area



Water return through wetland

“Recreational Park”

The constructed wetland waterfront park is also considered as an ecological public hub: people can enjoy the natural environment provided by the wetland plants; people can appreciate the scenic views of the Mobile River; etc. Actually, a popular and attractive waterfront park will not only increase the land value in the vicinity, but also urge the development of small business and retail commercials nearby.

Chapter 4 Reflections and Conclusions

Conclusively, the thesis project has achieved the expectation to create a productive public space and reconnect the waterfront to the city of Mobile. The new design successfully created a multi-functional constructed wetland waterfront. It can treat the waste water from the city; it can protect the city from floods; it can provide people a public space for social life. In fact, more river edges along the Mobile River are expected to use the same framework of the constructed wetlands to enhance the capability of water treatment and flood control. However, the maintenance of the wetlands will be difficult and costly in summer. Therefore, the budget cannot be neglected if the constructed wetland based waterfront concept will be applied to all the river edges in Mobile.

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