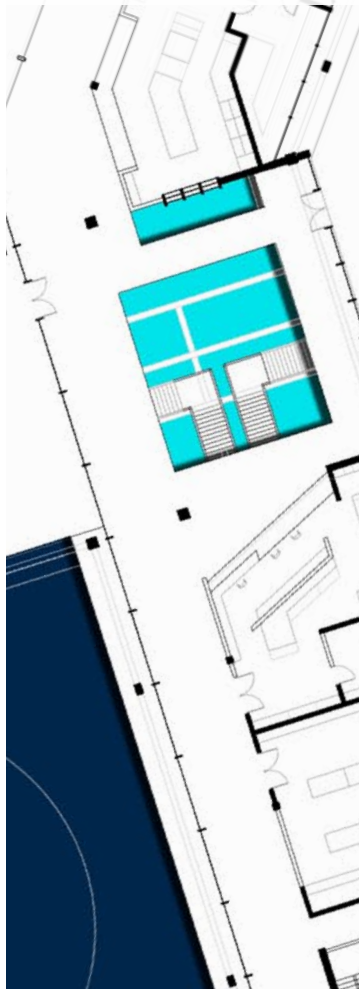
THE URBAN BAYOU

Balancing Natural Processes and Urban Development in New Orleans



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THESIS PROJECT
TU Delft

June 28, 2011

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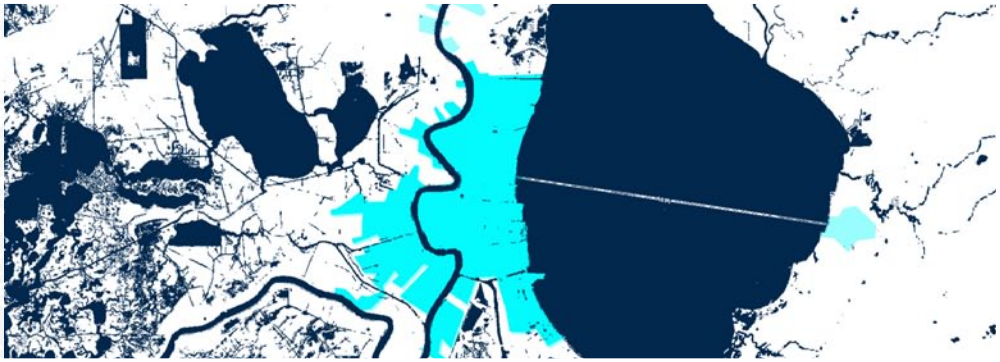

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PART 2 - URBANISM

PART 3 - ARCHITECTURE

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CONTEXT - Global Deltas

DELTAS IN DANGER

Over half of the world's 6.5 billion people live in densely populated delta areas, where major rivers meet seas and oceans (www.deltacompetition.com).

Due to their strategic locations, these regions are home to some of the largest cities and fastest growing economies. Not only are delta cities major hubs of trade and commerce, the lush landscape is home to the most biologically diverse and productive ecosystems in the world. These environments provide fertile soils excellent for agriculture as well as abundant fisheries for food.

However, the rich delta environment also poses difficult challenges for human settlement. The low-lying areas are highly susceptible to flooding from rivers, as well as storm surges and hurricanes from the sea. Problems of subsidence, erosion, and salt water intrusion pose additional challenges. The dynamic processes of the delta are a fragile system, and while they can provide rich opportunities, there are also considerable dangers.

MAN VS NATURE

Historically, people did not have the knowledge or technology to alter the delta landscape to suit their needs; instead people had to adapt to the dynamic conditions of the delta if they wanted to live there.

However, over the past 150 years, man has slowly acquired the ability to control the natural landscape to suit his needs. Rivers were tamed and floods were restricted by creating dikes and dams. Rivers were straightened and canals were dug to best utilize and control the difficult delta environment. While these methods have increased developable land, a sense of safety, and agricultural and energy output from the delta, it has been at a great cost.

Global Deltas

Source: By Author

Delta Landscape

Source: www.alaska-in-pictures.com

Industrial & Economic Engines

Source: By Author

CONTEXT - Global Deltas

River Dam

Source: www.pineedge.com

Drainage Culvert

Source: Book, Dutch Dialogues

Flooding in Jarkata, Ciliwung Delta

Source: Deltares Magazine, Deltas Around the World

Hurricane

Source: www. yahyasheikho786.files.wordpress.com

The natural processes and functions of these constantly changing, rich and diverse environments are being hindered and destroyed. Not only is this damaging critical habitat for unique flora and fauna, the long term sustainability and safety of the delta is also being impaired. Ecological processes such as sedimentation and land creation have greatly decreased, leading to erosion and a significant decrease in wetlands, marshes, and swamps, all of which provide a buffer from storm surges and protect inland areas.

CHALLENGES & SOLUTIONS

Evidence suggests that climate change has begun and will continue to create more extreme hydrological conditions: rising sea levels, increased rainfall, longer droughts, and stronger storms. Due to the deltas' precarious existence on the edge of both sea and land, all of these consequences of climate change will have an even greater impact on both the environment and inhabitants of these regions.

A new approach to management of environmentally sensitive areas and urban development within them is needed. This approach cannot rely solely on technical solutions to fight against and control the delta environment, but must utilize the natural processes for the safety and sustainability of both the delta and its inhabitants. Often called a "systems-based approach" or "working with nature," this new mindset provides an alternative to simply building stronger dams, higher dikes, and larger surge barriers. Instead, a clear understanding of geomorphologic and ecological processes provide the basis for "soft solutions" that allow urban development to be compatible with – or even contribute to – the existing natural context of the delta environment.

THE MISSISSIPPI RIVER - Drainage Basin and River Structure

In Native American languages, the name Mississippi literally means big water: “misi,” big, “sipi,” water; and the river easily lives up to its name (Deltares 2009, p. 70). The Mississippi River drains approximately 41 percent of the continental United States and a small area of two Canadian provinces, totaling an area of roughly 3.2 million square kilometers (Rogers et al. 2006, p. 3.1). This vast drainage basin is the fourth largest in the world, exceeded only by the Amazon, Congo and Nile basins. The Mississippi River is the third longest in the world at 3,730 km, again only surpassed by the Amazon and the Nile Rivers (Gupta 2007, p. 145).

The true Mississippi begins in the forests and hills of Minnesota as a clear and fresh stream, but the majority of its water comes from tributary rivers.

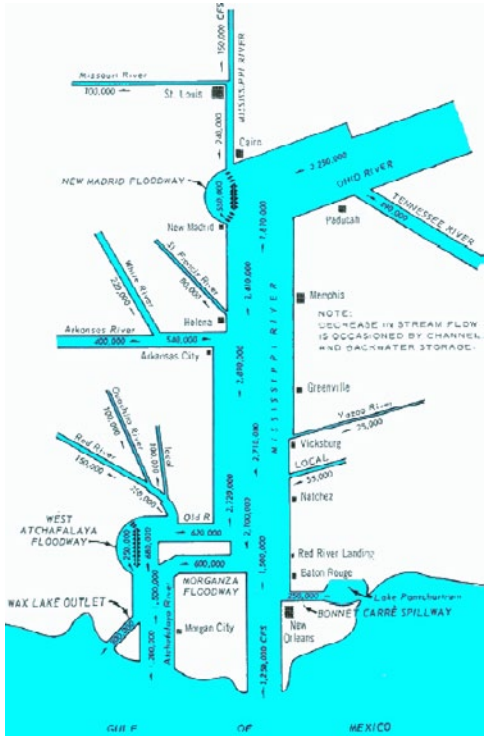
Far-reaching tributaries to the west, such as the Missouri and Arkansas Rivers, bring snowmelt from high in the Rocky Mountains. The Missouri, which flows through large areas of plains and grasslands, adds the vast majority of suspended sediment to the river.

But it isn’t until the Ohio River merges with the Mississippi that the river reaches its full size and strength. Contributing 43 percent of the overall output of the Mississippi, the Ohio River nearly doubles its total size (Gupta 2007, p. 145).

In total the discharge of the Mississippi River accounts for 90 percent of the freshwater flow entering the Gulf of Mexico (Deltares 2009, p. 69). Within the lower Mississippi Valley, the river often reaches widths of 2 km across and 60 meters in depth (Meyer et al. 2009, p. 44).

Mississippi Drainage Basin in the USA

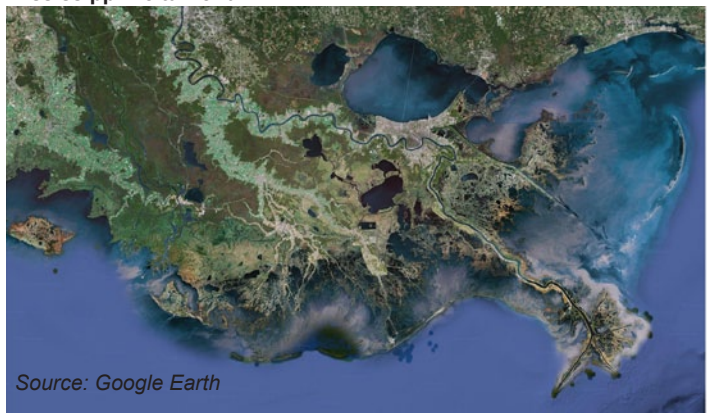
River Flow & Tributary Structure



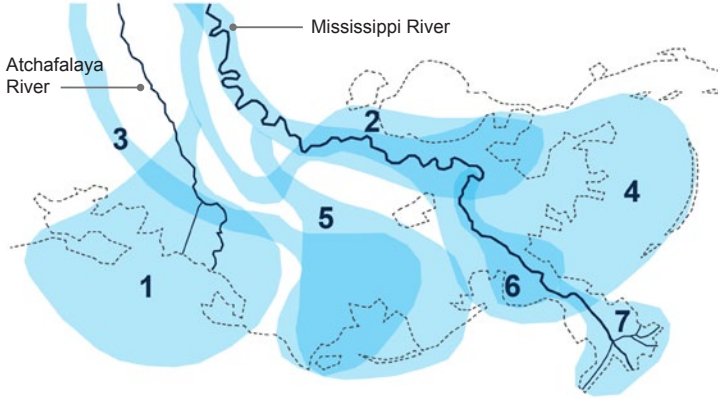
Source: LSU Lecture, Rogers

THE MISSISSIPPI DELTA - Delta Lobes and Wetlands

Mississippi Delta Aerial



Historical Delta Lobes



Approximate age of discernible Mississippi River deltas

Delta	Years before present: 5000	4000	3000	2000	1000	0
1 Salé Cypremort						
2 Cocodrie						
3 Teche						
4 St. Bernard Metairie Barataria-La Loutre						
5 Lafourche						
6 Plaquemines	Length of line indicates the approximate duration of significant flow.					
7 Balize						

Source: Journal, Technology in Science

Wetlands - Flora & Fauna

The Mississippi Delta is a classic river delta; the powerful river is the dominant force in the delta, not waves or tides from the sea. This means historically the delta has been creating large amounts of land and growing into the Gulf of Mexico. The delta is the result of large quantities of sedimentary deposit over the past 6,000 years. Over time, as the river changes its course always finding the easiest and most direct route to the sea, various delta lobes are created. There are seven major depositional lobes recognizable within the delta today, each contributing to the form and composition of the delta.

The current lobe being built is the Belize, or Birdfoot lobe (#7), primarily the result of human intervention within the river and the creation of jetties in 1870 to increase velocity and create a better channel for ship navigation. However, as the current channel extends far out into the sea, currents and deeper water are washing away sediment and limiting new land creation.

Human engineering measures have further impacted the creation of lobes and river morphology. In 1951, geologist Harold Fisk predicted that sometime in the 1970's the Mississippi River would switch its main course to a major branch, the Atchafalaya River. This would have doomed the Port of New Orleans and potentially the city itself, so the US Army Corps of Engineers in the late 1950's built a regulating dam at the river junction which controls the amount of flow into the Atchafalaya, which is currently about 30 percent of the total river (Sparks 2006, p. 34).

The current delta contains major and minor river channels, bayous, swamps, marshes, lakes, tidal flats, and barrier islands. There is a gradual gradient from salt water to fresh water, producing ideal conditions and habitat for diverse species of flora and fauna. This environment creates one of the most diverse fisheries in the world; at least 183 species of freshwater fish live in the delta, including shellfish, oysters, mussels, clams, etc. The current area of the delta is roughly 25,000 km2, including 5,000 km2 of wetlands (Deltares 2009, p. 69).

NEW ORLEANS - Culture & Character

New Orleans is a one-of-a-kind city. It is the result of 300 years of different cultures mixing and growing together. The city was first settled by French explorers, followed by the Spanish, and later waves of French Canadians came south. In addition, at an important position in the global slave trade, a large African population was also brought to the city. Further, it's proximity to the Caribbean brought Latin styles as well. Waves of other immigrants from Europe and beyond further contributed to the city's diverse demographics.

These conditions have resulted in numerous cultural creations unique to the city and region. Cajun food gets its origins from the delta, using seafood and other local ingredients to create a new style in cooking. Difficult conditions in the delta, especially for African Americans, also spurred the creation of a new type of music: blues. In addition, New Orleans is responsible for the birth of jazz, as well as the distantly local zydaco music which combines French and southern styles. During Mardi Gras and other festivals of strong historic tradition, the city's true spirit and energy comes alive.

This melting pot of different cultures and people has created a unique and special character within New Orleans that is like nowhere else in the United States and even rare in the world, making this city very worth preserving.

The French Quarter & City Character



Music & Festivals



Food & Lifestyle



NEW ORLEANS - Culture & Character













PROBLEM STATEMENT

DELTA SCALE

Human interventions (such as dams, dikes, canals, etc.) have disrupted the natural processes within the Mississippi Delta. Historic and current water management practices and urban development have resulted in significant environmental damage (wetland erosion, land loss and soil subsidence) which is not only harming the fragile delta ecosystem, but also increasing flood risk. The consequences of these human interventions within the ecological system jeopardize not only the future sustainability of the delta environment, but its inhabitants as well.

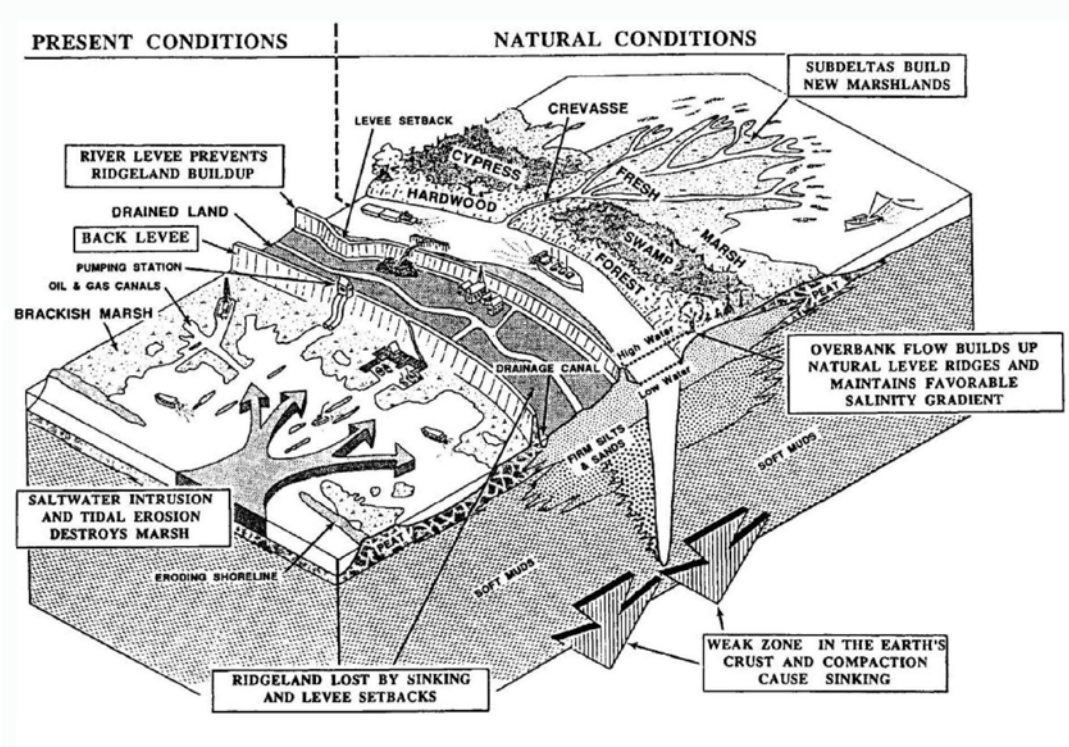
CITY SCALE

In New Orleans problems also stem from a disregard for the natural processes and constraints of life within a delta landscape. New Orleans suffers an identity crisis; it is built like any other American city. Canals and water are hidden underground or behind tall walls. The relationship between city and water has been disconnected; there is no recognition or embracing of the fact that it is a delta city in a unique location and environment.

As a result of this weakened connection between city and water, there are major water management issues, both for large scale hurricanes (100 year events) and smaller peak rain flood events (several times a year). While defense from hurricanes requires also regional measures, both issues can be addressed at the city scale.

Further, due to significant damage from Hurricane Katrina, there is a serious lack of basic services and amenities in many newer New Orleans neighborhoods. Residents have begun to move back and rebuild, but key community facilities, such as shopping centers, restaurants and grocery stores, are still lacking. There is a need to reconnect and reinvigorate community life.

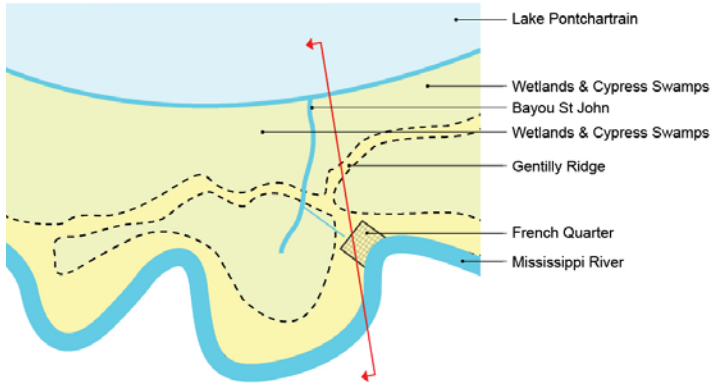
Summary of Problems

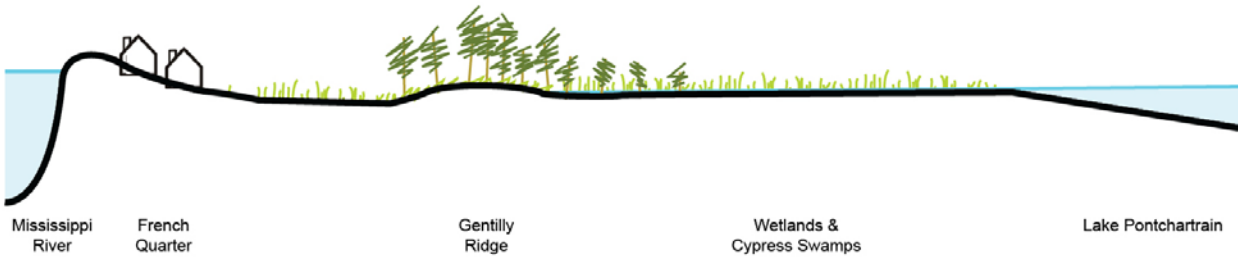


Source: Dutch Dialogues Presentation, Waggonner

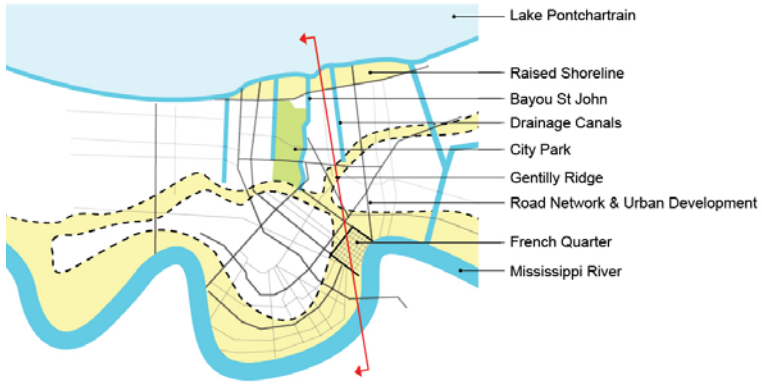
SUMMARY OF PROBLEMS

Historical Conditions





Current Conditions



Based on: Dutch Diaglogues III, 2010

METHODOLOGY

The general methodology of the project uses both a literature review and layer analysis to form a strong underpinning for both understanding the context of the location as well as a clear theorhetical viewpoint to guide design solutions.

LITERATURE REVIEW

Theories & Approaches to Ecologically Oriented Planning & Design

1) Building with Nature
2) Living with Water
3) (Soft) System-Based Approach
4) The Layer Model

In recent years there has been a radical shift in philosophies and theories related to how man and the environment interact. Historically, it has been man's only desire to fully conquer and control nature. Recently however, it is being realized that this approach is detrimental not only to the environment, but to human life as well. It is with this awareness that new theories such as "building with nature," "living with water" and "system-based approaches" have been created.

Generally, these theories advocate the same philosophy: human interventions should reinforce, not restrict, natural processes (Meyer et al. 2009, p. 21). This is achieved by providing space and allowing environmental processes to flourish, along with the notion that these ecological processes can also create the framework to ensure sustainable development. This integrated approach aims to combine urbanization with ecology to create holistic solutions.

(See Page 156 for Literature Review & Theory Essay)

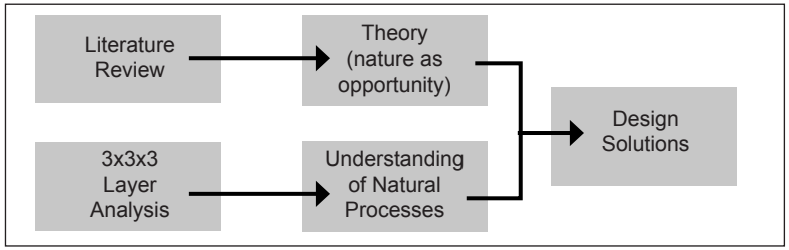
Literature Review

McHarg, 1967

Swaffield, 2002

Deltacommittee, 2008


Room for the River , 2006



THE LAYER APPROACH

Layers within the built environment make up our world and these layers are operating both at different scales as well as through time. These various layers will be used to study the situation of both the natural and built environments. The layers will be pulled apart, studied separately, put back together and studied again, with the intention to understand how the different layers interact and influence one another. Not only does the landscape influence urban development, but urban development also manipulates the landscape. Also, the regional structure clearly influences cities, neighborhoods and buildings, but how do buildings influence the region?

The final aim is to gain an understanding of the structure of all layers of both environments and scales, how various layers within each interact and contribute to the form and function of one another and the overall whole. This will lead to the knowledge that certain interventions at particular layers of the environment and at certain scales will have specific effects upon the overall system. Once this is understood, key interventions at precise locations and scales can have the desired effect on the total structure of the natural and built environments.

Layer Analysis

Layers of Environment (The Layer Model):

1) Ground Layer (Landscape / Geology)
2) Network Layer (Infrastructure)
3) Occupation Layer (Built Form / Spatial Patterns)

Layers of Scale

1) Regional (Delta)
2) Metropolitan (New Orleans)
3) Neighborhood
4) Block
5) Building

Layers of Time

1) Past
2) Present
3) Future (Design)

Layers of Scales

Source: Google Earth

PROJECT AIMS

Designing with the River

Source: www.hamburgtours.files.wordpress.com

Living with Water: Floating Houses

Source: www.koontuch.multiply.com

Wetland Erosion

Source: http://ian.umces.edu/

Healthy Cypress Forest

Source: www.kimanddennis.com

Hurricane Katrina Flooding

Source: http://ian.umces.edu/

Living with Water

Source: www.molon.de

NATURE AS OPPORTUNITY

The aim of this project is to show that natural processes, water management, and urban development can be compatible, through the example of the Mississippi Delta and the city of New Orleans. The project will explore how approaches such as “living with water” and “building with nature” can be applied within the Mississippi Delta. These principles will guide spatial strategies and designs for new urban forms and architectural solutions to the social and environmental challenges of dynamic delta landscapes.

ANALYSIS & RESEARCH:

- Understand the geomorphologic and ecological processes that historically took place in the delta.
- Uncover how the spatial development of New Orleans has evolved over time in relation to natural processes. Understand how the connection between city and water has been lost.

DESIGN CITY SCALE:

- Use natural drainage processes as a model for water management.
- Combine historic water management systems within the city and natural processes to create a new water management strategy. Find a harmony between the spatial structure of the city and water systems.

DESIGN NEIGHBORHOOD SCALE:

- Locate a strategic place within the city that can provide opportunities for water management, community development and urban renewal.
- Provide needed amenities and services for the existing neighborhood.
- Create a pilot project neighborhood that will showcase the potentials of living with water; this approach can then be repeated throughout the city.

DESIGN BUILDING SCALE:

- Create a building that provides the local community with a center for cultural activities: educational, social and recreational.
- Create a building that can adapt to dynamic water levels, display and educate the public about life within a delta landscape.

RESEARCH QUESTIONS

The following questions not only brought on the need for the research and design of this project, but also guided its course throughout the process.

MAIN RESEARCH QUESTION:

How can the diverse ecology and unique natural dynamics of the Mississippi River Delta environment be restored and integrated with new and existing urban development?

SUB RESEARCH QUESTIONS:

Theory

1) What are the core principles and beliefs behind such theories as “living with water” and “building with nature”?
2) What is the relationship between the theoretical analysis and its application through recent planning and policy documents?
3) How will these theories materialize in urban form when applied to ecological restoration, urban design and architecture?

Ecology

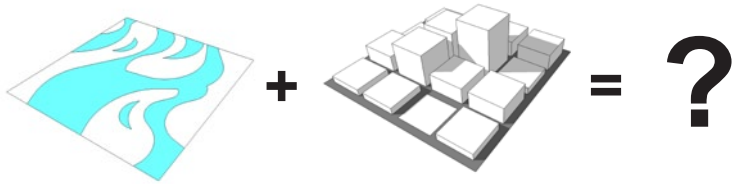
1) How did the Mississippi Delta function historically as an ecological system?
2) What human interventions and water management strategies have negatively impacted these landscape processes and why?
3) What measures can be taken to restore the delta back to its original diverse and productive ecosystem?

Urbanism

1) How can cities address the issues of climate change and prepare for future conditions?
2) How can cities incorporate more space for water within an existing urban structure?
3) How can urban forms be flexible and adapt to an ever-changing environment and shifting water levels?
4) How can an infill development contribute to an existing neighborhood culture and provide needed amenities while also showing new ways of living with water?
5) How can urban planning and design contribute to architecture and vice versa?

Architecture

1) How can a building contribute to and acknowledge its larger urban context and place within the delta landscape?
2) How can a building contribute to flood defense strategies?
3) How can architecture deal with more water and use / recycle excess water effectively within the building?
4) How can a building be flexible, adapt to changing conditions, highlight fluctuating water levels, and showcase the potentials of living with water?
5) What does a community cultural center mean to this city within a particular neighborhood context?
6) What type of building form and program can contribute to the identity of an existing community and provide a place for neighbors to interact and gather?



DISCIPLINES INVOLVED

ARCHITECTURE + URBANISM

Stronger than the sum of its parts

This thesis project will encompass numerous disciplines throughout the process of research and design. Unlike most single-discipline thesis projects at TU Delft Faculty of Architecture, The Urban Bayou will put considerable focus on both architecture and urbanism. The advantages of this approach are many. Complex problems such as life within a delta environment require understanding at a variety of scales. It is important to realize how decisions at one scale will affect both larger and smaller scales as well. A stronger architectural design will come from knowledge of how a building fits into and contributes to the larger system. This understanding of context will create more than just an object. Further, an understanding of architectural opportunities will increase the success of an urban plan. The relation between urbanism and architecture is complicated, but by looking at the big picture and taking all disciplines into account, the final outcome will always be stronger.

The process to achieve a symbiotic relationship between both architecture and urbanism is challenging. Instead of strictly a top-down approach where urban strategy goals dictate architecture, the approach should go both ways. Early on, architectural opportunities should be carefully studied so as to contribute to and influence decisions at the urban scales. In addition, research and design should always relate to both disciplines, and constantly keep the relation between both in mind. This process of looking at the problem from both large and small scales, as well as going back and forth between disciplines, will create holistic and successful solutions.

A↔U

Additional disiplines involved:

Spatial Planning & Strategy
Metropolitan and Regional Design
Urban Design
Architecture
Civil Engineering
Ecology / Environmental Design
Landscape Architecture

RELEVANCE

SOCIETAL

The past 150 years of industrial development have caused immense environmental damage, especially to delta landscapes. Half of the world population lives in delta regions that are under increasing threats, all of which are under further pressure from global warming. Major changes need to take place as to how society and the natural environment interact. There is now an opportunity to re-evaluate society's place in the natural world and create a new harmonious relationship that builds on ecological processes to improve both society and the environment. The city of New Orleans faces similar challenges to many other delta cities. It can provide a place to test new theories and methods for living with water in a delta landscape.

SCIENTIFIC

Much study has been done into delta environments, and the ecology and water issues present. The consequences of various human interventions, such as dams, dikes, and canals, are generally understood. However, little connection has been made between this scientific data and issues of urban development and architecture. It is important that our existing vast scientific, environmental, and ecological knowledge influence the future path of urbanization.

This project will contribute to the current philosophies of "working with nature" and "living with water." Recently in both The Netherlands and abroad, these strategies have been receiving increased attention as the Dutch are re-examining how their country interacts with water. While there is a general consensus that these new approaches provide the proper direction to guide future growth and development, little has been shown as to how urban environments will physically look and function, and what these policies mean for cities, buildings, and people. This project will provide the opportunity to explore these strategies within the Mississippi Delta and lead to physical design solutions that will help to elaborate and explain what "living with water" actually means.

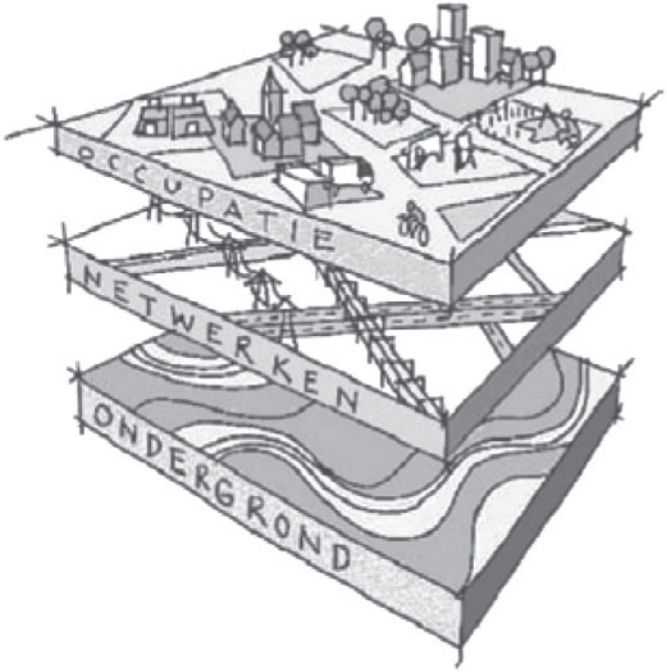
3x3x3 LAYER ANALYSIS: Process & Purpose

The Layer Model (www.ruimtexmilieu.nl) is a conceptual model for analysis and integrated planning and design. The model distinguishes between three different physical layers, and not only do these layers influence and interact with each other, they also operate on different scales of time. The first layer consists of the ground layer, generally large scale natural processes including the underlying geological conditions and landscape. Elements such as soil, groundwater, surface water, flora and fauna make up this layer. The second layer consists of all man-made infrastructural networks including roads, railroads, utilities, pipelines, waterways, dikes, etc. The third layer is the occupied or built layer, consisting of spatial patterns related to human use, such as housing, offices, cultural and recreational functions (Adriaanse & Blauw 2008 p. 4). In the complexity of this dynamic system lies the strength of the layer model; being able to study and understand each layer independently allows for a better understanding of the whole.

In addition to the layers of environment, it will be equally important to distinguish and work among various layers of scale. Scales range from the regional down to the building scale and it will be crucial to understand how these scales relate to and influence each other.

Furthermore, layers of time will be part of the equation. There is much to learn by studying past conditions. Comparing the past to the current situation brings and awareness and appreciation of what changes occurred and why. This understanding will also contribute to a vision and design for the future.

The Layer Model



Souce: www.ruimtexmilieu.nl

3x3x3 LAYER ANALYSIS: Summary

DELTA SCALE

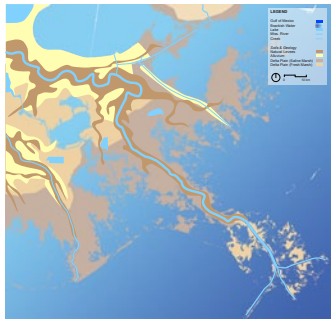
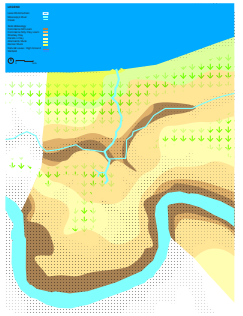
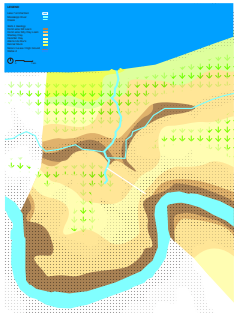
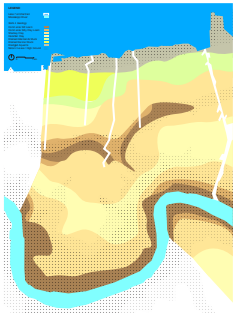
1700 | 1900 | 2010

CITY SCALE

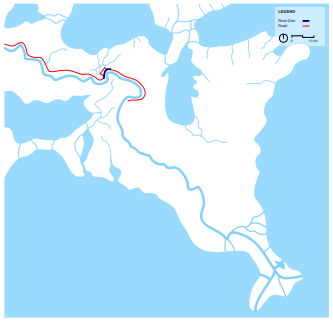
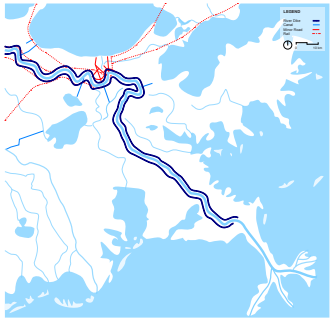
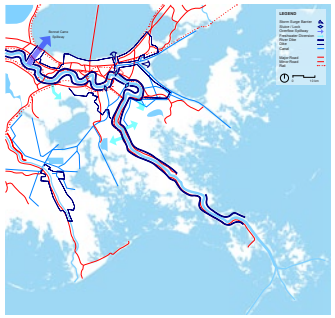
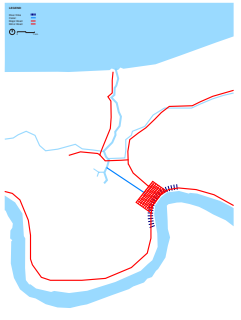
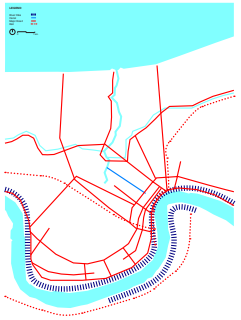
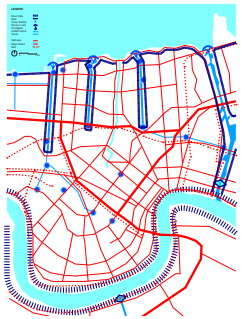
1722 | 1855 | 2010

Landscape

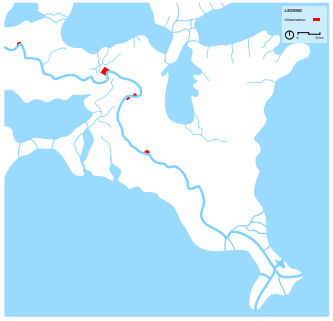
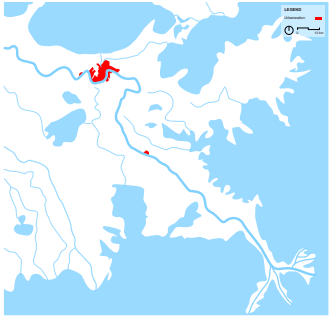
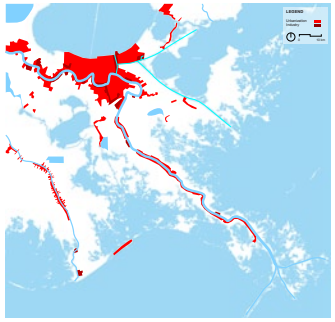


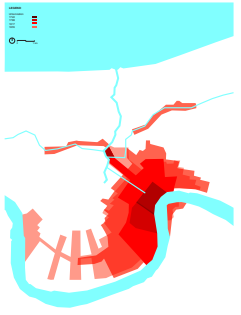
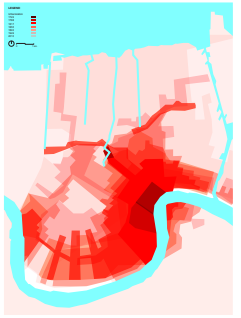





Infrastructure

Occupation

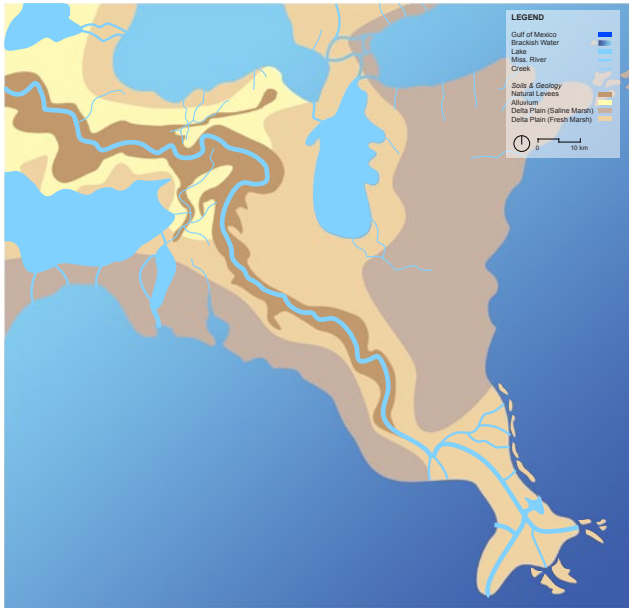



Mississippi River

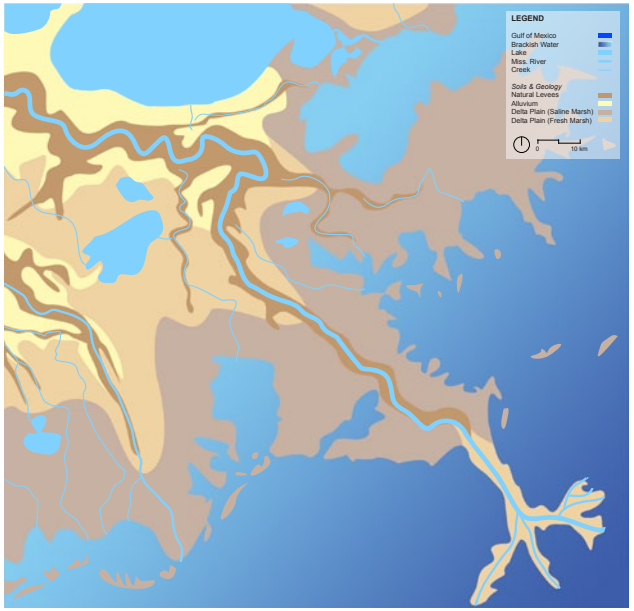
3x3x3 ANALYSIS: Landscape Layer

DELTA SCALE

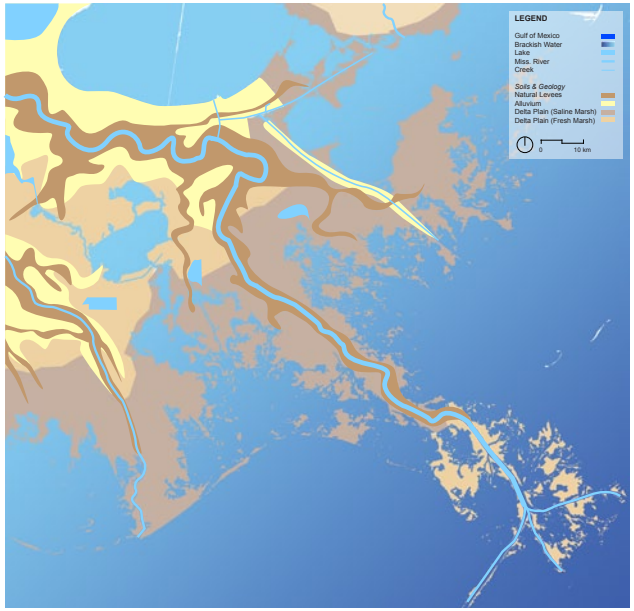
1700



1900



2010



LEGEND

Gulf of Mexico
Brackish Water
Lake
Miss. River
Creek

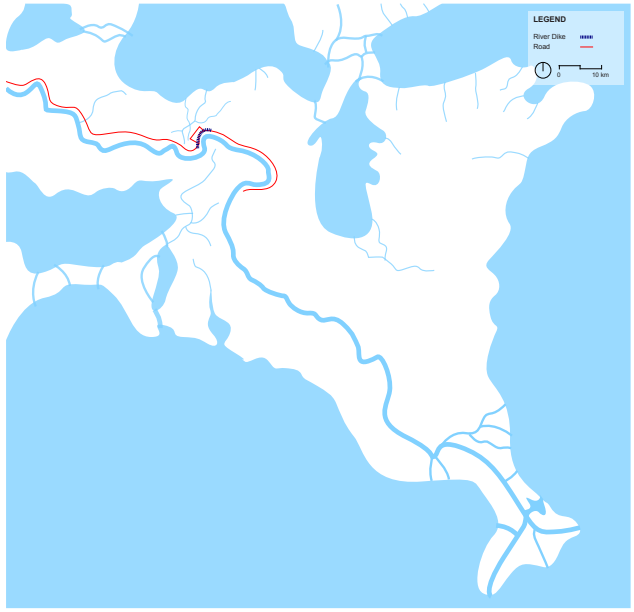
Soils & Geology
Natural Levees
Alluvium
Delta Plain (Saline Marsh)
Delta Plain (Fresh Marsh)
Reclaimed Land

The landscape of the delta is composed of a variety of environments based on the type of water and soil types. There are salt water marshes, brackish swamps, and also freshwater dominated landscapes; each with their own unique vegetation. Soil types are influenced by both vegetation growth as well as mainly sediment deposits from the river.

3x3x3 ANALYSIS: Infrastructure Layer

DELTA SCALE

1700



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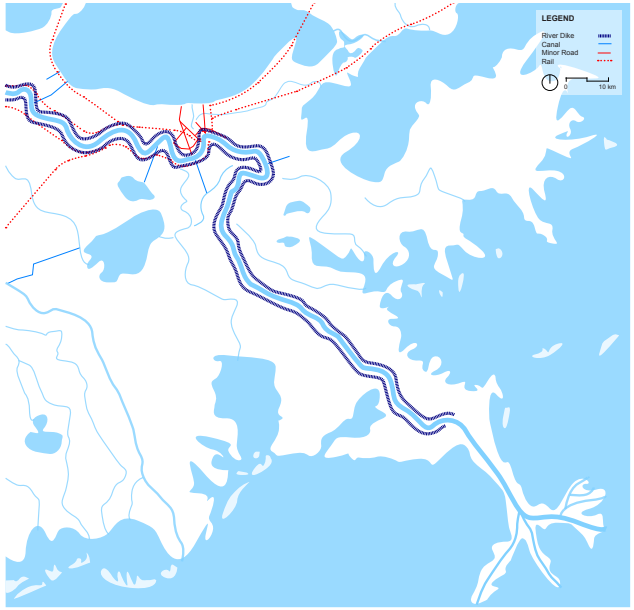

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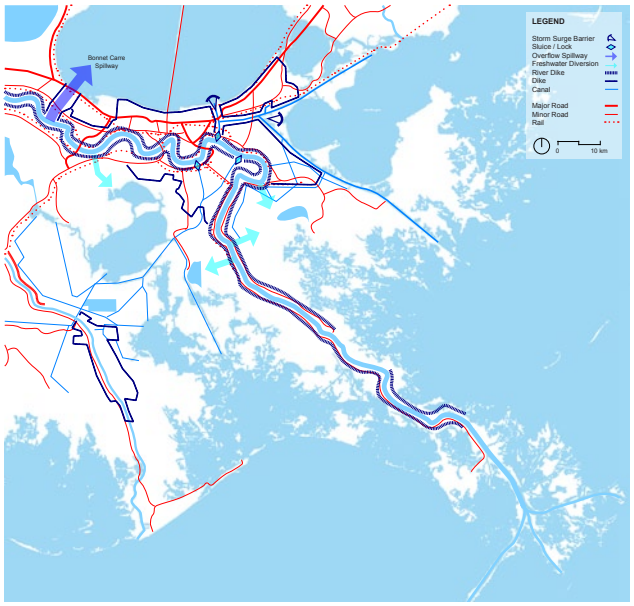


LEGEND

Storm Surge Barrier
Sluice / Lock
Overflow Spillway
Freshwater Diversion
River Dike
Dike
Canal

Major Road
Minor Road
Rail

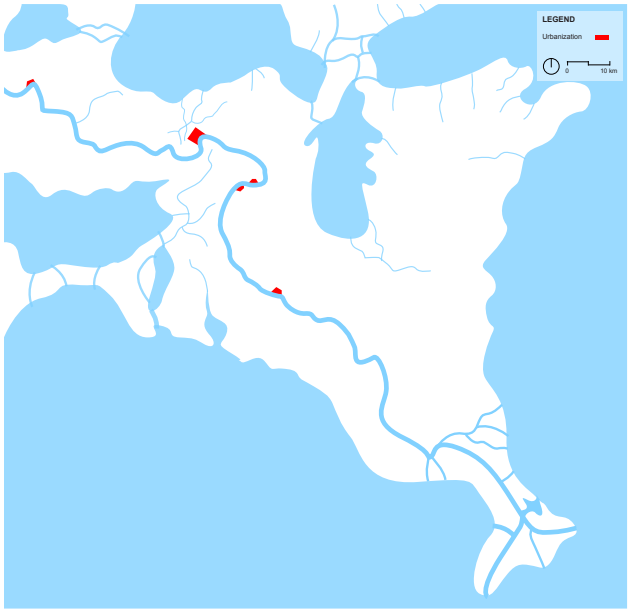
An extensive network of transportation has grown within the delta over the years. First, primarily railroads were the dominate mode of transport, along with only minor roads. More recently major highways have come along. In addition, extensive gas and oil extraction has been taking place in and around the delta. To make mining accessibility easier, thousands of canals have been dredged through the soft vulnerable soils of the delta, increasing erosion and land loss. Most transportation infrastructure follows the rivers and natural levees, which provide higher ground and increased safety from the water.

Along with transportation infrastructure, there is an extensive network of flood management structures. This primarily includes large dikes which line almost all of the major rivers. In addition to the levee system, numerous overflow and spillway structures have been installed to further control the river during times of flooding.

3x3x3 ANALYSIS: Occupation Layer

DELTA SCALE

1700



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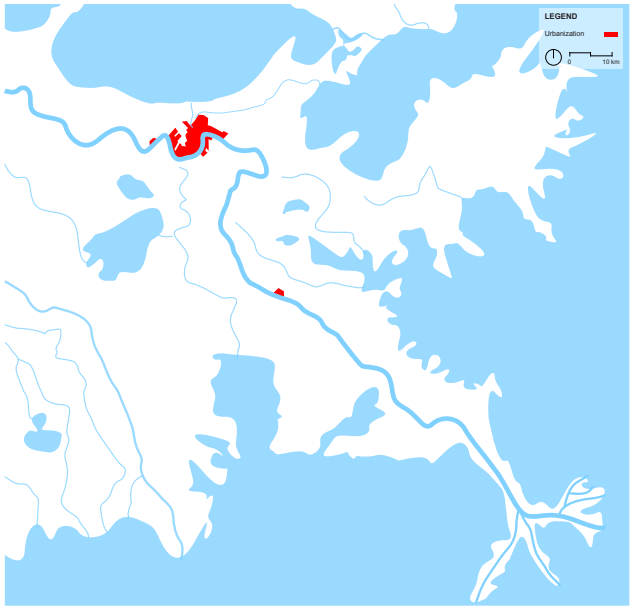

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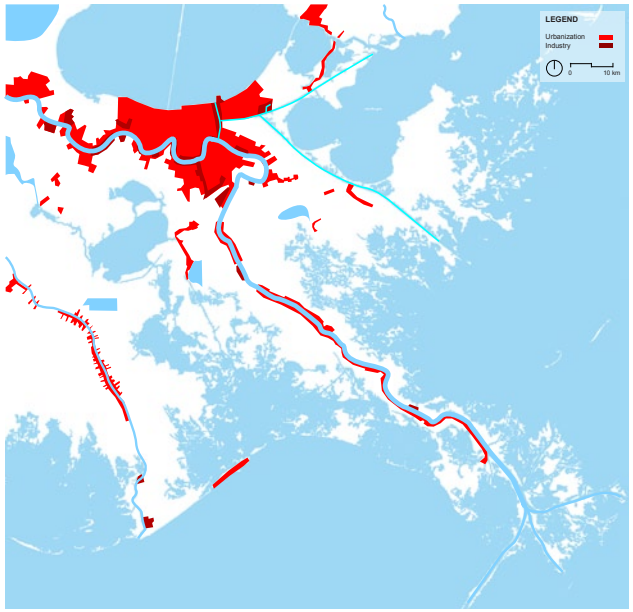


LEGEND

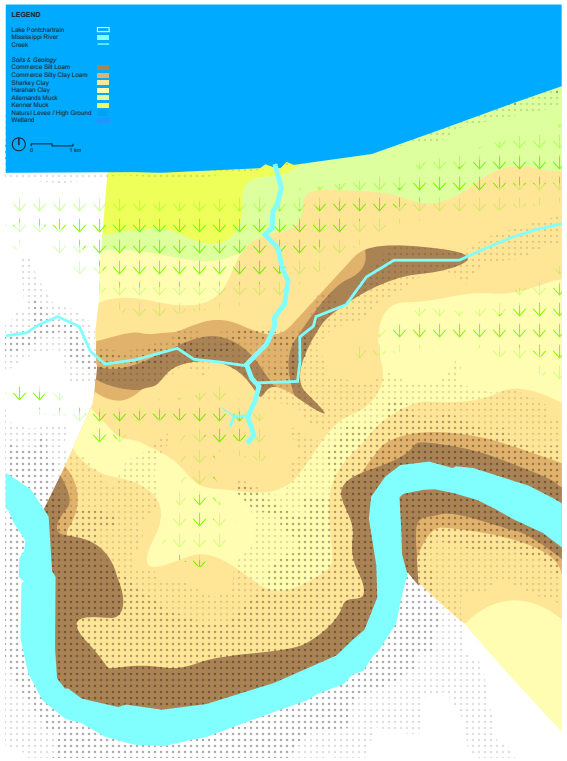
Urbanization
Industry
Agriculture

Occupation of the delta has always been connected to the river. Control of the river and trade into the mainland of the United States was always the main objective. Agricultural uses in the delta have also become a productive enterprise due to the rich soils.

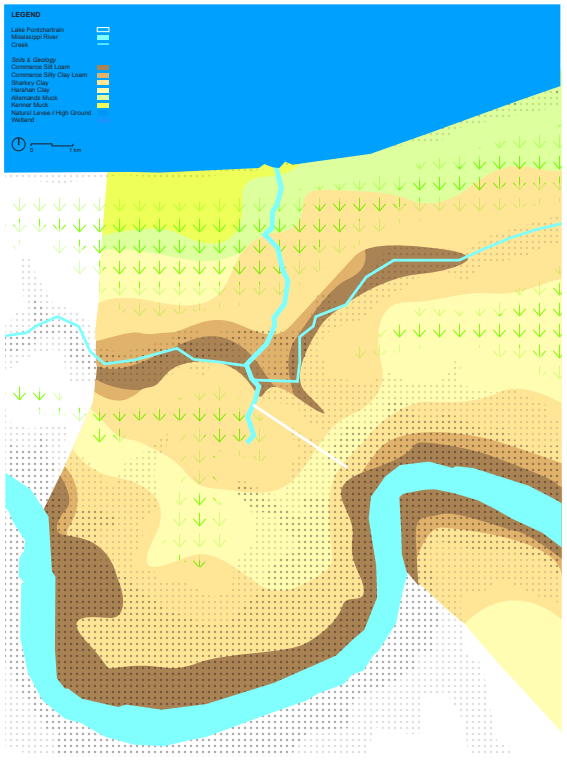
3x3x3 ANALYSIS: Landscape Layer

CITY SCALE

1722



1855



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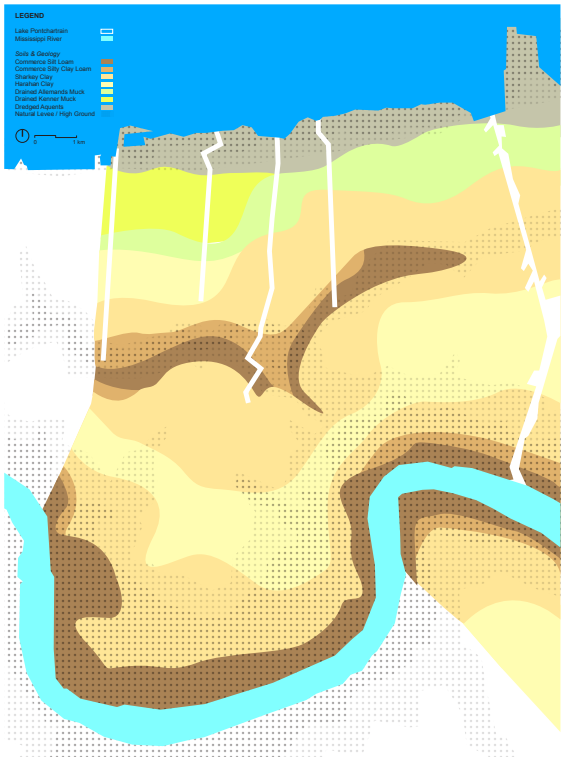


LEGEND

Lake Pontchartrain
Mississippi River

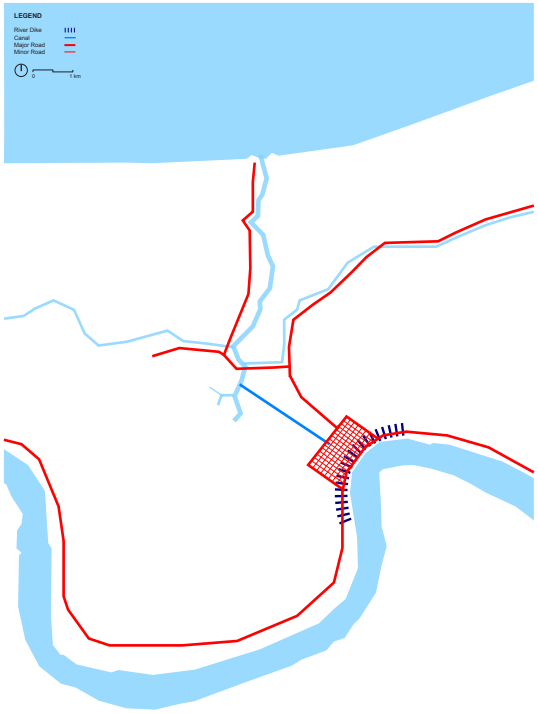
Soils & Geology
Commerce Silt Loam
Commerce Silty Clay Loam
Sharkey Clay
Harahan Clay
Drained Allemands Muck
Drained Kenner Muck
Dredged Aquents
Natural Levee / High Ground

The city of New Orleans is located on a variety of soils. Soils along the river edge are higher elevation as well as better drained. Moving north towards the lake, the soils become softer, more organic, as well as poorly drained due to the wetlands that historically grew here. A complex system of bayous and inland waterways was characteristic of this area. Lake Pontchartrain to the north is a brackish body of water; even though it is connected to the sea it is significantly inland with little tidal fluctuations.

3x3x3 ANALYSIS: Infrastructure Layer

CITY SCALE

1722



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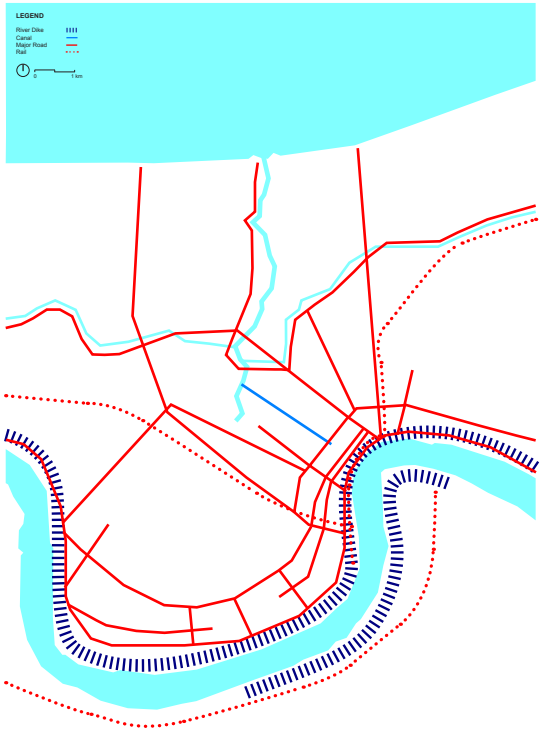

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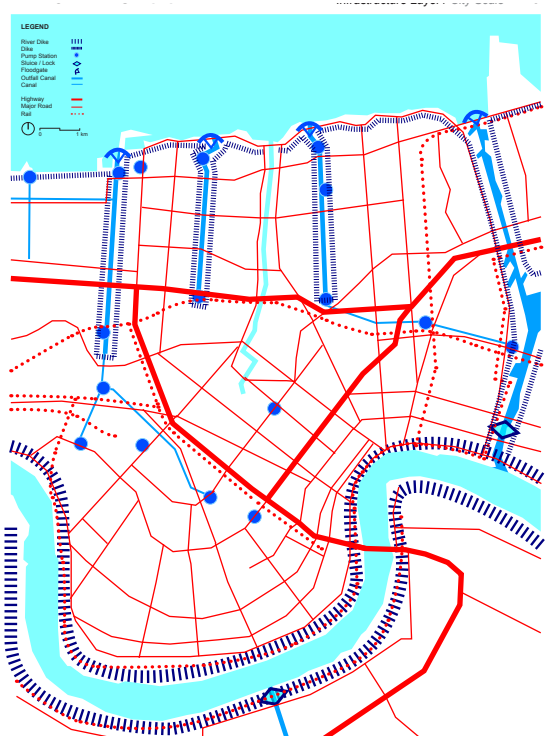


LEGEND

River Dike
Dike
Pump Station
Sluice / Lock
Floodgate
Outfall Canal
Canal

Highway
Major Road
Rail

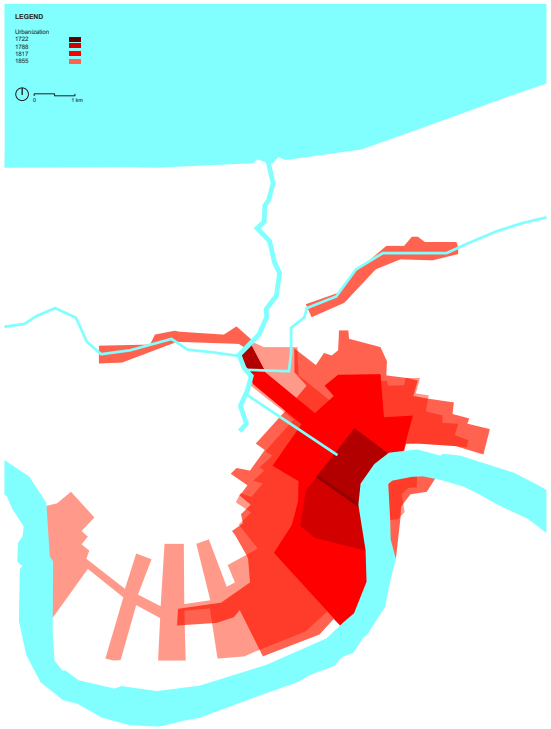
Transportation infrastructure historically followed the river edge in the form of rail lines and roads. Only later were the major transportation highways moved inland from the river edge. Water related infrastructure started as a simple levee along the river to protect the city from seasonal flooding. As the city grew more infrastructure was added including canals, pumps, flood gates, sluices and locks.

3x3x3 ANALYSIS: Occupation Layer

CITY SCALE

1722

1855



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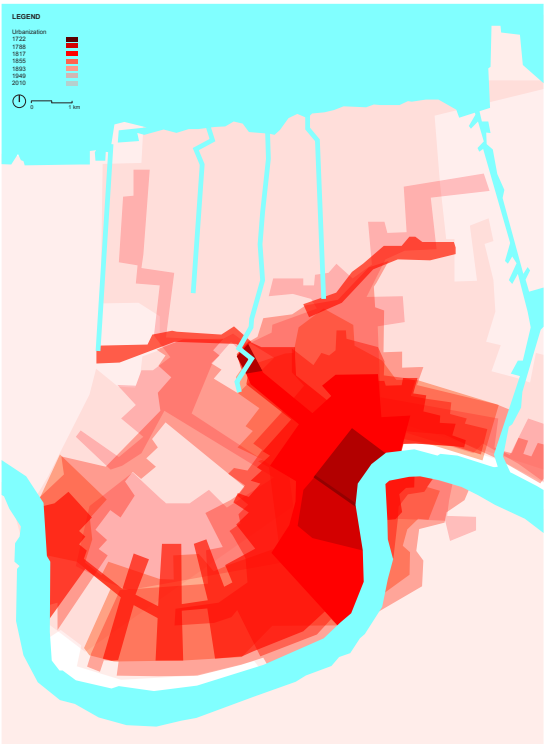


LEGEND

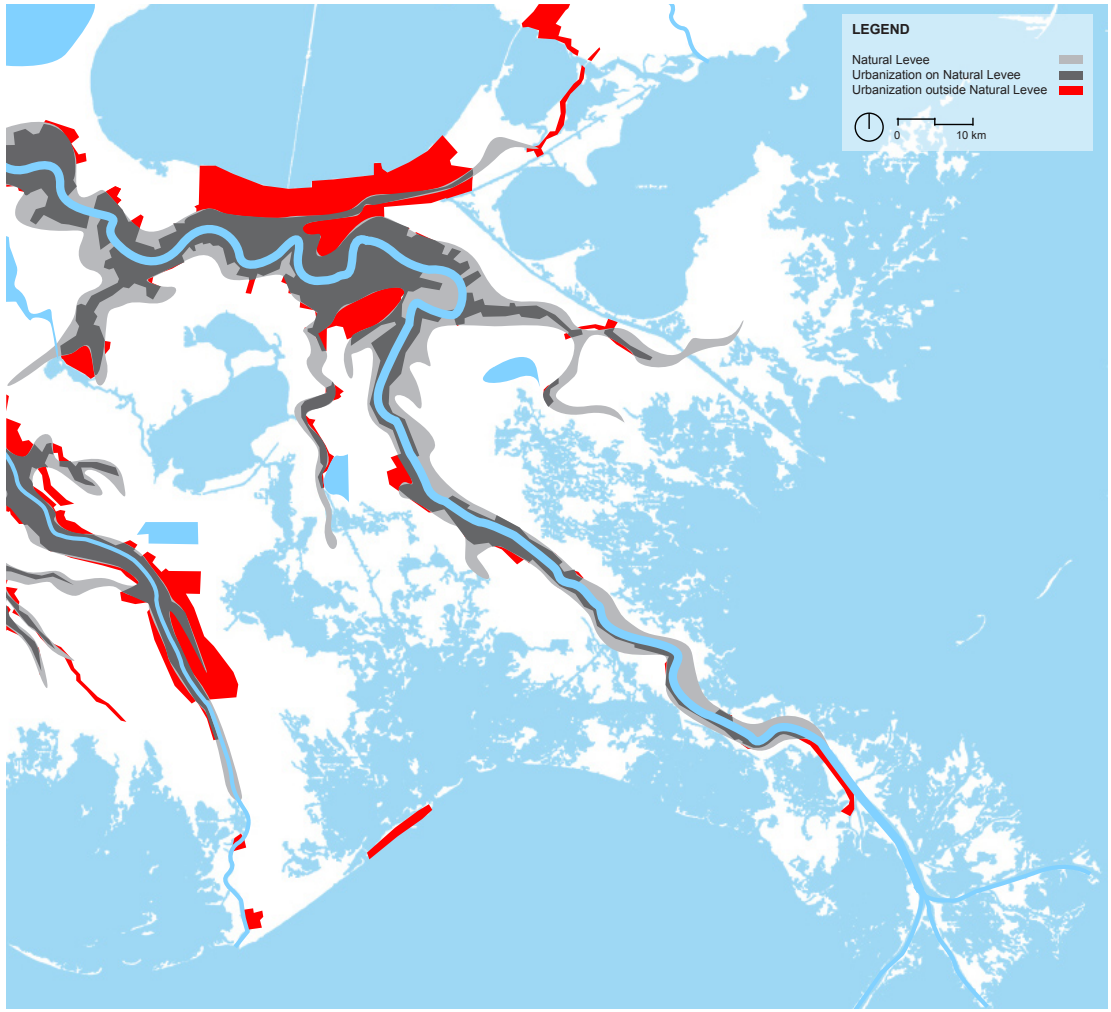
Urbanization
1722
1788
1817
1855
1893
1949
2010

The location of the original French Quarter was chosen due to the high ground along the river edge. In addition, the bayou allowed rear access to the city from Lake Pontchartrain. The growth of the city followed the high ground until in mid 20th century when it expanded north towards the lake.

3x3x3 LAYER ANALYSIS CONCLUSIONS

While mapping the various layers with the delta and city provides a great deal of information, that alone is not enough. In fact, too much information without a clear purpose and be less than helpful. This is why it is most important to draw conclusions from the previously completed layer analysis. Much can be learned by understanding how the various layers interact and influence one another. To understand this, it is helpful to separate various layers and see how they are working together. These conclusion maps and diagrams pull apart the layers and put them together again in various ways to see what exactly is happening within the complex delta environment. Doing this exposes the underlying natural processes, what they mean for the built environment and vice versa. Only when this information is clear, can one begin to propose the right path for the future.

NATURAL LEVEES IN THE DELTA: Landscape + Occupation Conclusions

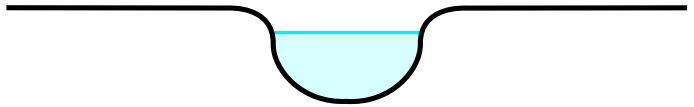


LEGEND

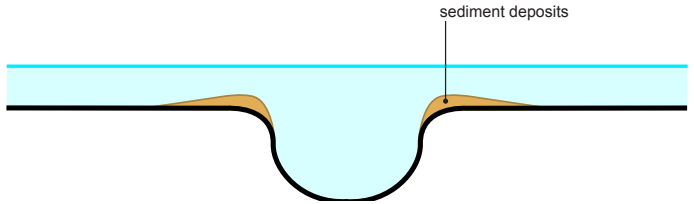
Natural Levee
Urbanization on Natural Levee
Urbanization outside Natural Levee

Development of Natural Levees

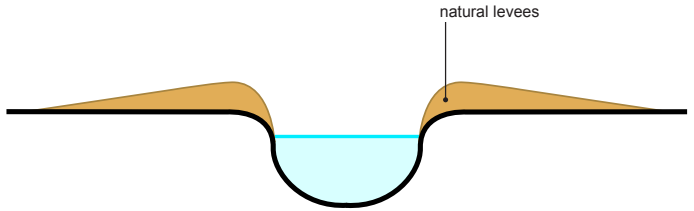
1) Before Flood



2) During Flood

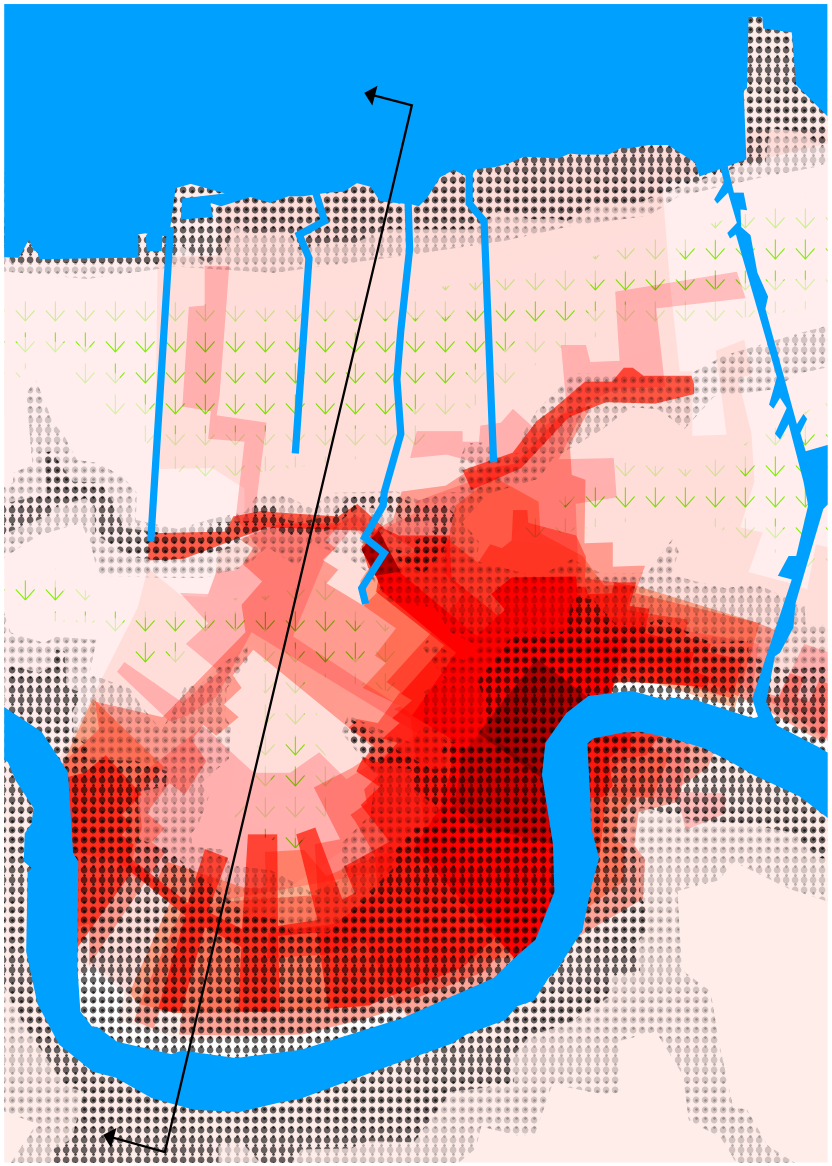


3) After Many Floods



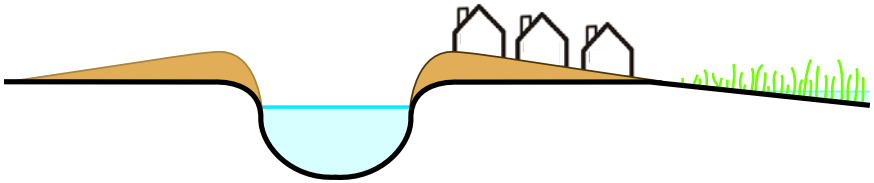
Traditionally, the river would always flood seasonally in the spring, along with rarer major flood events at other times. The Mississippi River historically carried high volumes of suspended sediments and silts from the central plains of the United States. These floods allowed the river to deposit thick layers of sediment along its shores and in the adjacent areas, which over time has built large natural levees. These natural levees have been created along the Mississippi's current route, as well as previous river paths. Old river routes to the sea are visible due to the old natural levees that remain there. These natural levees are the only land above sea level in the delta and have provided the safest place for development.

NATURAL LEVEES IN THE CITY: Landscape + Occupation Conclusions

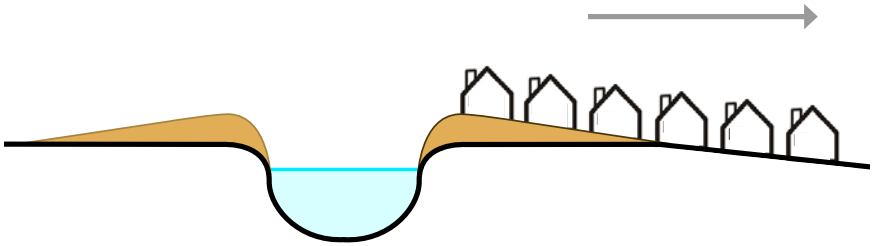


Development Trends

Historical Development
Building only on natural levees & high ground



Recent Development
Infrastructural improvements enable expansion



LEGEND

Natural Levees
Historic Wetlands

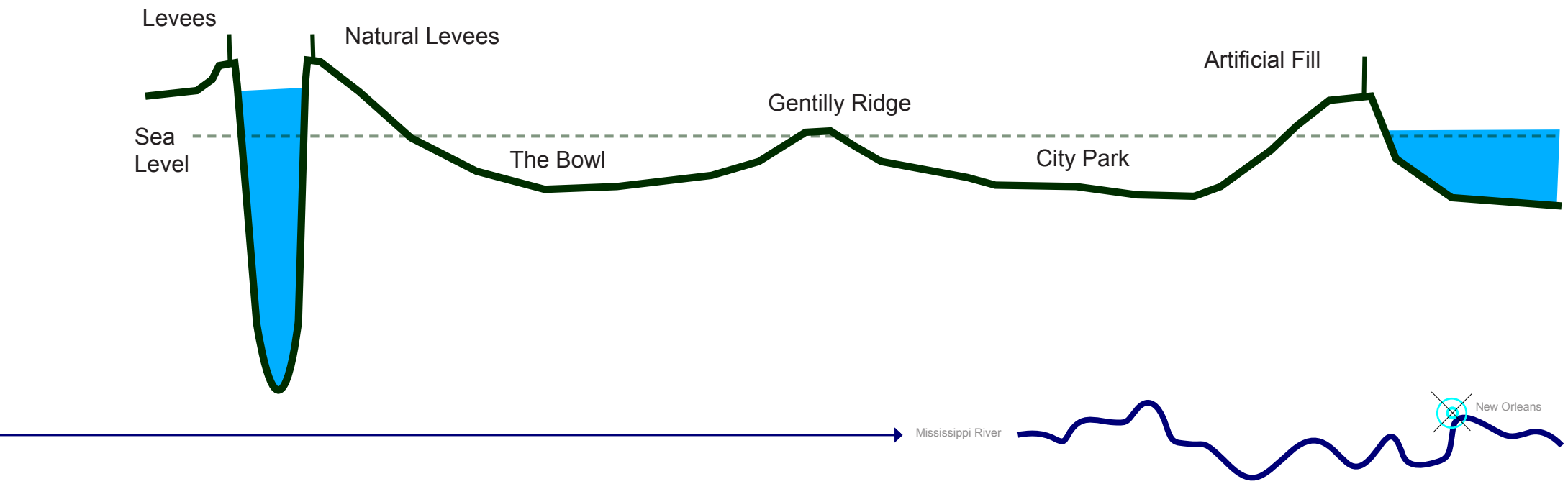
Development Timeline
1722
1788
1817
1855
1893
1949
2010

NATURAL LEVEES IN THE CITY: Landscape + Occupation Conclusions

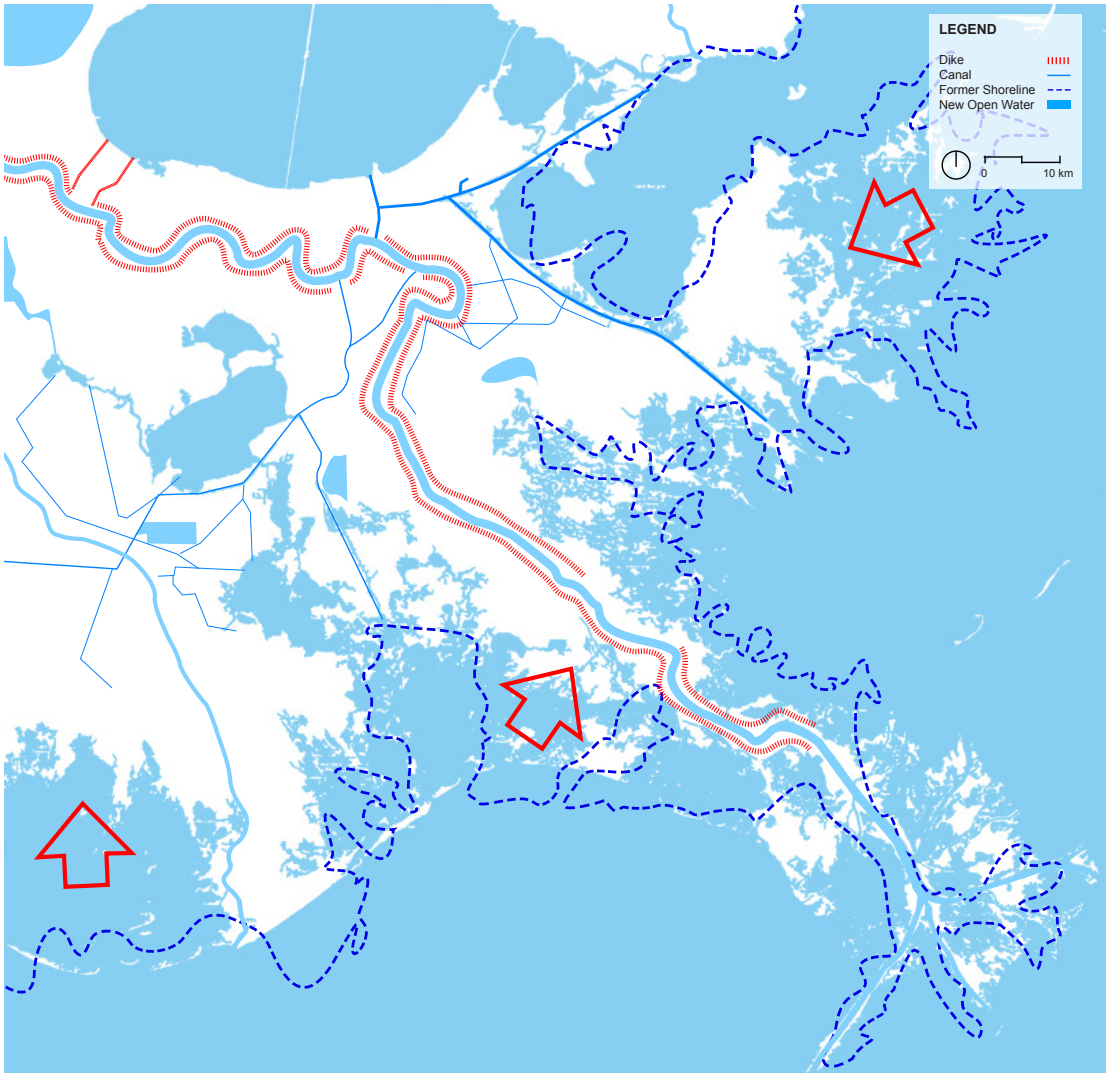
The land around New Orleans follows the typical trends within the delta in terms of natural levees. These natural levees along the banks of the river provide the highest and safest ground, often extending inland for several kilometers. In addition, there is a large ridge running roughly east-west to the north of the river. This high ground, Gentilly Ridge, is the result of former delta lobes and historical deposits. When moving away from the river, land gradually becomes lower and wetter with cypress forests, swamps, and marshes historically found along the shores of Lake Pontchartrain.

Occupational patterns in the delta have closely followed the natural levees, and the old French Quarter of New Orleans was first founded on one of these natural embankments. Historical development within the city stayed to these natural high grounds and followed the curve of the river banks. Only recently (from the 1940's on) has development expanded beyond the natural levees and into adjacent lowlands, greatly increasing the danger of flooding to these neighborhoods.

City Section

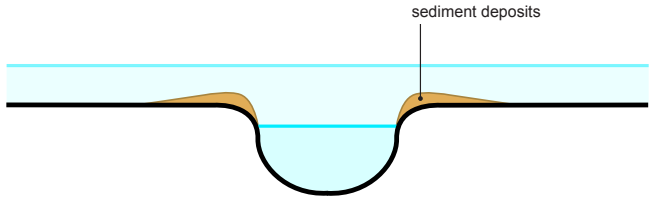


LAND LOSS IN THE DELTA: Landscape + Occupation Conclusions

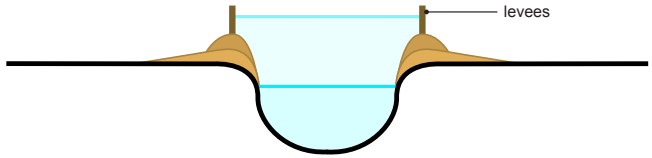


Consequences of the Levee System

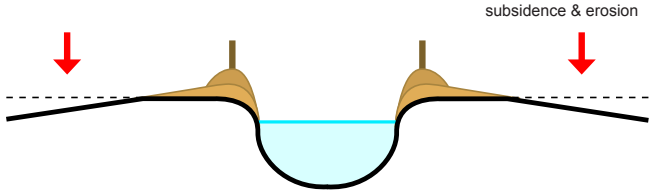
1) Common Regular Flooding = Sedimentation



2) Levee System = Controlled Flooding = Lack of Sedimentation



3) Lack of Sedimentation = Land Loss

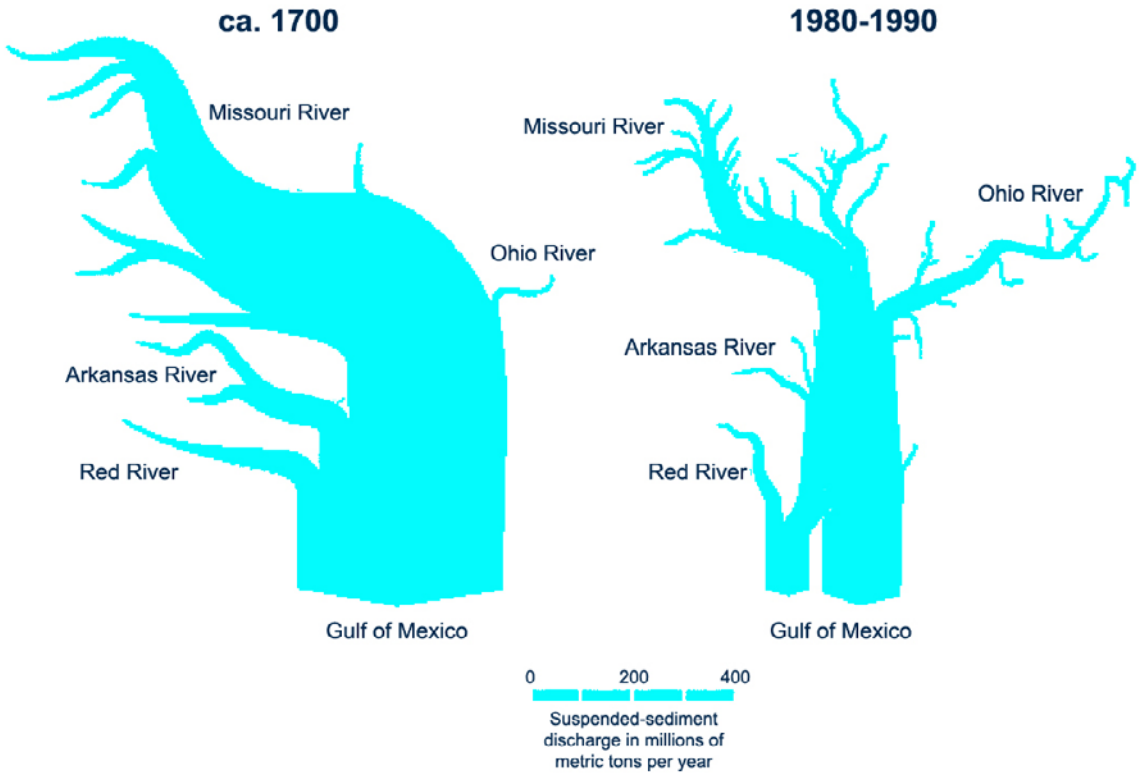


LEGEND

Dike
Canal
Former Shoreline (1900)

LAND LOSS IN THE DELTA: Landscape + Occupation Conclusions

Decreasing Sediment Loads



Source: LSU Lecture, Rogers

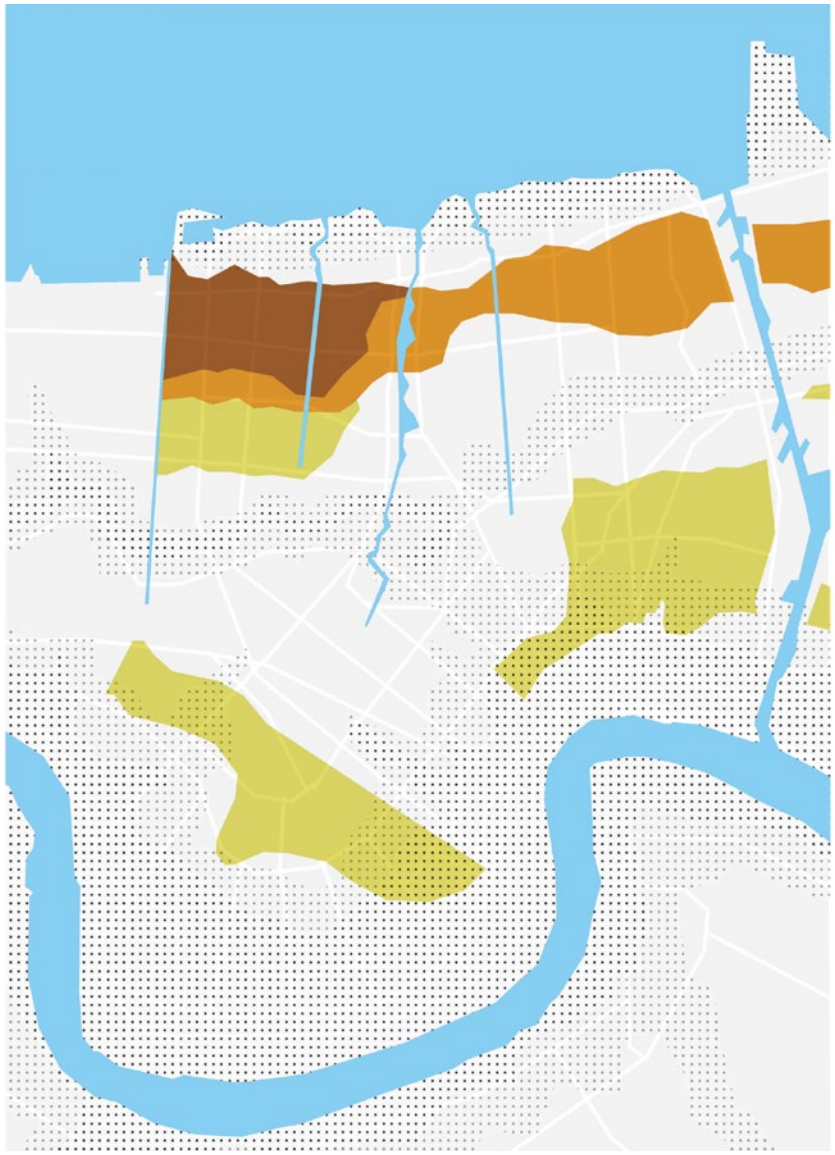
The past 150 years of flood management strategies have primarily been aimed at controlling the river as much as possible, mainly through the use of dikes. This has greatly inhibited flooding along the river and within the delta, and while this does protect developed areas, it also interrupts natural cycles which are currently bringing greater threats to those very same cities. With regular flooding restricted, construction of these natural levees has stopped and so has the construction of new land.

Other infrastructural interventions are disrupting natural processes within the Mississippi River and delta as well. Large numbers of dams have been built along the length of the river, severely restricting the amount of sediment entering the delta, which is critical for new land creation. Prior to 1700, average sediment discharge was about 440 million tons/year, but since 1950 this figure has decreased by about 50 percent (Rogers 2007, p. 28). Without enough sediment being deposited in the delta, the sea will continue to take back land. From the 1930's until the present a total area of roughly 3,900 km2 of coastal wetlands have been lost, equaling one hectare per hour (Deltares 2009, p. 70).

Factors other than dams also contribute to the dramatic loss of wetlands within the delta. Oil and gas extraction under the delta have caused land subsidence. In addition, dredging of large canals for the energy industry has increased erosion. Salt water intrusion is harmful to many wetland species and contributes to creating more open water.

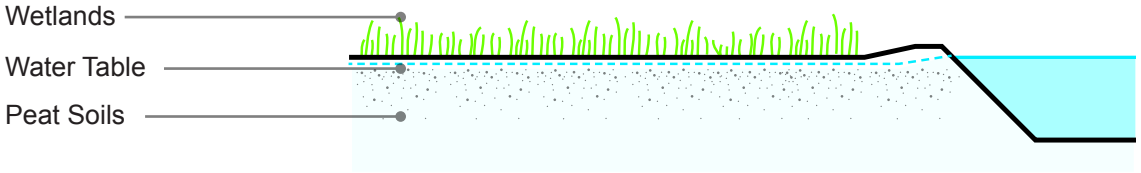
Issues of land loss are important not only for the sake of the natural environment, but also for the safety of cities within the delta. Historically wetlands have provided a buffer from major storms, in that for every 1 kilometer of wetlands a storm surge is reduced by 1 meter. With these wetlands gone, storms will have a far greater impact on land that was historically far inland.

SINKING LAND IN THE CITY: Landscape + Occupation Conclusions

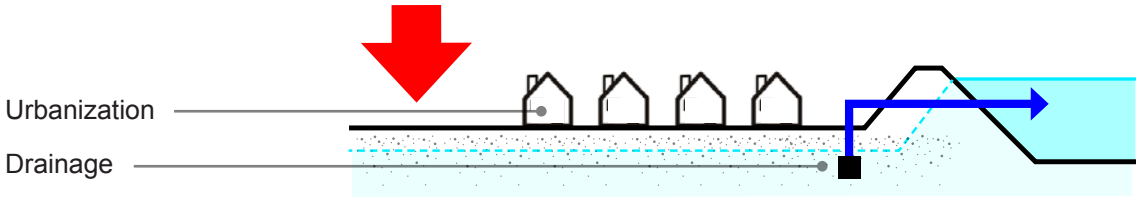


Consequences of Urbanization of Wetlands

1) Natural Situation: wetlands, peat soils, high water table



2) Effects of Drainage & Urbanization = Soil Subsidence



LEGEND

10 - 50 cm
50 - 130 cm
>130 cm

total settlement of soils as of 1989

The former wetlands within New Orleans are primarily composed of peat soils, which consist of recently decomposed vegetation and are easily compactable, high in water content and very sensitive to changes in the water table. These factors, when combined with urban development on top of young soils, results in sinking land. In the New Orleans region, the average rate of land subsidence is 5 mm/year (Burkett et al. 2003, p. 67). This results in urbanized land that is below sea level. Buildings that are significantly lower that the surrounding land and water creates a difficult situation when dealing with water management.

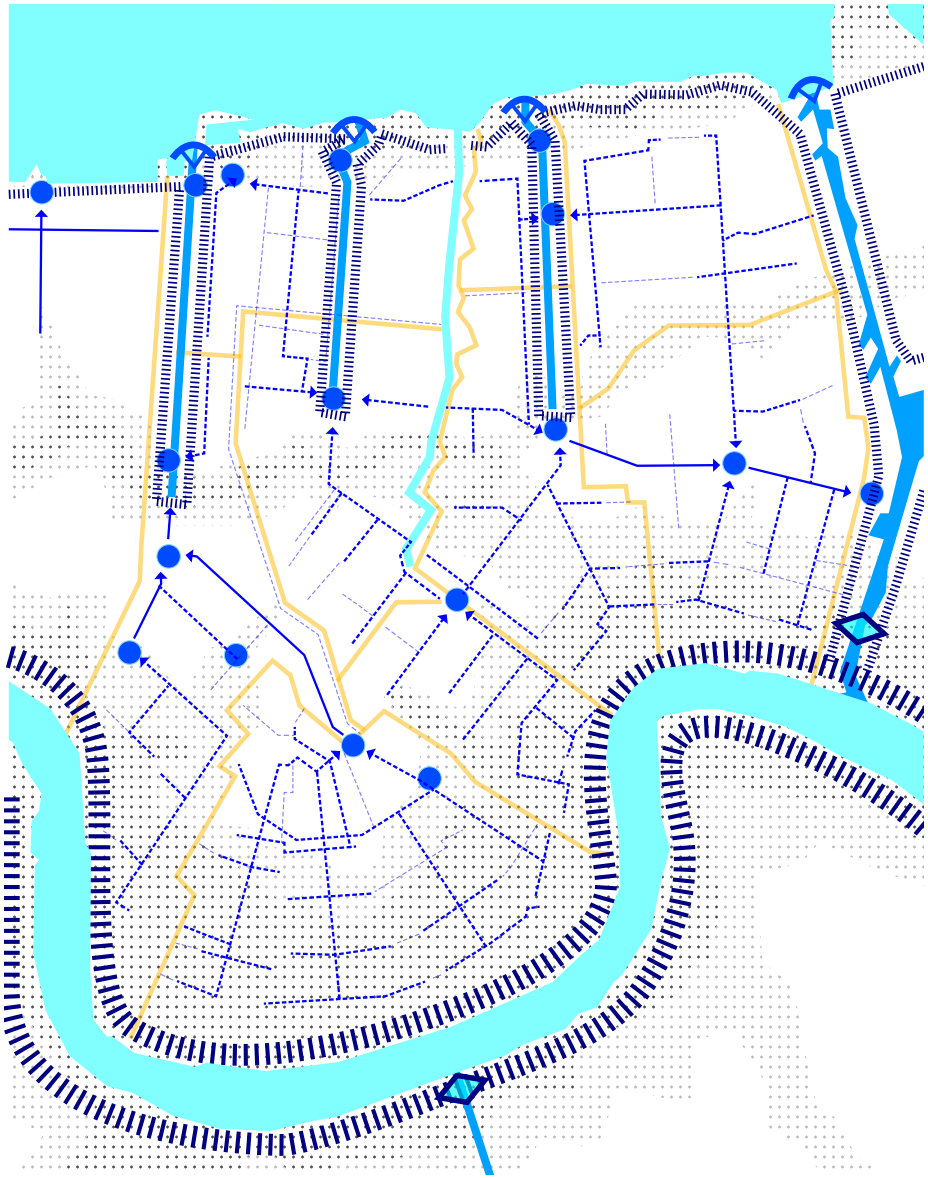
INCREASING INFRASTRUCTURE: Infrastructure + Occupation Conclusions

infrastructural improvements
(pumps & canals)
ALLOWED
development beyond the natural levee

development beyond the natural levee
REQUIRED
need for additional infrastructure
(surge barriers & flood walls)

For the survival of present-day New Orleans, a thorough water management network has been constructed over the years. As the city grew further into the low-lying areas, this water network has needed to be expanded. Today a combination of levees, canals and pumps attempt to keep the city dry, but with obvious difficulties. The historic city was built on safer, high ground areas and was directly connected to the natural water system. Over time, canals and pumps were added; first these canals were at ground level, their function and purpose clearly visible. Canals were buried underground, or raised meters up above ground level to better connect to Lake Pontchartrain.

Slowly the connection between city and water was concealed and weakened. Modern New Orleans has attempted to develop in a way that denies its location in a delta landscape. This has resulted in the current water management network that is not only visibly disconnected and spatially disruptive for the city, but also clearly dysfunctional and unsafe.



HURRICANE KATRINA: A Man-Made Disaster

Climate change and sea level rise will also continue to affect the Mississippi Delta environment. A sea level rise of one meter, commonly predicted to occur by 2050, would easily drown the majority of the low-lying delta unless sediment deposition is reintroduced. Consequences of human interventions within the natural systems of the delta are greatly reducing new land creation while at the same time furthering wetland erosion. This impacts not only the quality of the environment, but also the safety of delta settlements, as these wetlands help to provide a buffer from storms and keep the land above water.

In addition, climate change will bring more frequent heavy rain storms, which already often overwhelm the drainage system of New Orleans. More importantly, climate change will also create larger and more recurrent hurricanes in this region. In 2005 Hurricanes Katrina and Rita combined to destroy roughly 260 km2 of wetlands (Deltares 2009, p. 71) along with severe damage to the city of New Orleans and its inhabitants. Five years later New Orleans is still greatly feeling the damage from the hurricane. Hundreds of homes were destroyed, nearly two thousand people killed, and even more residents were permanently displaced. This has dramatically harmed not only the economy, but also the quality of life and spatial character of the city.

Hurricane Katrina very clearly exposed the disconnection between the natural and built layers within New Orleans and the delta. It was made painfully obvious that the city (as well as regional infrastructure and development) has grown in a way that has disregarded the landscape layer and the processes associated with it. In order for New Orleans to once again live in harmony with the natural environment, a reassessment of its position in the landscape is necessary. Not only must these natural processes be reintroduced, but the city must adapt to be able to live with them.

Hurricane Katrina

Source: Report, Flood Risk in New Orleans

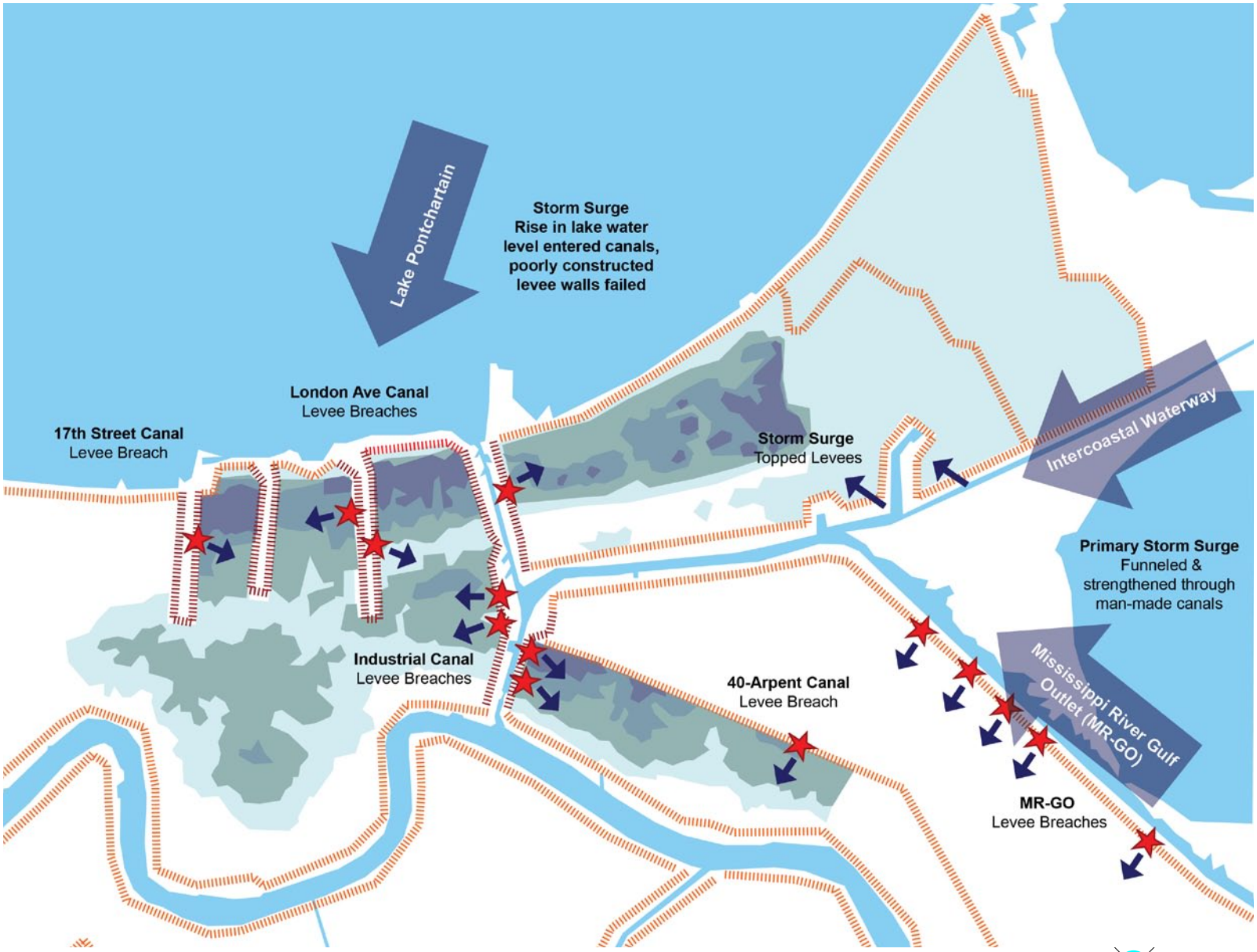
Hurricane Katrina, New Orleans Flooding

Source: Thesis Project, Bram Vlaun

HURRICANE KATRINA: A Man-Made Disaster

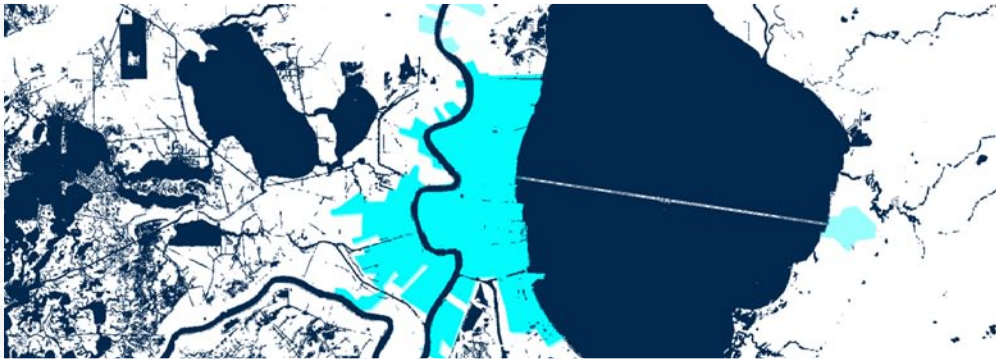
LEGEND

- Earth Levee
- Levee + Flood Wall
- Breached Levee
- Topped Levee
- Main Storm Surge
- Flood Depth
  - 0-1 meter
  - 1-2 meters
  - 2-3 meters
  - 3-4 meters



THE URBAN BAYOU

Balancing Natural Processes and Urban Development in New Orleans



PART 2 - URBANISM

CONTENTS:

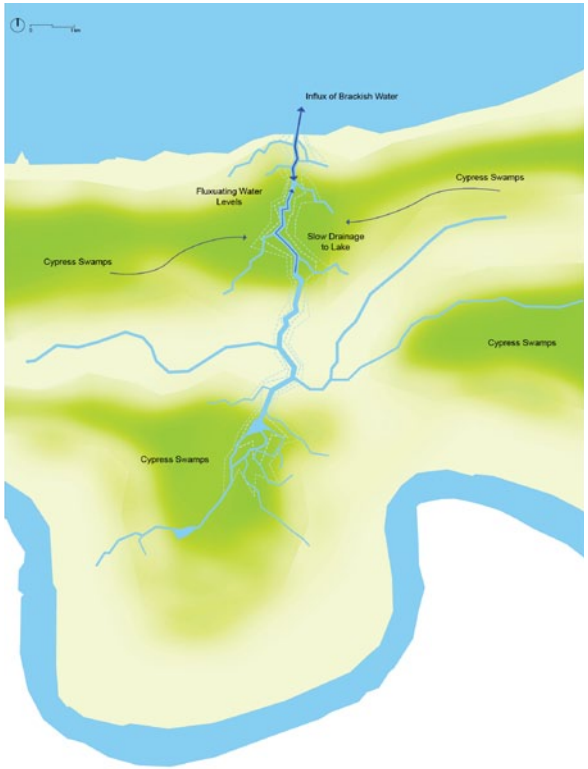
CONCEPT: Nature as the Model

THEORY

The theory behind a new concept for the spatial structure and water management strategy for the city comes from a clear understanding of historic natural processes (see theory essay: Living with the Land, p. 44). A thorough ecological investigation into how the natural systems historically functioned in this area has provided guidance for a new direction. While it is not possible to entirely reproduce previous processes, their principles can guide future design decisions. The intention is to understand how the natural drainage processes functioned and replicate it within the existing urban structure of the city.

HISTORICAL BAYOU: Natural Conditions: Space for Water & Slow Drainage

Bayous & Swamps



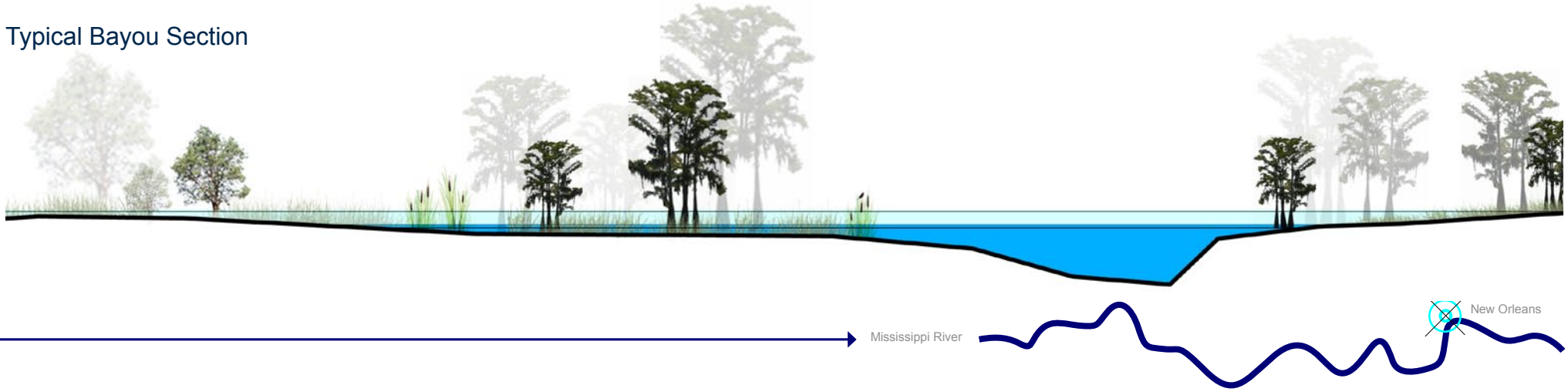
Bayou Landscape

Cypress Forests

"Bayou" is a southern Louisiana term referring to a body of water typically found in flat, low-lying areas; it can either refer to a very slow moving stream or river often with a poorly defined shoreline, or to a marshy lake or wetland (Wikipedia).

The low lying areas north between the Mississippi River and Lake Pontchartrain consisted of a complex system of bayous and cypress swamps. Bayou St John was the primary bayou that provided an outlet for water to the lake. Within this system, drainage was very slow, there was space for extra water everywhere, and plants and animals were adapted to this environment of fluctuating water levels. There was rich ecological diversity and a wide variety of unique flora and fauna.

Typical Bayou Section



EXISTING CANALS: Disconnection from & Concealing of Water System

In clear contrast to the natural conditions is the current system of canals. As previously discussed, there was historically a substantial and visible water system, but over the past 60 years it has been cut off and concealed from the structure of the city. Of the historic water drainage system of 1895, Pontchartrain Boulevard Canal and Franklin Ave Canal have been buried below ground, while 17th St Canal, Orleans Canal, and London Ave Canal have all been raised several meters above grade and hidden behind tall levees and retaining walls.

This has resulted not only in an unsafe situation prone to frequent flooding, but also a very unaesthetic visual character and fragmented spatial structure which disconnects neighboring communities. Bayou St John is the only remaining piece of the natural water system.

Although the historic canal that had traditionally connected it to the French Quarter has been buried, the character along the Bayou is that of a pleasing linear park space.

Outfall Canals

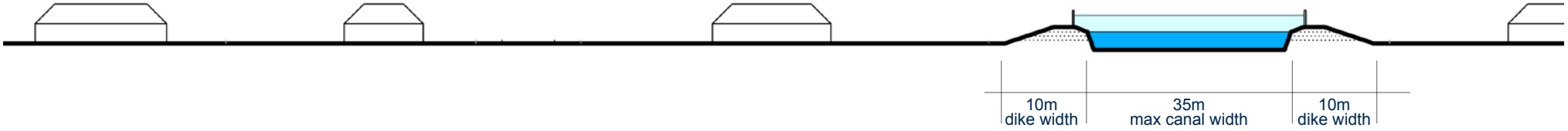
Underground Canal

Smaller Canal

Current Outfall Canals

Typical Outfall Canal Section

+3.25m top of wall
+2.5m 100 year storm surge
+0.75m top of dike
+0.0m sea level
-1.75m ground level (ranges from -2.5 to +0.5m)
-2.75m bottom of canal

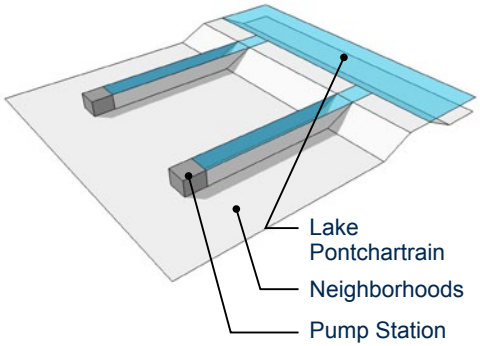


OUTFALL CANAL OPTIONS: Reconnecting City and Water

In order to once again connect the city with water, both visually and physically, a change needs to occur with the outfall canals. Generally, there are two options: either to raise the land up to the level of the canals or to lower the canals to the level of the land. Ideally, the land and water would be at the level of the lake; this would allow the bayou and vicinity to function closest to its historical conditions and processes. However, this land is already highly urbanized and considerably below the lake level, making raising the land a very difficult and costly option.

A more simple choice is to lower the canals closer to the current land level. In this situation, it is then possible to explore a hybrid system of regulated natural processes; mimicking historic drainage processes in the lower canals but creating an artificial pump connection with the lake.

Existing Situation



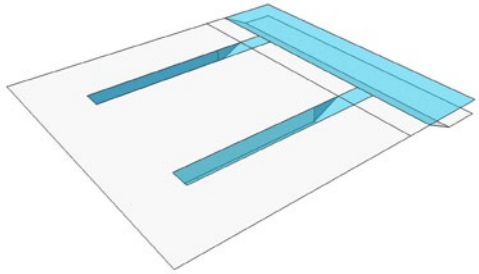
+ direct at-grade connection from canal to lake

- canals create barriers to neighborhoods

- canals prone to flooding

- poorly constructed flood walls

Option 1: Raise Land



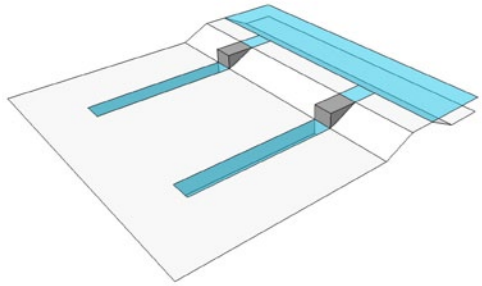
+ direct at-grade connection from canal to lake

+ closest resemblance to historic conditions, potential to re-introduce natural processes of bayou

- immense amount of fill required

- land needed to be raised is already highly urbanized

Option 2: Lower Canals

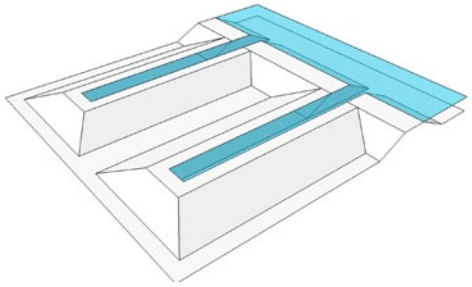


- no longer direct at-grade connection from canal to lake

+ canals no longer barrier to neighborhoods

+ existing neighborhoods can remain

Option 1B: Raise Land Along Canal



+ direct at-grade connection from canal to lake

+ closest resemblance to historic conditions, potential to re-introduce natural processes of bayou

+ vast majority of existing neighborhoods can remain

CLUES FROM THE PAST: Historic Water City

There was a time when New Orleans was connected to water. Bayou St John, as the last remaining thread of the natural water system present in the city today, can be seen as an example of what is possible when the city embraces water instead of trying to conceal it.

Historic Lakefront & Riverfront

Lakefront Development, 1941
Elevated housing on Lake Pontchartrain within a natural shoreline of grasses and wetlands

Lake Pontchartrain, 1920
Milneburg "Aqua-hood" consisting of floating and elevated housing on the lake

Lakefront Development, 1941
Elevated housing on Lake Pontchartrain within a natural shoreline of grasses and wetlands

Mississippi Riverfront, 1880
Steamships loading and unloading cotton on this major industrial working riverfront

Historic Bayou St John & Orleans Ave Canal

Bayou St John, 19xx
Housing and boat access along the bayou

Bayou St John, 19xx
With no major roads crossing the bayou, large sailboats are able to access far inland

Bayou St John, 1910
Elevated housing along the bayou with private boat docking

Orleans Ave Canal, 1899
Natural swamp and wetlands growning within canal

Bayou St John, 2010
Recreation such as jogging and boating are common also this natural corridor

PROPOSED CANALS: The Urban Bayou

Proposed Outfall Canals

Living with Water


The Islands, Nesselande


Eva Lanxmeer Culemborg

The proposed canal system takes its inspiration both from the natural drainage processes that traditionally operated in the region as well as the historic drainage system of 1895. The intention is to daylight all the former outfall canals and return them closer to the current ground level; water can then be pumped up and out of the city at the edge of Lake Pontchartrain. These canals can serve as “bayous” by allowing water levels to fluctuate and providing extra space for water storage during periods of heavy rain or hurricanes. Also, in order to combat soil subsidence, it is important to keep the ground water at a steady level; this can be achieved by having a constant minimum level of water in the canals.

Instead of fighting to keep the water out of the city, now there will be more space within the city for water. Once again the city will be connected to the water, and the unique conditions of living within the delta will be clearly visible.

Height of “Super Levee” things to consider:

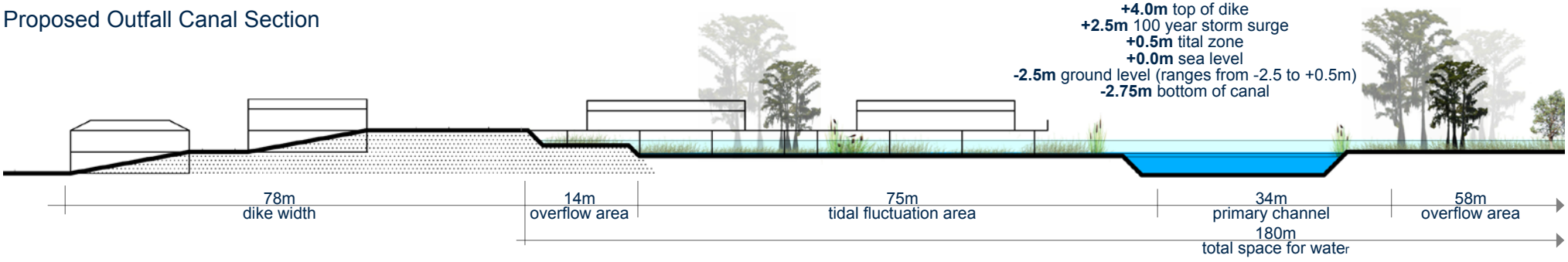
Storm Surge: Hurricane Katrina (+/- 100 year storm) west shore of Lake Pontchartrain = +1.5 to +3m

Tidal Changes: New Canal USCG Measuring Station = max +.3m / min -.12m

Sea Level Rise: IPCC Report by 2100 = max +1m / mid +.5m / low +.2m

With the top of dike at 4m above current sea level, it will more than accommodate the above-mentioned challenges.

Proposed Outfall Canal Section



URBAN WATER CYCLE: Separating the Threats

There are two main sources of water that threaten New Orleans, one from the lake and one from rain. (Historically there was a third threat, the river, but this threat has been contained by the Bonnet Carre Spillway just north of the city that can divert a portion of the river during high water into Lake Pontchartrain before it passes New Orleans.) By creating two systems that can both naturally deal with each threat separately, they will be much less likely to fail.

Heavy rains frequently flood the city when the storm system is simply overwhelmed and can't remove the water fast enough in the outfall canals. This proposal aims not at removing water from the city but instead providing space for water within it by using existing available open spaces. Both streets and vacant parcels left empty due to damage from the hurricane, can be reconfigured to accommodate space for water storage during heavy rains. In this way, instead of trying to remove water immediately from the city, it can be accommodated within the existing city structure and be seen as an amenity.

Threats from the lake in the form of storm surges will be absorbed within the soft edges along the lake and new urban bayous. Instead of building more costly and unaesthetic infrastructure to keep the water out, the new bayous will again give space for fluctuating water.

Generally these systems will operate independently of one another, but during periods of extremely high storm surges the urban bayous will have the ability to overflow into the vascular network. This will happen in a controlled way through strategic overflow channels that will directly connect extra water from the lake to large storage spaces within the vascular network. Similarly, a minimal amount of pumps will be left in place so that again under extreme circumstances water can be pumped from the vascular network to the urban bayous and out to the lake.

THREAT:
heavy rains, storm water flooding, lack of storage capacity

THREAT:
storm surges & sea level rise via the lake

vascular network
street swales, canals & ponds to store and infiltrate rain water

strategic overflow channels
during peak storm surges bayous can overflow and be accommodated in vascular network

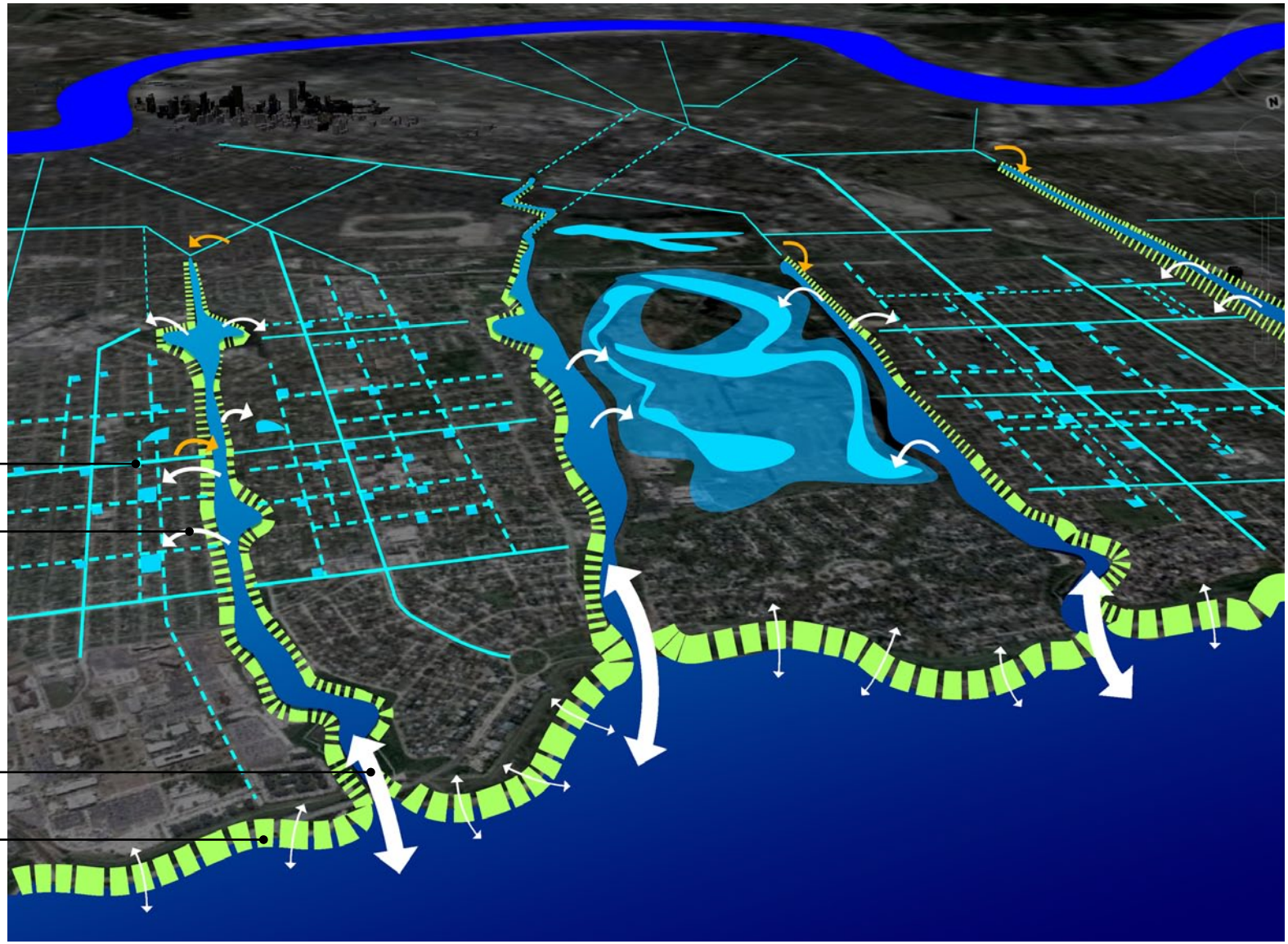
open connection to lake
natural marsh and swamp environments including tides and water fluctuations

soft edge along lake front
swamps, cypress forests

URBAN WATER CYCLE: Separating the Threats

LEGEND

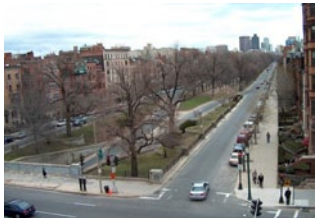
Brackish Water
Canal
Swale
Rain Garden
Natural Dike Edge
Natural Fluctuation
Overflow Channel
Emergency Pump



CASE STUDIES: City Structures

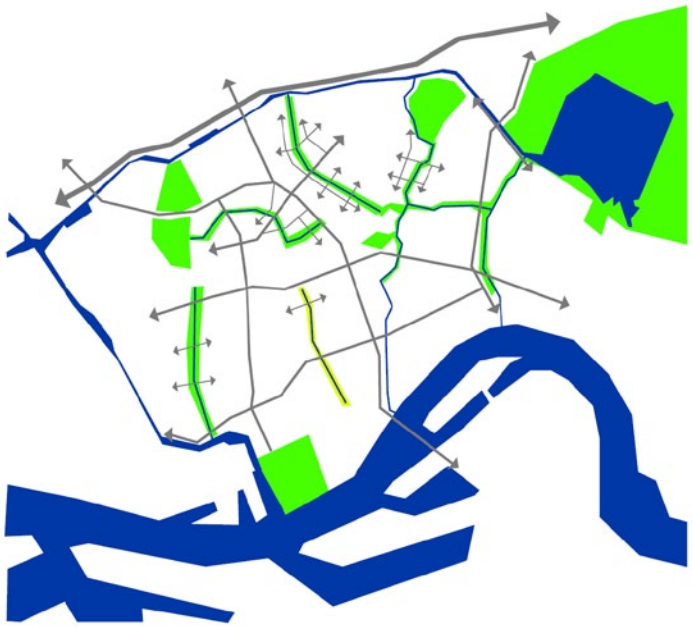
BOSTON, Emerald Necklace

- structure of parks based on natural system
- distinctly different from city structure
- linear park system changes character from urban to suburban and links different parts of city



ROTTERDAM, The Water Plan

- man-made canals and boulevards
- integrated into and planned with city structure
- forms an interconnected network within the city center, generally the same character



CASE STUDIES: City Structures

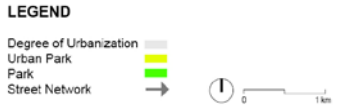
NEW ORLEANS, Linear Parks

- structure of parks based on both natural structure of bayou and historic man-made canal system
- combination of linear parks and canals integrated into city fabric
- park system connects various grid structures and neighborhoods of the city

Other cities around the world have created ambitious historical plans to combine new urban expansion with open space networks. Both Boston and Rotterdam have created large city-wide park systems that link various parts of the city and also combine parks with water management.

The two cities have resulted in vastly different solutions to a similar problem. Boston's park system is mainly based on previous natural systems, while the boulevards and canals – singels – in Rotterdam are generally man-made structures. Boston's Emerald Necklace is one main linear structure that connects the outlining suburban areas to the inner city, while the singels of Rotterdam form an interconnected network within the city center. The park system in Boston is largely separate and distinct from the city structure, while in Rotterdam the canals and boulevards are very much integrated into the city fabric.

These two different approaches to combining water management and park systems within the structure of a city can provide valuable lessons for the city of New Orleans. It is possible for New Orleans to use a combination of both methods that integrates existing canals and the natural bayou into the city fabric to create a city-wide system of linear parks.

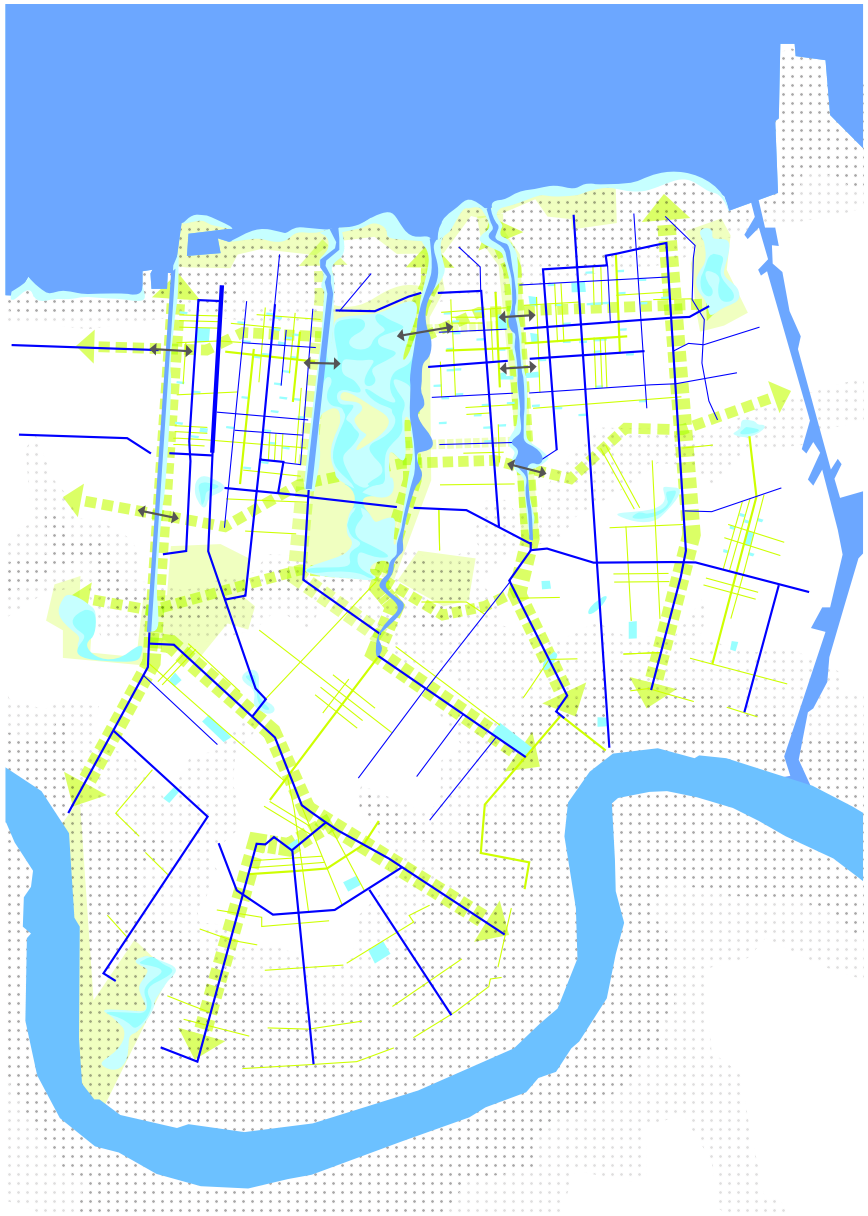


NEW CITY STRUCTURE

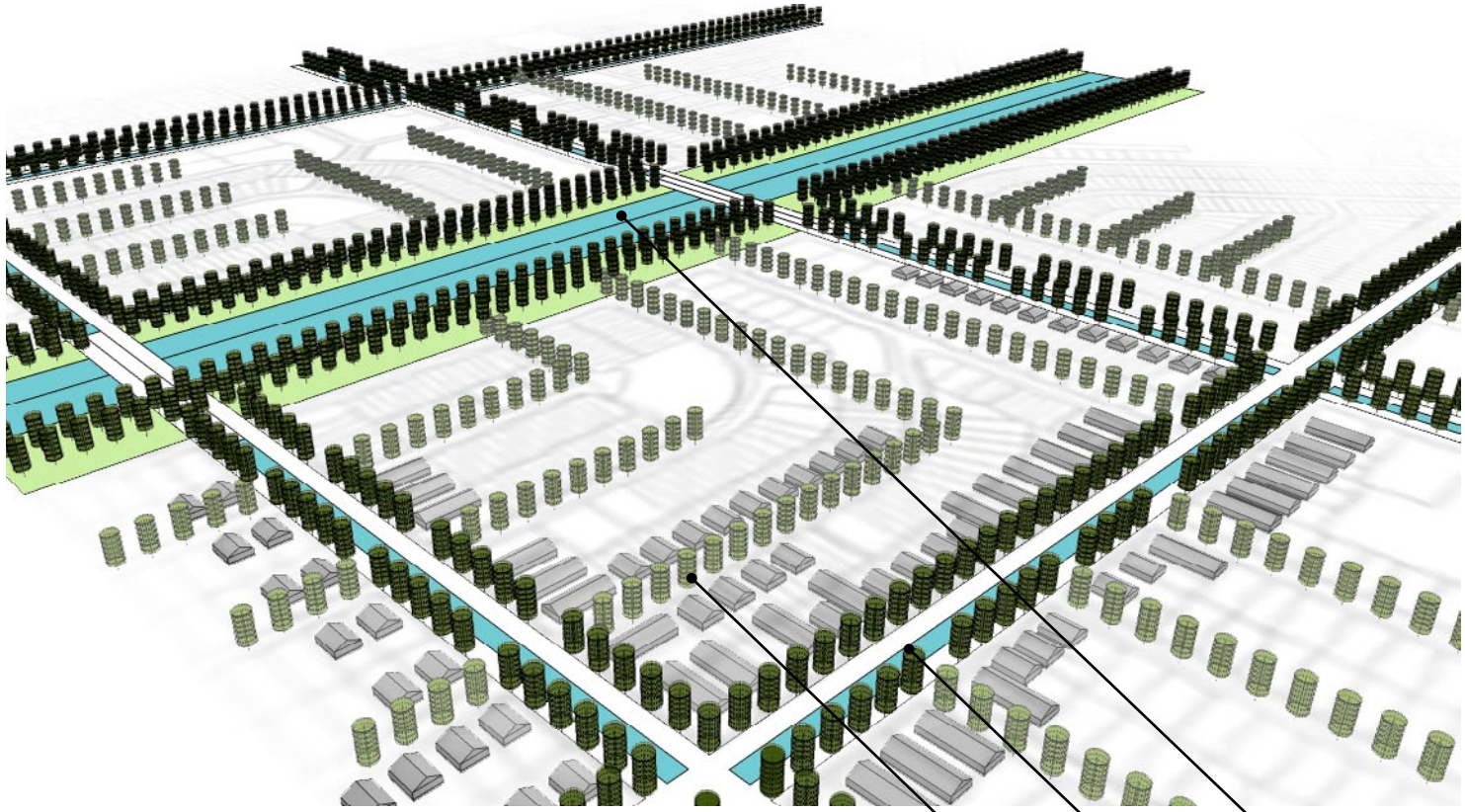
The improved water system of existing canals can provide the backbone of a new urban structure. This structure already exists in the city, it is just currently hidden. By making it visible again, the city's connection to water will be reinforced, highlighted and expanded.

The canal network can create a city-wide linear park system combining water management, recreation, new urban development, and natural habitat. This network is also the bridge that can connect the old and new city grid structures and bring coherence and order to the spatial structure of the city.

This blue-green network will connect various parts of the city, but its character will vary depending on location. The city's relation to the river edge is very different from that of the lake edge, while internal canals create a third spatial language between city and water. While the new city network will connect all the water elements in the city, their unique position and importance within the larger urban structure will remain clear.



CITY STRUCTURE: Streets & Open Space Hierarchy



The city already contains a clear hierarchy of streets and open space, they just need to be re-designed in a more pedestrian and water-friendly way. The existing Bayou St John and other outfall canals make up the highest level of the structure, being large corridors containing nature, recreation, and development. Next, existing boulevards make up the secondary structure of the city. These are the main routes moving transportation through the city, as well as providing considerable space for water and linear walking and biking trails. Lastly are the smallest neighborhood streets which provide local access to immediate housing and facilities. These streets can be retrofitted to provide space for runoff from the street and houses to be purified and partially infiltrated in bioswales before entering the larger boulevard canals.

1
Urban Bayou

2
Boulevard Canal Street

3
Neighborhood Swale Street

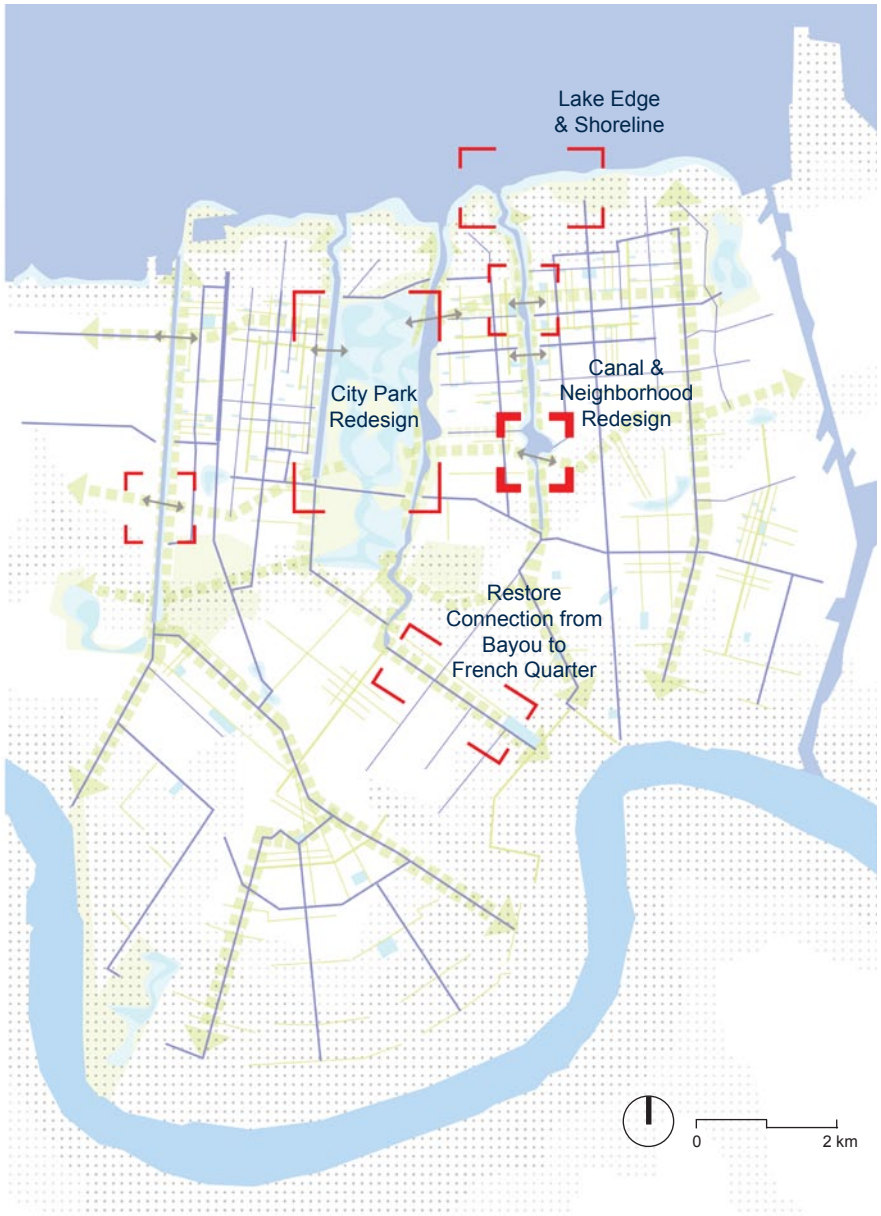
CITY STRUCTURE: Streets & Open Space Hierarchy

1. TYPICAL URBAN BAYOU

2. TYPICAL BOULEVARD CANAL STREET

3. TYPICAL NEIGHBORHOOD SWALE STREET

SITE SELECTION: Strategic Projects



The next step is to identify key interventions necessary to achieving the new city structure. This entails finding the best locations to test and apply the concept with a detailed design.

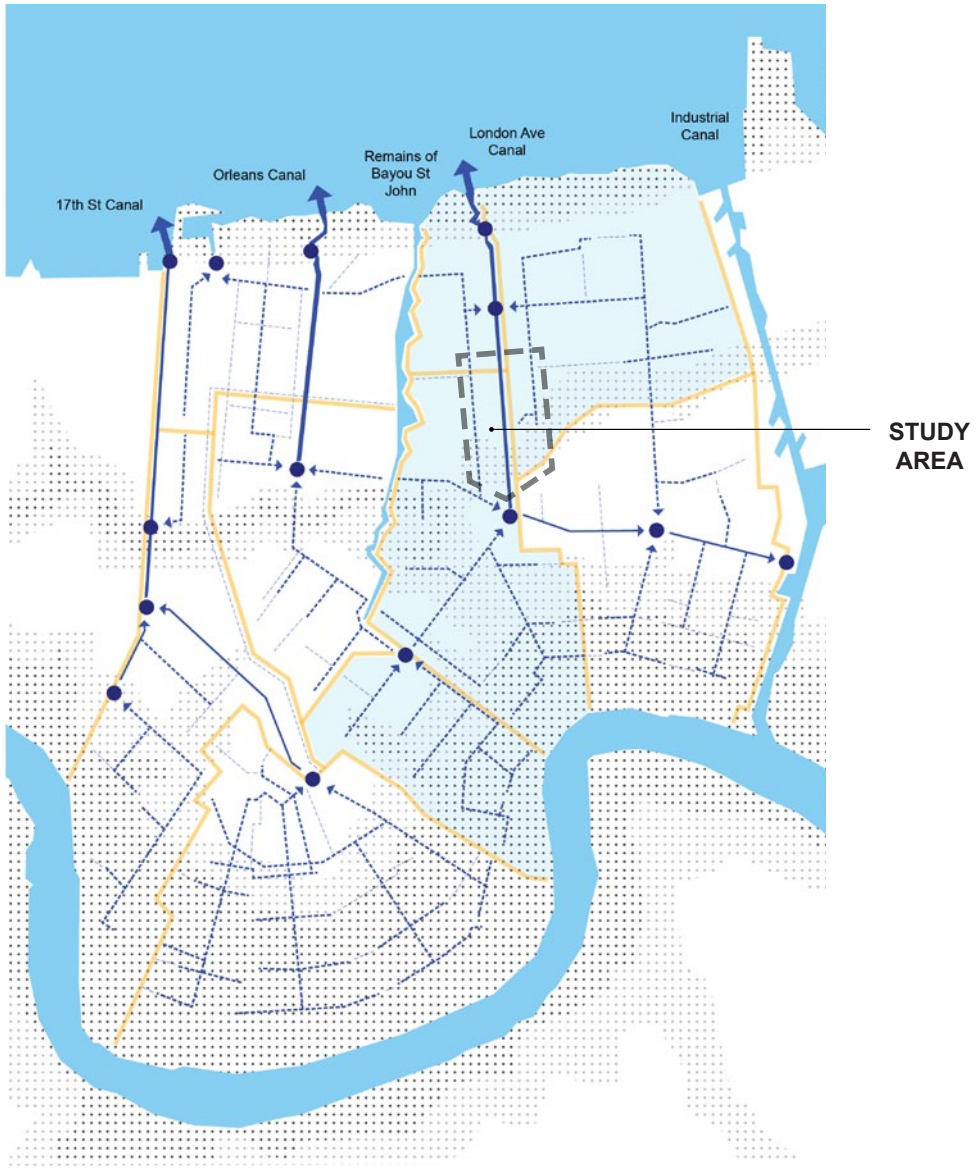
While there are numerous important areas to address, some provide the opportunity to solve both water management and urban renewal issues. Not only does the water system need to be revised, also needed is redevelopment and reinvigoration of existing communities. Many neighborhoods were severely damaged from Hurricane Katrina and the failure of the water system. This has left vast amounts of residential properties vacant, homes irreparably damaged or torn down entirely. Furthermore, the majority of facilities such as grocery stores, restaurants and retail shops have yet to return to these neighborhoods. While the current situation is still dire, there is also opportunity to combine a restructuring of the water system with urban renewal and provide need amenities and services for the community. The chosen strategic project provides an ideal site that has that potential to do just this. This strategic pilot project will showcase the potentials of living with water, an approach that can then be repeated throughout the city.

STRATEGIC PROJECT: Relation to Water Systems

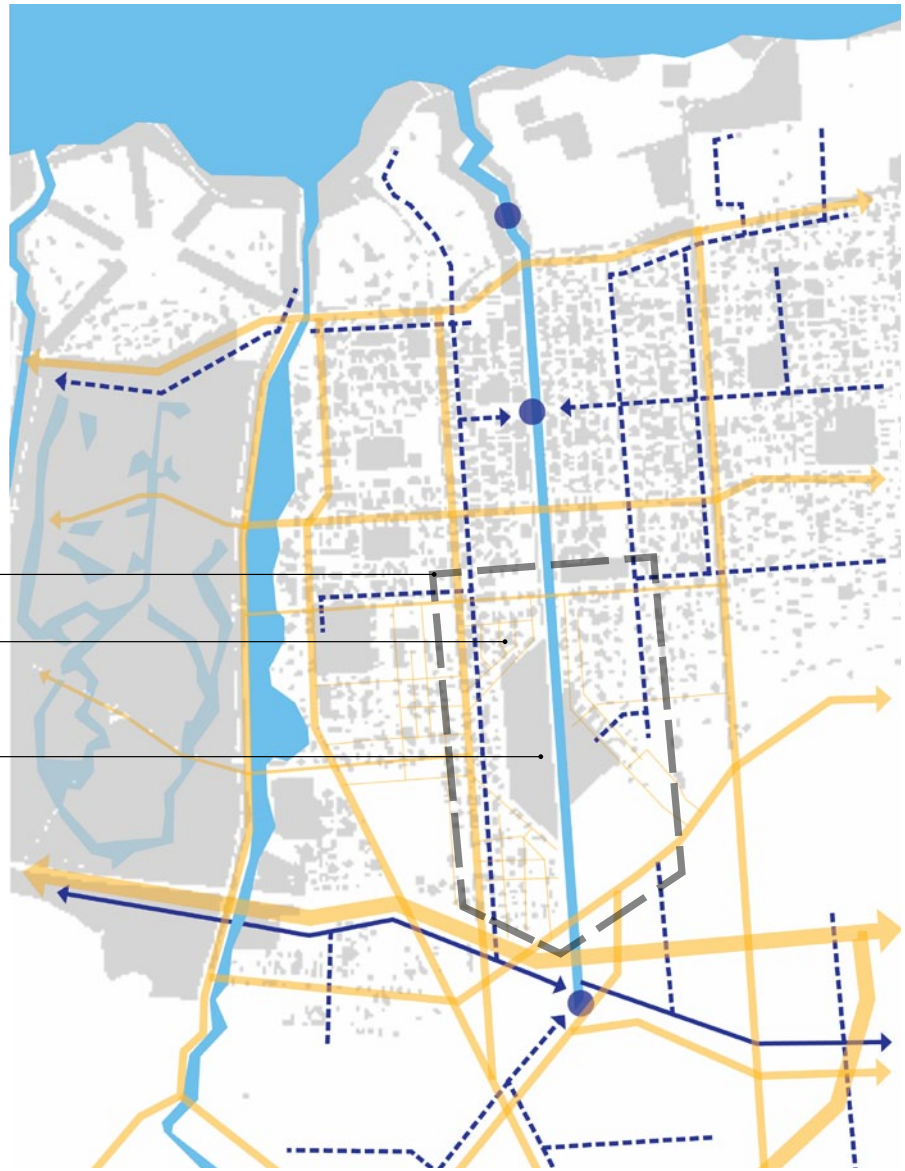
POSITION IN THE CITY: **WATER SYSTEM**

The chosen strategic project provides the ideal site to elaborate on issues of water management. At this location there is substantial vacant land available right now, with little demolition or urban restructuring needed. The area is directly adjacent to the London Avenue Canal (one of the new Urban Bayous) and can easily provide additional space for water storage.

A large portion of the greater city and immediate neighborhood also drains into and through this site area and canal. The site is bordered by Paris Avenue to the west, which contains a neighborhood drainage canal currently underground with the potential to be brought to the surface. It is also possible to explore how strategic overflow points can connect the bayou to these Boulevard canals. In addition, it is possible to add a canal to Harrison Avenue and connect the neighborhood water system to Bayou St John and the City Park water network.



STRATEGIC PROJECT: Relation to Water Systems



POSITION IN THE NEIGHBORHOOD:
VACANT LAND

The surrounding neighborhoods were hit hard by the hurricane, many homes were destroyed and large amounts of residents left the area. While people are beginning to return to the neighborhoods and rebuild their homes, important community facilities are still missing. The immediate neighborhood is still lacking basic amenities such as grocery stores, retail, restaurants; the shopping center at Paris Avenue and Mirabeau Avenue still remains vacant since the hurricane. While it is clearly a major challenge to rebuild and bring back residents to these neighborhoods, it also provides an opportunity. Substantial amounts of vacant land can provide new space for expanding the water system and integrating water into the existing urban structure.

LEGEND

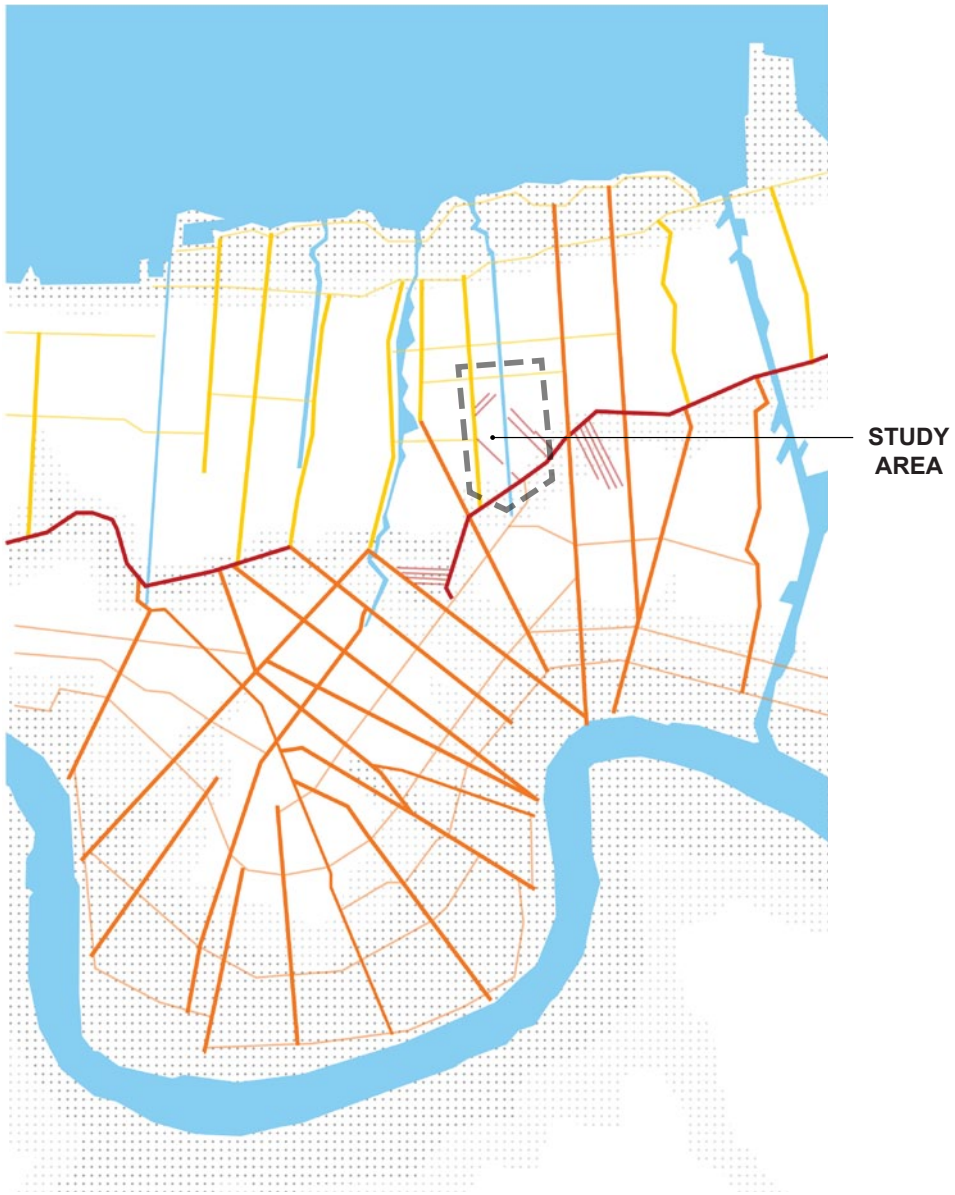
Open Canal
Underground Canal
Pump Station
Primary Street
Secondary Street
Vacant Land

0 2 km

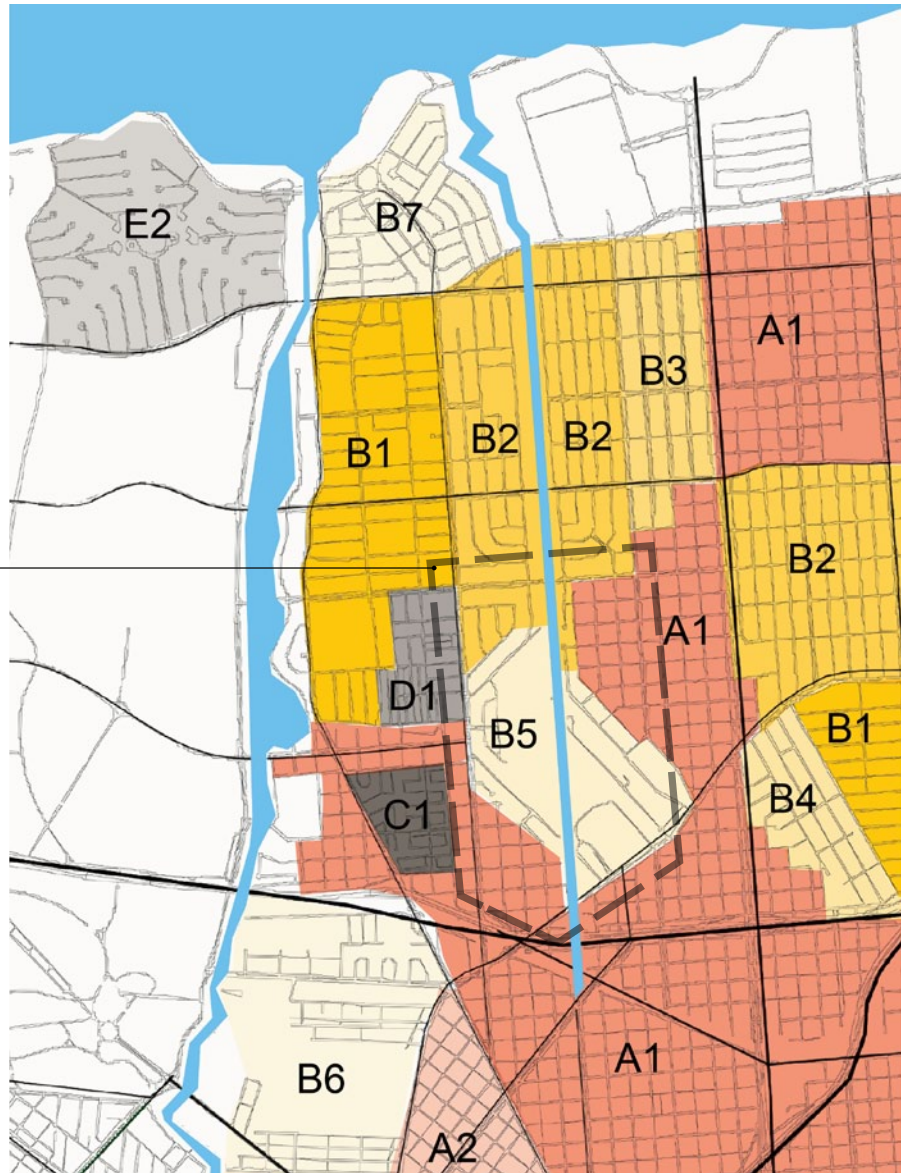
STRATEGIC PROJECT: Relation to Urban Structure

POSITION IN THE CITY: **GRID STRUCTURES**

The site sits at the junction of several major city-wide grid systems. There is the radial grid based on the curving river edge, the rectilinear grid based on the lake edge, and lastly the grid based on Gentilly Ridge. Often throughout the city these grids are not connected to one another in a clear and legible way. This site provides an opportunity to address how these separate grids systems can better merge and connect.



STRATEGIC PROJECT: Relation to Urban Structure



POSITION IN THE NEIGHBORHOOD:
BLOCK STRUCTURES

The city of New Orleans is composed of a variety of block and building typologies. These range greatly in their lot layout, depending on when and where they were built. Immediately surrounding the site there are a variety of block types based on the orientation, dimensions, and structure. Accessibility also varies within the different blocks, with some having alley's, some having courtyards, and others getting vehicular access just off the neighborhood street. Therefore, the type of block is closely tired to the housing typology as well as the overall character of the neighborhood.

BLOCK & GRID TYPES

A1 - square block angle 01
A2 - square block angle 02

B1 - rectangle block angle 01
B2 - rectangle block angle 02
B3 - rectangle block angle 02 wide
B4 - rectangle block angle 03
B5 - rectangle block angle 04
B6 - rectangle block angle 05
B6 - rectangle block angle 07

C1 - courtyard block

D1 - alley block

E1 - cul-de-sac block

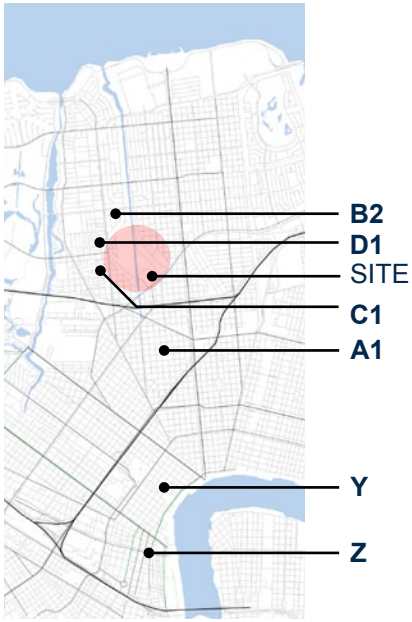
0 2 km

Mississippi River

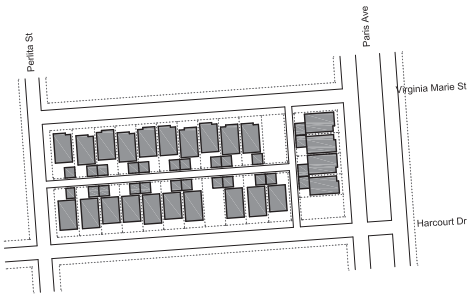
BLOCK TYPOLOGIES: Urban Fabric

In order to understand just what type of character various block types have, they must be studied in more detail. This includes looking at the block structure and parcel layout, as well as density, footprint, and amount of open space.

KEY MAP



D1) **Dillard A**



STATISTICS

Block Dimensions	62 x 167 m
Block Area	10,354 m2 (1.3 ha)
Foot Print Area	4,910 m2 (47%)
Open Space Area	5,444 m2 (53%)
Dwelling Units	24
Density	18 du/ha
Originally Developed	1940's
Architectural Styles	1 Story Ranch Homes

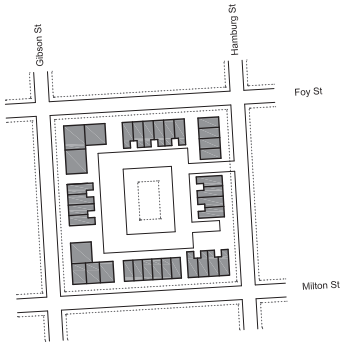
B2) **Dillard B**

STATISTICS

Block Dimensions	76 x 212 m
Block Area	17,252 m2 (1.7 ha)
Foot Print Area	3,122 m2 (18%)
Open Space Area	14,130 m2 (82%)
Dwelling Units	14
Density	8.2 du/ha
Originally Developed	1940's
Architectural Styles	1 Story Ranch Homes

BLOCK TYPOLOGIES: Urban Fabric

C1) St Bernard



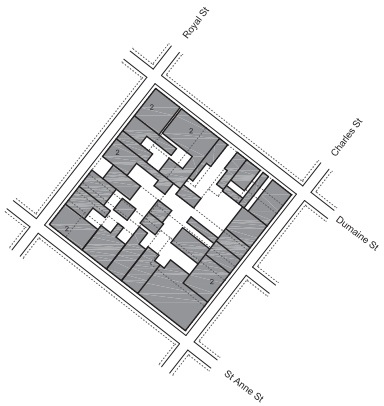
STATISTICS

Block Dimensions	100 x 100 m
Block Area	10,000 m2 (1 ha)
Foot Print Area	3,072 m2 (31%)
Open Space Area	6,928 m2 (69%)
Dwelling Units	35
Density	35 du/ha
Originally Developed	2010
Architectural Styles	Townhomes
	Garden-Style Apartments

1/3 Market Rate, 1/3 Tax Credit, 1/3 Social Housing



Y) French Quarter

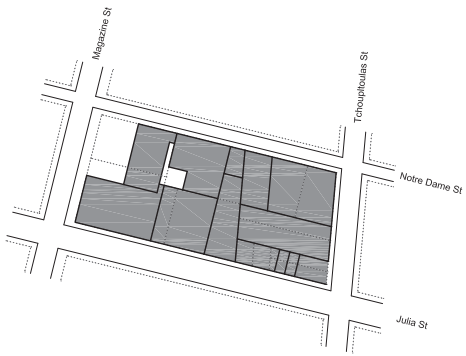


STATISTICS

Block Dimensions	100 x 100 m
Block Area	10,000 m2 (1 ha)
Foot Print Area	7,105 m2 (71%)
Open Space Area	2,895 m2 (29%)
Dwelling Units	27
Density	27.0 du/ha
Number of Shops	13
Originally Developed	1722
Architectural Styles	Creole Townhouse
	Creole Cottage
	Storehouse

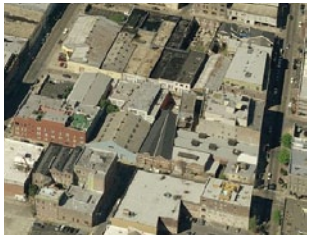


Z) Warehouse District



STATISTICS

Block Dimensions	64 x 145 m
Block Area	9,280 m2 (.9 ha)
Foot Print Area	8,316 m2 (89%)
Open Space Area	964 m2 (11%)
Dwelling Units	*not housing
Density	*not housing
Originally Developed	1788
Architectural Styles	Storehouses



A1) Mid-City

STATISTICS

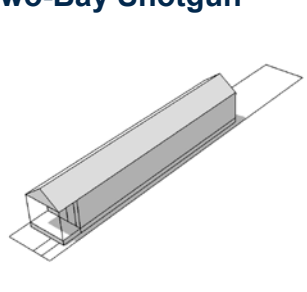
Block Dimensions	100 x 100 m
Block Area	10,000 m2 (1 ha)
Foot Print Area	5,260 m2 (52%)
Open Space Area	4,740 m2 (48%)
Dwelling Units	37
Density	37.0 du/ha
Originally Developed	1895
Architectural Styles	Four Bay Shotgun
	Two Bay Shotgun



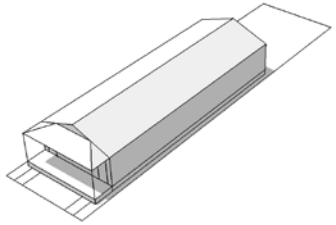
BUILDING TYPOLOGIES: Historic New Olreans

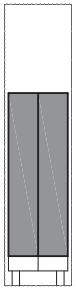
New Orleans is composed of a variety of historic architectural typologies. The city has retained a large amount of 19th century buildings, all of which are a unique combination of climate, location and history. The various settlers of the city brought with them urban housing types such as the Creole Townhouse, the Creole Cottage, and the Shotgun house. The simplicity of these building forms has allowed them to be replicated and built throughout the city. Before proposing new urban forms and buildings, one should have a clear understanding of existing architectural styles and block structures.

Two-Bay Shotgun



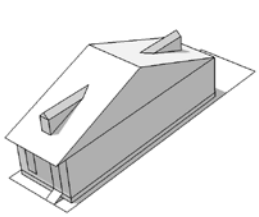
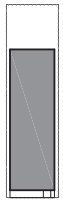
Four-Bay Shotgun





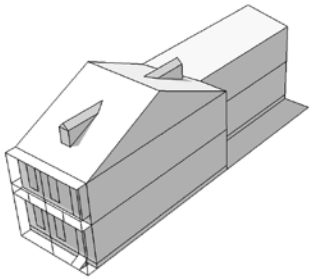
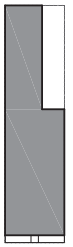
BUILDING TYPOLOGIES: Historic New Olreans

Two-Bay Creole Cottage

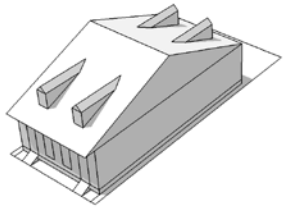
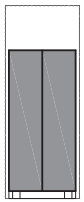





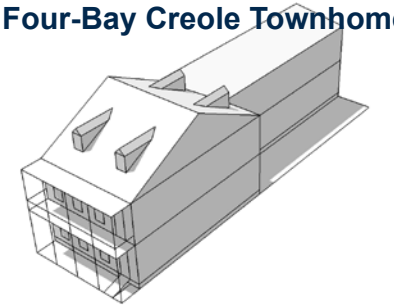
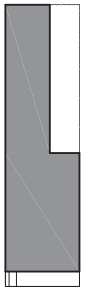
Three-Bay Creole Townhome


Four-Bay Creole Cottage


Four-Bay Creole Townhome



OPEN SPACE TYPOLOGIES

New Orleans has a diverse mix of different open space types throughout the city. These cover the entire spectrum from highly public urban square to personal private garden, and everything in between. By studying these spaces, it becomes clear by whom they are used and how. It also becomes clear where improvement need to be made.

CONCLUSIONS:

- A lack of “semi-private“ open space: smaller scale spaces, stronger sense of ownership, community

- Strong demand for increased accessibility to water, linear recreational opportunities

URBAN SQUARE
Jackson Square

STATISTICS

type of uses: festivals, music, art shows, leisure, people watching
range of users: tourists, residents
range of accessibility: national to local
public */ semi-public / private*

RIVER FRONT
Woldenberg Park

STATISTICS

type of uses: festivals, leisure, music
range of users: tourists, residents
range of accessibility: national to local
public */ semi-public / private*

CITY-WIDE PARK
CIty Park & Audubon Park

STATISTICS

type of uses: sports, leisure, art
range of users: tourists, residents
range of accessibility: regional to local
public */ semi-public / private*

EXISTING OPEN SPACE TYPOLOGIES

LINEAR WATER PARK
Bayou St John & Lake Front

STATISTICS

type of uses: recreation, leisure
range of users: residents
range of accessibility: city to local
public */ semi-public / private*



BOULEVARD PARK
Esplanade & St Charles

STATISTICS

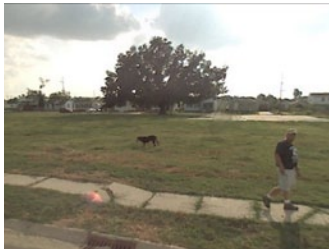
type of uses: recreation, leisure
range of users: residents
range of accessibility: local
public */ semi-public / private*



NEIGHBORHOOD PARK
Mirabeau Park & Pratt Park

STATISTICS

type of uses: recreation, leisure, sports
range of users: residents
range of accessibility: local
public */ semi-public / private*


COMMUNITY GARDEN
Semi-Public Space

**TYPOLOGY LACKING*

STATISTICS

type of uses: recreation,
range of users: immediate residents
range of accessibility: local
public / **semi-public** */ private*



PRIVATE GARDEN
Individual Residence

STATISTICS

type of uses: leisure
range of users: residents
range of accessibility: local
public / semi-public / **private**



Mississippi River

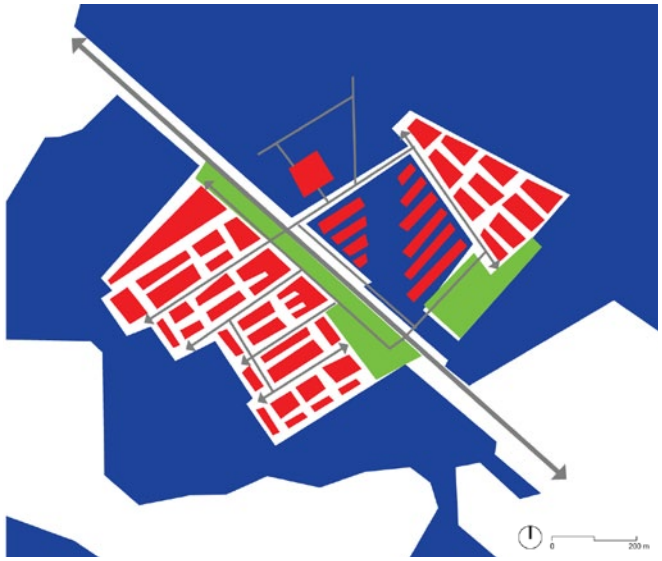
CASE STUDIES: Districts & Water

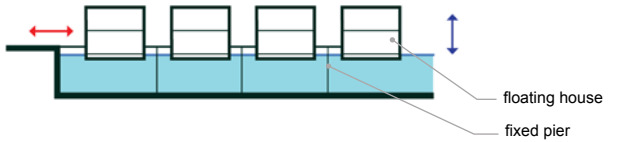
While the block, building, and open space typologies in New Orleans contain a local character, they are lacking the element of water. In order to provide inspiration and better understand the current state of the art of urban design with water, a number of case study projects were studied. These districts were analyzed in terms of their urban form and building typology, both in relation to water, as well as their relation to their larger urban context and comparisons related to their scope and scale.

These recent projects both from the Netherlands and Germany each relate and respond to water in different ways. Unique building typologies address water management and safety both at a district scale and building scale. In some cases it is the responsibility of the building owner to respond to changing water or the resident needs to deal with water storage within his own parcel. Other options allow the building itself to respond to changing water levels automatically, such as a floating building.

AMSTERDAM, Steigereiland

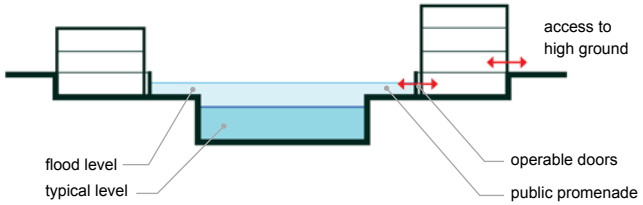
- medium density development
- primarily fixed water level, floating houses can respond to water changes





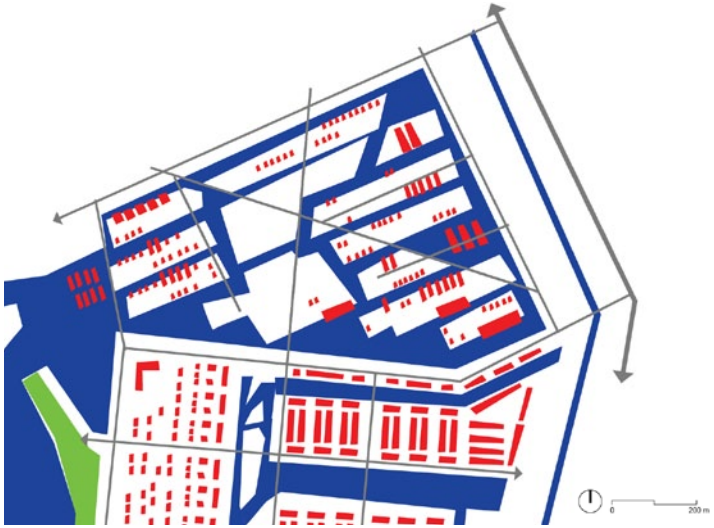
HAMBURG, HafenCity

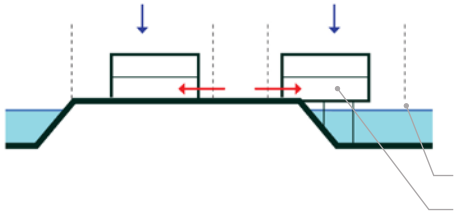
- high density mixed-use development
- barrier buildings and operable doors can respond to fluctuating river levels



ROTTERDAM, Nesselande

- medium and low density development
- individual parcels responsible for addressing water storage, variety of responses: elevated, floating, on land





NEIGHBORHOOD CONNECTIONS: Context & Design Influences

GRID SYSTEMS

As previously described, the site is located at the junction of several major grid systems. The dominant Lake Grid is based of the lake edge to the north, while the Ridge Grid is clearly secondary and clashing with the main grid. However, its impact in the area is significant. It is the organizing structure of the university and its influence extends across the canal. On only one of the three sides where these grids meet are they integrated. This is done by the lake grid curving to meet the Ridge Grid. The majority of borders within the vacant land are defined by the Ridge Grid.

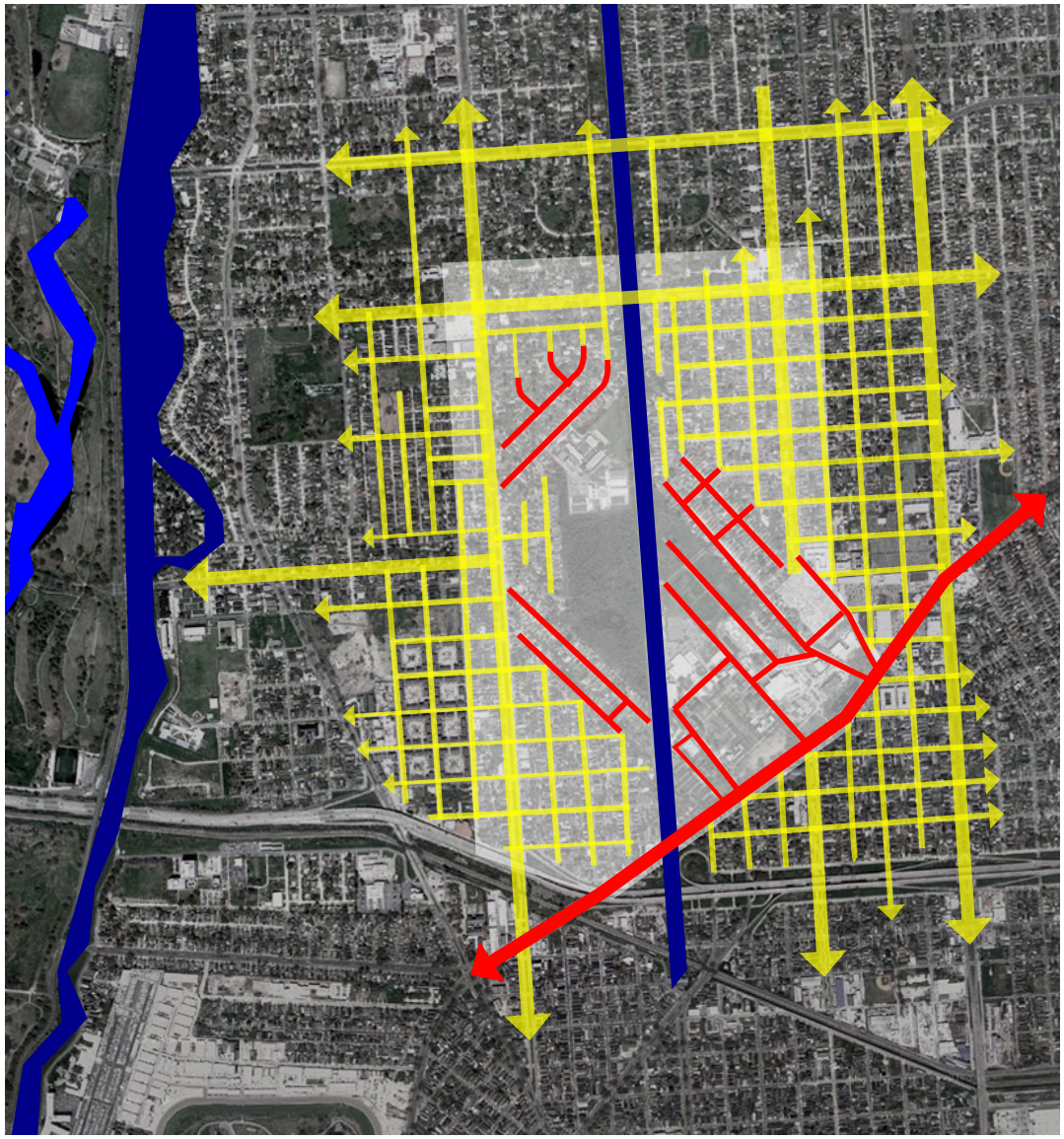
Options of how to address conflicting grids:

1) Strengthen Contrast
+ highlights and exposes the differences
- often leads to poor and inefficient circulation and parcelization

2) Better Integrate
+ increased efficiency in circulation and parcelization
- obviousness of differences is lessened

Goals of grid design:

- Increase integration while ALSO exposing differences
- More emphasis should be placed on the Ridge Grid as it is a remnant of an important historical structure (Gentilly Ridge) and is unique and different within the area
- The Ridge Grids' range of influence should extend further into the surrounding neighborhood



NEIGHBORHOOD CONNECTIONS: Context & Design Influences

OPEN SPACE & COMMUNITY FACILITIES

There are a number of existing community facilities in the immediate vicinity of the site. These include several educational institutions: Dillard University, Akili Arts and Technology Academy, as well as a Gregory Junior High School and Elementary School. These educational facilities are currently separated by the canal, but by creating a more open bayou with numerous crossings, it is possible to create an educational campus built around the expanded bayou environment. At the center of this educational campus will be a new community learning center. This new cultural building will serve the purpose of better connecting adjacent neighborhoods, strengthening existing communities that were damaged by the hurricane, and highlighting the opportunities of living with water.

Also in the vicinity of the site several retail areas serving the immediate community and beyond. A new pedestrian oriented open space network can serve to better connect these community facilities to each other as well as to adjacent neighborhoods. The open space network can also tie into the existing boulevard system which extends further into the city as well as connects directly to City Park and Bayou St John to the west.

THE URBAN BAYOU: Existing Figure Ground

A before and after comparison of the figure ground of the district reveals many striking differences. First, in the existing map it is clearly visible the amount of missing homes along the canal, with large amounts of vacant land. These are the few houses that will be relocated to make way for the expansion of the canal and the creation of the super levee. It is also visible the old school facilities that will be rebuilt within the new bayou zone.

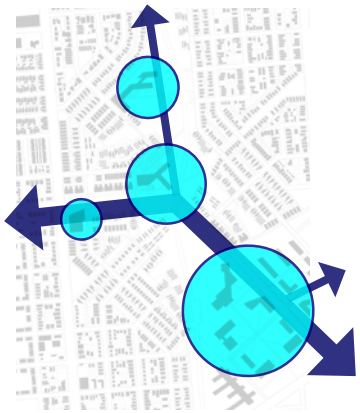
The proposed figure ground shows the new fabric of the neighborhood. The historic New Orleans housing typologies have been modified to tolerate fluctuating water and are arranged within new block structures to reinforce the two grid systems. The new street and block pattern also creates a more ordered and hierarchical system of circulation, putting strong emphasis on the major routes. The end result is both a higher density district, as well as more functional circulation and access to open space.

Several main concepts dictated the overall layout of the district, most of which derived from the surrounding context and existing conditions. A hinge anchored by the primary public facilities is used to connect both the various grids as well as guide the dominant pedestrian traffic routes. Further emphasis is placed on the “ridge grid” by extending it further into the surrounding blocks, and at the same time increasing connectivity to the “lake grid.” Detail is paid to the arrangement of front and back (public & semi-public/private) space. Internal intimate and smaller semi-public spaces are geared towards local residents. Urban public edges complement the dominant pedestrian traffic routes leading to major public facilities adjacent to the site. Lastly, when housing borders a bayou, there is a contrast between hard and soft (public and semi-public) edges to create a diverse environment and guide movement within the site.

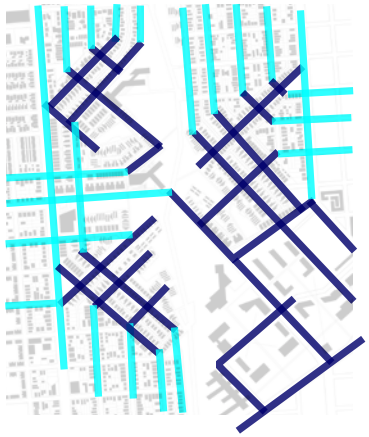
THE URBAN BAYOU: *Proposed* Figure Ground

CONCEPTS

Hinge



Merging Grids

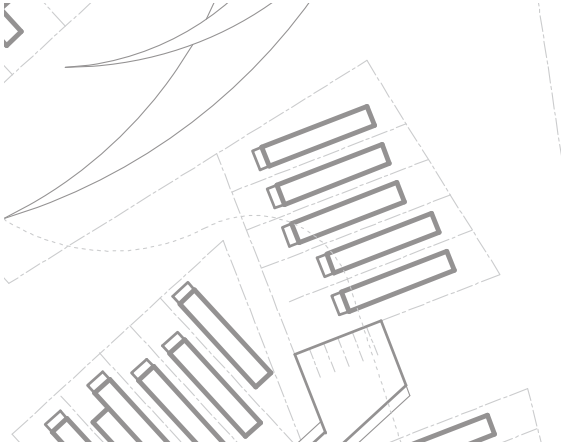


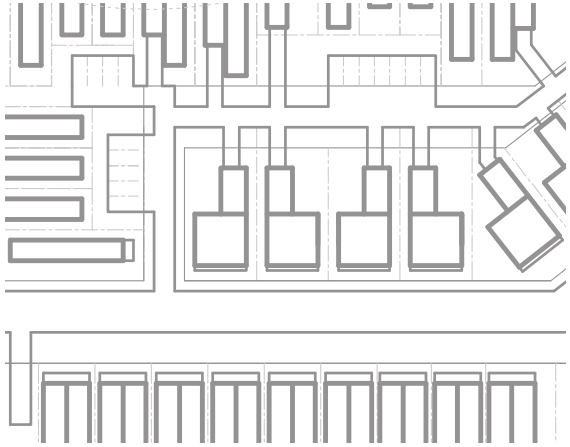
Front vs Back

THE URBAN BAYOU: Master Plan

THE URBAN BAYOU: Master Plan

Details





THE URBAN BAYOU: Water System

Space for water is one of the primary objectives of this neighborhood infill project. By elevating the blocks surrounding the canal to form a super levee, the development can provide substantial room for the London Avenue Canal to overflow its typical water level, something that would happen during major storms and surges, without causing damage to the surrounding community. Within the new housing clusters, water will drain towards small community gardens where it can be collected and reused for activities such as urban agriculture.

During very extreme surge events when the levee can't handle the height of the water, it can overflow at strategic points directly into the adjacent neighborhood system where there is considerable extra space for water storage. The underground canal on Paris Ave will be brought to the surface and incorporated into the streetscape. A new canal will be added to Harrison Ave that will further drain the immediate neighborhood and connect to Bayou St John and the City Park water system to the west. Numerous neighborhood streets will be renovated to incorporate bioswales. Further, parks and vacant parcels will also be retrofitted to store excess water during peak times.

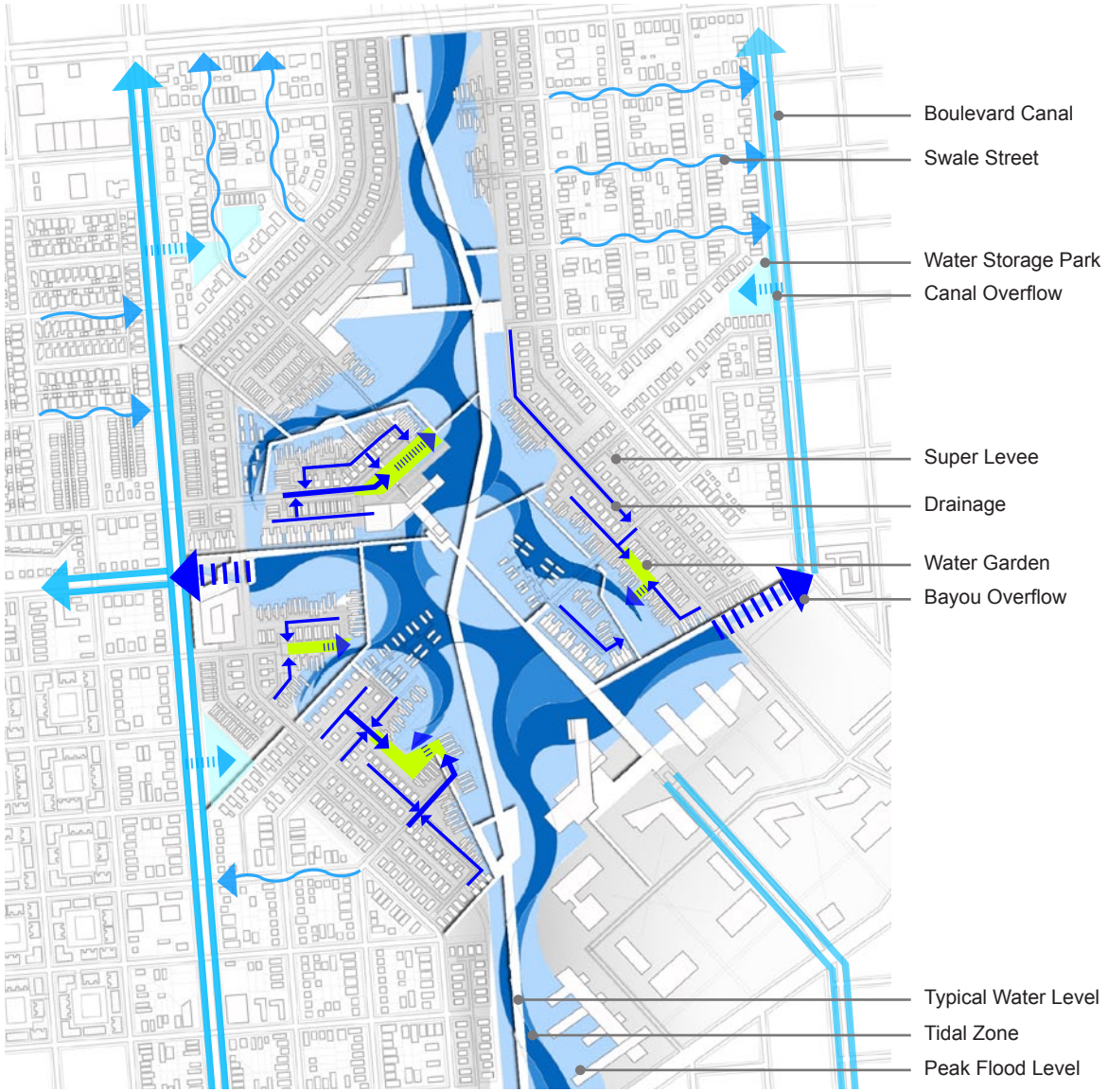
LEGEND

Bayou Corridor
Tidal Zone
Max Flood Level

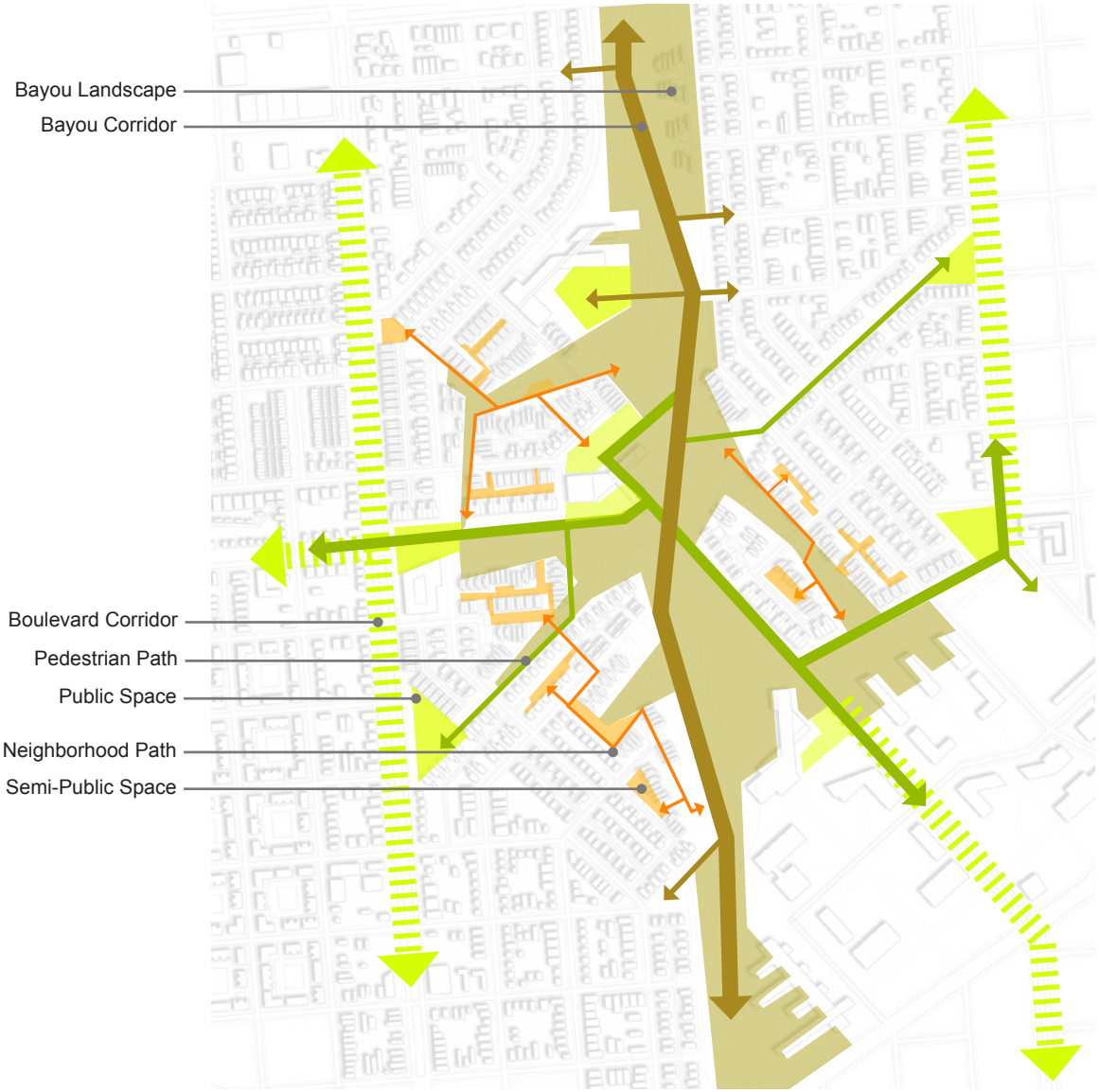
District Drainage
Agriculture Water Garden
Bayou Inlet
Bayou Overflow
Super Levee

Boulevard Canal
Canal Overflow
Neighborhood Swale
Water Storage Area

0 200m



THE URBAN BAYOU: Open Space Network



There is a distinct hierarchy to the open space system within the site as well as how it connects to the surrounding network which mimics the larger open space hierarchy defined for the city. The bayou recreational corridor is the main pedestrian route that goes through the site with numerous connections to the adjacent neighborhoods. Secondly, there is another system of pedestrian paths that connect the educational and community facilities within and bordering to the site. These routes also connect directly to several public parks and squares. Lastly in the hierarchy is the local neighborhood oriented pedestrian paths. These fall into the category of “semi-public” spaces as they are geared towards local residents, while also connecting to small-scale community gardens.

LEGEND

Existing Boulevard Corridor
Bayou Corridor
Primary Pedestrian Path
Neighborhood Pedestrian Path

Bayou Landscape
Public Space
Semi-Public Space

0 200m

THE URBAN BAYOU: Sections

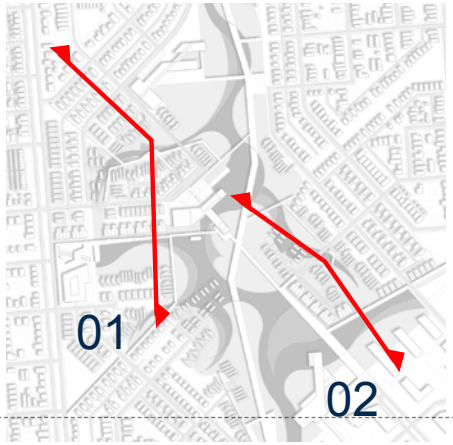
SECTIONS

These sections provide more detail into how the buildings, landscape and water interact. The extra space and fluctuating water levels can mimic historic conditions, allowing the creation of natural environments such as marshes and cypress forests. In addition, during times of low water these landscapes can provide opportunities for recreation, hiking, and other activities.

BUILDING TYPOLOGIES

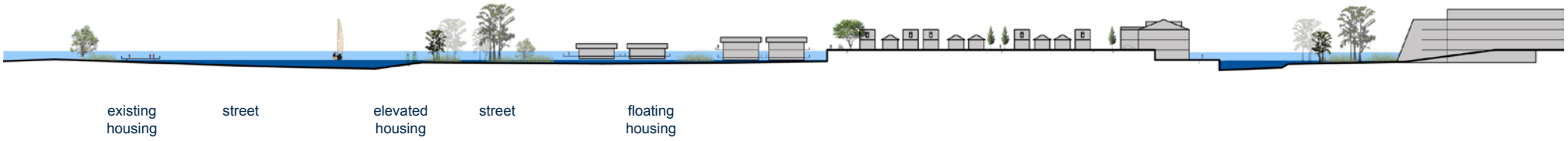
A variety of different building typologies will respond to the fluctuating water levels. As explored in the case studies, there will be elevated buildings, floating buildings and barrier buildings. Elevated buildings will be raised above the water on stilts, allowing space for water to fluctuate beneath the building. Floating buildings can respond to fluctuating water levels by rising and falling with the water. The facades of barrier buildings are able to withstand rising water levels, by using strong materials and/or closing large doors and windows during high water. These different building typologies are located throughout the development and will showcase different ways it is possible to live with water.

KEY MAP



Section 01

Section 02



THE URBAN BAYOU: Building Typologies

Barrier Building

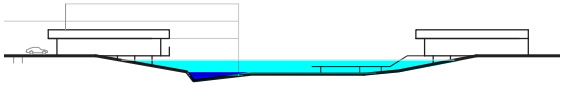
Typical Water

Max Water

Elevated Building

Typical Water

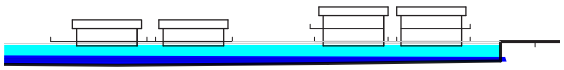
Max Water

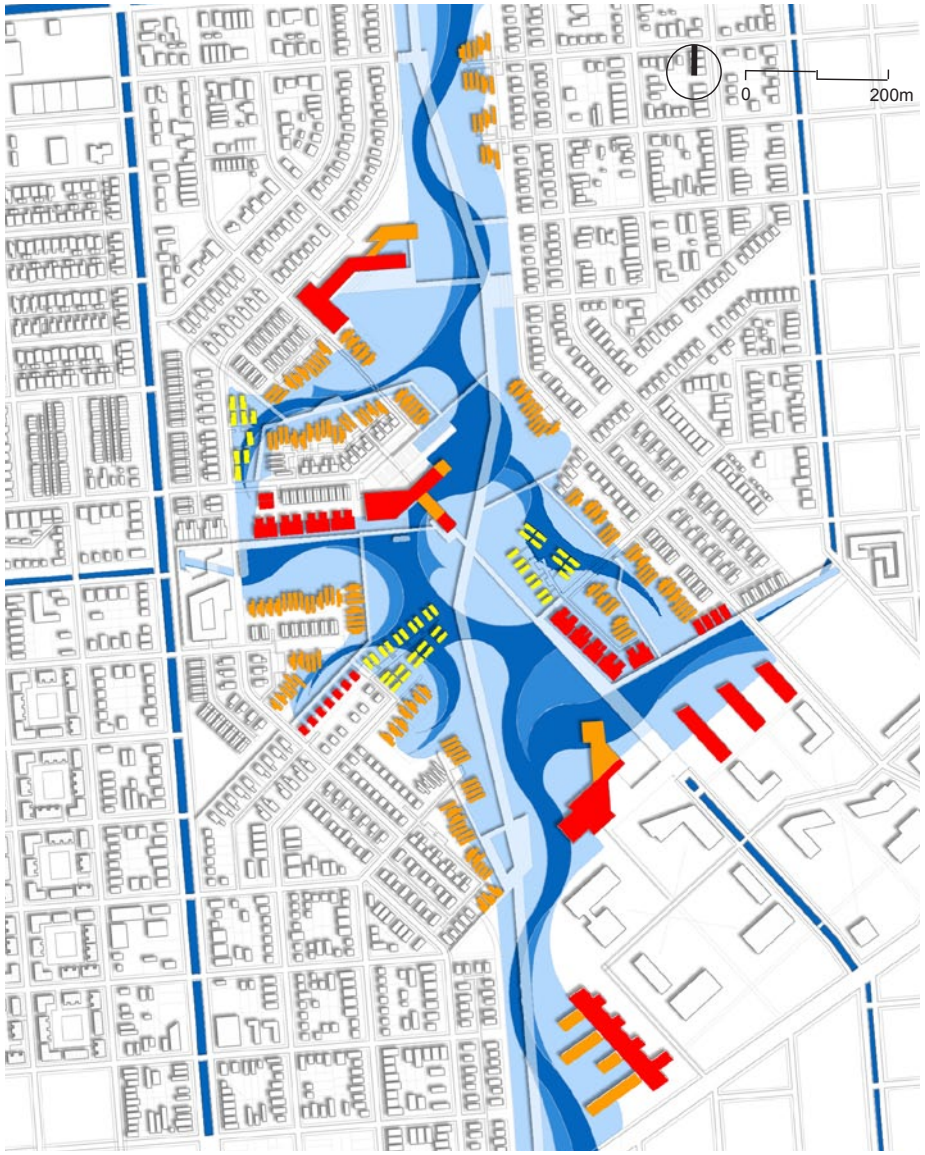


Floating Building

Typical Water

Max Water





Mississippi River

THE URBAN BAYOU: Block Typologies

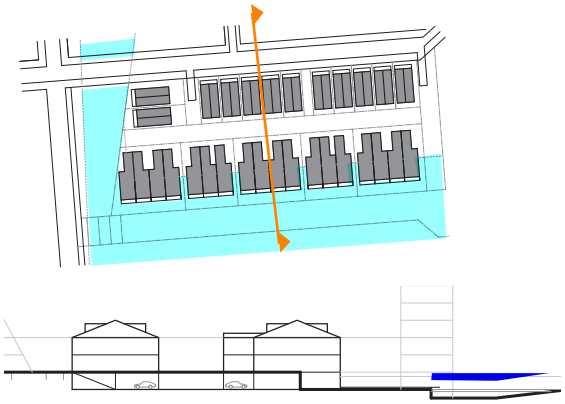
01 Water Edge Block

CONCEPT

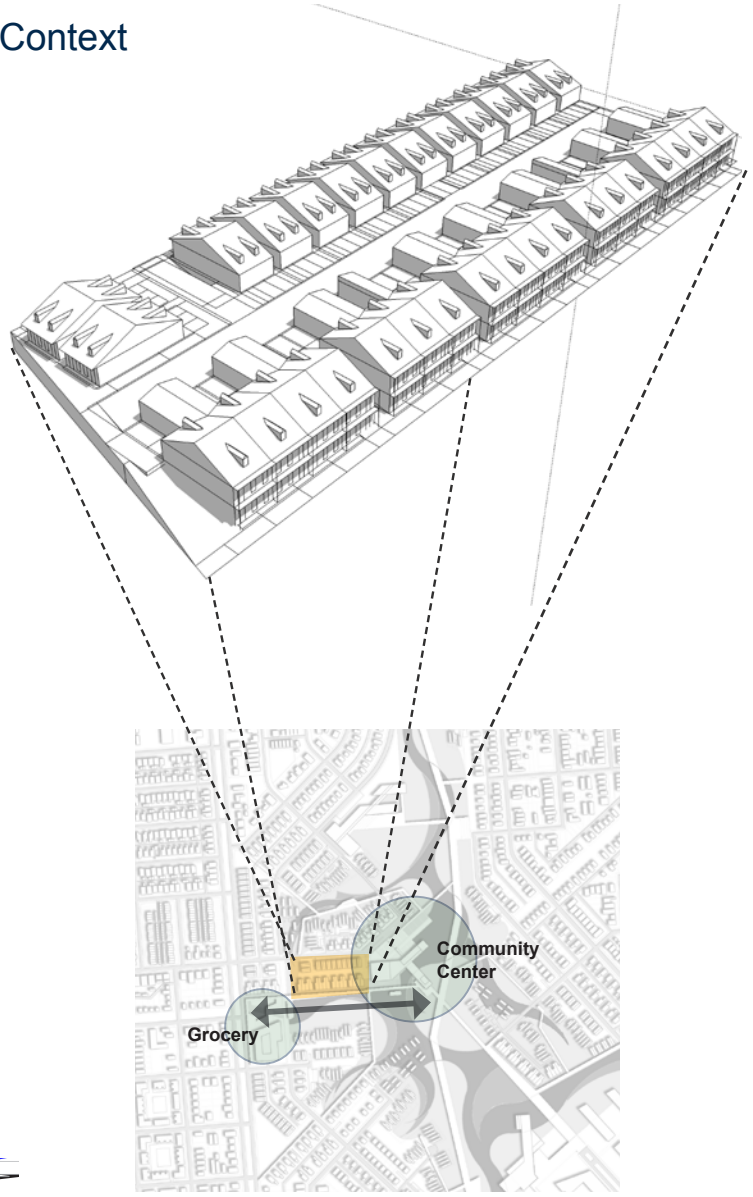
This block serves to connect Paris Ave and the grocery store with the community center through a continuous urban edge. Vehicular accessibility is accommodated through an underground parking garage beneath the entire block. In this way the streetscape facades can be without cars and instead contain porches and pedestrian oriented architectural elements. In addition, the space above the parking garage in the center of the block can be both private and semi-private green space for the residents.

STATISTICS

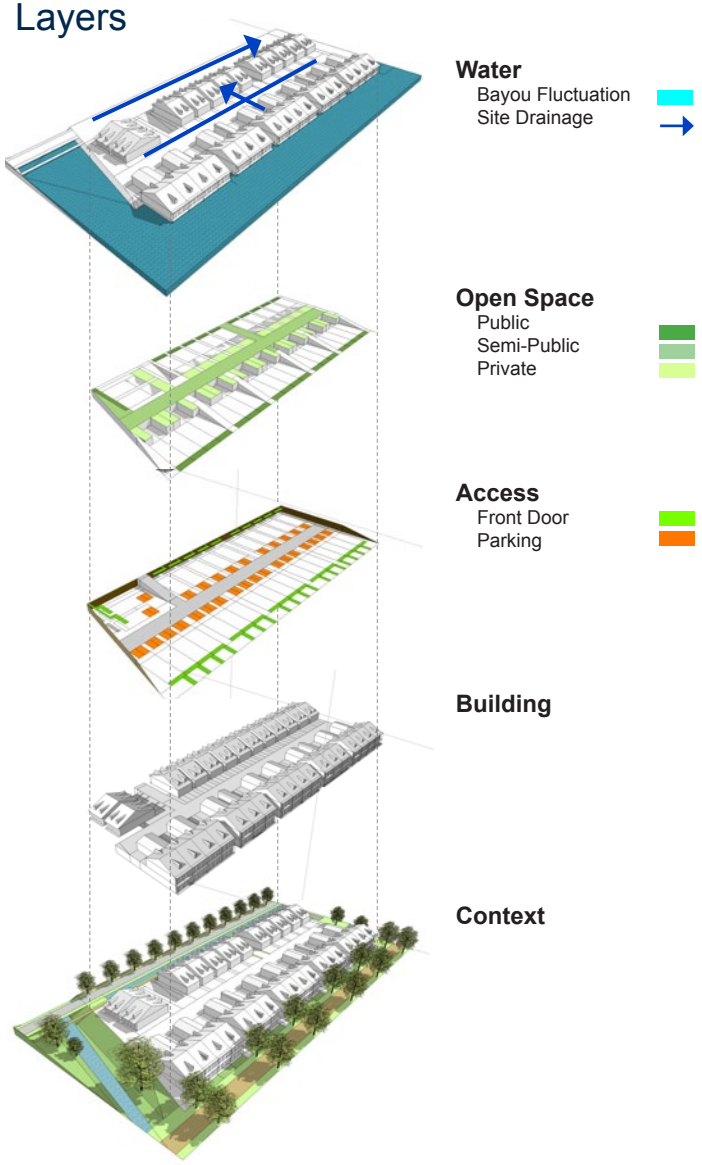
Block Dimensions	70 x 160 m
Block Area	11,304 m2 (1.1 ha)
Foot Print Area	5,508 m2 (48%)
Open Space Area	5,796 m2 (53%)
Floodable Area	1,346 m2 (12%)
Dwelling Units	42
Density	38.2 du/ha
Architectural Styles	Barrier Creole Townhouse Creole Cottage



Context



Layers



THE URBAN BAYOU: Block Typologies

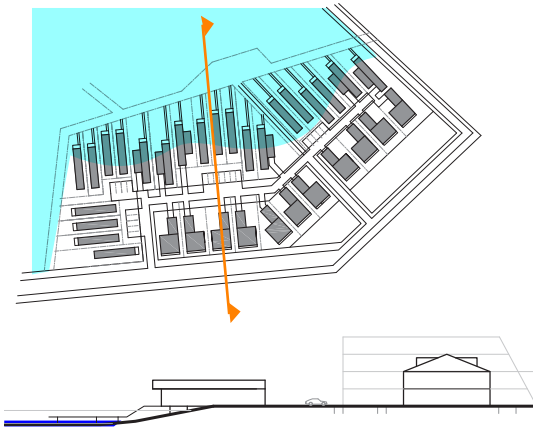
02 Elevated Housing Block

CONCEPT

This typical block provides two types of edges, both a public and semi-public edge. The more urban edge on the south addresses a green space adjacent to the community center, while the north side of the block is oriented towards a small-scale bayou environment, geared towards only local residents. Vehicular access is provided by an alleyway in the center of the block allowing access to both personal garages and shared separate parking spaces.

STATISTICS

Block Dimensions	+/- 80 x 200 m
Block Area	15,045 m2 (1.5 ha)
Foot Print Area	4,104 m2 (27%)
Open Space Area	10,941 m2 (73%)
Floodable Area	4,026 m2 (26%)
Dwelling Units	33
Density	22.0 du/ha
Architectural Styles	Creole Cottage Elevated Shotgun



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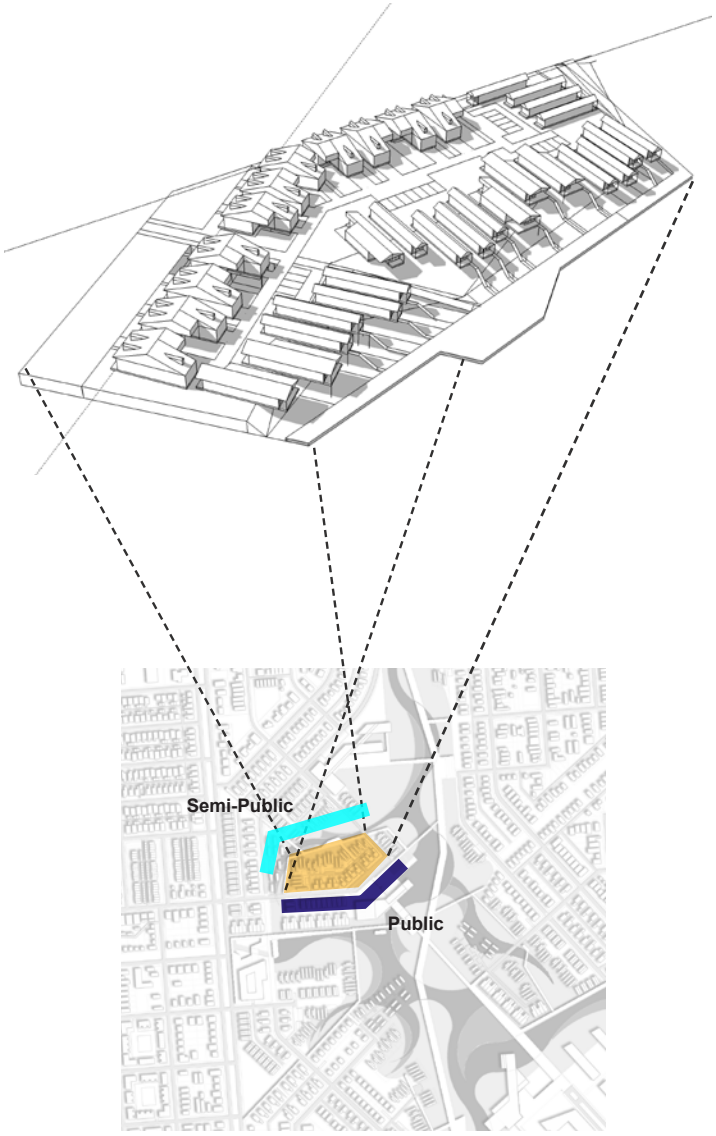

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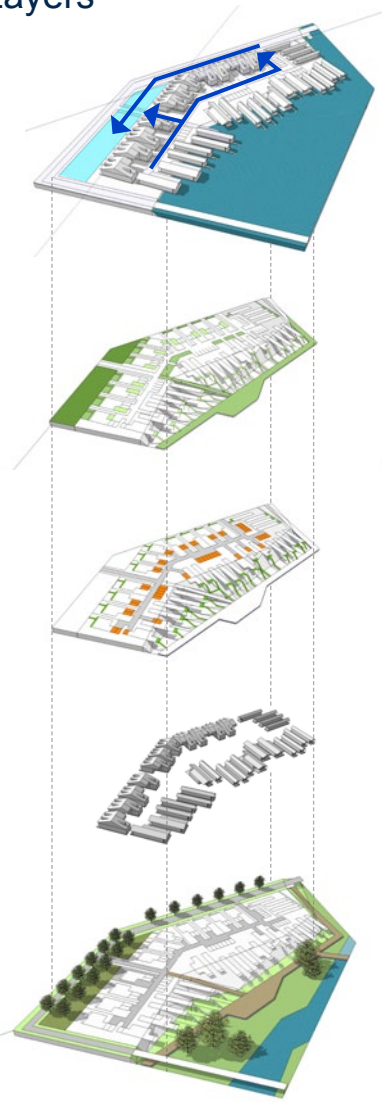


Water
- Bayou Fluctuation
- Site Drainage
- Reuse & Infiltration

Open Space
- Public
- Semi-Public
- Private

Access
- Front Door
- Parking

Building

Context

THE URBAN BAYOU: Block Typologies

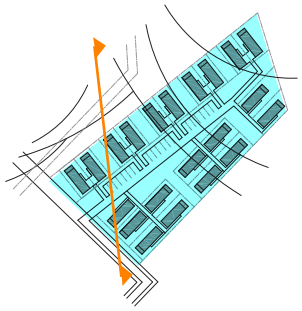
03 Floating Block

CONCEPT

This is a typical floating housing block in that its accessibility happens internally while externally the block is very visible to the surrounding neighborhoods as it is projecting out into the water. A stationary pier extends out from the high ground providing detached vehicular parking. Accessibility to the houses occurs via platforms that are fixed to both the homes and pier but that can move up and down with the water.

STATISTICS

Block Dimensions	+/- 60 x 129 m
Block Area	7,572 m2 (0.7 ha)
Foot Print Area	1,711 m2 (22%)
Open Space Area	5,860 m2 (78%)
Floodable Area	7,572m2 (100%)
Dwelling Units	30
Density	22.0 du/ha
Architectural Styles	Floating Creole Cottage



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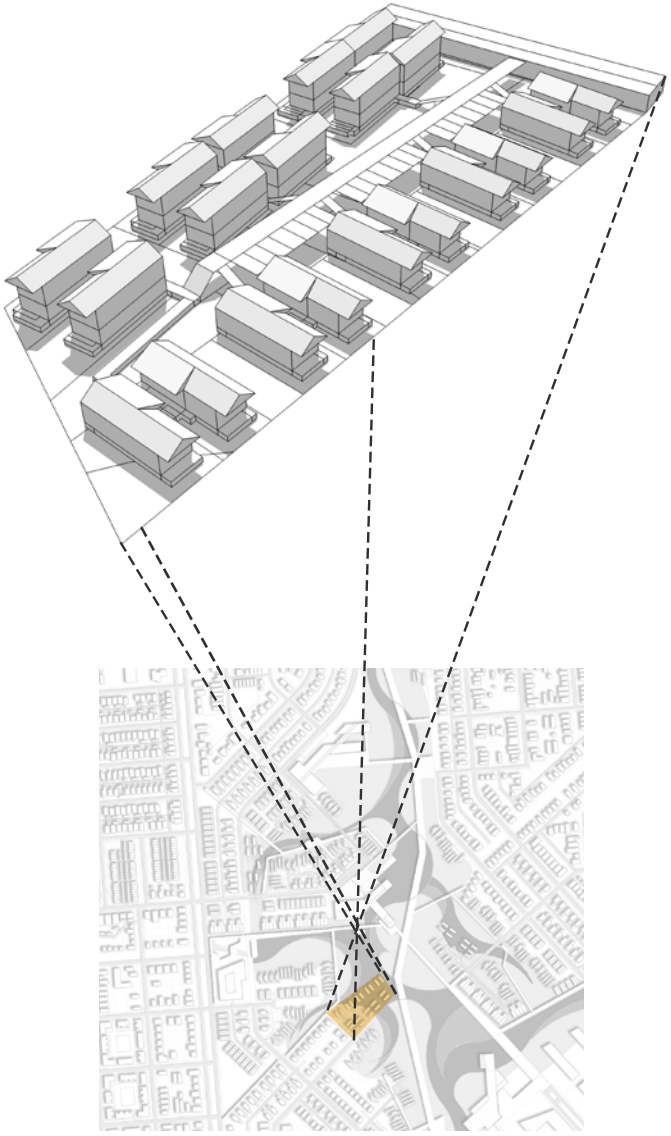


Layers

Water
Bayou Fluctuation

Open Space
Public
Semi-Public
Private

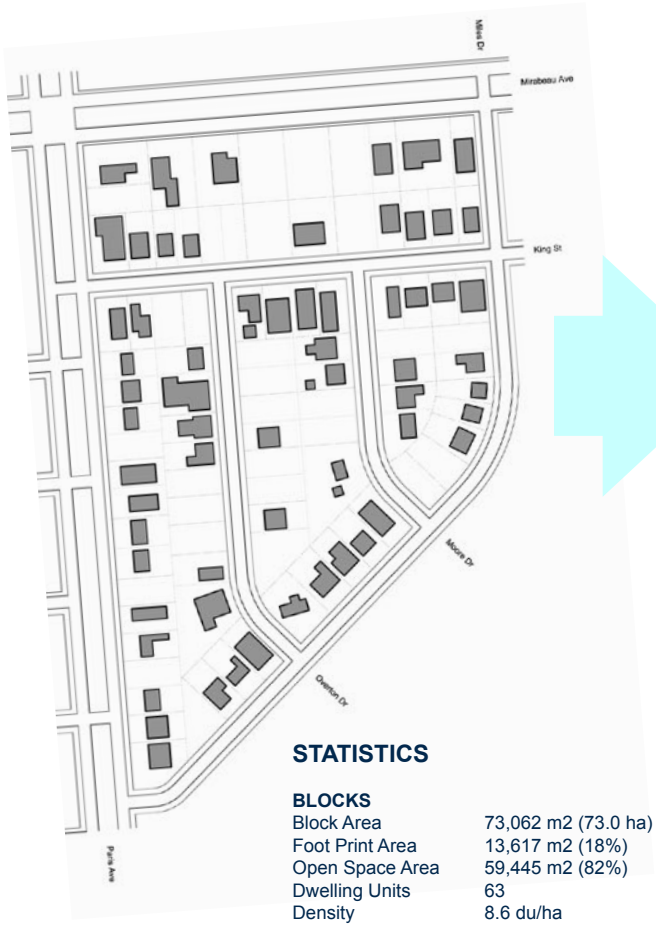
Access
Front Door
Parking

Building

Context

VASCULAR NETWORK: Retrofitting Existing Blocks

BLOCK STRUCTURE **BEFORE**



STATISTICS

BLOCKS

Block Area	73,062 m2 (73.0 ha)
Foot Print Area	13,617 m2 (18%)
Open Space Area	59,445 m2 (82%)
Dwelling Units	63
Density	8.6 du/ha
Originally Developed	1940's
Architectural Styles	1 Story Ranch Homes

STREETS

Total ROW Area	47,705 m2 (47.7 ha)
Paved Area	23,989 m2 (50%)
Open Space Area	23,760 m2 (50%)

BLOCK STRUCTURE **AFTER**

+52 dwelling units
+2.4 ha water storage

- bioswale & mid-block crossing
- bioswale
- individual parcel retention area
- housing infill: 4-bay shotgun unit
- housing infill: accessory dwelling unit
- block retention area
  secondary functions can include park, recreation & urban agriculture
- canal

STATISTICS

BLOCKS

Block Area	73,062 m2 (7.3 ha)
Foot Print Area	20,449 m2 (28%)
Water Retention Area	12,835 m2 (18%)
Other Open Space Area	39,778 m2 (54%)
Dwelling Units	115 (+52)
Density	15.7 du/ha

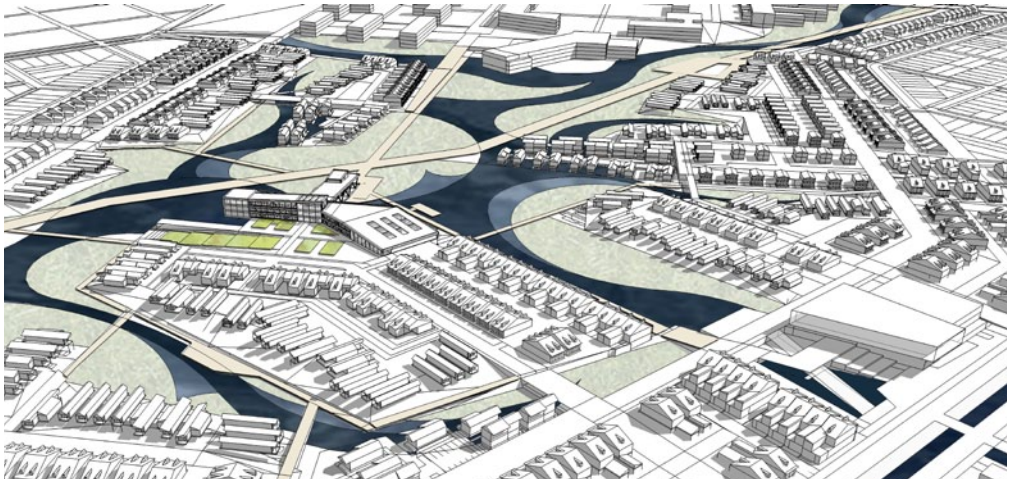
STREETS

Total ROW Area	47,705 m2 (47.7 ha)
Paved Area	22,902 m2 (48%)
Water Retention Area	12,357 m2 (26%)
Other Open Space Area	12,440 m2 (26%)

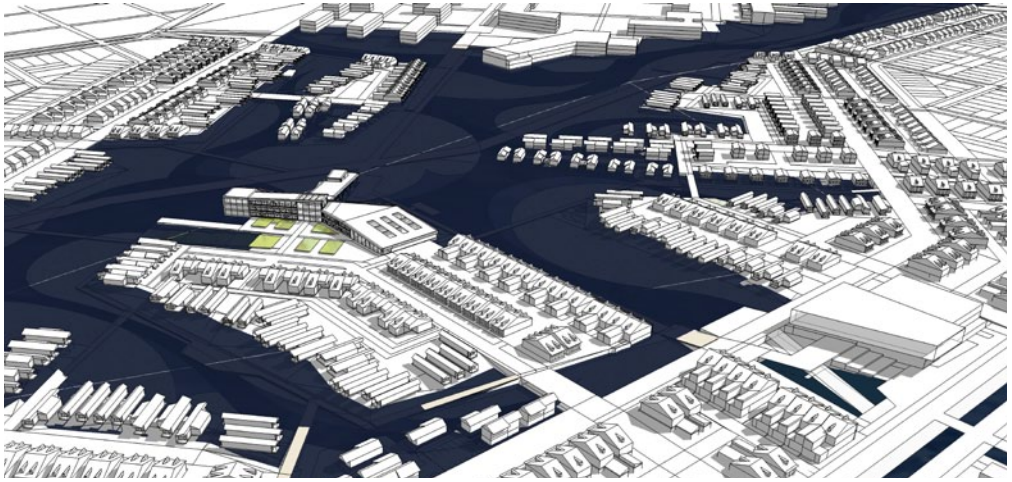
Key Map

THE URBAN BAYOU: Neighborhood Views

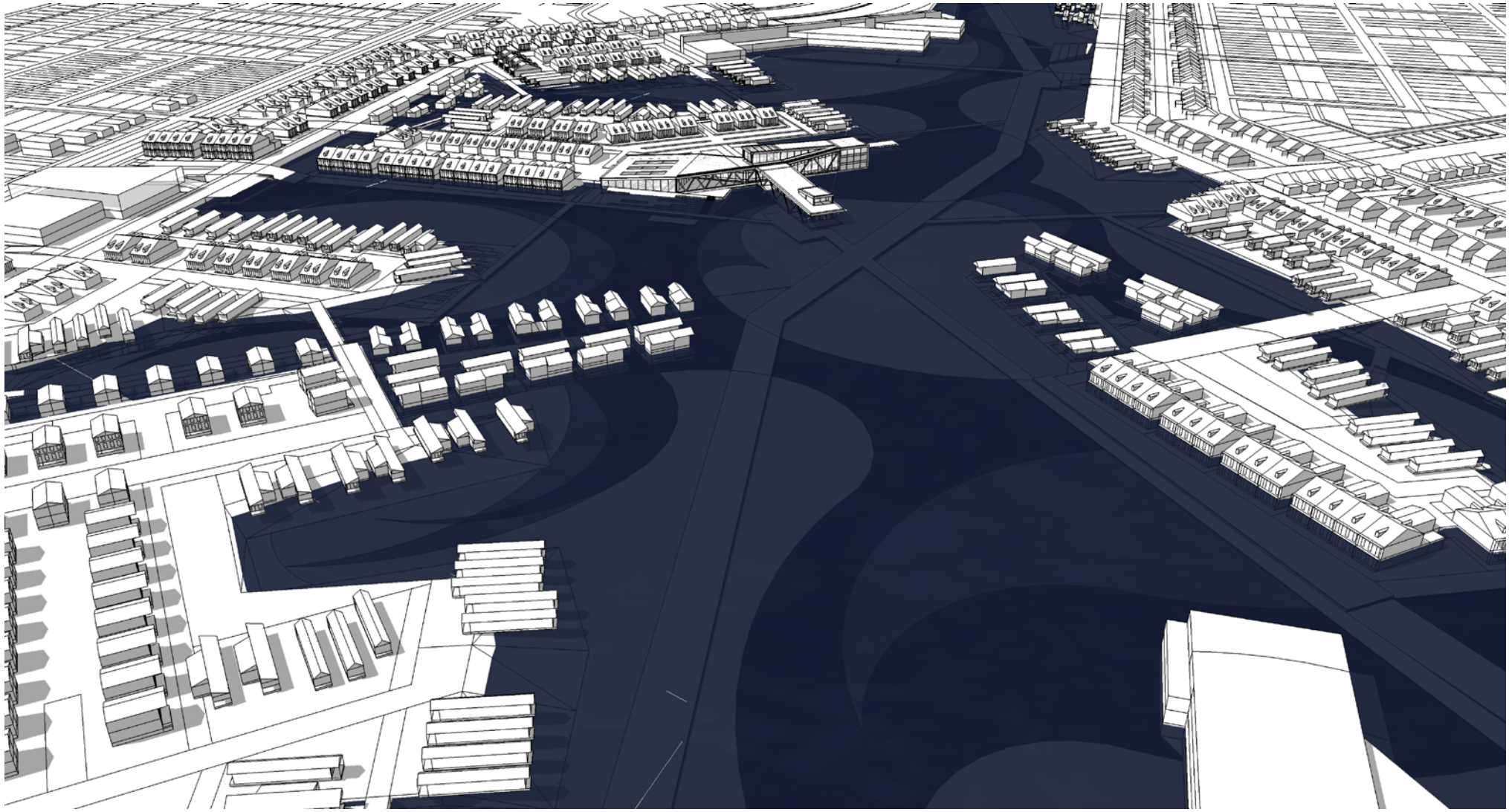
Typical Water Level



Peak Water Level



THE URBAN BAYOU: Neighborhood Views



THE URBAN BAYOU: Neighborhood Views

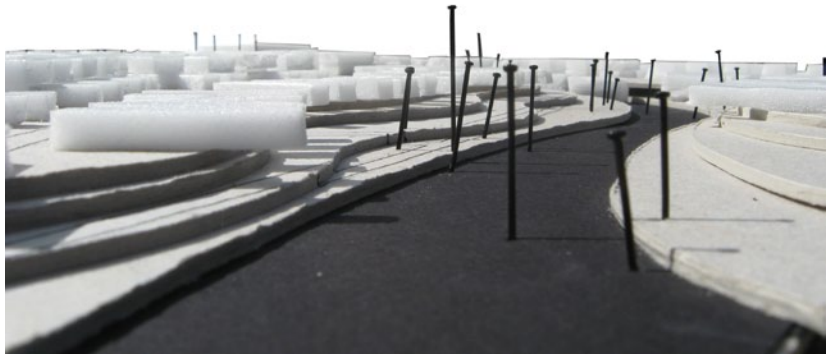
Bayou Promenade

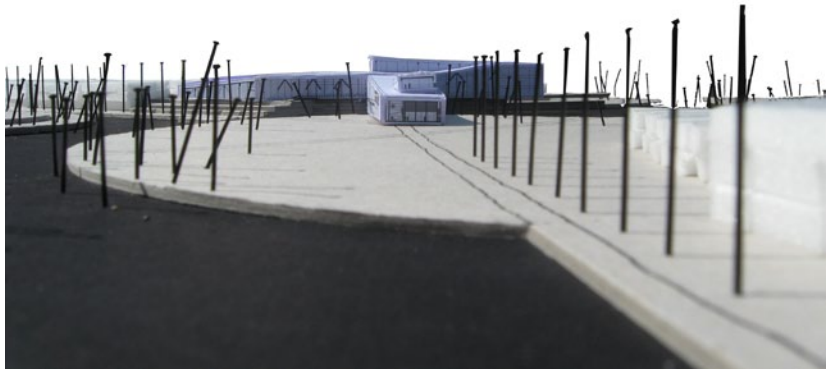
THE URBAN BAYOU: Neighborhood Views

Community Garden

PHYISCAL MODEL

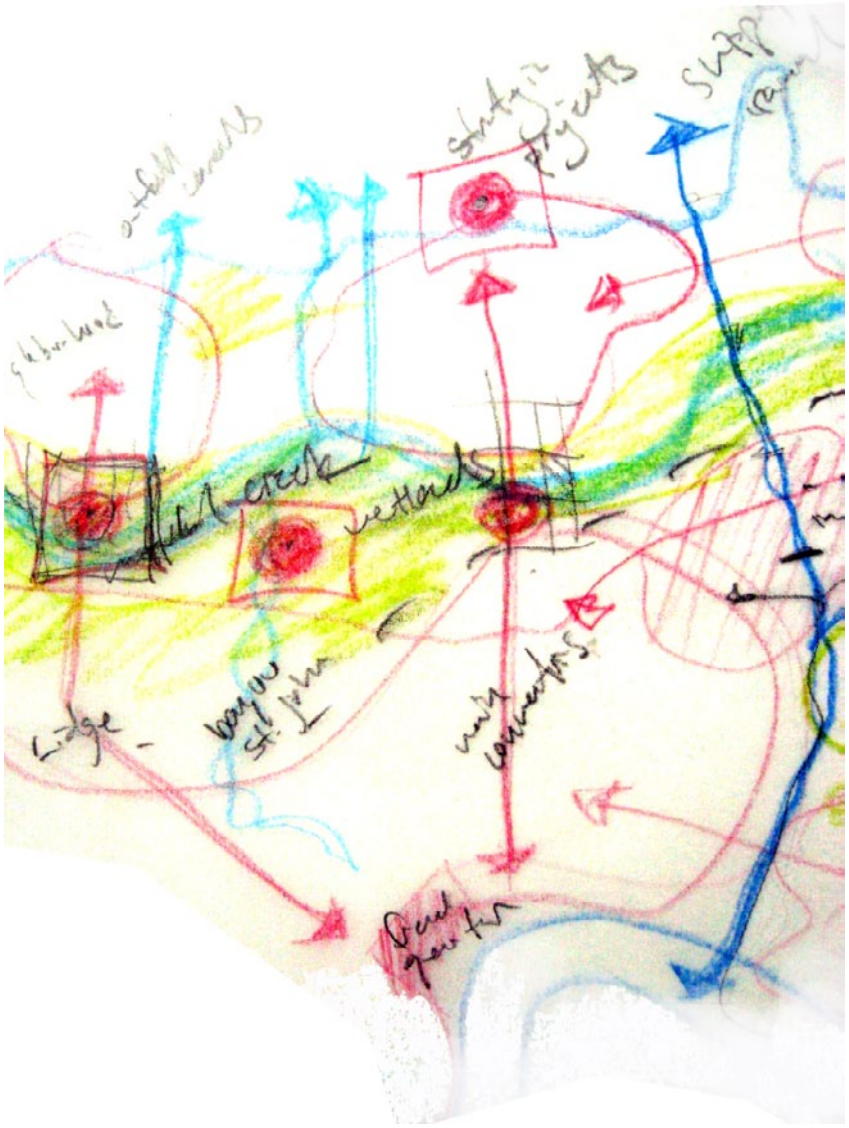
A1 Base / 1:750 Scale

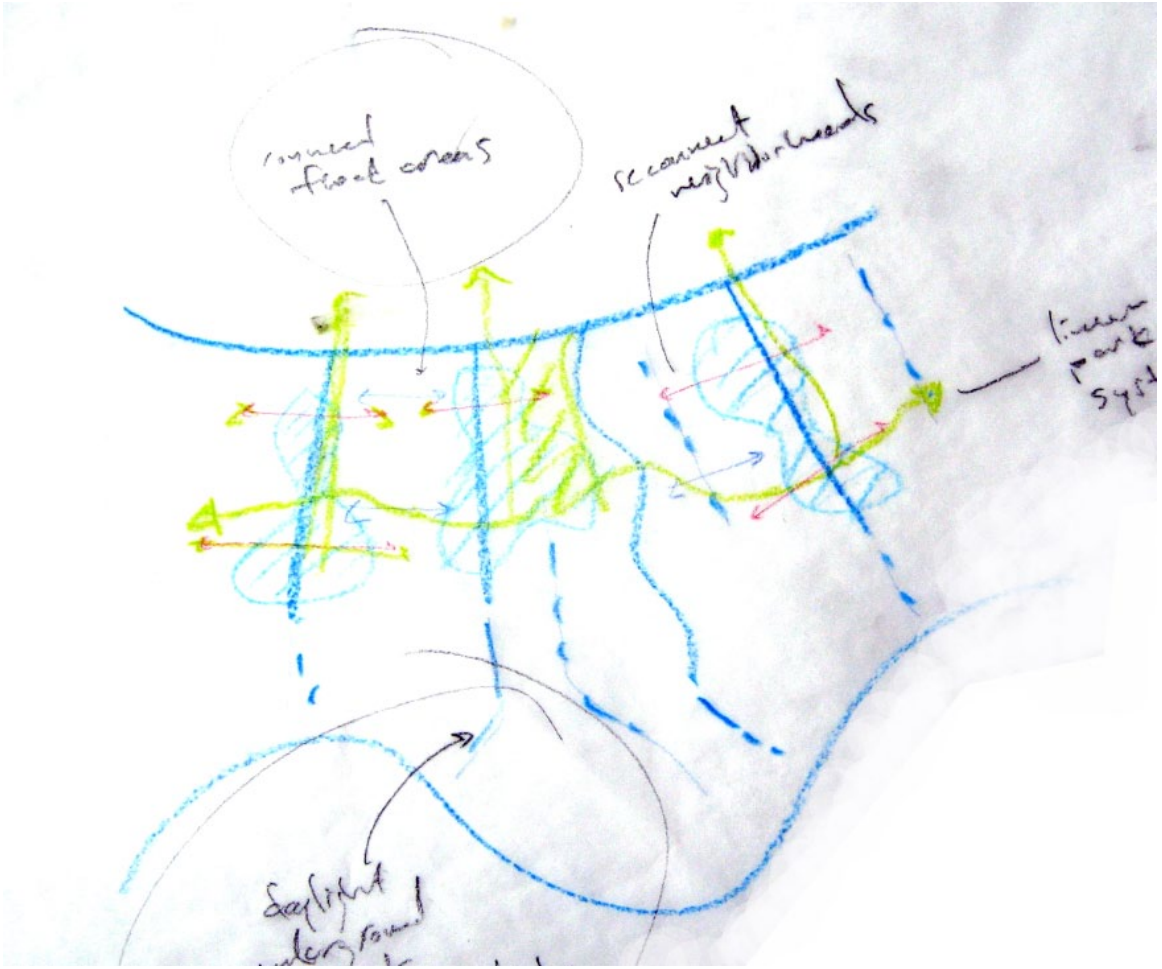


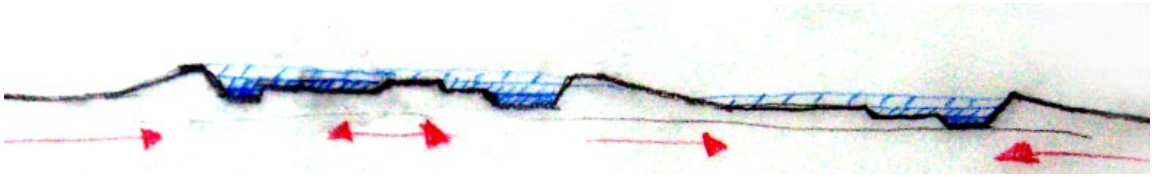


Mississippi River

PROCESS SKETCHES: City Water Strategy

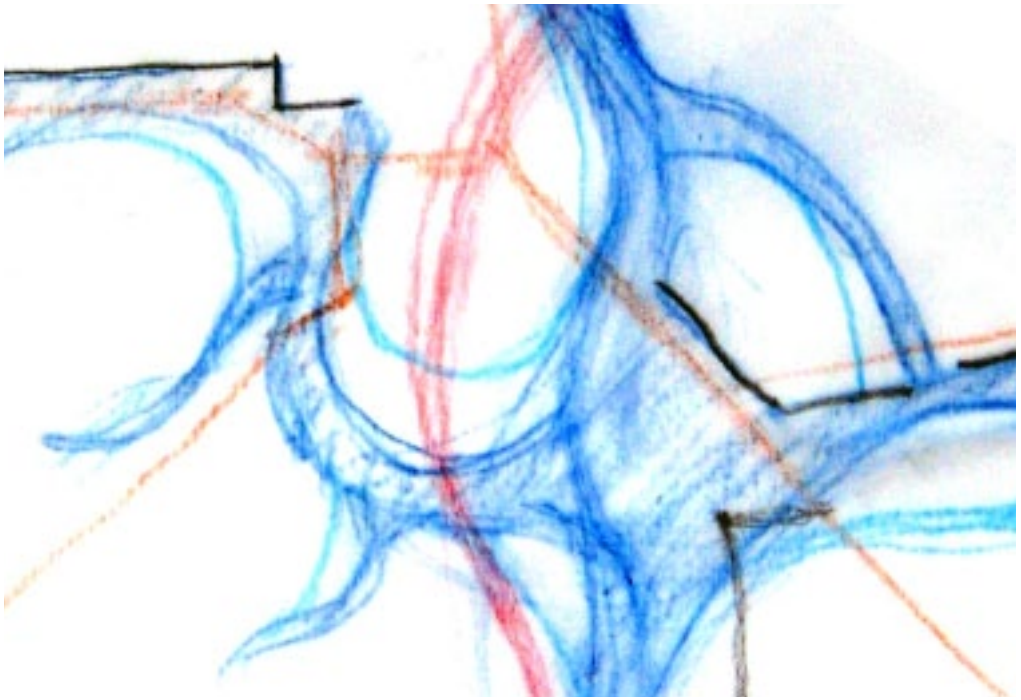




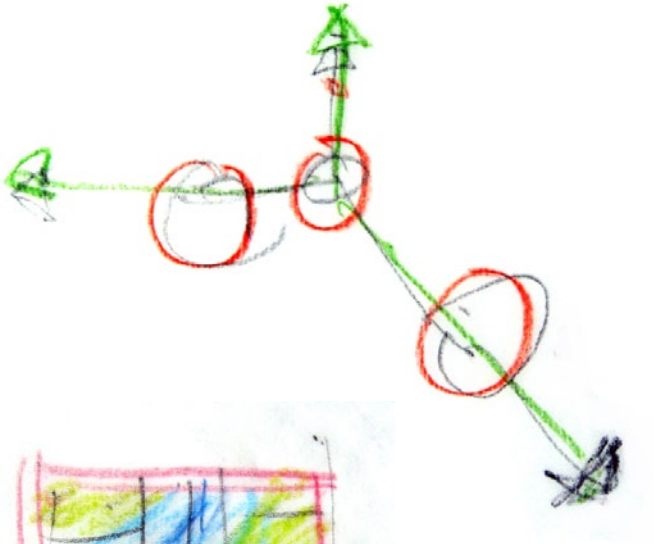


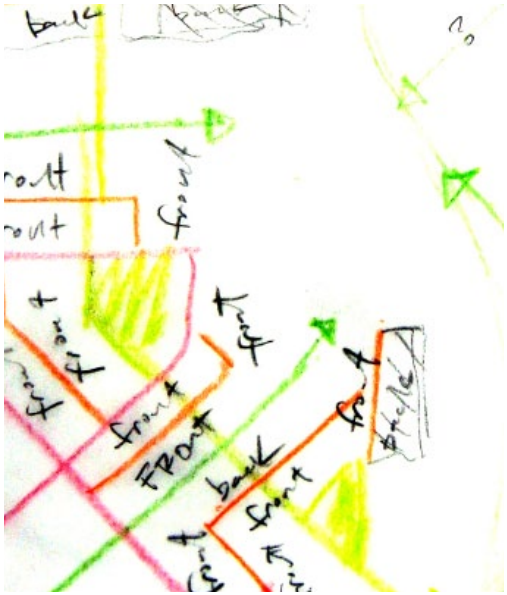
PROCESS SKETCHES: City Water Strategy

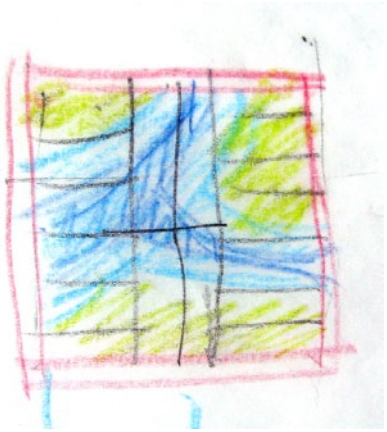
PROCESS SKETCHES: District Design

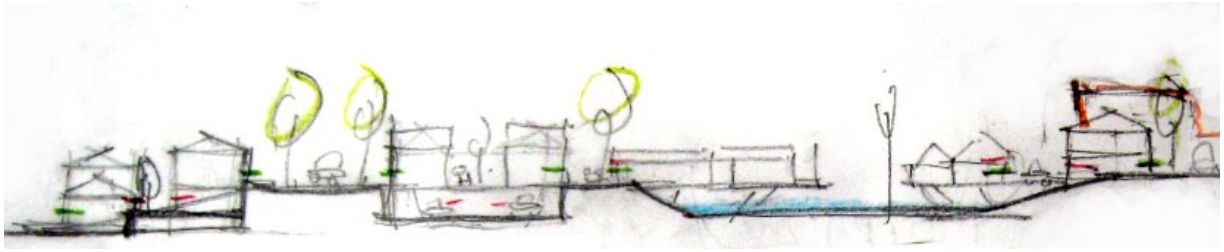


PROCESS SKETCES: District Design









A NEIGHBORHOOD CULTURAL CENTER

In The Urban Bayou

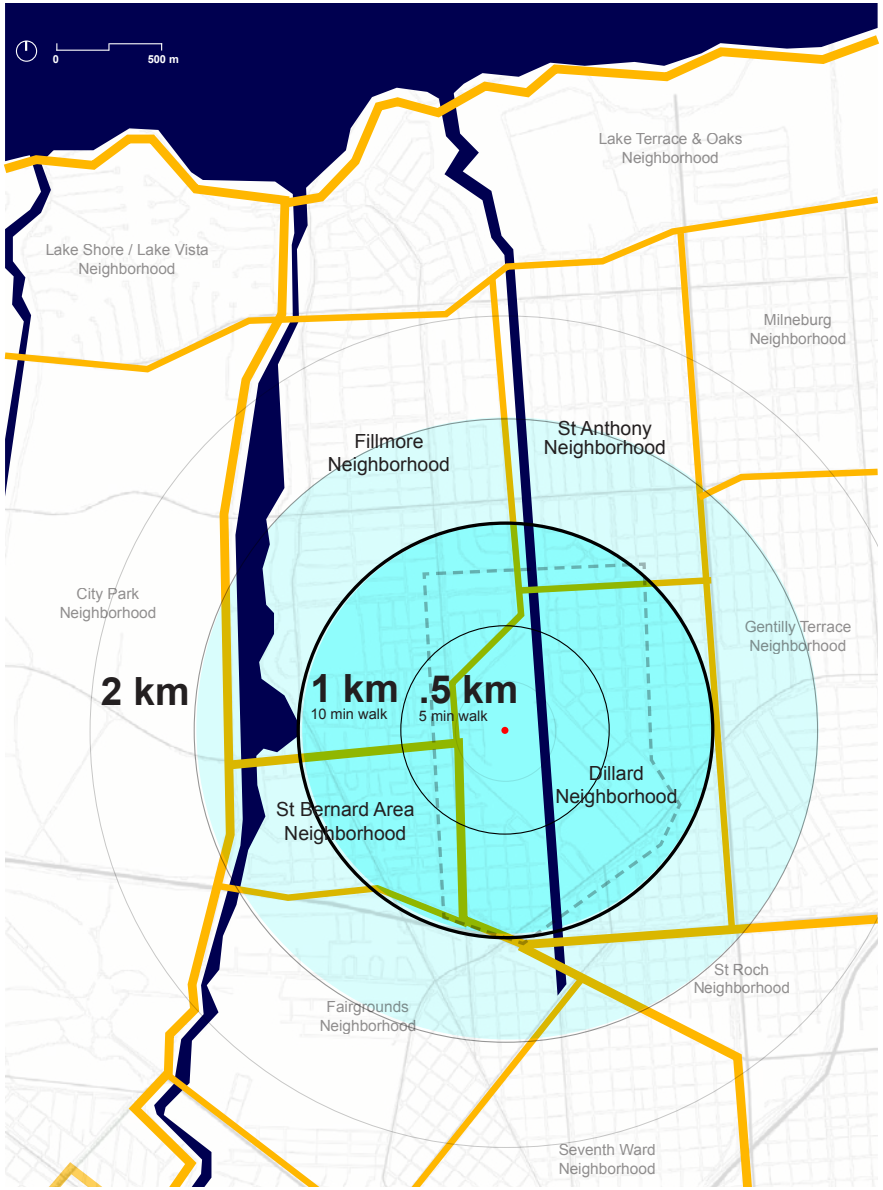
PART 3 - ARCHITECTURE

CONTENTS:

LOCATION IN THE COMMUNITY: Site Context

The placement of the building in the larger community is important to take into consideration for several reasons. When looking at accessibility to the adjacent communities, both walking distance and biking distance are studied. The cultural center will service the immediate neighborhoods, and its location poses several interesting opportunities.

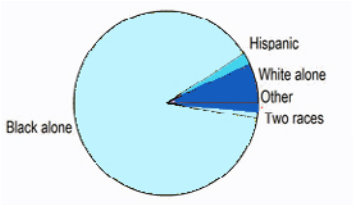
First it should be noted that the municipality has divided the city into numerous neighborhoods. While these are political boundaries, they also roughly correlate to different demographic groups. The building location is situated within close proximity of four of these different neighborhoods, each with their own unique demographics. The majority of the residents in the vicinity are African American, with smaller numbers of white, Hispanic and Asian residents. In addition, the education, poverty, and unemployment levels range greatly within these different neighborhoods. The end result is that this location of the cultural center provides the opportunity to connect these different groups of people and create a stronger sense of community amongst everyone in the area.



NEIGHBORHOOD DEMOGRAPHICS: Site Context

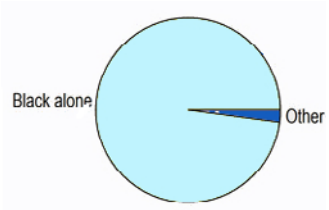
DILLARD:

Population (2008):	6,395
Area:	1.089 sq mi
Poverty:	Medium
College Education:	Low to Medium
Unemployment:	Medium



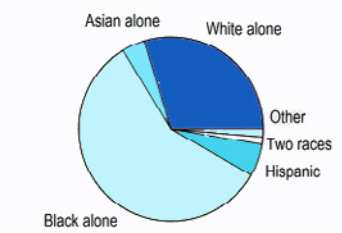
ST BERNARD AREA:

Population (2008):	6,564
Area:	0.429 sq mi
Poverty:	High
College Education:	Low
Unemployment:	High



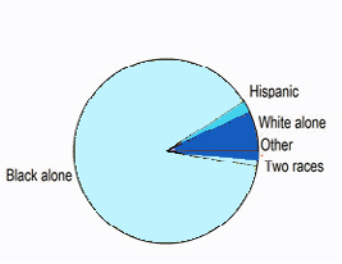
FILLMORE:

Population (2008):	6,940
Area:	1.413 sq mi
Poverty:	Low
College Education:	Medium to High
Unemployment:	Low



ST ANTHONY:

Population (2008):	5,247
Area:	0.725 sq mi
Poverty:	Medium
College Education:	Low to High
Unemployment:	Medium to Low

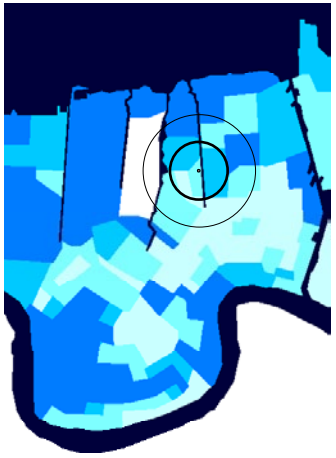


POVERTY

0 - 7.5%
7.5 - 15
15 - 35
+35

EDUCATION

0 - 10%
10 - 24
24 - 37.5
+37.5

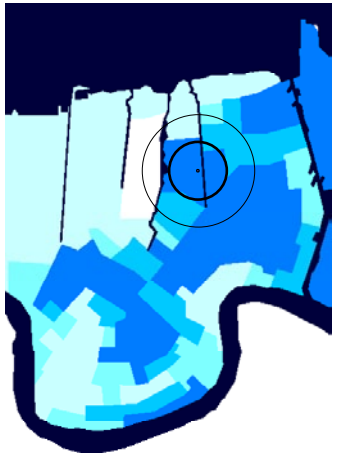


UNEMPLOYMENT

0 - 5%
5 - 10
10 - 15
+15

BLACK ETHNICITY

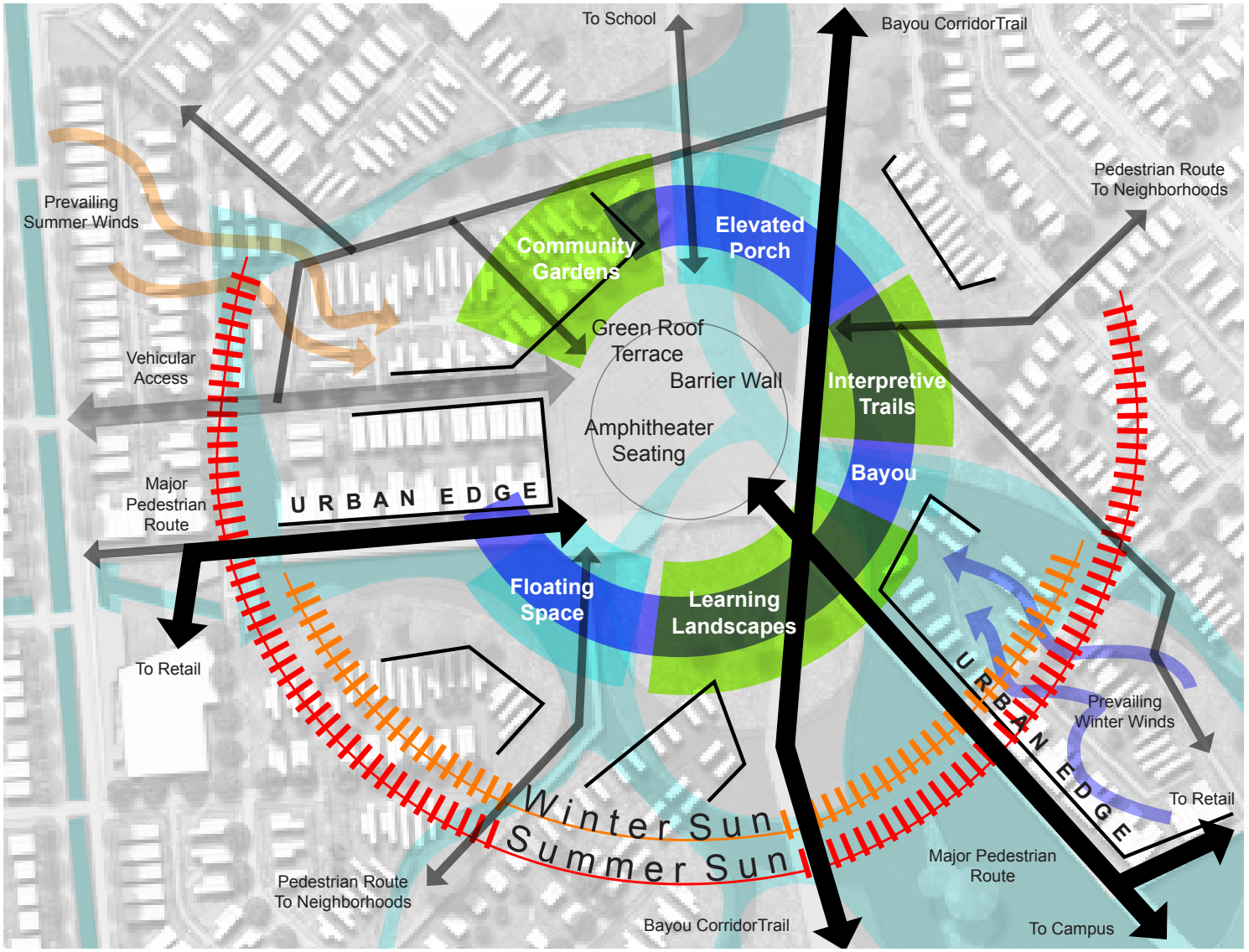
0 - 25%
25 - 50
50 - 75
+75



SITE ANALYSIS: Context & Opportunities

Upon zooming in closer to the immediate building site, a further analysis is conducted. After previously studying the social context of the neighborhoods, this analysis looks at the physical urban conditions around the building. Issues such as accessibility, both pedestrian and vehicular, are identified. There is a clear hierarchy of routes to and around the building ranging from neighborhood roads, the bayou corridor recreational trail, as well as smaller pedestrian paths. Natural conditions are also studied, such as prevailing wind directions and solar orientation. All this information will influence the basic configuration and massing of the building.

In addition, possible opportunities for connecting to and addressing the surrounding landscape are explored in terms of their placement within the larger context. There are potentially numerous ways the building can connect people to the bayou landscape, with the intention of educating people about water, all of which will be further explored in the architectural design.



0 100 m

BUILDING TYPOLOGY: Culture & Learning Center

NEW ORLEANS CULTURE & COMMUNITY



WATER LANDSCAPES AROUND NEW ORLEANS




OBJECTIVES, FUNCTIONS & CONCEPTS

1) COMMUNITY

- Provide the community with a **place to gather** for **educational**, **social** and **recreational** activities

- Facilities that serve the local community; providing **social support**, **public information**, **sharing of resources and ideas**, promotion of **local arts and culture**

- A **flexible building** that can host a variety of services which are determined by the **needs of the community**

- Ability to host private functions: banquets, weddings, receptions, parties, etc

- Respect **local New Orleans traditions** and values:
    - Provide space & opportunities for **music**: practice and performance
    - Provide space & opportunities for **food**: both cooking and eating events, potlucks, indoor and outdoor space

2) WATER EDUCATION

- **Information center** showcasing pilot neighborhood and allowing residents to **experience water**

- A building that can physically highlight ways of **living with water** & the bayou landscape
    - Ability to tolerate **dynamic water levels**
    - **Rain water harvesting** and gray water re-use
    - Water for **passive cooling**
    - Green roof

CASE STUDIES

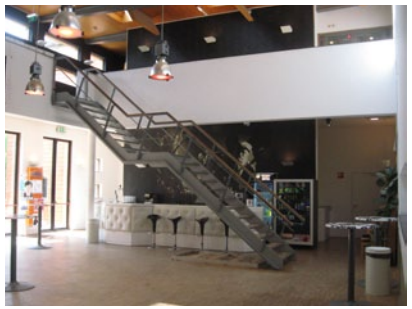
For further architectural inspiration, numerous case study projects were studied. These studies were broken down into several categories, each being themes to address in the design of the building. Most of these themes deal with different ways a building can connect to its surrounding landscape and water. The challenge is how to express the relation to the natural context, which is often done by blurring the boundaries between where the building ends and the landscape begins. In addition, existing community and cultural centers were studied to get a feeling for common programmatic elements within this building typology, as well as the required square meters and size of neighborhood population being served. Lastly, a variety of atriums are researched with the intention of exploring how these large interior spaces can provide an open and flexible space for the community to use for both circulation and informal interaction and gatherings.

CULTURAL CENTERS

Yesler Terrace Center / Seattle, WA, USA

Ludesch Community Center / Ludesch, Austria

TU Delft Sports & Culture / Delft, The Netherlands



GREEN ROOFS

Botanical Visitor Center / Queens, NY, USA

Faculty of Life Sciences / Groningen, NL

TU Delft LIbrary / Delft, The Netherlands

CASE STUDIES

WATER

Aluminum Center / Houten, NL

HafenCity / Hamburg, Germany

Opera & Ballet / Oslo, Norway

NATURE CENTERS

Oostvarders Visitor Center / Almere, NL

Posbank Pavilion / Rheden, NL

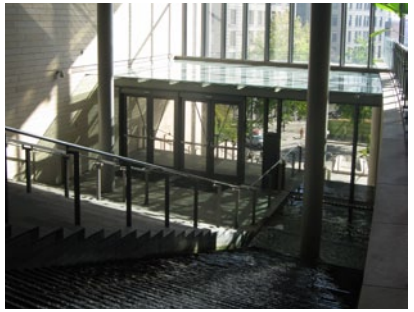
Competition Entry / Oostvardersplassen, NL

ATRIUMS

Unilever Headquaters / Hamburg, Germany

Federal Environmental Co / Dessau, Germany

Seattle City Hall / Seattle, WA, USA

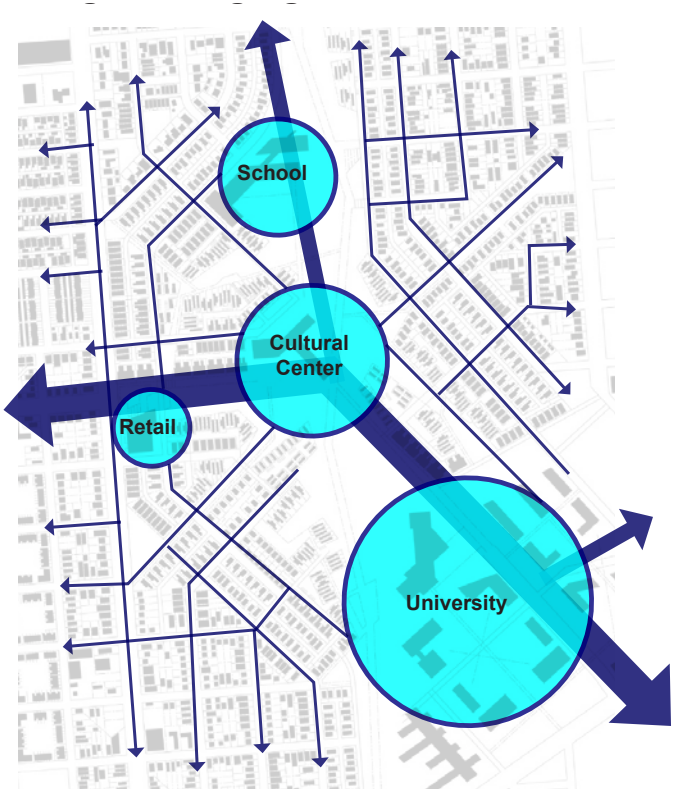


STRATEGIC POSITION: Building in the Neighborhood

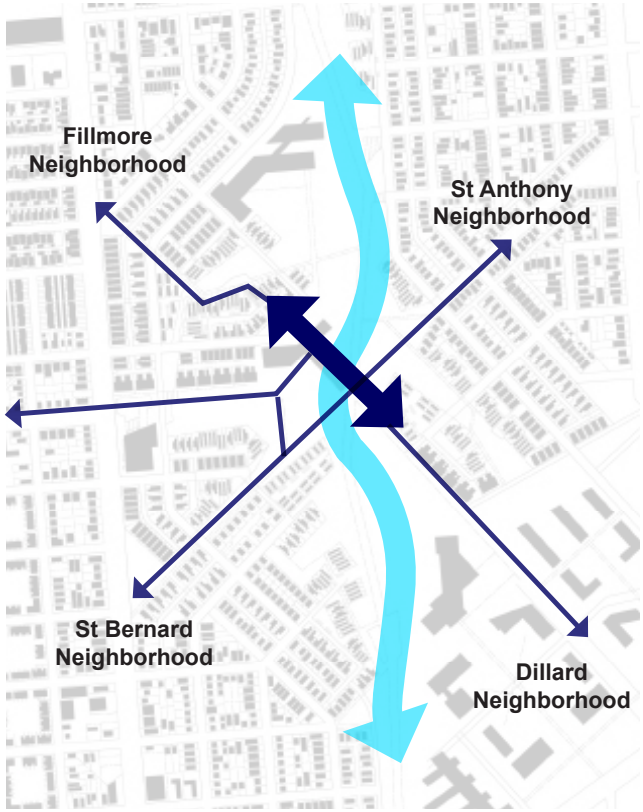
The overall massing and arrangement of the building is determined by its context, both urban and natural. There were several main driving factors contributing to the building composition and concept; ideas that originally derived from the larger district plan. The two distinct and separate grid systems that influenced the structuring of the district also contribute to the building, both in terms of its placement within the district and how these grids are represented in the building itself. Another major factor within the design of the building is related to the bayou landscape. The previously existing outfall canal was both a major physical barrier disrupting the urban fabric as well as disconnecting people from the water. With the new bayou canal this relationship is reversed, so that instead of the canal being at the back of houses, it is now the focus. Also, where it was once very difficult to cross the canal and the neighborhoods on either side were highly disconnected, now the new bayou allows for much better integration. The building expresses this new connection by spanning the water and literally bridging both sides of the canal.

Also visible in the site plan is the buildings' relation to the bayou water system. The building is connected to the high ground on the north, whereas the southern portion is protruding into the floodable bayou zone. The ability for portions of the building to tolerate fluctuating water will be further addressed in the design.

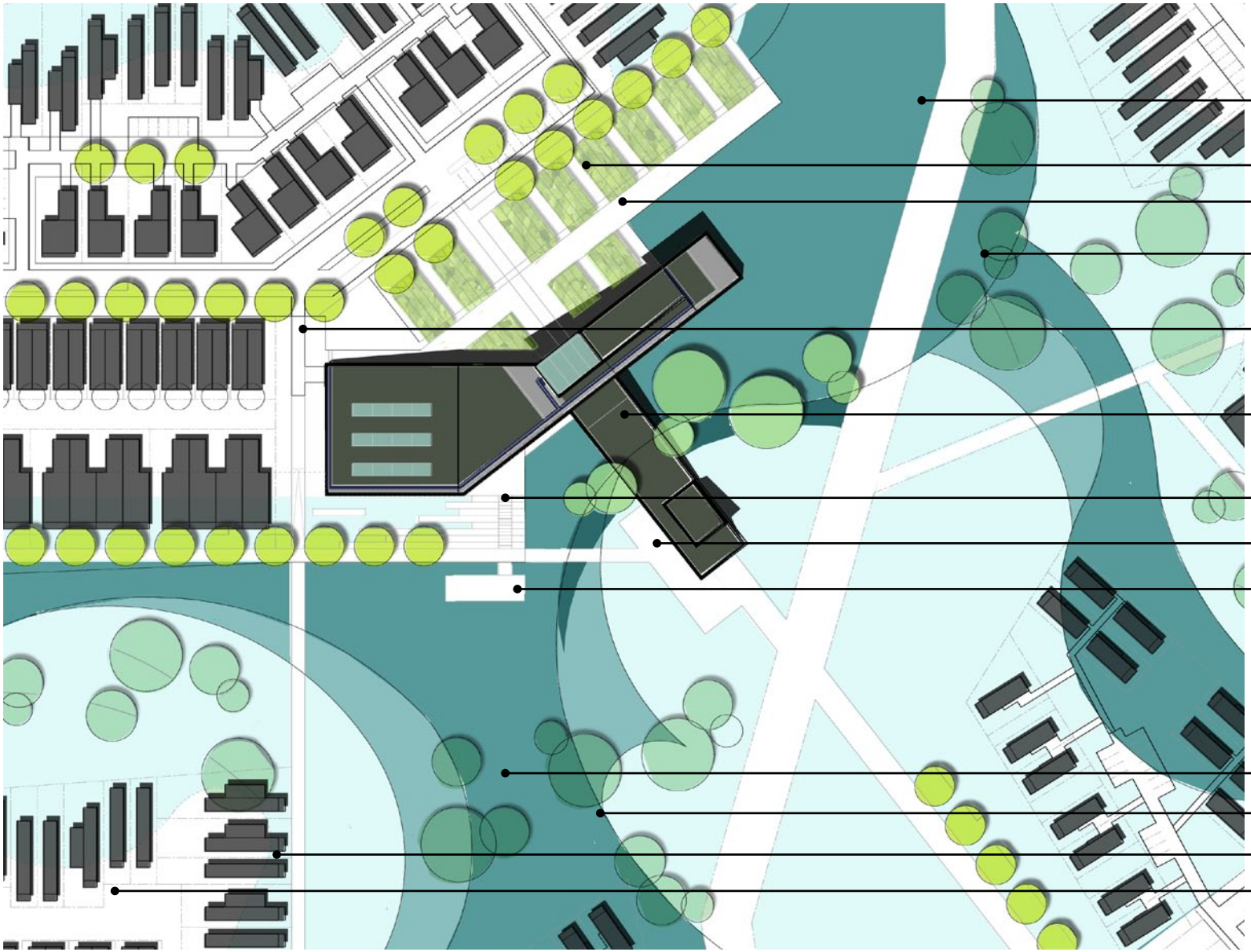
HINGE + MERGING GRIDS



BRIDGING NEIGHBORHOODS



SITE PLAN

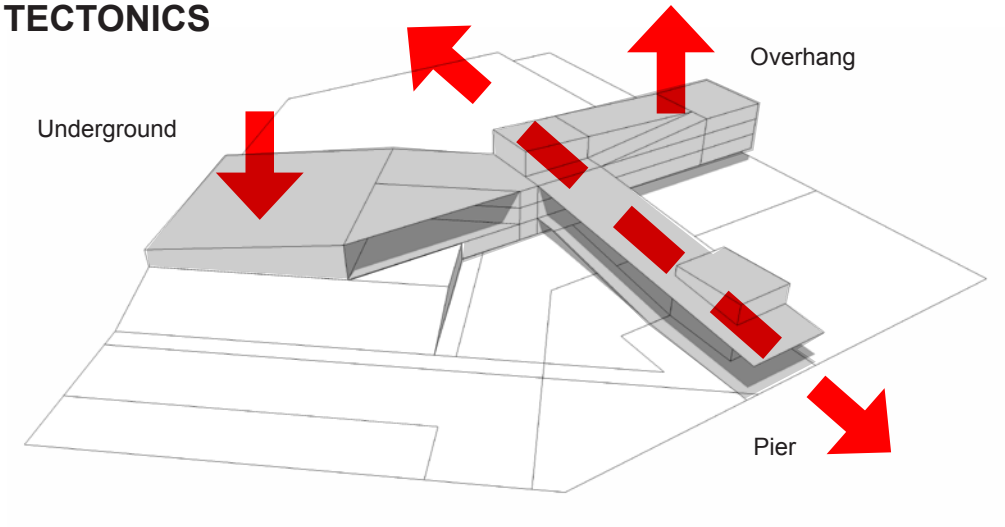

0
500 m
Bayou Corridor Trail
Community Gardens
Boat Dock
Cypress Forests
Parking Entrance
Nature Pier
Landscape Terrace
Cafe Seating
Floating Stage
Typical Water Level
Tidal Zones
Peak Flood Level
High Ground


Mississippi River
New Orleans

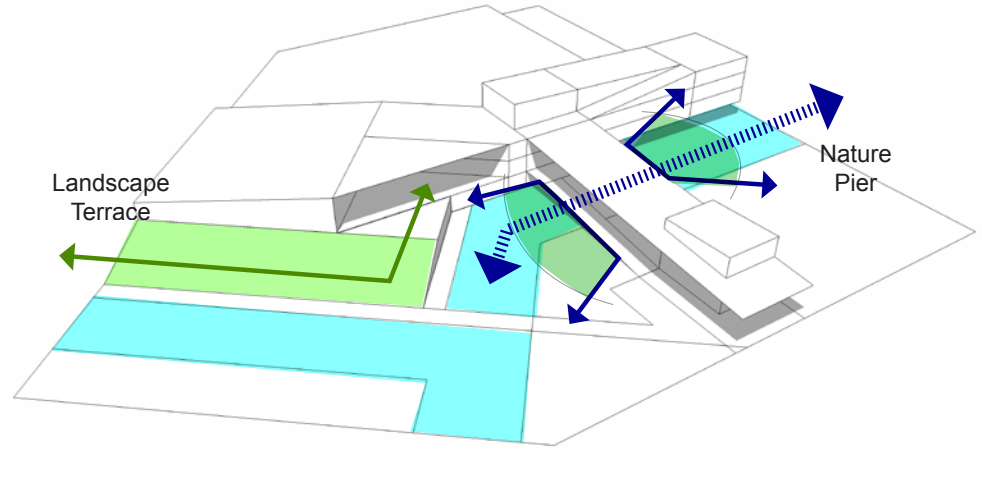
BUILDING CONCEPTS

A number of basic concepts influenced the general design, composition, and arrangement of the building, as well as how it addresses the surrounding landscape. To further express the four meter grade change from the top of high ground to near sea level, a portion of the building is pushed underground while the other side is raised up and overhanging above the water. The building wing that protrudes out into the landscape takes on the role of a bridge in that it spans the water and allows views to the landscape from a covered pier walkway. The ends of each building wing maximize views towards the landscape and highlight the two different grid systems. The three wings of the building form arms that embrace the landscape, each with a different character and function. The program is distributed so that at the end of each building wing is a major function, either the theater, gymnasium or café, and where these wings all intersect is the heart of the building: the central atrium. This is the main pivot point from where the different grid angles originate and from here circulation leads in each direction, both horizontally and vertically, with the space itself serving as an iconic flexible gathering area.

TECTONICS

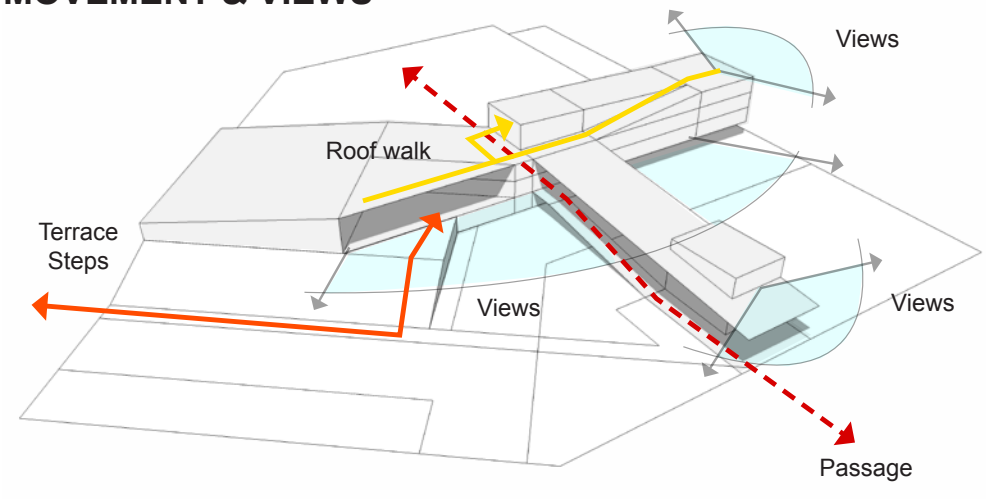


LANDSCAPE



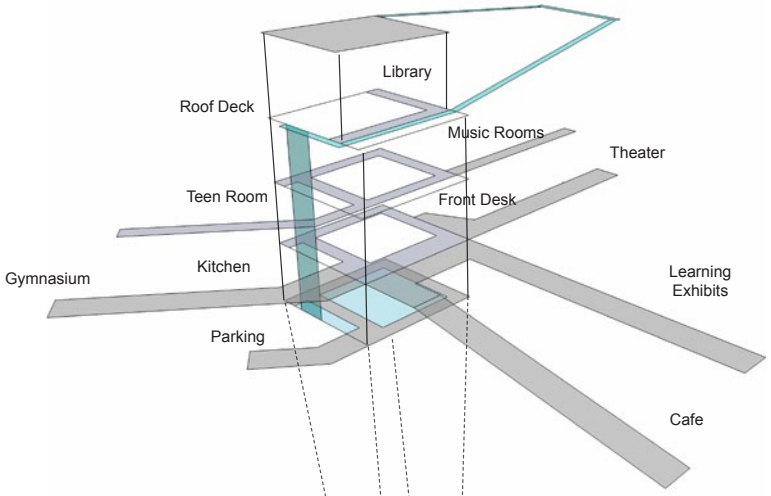
BUILDING CONCEPTS

MOVEMENT & VIEWS

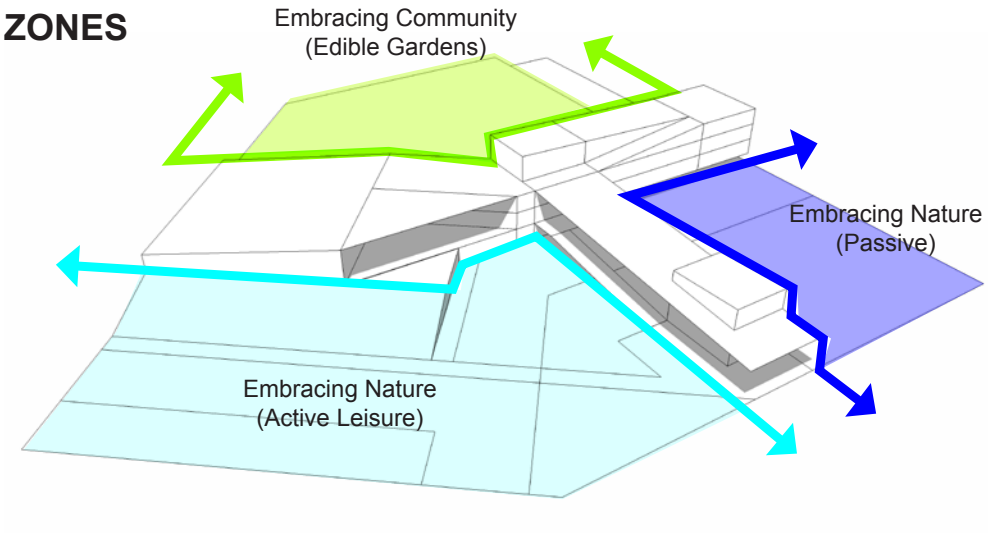


ATRIUM

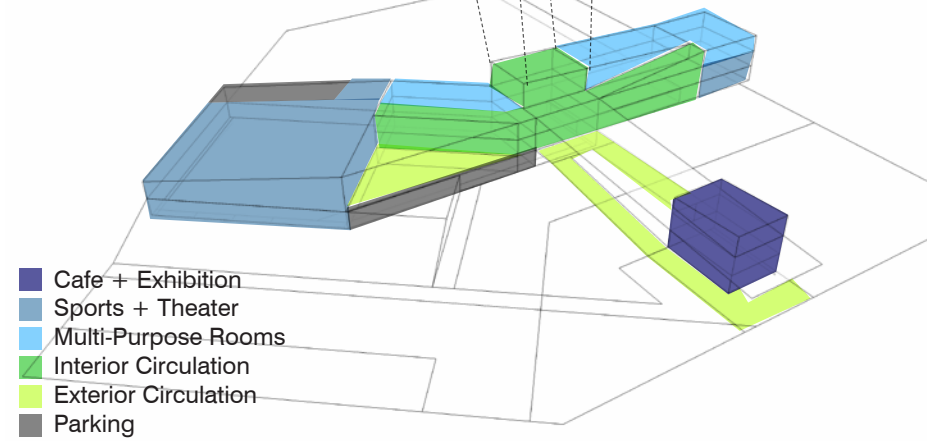
Central Circulation Pivot Point



ZONES



PROGRAM DISTRIBUTION

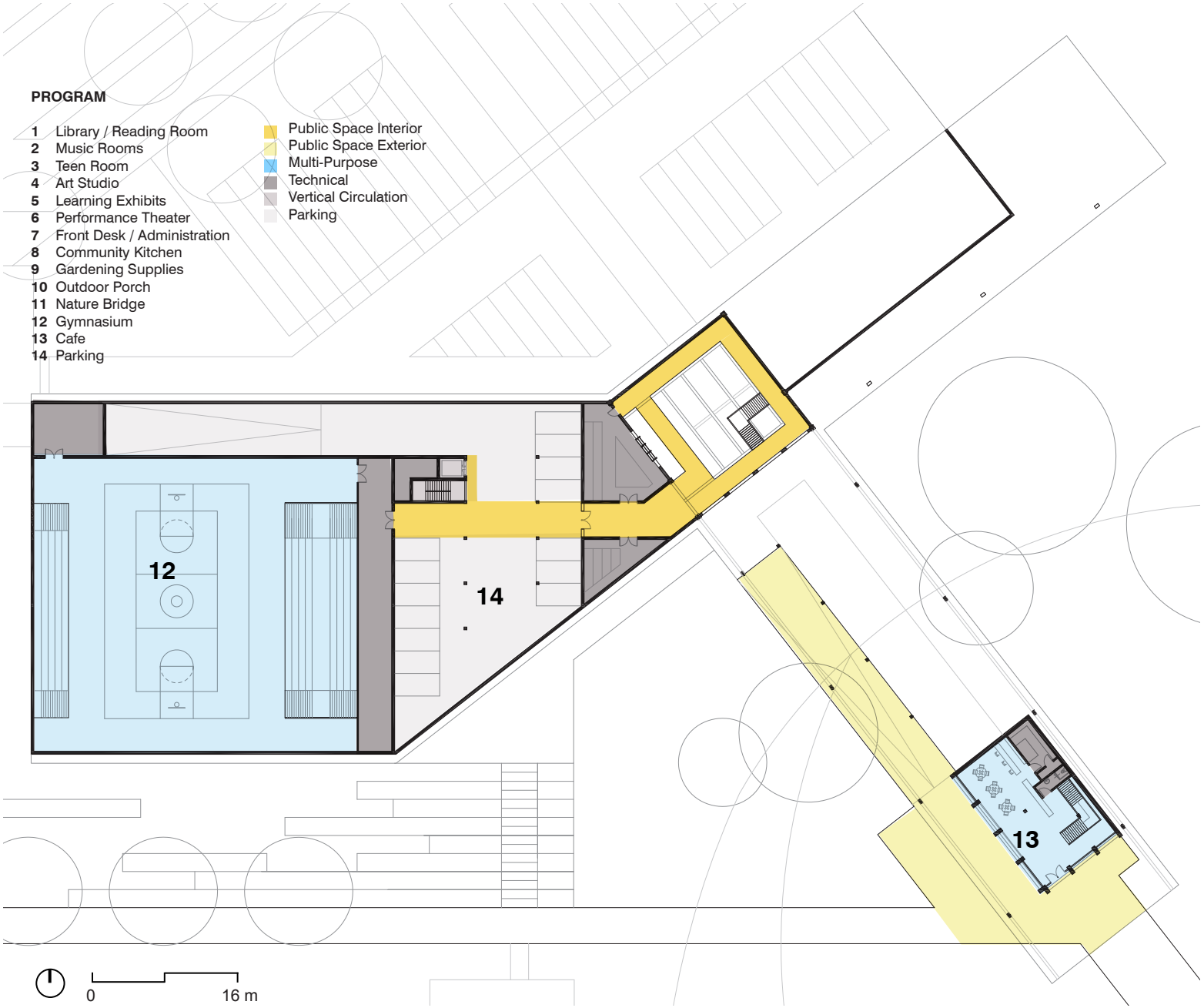


FLOOR PLANS

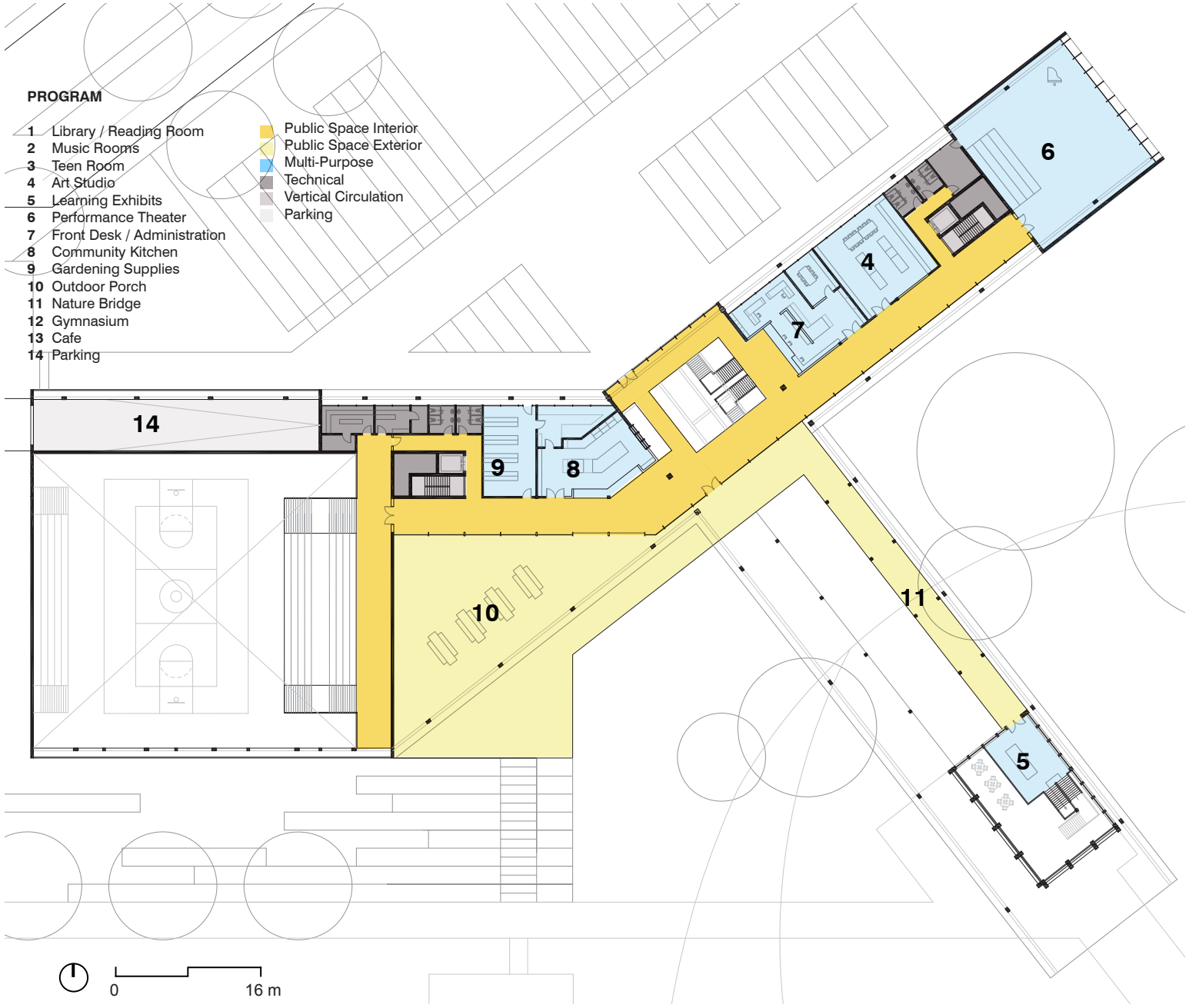
-01 Floor

The lower floor of the building is sunken underground into the dike. Located here is space for parking, as well as the gymnasium, which is primarily accessed from the ground floor above. From the parking spaces, one can move vertically to the higher floors through the atrium. In addition, the lowest level of the atrium houses mostly technical installations, including the living machine and rain water storage.

On the ground floor of the building wing that juts out into the landscape is the café and bayou landscape learning exhibits. This small pavilion houses the most public oriented functions within the cultural center since its location is closest to the bayou corridor trail, which would receive the most pedestrian traffic from beyond the immediate community.



FLOOR PLANS



00 Floor

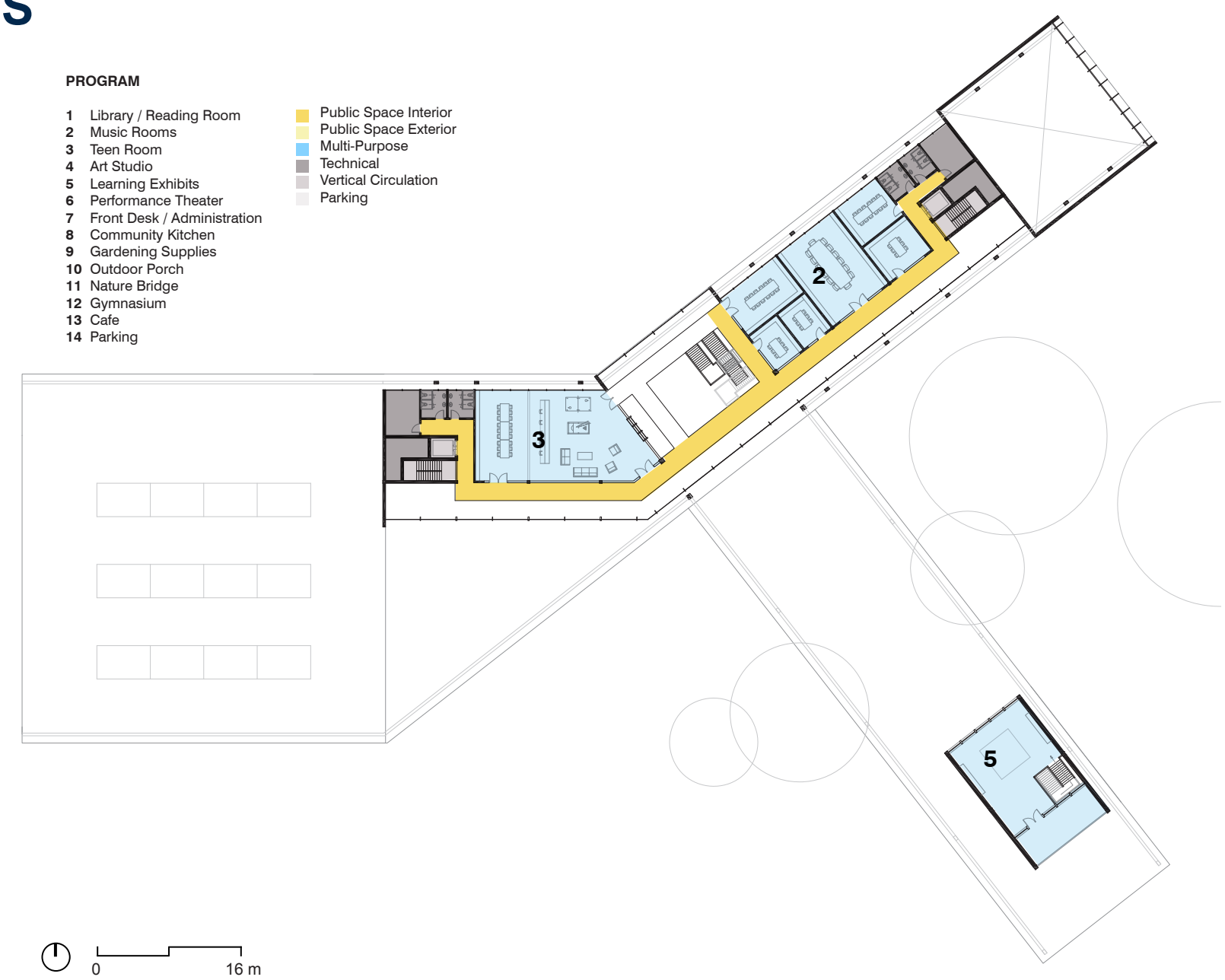
This is the ground floor of the building, and houses many major and important functions for the community. Again the atrium is at the center, providing the main vertical circulation as well as access to the other wings of the building. Addressing the atrium on the ground floor are two important components for the cultural center: the information desk and the community kitchen. The kitchen provides a large visible space for residents to cook together for community gatherings. The kitchen leads directly outside to the covered porch where there is the opportunity to sit and relax in the shade. Also next to the kitchen is the garden storage area, where tools and food can be stored from the community garden and directly sent to the kitchen for cooking and eating. Further along this building wing leads to the gymnasium as well as its associated shower and locker rooms, used by neighborhood children, teens and adults for sporting events. The gymnasium space also has the flexibility to be used for large gatherings. In the other direction the corridor leads to the art studio and performance theater at the end of the wing. Going south from the atrium leads outside to the nature bridge and the covered walkway to the café and exhibition pavilion.

FLOOR PLANS

01 Floor

On the first floor is the teen room, a flexible space for neighborhood adolescents to come for various after school and daytime activities. Also on this floor are the music rooms, providing a variety of sized spaces for local musicians to practice their musical instruments. Here there are also music classes and teaching opportunities, with the chance to then have large performances in the theater space below. These flexible rooms can also serve other community activities as needed, such as courses, workshops and meetings.

Also at this level is the top floor of the pavilion. Here there is additional exhibition space where residents and visitors can learn about the new district and the water system. In addition, there is an outside balcony offering significant views of the neighborhood.



FLOOR PLANS

TOTAL PROGRAM BREAKDOWN

Library	547 m2
Music Rooms (6x)	220 m2
Teen Room	152 m2
Art Studio	100 m2
Learning Exhibits	217 m2
Performance Theater	267 m2
Front Desk / Administration	100 m2
Community Kitchen	108 m2
Garden Storage	60 m2
Gymnasium	1452 m2
Cafe	192 m2
Public Space / Circulation	895 m2
Tech / Storage	496 m2
Parking	820 m2

Building Integrated Outdoor Space

Roof Terraces & Walk	282 m2
Porch	626 m2
Nature Bridge	235 m2
Nature Ramp	160 m2
Cafe Terrace	140 m2

Usable Space	5779 m2
Public Space / Circulation	1290 m2
Ratio	78 : 22

Total Area **7069 m2**

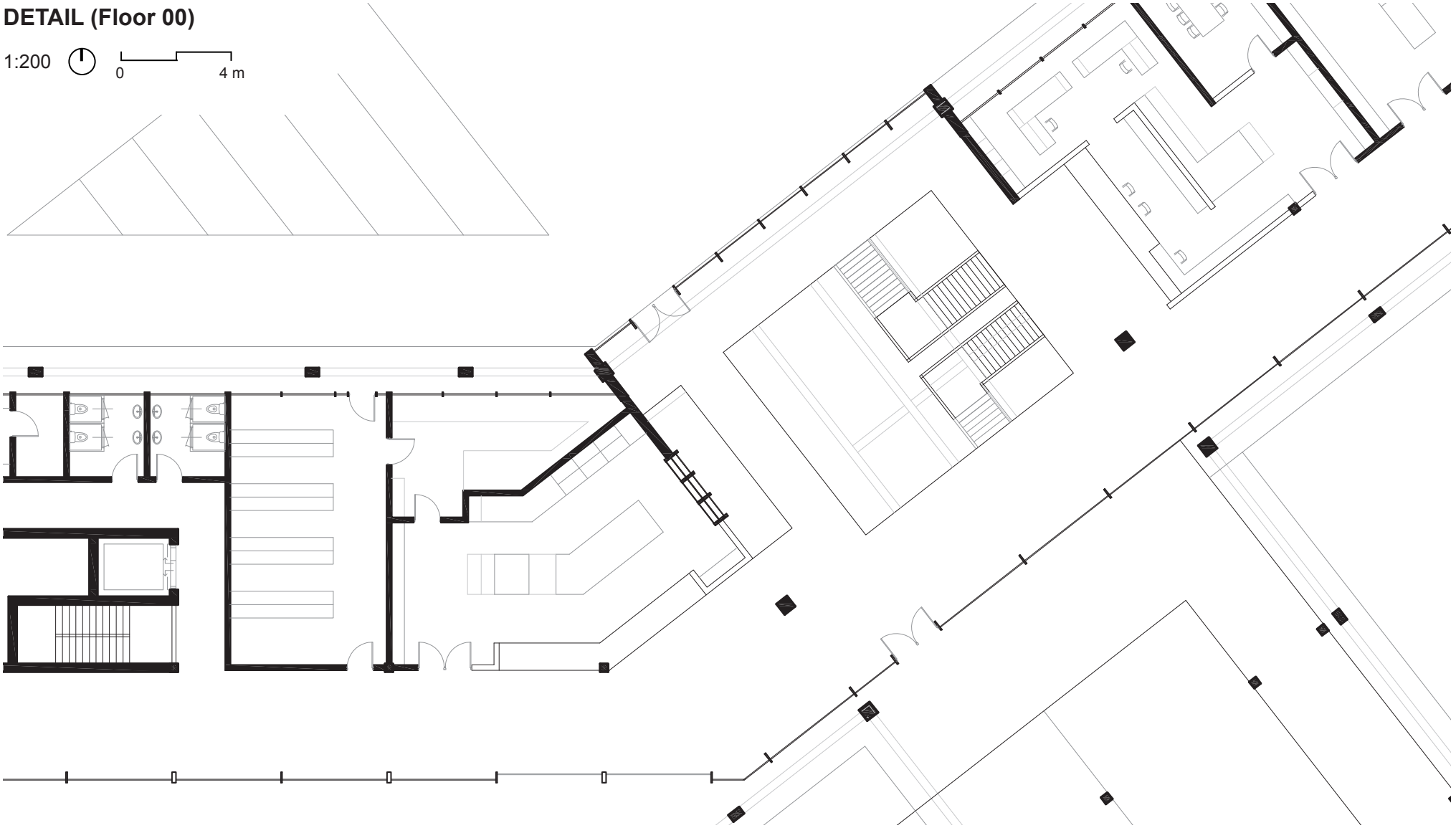
02 Floor

The top floor of the building is the library and learning room. Here is a small book and magazine collection, as well as quiet seating for reading and studying with expansive views out to the neighborhood and landscape. There are several computer stations for internet access and basic digital needs for the community. Also from the atrium is access to a small rooftop terrace, providing further views of the surroundings and a close-up look at the buildings green roof and rainwater connection system.

FLOOR PLANS

DETAIL (Floor 00)

1:200 0 4 m



FLOOR PLANS

DETAIL (Floor -01)

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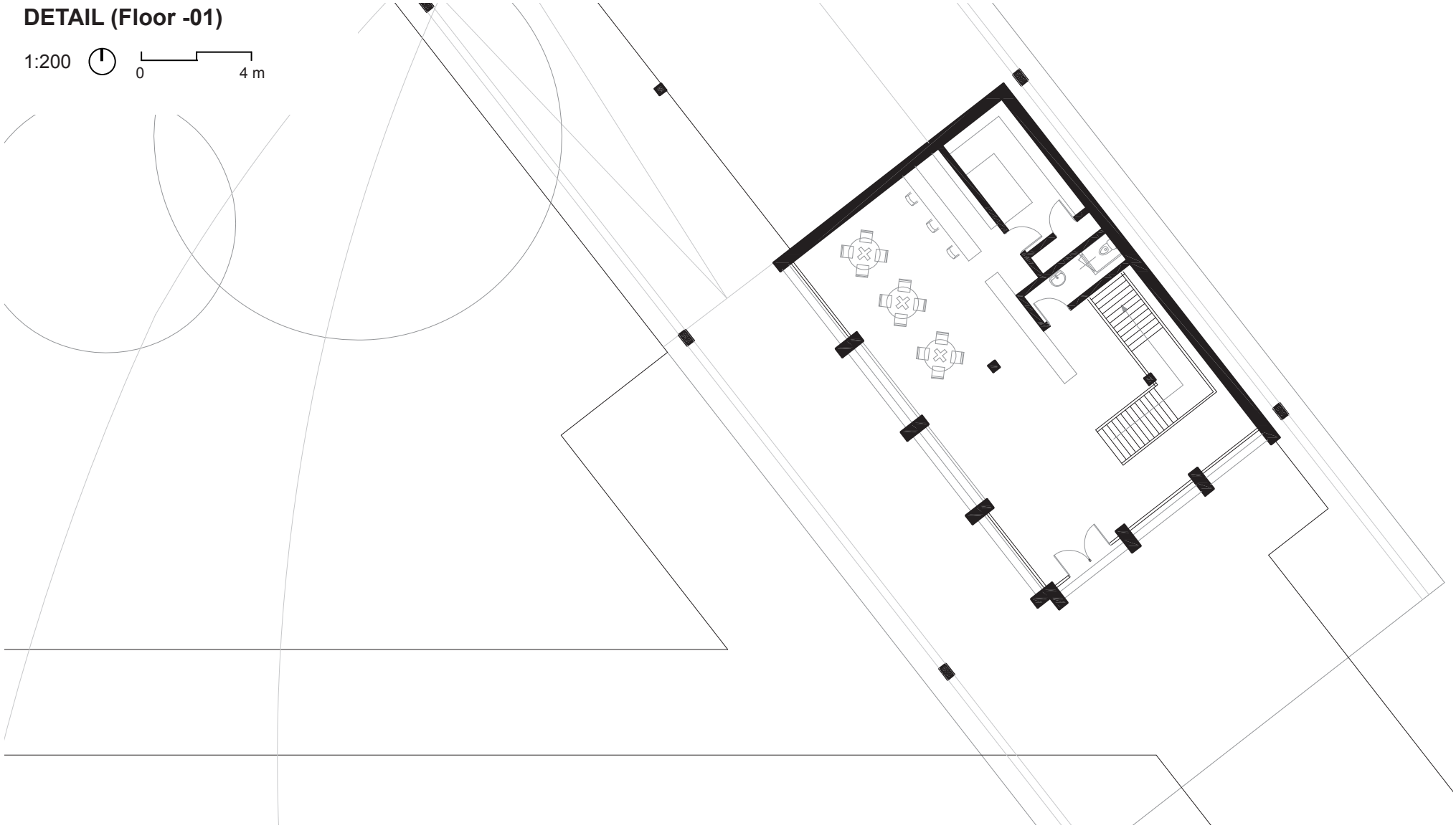


FACADE CONCEPT

MATERIALS

Steel Angled Columns (Connecting Structure)


Reflective Glass (Transparent)

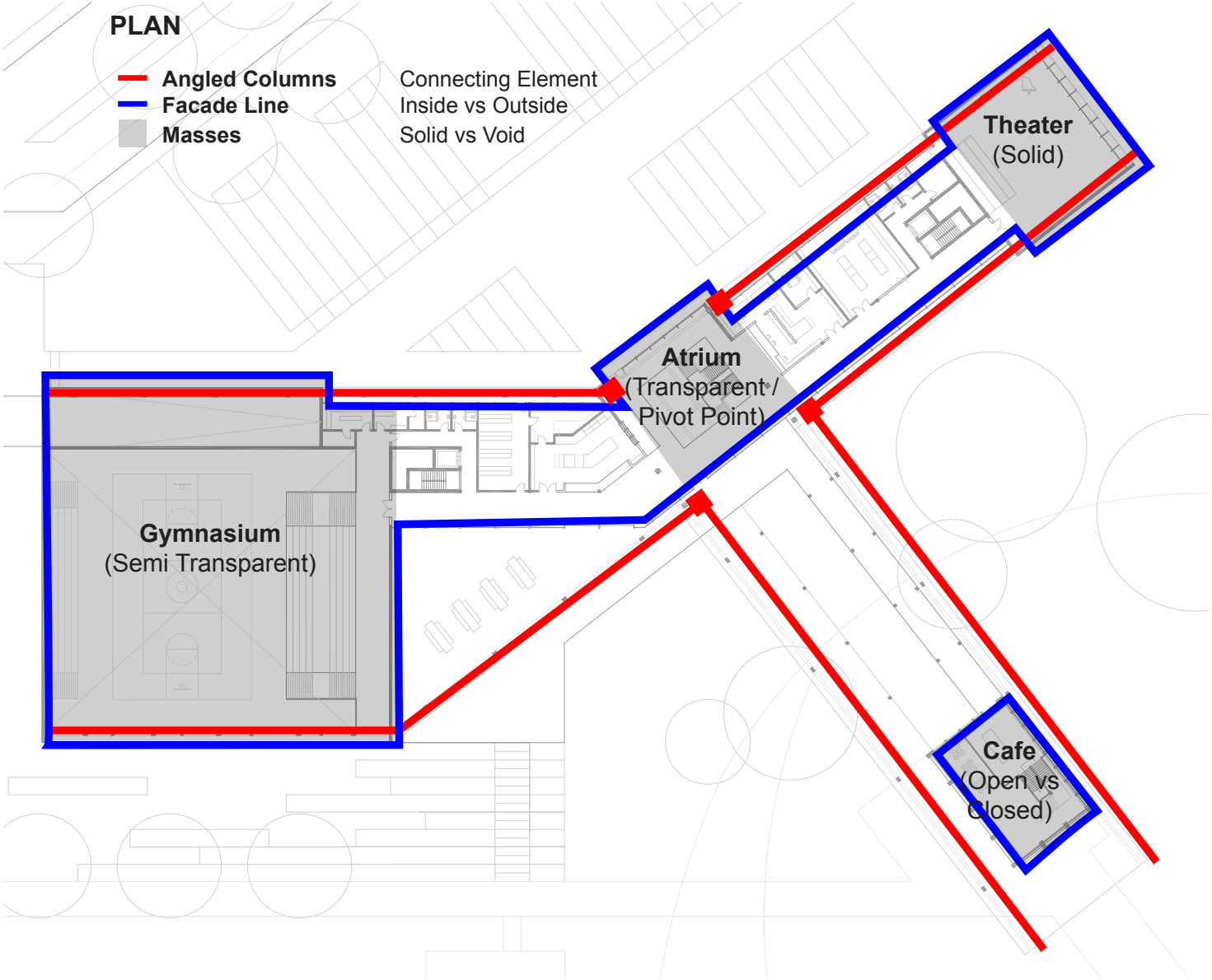

Cloudy Glass (Semi-Transparent)


Aluminum (Solid)



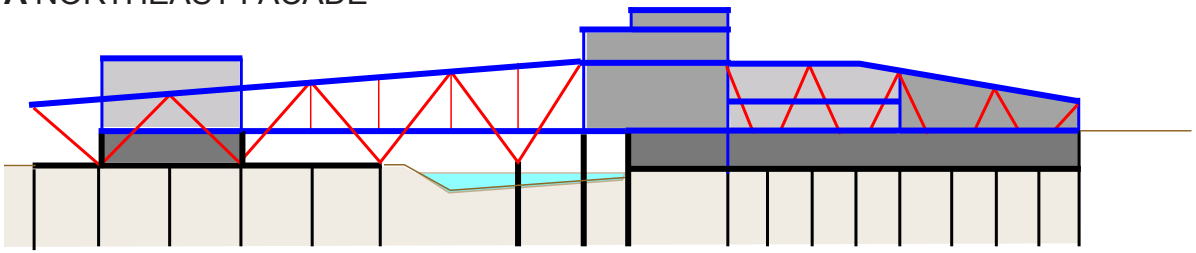
Steel Barrier Cafe Doors (Open vs Closed)


PLAN

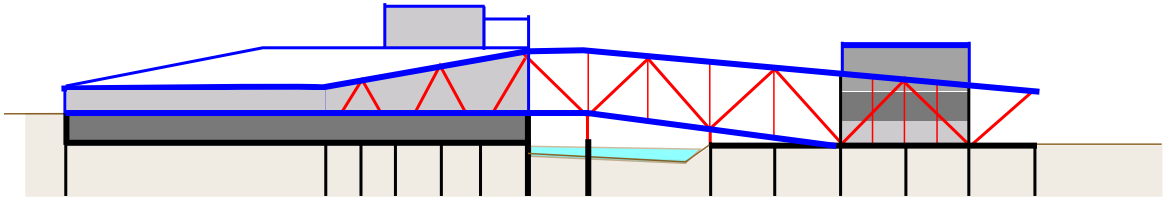


FACADE / CONSTRUCITON CONCEPT

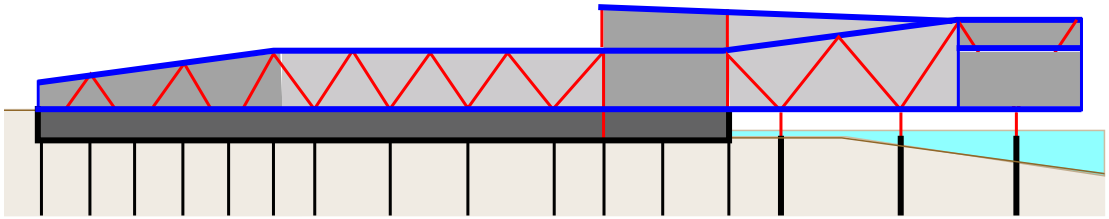
A NORTHEAST FACADE



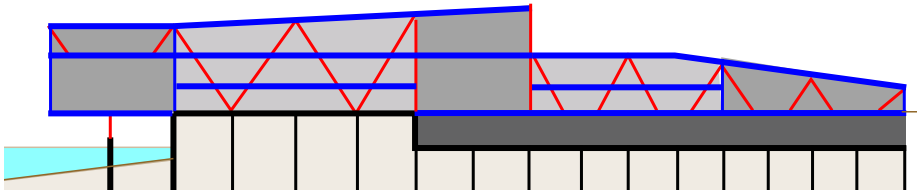
B SOUTHWEST FACADE

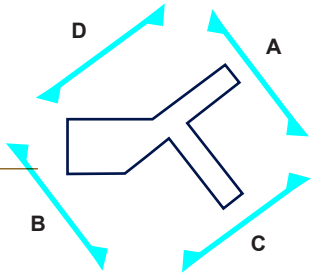


C SOUTHEAST FACADE



D NORTHWEST FACADE





The façade, structure, and expressive language of the building is composed of several basic elements and principles. The basic composition is a combination of masses, connected by the supporting truss structure, and an interplay of the façade moving from the inside to outside of this truss structure.

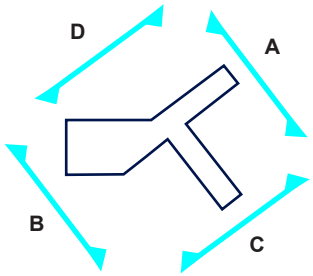
The masses are determined and placed due to their programmatic functions and the larger circulation and layout of the building. These are large interior spaces that typically want to have a closed facade to control daylight; and further, the character of the interior space can benefit from larger structural elements within the big space. This argues the logic of moving the cladding to the outside of the structure.

The multi-purpose rooms are the opposite; they want to maximize daylight and views to the exterior, while at the same time are composed of many smaller rooms and walls that logically argue for the structure to be on the outside of the glass cladding so as to not interfere with the interior walls.

The atrium is a unique element. It is where the three wings intersect. The language is one that the supporting structure does not bypass or breakup the four sides of the square. Rather, the atrium is where the supporting structure ties into large columns on each side, to keep the interior void as open and transparent as possible.

The concept of the supporting structure is to connect the intermediate spaces between the masses. Also, as the building slopes up and down, the trusses follow these slopes and bring attention to the grade change. As the facade switches from in front of the structure to behind it, there is an interplay between expressing versus concealing the structure, as well as when and how it is experienced from the interior. Semi-transparency and sporadic windows on the masses, allow glimpses of this structure from the exterior.

ELEVATIONS



A NORTHEAST FACADE

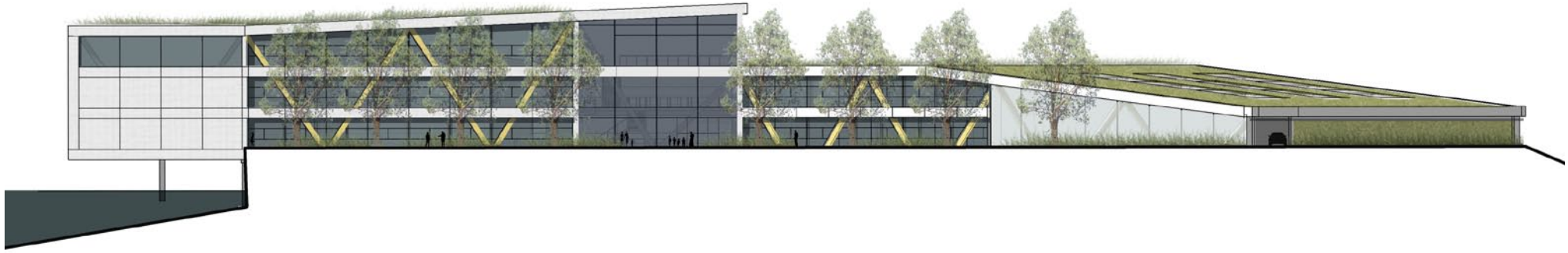
0 8 m

B SOUTHWEST FACADE

ELEVATIONS

C SOUTHEAST FACADE

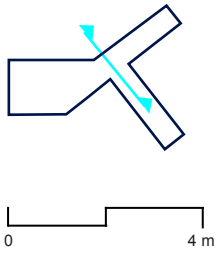
D NORTHWEST FACADE

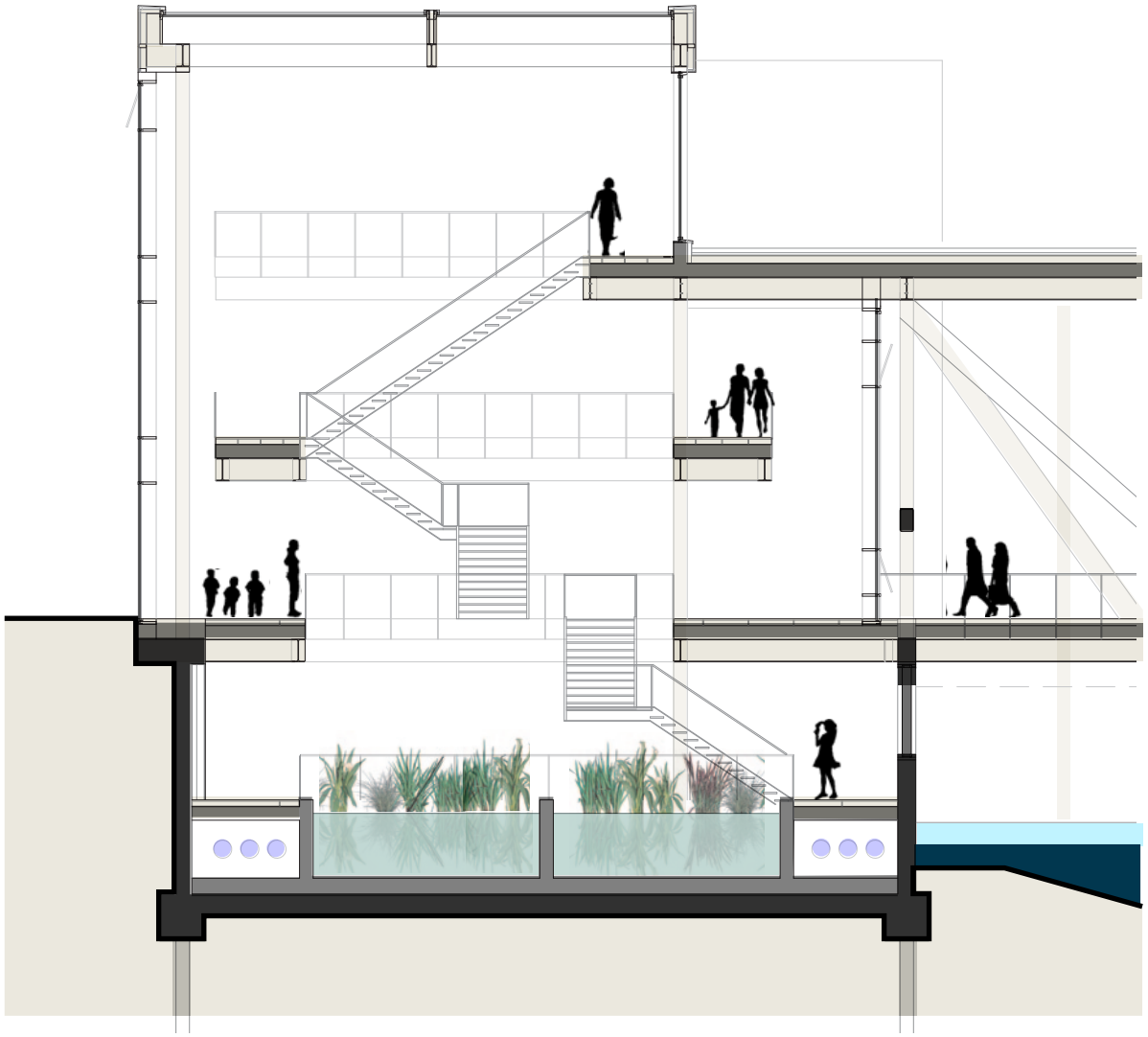


THE CENTRAL ATRIUM

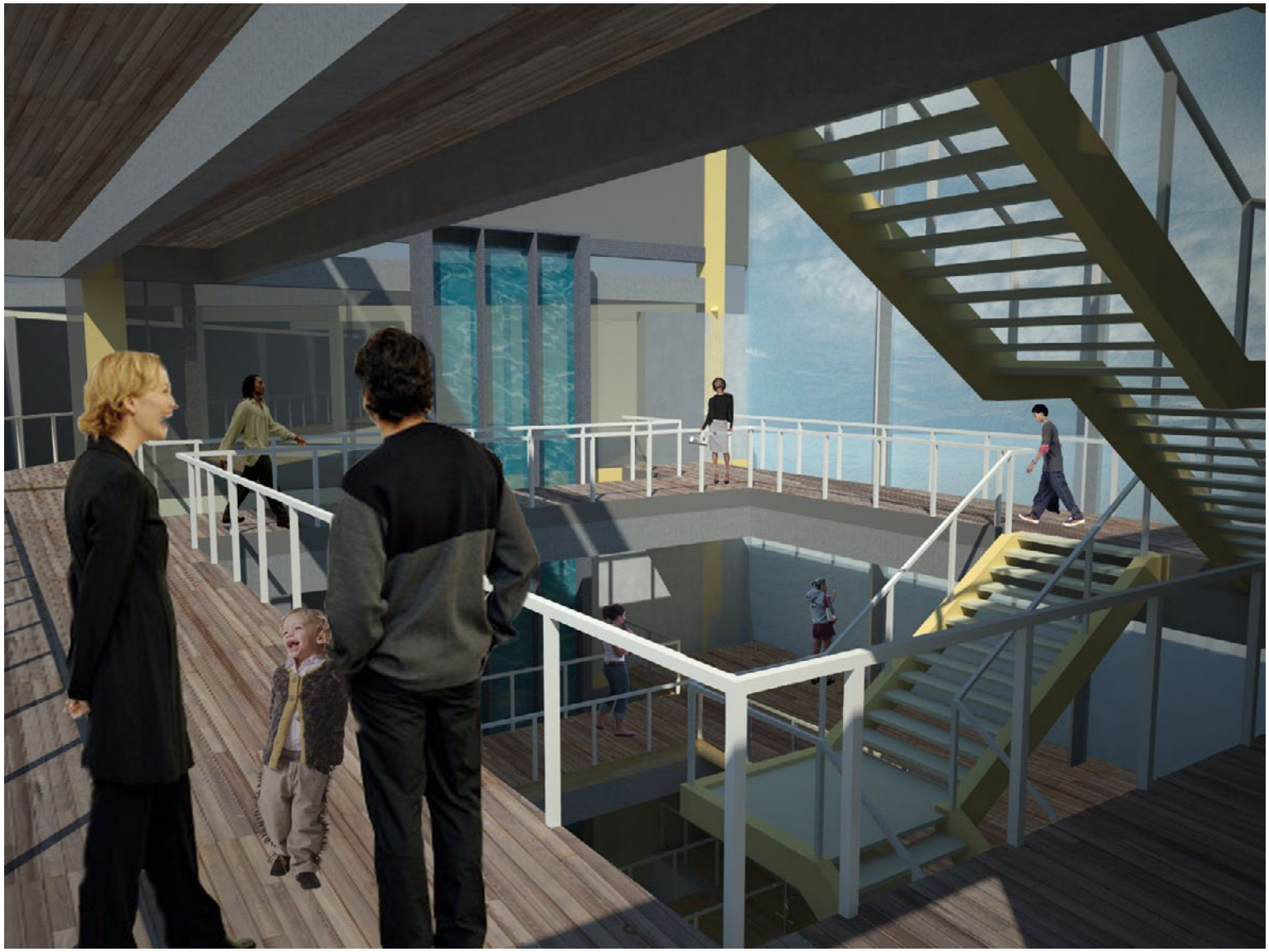
The central atrium is literally and figuratively the heart of the cultural center. It can be considered as a large four story void, enclosed with glass and crossed by various bridges and stairs. The placement of the stairs and bridges is such that they logically connect various functions, as well as orient views toward desired locations outside of the building. Most horizontal movement is pushed to the edge adjacent to the water wall and above the rainwater pool, so as to especially give the feeling of a bridge above water, whereas the vertical movement is located on the other side of the atrium, above the living machines. When coming up from the lowest level and parking area to the ground floor, the stairs lead directly to the information desk. Continuing up to the first floor, the bridges orient views out toward the community gardens. The final flight of stairs to the second floors points people to look to the bayou landscape, so that as they move up or down, their views continuously change.

The character of the atrium is one that the bridges and stairs seem to be freely suspended within the large space with no vertical columns. The bridges are able to make these long spans as they are supported by the same large steel beams that compose the rest of the building and floors.





THE CENTRAL ATRIUM



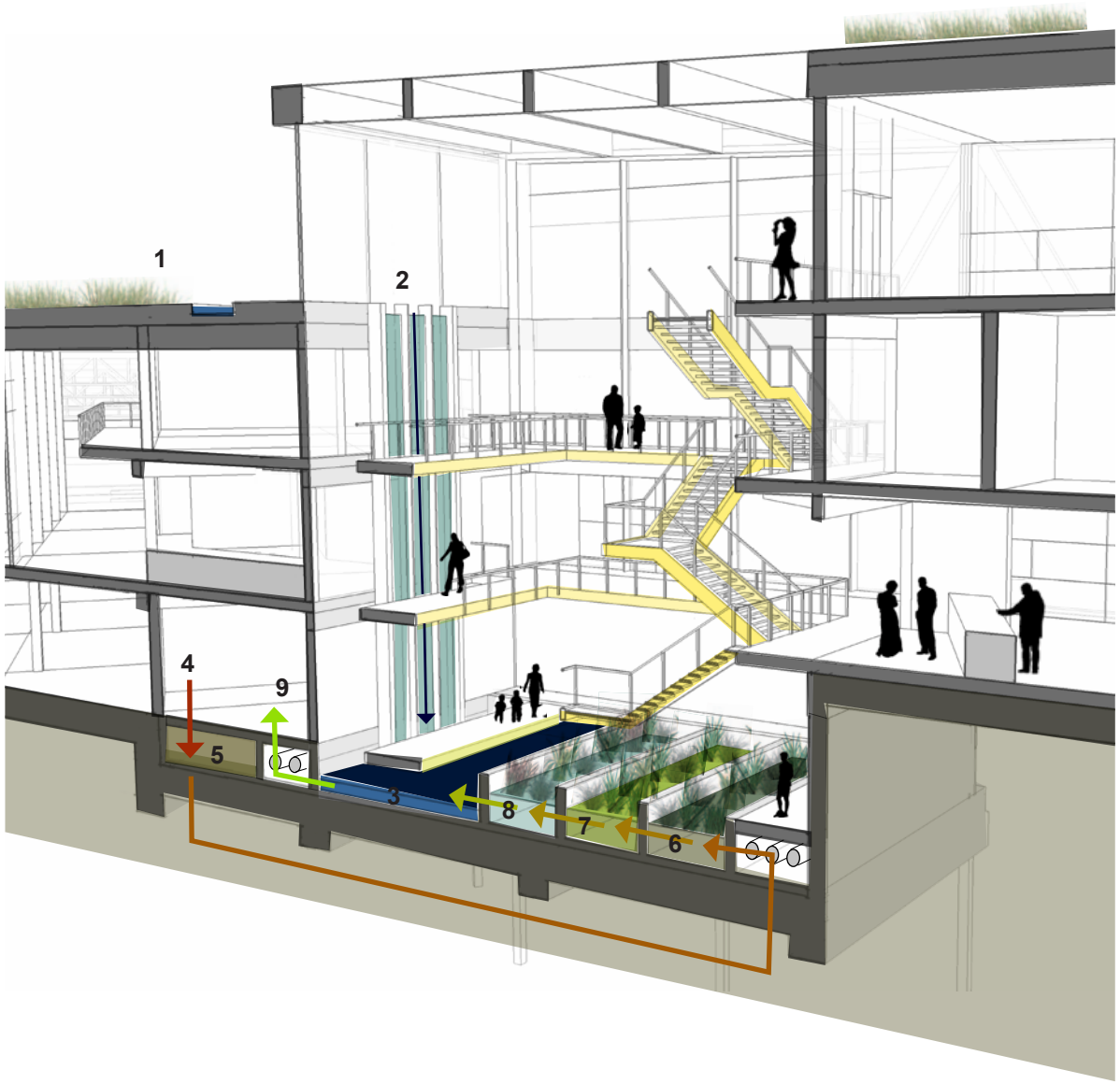
THE CENTRAL ATRIUM / LIVING MACHINE

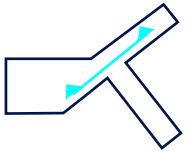
Storing & Cleaning Rain & Waste Water

Water is the main focus within the central atrium, and the atrium itself houses many of the important technical installations of the building. The intention is to make the water cycle and the process of collecting, cleaning, and reusing water clearly visible to all the users and visitors of the building. This is done by exposing these processes, rather than hiding them, and using them as an amenity that increases both the character of the space and the air and climatic quality.

Rainwater is collected on the roof and drained via the slopes towards the atrium, where it falls along the water wall where it is stored in an open pool at the bottom of the atrium. From here this water can then be reused for both toilets and irrigation of the community gardens. Waste water from the toilets is also treated and cleaned through the living machine. A series of large tanks with plants and small aquatic animals cleanse the waste water and remove all toxins, so that it can again be reused in the toilets or garden outside. In this way there is a closed loop that all waste water produced in the building is reused in the building as well.

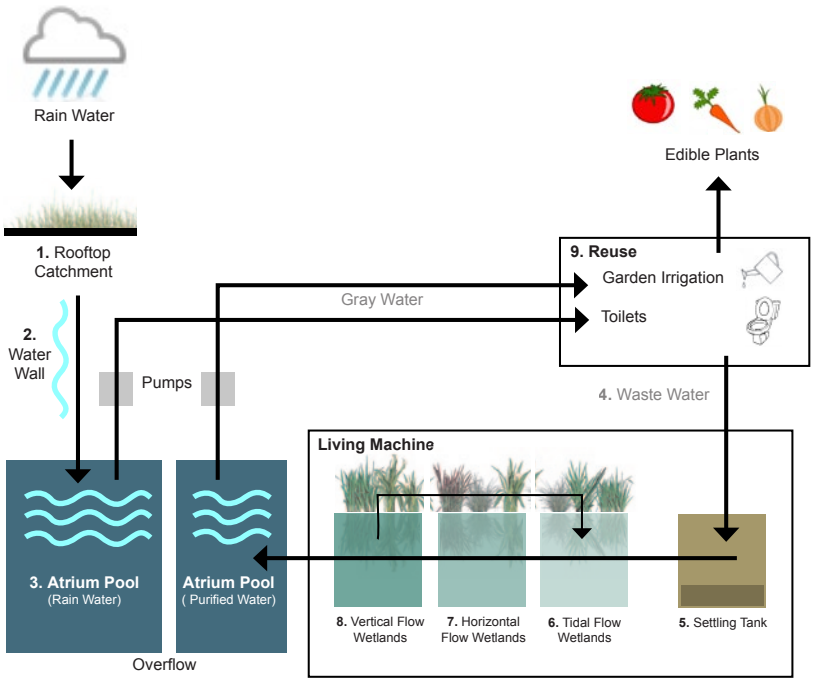
Furthermore, these processes are made visible for all building visitors to clearly see and understand. In addition, having water and plants in the atrium contributes to the character of the space and also helps to keep it cool and comfortable.



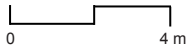


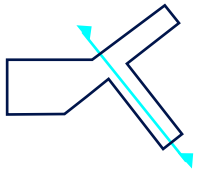
THE CENTRAL ATRIUM / LIVING MACHINE

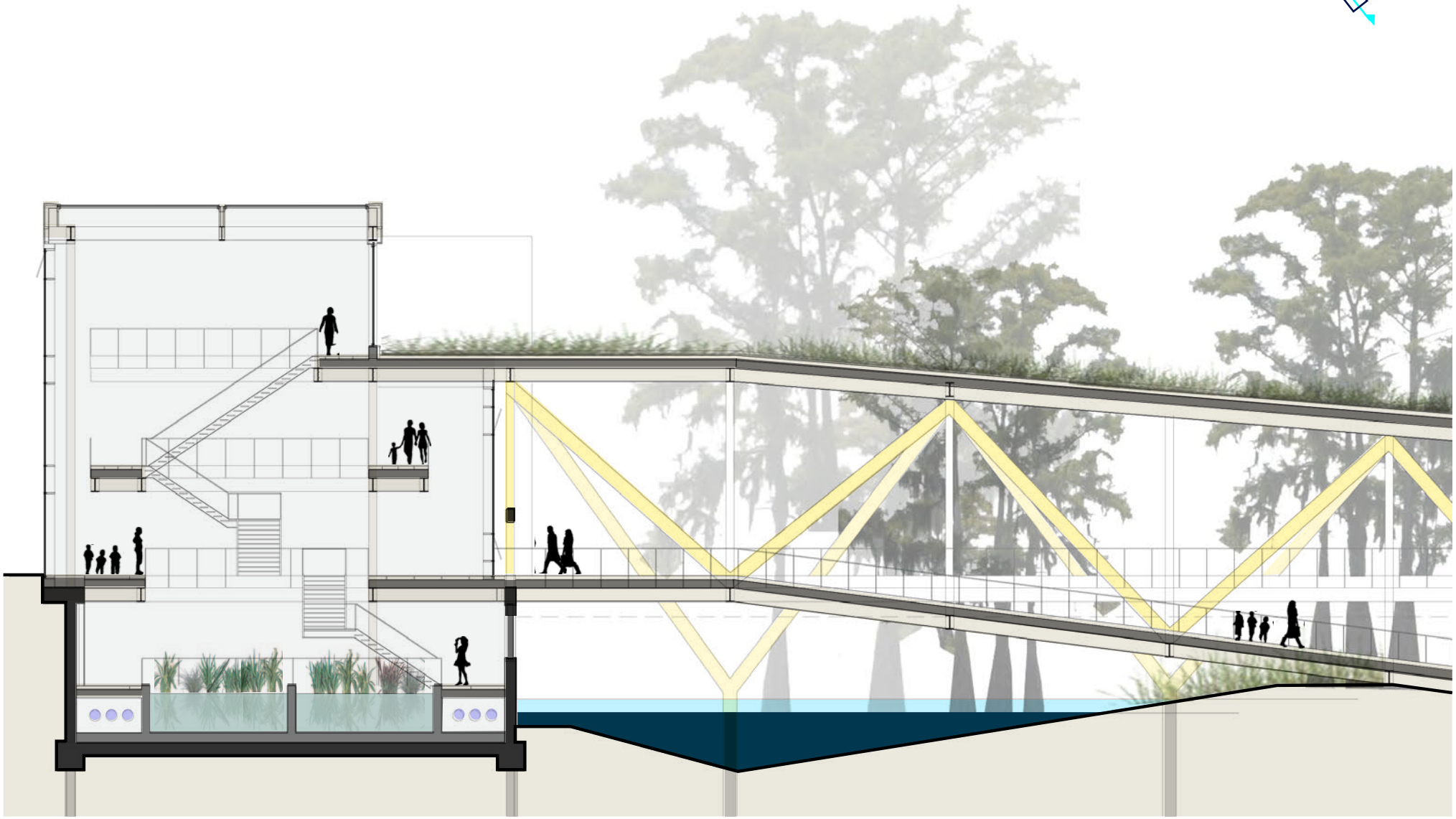
Water Cycle



THE NATURE BRIDGE

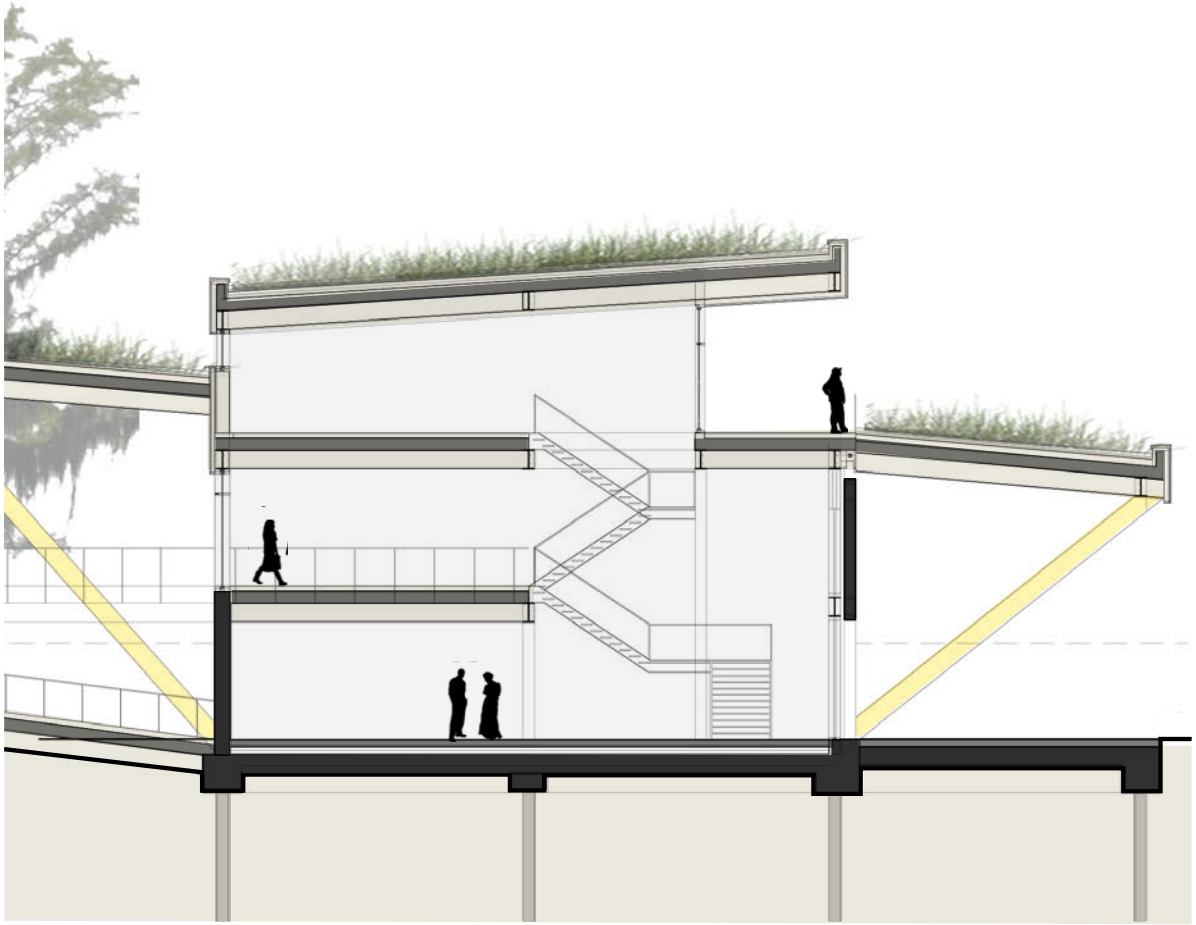


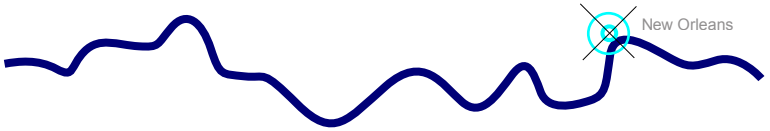




THE NATURE BRIDGE

The Nature Bridge provides a unique opportunity for viewing and experiencing the bayou landscape. Outside open air walkways, covered by a large roof above, cross over the bayou water and pass in between cypress forests. Two platforms connect the atrium to the café and pavilion. One of these platforms is elevated, suspended from the roof, leading directly across to the first floor of the pavilion. The other walkway slowly ramps down to meet the café terrace seating outside. This outside space blurs the boundary between what is building and what is landscape, allowing people a unique sequential experience within the bayou environment.

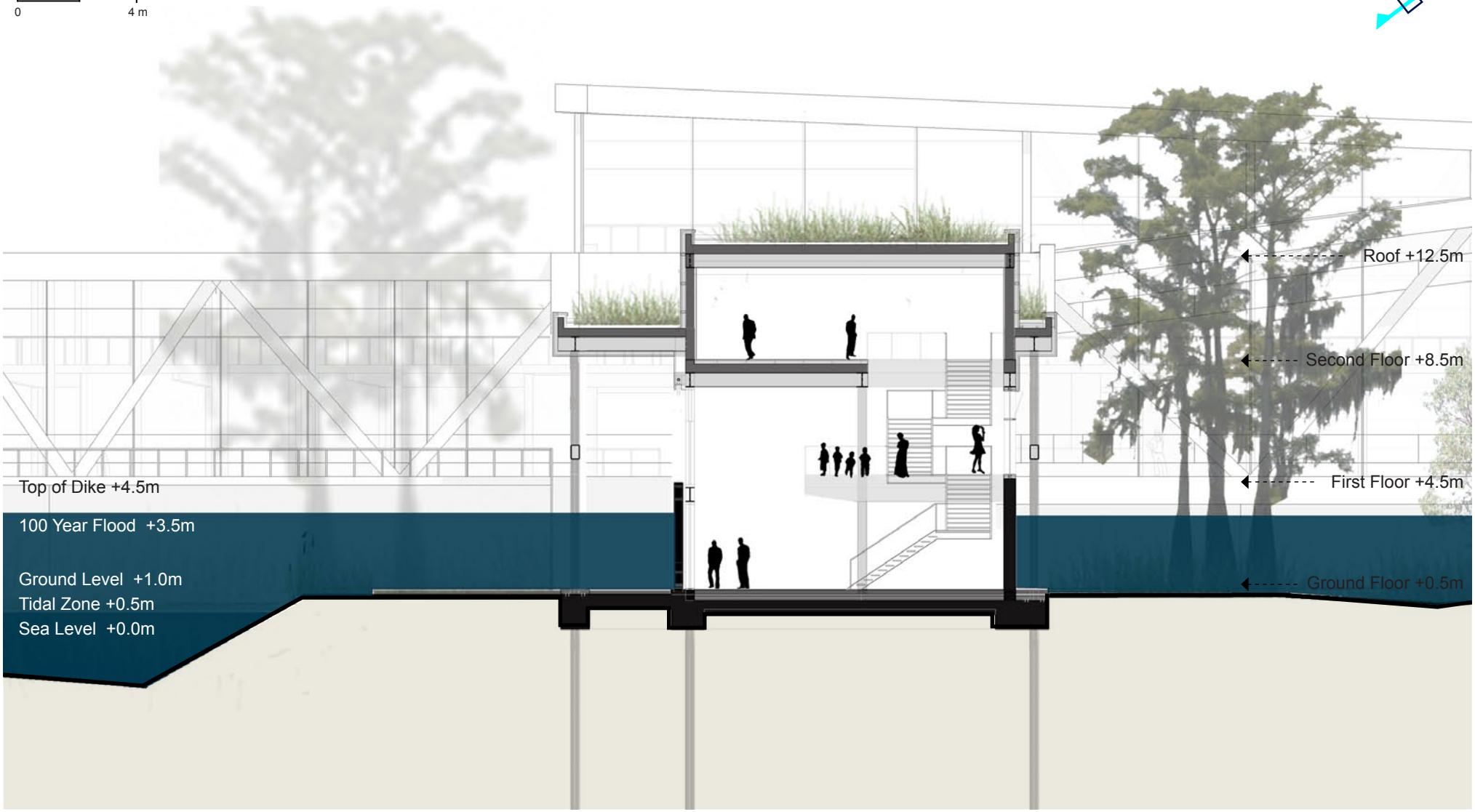




THE CLOSABLE CAFE

Adapting to Fluctuations / Max Water Level

0 4 m



THE CLOSABLE CAFE

Adapting to Fluctuations / Typical Water Level

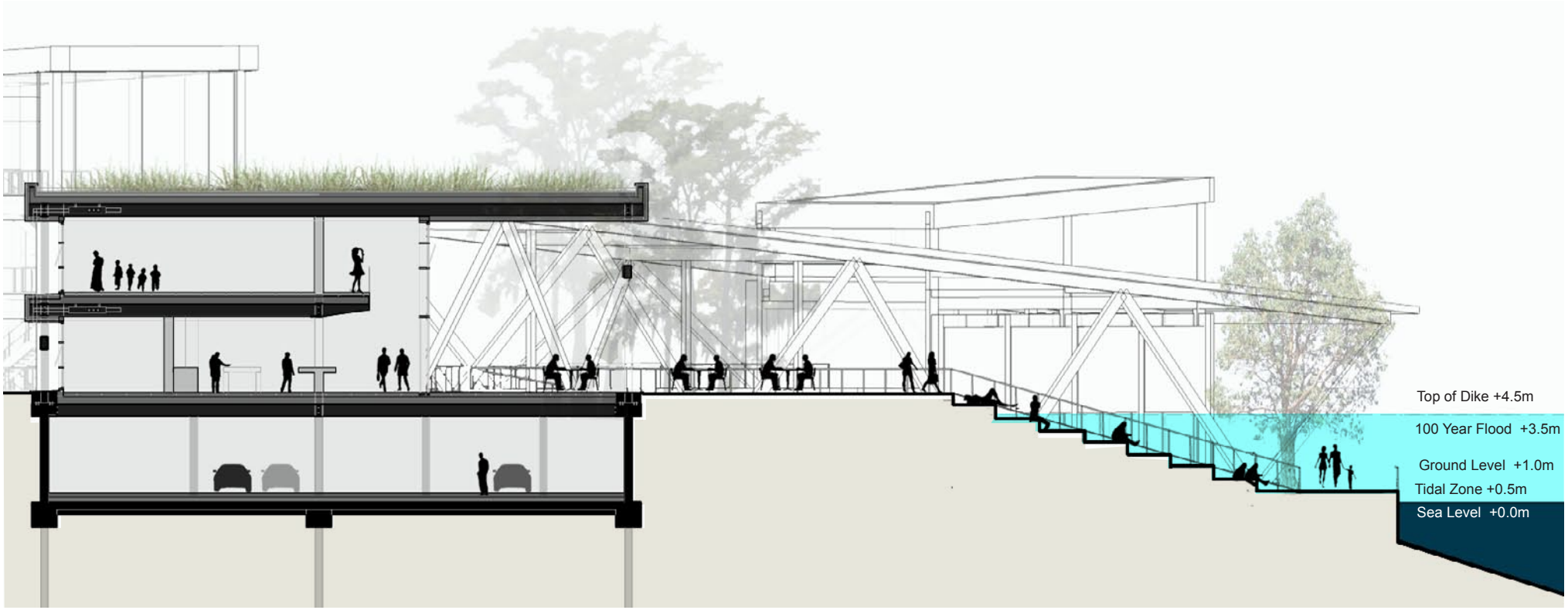
At the end of the Nature Bridge is the Learning Pavilion and Closable Café. Situated closest to the bayou corridor trail, this portion of the building is oriented towards passersby.

The café itself is an example of how buildings can change and adapt to fluctuating water levels. Large steel operable doors have the ability to open or close depending on flood conditions. Under normal water levels, the doors are raised up, allowing the café to easily spill out onto the terrace. When flood waters come, the doors move down and keep the inside of the café dry. Again the purpose of this architectural feature is to clearly make visible to everyone how a building can respond to changing water levels and still remain safe.

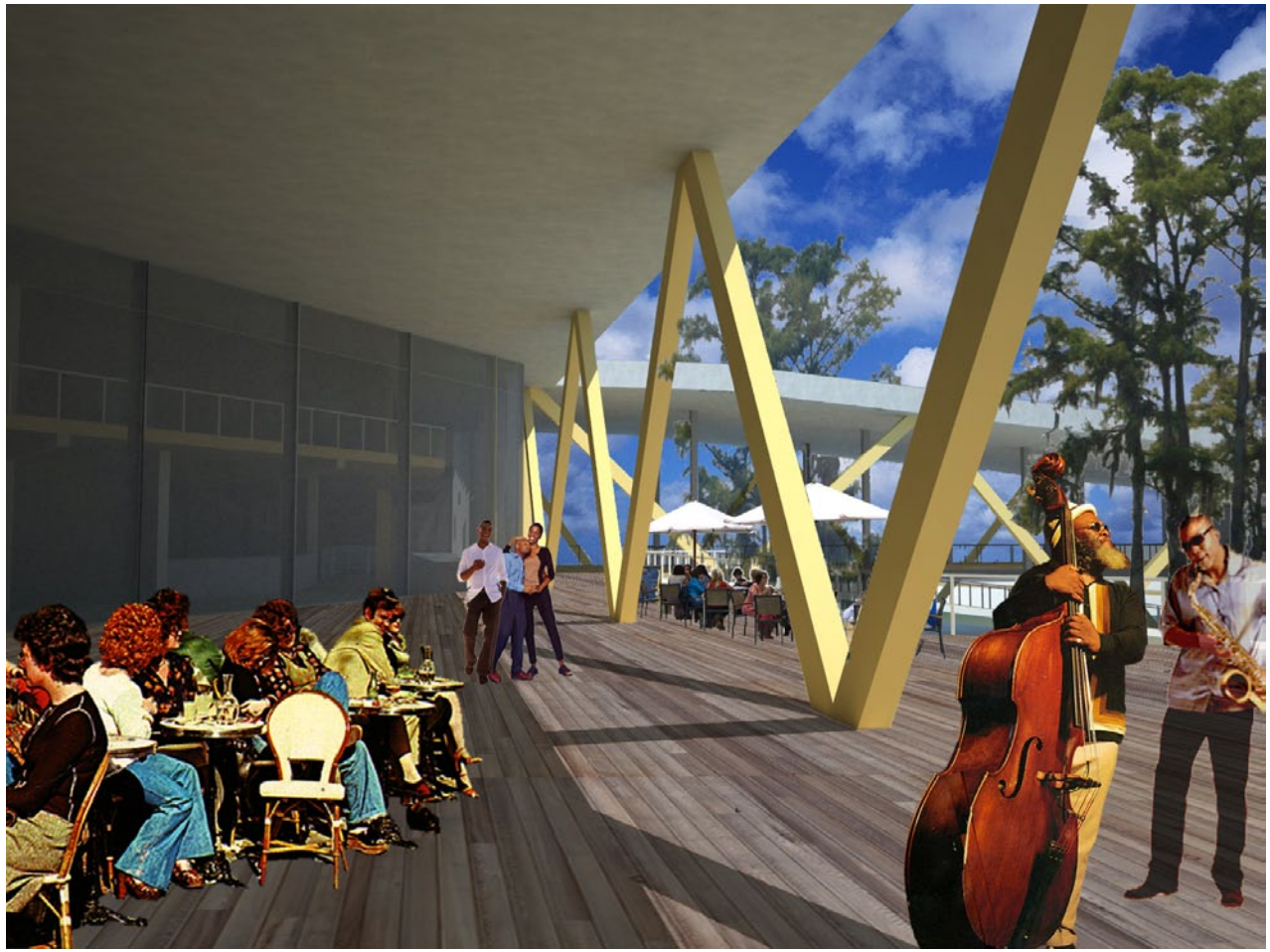
THE PORCH

Interacting with Water

0 4 m



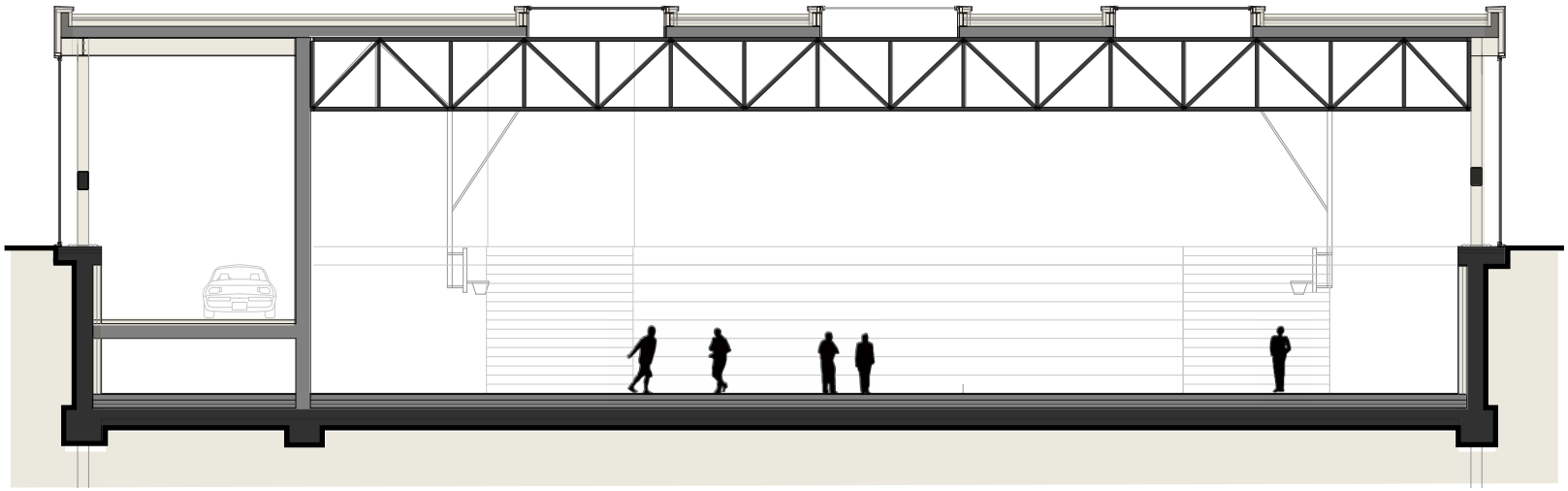
THE PORCH

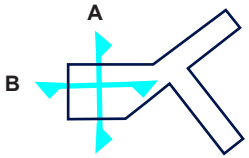


The Landscape Terrace and Porch gives another opportunity to experience changing water. The covered porch provides a shaded area for food oriented events to flow out from the kitchen inside. The landscape terrace incorporates a series of steps moving down towards the water edge. During times of higher water, these steps will become slowly inundated with water, and with the steps as a reference of measure, it becomes clear how much the water is changing. The steps can also provide a place for people to get their feet wet and play in the water. The steps can also function as a large seating area, oriented towards a floating stage platform on the water at the bottom of the stairs. This area can be used for additional special events within the community.

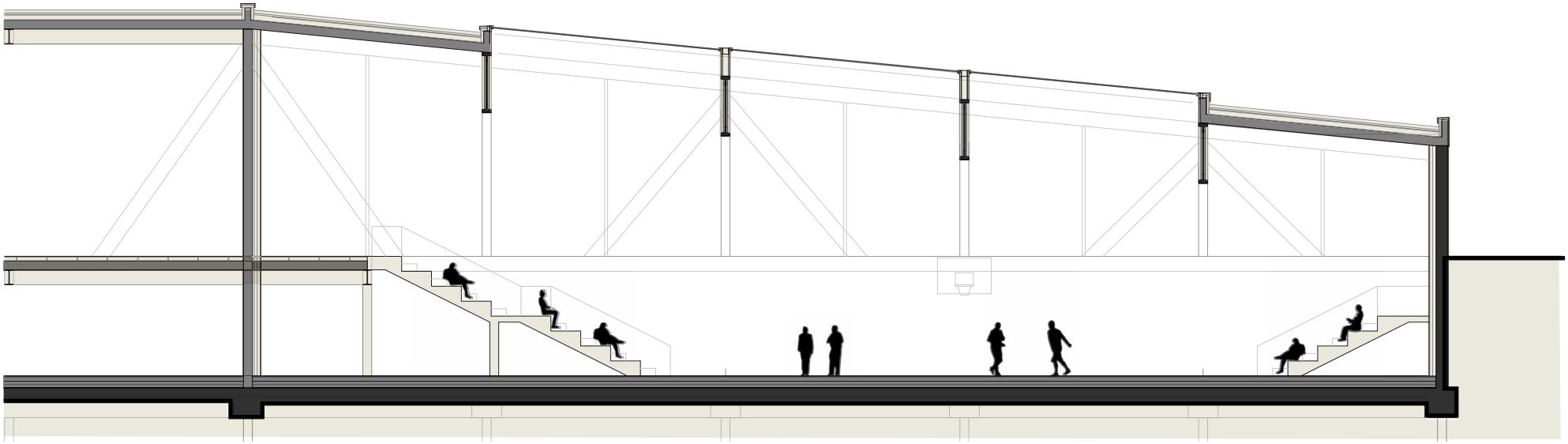
THE GYMNASIUM

Gymnasium / Section A 1:200





Gymnasium / Section B



THE GYMNASIUM

The programmatic demands of the Gymnasium and sports hall allow it to be sunken underground so as to better control daylight access. Large skylights within the sloped roof allow light to enter from above. During times of direct sunlight, special electrochromic glass will become tinted to better control heat gain.

CLIMATE SYSTEMS

1) Passive Methods

- Natural ventilation through operable windows (100% in circulation spaces / when possible in occupied spaces)

- Evaporative cooling through water wall and rainwater storage pool in atrium

- Ground cooling in gymnasium buried underground

- Green roof to reduce heat gain

2) Active Method: Ground / Water Source Heat Pump

- Proximity of adjacent bayou water as heat sink

- Water source heat pump provides highest efficiencies for thermal systems

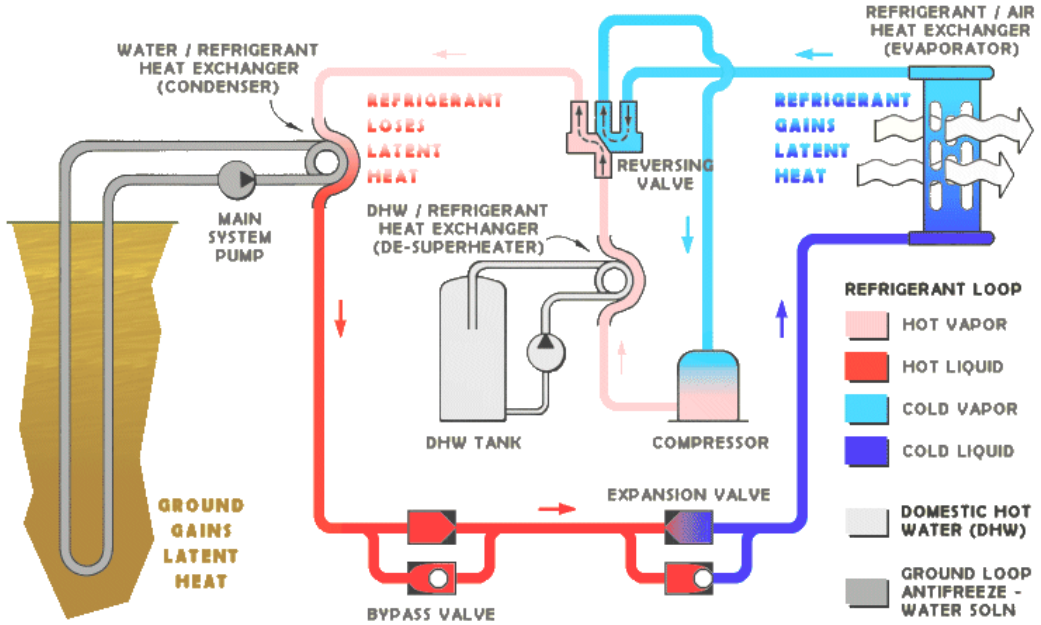
3) Air Distribution: Decentralized Mechanical Ventilation Units

- Flexibility: each room can be controlled separately

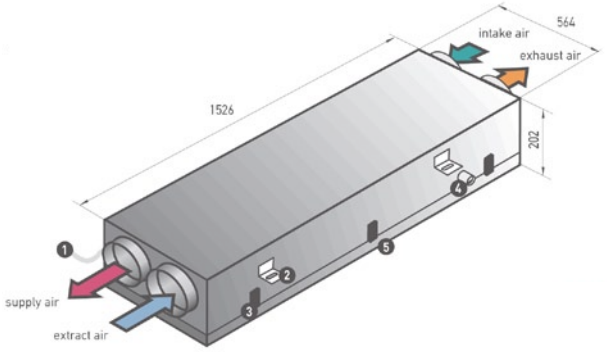
- No massive ducts running from room to room and through beams

- Added ability to get heat recovery and dehumidification

Typical Ground Source Heat Pump System



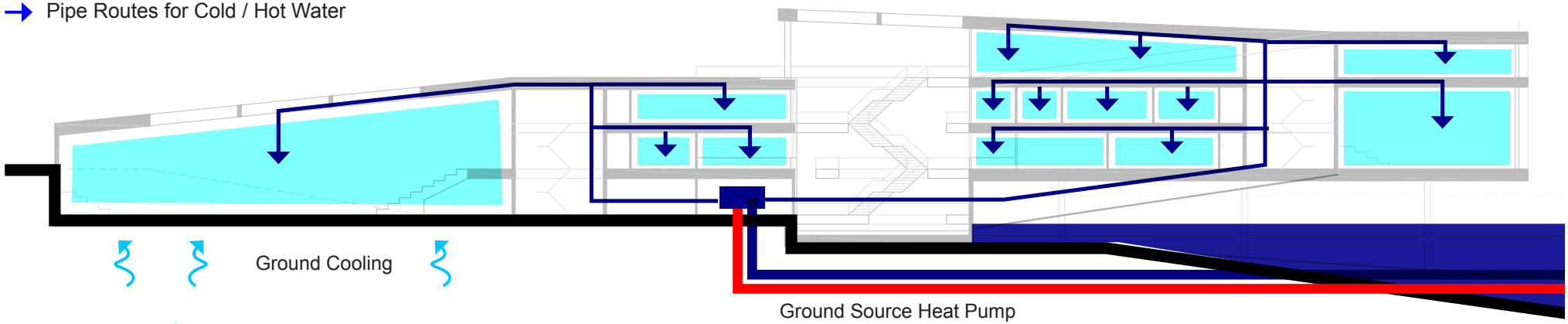
Ceiling Mounted Ventilation Unit

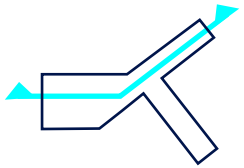


CLIMATE SYSTEMS

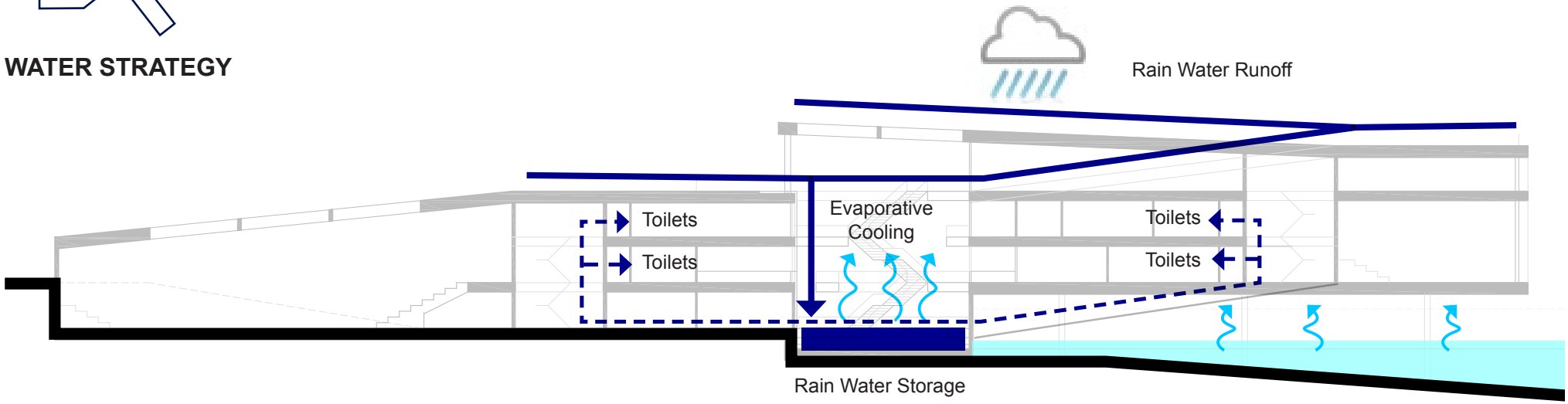
COOLING STRATEGY

Individually Climatized Rooms
Pipe Routes for Cold / Hot Water





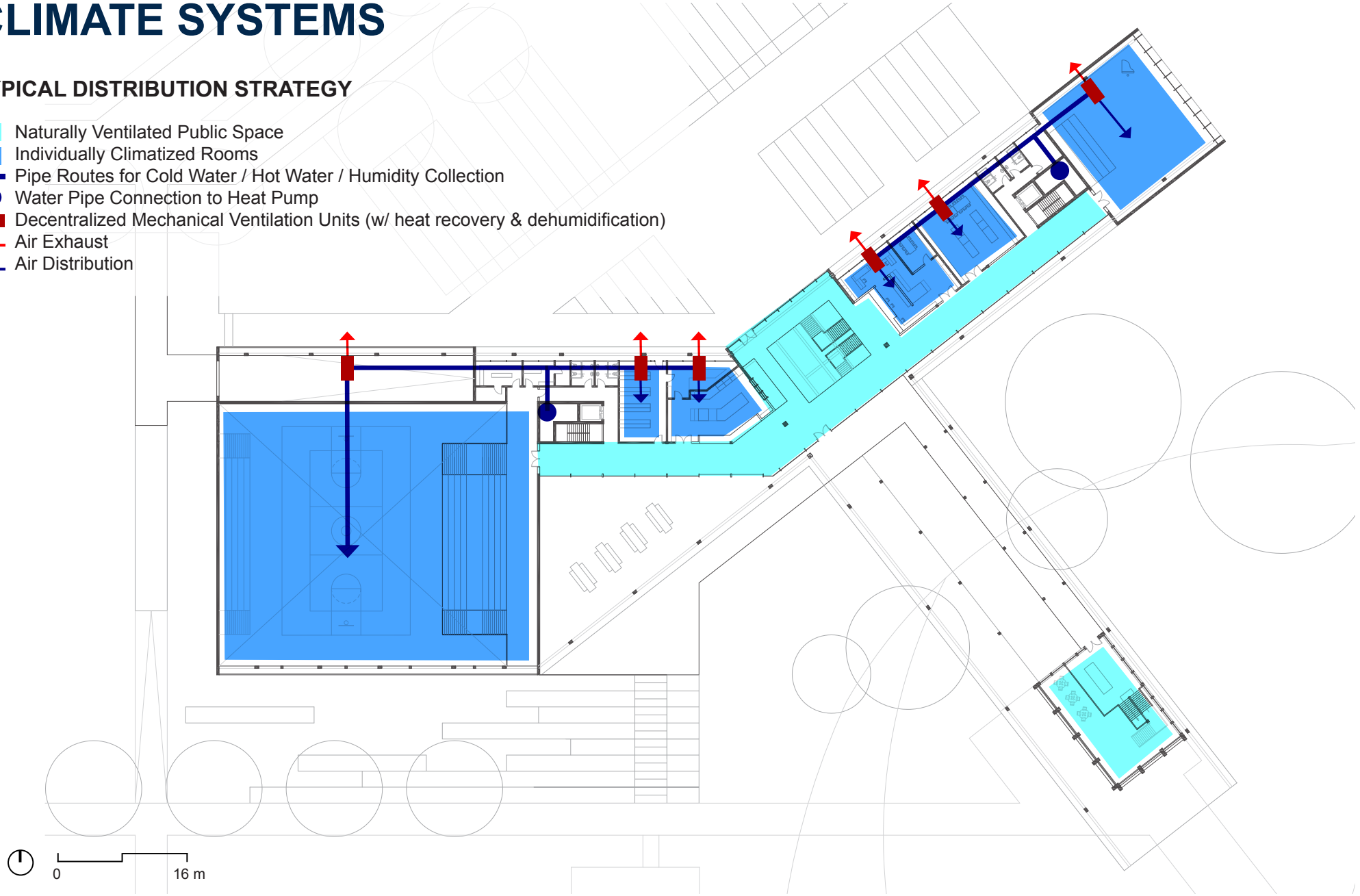
WATER STRATEGY



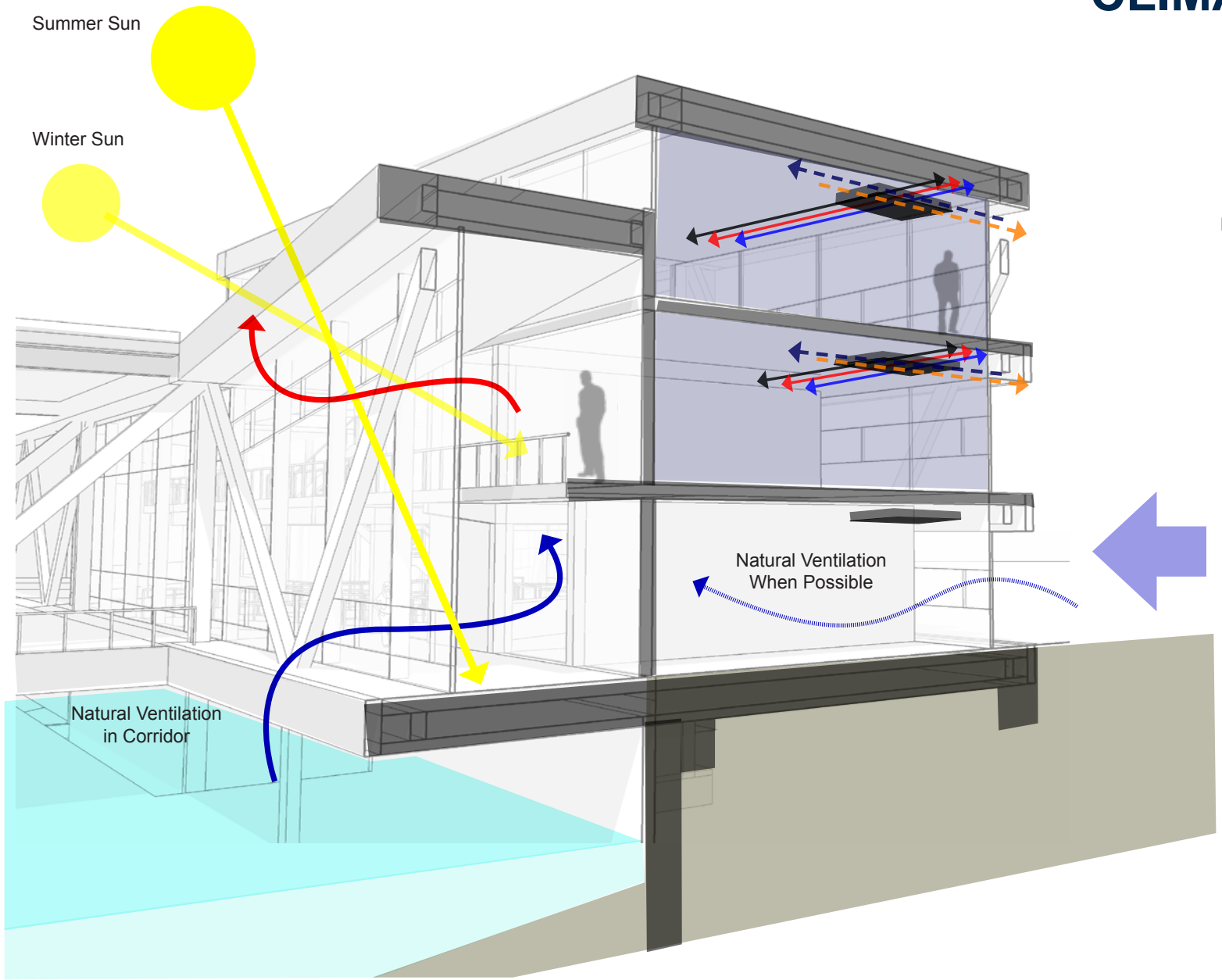
CLIMATE SYSTEMS

TYPICAL DISTRIBUTION STRATEGY

- Naturally Ventilated Public Space
- Individually Climatized Rooms
- Pipe Routes for Cold Water / Hot Water / Humidity Collection
- Water Pipe Connection to Heat Pump
- Decentralized Mechanical Ventilation Units (w/ heat recovery & dehumidification)
- Air Exhaust
- Air Distribution



CLIMATE SYSTEMS



Mechanical Cooling

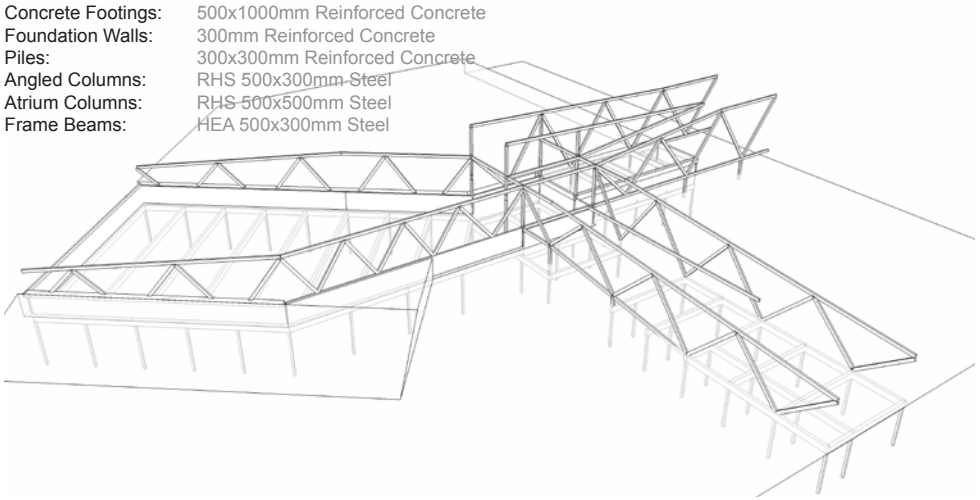
- Cold Water Pipe
- Hot Water Pipe
- Humidity Pipe
- Decentralized Ventilation Unit
- Air Intake
- Air Exhause
- Individually Climatized Room

CONSTRUCTION

01 Foundation & Frame

MATERIALS

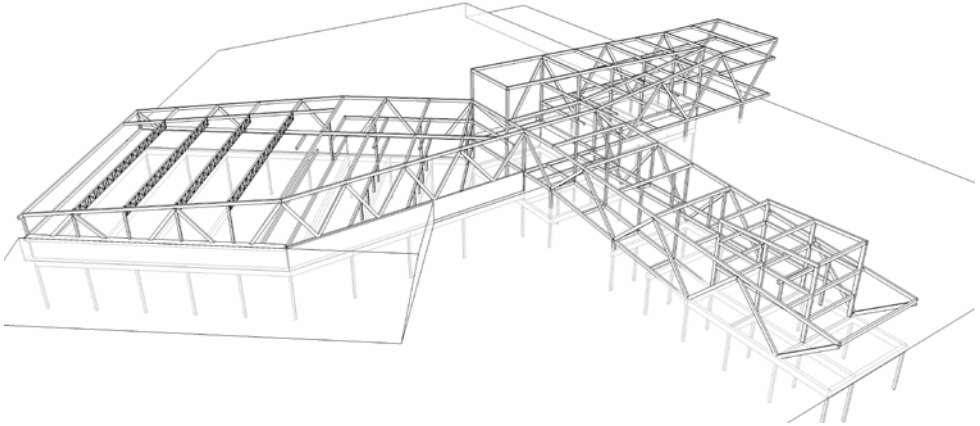
Concrete Footings:	500x1000mm Reinforced Concrete
Foundation Walls:	300mm Reinforced Concrete
Piles:	300x300mm Reinforced Concrete
Angled Columns:	RHS 500x300mm Steel
Atrium Columns:	RHS 500x500mm Steel
Frame Beams:	HEA 500x300mm Steel



02 Beams & Columns

MATERIALS

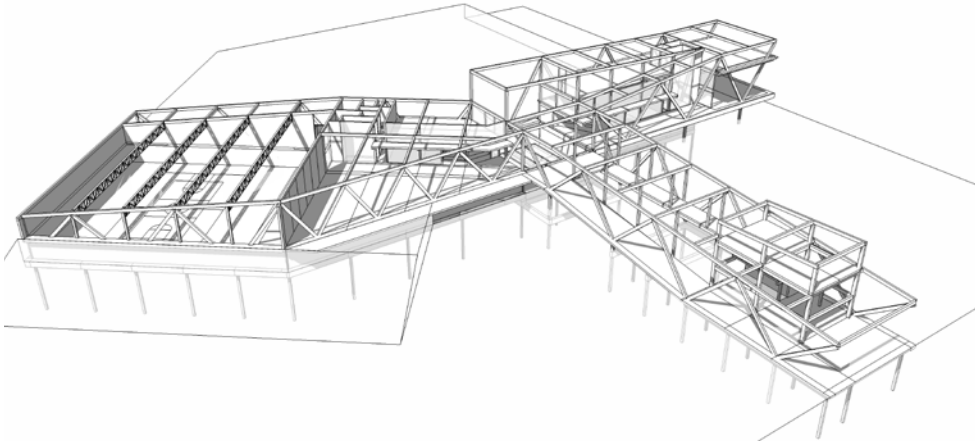
Typical Columns:	IPE 500x300mm Steel
Typical Beams:	IPE 500x300mm Steel
Gymnasium Beams:	2000x300mm Steel Truss



03 Walls & Floors

MATERIALS

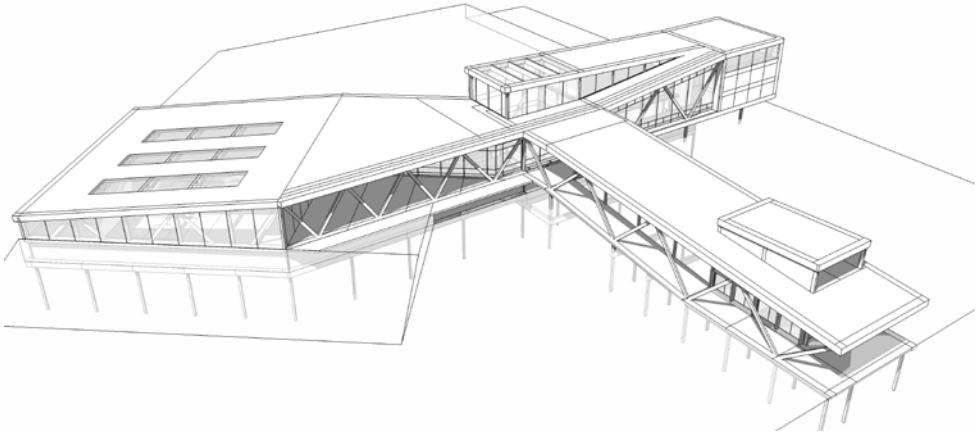
Typical Walls:	Steel Frame / Insulation / Vapor Barrier / Finish
Typical Floors:	Concrete Slab / Insulation / Vinyl Flooring
Typical Ground Floor:	Concrete Plinth / Insulation / Waterproofing / Concrete Slab / Vinyl Flooring



04 Roof & Facade

MATERIALS

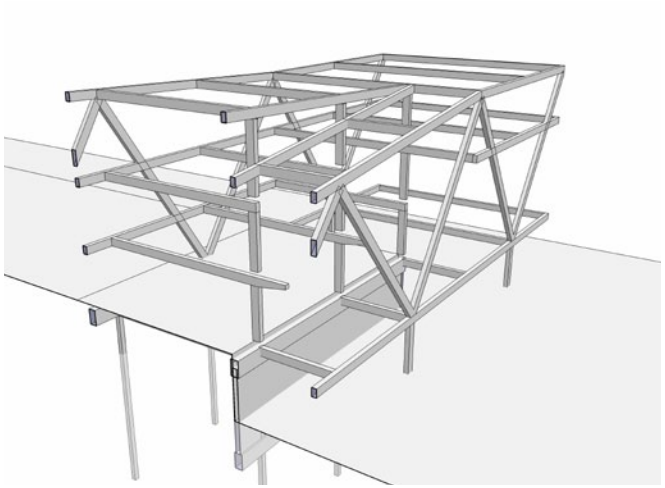
Glass Facade:	Steel Frame / Double Glazing Glass
Aluminum Facade:	Steel Frame / Insulation / Aluminum Panels
Typical Roof:	Concrete Slab / Vapor Barrier / Thermal Insulation / Filter Map / Drainage Layer / Top Soil / Vegetation



CONSTRUCTION

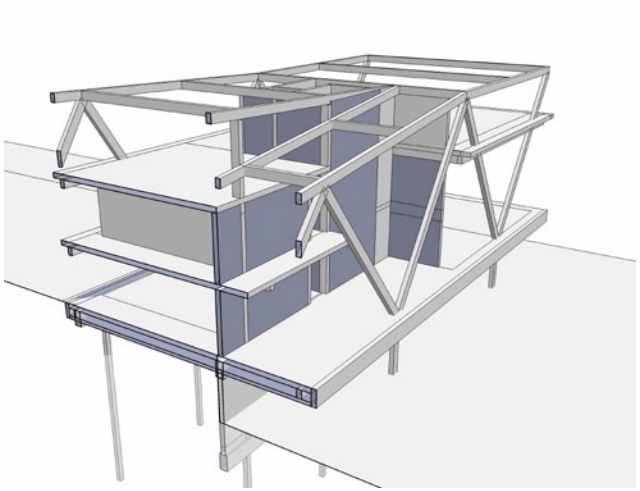
01 Foundation & Frame

02 Beams & Columns

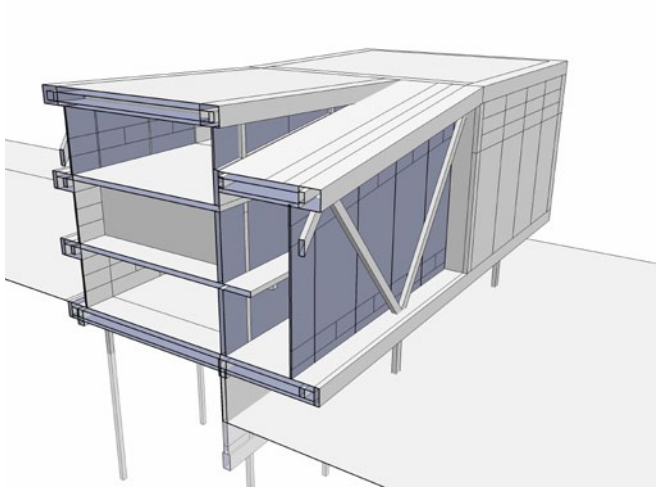


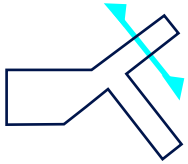
The construction and structural design of the building is shown here. The base of the building is composed of a concrete foundation with concrete piles, as well as concrete walls where the building is either underground or adjacent to water. From this base, the rest of the structure is make of steel. A steel truss creates the primary frame of the building along the facades. From this frame, beams support the floors and roofs. The truss is exposed so as to display the structure of the building, as well as the slopes within the landscape.

03 Walls & Floors



04 Roof & Facade



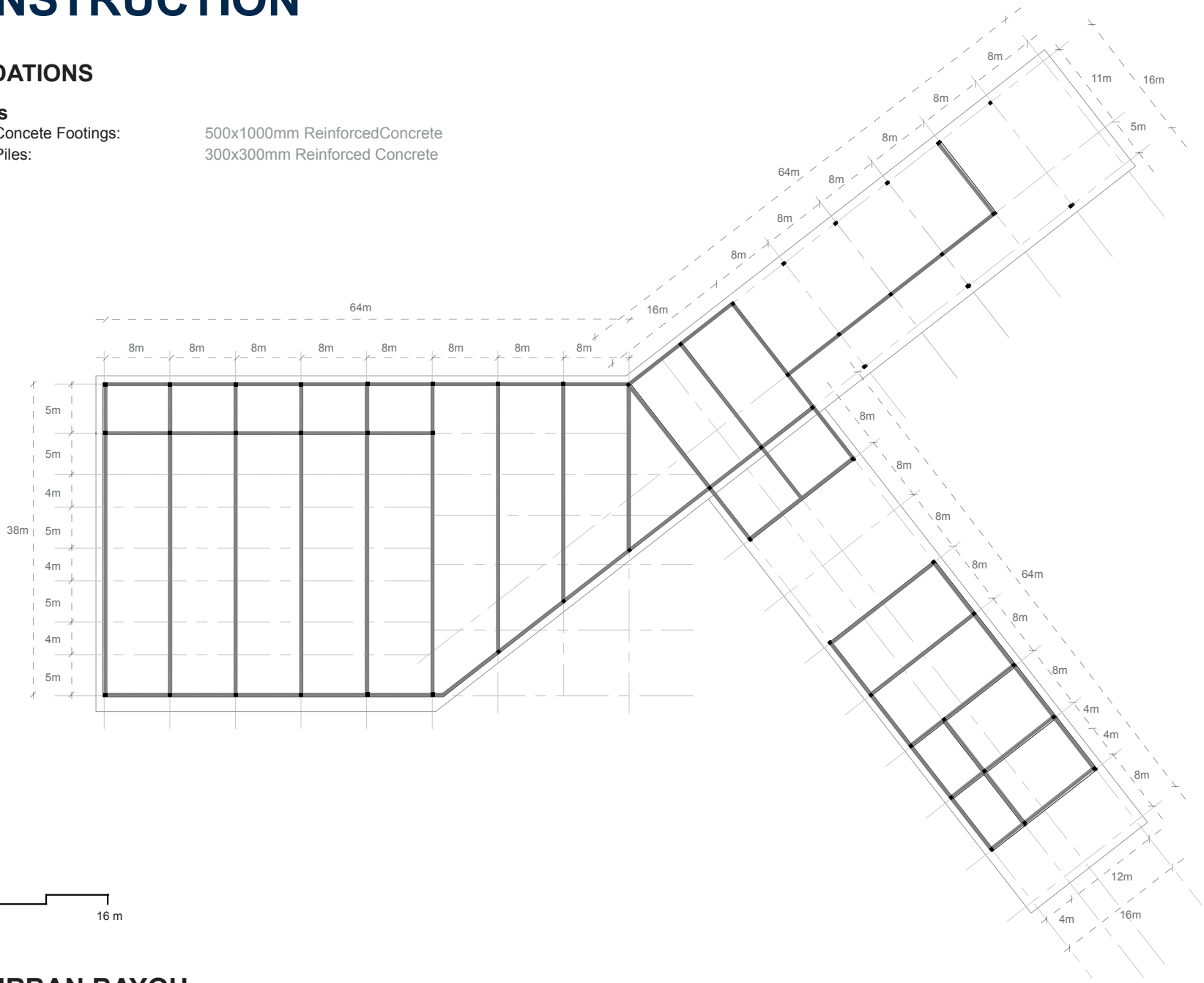


CONSTRUCTION

FOUNDATIONS

Materials

—	Concete Footings:	500x1000mm ReinforcedConcrete
■	Piles:	300x300mm Reinforced Concrete

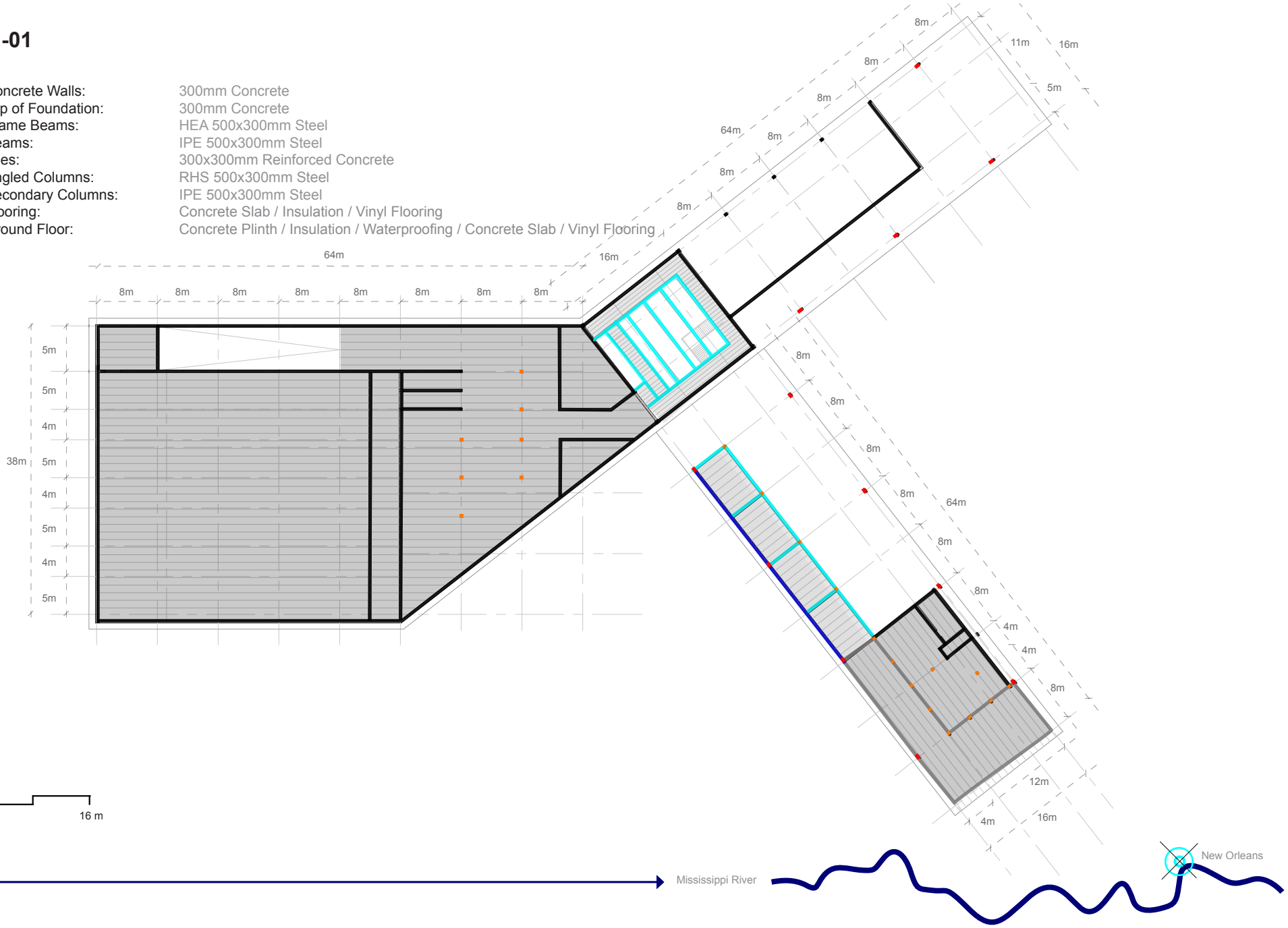


CONSTRUCTION

FLOOR -01

Materials

Concrete Walls:	300mm Concrete
Top of Foundation:	300mm Concrete
Frame Beams:	HEA 500x300mm Steel
Beams:	IPE 500x300mm Steel
Piles:	300x300mm Reinforced Concrete
Angled Columns:	RHS 500x300mm Steel
Secondary Columns:	IPE 500x300mm Steel
Flooring:	Concrete Slab / Insulation / Vinyl Flooring
Ground Floor:	Concrete Plinth / Insulation / Waterproofing / Concrete Slab / Vinyl Flooring

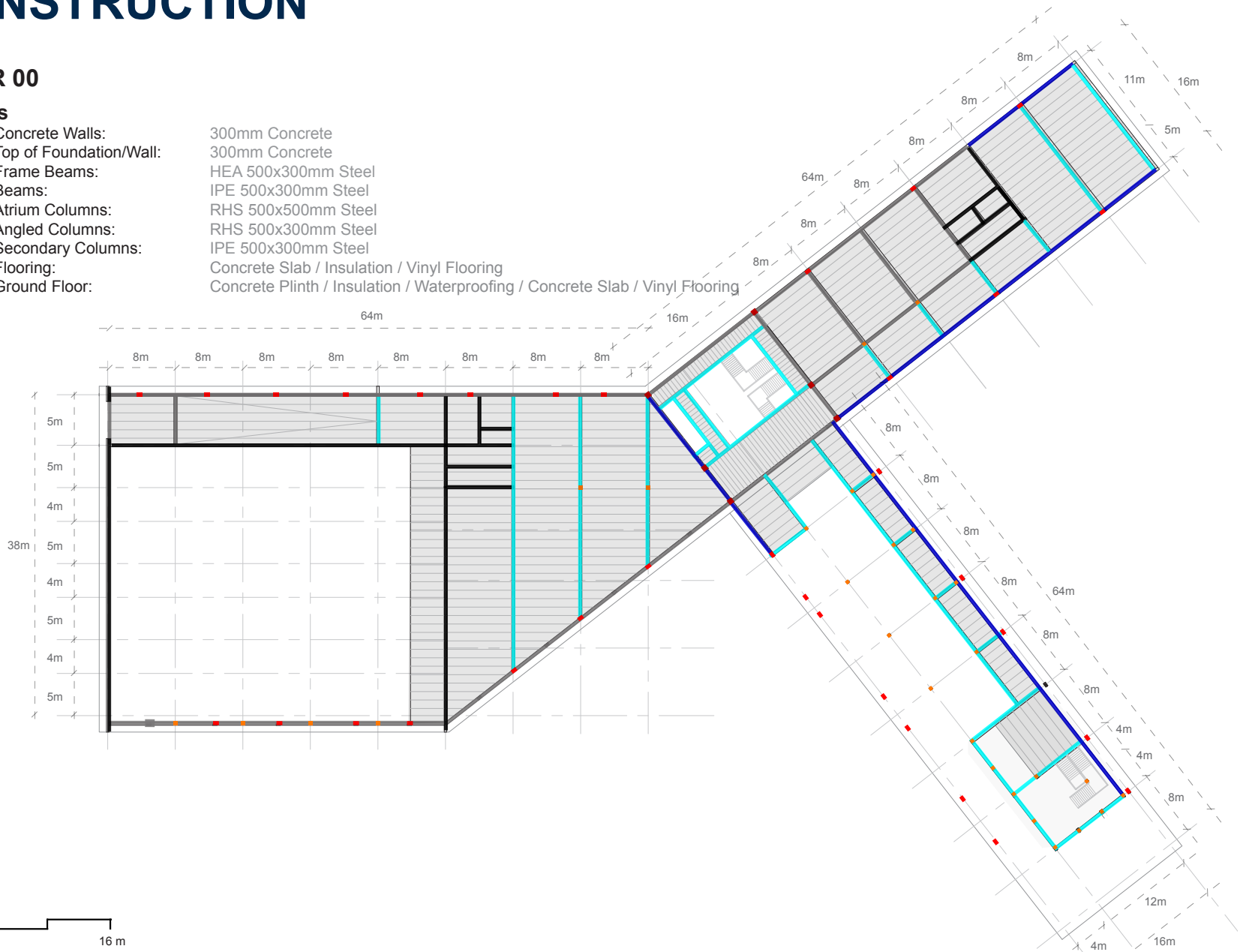


CONSTRUCTION

FLOOR 00

Materials

Concrete Walls:	300mm Concrete
Top of Foundation/Wall:	300mm Concrete
Frame Beams:	HEA 500x300mm Steel
Beams:	IPE 500x300mm Steel
Atrium Columns:	RHS 500x500mm Steel
Angled Columns:	RHS 500x300mm Steel
Secondary Columns:	IPE 500x300mm Steel
Flooring:	Concrete Slab / Insulation / Vinyl Flooring
Ground Floor:	Concrete Plinth / Insulation / Waterproofing / Concrete Slab / Vinyl Flooring

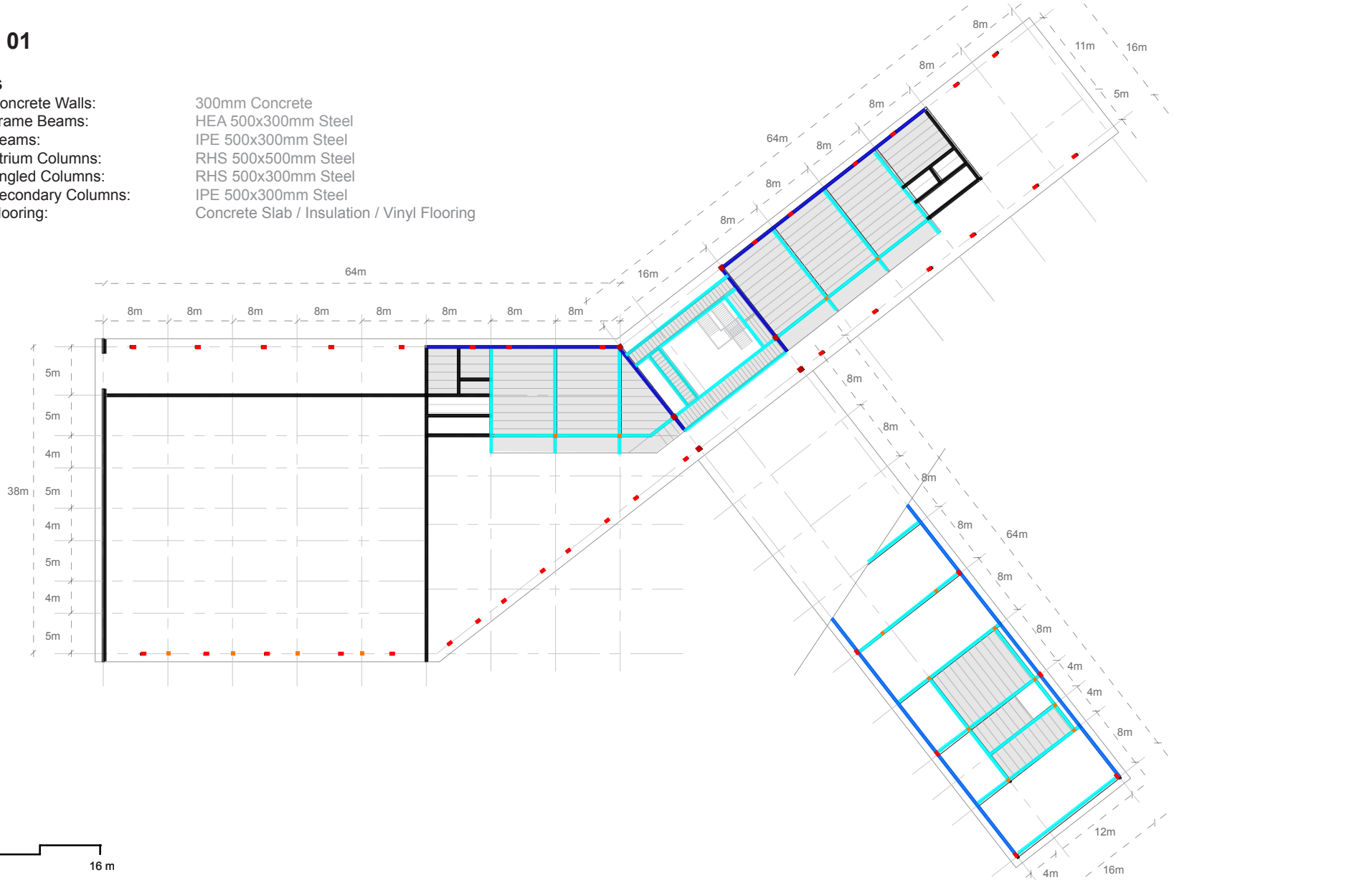


CONSTRUCTION

FLOOR 01

Materials

Concrete Walls:	300mm Concrete
Frame Beams:	HEA 500x300mm Steel
Beams:	IPE 500x300mm Steel
Atrium Columns:	RHS 500x500mm Steel
Angled Columns:	RHS 500x300mm Steel
Secondary Columns:	IPE 500x300mm Steel
Flooring:	Concrete Slab / Insulation / Vinyl Flooring

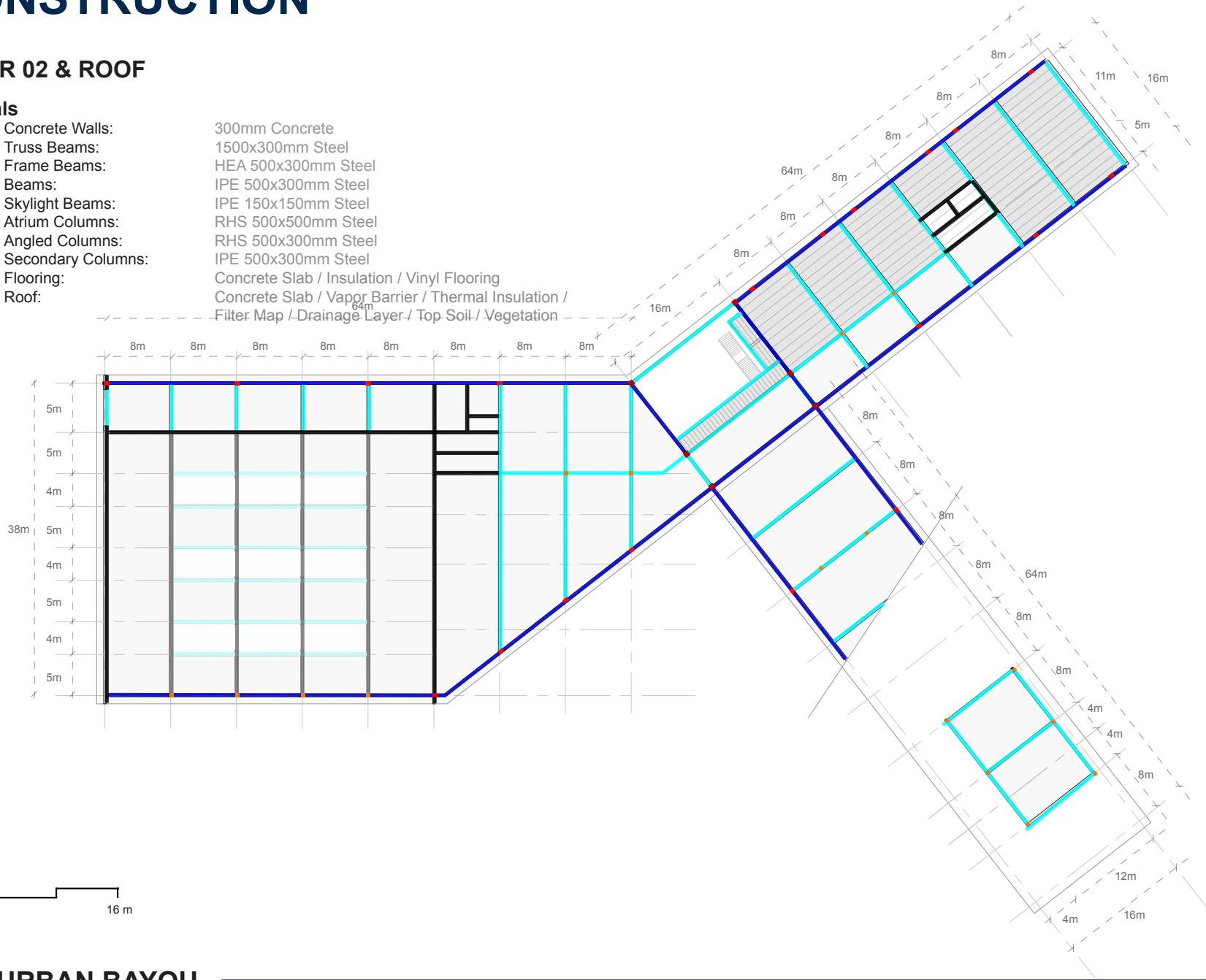


CONSTRUCTION

FLOOR 02 & ROOF

Materials

Concrete Walls:	300mm Concrete
Truss Beams:	1500x300mm Steel
Frame Beams:	HEA 500x300mm Steel
Beams:	IPE 500x300mm Steel
Skylight Beams:	IPE 150x150mm Steel
Atrium Columns:	RHS 500x500mm Steel
Angled Columns:	RHS 500x300mm Steel
Secondary Columns:	IPE 500x300mm Steel
Flooring:	Concrete Slab / Insulation / Vinyl Flooring
Roof:	Concrete Slab / Vapor Barrier / Thermal Insulation / Filter Map / Drainage Layer / Top Soil / Vegetation



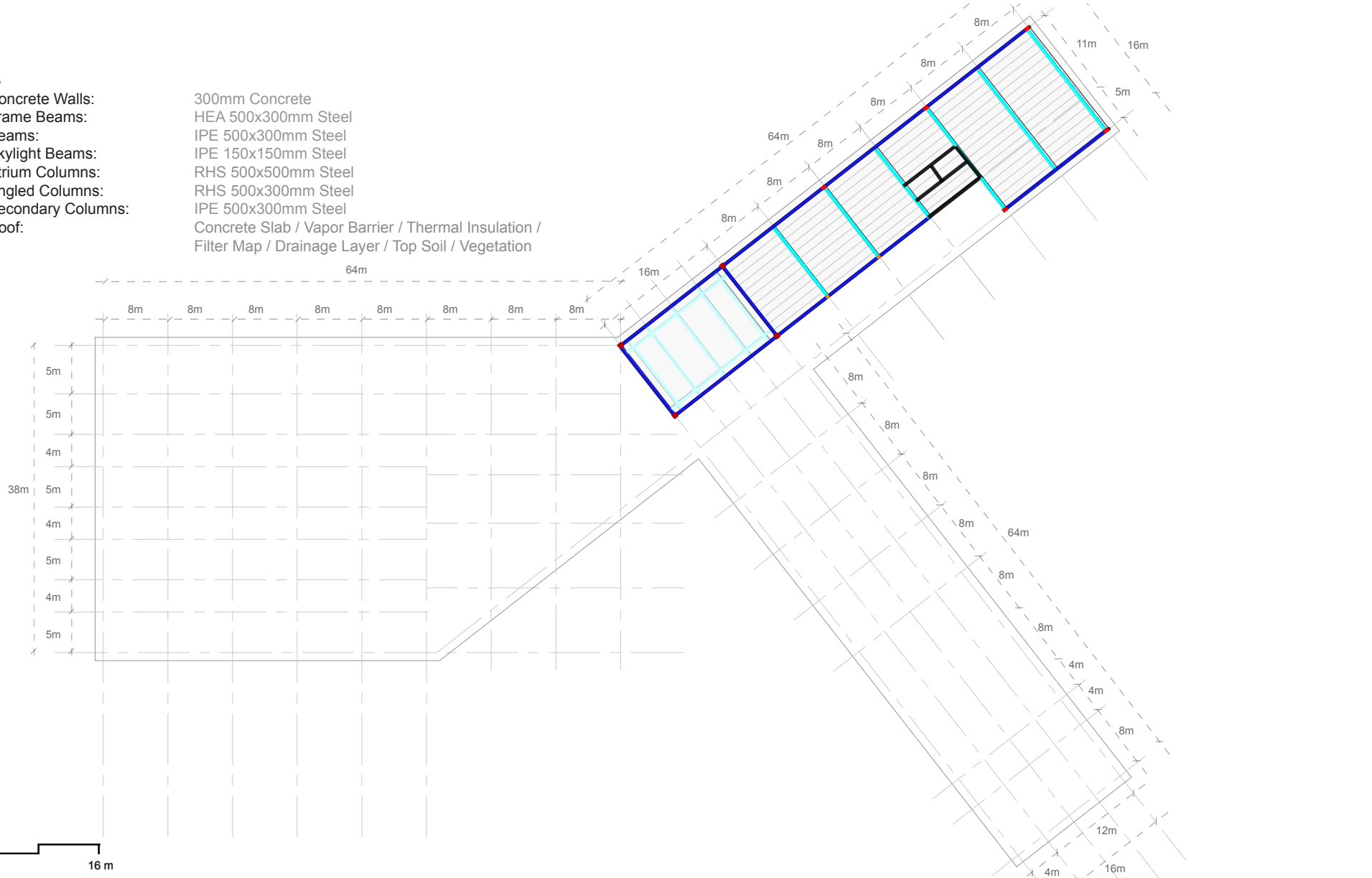
0 16 m

CONSTRUCTION

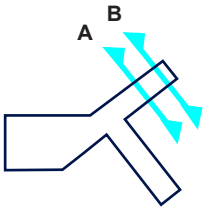
ROOF

Materials

Concrete Walls:	300mm Concrete
Frame Beams:	HEA 500x300mm Steel
Beams:	IPE 500x300mm Steel
Skylight Beams:	IPE 150x150mm Steel
Atrium Columns:	RHS 500x500mm Steel
Angled Columns:	RHS 500x300mm Steel
Secondary Columns:	IPE 500x300mm Steel
Roof:	Concrete Slab / Vapor Barrier / Thermal Insulation / Filter Map / Drainage Layer / Top Soil / Vegetation

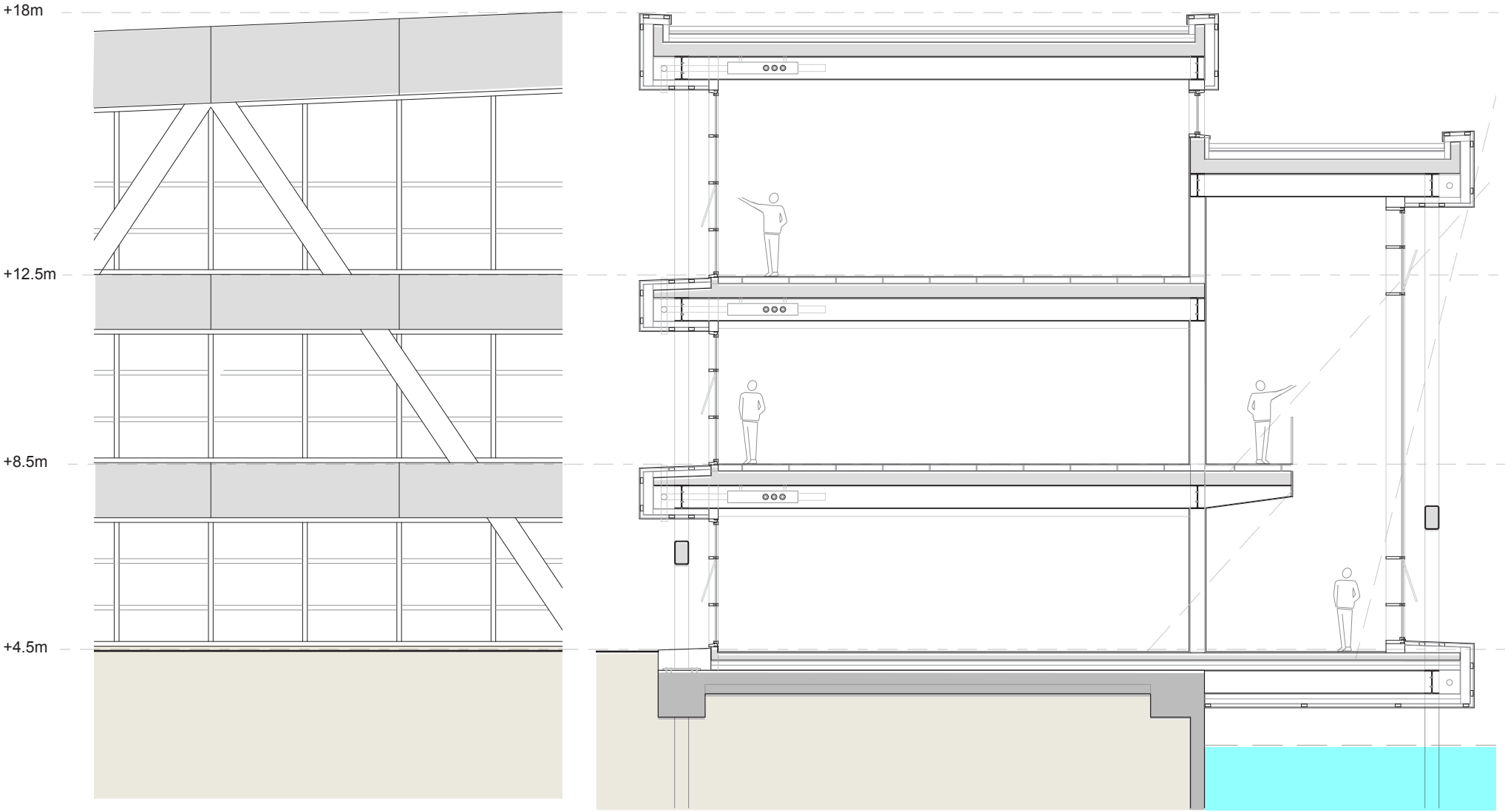


DETAILED SECTIONS



A FACADE INSIDE

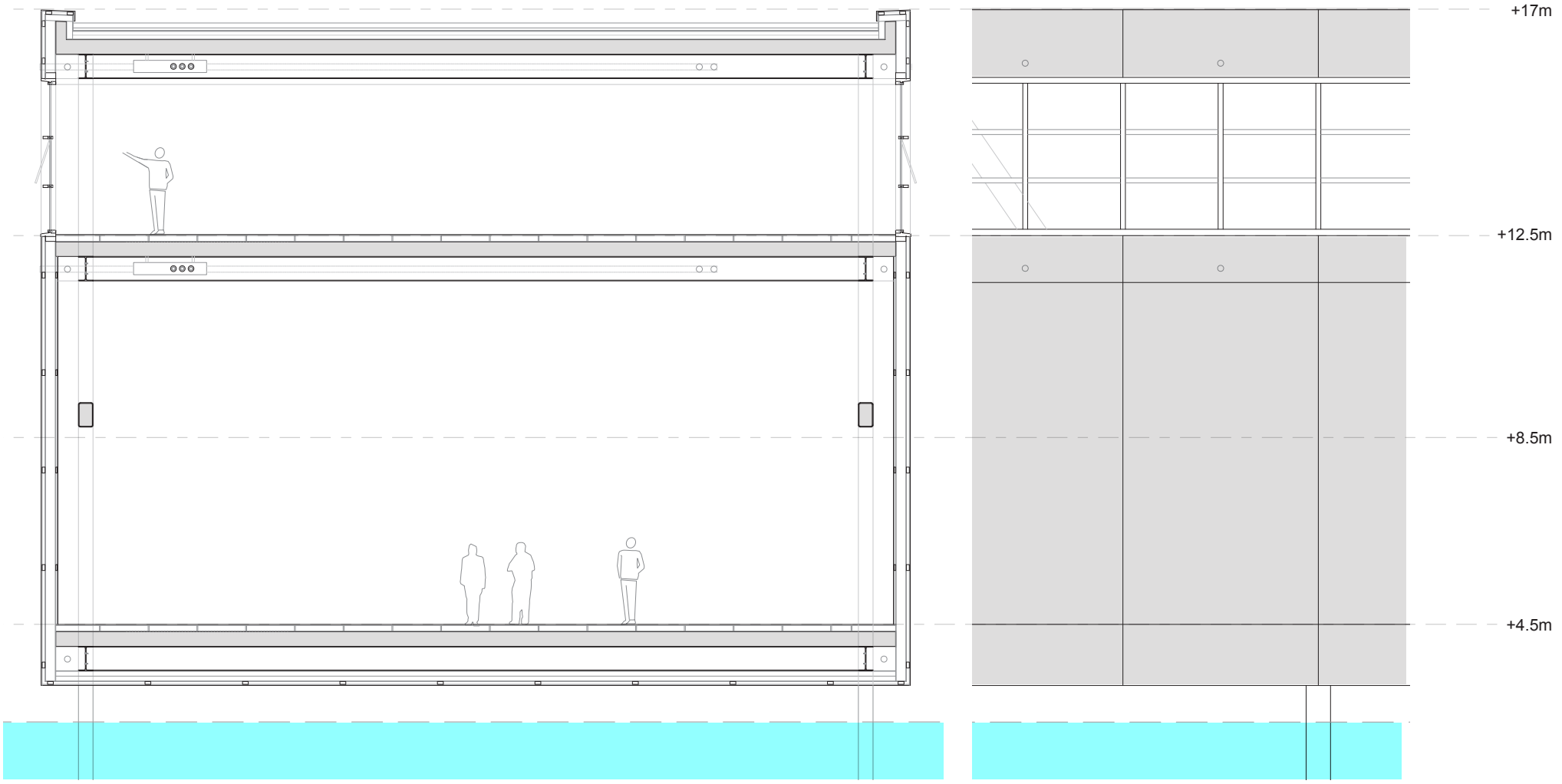
0 2 m



DETAILED SECTIONS

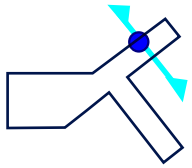
B FACADE OUTSIDE

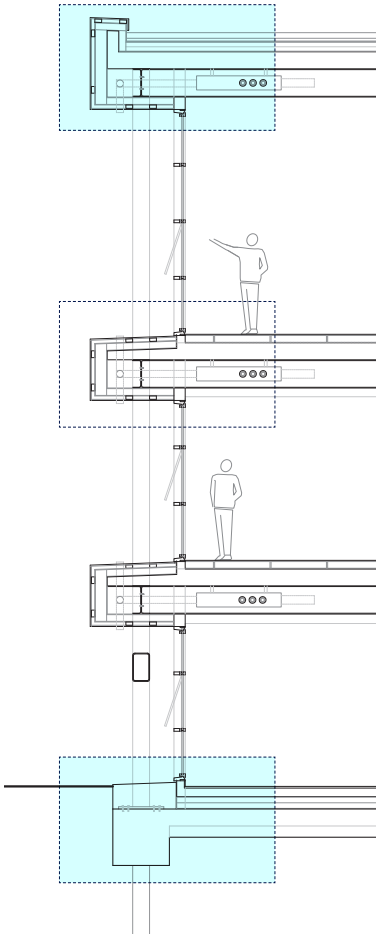
0 2 m



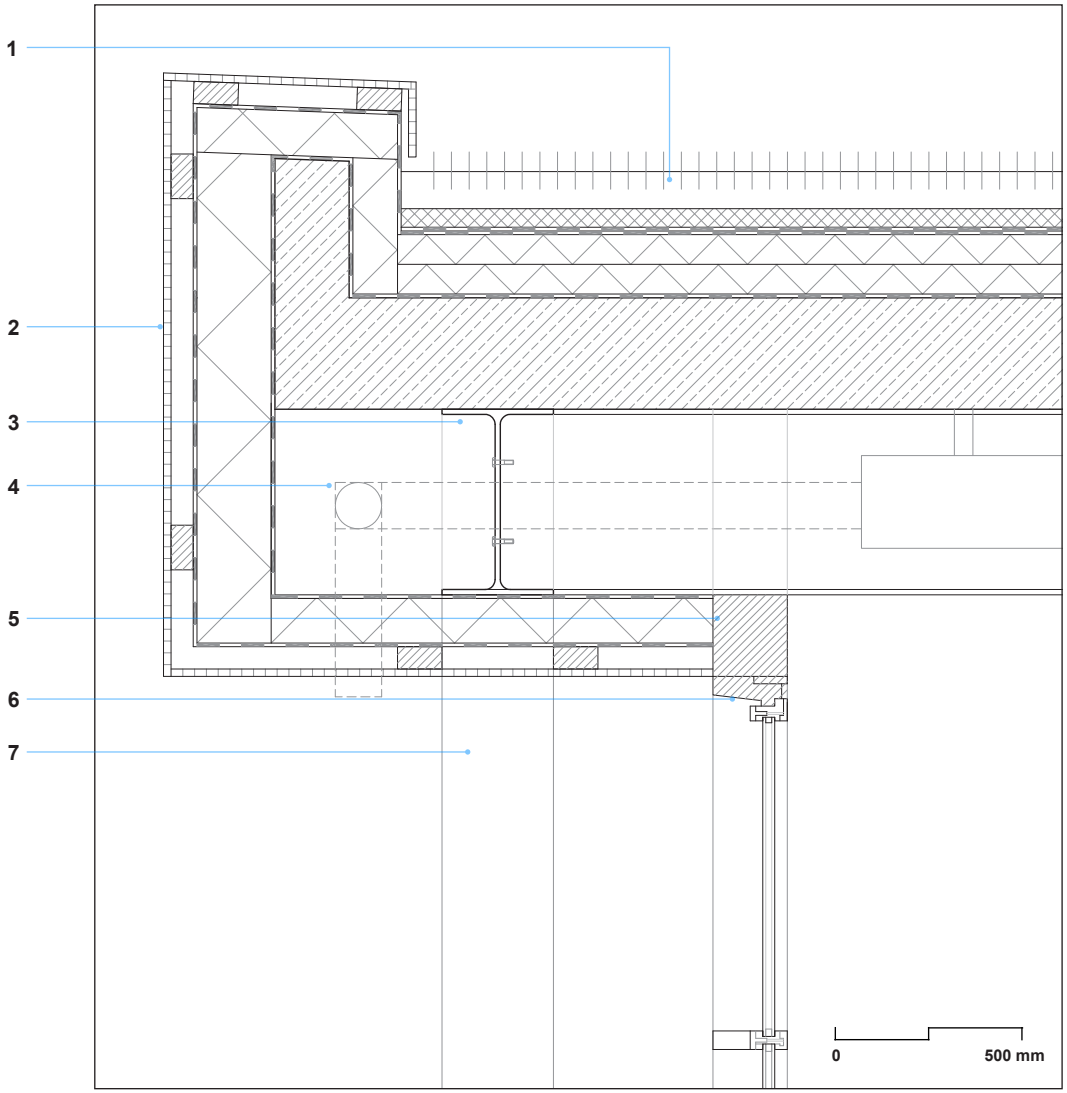
DETAILS

KEY





ROOF 1:20



1) Top Soil 100mm
Drainage Layer 50mm
Protective Root Resistant Matting 10mm
Waterproof Membrane 10mm
Thermal Insulation 160mm
Vapor Barrier 10mm
Reinforced Concrete slab 300mm
IPE Steel Beam 500x300mm

2) Aluminum Panel Cladding 20mm
Steel Battons / Ventilated Cavity 60mm
Weather Proofing 10mm
Steel Frame / Thermal Insulation 200mm
Vapor Barriar 10mm

3) HEA 500x300x14mm

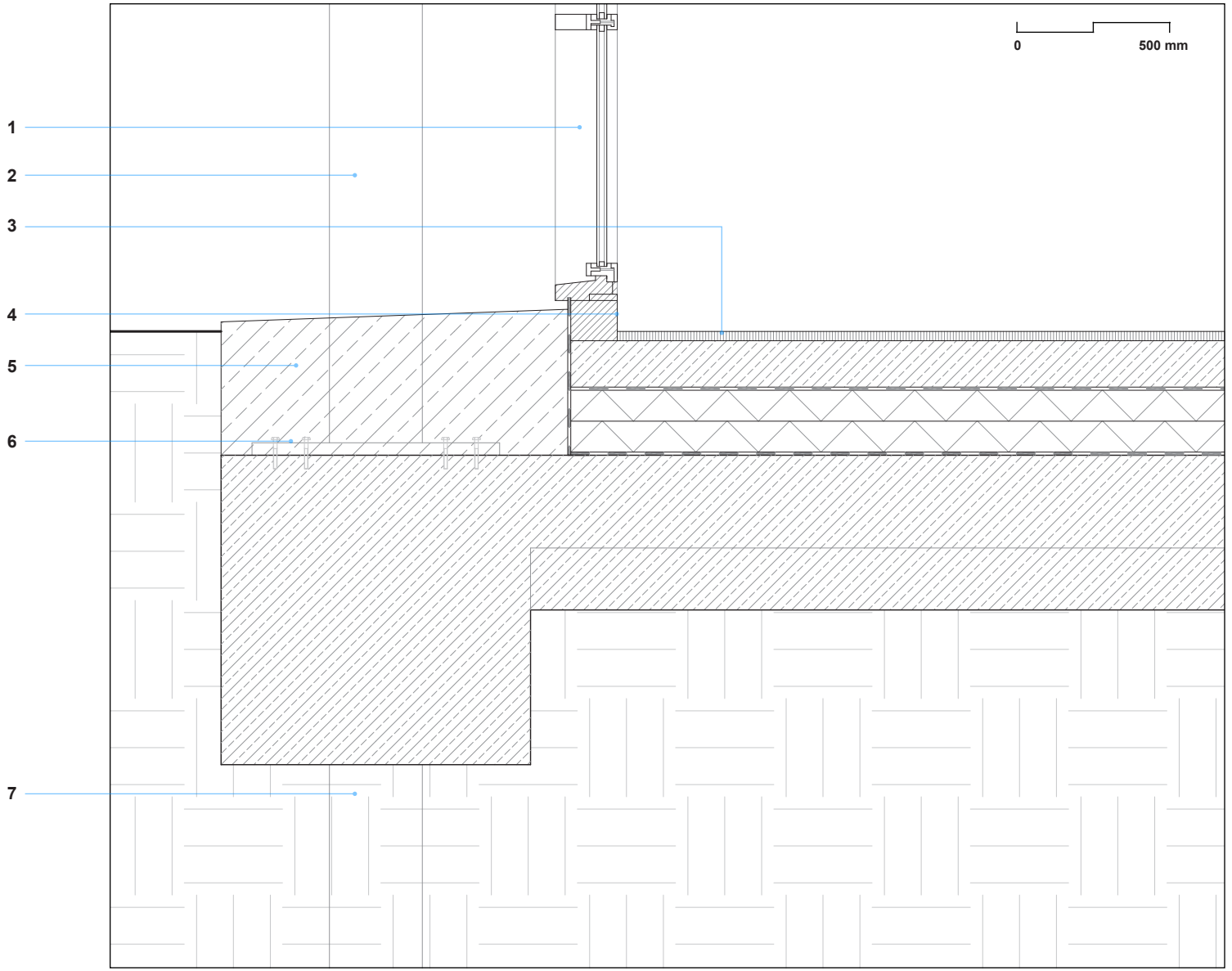
4) Intake Air & Exhaust Air Pipes 125mm

5) Steel Window Frame Footing

6) Double Glazing 8mm glass + 16mm Cavity
In Steel Frame 200mm

7) Angled Steel Column RHS 500x300x14mm

DETAILS

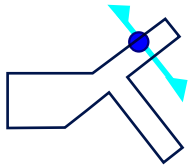


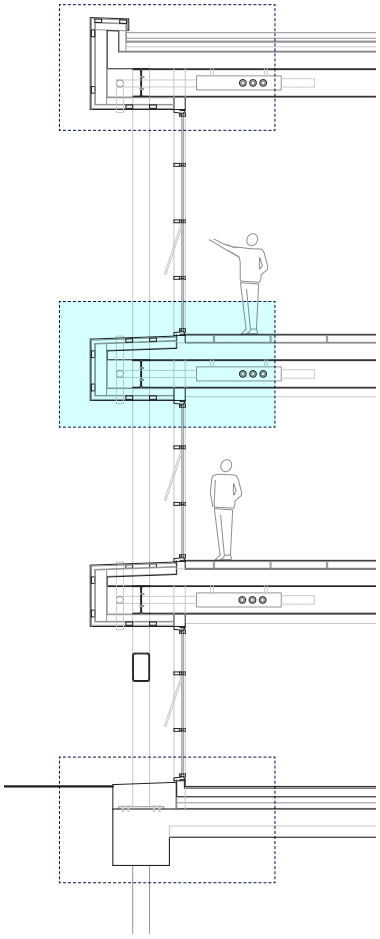
FOUNDATION 1:20

1) Double Glazing 8mm glass + 16mm Cavity
In Steel Frame 200mm
2) Angled Steel Column RHS 500x300x14mm
3) Vinyl Composite Flooring 30mm
Reinforced Concrete Slab 150mm
Vapor Barrier 10mm
Thermal Insulation 200mm
Waterproof Membrame 10mm
Reinforced Concrete Plinth 500mm
4) Plaster Board Finish 15mm
5) Precase Concrete Cap
6) Base Plate 40mm
7) Concrete Pile 300mm x300mm / 10m depth

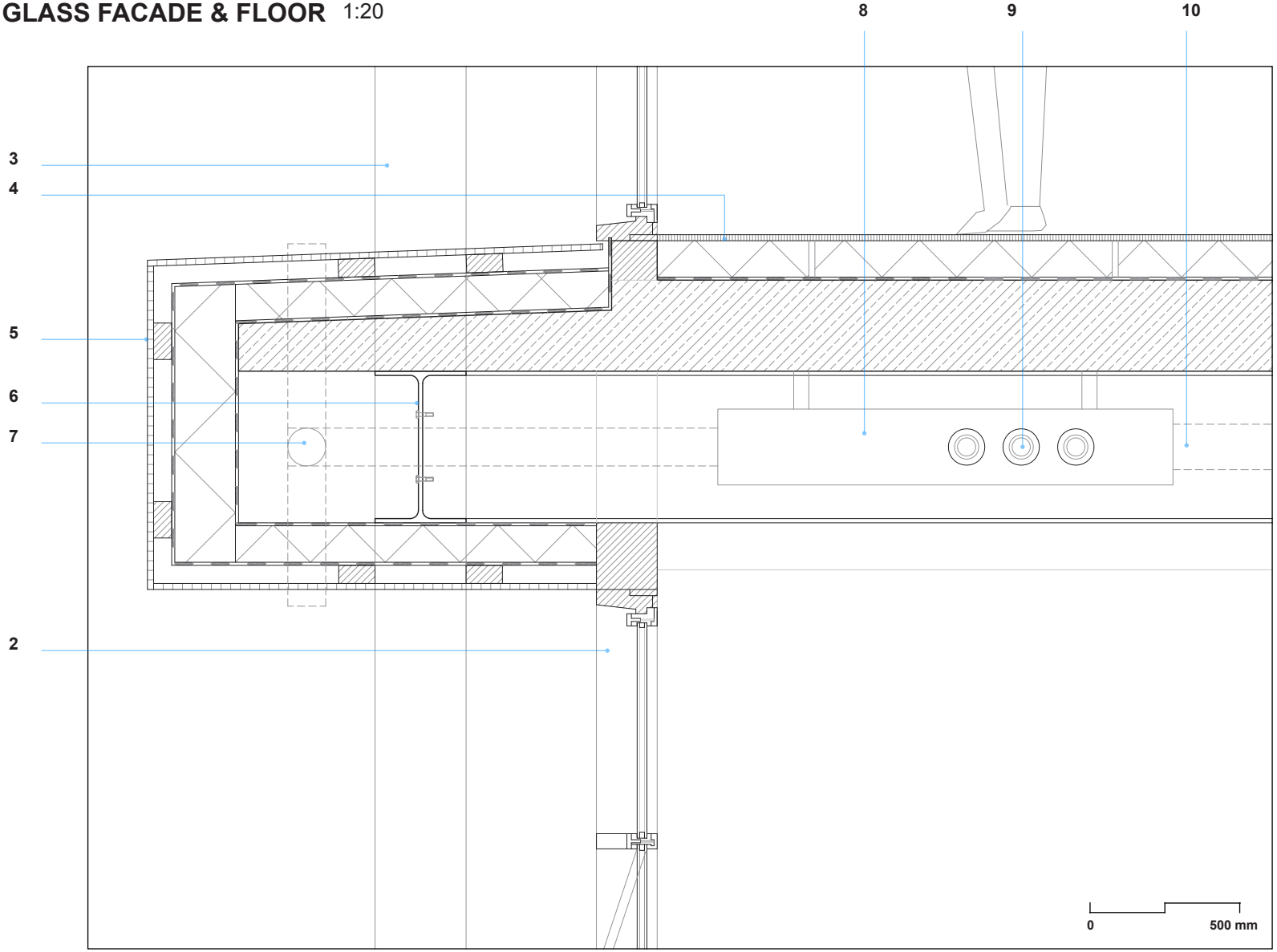
DETAILS

KEY



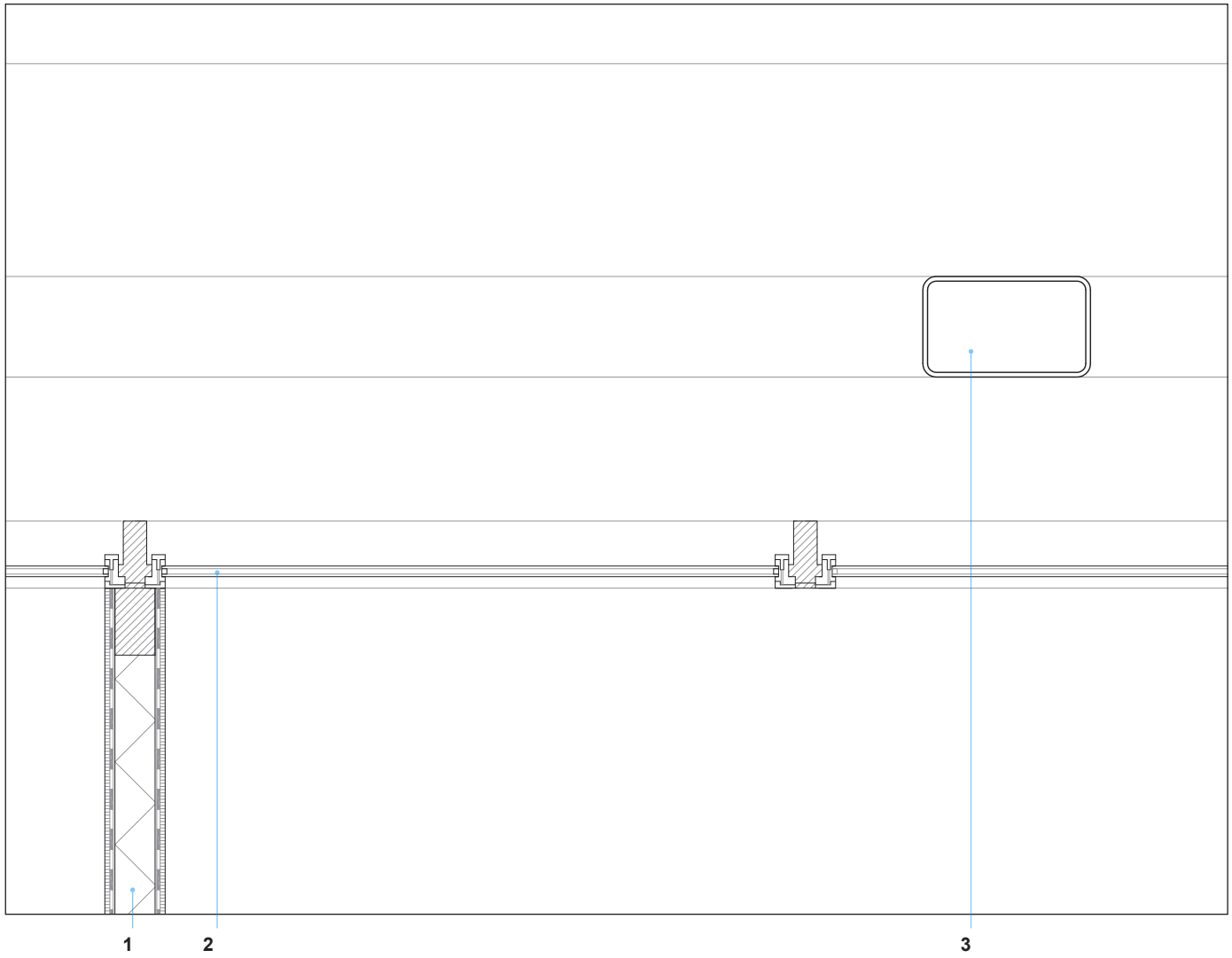


GLASS FACADE & FLOOR 1:20



DETAILS

Horizontal

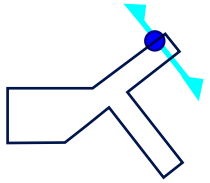


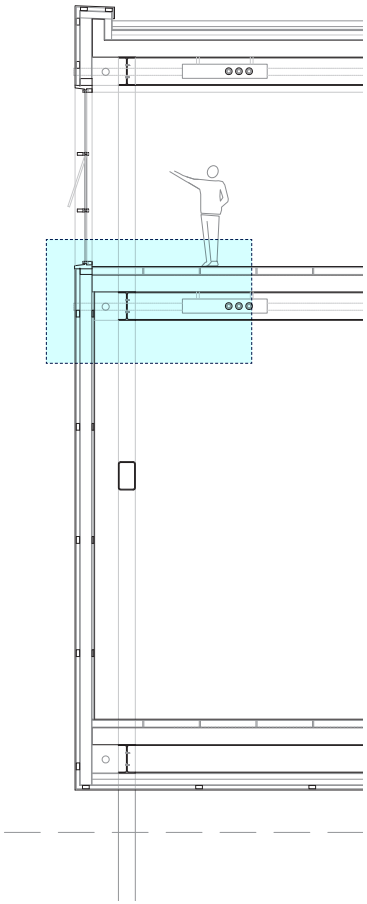
GLASS FACADE & FLOOR

1) Internal Wall: Steel Frame w/ Thermal Insulation 120mm
Exterior Sheeting 15mm
Vapor Barrier 10mm
Plaster Board Finish 15mm
2) Double Glazing 8mm glass + 16mm Cavity
In Steel Frame 200mm
3) Angled Steel Column RHS 500x300x14mm
4) Vinyl Composite Flooring 30mm
Thermal Insulation 120mm
Reinforced Concrete Slab 300mm
IPE Steel Beam 500mm x 300mm
5) Aluminum Panel Cladding 20mm
Steel Battons / Ventilated Cavity 60mm
Weather Proofing 10mm
Steel Frame / Thermal Insulation 200mm
Vapor Barriar 10mm
6) Steel Beam HEA 500x300x14mm
7) Intake Air & Exhaust Air Pipes 125mm
8) Ceiling Mounted Decentralized Air Ventilation Unit
9) Hot & Cold Water Pipes 100mm / Insulation 25mm
10) Supply Air & Intake Air Pipes 125mm

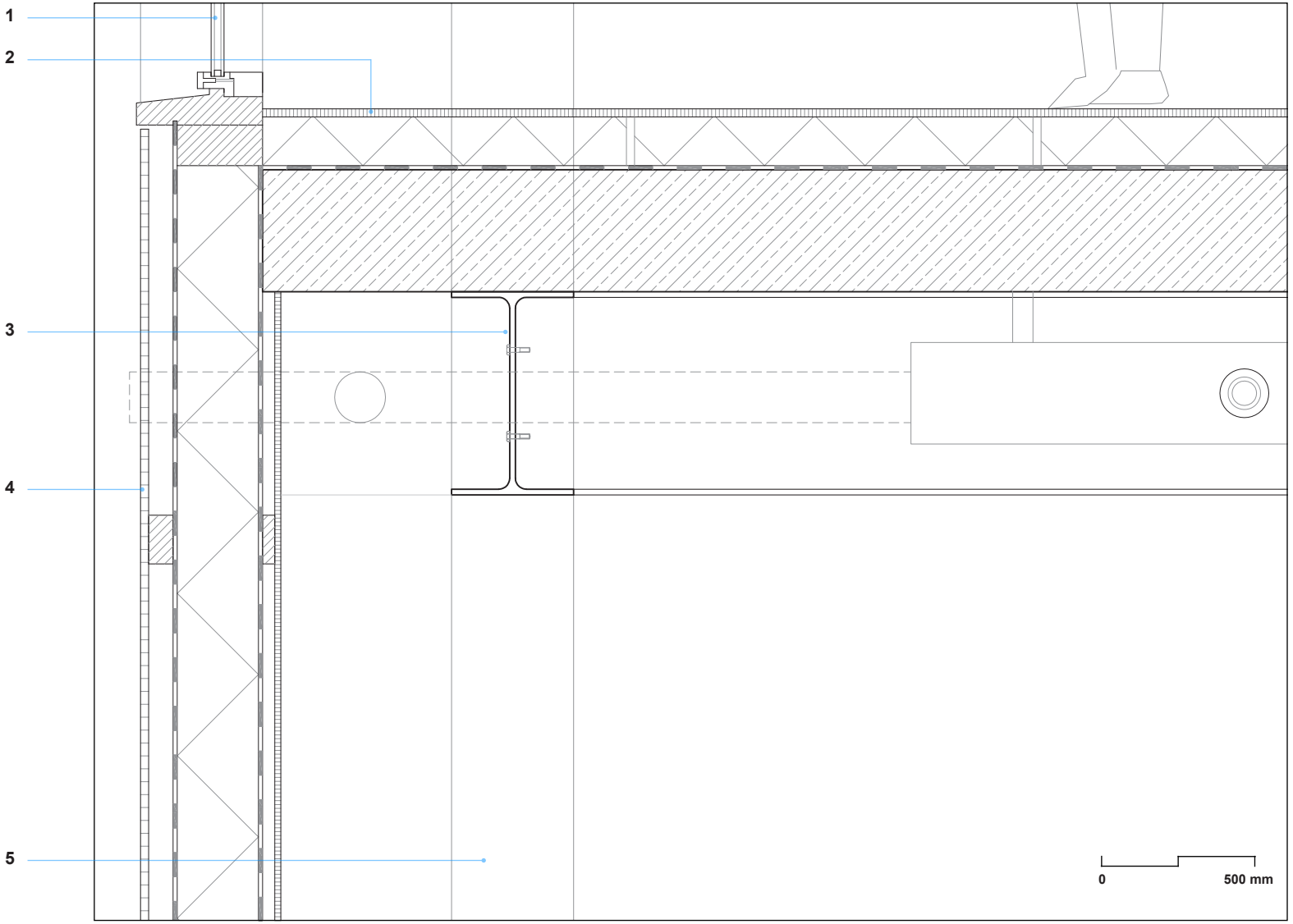
DETAILS

KEY



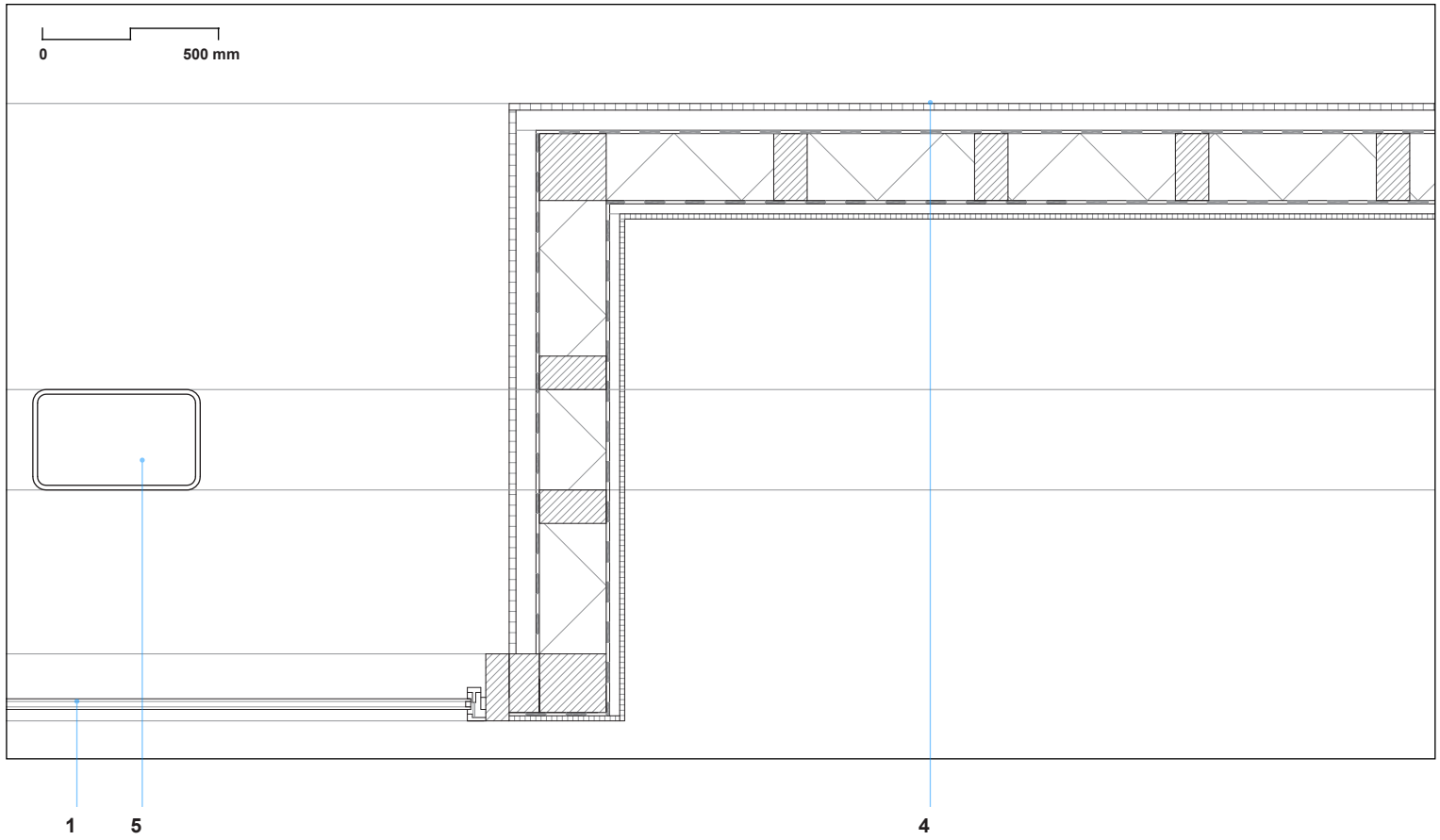


ALUMINUM FACADE & FLOOR 1:20



DETAILS

Horizontal

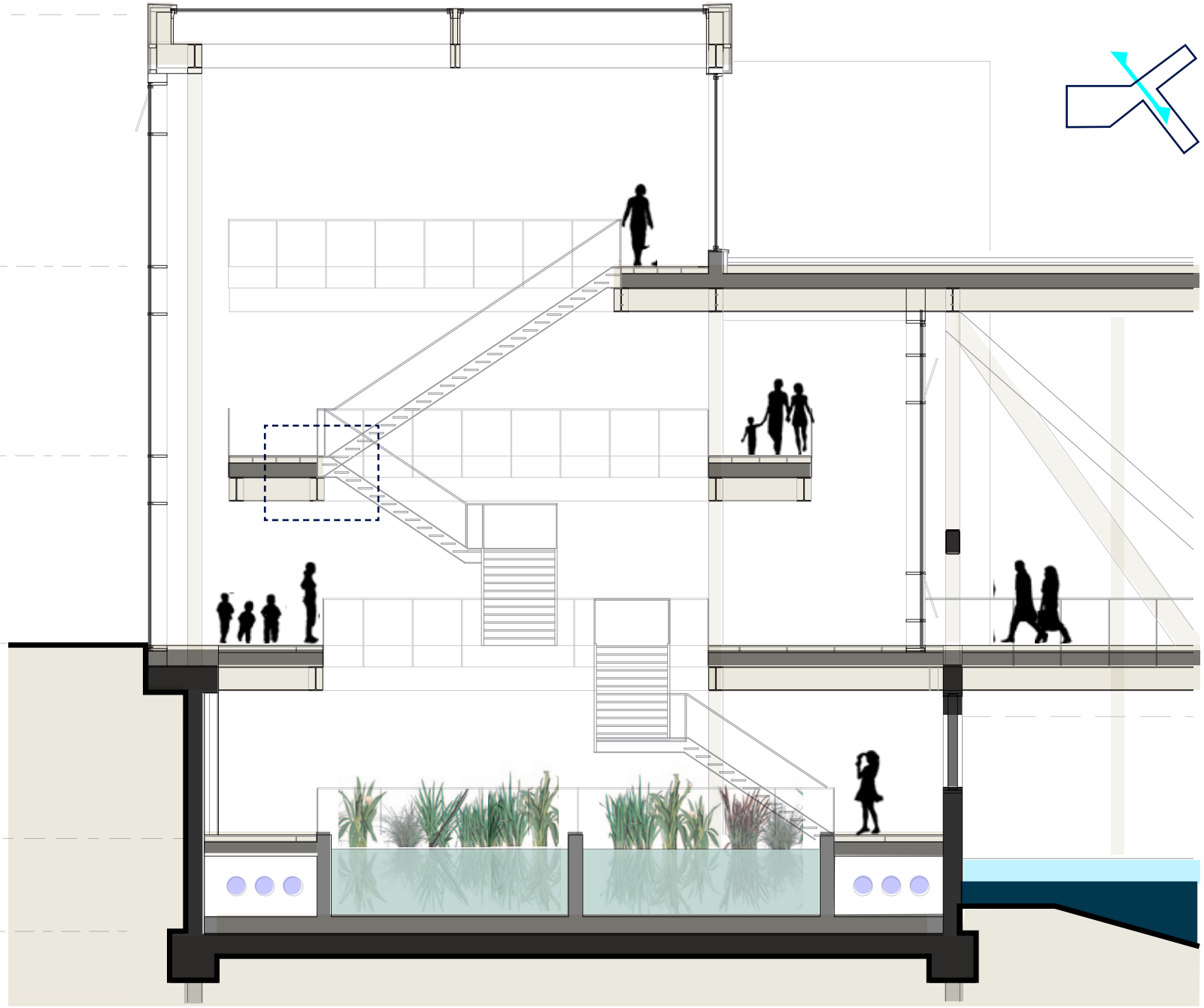


ALUMINUM FACADE & FLOOR

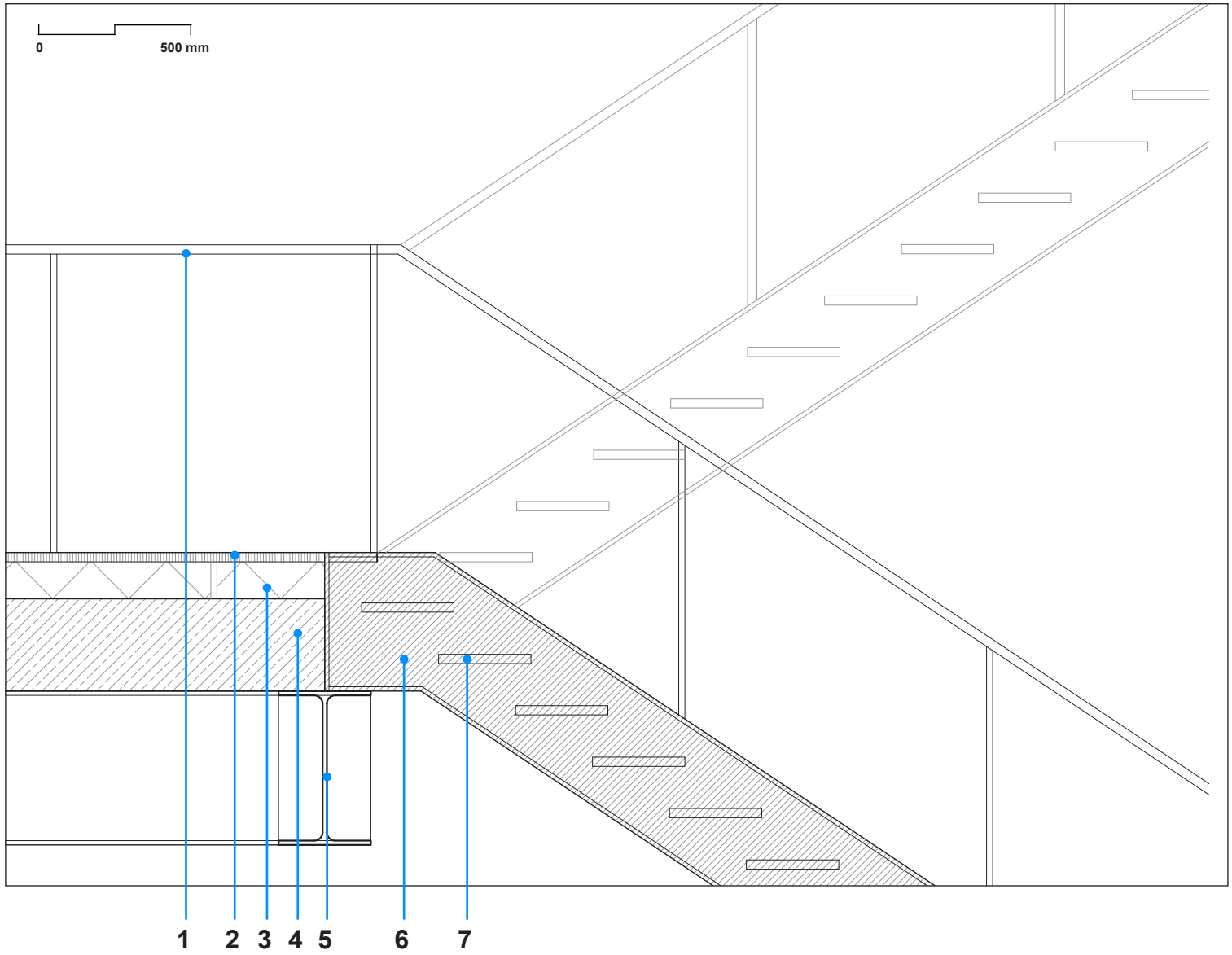
1) Double Glazing 8mm glass + 16mm Cavity
In Steel Frame 200mm
2) Vinyl Composite Flooring 30mm
Thermal Insulation 120mm
Reinforced Concrete Slab 300mm
IPE Steel Beam 500mm x 300mm
3) Steel Beam HEA 500x300x14mm
4) Aluminum Panel Cladding 20mm
Steel Battons / Ventilated Cavity 60mm
Weather Proofing 10mm
Steel Frame / Thermal Insulation 200mm
Vapor Barriar 10mm
Steel Battons / Ventilated Cavity 30mm
Plaster Board Finish 15mm
5) Angled Steel Column RHS 500x300x14mm

DETAILED SECTION

0 2 m



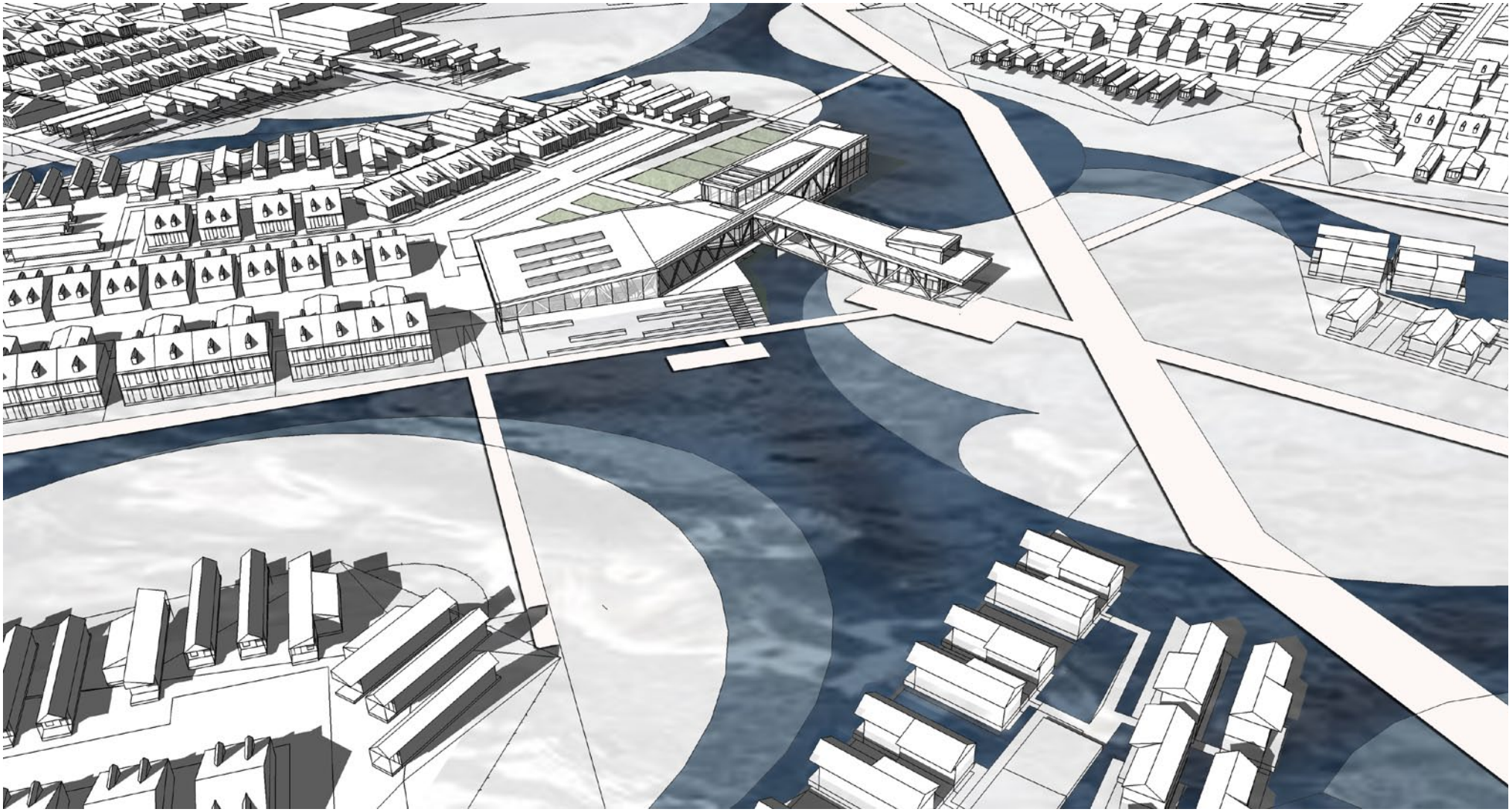
DETAILS



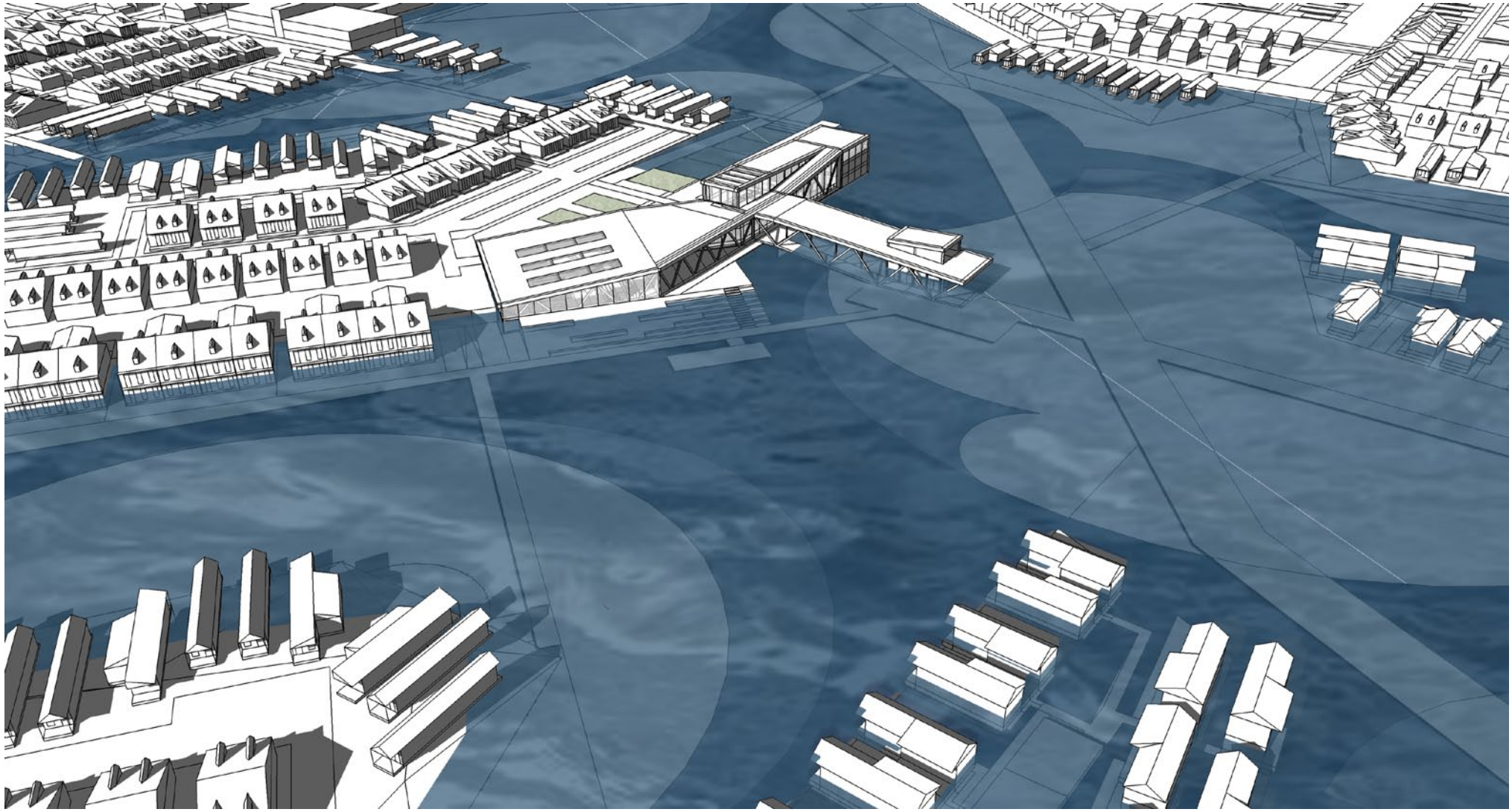
ATRIUM STAIRS 1:20

1) 30mm Steel Railing
2) Vinyl Floor 30mm
3) Thermal Insulation 120mm
4) Reinforced Concrete Slab 150mm
5) IPE Steel Beam 500mm x 300mm
6) 400x50mm Steel Plate Frame
7) 1500x300x30mm Steel Sheet Tread
(167mm rise per stair with 50mm overhang)

VIEWS: Typical Water Level

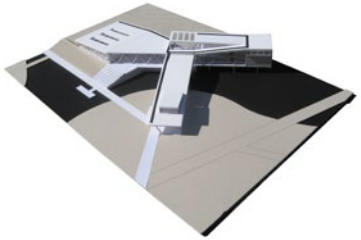


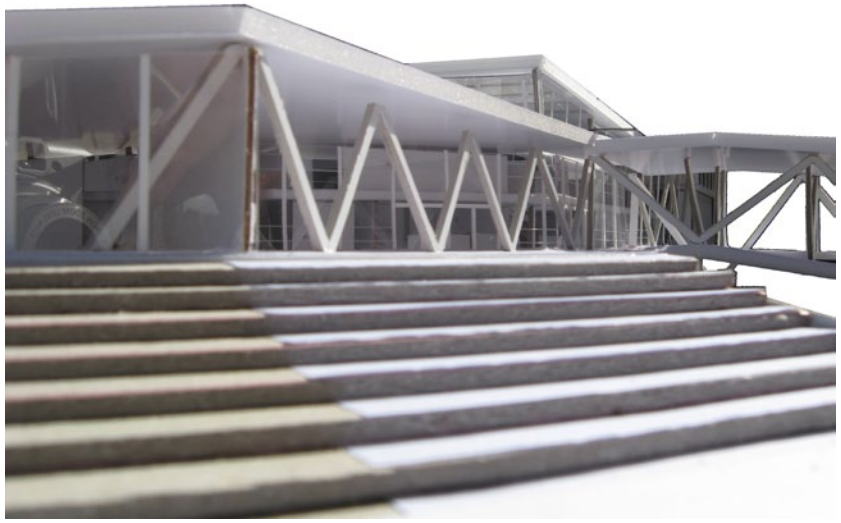
VIEWS: Max Water Level

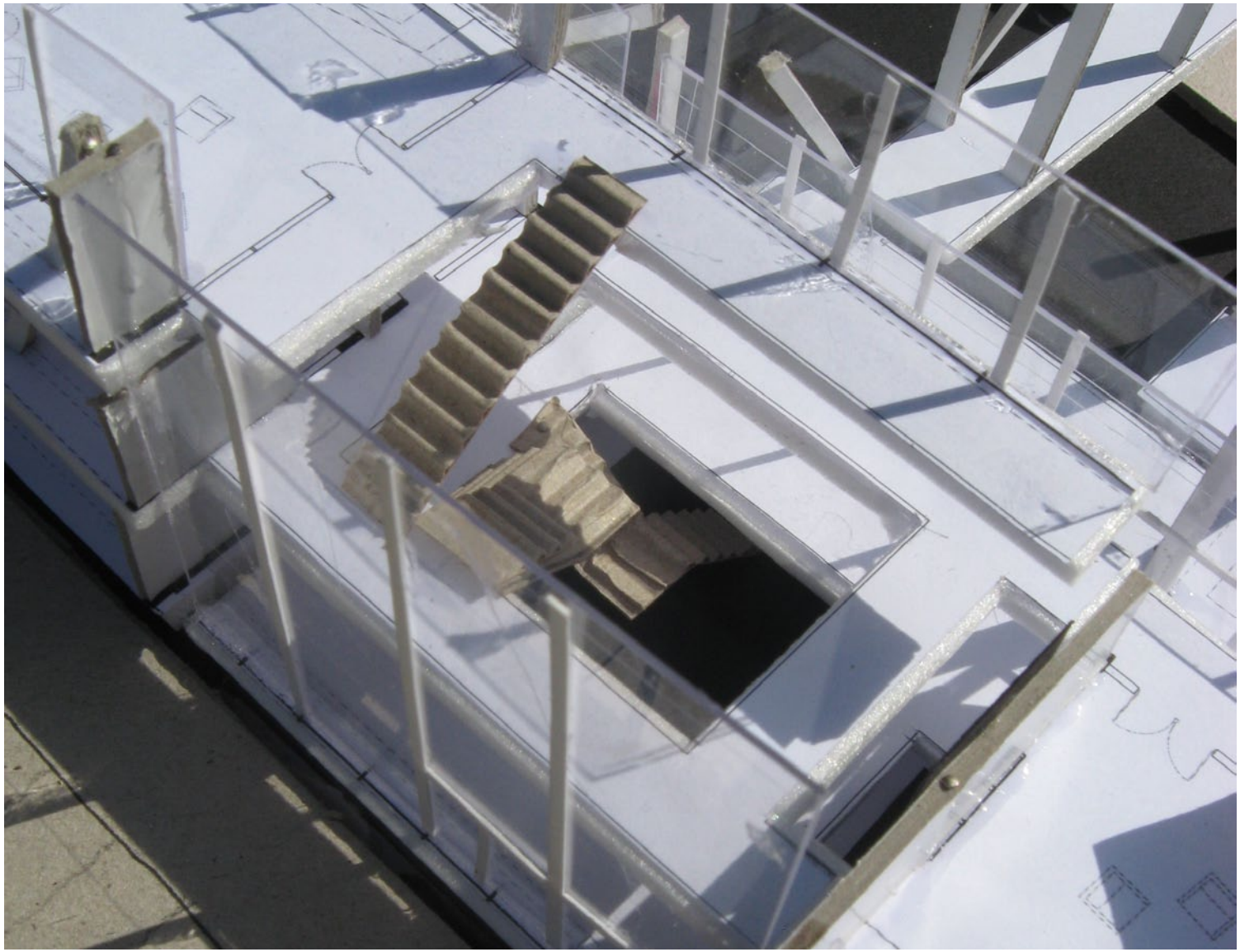


PHYISCAL MODEL

A0 Base / 1:200 Scale

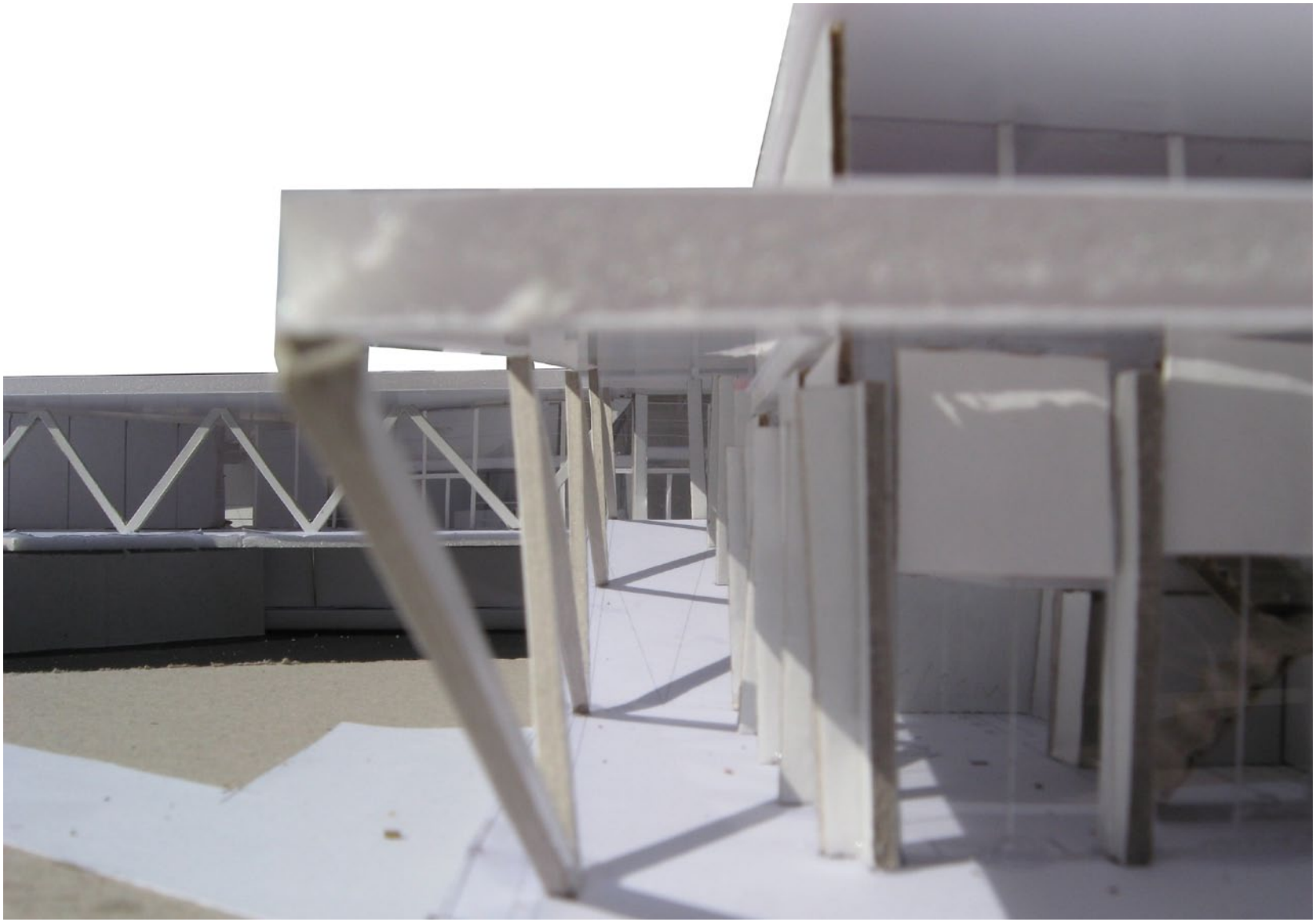







Mississippi River
New Orleans

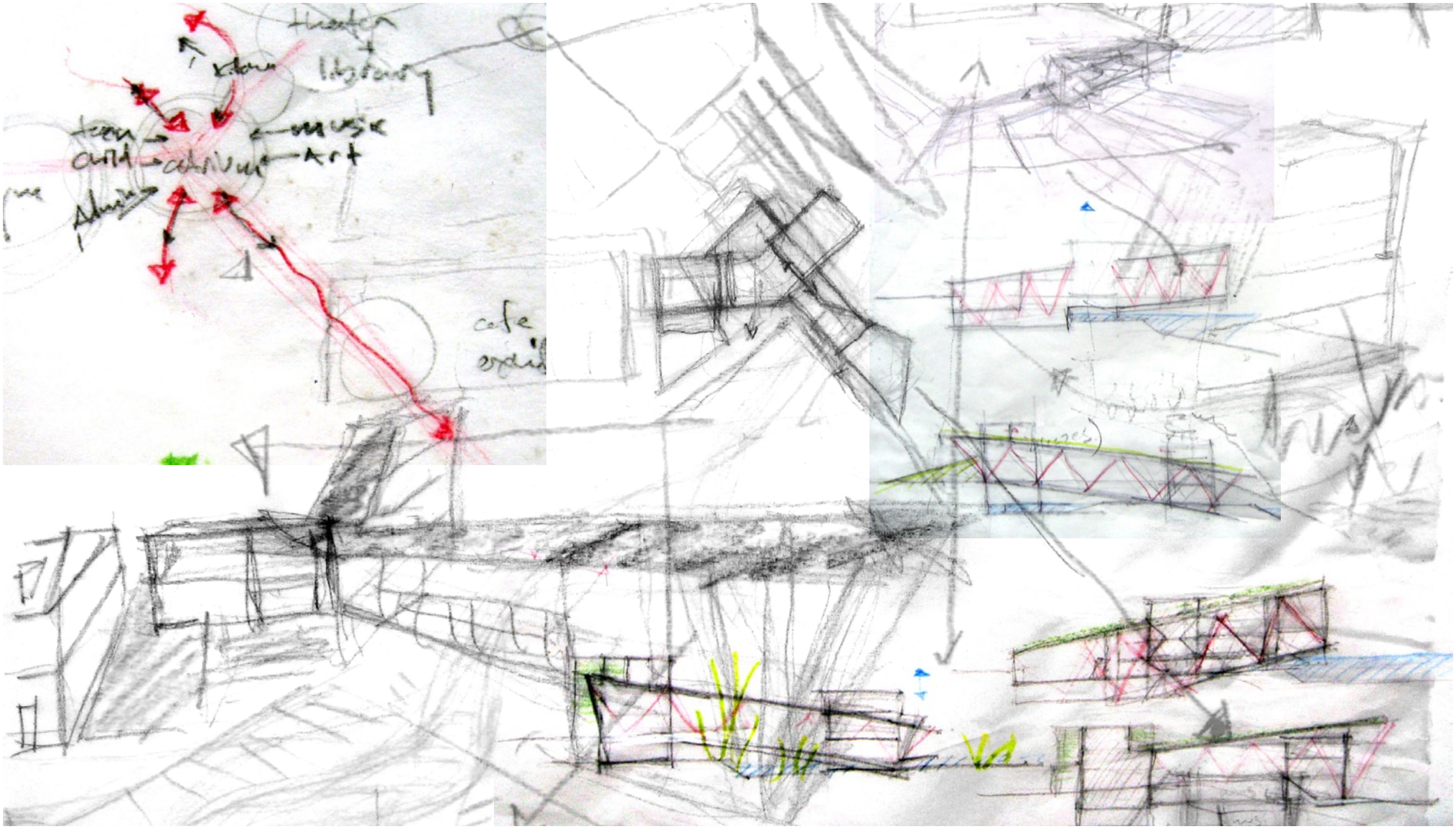
PHYISCAL MODEL

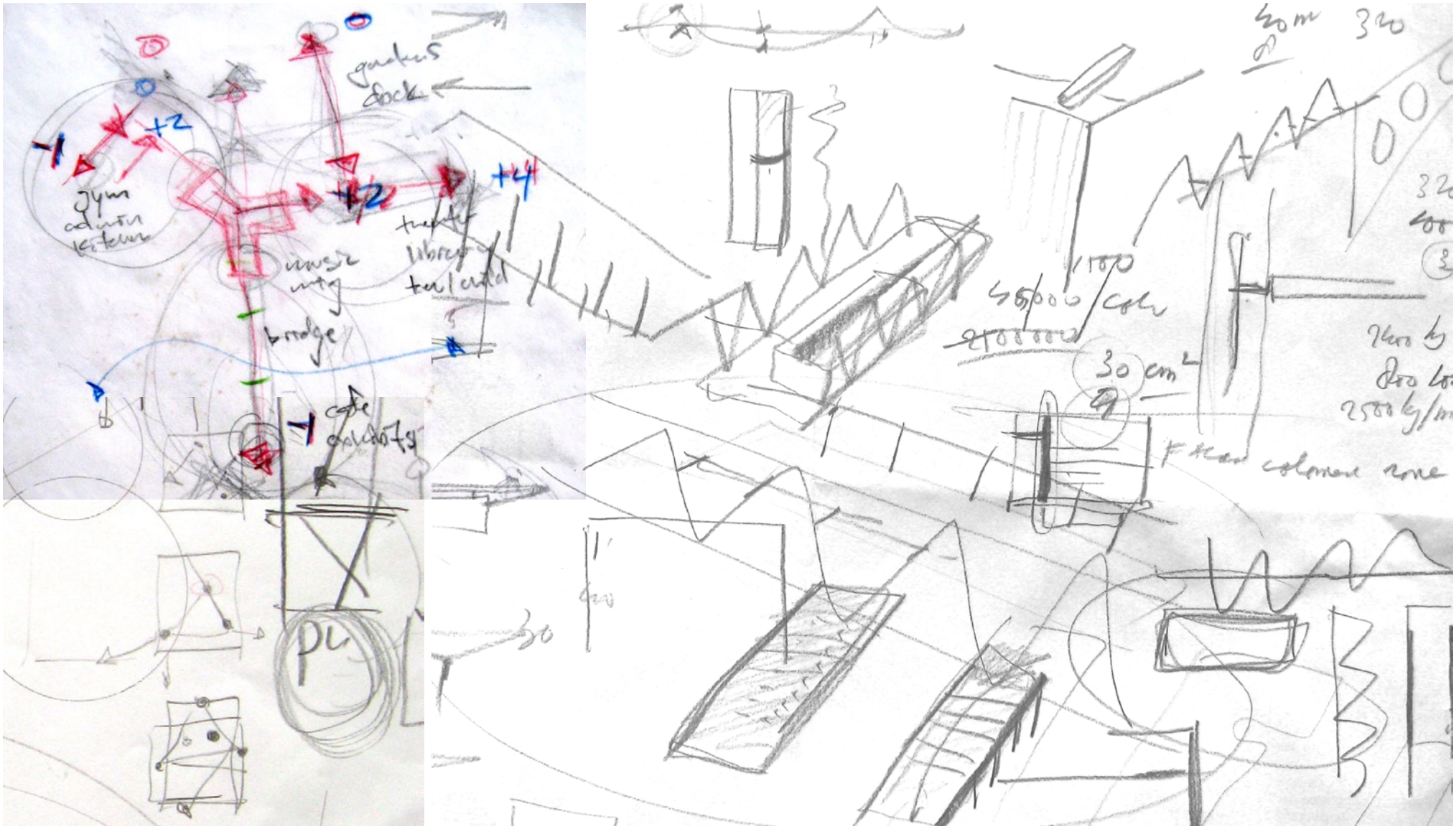


Mississippi River

New Orleans

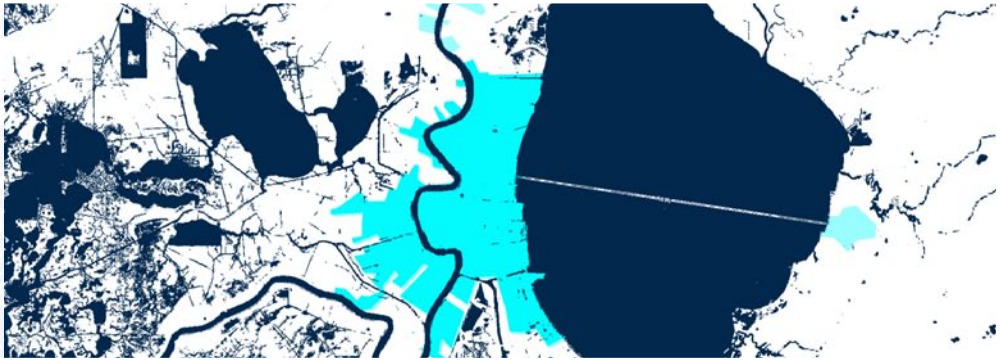
PROCESS SKETCHES:



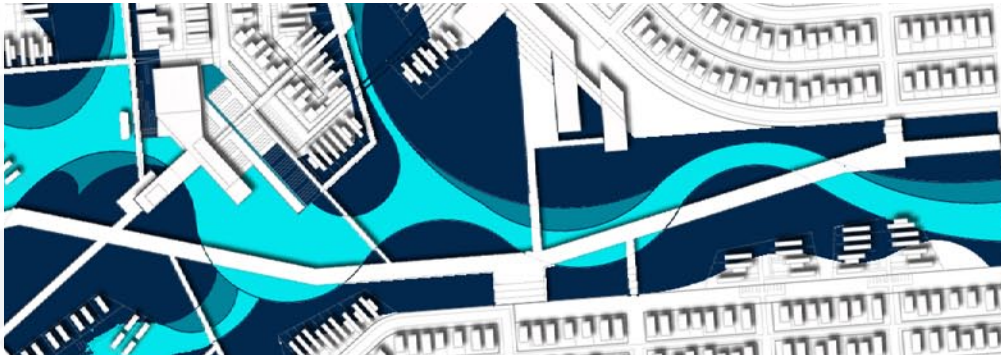

+2
+2
+4
bridge
+1
30 cm²
Mississippi River
New Orleans

THE URBAN BAYOU

Balancing Natural Processes and Urban Development in New Orleans



PART 4 - APPENDIX



CONTENTS:

PART 1 - CONTEXT & ANALYSIS

PART 2 - URBANISM

PART 3 - ARCHITECTURE

PART 4 - APPENDIX

EVALUATION & REFLECTION

BASIC APPROACH OF PROJECT & CONCLUSIONS

The general approach of the project, and the theory behind it, is not anything new. The theoretical underpinnings guiding the proposed urban development have been used for many years (see Theory Essay, page 156). Rather, the point of the project is to take an existing established sustainable model of how to integrate the natural and built environments and apply it to a specific context, in this case: New Orleans. With this approach, the end result is to show how New Orleans could look and function when the natural delta processes of fluctuating water are allowed to act within the city. The innovative portion of the project is to then envision these new urban forms and their relation to water. Again, the ways of relating to dynamic water are not new (see page 60), yet how they are applied to the specific context of New Orleans is what this project explores. With the end result showing that not only can water be incorporated into the existing city fabric of New Orleans, it also creates a safer and more enjoyable city.

Several conclusions can be made from this project. First, the "fight against water" doesn't have to be considered a fight when urban development is initially integrated with natural processes. Furthermore, when needing to live with water, this challenge doesn't have to be solved strictly with technical solutions. Bigger and stronger engineered infrastructure projects do not necessarily mean a safer city. Generic technical solutions are never the best answer; instead solutions should be site specific. In addition, and as the project shows, it is possible to use design to not only solve water challenges but also create aesthetic living environments. Also, when using design to solve water issues, it is important to address all scales: region, city, neighborhood, and building. The best result will come when the solutions to the challenges faced at each of these scales are connected and integrated together.

PROCESS & RESEARCH QUESTIONS ANSWERED

It is important to take a look back and review the project after its completion, examining both the process, as well as the end results. A good starting point is to see if the initial research questions were answered (see page 14). The overall research question was:

How can the diverse ecology and unique natural dynamics of the Mississippi River Delta environment be restored and integrated with new and existing urban development?

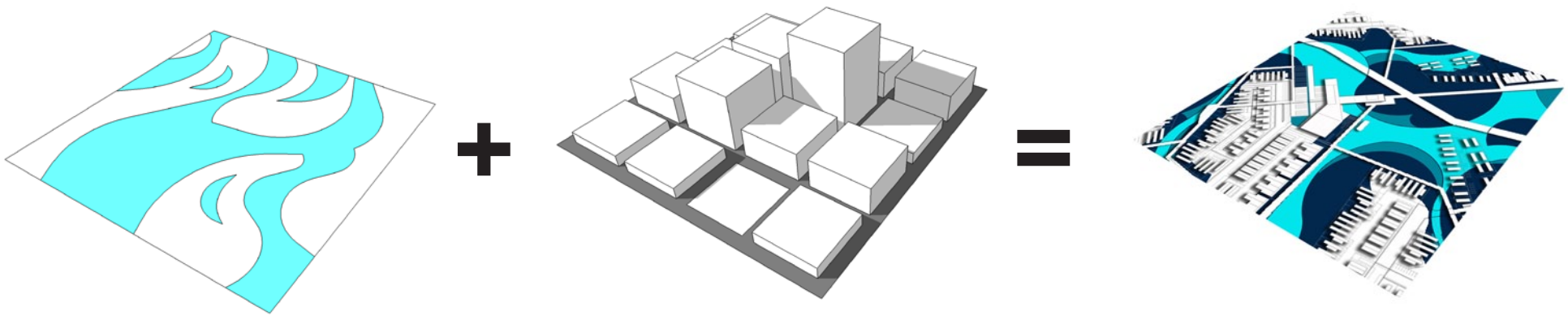
Before it is possible to answer this question, one must first understand what is the ecology and natural processes within the Mississippi Delta. This question was answered thoroughly and clearly through the 3x3x3 layer analysis (see page 16). The information obtained through this analysis provided the essential knowledge needed to intervene in the delta in a way that respects the natural context. Also in this stage was analysis at the city scale, in connection to how New Orleans fits into the larger delta environment. Equipped with this knowledge, only then was it possible to create a new water strategy for the city and explore new types of urban development.

As described in the research question, it was not enough to just impose new urban forms without an understanding and integration into the rich and historical existing urban context of New Orleans. Further analysis of the existing urban morphologies ensured that any new development fits into the character and style of the city (see page 54). Existing urban forms and architectural typologies were used as the basis for new urban development, yet they were modified to incorporate water, a key component that was initially lacking. This process not only answered the research question, it ensured that new urban development is done in a way that both respects the unique character of New Orleans and works within the natural processes of the Mississippi Delta.

IMPLEMENTATION?

Instead of proposing the demolish and remove all the portions of the city below sea level, the project tried to take a more realistic approach and one that could in implemented. Of course with any project such as this that initially requires heavy investment into infrastructural elements, the impacts to the existing city will be high. The main focus of the project is to address the outfall canals in a way that makes them safer by giving more space for water (see page 39). This requires expanding their width into existing residential blocks. Yet this impact is lessened due to the fact that these blocks were already severely damaged from Hurricane Katrina. In addition, these houses will be rebuilt and integrated into the new super levee and canal zone. The long term benefits of this proposal (water safety, improved living environments) far outweigh the initial costs.

If a large scale project like this is to be built, it is important to consider how it would fit into the existing planning and design framework of the city. The proposed infrastructural work addressing the outfall canals (the technical solution to the water problems) has little room for flexibility. Furthermore, the details of the new housing district (see page 66) seem to be very specific and require highly controlled urban design. However, the urban design is composed of several basic building blocks (see page 72), which could be composed in any number of ways. Following this framework, after completing the infrastructural improvements to the canals, the districts would be built using the proposed housing and block typologies. With this set of standards and guiding principles, the final design of the canal districts could be given to any design firm to complete. The role of the municipality would be to ensure the adopted general design guidelines are followed. This structure of the project allows for both flexibility in the detailed designs, as well as a coherent character for the entirety of the canal zones.




Mississippi River
New Orleans

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THEORY ESSAY

Living with the Land

Theories and Methods of Ecologically Oriented Design

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Abstract – Delta regions around the world are home to the most densely populated areas and largest cities, as well as the most diverse and productive ecological landscapes. Is it possible for these seemingly opposing characteristics of both human and natural environments to coexist and contribute to one another? In an attempt to answer this question, a shift has begun in the view towards the relationship between man and nature. A new mindset and vastly increased knowledge of ecological processes has lead to new theories and approaches to planning, urban design and architecture within the context of ecology. Ian McHarg has created a new method of "designing with nature," while other theorists such Henk L.F. Saeijs and John T. Lyle have presented the idea of "human ecosystems." In addition, several Dutch government documents and national plans, such as Room for the River and Working Together with Water, attempt to apply these principles to policy. These theories provide new opportunities for a symbiotic relationship between urban development and nature. No where in the world is there a better and more urgent need to implement these new methods than in delta regions. The city of New Orleans, Louisiana, in the Mississippi Delta has a unique set of challenges to work within the context of the dynamic delta processes. When an understanding of natural processes is applied to creating new human ecosystems balanced with creative design, these challenges can be turned into opportunities.

Key words – building with nature; climate change; delta regions; human ecosystems; living with water

1 Introduction

Today more than ever the relationship between man and nature is of utmost importance. With the global population reaching nearly seven billion, the natural environment is under increasing pressures. Strong evidence of human caused climate change is currently exposing the delicacy of natural systems and our dependence on them. Nowhere in the world are these issues more visible and critical than in delta landscapes, where rivers meet the sea. These regions are home to some of the largest cities and fastest growing economies; they contain the most productive but also the most dynamic and fragile of landscapes. Changes in climate will create more extreme hydrological conditions -- rising sea levels, increased rainfall, and longer droughts -- all of which have an even greater impact on delta regions.

It is clear that a re-evaluation of the relationship between man and nature, between the built environment and natural environment, is urgently necessary. Not only do our ways of thinking, theories and philosophies on this subject need to change, so do our planning practices and how we physically construct cities and buildings.

The essay aims to uncover a number of these new theories by understanding the historical relation between man and nature and how an understanding of that relationship is beginning to change. This new view, combined with an increased knowledge of ecology and natural processes, has lead to many new design theories, several of which will be explored here. Ian McHarg has created a new method of "designing with nature" that requires first a thorough understanding and inventory of natural processes that in turn determine suitable land uses. Other theorists such as Henk L.F. Saeijs and John T. Lyle have presented the idea of "human ecosystems," designed and maintained environments based on natural processes. More recently, governmental documents, reports and national plans have created policies that reflect these principles, which will provide additional insight into how these ideas can be applied. Some policy examples in the Netherlands include the Room for the River project and the national report titled Working Together with Water.

This knowledge will ultimately provide the ability to address difficult challenges of specific locations. Nowhere is this more essential than in delta regions, such as the Mississippi Delta and the city

of New Orleans, that are currently facing increased environmental pressures. We must equip ourselves with the knowledge of how natural processes function, as well as a better understanding of our place within the larger system. Only then will we be able to create cities and buildings that work within environmental constraints, contribute to natural systems, and ensure a sustainable future for both man and nature.

2 Two Views

2.1 Historical View

Ancient Greek thinkers either examined man in isolation from nature or examined nature without the presence of man (McHarg 1969, p. vi). Similarly, ecologists today generally choose to study ecosystems that exclude man, and people typically tend to think of themselves as somehow set apart from ecosystems (Lyle 1985, p. 180). This view of man as separate from nature has been with western culture for a long time, with its roots in religion. Christianity paints a picture of man as a divine being, one that has been given domination over all other life and has the luxury of using nature to his liking. This has created a culture set against nature, with the desire to conquer and control the environment (McHarg 1969). This anthropocentric view assumes man is all that matters, while little attention is paid to other life on earth and the ecosystems within it (Saeijs 2008).

This deeply ingrained view of man as separate from nature has greatly influenced how man has acted and still acts toward nature, especially in terms of urban development. Ann Whiston Spirn (1984, p. 175) argues, "unfortunately, this tradition has set the city against nature, the belief that the city is an entity apart from nature and even antithetical to it has dominated the way in which the city has been perceived and continues to affect how it is built."

Even those who have sought to introduce nature into the city in the form of parks and gardens have frequently viewed the city as something foreign to nature (Spirn 1984, p. 175). This view of separation from nature has also played a role in landscape design. The historical English Garden movement disguised ecological processes by associating nature with the picturesque, something that is a cultural concept, not ecological (Nassauer 1995). English gardens are domesticated nature, decorative and tame; they choose to reflect natural processes, but the complexity of nature is reduced and they express only the idea of nature (McHarg 1969, p. 72).

This difference between a concept of nature and the scientific realities of complex ecosystems reflect a cultural misunderstanding. Further, the belief that man is somehow separate from natural processes has led to urban development that has no connection or relation to the world around it, which is not only harmful to the environment but also human civilization itself.

2.2 A New View

Fortunately, a new view towards the relationship between man and nature has emerged. The anthropocentric view is slowly being replaced with an eco-centric view, where ecosystems are given a central place and man's demands are adjusted to the realization that humans are totally dependent on nature and subject to its laws (Saeijs 2008). According to McHarg, in this belief "man and nature are indivisible, and our survival and health are contingent upon an understanding of nature and processes" (1964, p. 27). To embrace this new view, it must be realized that there are physical and biological laws that are intrinsic and self-enforcing (McHarg 1969) and that all living and nonliving components of the natural world are interrelated and interdependent (Ruff 1982). With this knowledge, it is possible to understand man's place in the larger system, as well as the greater consequences of our built interventions.

While it has become clear man is subject to all rules and laws within the natural environment, we are now in a unique position due to our knowledge and understanding of these processes. With a sound understanding of physical and biological sciences, we have the unique ability to not only create, but to preserve and manage within the environment. Man's role within the world can be that of an intelligent steward, enhancing the creative fit between man and the environment (McHarg 1969).

An awareness of man's role within nature also leads to a better understanding of the relationship between city and nature. While the city is neither wholly natural nor wholly contrived, the same natural processes operate in the wilderness as in the city (Spirn 1984, p. 174). This view leads to a new attitude towards the city; it is now recognized as a part of nature and should be designed accordingly. This understanding creates opportunities for new methods of combining ecology and urban development.

3 Theories and Their Relation to Design

3.1 General Principles

Understanding Ecology & Natural Processes

At the root of this new view towards a better relationship between man and nature is a deep understanding of natural systems. Before we can know our place

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in the natural world, we must first understand how the environment functions (See Illustration 1). It is necessary to increase our knowledge of ecology; we must learn about the evolution of physical and biological processes. This is the first step towards the knowledge one needs before making changes on the land (McHarg 1969). We must accept that nature is a process, that it is interacting and responding to laws that offer both opportunities and limitations to human use (McHarg 1969).

Saeijs (2008, p. 12) calls this view "eco-pragmatism": acting pragmatically and specifically guided by ecology and laws of nature to the benefit of both man and nature. We should not use man's requirements as a starting point, but rather the possibilities of the system. We must start a dialogue with the natural system and try to establish what variables can be harnessed to guide the system while leaving it intact (Saeijs 2008, p.132). According to John T. Lyle, in order "to participate creatively in natural processes, we need to include as subjects of design not only the visible form of landscapes but also its inner workings, the systems that motivate and maintain it" (1985, p. 179). Nature contains a wealth of information and we must make use of all ecological understanding when building on the land.

It is possible to divide scientific knowledge into two types: facts and data concerning the situation (such as composition of rock formations or shellfish species) and concepts and general notions, ideas or principles (such as succession, energy flows, or nutrient cycles). Concepts are especially useful for design because they provide access to the mechanisms that connect all of the facts (Lyle 1985). While all of these principles are familiar to botanists and ecologists, they currently have little effect on the form of development. The need is to bring natural sciences into the planning process (McHarg 1969). Identification and expression of the underlying ecological and cultural processes should influence and be made explicit through urban planning and built form (Swaffield 2002, p. 171).

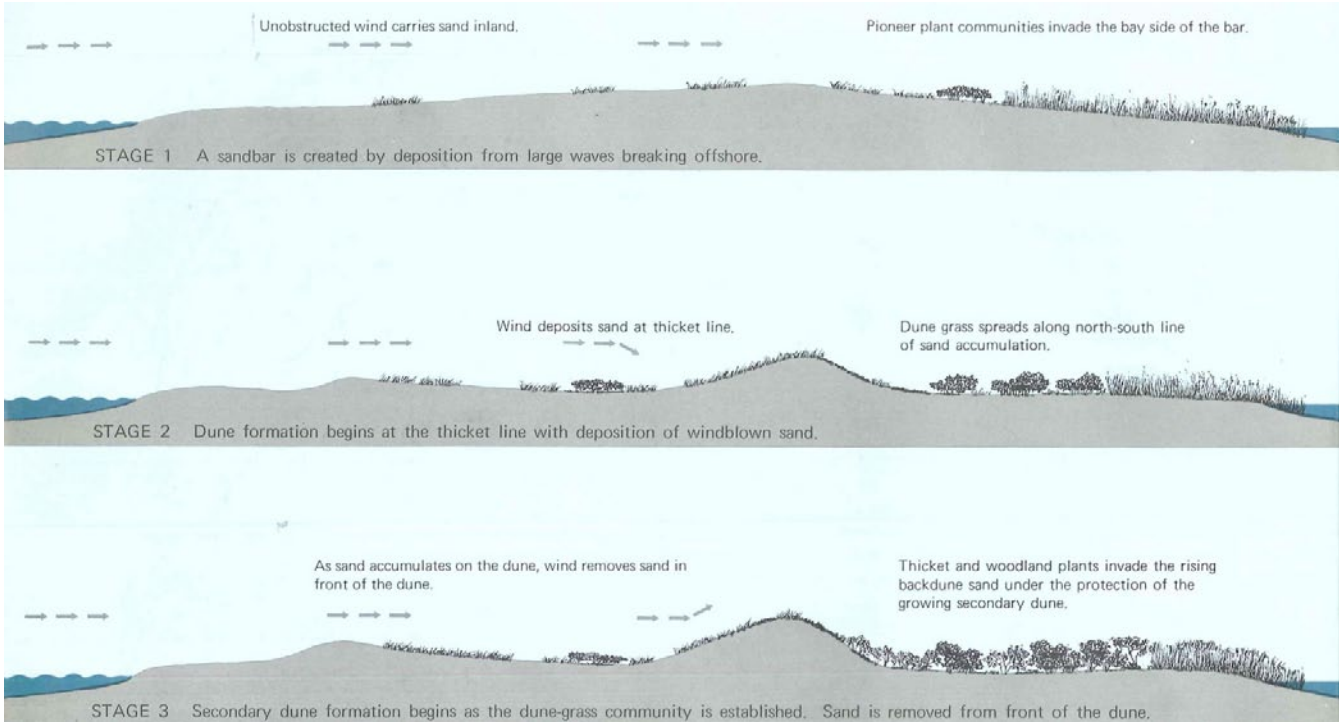

Illustration 1, Process of Dune Creation, Source: McHarg, 1969

Bioregionalism

While forms and concepts for the urban planning of cities and buildings should come from an understanding and response to natural processes, these vary based on their region, location and site. Bioregionalism is an approach that recognized that no two landscapes are alike and deliberately attempts to use the uniqueness of local cultures and landscapes (Thayer 1994). According to Ian McHarg, "memorable cities have distinct characteristics, these derive from site; the city can be seen as an exploitation of the intrinsic site, the creation of man as conscious adaptations to it, that preserve, heighten and enhance its basic qualities" (1969, p. 175). A simple examination of a place's historical, physical, and biological processes will reveal the uniqueness of place, the valuable and

expressive qualities present, all of which can influence design and planning.

3.2 The Ecological Method

In his seminal book Design with Nature, Ian McHarg outlined an "ecological method," a way of studying natural processes and using this understanding to guide regional planning and development. The method first requires an understanding of natural processes such as topography, subsurface geology, and surface and groundwater. It is clear that each of these processes interacts with the others. These systems and interactions create restraints and opportunities inherent in the landscape. These processes can be evaluated and ranked since each has an intrinsic suitability for certain land uses (McHarg 1969).

It is also critical to identify natural processes as social values (McHarg 1969). These physical and biological processes are beneficial to society and need to be measured accordingly. The intention is to create a method to identify values by outlining critical factors such as uniqueness of resources, productivity, natural phenomena and cultural manifestations. The method should be explicit, in that any person accepting the method and evidence should come to the same conclusion. Application of this method will reveal the most suitable areas for conservation and development (McHarg 1969).

The method proposes to select eight dominant aspects of natural processes and rank them in order of both value and intolerance to human use: surface water, marshes, floodplains, aquifer recharge areas, aquifers, steep slopes, forests and woodlands, and flat land. Each natural process or zone is best suited for certain uses, and different natural features can absorb degrees of urbanization while some areas are intrinsically unsuitable for urbanization. From each major data category, a number of important factors can be selected, evaluated, and ranked. The intention is by understanding the nature of the place, its intrinsic suitability for different land uses (such as agriculture, recreation, and urbanization) becomes clear. A proper analysis of the present natural systems will reveal the best relation for man and environment (McHarg 1969) (See Illustration 2).

3.3 Human Ecosystems and Environmental Conditioning

Another theory looks not only at how we can design with nature, but how we can literally design nature itself. In fact, humans have been designing ecosystems for a long time, but it has almost always been unintentional; that is, without a conscious understanding of natural processes, and therefore without any way of predicting how the new ecosystem would function (Lyle 1985, p. 178)

However, through scientific advances we have gained a deeper understanding of natural processes and can combine this vast analytical knowledge with creative thinking. We now possess the knowledge of ecological processes and have the technical means to actually guide the system in a desired direction (Saeijs 2008). With nature as the inspiration for design and where the merging of ecological and aesthetic orders is harmonious, we have a human ecosystem (Lyle 1991, p. 37). This "conditioning" of the landscape is about creating favorable conditions and guiding ecosystem development; it is cooperation between man and the system (Saeijs 2008). As Saeijs says, "it is not about how to build new marshes, it is a matter of creating the circumstances that will favor their creation" (2008,

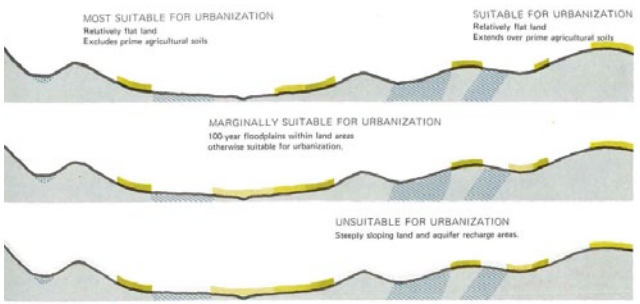

Illustration 2, Urbanization Suitability, Source: McHarg, 1969

p. 86). But such a human designed system will not operate entirely by itself; management will have to take the place of the self-regulating mechanisms of a natural system. A human ecosystem will continue to work well only if it is well managed (Lyle 1991).

By working with nature and encouraging complexity, new urban forms and landscapes are ecologically inspired. Along with this concept comes the idea that landscape is a process. There should be no preconceived idea of the final solution, but instead a structure capable of responding to changing social needs and biological requirements; the landscape should slowly evolve, which requires creative management (Ruff 1982).

If transformation of natural systems is unavoidable, then it must be directed in such a way that we can achieve the most beneficial combination of functions for man and nature (Saeijs 2008). These intentionally designed and managed human ecosystems represent a symbiosis of urban and natural processes and they contribute towards our role as stewards of the earth.

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4 Theories Applied to Policy

4.1 Introduction to Dutch Policies and Connection to Theories

In the Netherlands governmental agencies have adopted an ecologically oriented and holistic view of the relationship between man and the environment. Surely this comes from the intimate connection with water in the Rhine Delta region; the Dutch have long fought to control the rivers and sea, as well as reclaim and create new land within the low country. In recent years there have been numerous long-term planning studies and policies implemented in the Netherlands that reflect a change in perspective toward the water. This new approach is no longer about fighting the water but instead embracing it and allowing space for water and its natural processes. With a clear understanding of what to expect from the environment, the Dutch attempt to plan their future with ecological processes, creating both healthy ecosystems and a safe country.

4.2 Room for the River

The Room for the River (Ruimte voor de Rivier) policy came out of several planning exercises which reached final approval in 2006. Main objectives include increased flood protection by 2015 as well as improved overall environmental quality in the river basin region. It is known that existing flood defenses are already inadequate, and combined with the assumption that river discharge will increase in the future, this created on the need for additional protective measures. Along with this urgent need came a shift in the approach toward flood safety.

Historically the Dutch protected themselves against high water levels of the rivers by a system of dikes; this system has been increased in height and reinforced for centuries (Room for the River: Explanatory Memorandum 2006). Over time there has been increased pressure on available space, resulting in further manipulating of the river environment by closing off overflows, moving dikes closer to the river, and canalizing the river channels. These measures improve economic function but at a high cost to natural processes such as sedimentation and diversity of ecologically rich landscapes. While dike reinforcements are technically possible and will reduce the risk of flooding, it is realized that there are limits to this approach and other methods of flood protection will be necessary (Room for Rivers: Explanatory Memorandum 2006). Now the emphasis will shift from improving dikes to creating more room for the river. This marks a dramatic change in policy and thinking about water: dikes will no longer be the default option for protecting the river region from flooding; instead spatial measures will be used to reduce water levels (Room for the River: Explanatory Memorandum 2006).

The primary objective of the policy is to increase safety within the river region, but the scope of work includes improving environmental quality as well. This ensures that solutions will not simply be technical, but will look to natural processes for the best ways to accommodate more water. There are numerous ways outlined to provide more space for the river and in turn lower high water levels, including deepening forelands of the rivers, displacing dikes further inland, depoldering, and creating flood channels (See Illustration 3). Through this approach not only will safety be increased but ecological benefits will be possible as well by creating places for new landscapes to emerge.

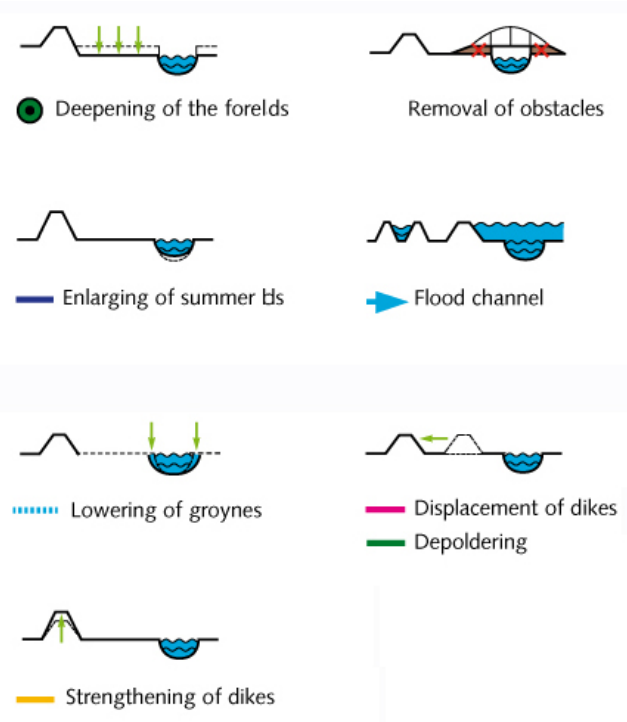

Illustration 3, Intervention Measures, Source: Room for the River: Explanatory Memorandum, 2006

Opportunities will become available to reorganize existing areas along the rivers and consideration will be given to coordination with other uses. Spatial planning along the rivers will consider not only urban development but also landscape, ecological and geographical features by giving value to biodiversity as well as people's living environments. No two areas are alike and each stretch of the river has its own distinct character, so unique approaches will be applied to each area (See Illustration 4). For example, in the Gelderland region, marshy ecosystems will be

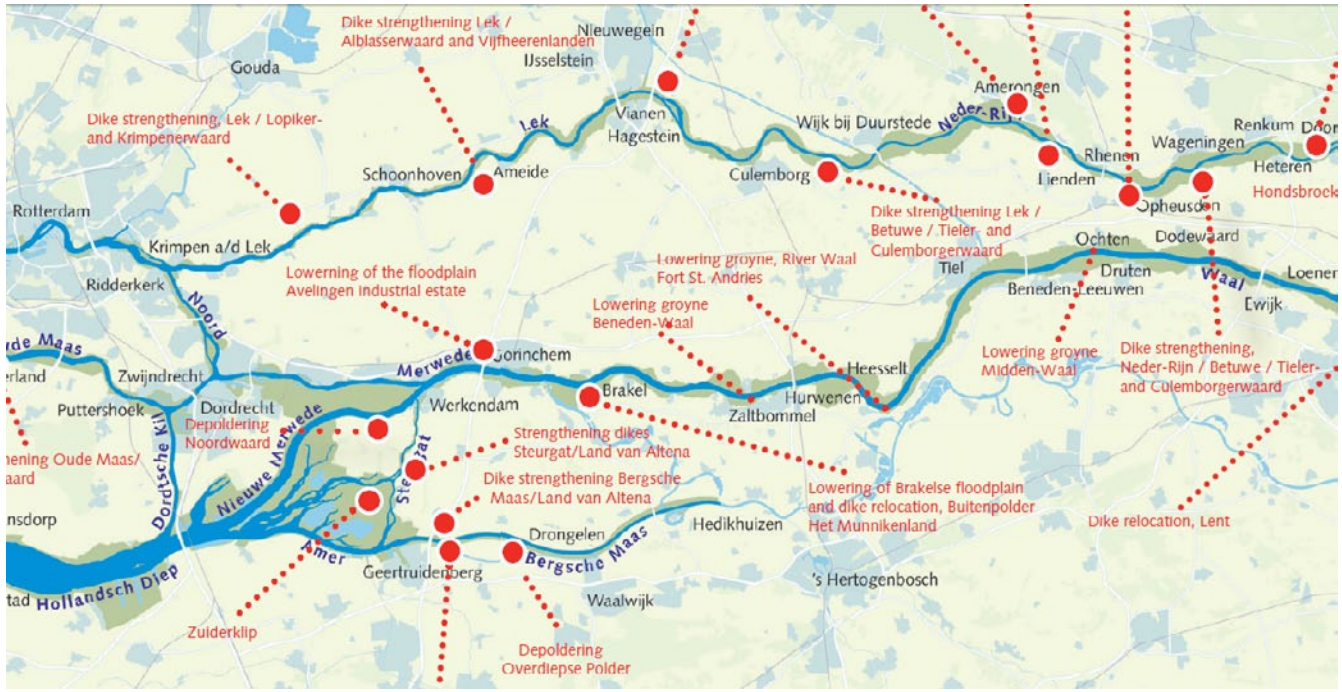

Illustration 4, Intervention Plan, Source: Room for the River: Explanatory Memorandum, 2006

reinforced and space must be provided for emerging river dunes and grasslands (Room for the River: Explanatory Memorandum 2006).

The Room for the River policy breaks from the traditionally used approach of dealing with water safety in the Netherlands. The new approach uses both theories discussed earlier, the ecological method and human ecosystems. With knowledge of river processes and understanding of the local landscape, it will become clear where the river naturally wants to flow. Also, by steering the river through man-made interventions and providing the opportunity for natural processes, human ecosystems will be created. By giving more space to the river, ecological processes will once again be less restricted, allowing for both increased safety and environmental quality.

4.3 Working Together with Water

The Dutch government asked the Delta Committee to come up with strategies to protect the coast and hinterland of the Netherlands, and in 2008 the committee released its results in a report titled Working Together with Water: A Living Land Builds for its Future. Similar to the Room for the River work, here the main focus is also on water and safety, and again the scope is increased; where the first report focused only on rivers, the Delta Committee looks at the entire country. The task of the committee is to assume a change in climate and prepare for the new environmental conditions. The latest insights into climate scenarios were accounted for, including a predicted sea level rise as well as greater fluctuations in river discharge. Based on the assumption of climate change and its vast consequences, the committee was compelled to look far into the future, widen its scope, and anticipate developments much further ahead (Delta Committee 2008). It was concluded that the best long-term strategy is to develop along with the changing climate, move with and utilize natural processes that allow humans and nature to adapt gradually over time (Delta Committee 2008).

The intention was to make the Rhine, Meuse and Scheldt Delta the world's safest delta. In order to do that the definition of water safety needed to be broadened to include people, economy, ecology, and cultural heritage. This meant assigning values to things that are worth preserving or creating, values that can not always be expressed in monetary terms. The committee needed to look further than just flood protection, including other functions and processes such as living and working environments, agriculture, nature, recreation, landscape, infrastructure, and energy. It became clear that there needed to be an integrated vision, one that not only strengthens flood defense but also changes the way the country is managed, physically and administratively. In order to achieve these drastic changes there needs to be a synergy between the water system and spatial

Illustration 5, National Program, Source: Delta Committee, 2008

planning (Delta Committee 2008). This approach will have consequences at a variety of scales, impact many functions and interests, and force choices about land use -- a difficult task that requires an integral and harmonized relationship between water management and spatial planning (See Illustration 5).

Key to the success of this large-scale strategy is gradual action, flexibility, and knowledge of natural processes (Delta Committee 2008). The plan puts emphasis on development along with climate change and natural processes, striving for a harmony with ecological systems. New and different biodiversity and attractive landscapes can emerge and flourish if more space is offered to the dynamics of rivers and the sea (Delta Committee 2008). It is possible to build with nature and coastal flood protection can be achieved by beach nourishment and islands off the coast, processes that are typical in delta landscapes. At the mouth of the Rhine River (See Illustration 6), an open system that can be closed when needed will combine flood protection, fresh water supply, urban development, and nature (Delta Committee 2008). Ecological processes and water safety create the framework that guides both urban and natural developments.

The report creates a long-term vision for the protection of the delta, based on a clear understanding of natural processes and their relationship to water management and spatial planning. It is not a final blueprint for the development of the country. Instead it must be flexible, because living in a delta means circumstances and outlook will always change, and there will be a need to modify plans continually (Delta Committee 2008). Fortunately, the overall strategy itself should not need to change, when developing along with climate change and natural processes we can be certain in creating a safe and secure delta.

5 Conclusions

5.1 Summary and Relevance to Delta Regions

Slowly we are beginning to realize our position within

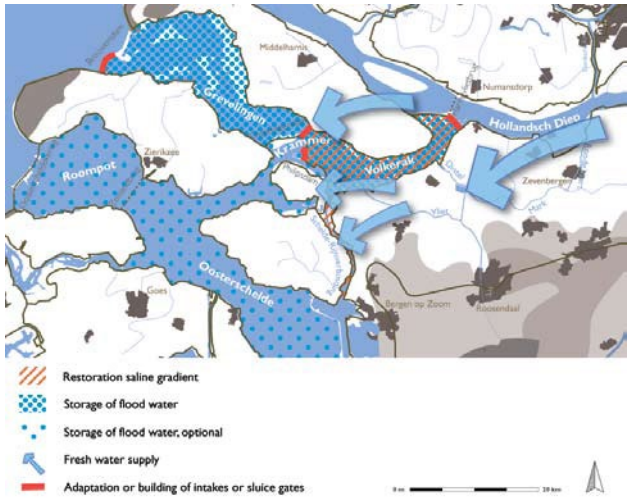

Illustration 6, River Mouth Strategy, Source: Delta Committee, 2008

and dependence on the natural systems and ecological processes that create the world around us. With modern technological advances our scientific knowledge of the natural world and its processes has greatly expanded. The combination of these developments has led to new views about the relationship between man and nature, in addition to creating exciting new methods and opportunities for architecture, urban design and regional planning.

Discussed here are several theories that embrace our position within ecological systems and use knowledge of their processes as the basis for new interventions. Also reviewed were several Dutch governmental documents that attempt to turn these design theories into policy.

In global deltas, an ecological approach to water management and urban development is especially important due to the dynamic and fragile landscape present. These methods and theories can provide a way to preserve and utilize natural processes in the delta environment while ensuring compatible urban development.

5.2 Application to the Mississippi Delta and the City of New Orleans

When looking at the Mississippi Delta, it becomes clear many natural processes have been disregarded and disrupted through many years of water management practices, urban development, and industrial activities. This has led to a dying delta, where land is sinking and wetlands are disappearing, both harming the rich ecology of the region and making it less safe for urban development. The recent growth patterns of the city of New Orleans have ignored the natural landscape and its processes, which has created a city very susceptible to dangerous flooding.

Yet there is hope. It is not too late to restore historic ecological processes in the Mississippi Delta. It is possible to harness their power to create new human ecosystems that will bring back the productive and ecologically rich landscapes of the delta while also creating opportunities for safe urban development. With a clear understanding of the delta processes and our proper place within them, it will be once again possible to live with the land.

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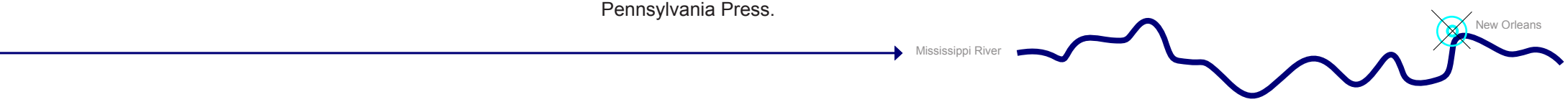


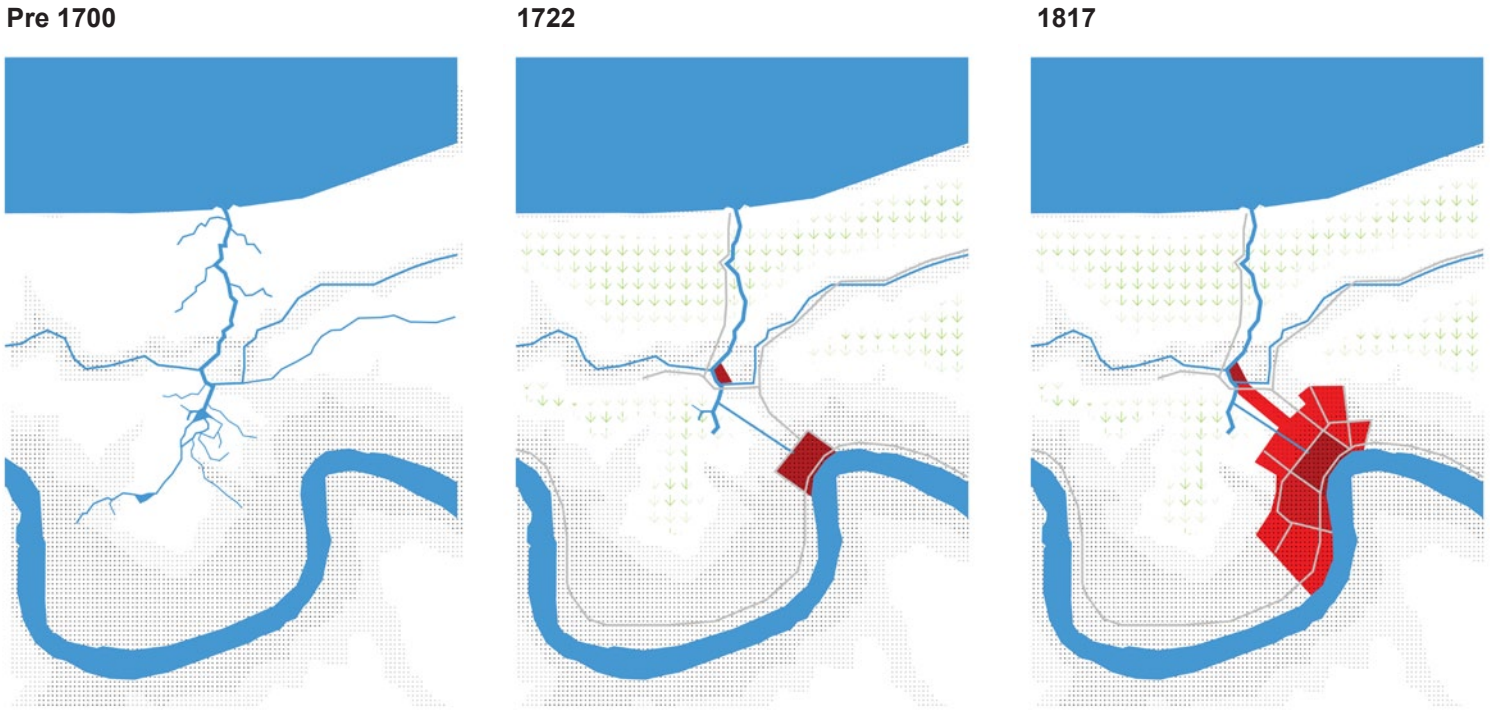
ANALYSIS: Historical Timeline

RELATION BETWEEN CITY & WATER

In order to understand the current situation in New Orleans, one must follow the spatial development of the city over time. As one of the oldest cities in the United States, dramatic changes have occurred over the past 300 years.

Historically the city was directly connected and dependent on the present water system and natural processes of the delta for survival, in fact that is the very reason for its location and existence. But over time as the city grew and technology improved, the connection between city and water has been disappearing. Technical measures have attempted to separate the city from the delta landscape within which it is located.

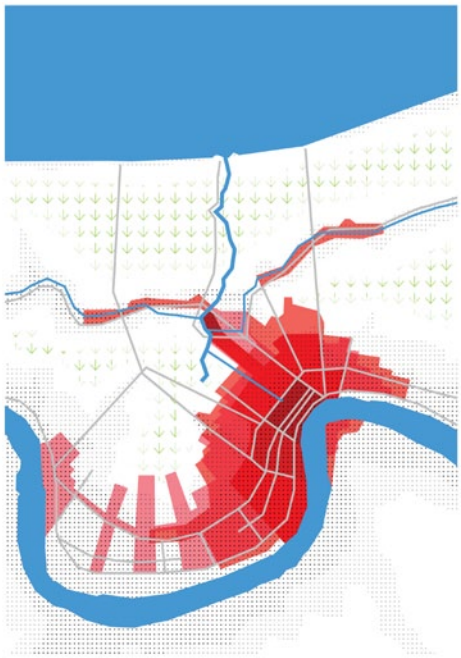
The recent disaster of Hurricane Katrina has proved this experiment to be a failure. Not only is the city unsafe and highly susceptible to flooding, the spatial character and visual quality of life in the post World War Two neighborhoods have suffered due to this separation of city and water. By analyzing the historical spatial development of the city, it becomes clear how we arrived at the current situation. Only when we understand the historical context and its relation to natural processes can we begin to propose solutions.



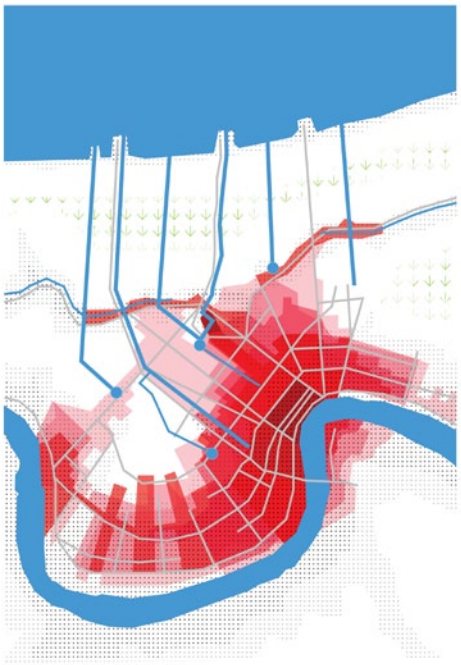
Based on: Hermans P., et al, 'A working landscape for New Orleans,' 2010

ANALYSIS: Historical Developement

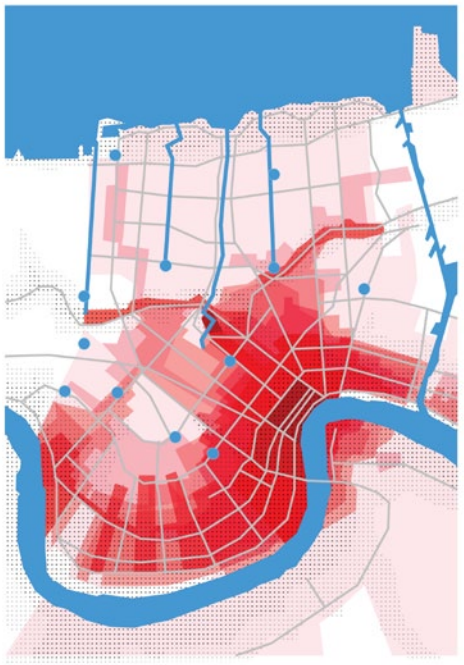
1855



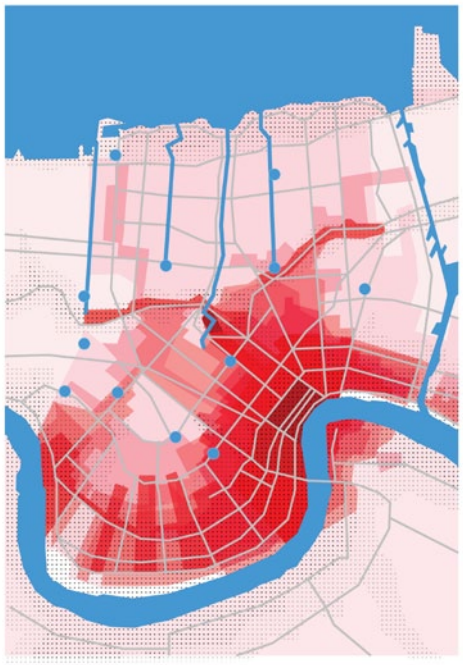
1895



1949

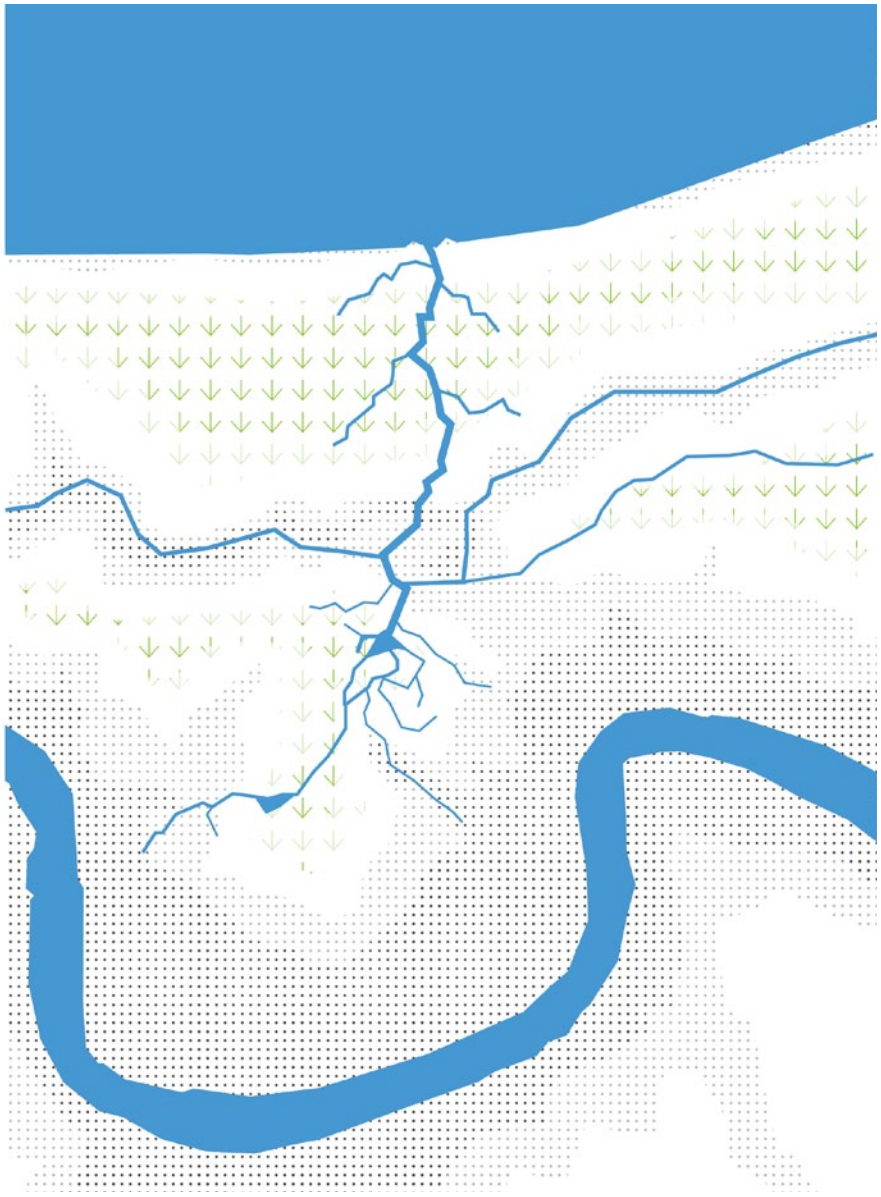


2005



Mississippi River

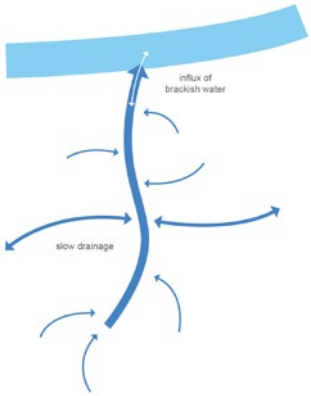
SPATIAL DEVELOPMENT: pre 1700



The pre-settlement conditions of the New Orleans region was similar to that of most of the delta landscape. There consisted an ecological gradient from the river edge to the sea -- in this case the brackish Lake Pontchartrain -- from high ground to low ground including a variety of ecosystems ranging from upland forests to cypress swamps and marshes.

A system of bayous slowly drained the swamps and connected inland water to the lake. An influx of brackish water was able to permeate into the swampy areas through the mouth of the main bayou, Bayou St John. In this environment there was space for water everywhere and the rich ecosystems thrived in this ever-changing water-dominated landscape.

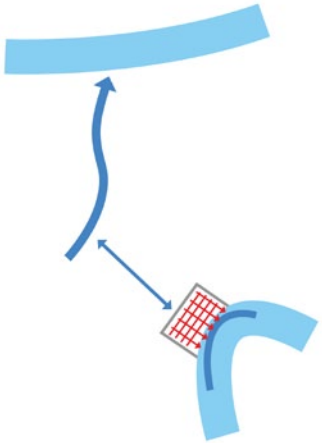
CONCEPTUAL DIAGRAM



CHARACTER

SPATIAL DEVELOPMENT: 1722

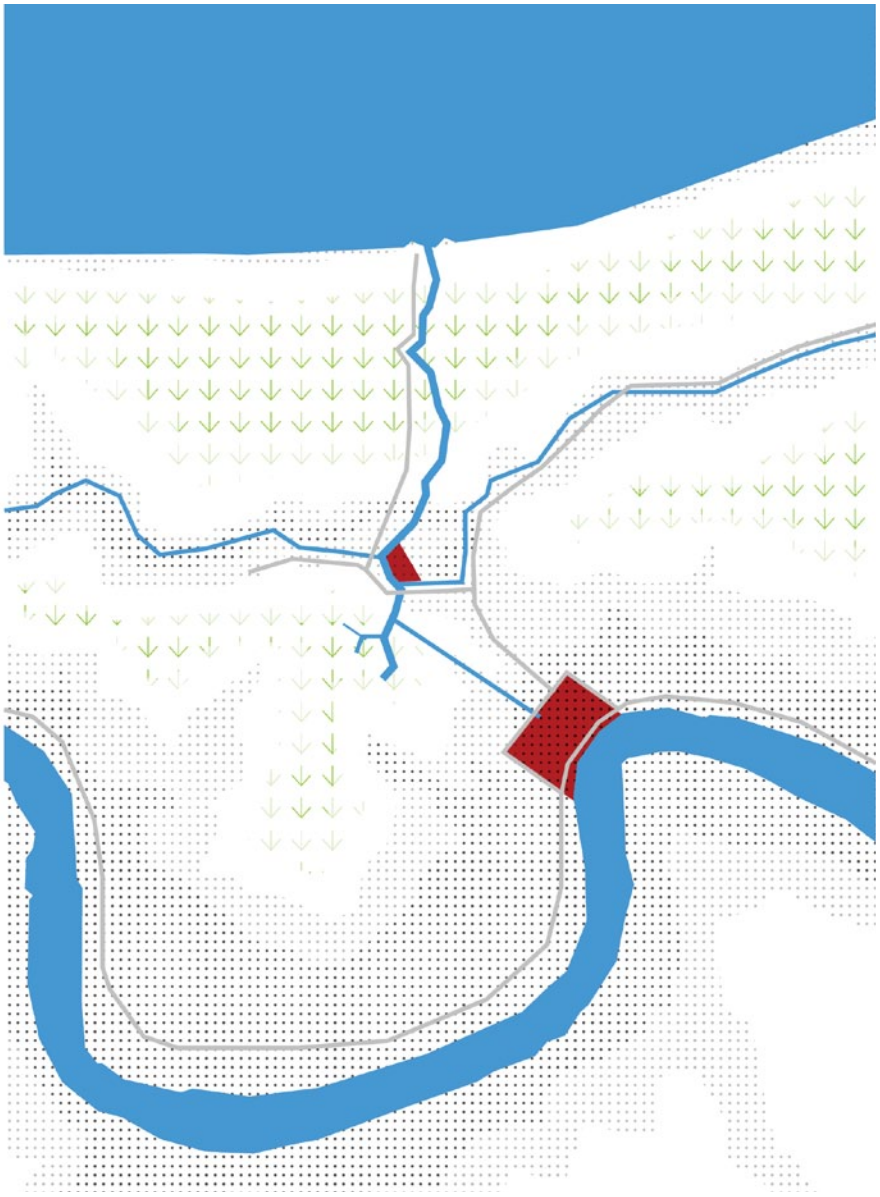
CONCEPTUAL DIAGRAM



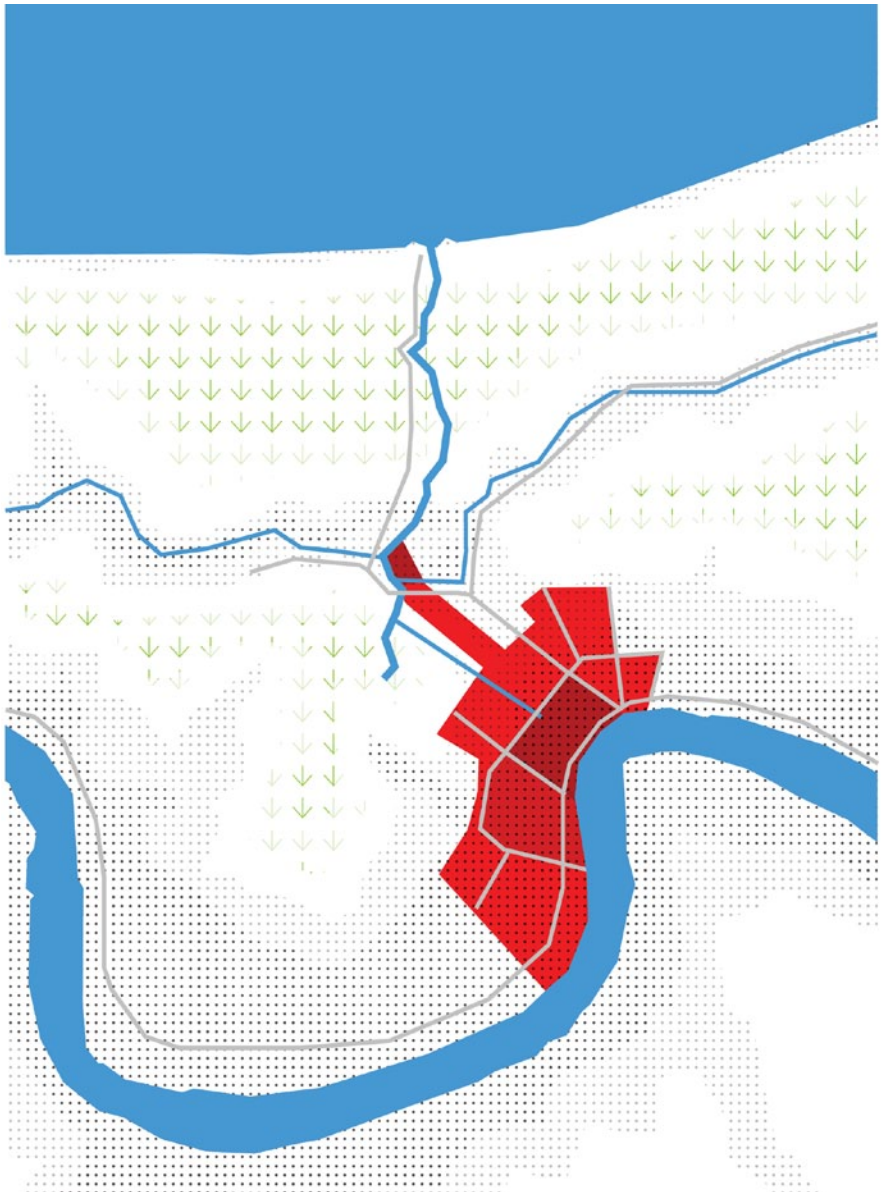
In 1722, the original New Orleans was settled by French explorers. The intention was to find a strategic location on the shore of the Mississippi River to control trade and travel into the center of the newly “discovered” vast land of North America. But the powerful river posed considerable challenges at that time for navigation upstream. Therefore, the location of the French Quarter was chosen due to its backdoor access from Lake Pontchartrain.

The Native Americans of the region showed the explorers that it was possible to access the shores of the river by going through the lake and up Bayou St John. From here the founders built a canal that directly connected the French Quarter to the bayou.

At this early stage in the development of the city, everything was determined by and directly connected to the natural water systems of the region.



SPATIAL DEVELOPMENT: 1817

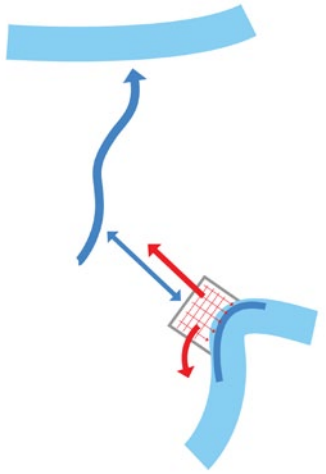


Over the next 100 years, expansion of the city was slow. New growth moved upstream along the banks of the river and created what is today the warehouse district. Expansion also followed the canal towards and along Bayou St John.

All new development was directly related to accessibility to water, either the river or canal, bayou and lake. In addition, any new development was restricted to being located on high ground, including both the natural levees on the river edge or the ridge north of the city.

At this point, the city was still directly connected to and dependent on the surrounding water systems and geomorphic properties of its location.

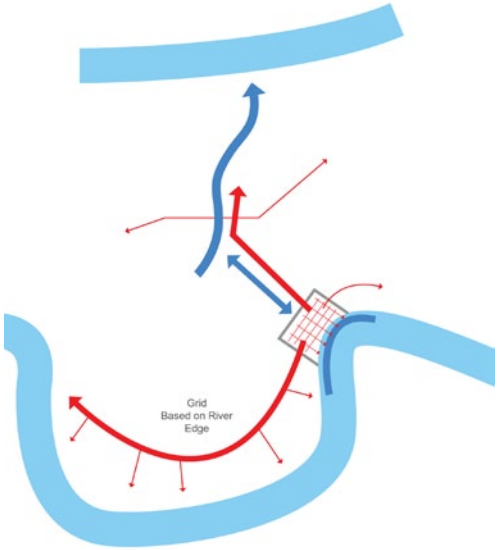
CONCEPTUAL DIAGRAM



CHARACTER

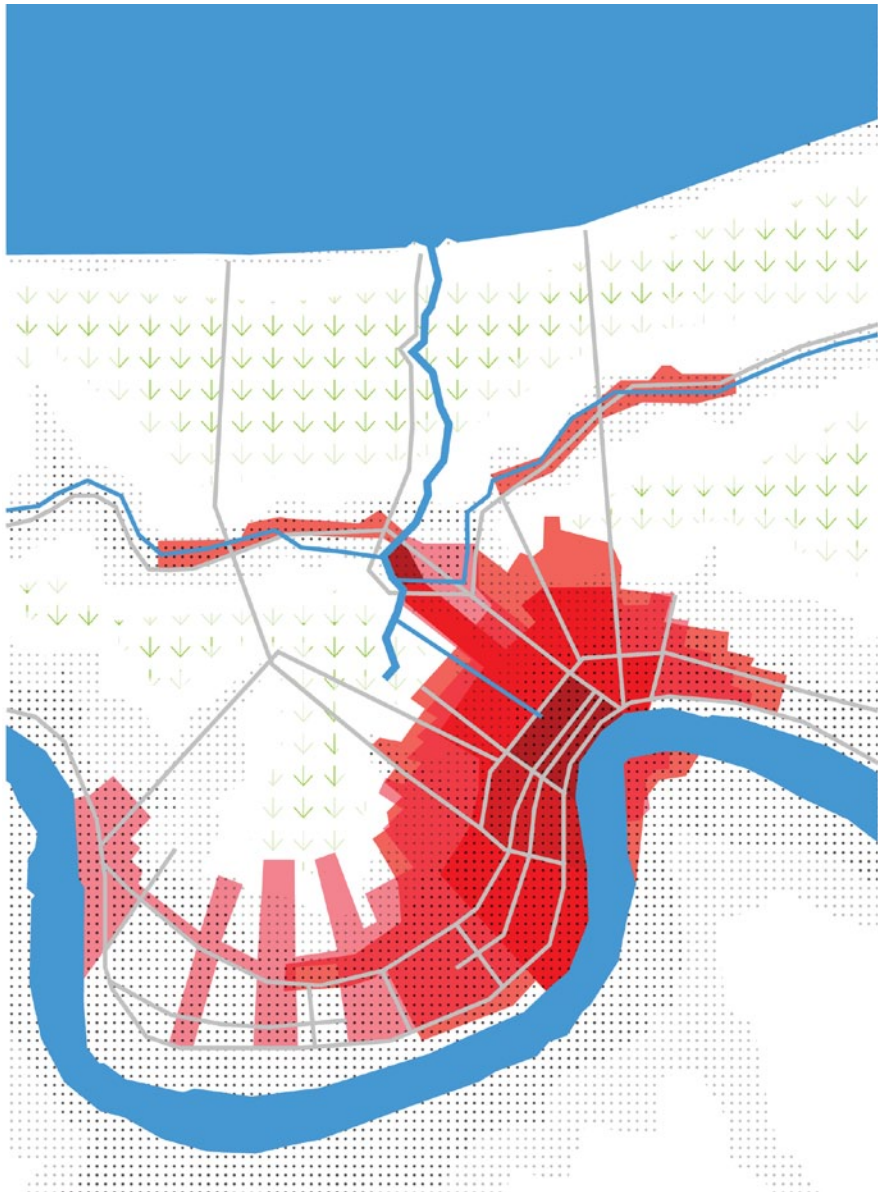
SPATIAL DEVELOPMENT: 1855

CONCEPTUAL DIAGRAM



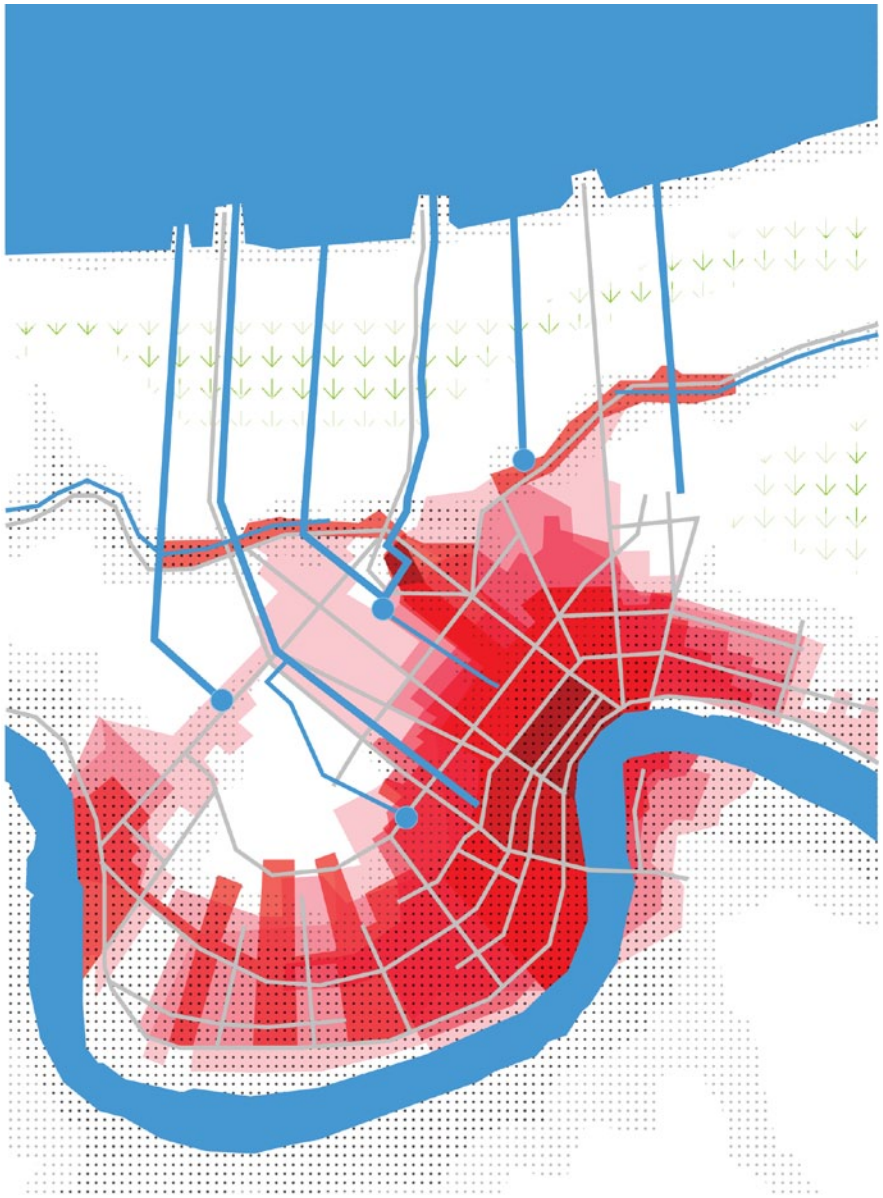
From this point on, expansion of the city occurred at a much faster pace, but development was still restricted by the inherent constraints of the landscape. New growth was still limited to high ground and accessibility to water. Continuing upstream, new development followed the natural curve of the river and the street grid began to reflect this; all new streets were created perpendicular to the river edge. In addition, the city also expanded considerably to the north. Settlements in this direction were also limited to the high ground of Gentilly Ridge.

Here the spatial structure of New Orleans still reflected its location in the delta landscape, safer high ground and a direct connection to water were requirements for any new development.



CHARACTER

SPATIAL DEVELOPMENT: 1895

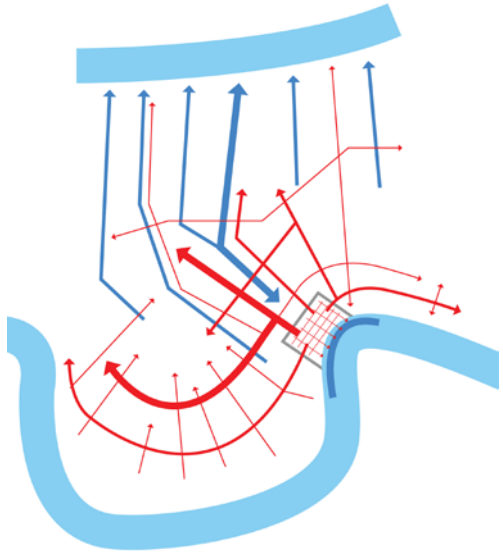


It is during the last half of the 19th century that New Orleans began to grow beyond the natural constraints of the environment. Due to its restricted location squeezed between the river and lake, development finally began to encroach into low-lying areas. This resulted in the need for the first time to create a major artificial water management system. Numerous canals were dug that connected the city to Lake Pontchartrain and removed excess water. This also necessitated the beginning of draining portions of the low wetlands and swamps.

The canals began to introduce a new spatial pattern and grid within the city. Whereas street patterns had previously followed the arced edge of the river and created a radial configuration, now canals and streets were following a different structure: the edge of the lake. This system was a more typical rectilinear grid, which met and merged with the previous grid system along the winding path of Gentilly Ridge.

These developments in the spatial structure and water management of the city marked for the first time a major departure from the existing natural systems. But even though a new system of water management was being imposed on the landscape, the connection between city and water was still clearly visible.

CONCEPTUAL DIAGRAM

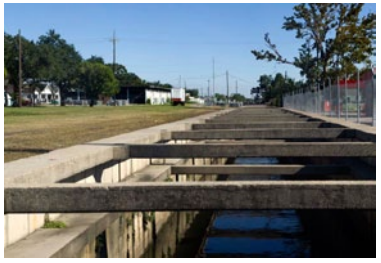


CHARACTER

SPATIAL DEVELOPMENT: 1949

CONCEPTUAL DIAGRAM

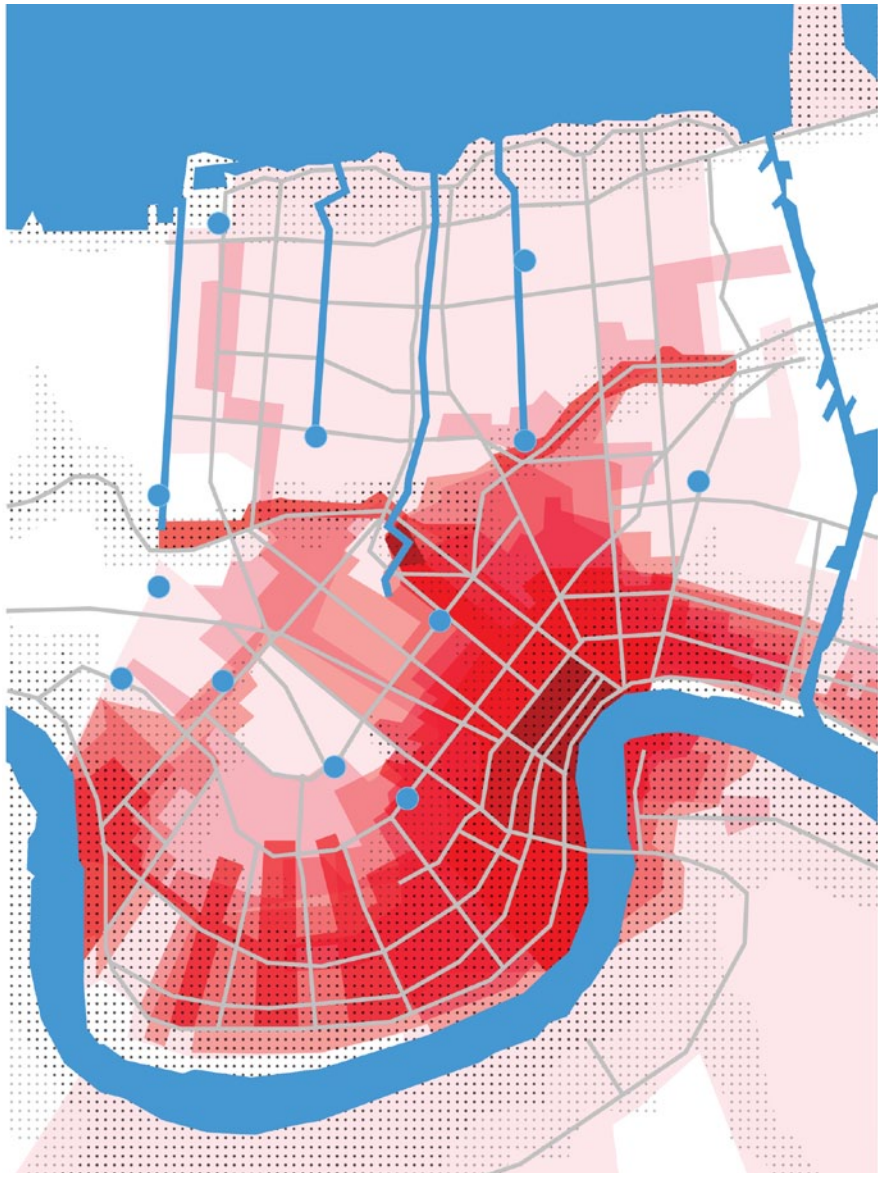
CHARACTER



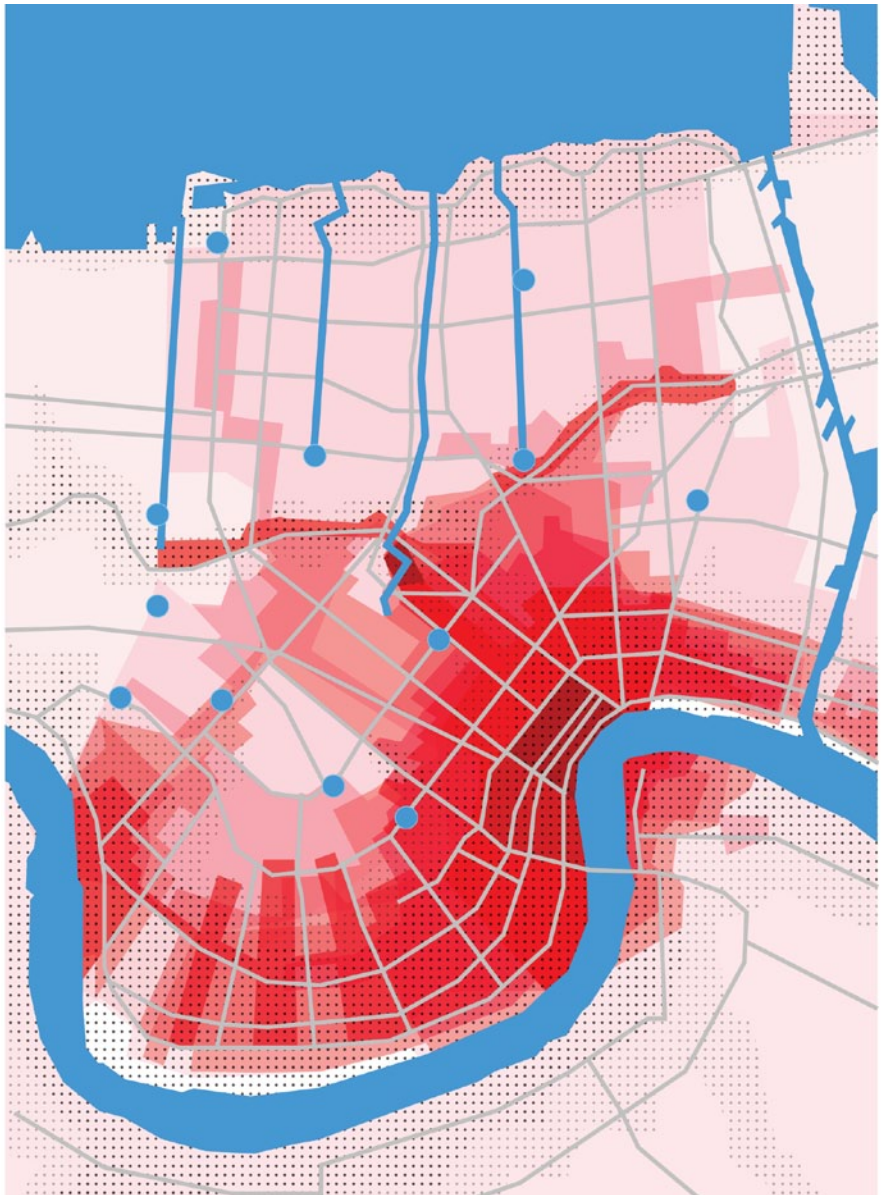
The previous creation of the outfall canals paved the way and enabled the complete drainage of all the wetlands and their subsequent development. This was only possible due to recent technological advances in pumping technology: enormous screw pumps in 1915. This allowed development of the city to continue without the former constraints of the natural landscape.

By this point in the development of the city, almost all ties to the natural water systems had been severed. The canal system that once visibly showed the city's connection to the water was either buried underground or raised high above grade creating visual and physical barriers within the city structure. The original canal that connected Bayou St John to the French Quarter had already lost its original function and was covered and concealed below the ground. Instead, a major artificial industrial canal along with a system of locks was built to serve as a new major shipping connection between Lake Pontchartrain and the Mississippi River, downstream from the original city center.

Now the relationship between the development of the city's spatial structure and the natural water systems were growing very far apart.



SPATIAL DEVELOPMENT: 2005

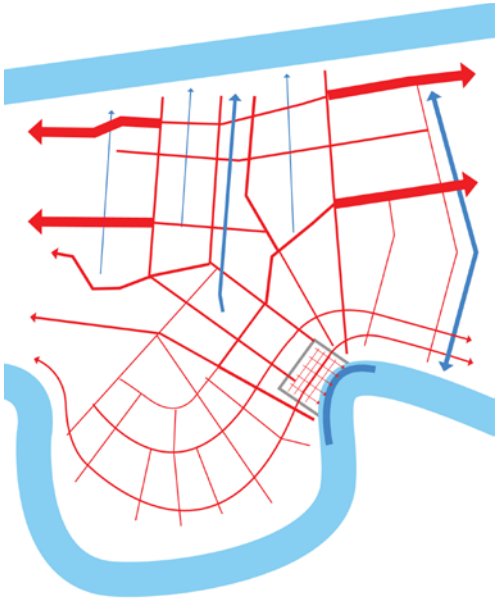


The past 50 years have seen continued expansion and growth within the low-lying former wetland areas near the lake edge, again fueled by improvements in technology and increased demand for space. Development within this area has since resulted in substantial soil subsidence, further separating the land from traditional drainage processes.

A channelized and reduced version of Bayou St John is the only remaining piece of the original natural water system in the city, and due to sinking of surrounding neighborhoods, the bayou cannot function in its natural way.

There has been little integration of the new water management system with the existing water structure or into the spatial composition of the city; this has resulted in a city that is separate from the surrounding natural processes.

CONCEPTUAL DIAGRAM



CHARACTER

ANALYSIS: SPATIAL DEVELOPMENT

RELATION BETWEEN CITY & WATER

After analyzing the historical development of the city and its relation to the surrounding natural water systems, it becomes clear what has gone wrong. It is also clear that there was a time in the city's history that it was living in harmony with the natural processes of the delta, and much can be learned from the original development patterns.

Historically the location, form, and structure of the city was completely based on and related to the water system. Slowly over time the city has grown beyond the safe high ground of the natural levees and into the low-lying former wetlands. Initially, the water network to keep the city dry was clearly visible and a dominant part of the city structure. It has only been over the past 60 years that these canals and other water management infrastructures have been concealed and separated from the spatial structure of the city. It is this most recent approach to development and water management that has disregarded its location within and dependence on the delta landscape. Streets were laid and houses built just like any other American suburb, when in fact New Orleans is not like any other American city, it is a delta city.

If New Orleans is to be a safe and successful city, attracting economic activity and provided a high quality of life, then there needs to be a reassessment of its relationship with water.


01
DELTA
THE URBAN BAYOU


02
DISTRICT


03
BUILDING

THE URBAN BAYOU

Balancing Natural Processes and Urban Development in New Orleans

Daniel G. Raymond

THESIS PROJECT
TU Delft

June 28, 2011

A *Special Thanks* to all my family, friends, and professors who made this project possible!