

THE URBAN BAYOU

The background of the slide is a collage of three vertical panels. The left panel shows a grayscale aerial map of a coastal area with a river and marshland. The middle panel is a colorful urban planning diagram with blue and green wavy shapes representing water and parks, overlaid on a grid of streets and buildings. The right panel is a detailed architectural site plan showing building footprints, courtyards, and landscaping details.

*Balancing Natural Processes and Urban Development
in New Orleans*

Daniel G. Raymond

Student Number 1531042

D.G.Raymond@student.tudelft.nl

TU DELFT

MSc4 Urbanism / Architecture

P5 Presentation

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Mentors:

Han Meyer (U)

Willemijn Wilms Floet (A)

Steffen Nijhuis (U)

Thorsten Schuetze (A)

Henk Muhl (A)

CONTEXT: Global Relevance



Opportunities



Challenges



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Understanding the City in the Delta

2. CITY SCALE

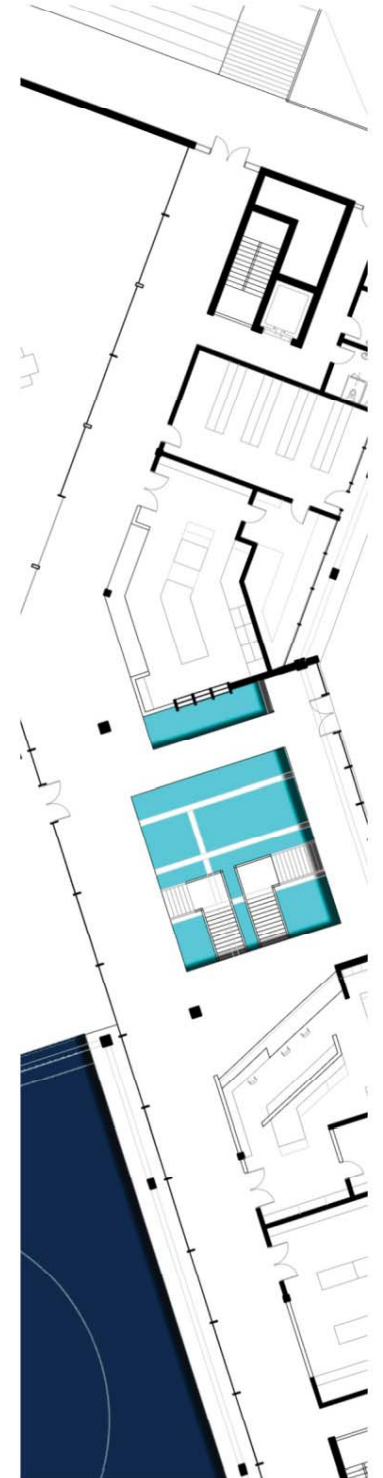
Allowing Natural Processes

3. DISTRICT SCALE

A Neighborhood Living with Water

4. BUILDING SCALE

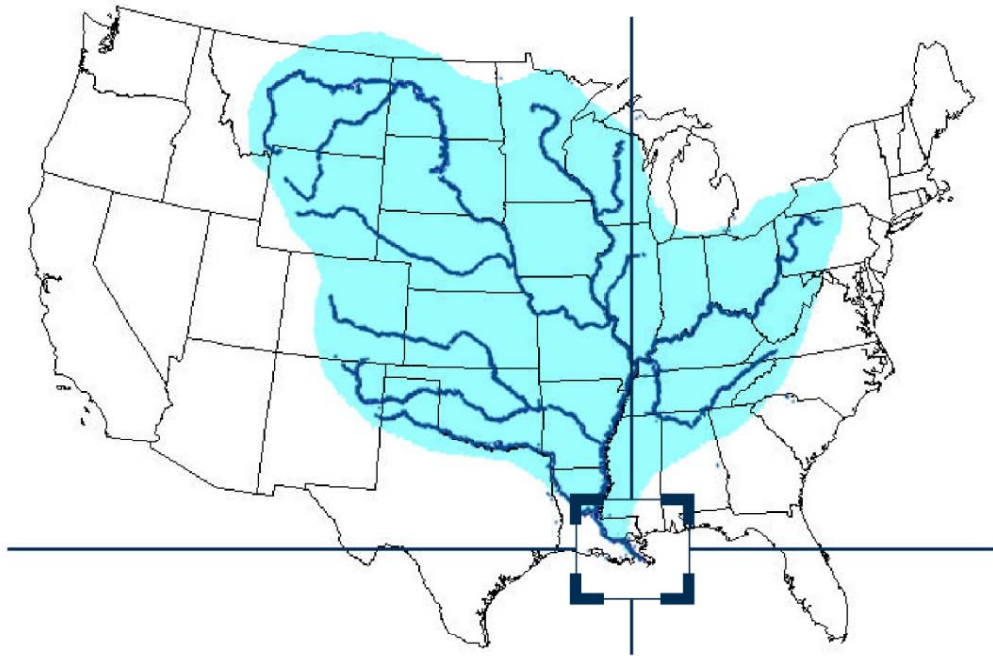
Cultural Learning Center



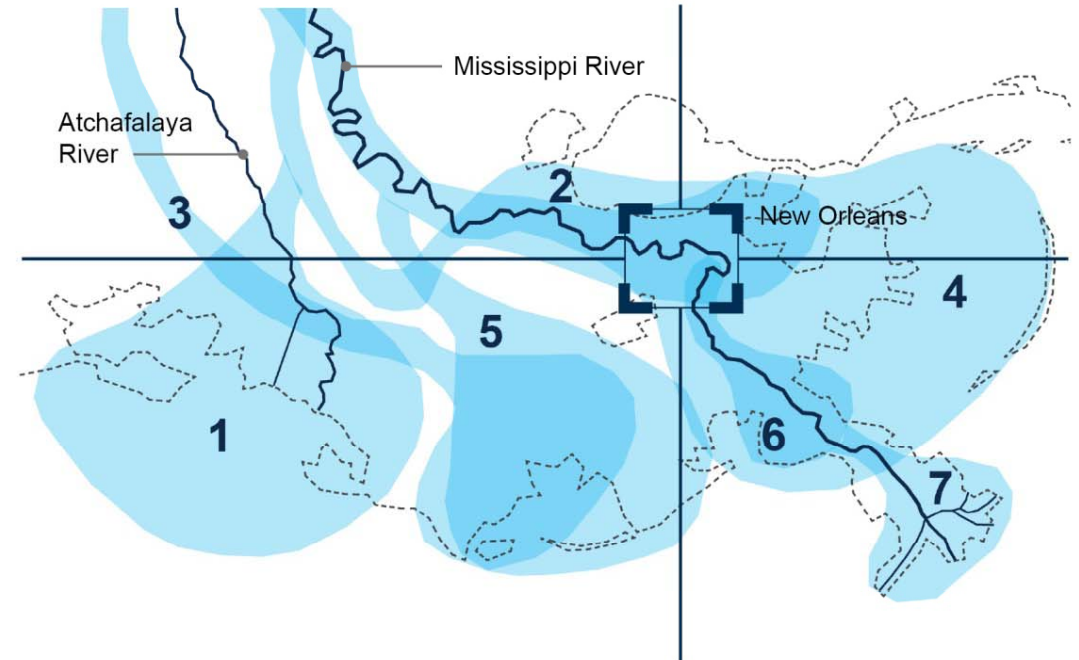
RIVER, DELTA & CITY

Context

MISSISSIPPI DRAINAGE BASIN



HISTORICAL DELTA LOBES



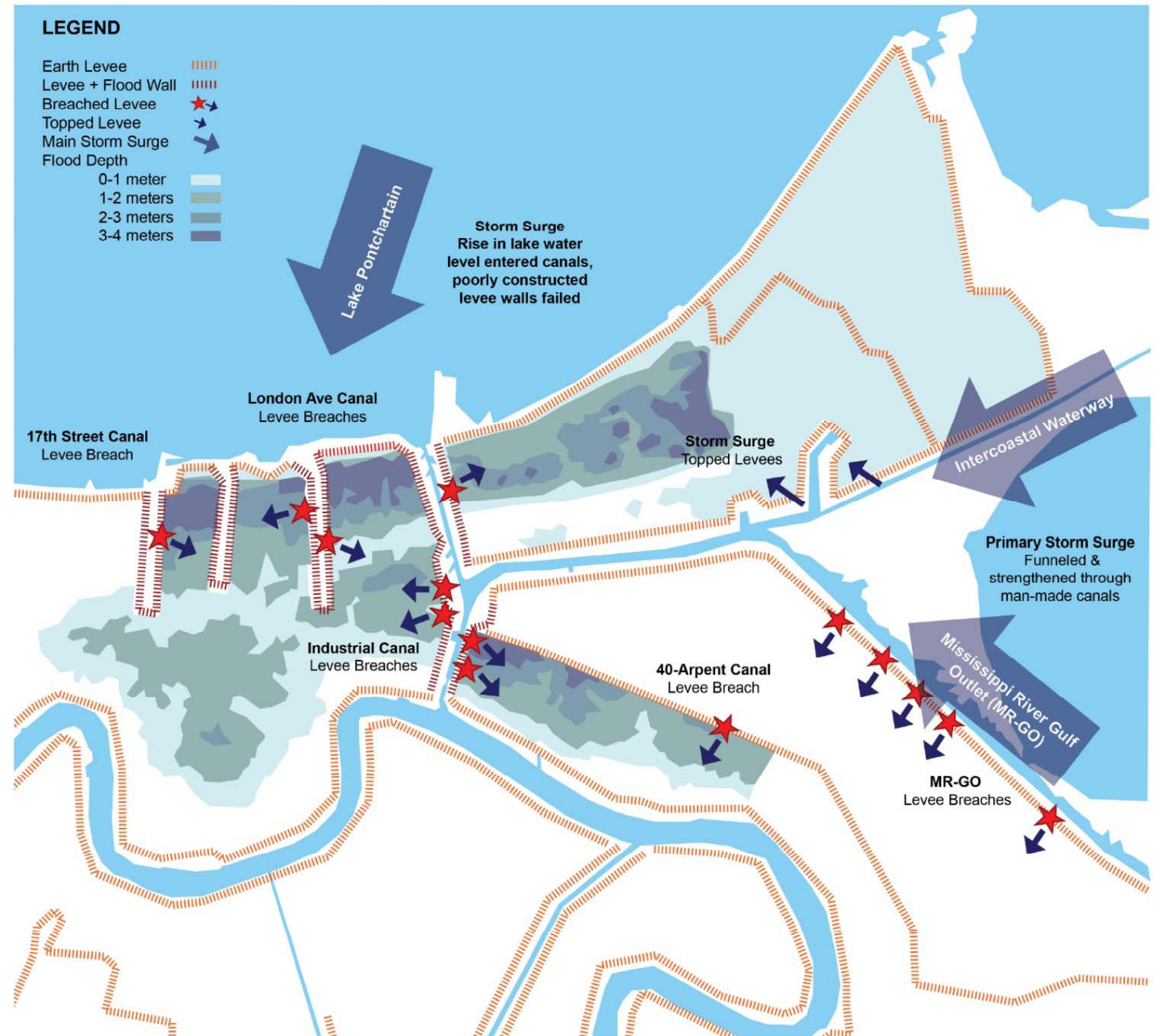
City & Delta Character



HURRICANE KATRINA

A Man-Made Disaster

Hurricane Katrina, New Orleans Flooding



3x3x3 LAYER ANALYSIS: *Understanding the Situation*

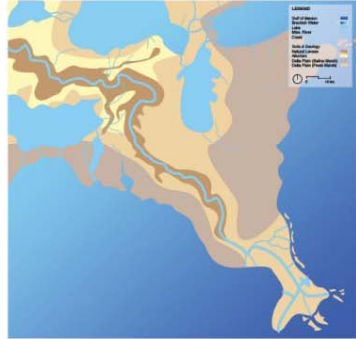
DELTA SCALE

1700

1900

2010

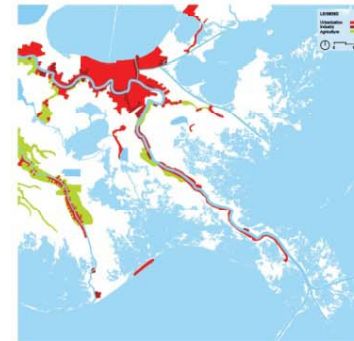
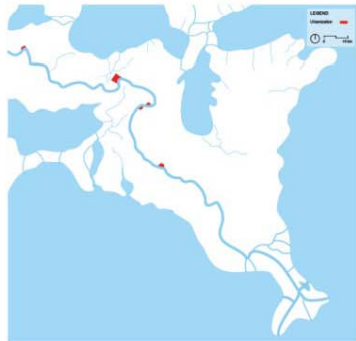
Landscape



Infrastructure



Occupation

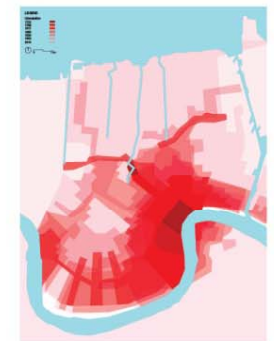
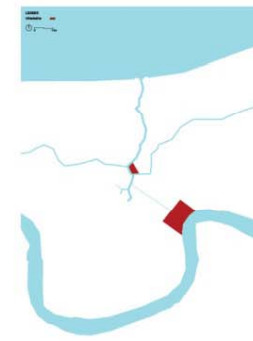
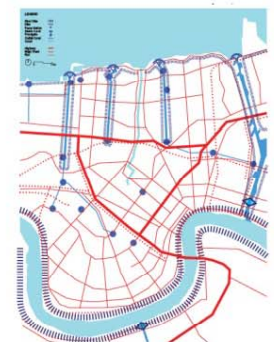
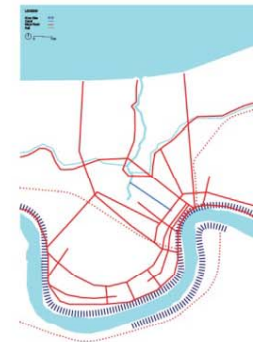
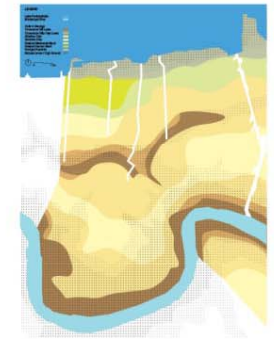


CITY SCALE

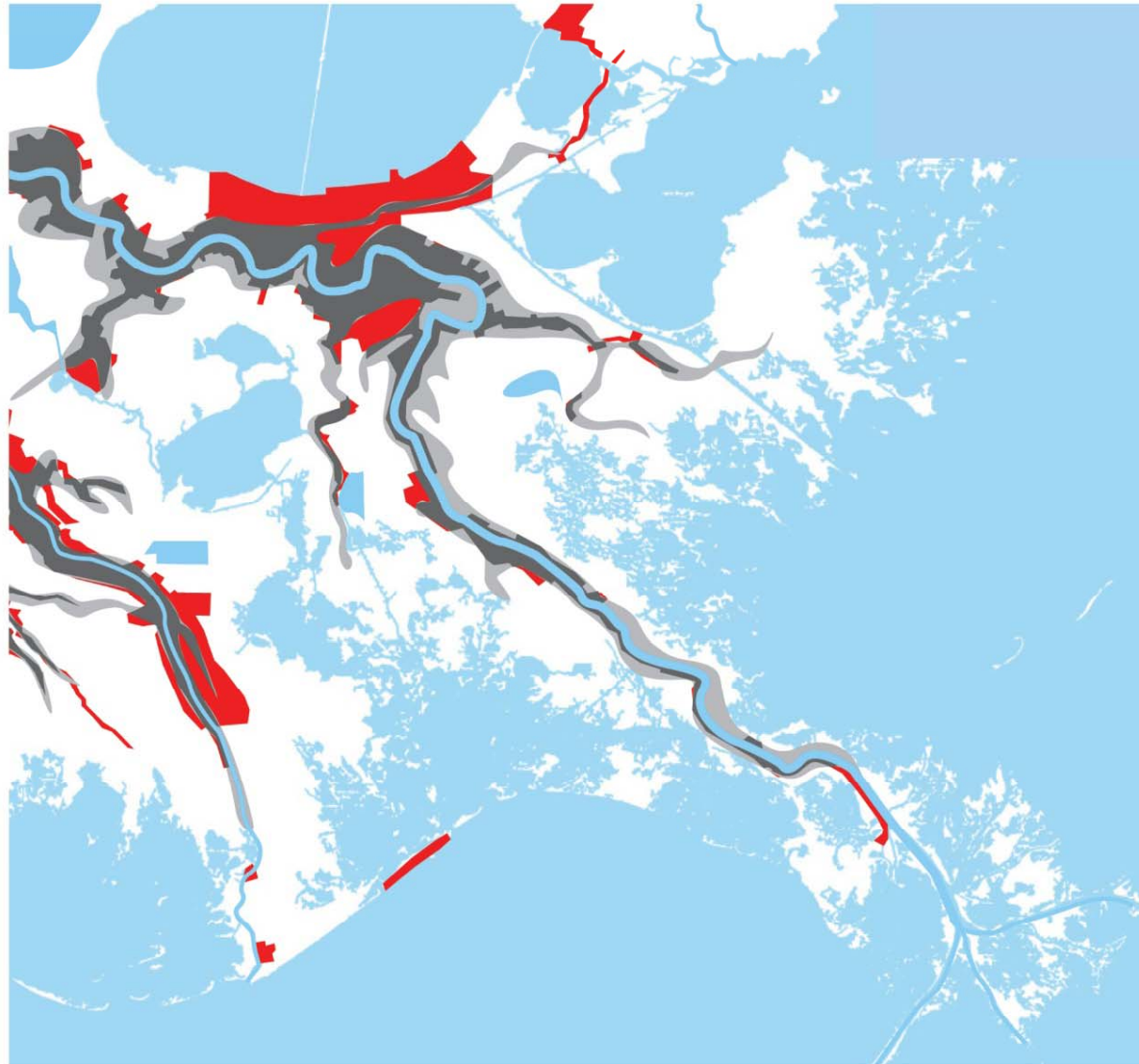
1722

1855

2010

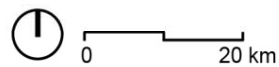


NATURAL LEVEES: In the Delta



LEGEND

Natural Levee 
Urbanization on Natural Levee 
Urbanization outside Natural Levee 



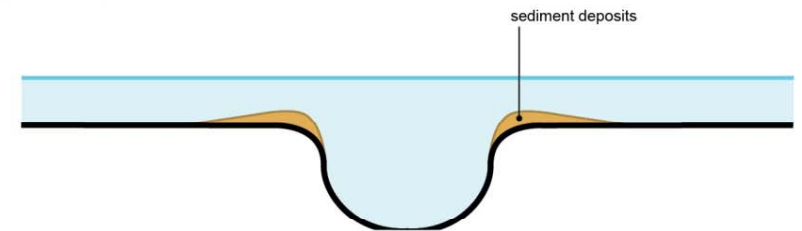
Landscape + Occupation Layers

DEVELOPMENT OF NATURAL LEVEES

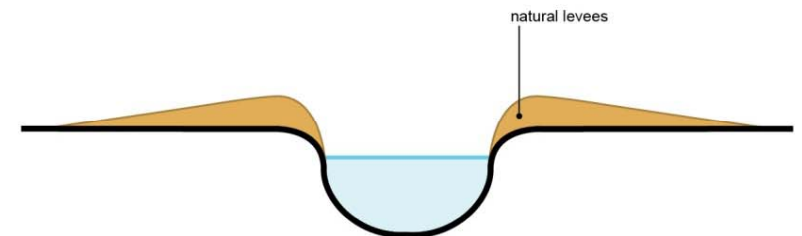
1) Before Flood



2) During Flood

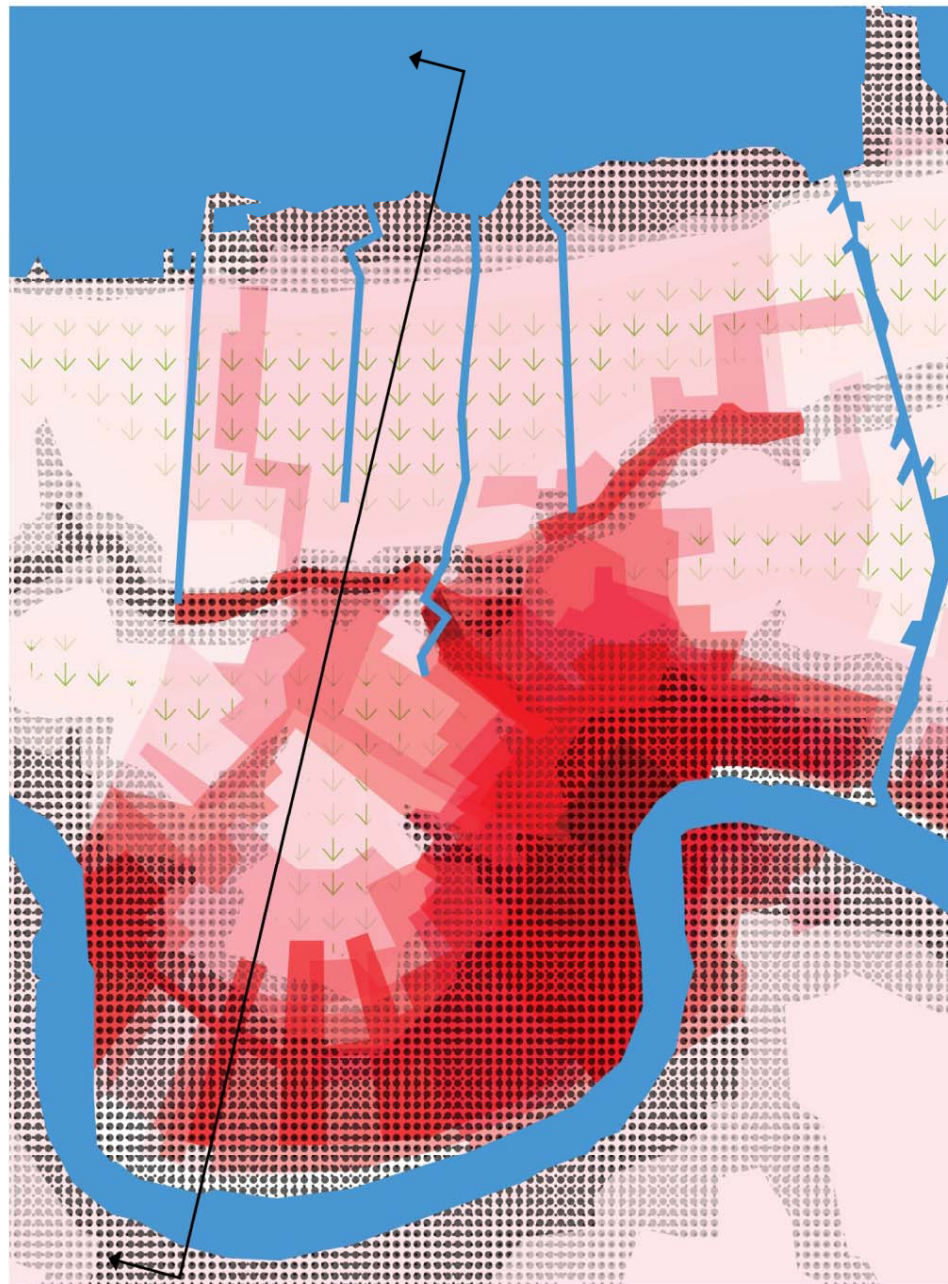


3) After Many Floods



NATURAL LEVEES: In New Orleans

Landscape + Occupation Layers



LEGEND

Natural Levees
Historic Wetlands

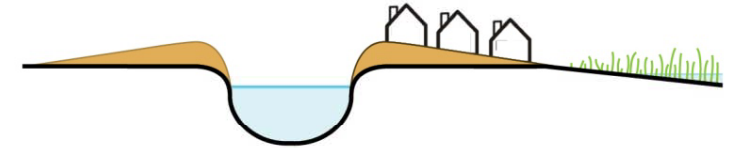
Development Timeline

1722
1788
1817
1855
1893
1949
2010

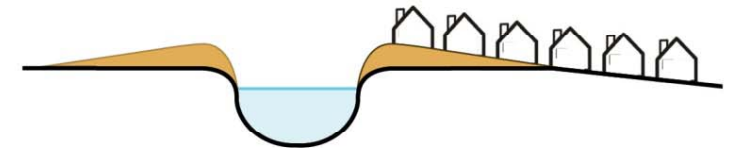
0 2 km

DEVELOPMENT TRENDS

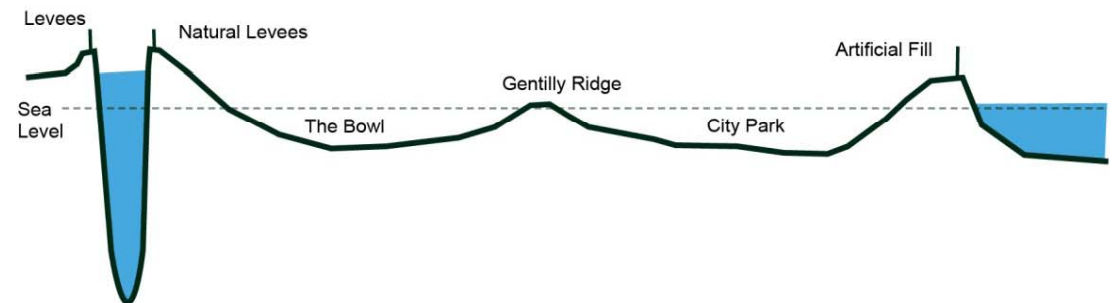
Historical Development
Building only on natural levees & high ground



Recent Development
Infrastructural improvements enable expansion

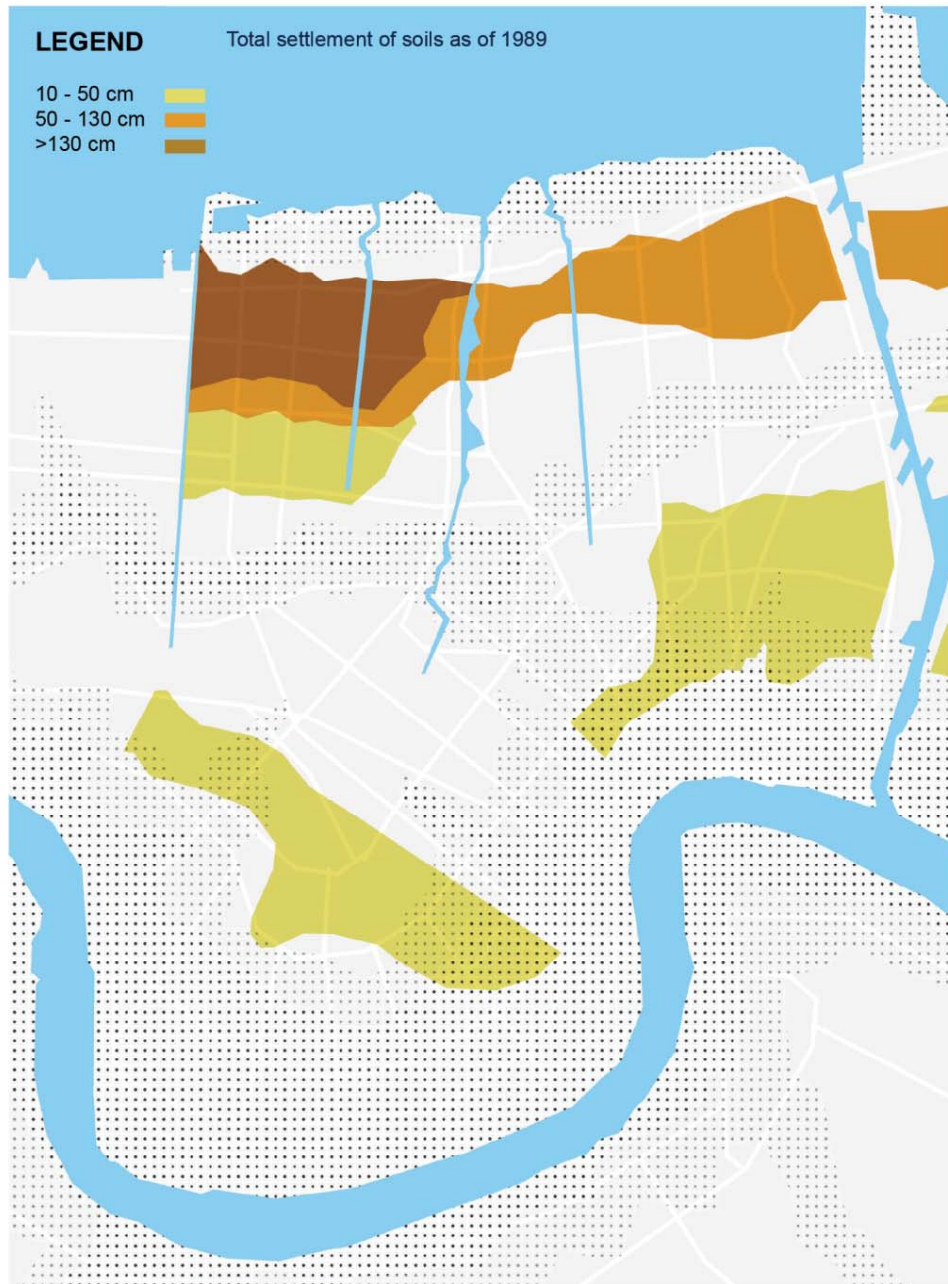


SECTION



SINKING LAND: In New Orleans

Landscape + Occupation Layers

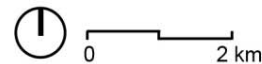
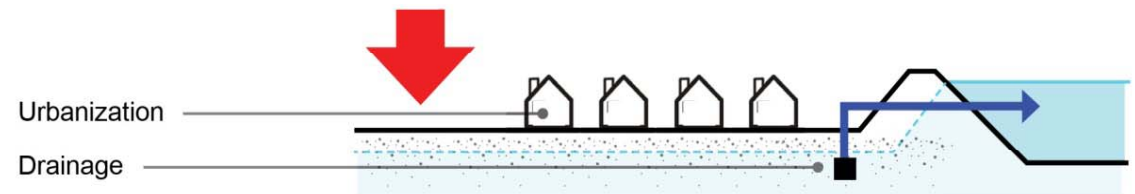


CONSEQUENCES OF URBANIZATION OF WETLANDS

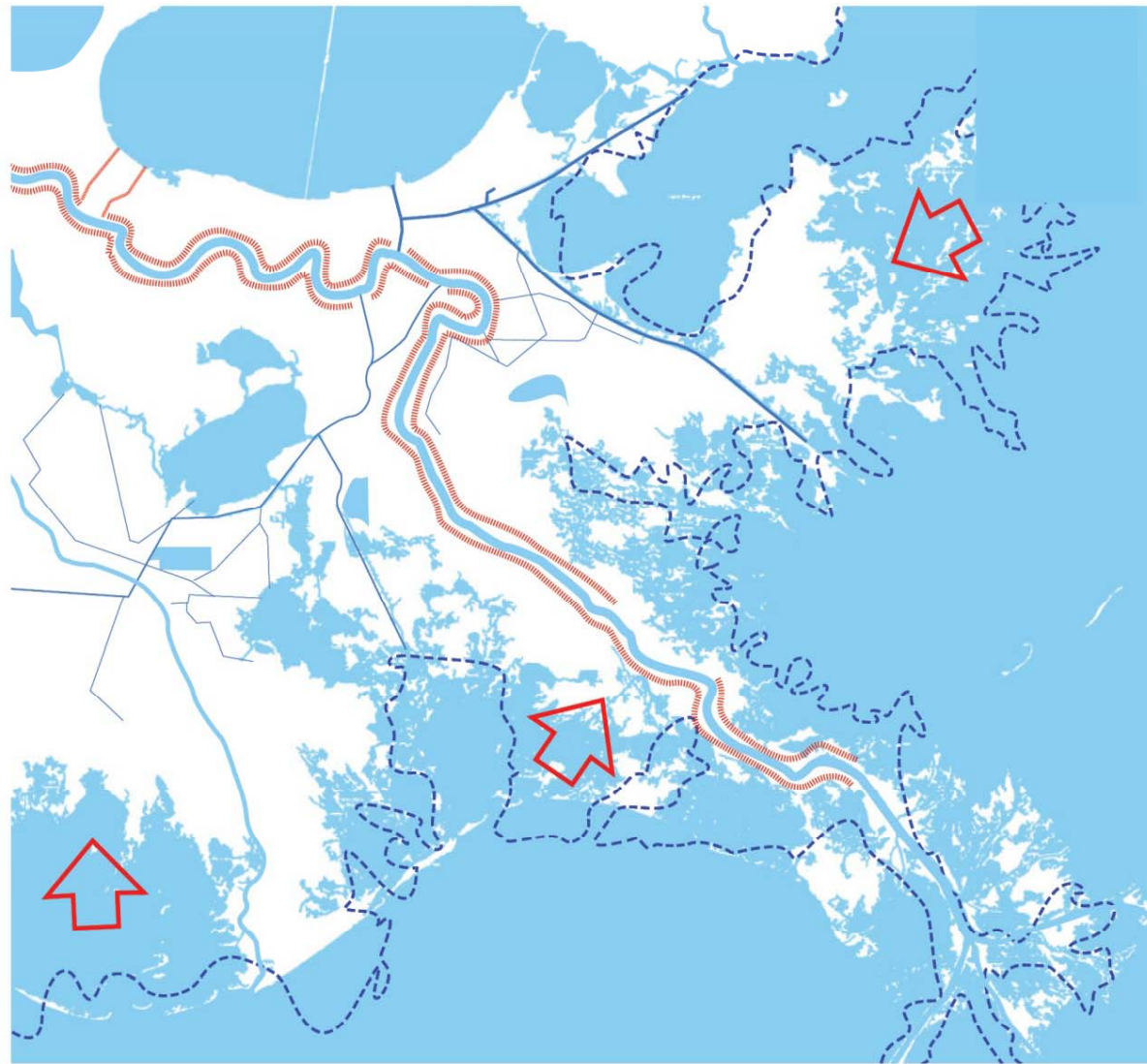
1) Natural Situation: wetlands, peat soils, high water table



2) Effects of Drainage & Urbanization = Soil Subsidence



LAND LOSS: In the Delta



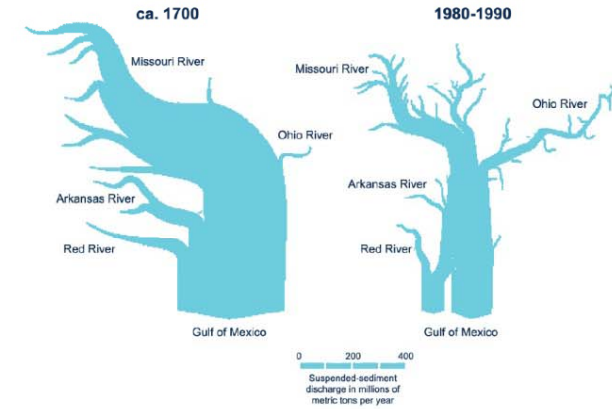
LEGEND

Dike |||||
 Canal ---
 Former Shoreline (1900) ---
 New Open Water ■

0 20 km

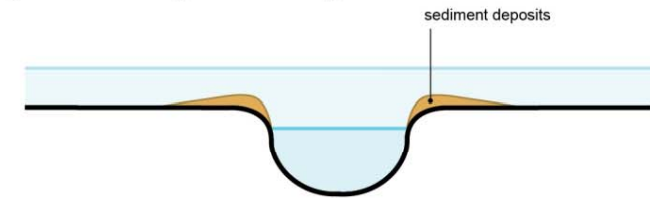
Landscape + Infrastructure Layers

DECREASING SEDIMENT LOADS

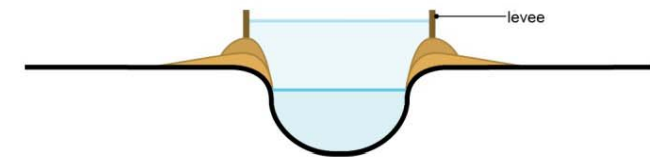


CONSEQUENCES OF THE LEVEE SYSTEM

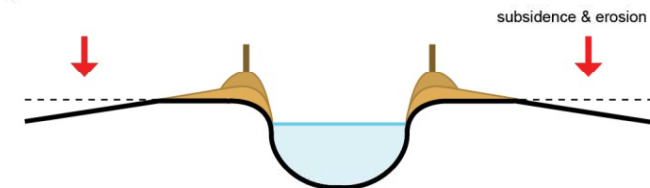
1) Common Regular Flooding = Sedimentation



2) Levee System = Controlled Flooding = Lack of Sedimentation

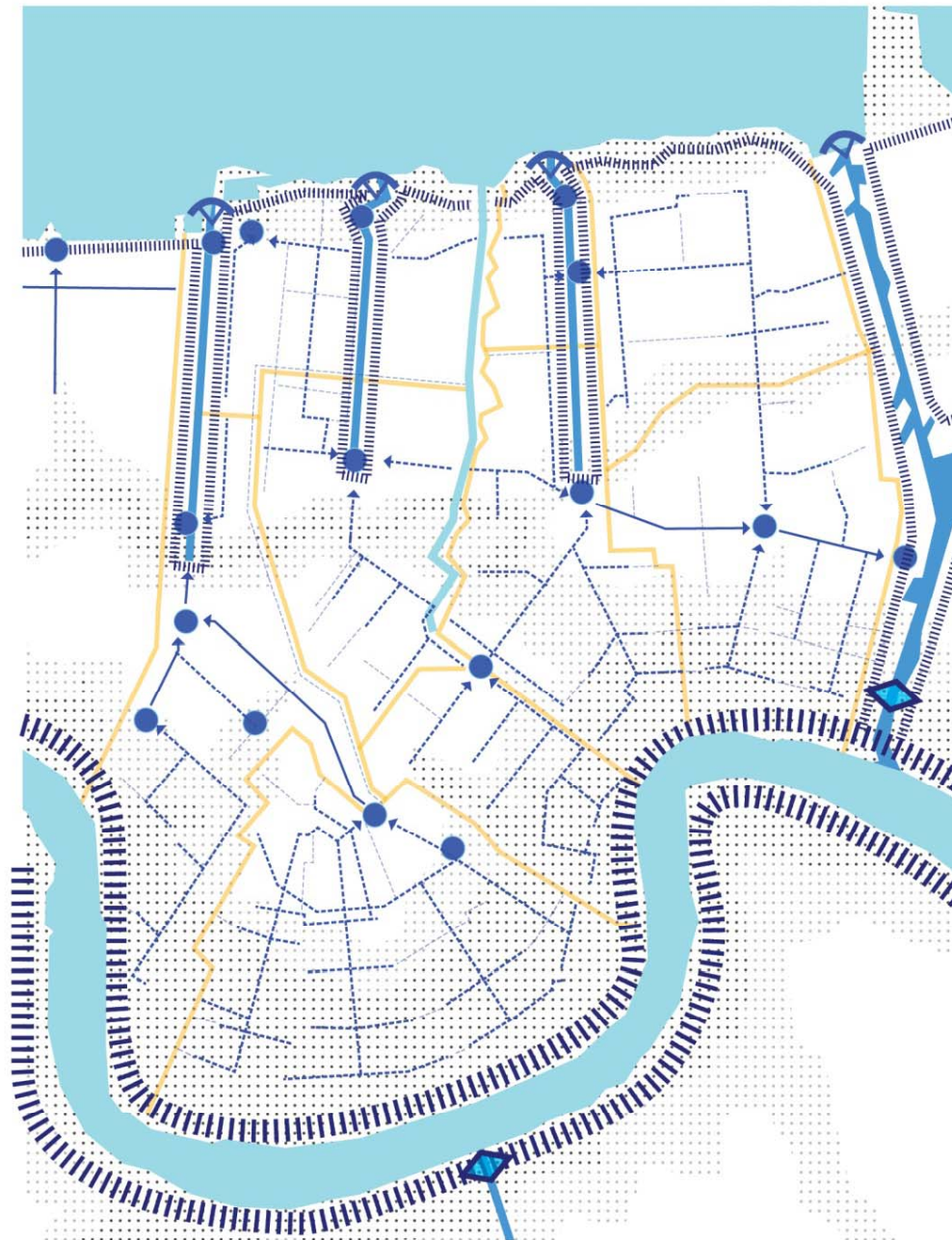


3) Lack of Sedimentation = Land Loss



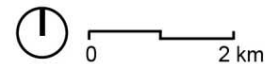
INCREASING INFRASTRUCTURE

Occupation + Infrastructure Layers



LEGEND

River Dike
Dike
Pump Station
Sluice / Lock
Floodgate
Outfall Canal
Open Canal
Underground Canal
Minor Underground Canal
Drainage Basin Boundary



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

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

HISTORICAL BAYOU

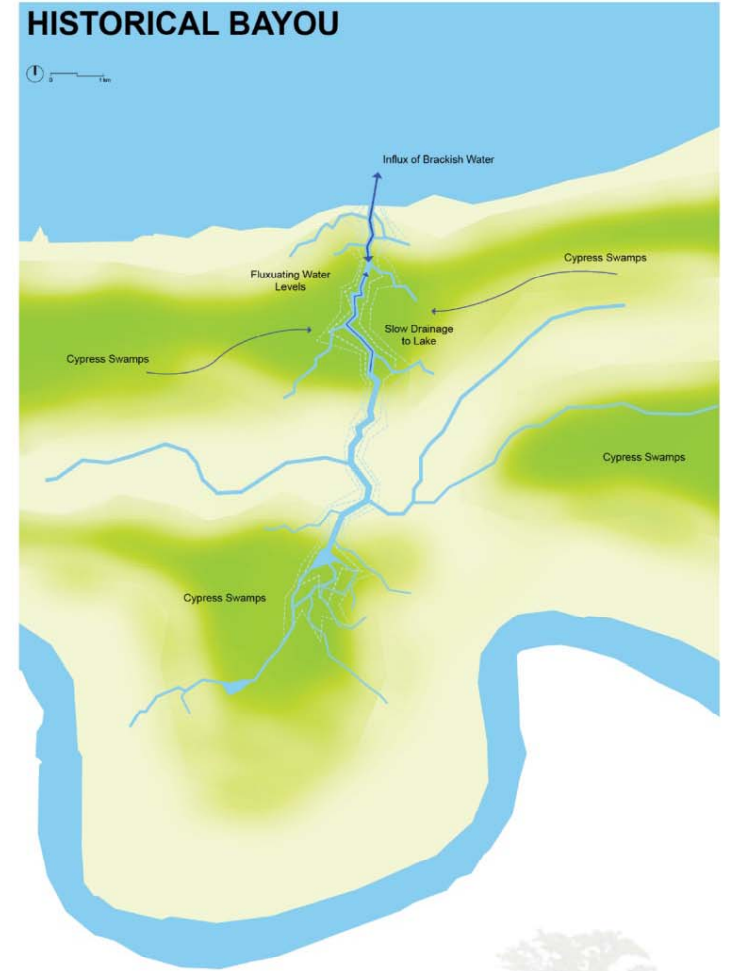
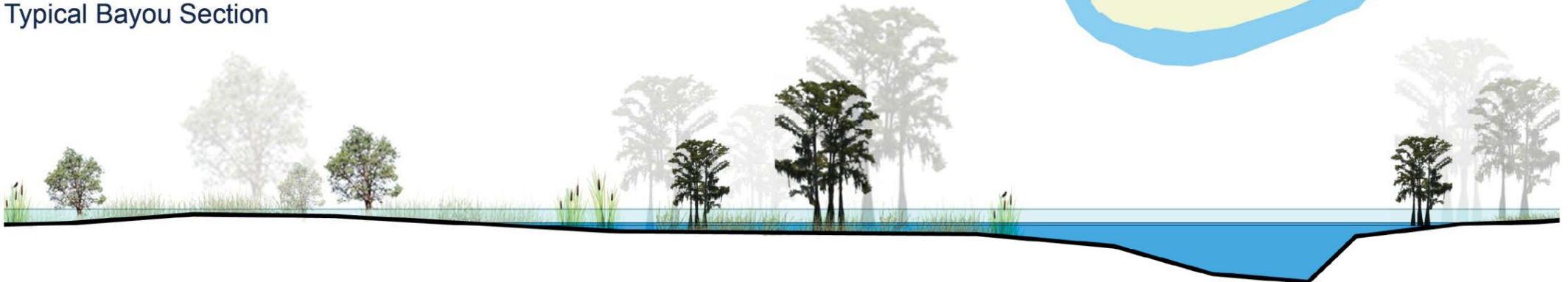
Natural Conditions: Space for Water & Slow Drainage

Bayou Landscape



Bayou = water typically found in flat, low-lying areas, either a very slow moving stream with poorly defined shoreline or a marshy lake or wetland

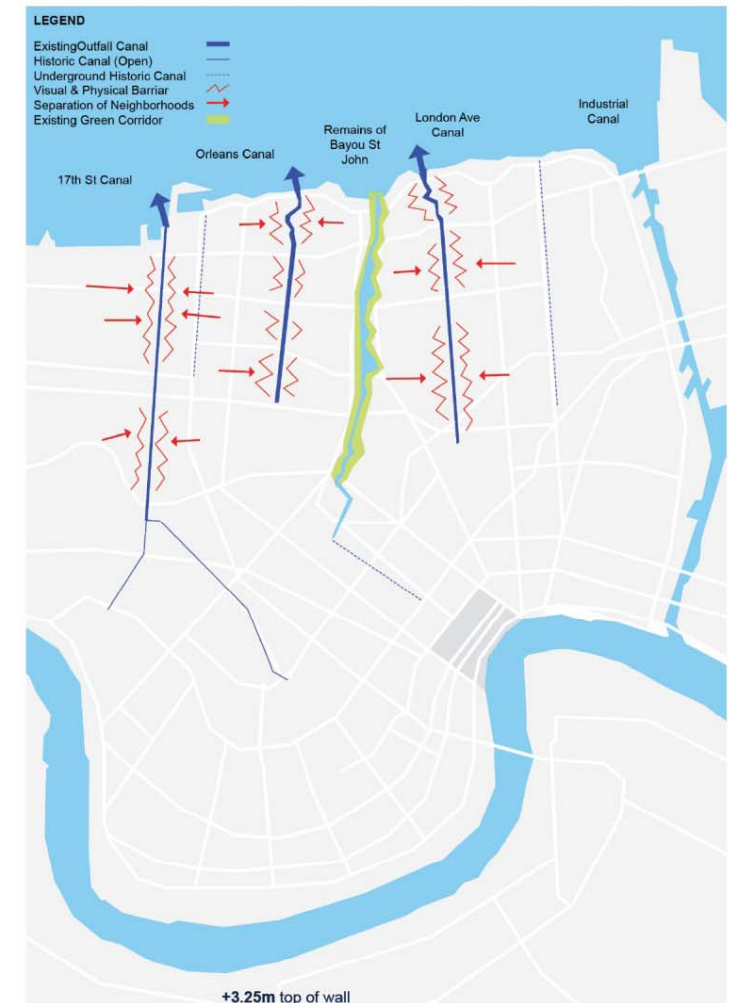
Typical Bayou Section



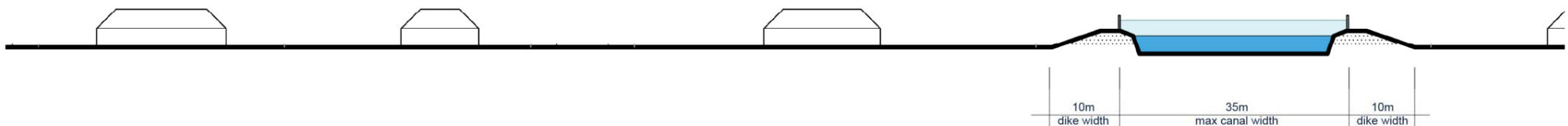
EXISTING CANALS

Disconnection from & Concealing of Water System

Outfall Canals



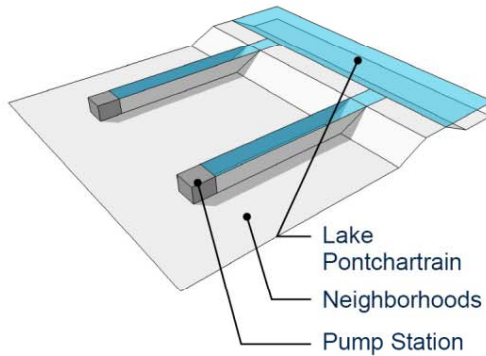
Typical Outfall Canal Section



OUTFALL CANAL OPTIONS

Re-Connecting City & Water

Existing Situation



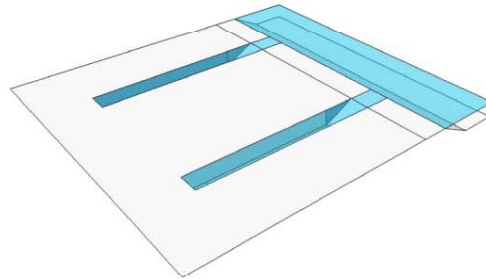
+ direct at-grade connection from canal to lake

- canals create barriers to neighborhoods

- canals prone to flooding

- poorly constructed flood walls

Option 1: Raise Land



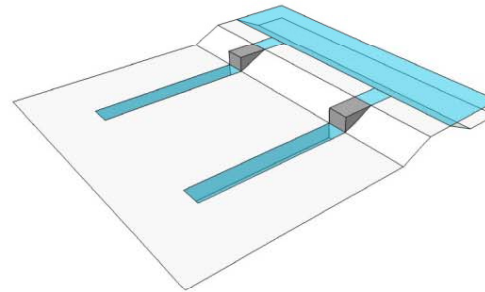
+ direct at-grade connection from canal to lake

+ 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

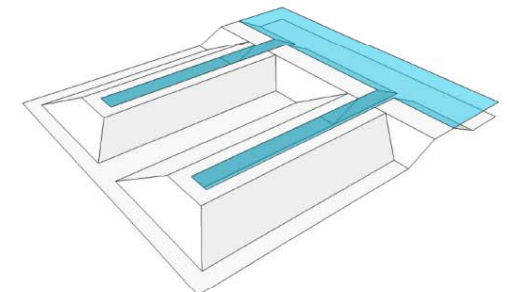


- no longer direct at-grade connection from canal to lake

+ 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

PROPOSED CANALS

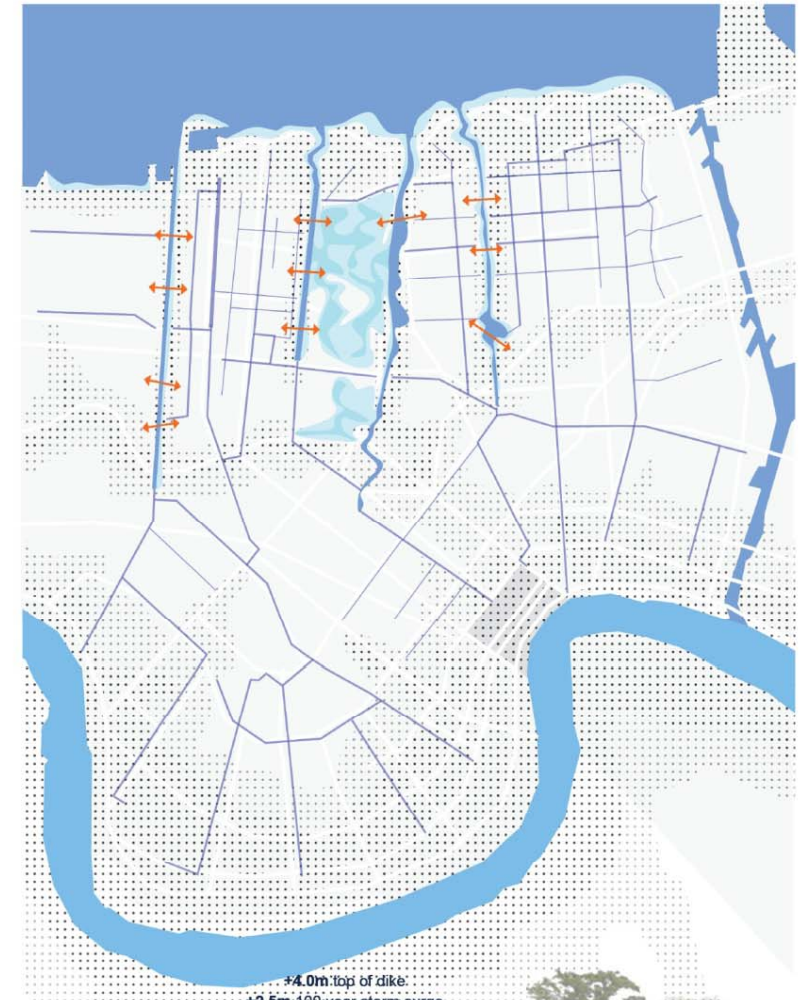
The Urbanized Bayou

Height of “Super Levee” Living with Water
Things to Consider:

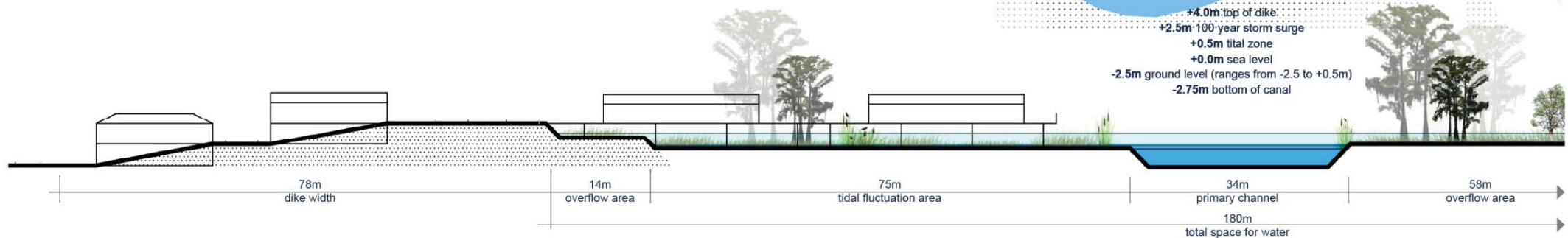
Storm Surge - Hurricane Katrina
(+/- 100 year storm) west shore
of Lake Pontchartrain = +1.5 to
+3m

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

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



Proposed Outfall Canal Section



URBAN WATER CYCLE

Separating the Threats: Rain Water / Storm Surge



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

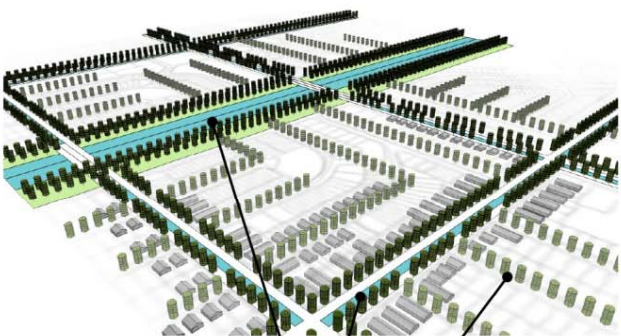
swamps, cypress forests



A NEW CITY STRUCTURE

Streets & Open Space Hierarchy

Typical Hierarchy



- 1. Typical Urban Bayou
- 2. Boulevard Canal Street
- 3. Neighborhood Swale Street

1. Urban Bayou



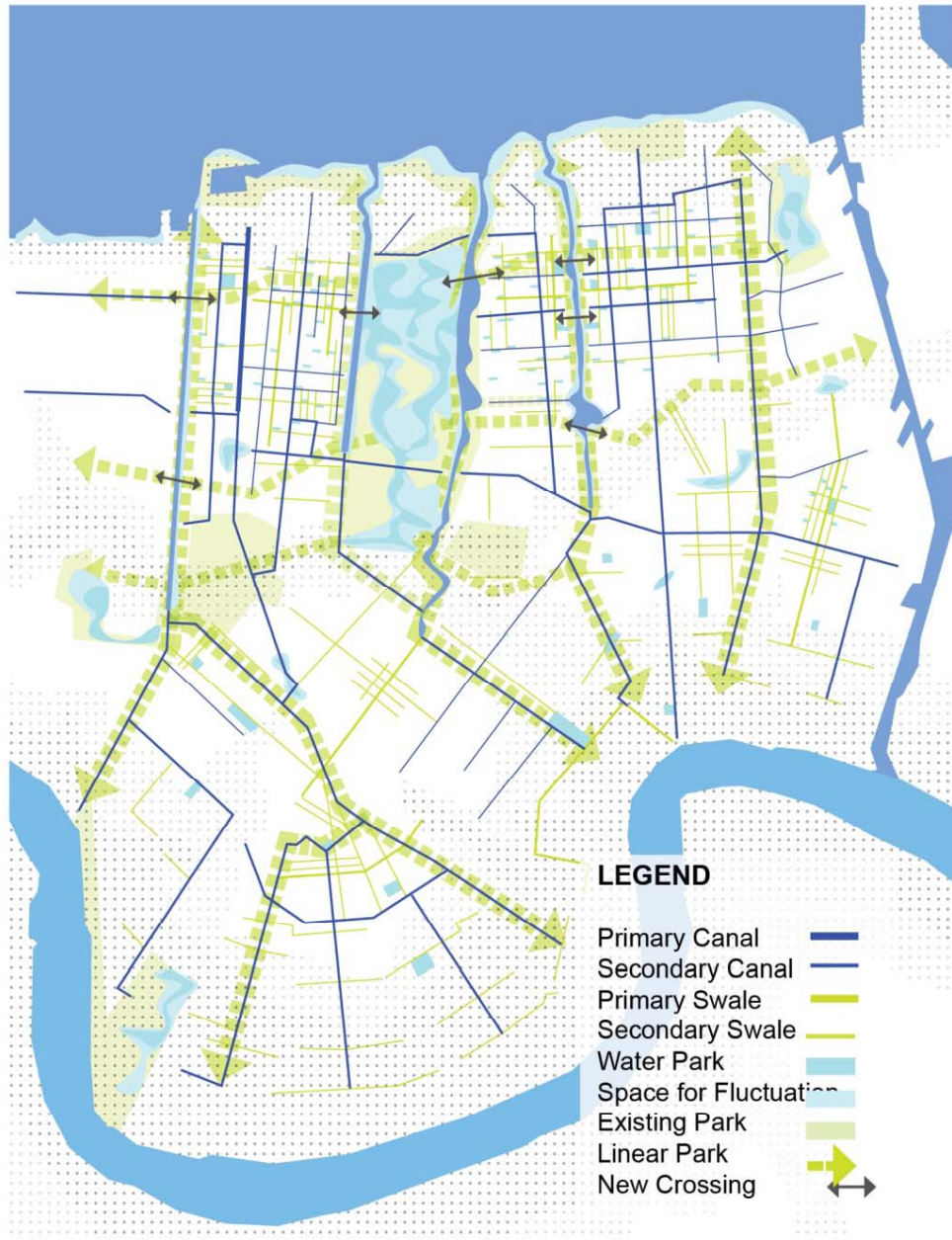
2. Boulevard Canal Street



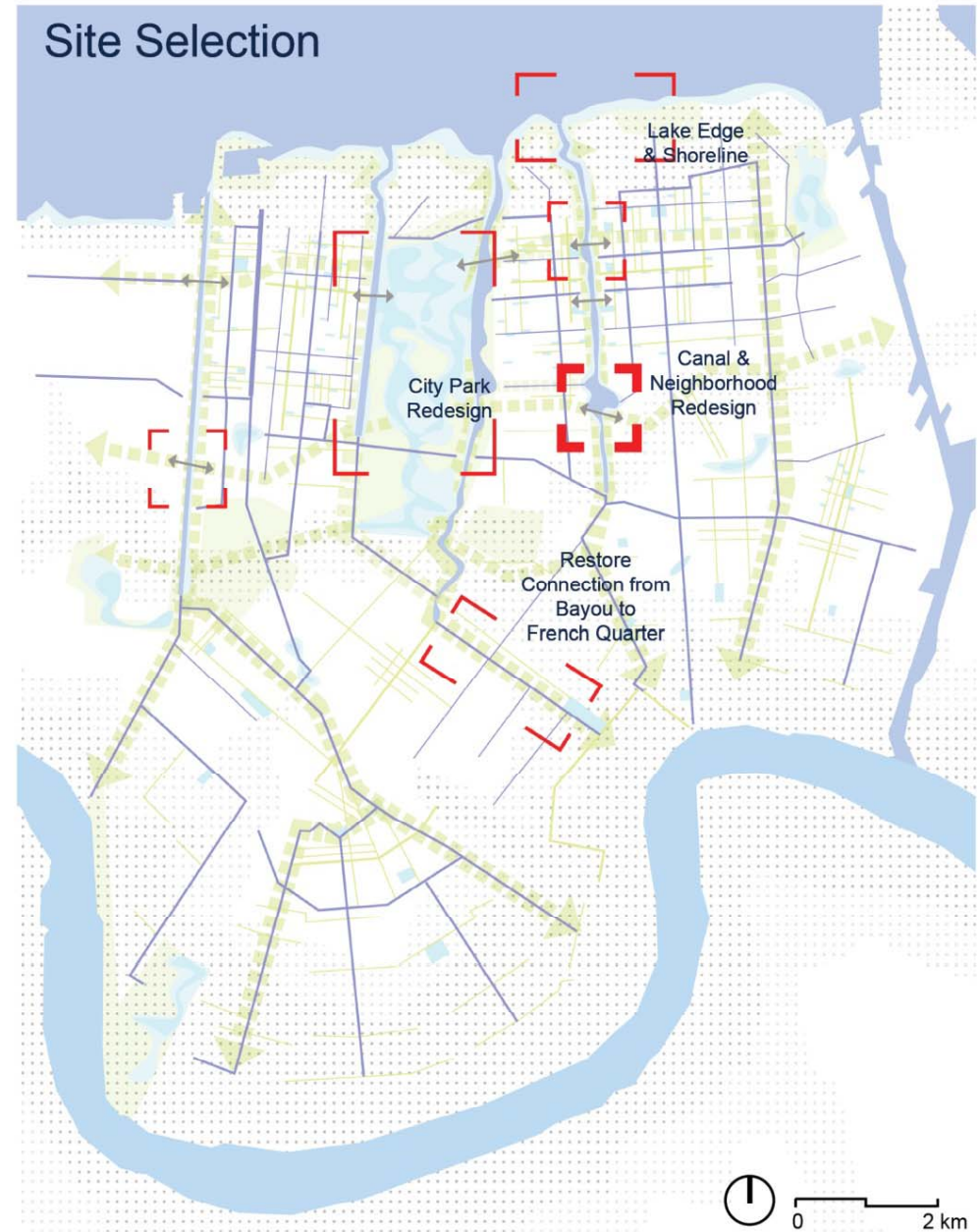
3. Neighborhood Swale Street



A NEW CITY STRUCTURE

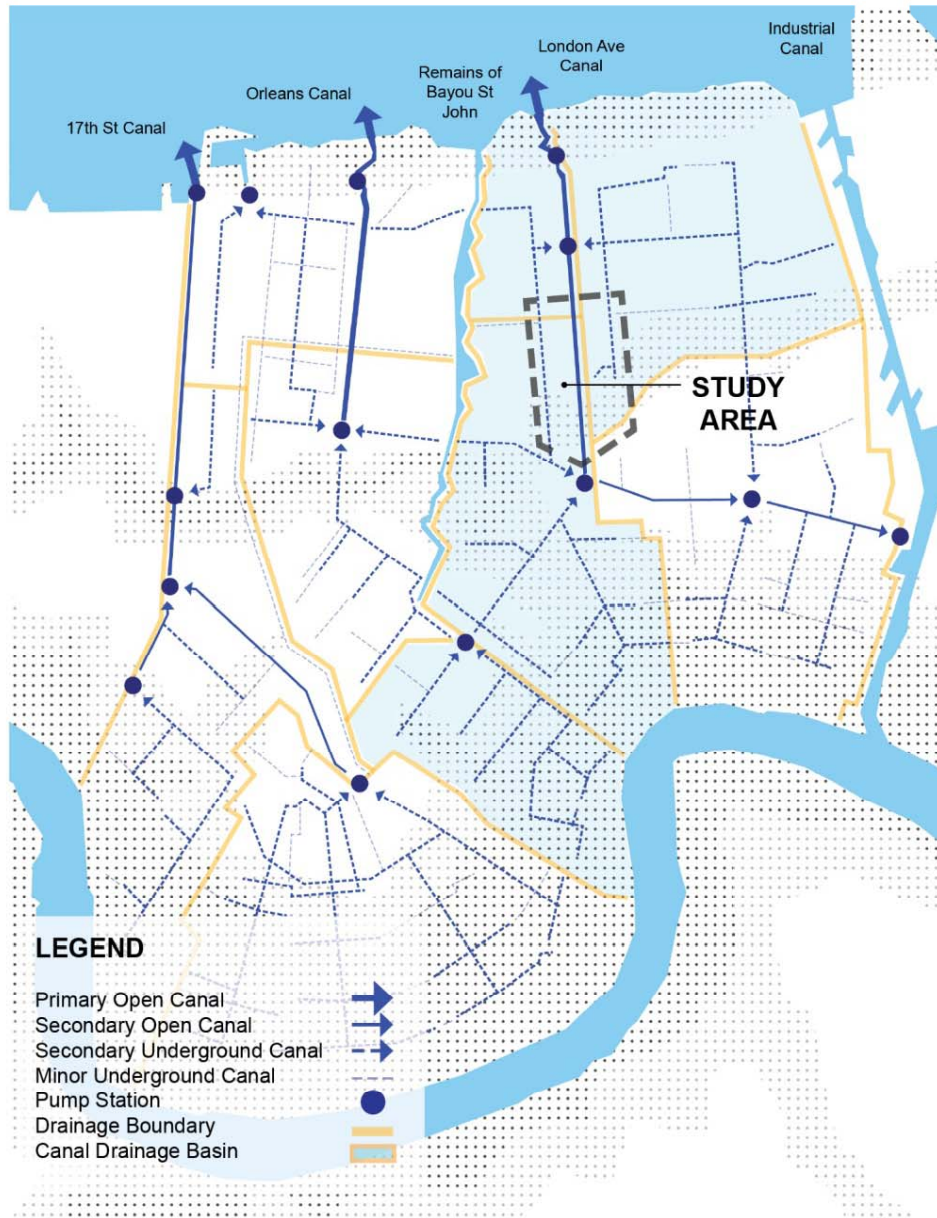


STRATEGIC PROJECTS



STRATEGIC PROJECT

Relation to Water System



Position in the City

Relation to Urban Structures

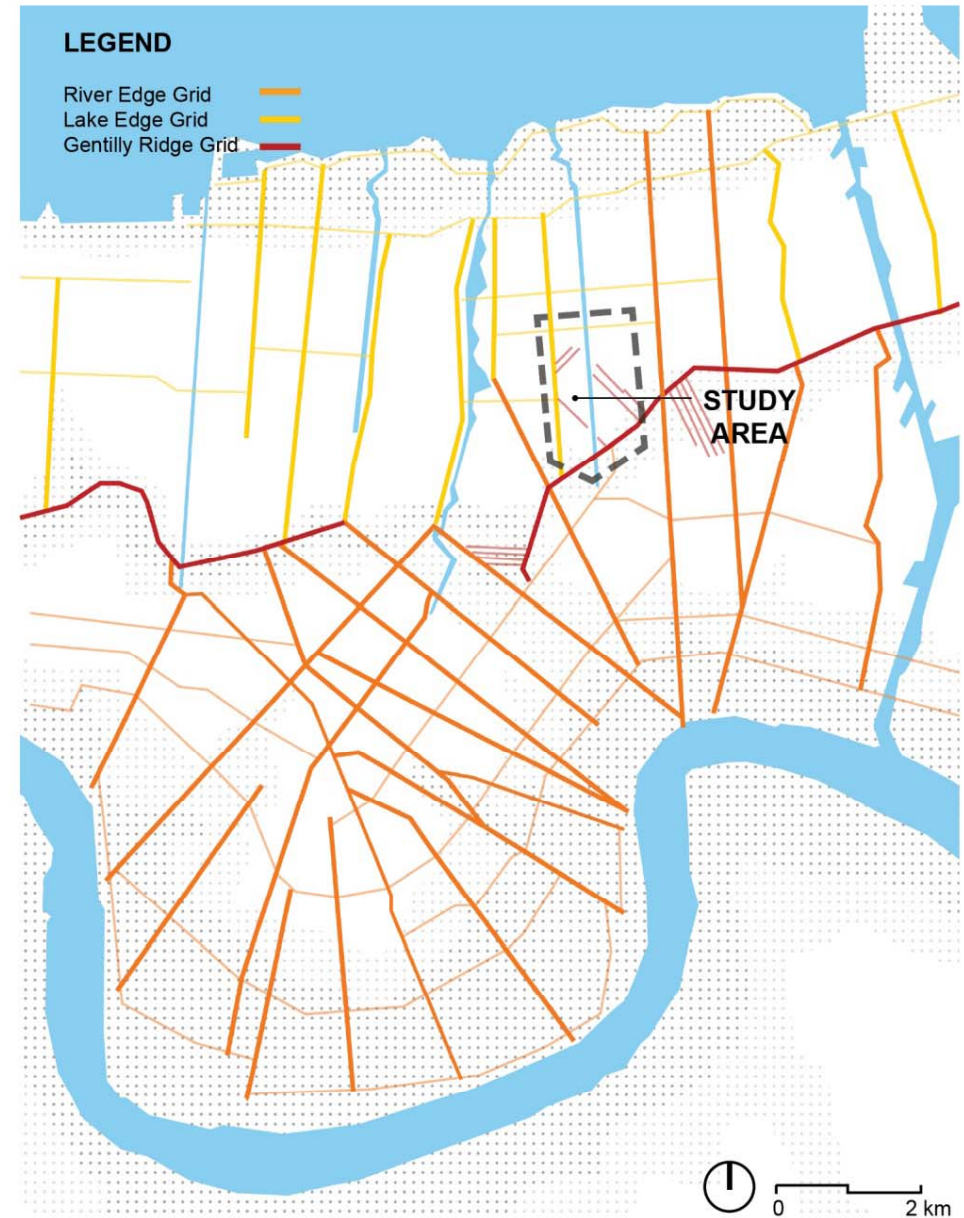
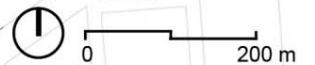
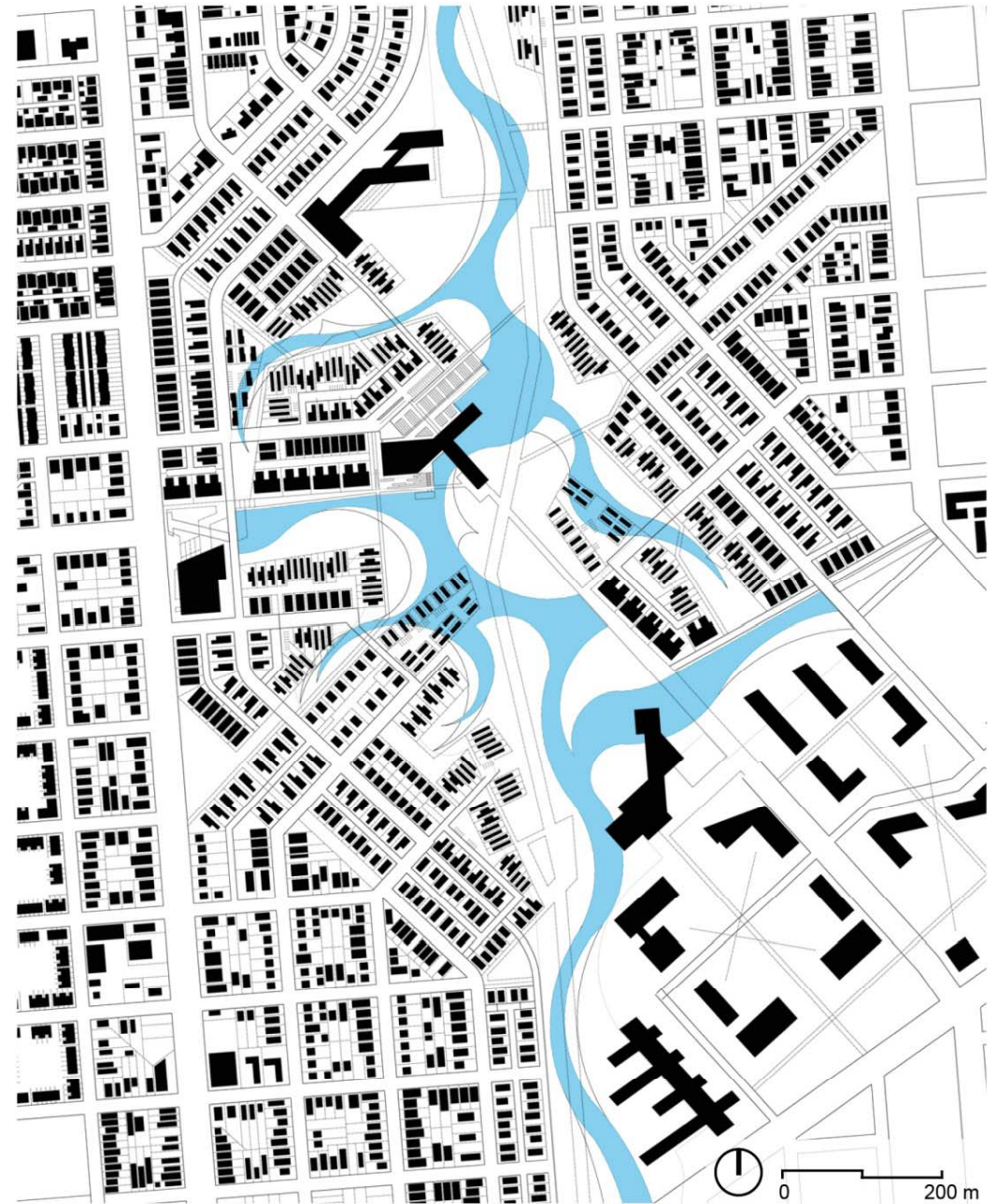


FIGURE GROUND

Existing



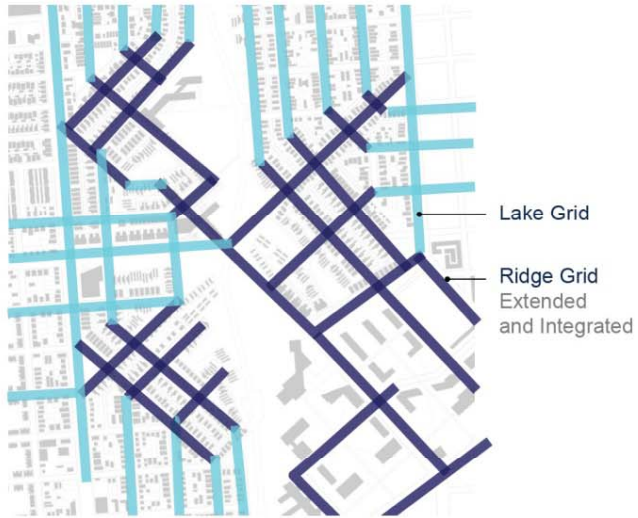
Proposed



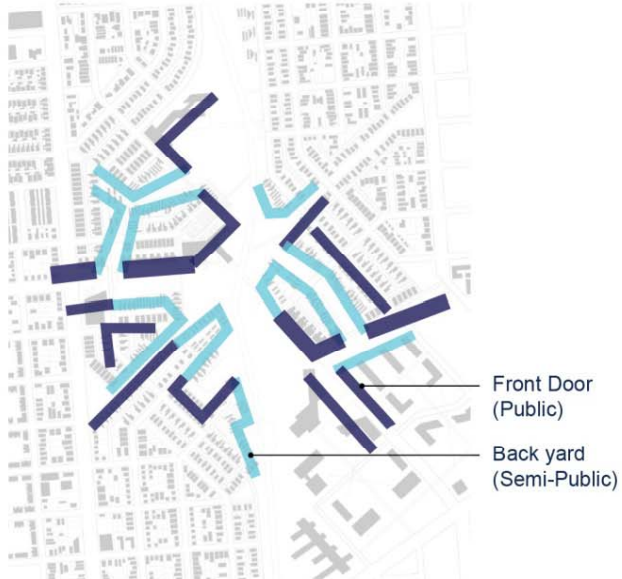
MASTER PLAN

CONCEPTS

Merging Grids



Front vs Back Yards



Boulevard Canal
Neighborhood Access
School

Bayou Landscape

Cultural Center

Mixed-Use Retail

Neighborhood Park

Dillard University

Bayou Trail

Typical Water Level

Tidal Zone

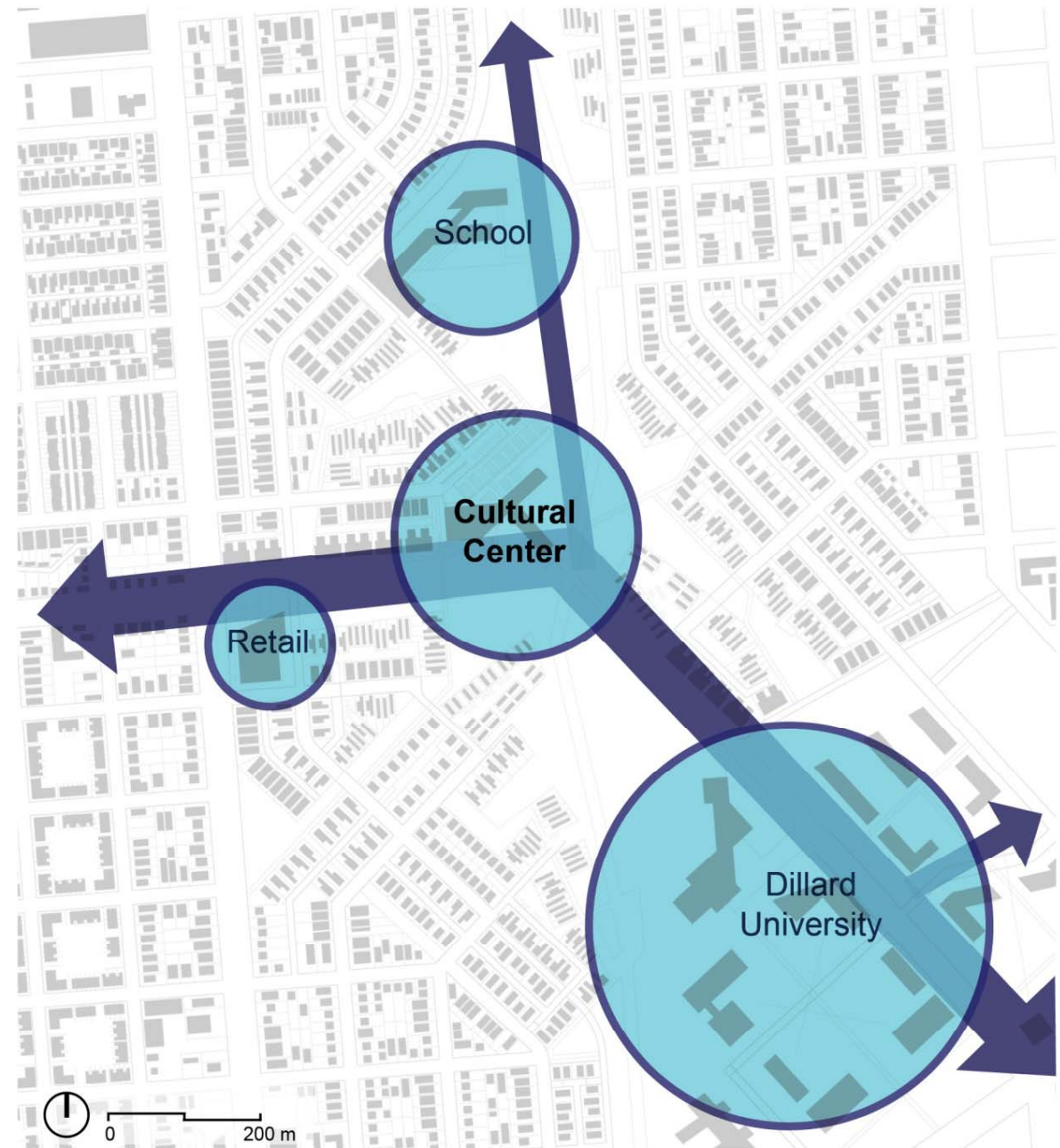


MASTER PLAN

Concepts

Hinge

Connecting Key Community
Buildings



MASTER PLAN

Water Network

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



Canal Overflow

Water Storage Park

Super Levee

Bayou Overflow

Water Garden

Drainage

Water Storage Park

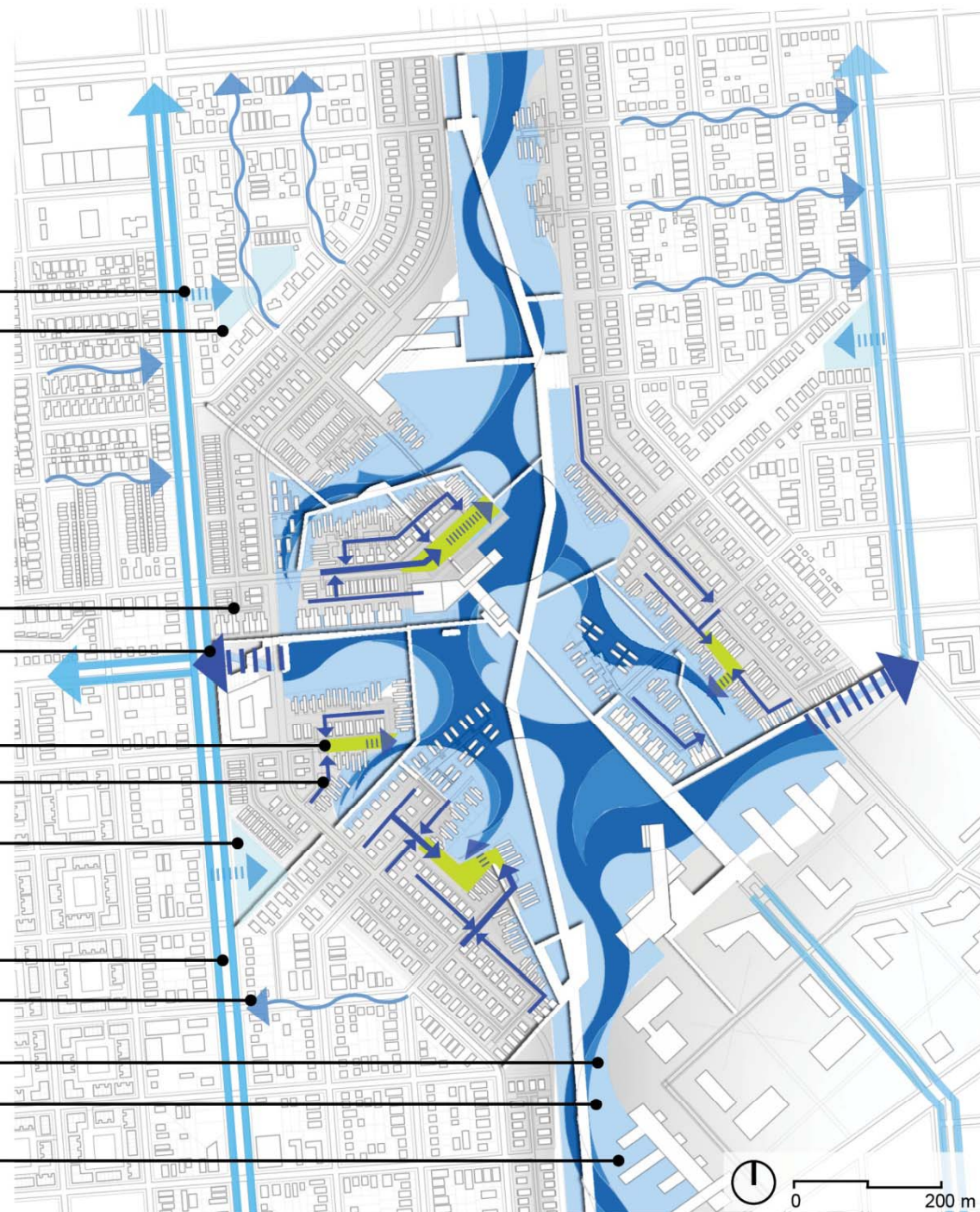
Boulevard Canal

Swale Street

Tidal Zone

Typical Water Level

Peak Flood Level



MASTER PLAN

Open Space

LEGEND

Existing Boulevard Corridor
Bayou Corridor
Primary Pedestrian Path
Neighborhood Pedestrian Path



Natural Landscape
Public Space
Semi-Private Space



Bayou Landscape

Bayou Corridor

Boulevard Corridor

Pedestrian Path

Public Space

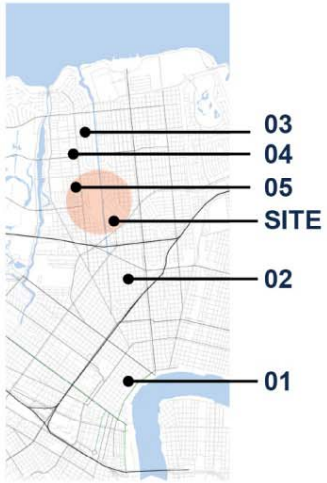
Neighborhood Path

Semi-Public Space

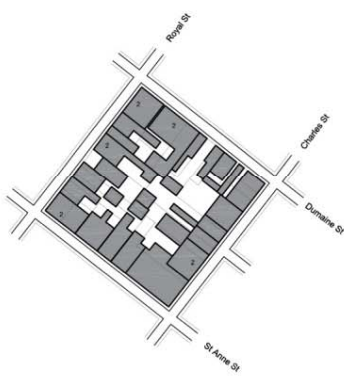


BLOCK TYPOLOGIES: THE *EXISTING* URBAN FABRIC OF NEW ORLEANS

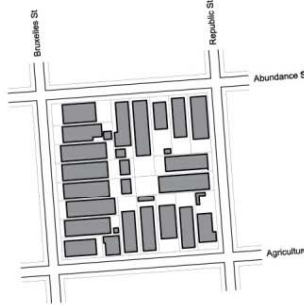
Key Map



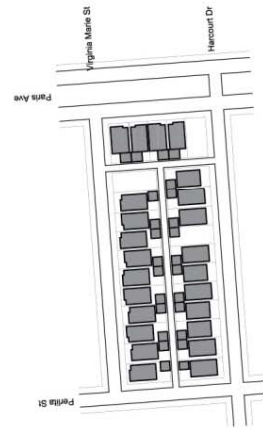
01 French Quarter



02 Mid-City



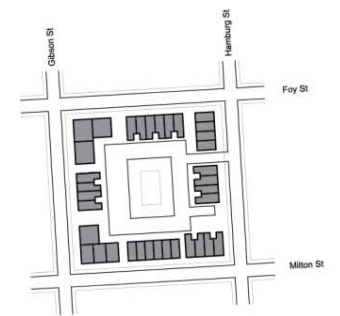
03 Dillard A



04 Dillard B

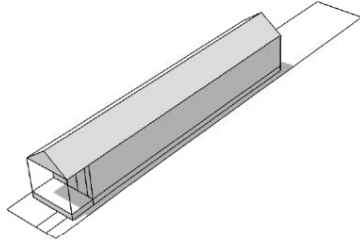


05 St Bernard

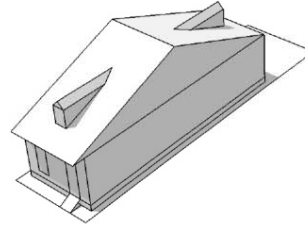


BUILDING TYPOLOGIES: THE *HISTORIC* URBAN FABRIC OF NEW ORLEANS

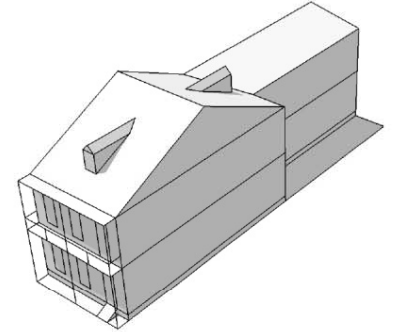
**Two-Bay
Shotgun**



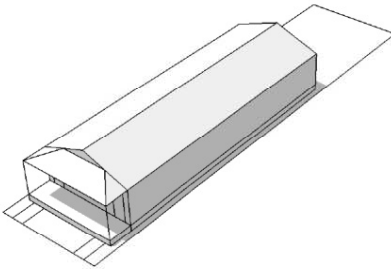
**Two-Bay
Creole
Cottage**



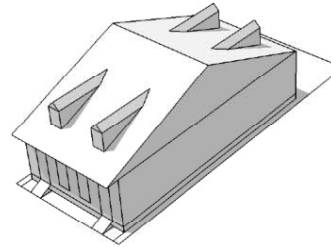
**Three-Bay
Creole
Townhome**



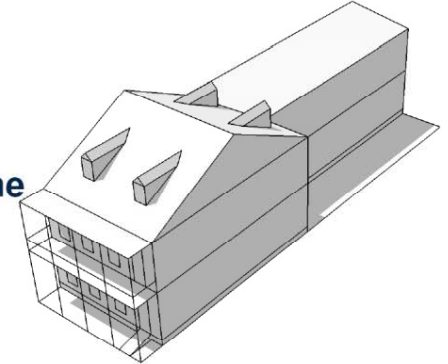
**Four-Bay
Shotgun**



**Four-Bay
Creole
Cottage**



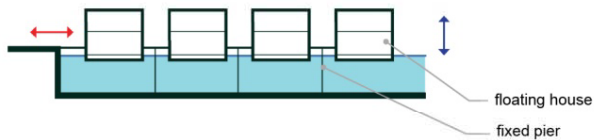
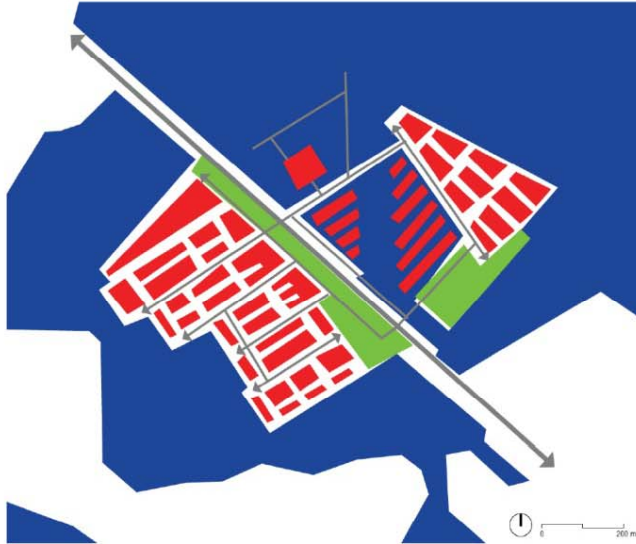
**Four-Bay
Creole
Townhome**



CASE STUDIES (Districts & Water)

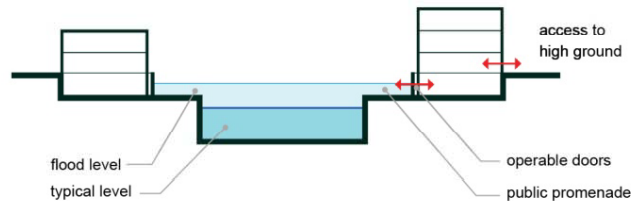
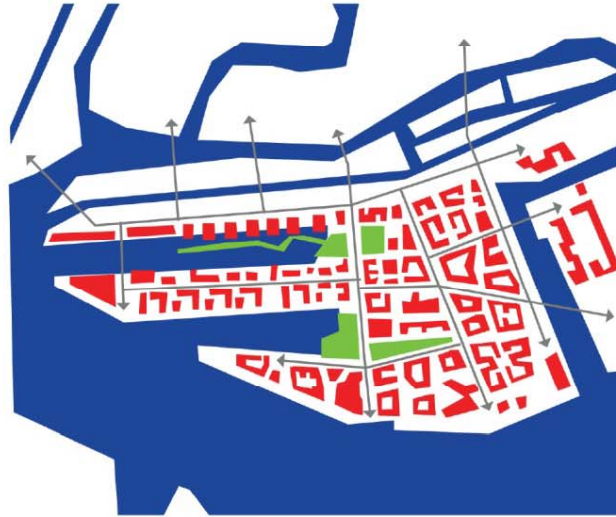
AMSTERDAM, Steigereiland

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



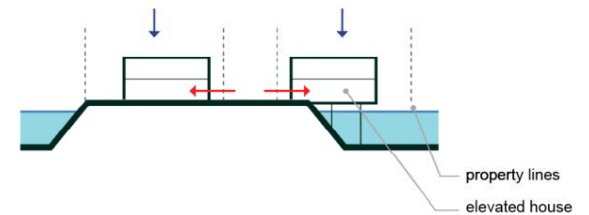
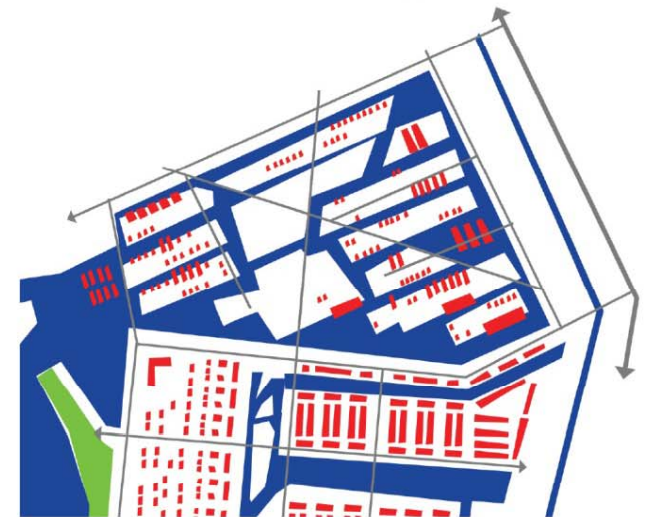
HAMBURG, HafenCity

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



ROTTERDAM, Nesseland

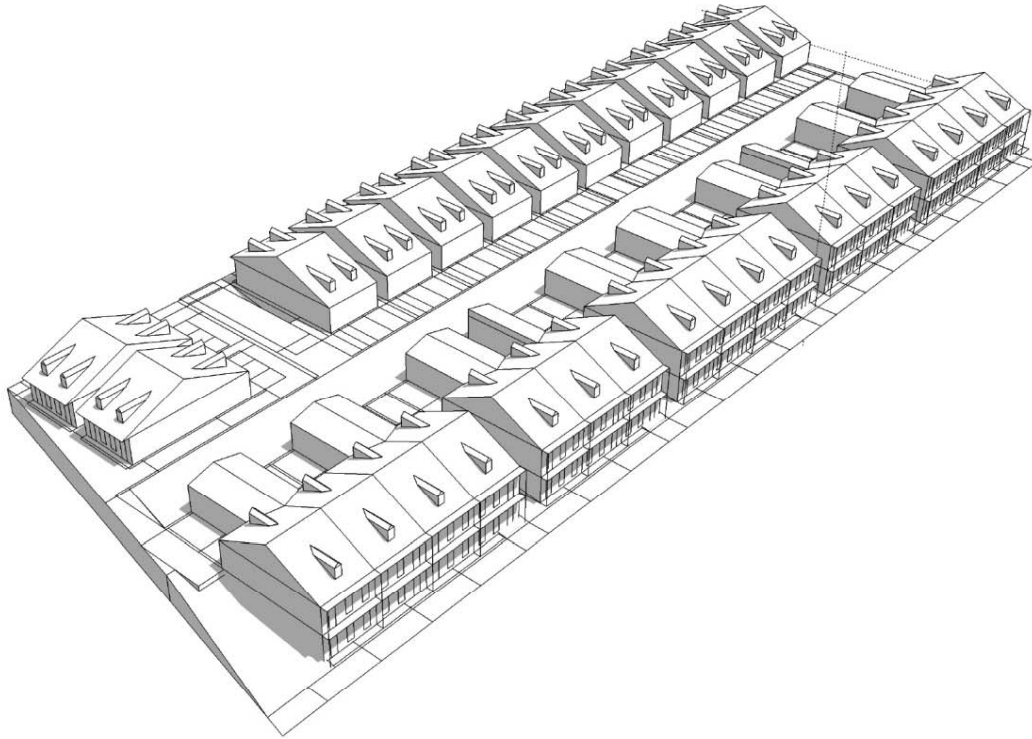
- medium and low density development
- individual parcels responsible for addressing water storage, variety of responses: elevated, floating, on land



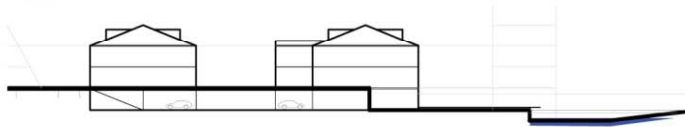
BLOCK & BUILDING TYPES

Barrier Buildings

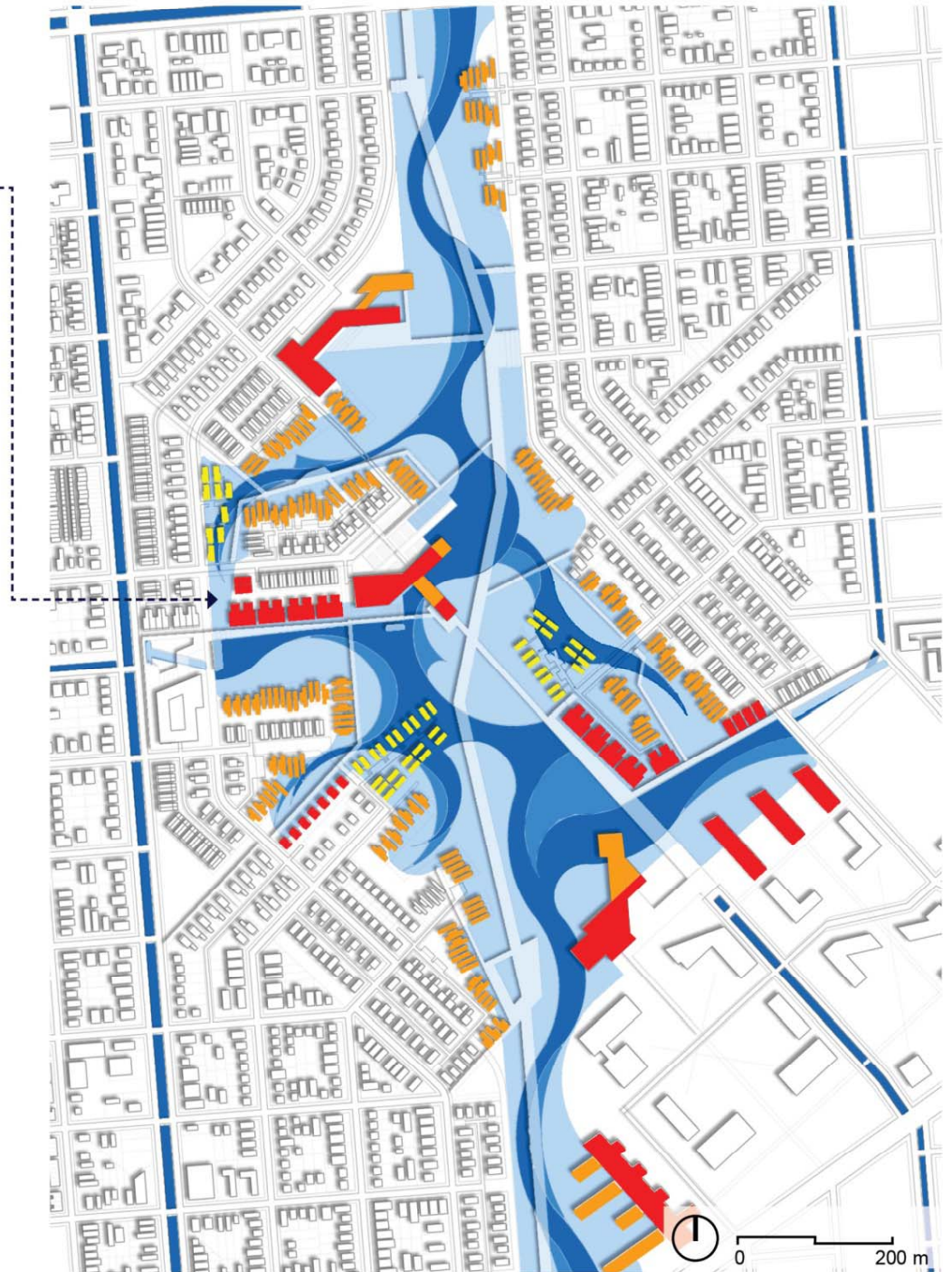
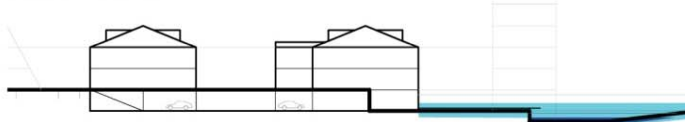
Water Edge Block (*Creole Townhouses*)



Typical Water



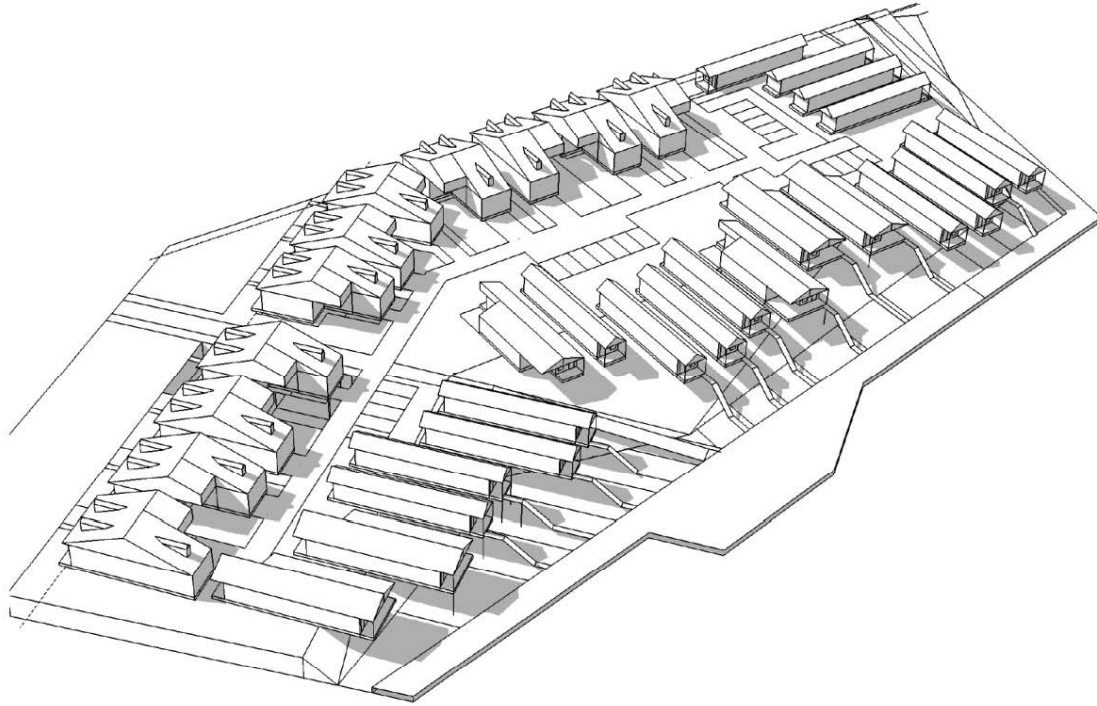
Max Water



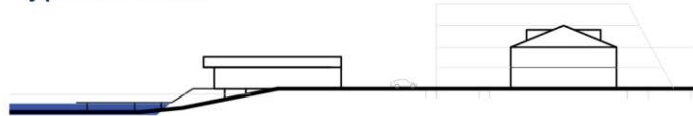
BLOCK & BUILDING TYPES

Elevated Buildings

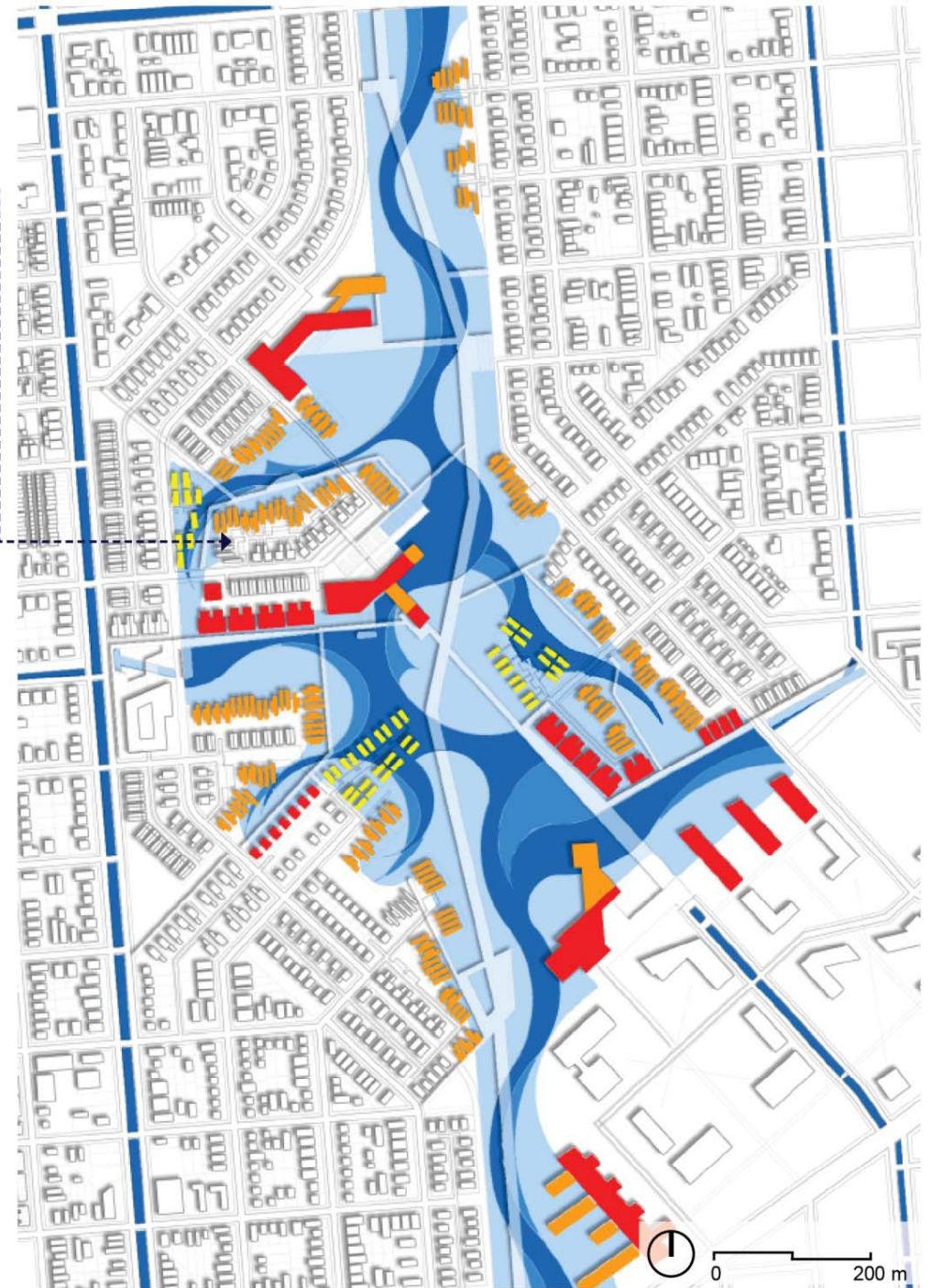
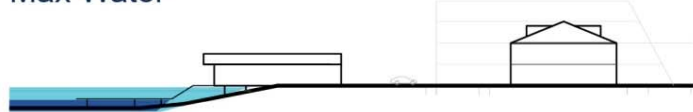
Elevated Alley Loaded Block (*Shotgun & Creole Cottages*)



Typical Water



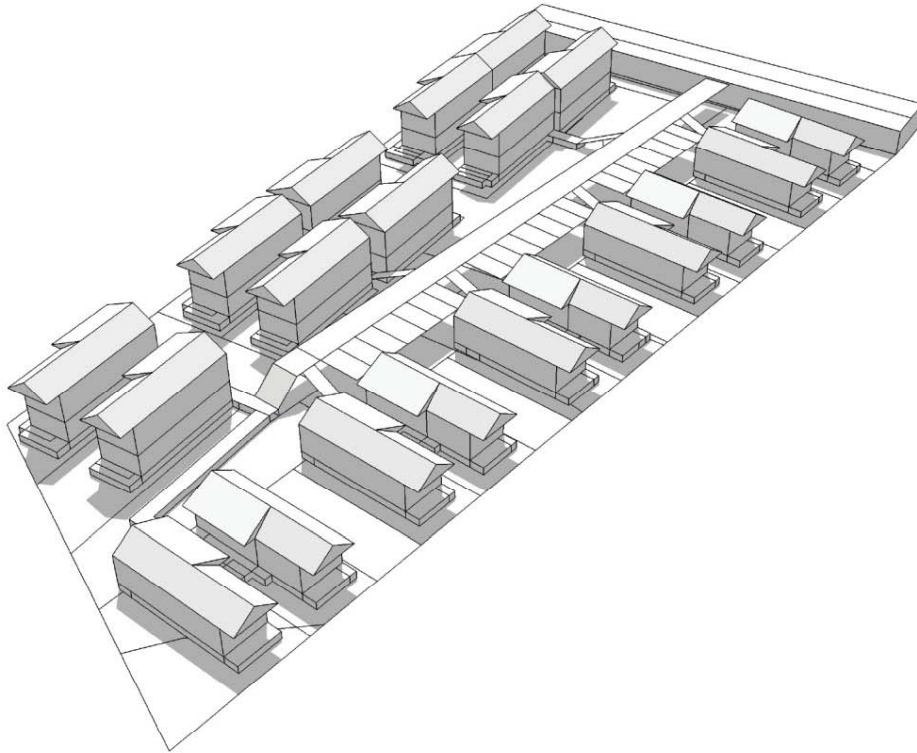
Max Water



BLOCK & BUILDING TYPES

Floating Buildings

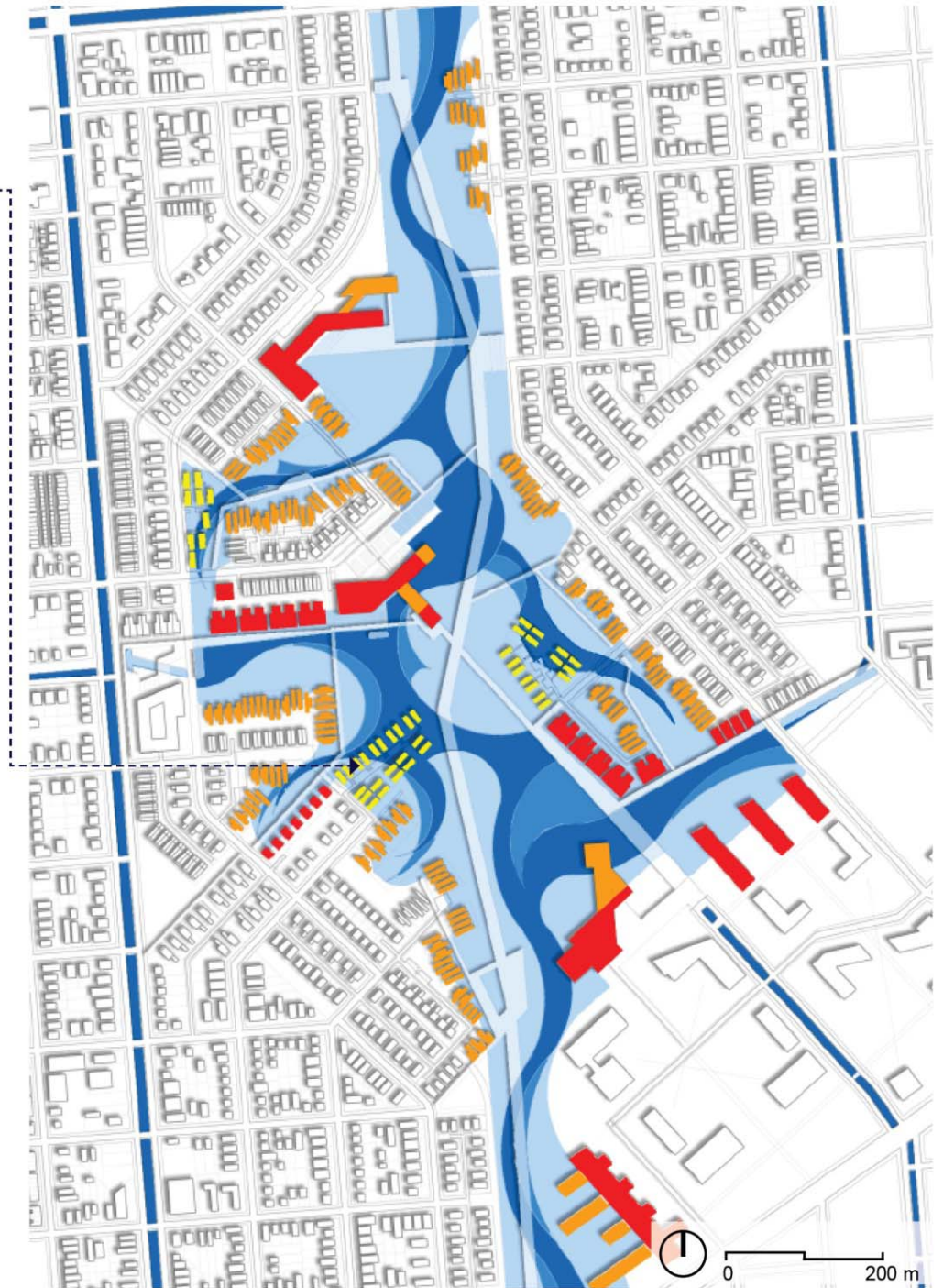
Floating Block (Creole Cottage Hybrid)



Typical Water



Max Water

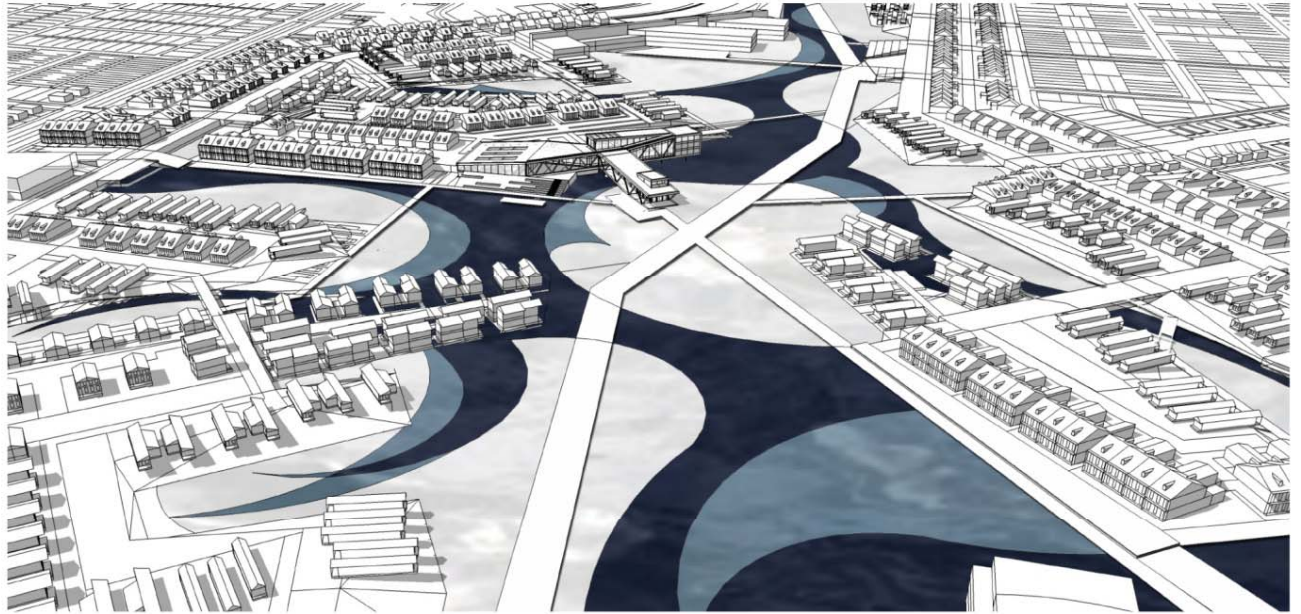


THE URBAN BAYOU: *Fluctuating Water*

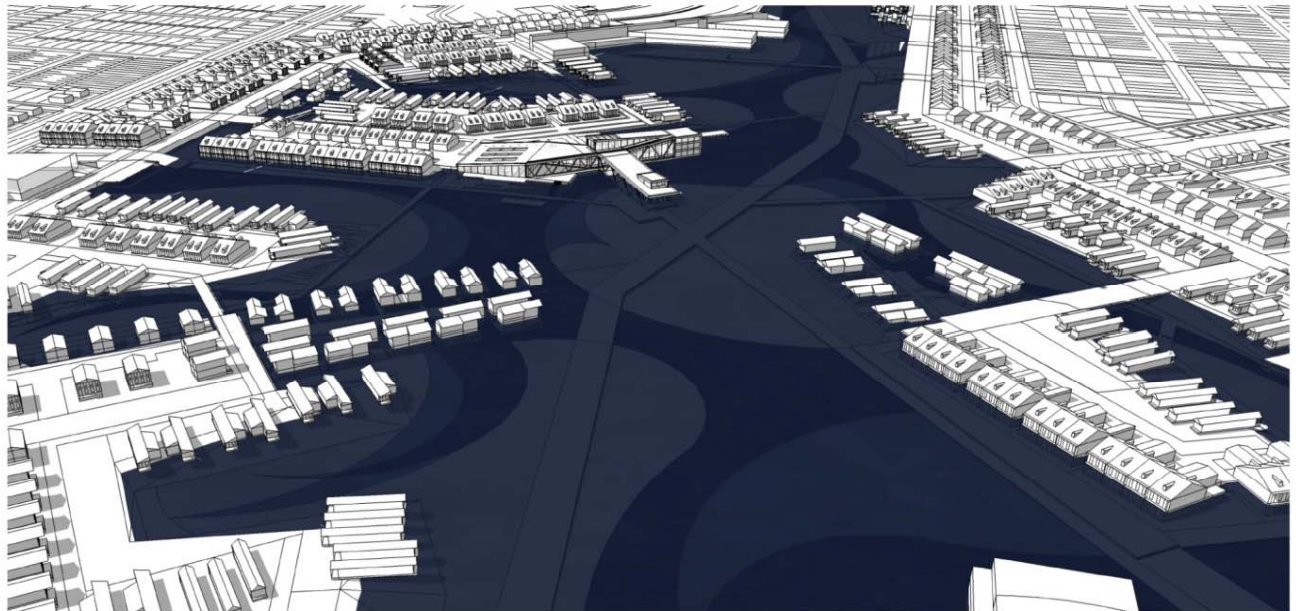
Key Map



Typical Water Level



Peak Water Level



THE URBAN BAYOU: *Neighborhood Views*

Front Door vs Back Yard / Hard vs Soft Edge



Community Gardens



KEY BUILDING IN THE DISTRICT: *Cultural Center*

OBJECTIVES, FUNCTIONS & CONCEPTS

1) COMMUNITY

A place to gather for educational, social and recreational activities

Respect local New Orleans traditions and values: Music & Food

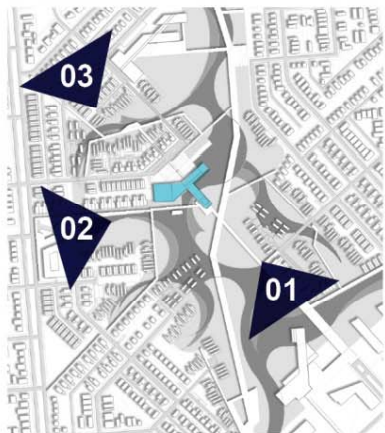
2) WATER EDUCATION

Information center showcasing new district and allowing residents to experience water

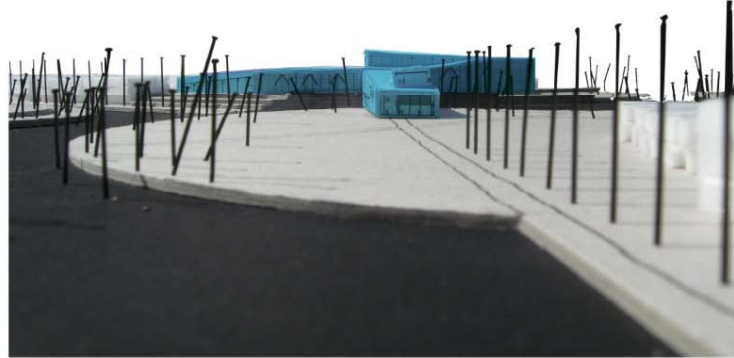
Building highlights ways of living with water & the bayou landscape

- Ability to tolerate dynamic water levels
- Rain water harvesting / gray water re-use
- Water for passive cooling

Key Map



01 Ridge Grid Approach



03 Community Side



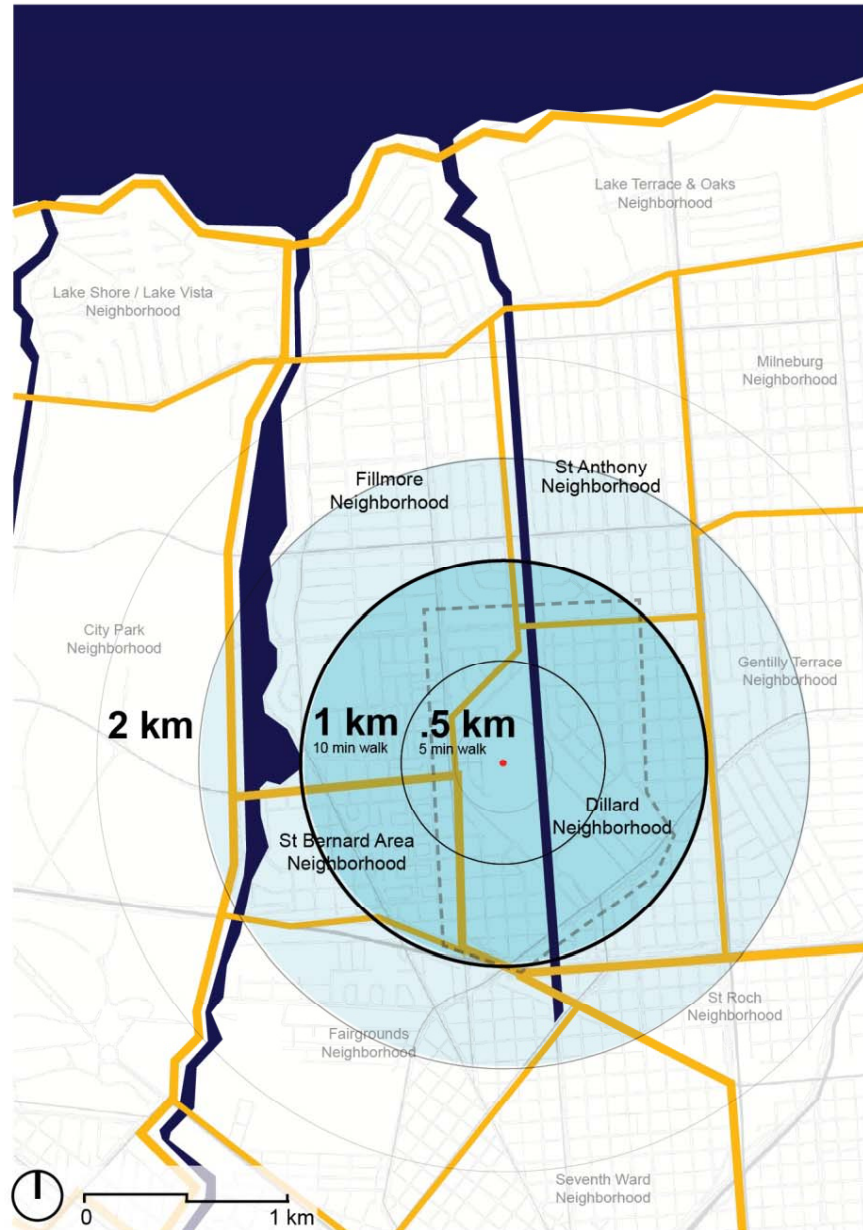
02 Lake Grid Approach



LOCATION IN THE COMMUNITY

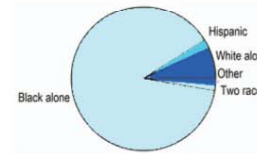
Site Context

BUILDING ACCESS



NEIGHBORHOOD DEMOGRAPHICS

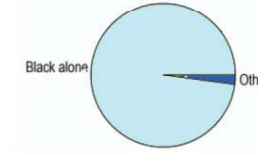
DILLARD:
Population (2008): 6,395
Area: 1.089 sq mi
Poverty: Medium
College Education: Low to Medium
Unemployment: Medium



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



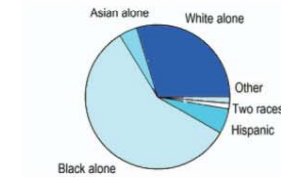
ST BERNARD AREA:
Population (2008): 6,564
Area: 0.429 sq mi
Poverty: High
College Education: Low to High
Unemployment: High



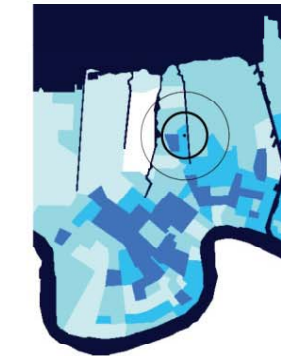
EDUCATION
0 - 10%
10 - 24
24 - 37.5
+37.5



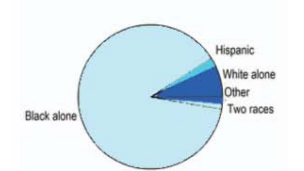
FILLMORE:
Population (2008): 6,940
Area: 1.413 sq mi
Poverty: Low
College Education: Medium to High
Unemployment: Low



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



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



BLACK ETHNICITY
0 - 25%
25 - 50
50 - 75
+75



NEW ORLEANS CULTURE & COMMUNITY

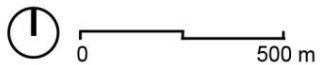
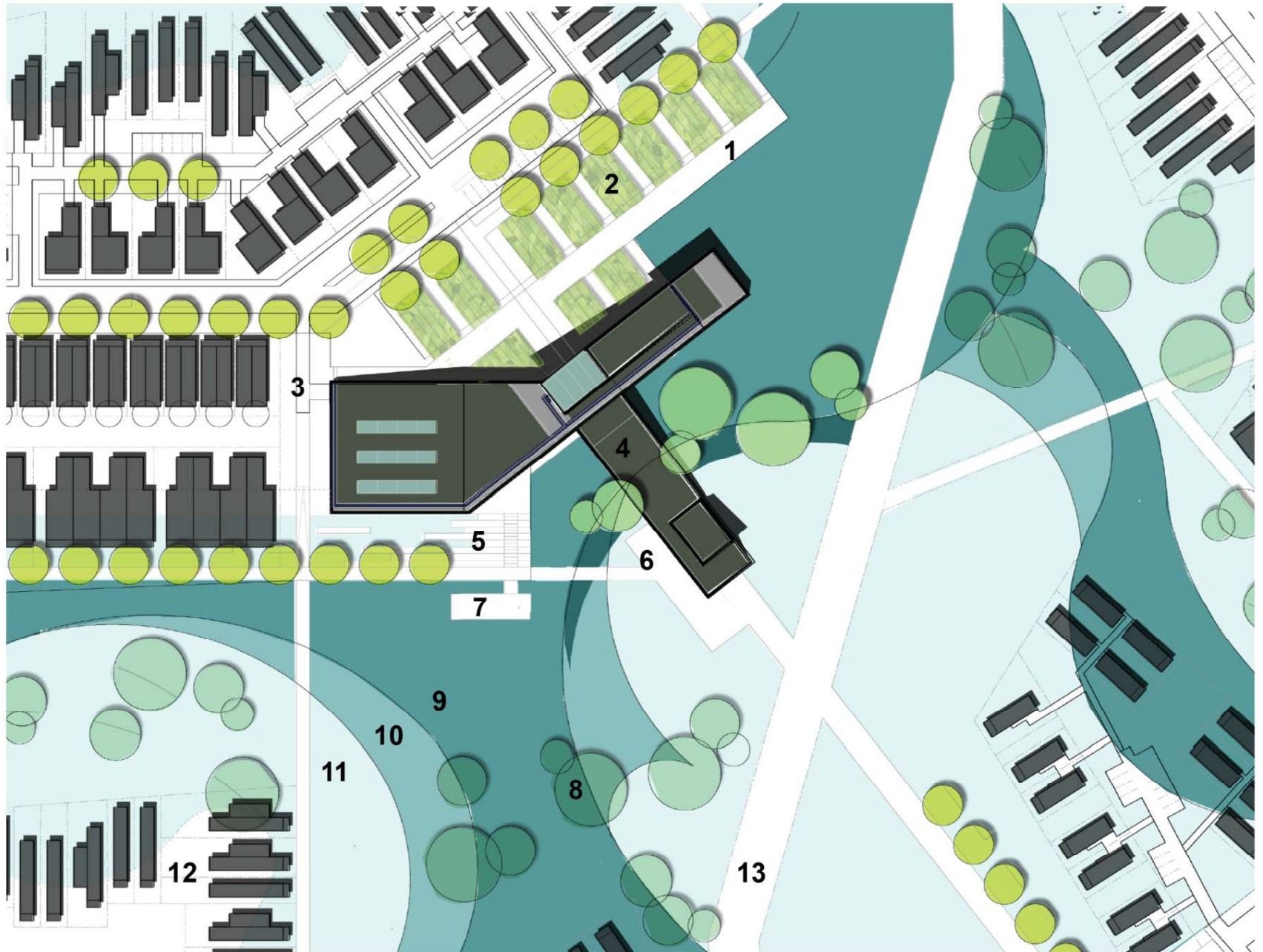


SITE PLAN

Key Map

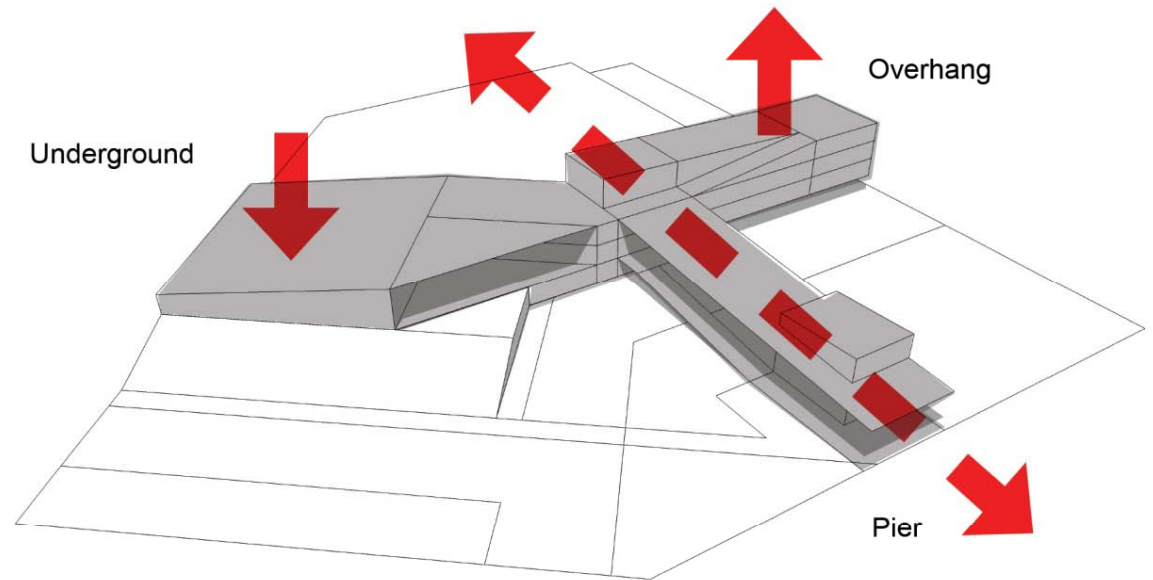


- 01 Boat Dock
- 02 Community Gardens
- 03 Parking Entrance
- 04 Nature Bridge
- 05 Landscape Terrace
- 06 Cafe Seating
- 07 Floating Stage
- 08 Cypress Forests
- 09 Typical Water Level
- 10 Tidal Zones
- 11 Peak Flood Level
- 12 High Ground
- 13 Bayou Corridor Trail

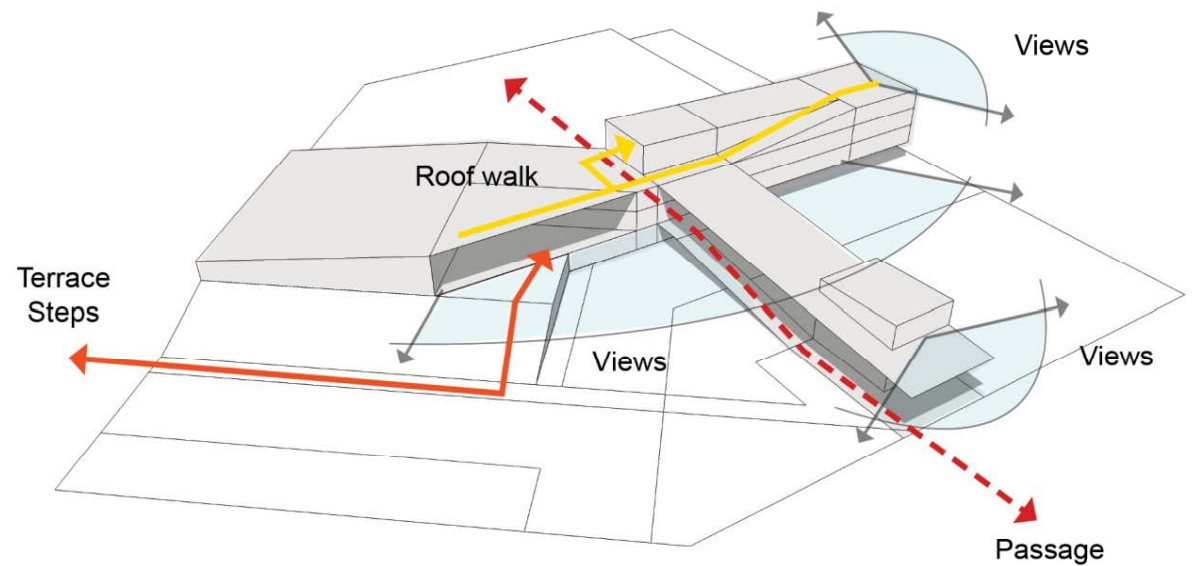


BUILDING CONCEPTS

TECTONICS

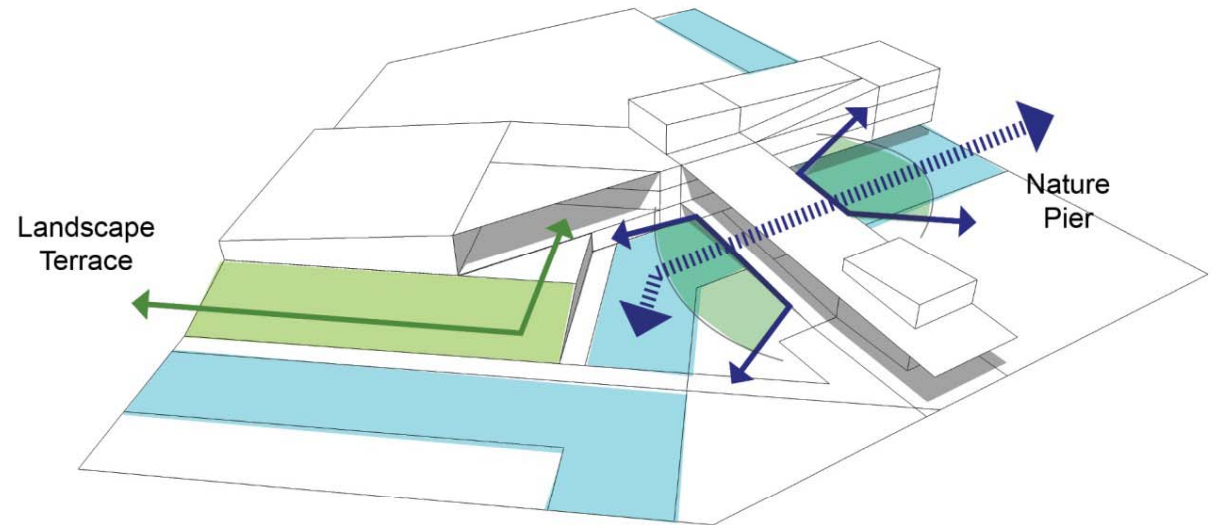


MOVEMENT & VIEWS

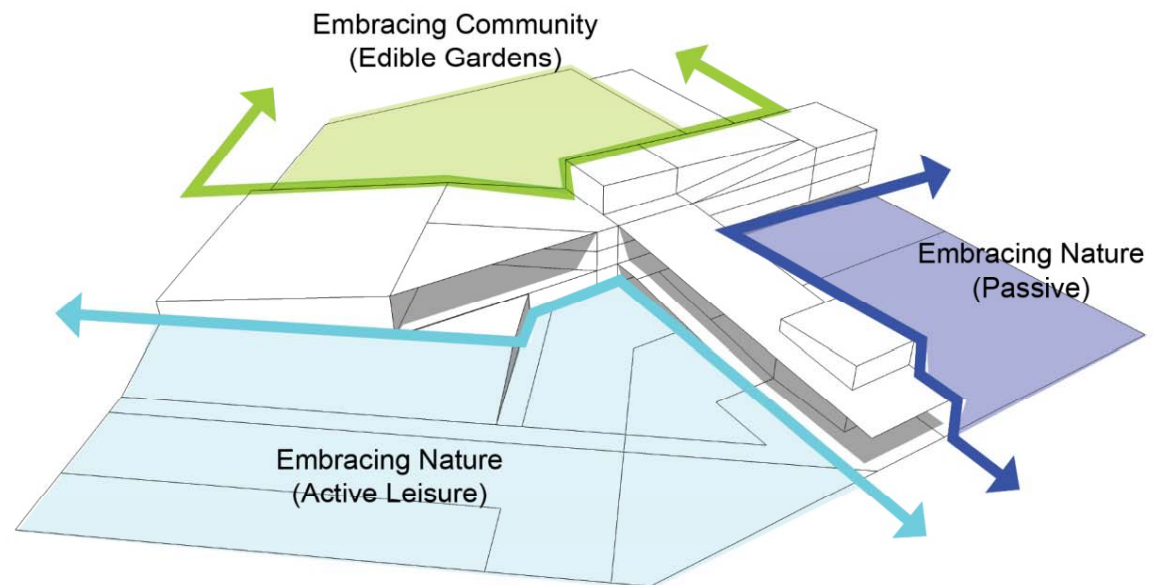


BUILDING CONCEPTS

LANDSCAPE



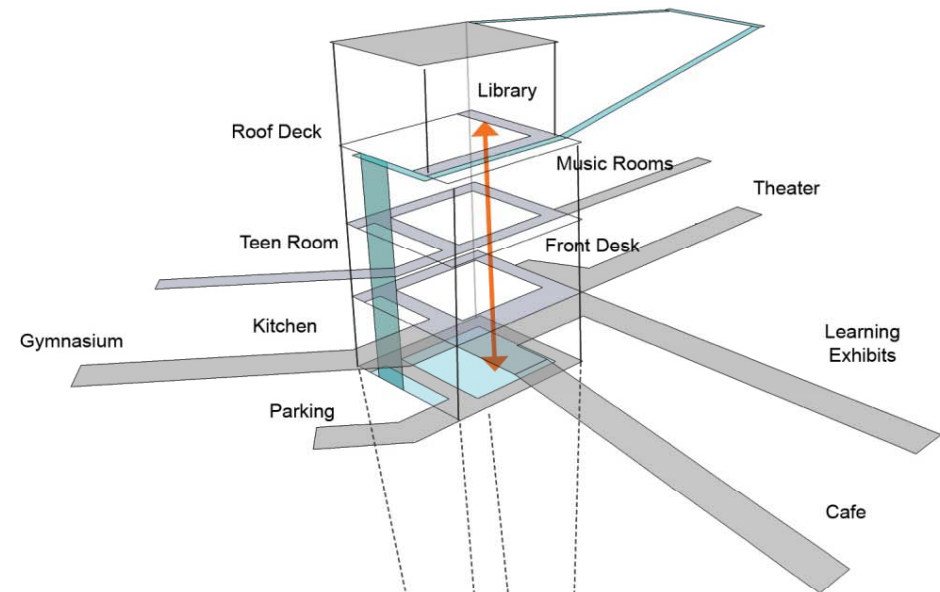
ZONES



BUILDING CONCEPTS

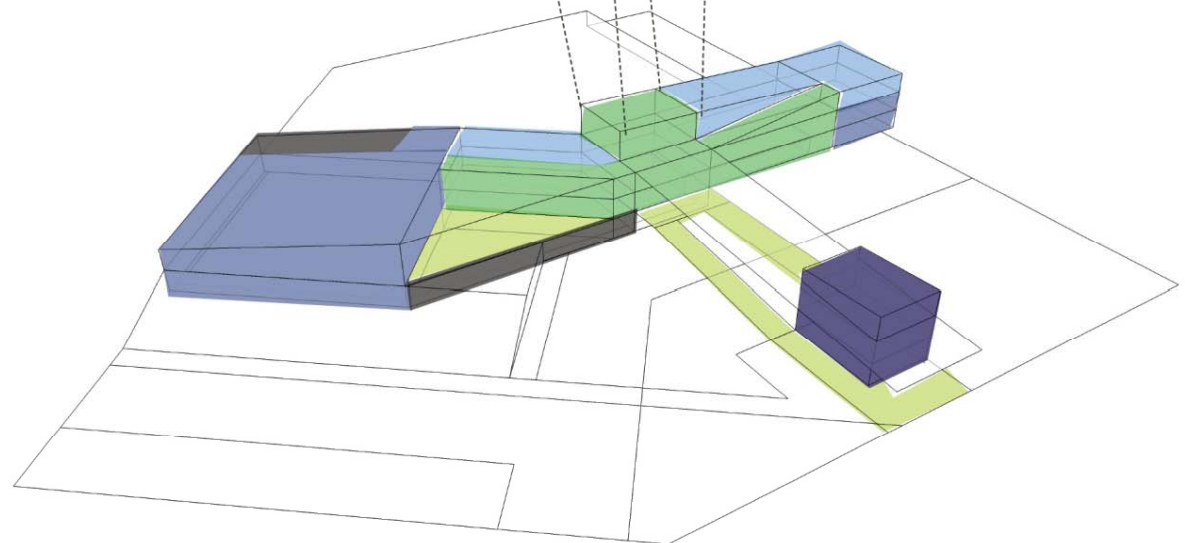
ATRIUM

Central Circulation & Pivot Point



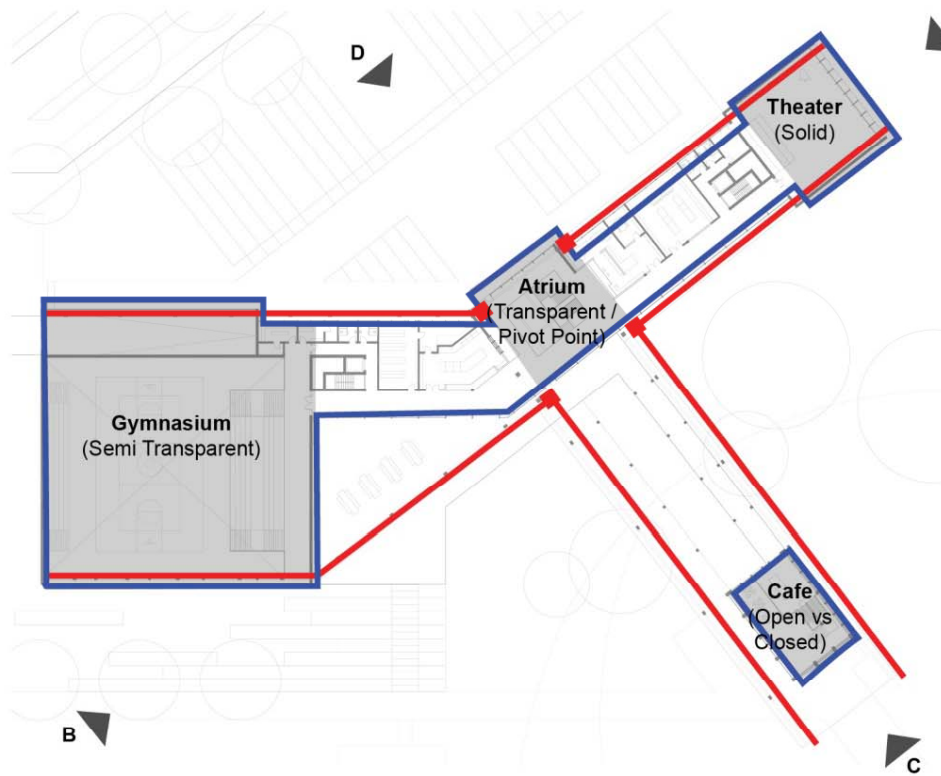
PROGRAM DISTRIBUTION

- Cafe + Exhibition
- Sports + Theater
- Multi-Purpose Rooms
- Interior Circulation
- Exterior Circulation
- Parking

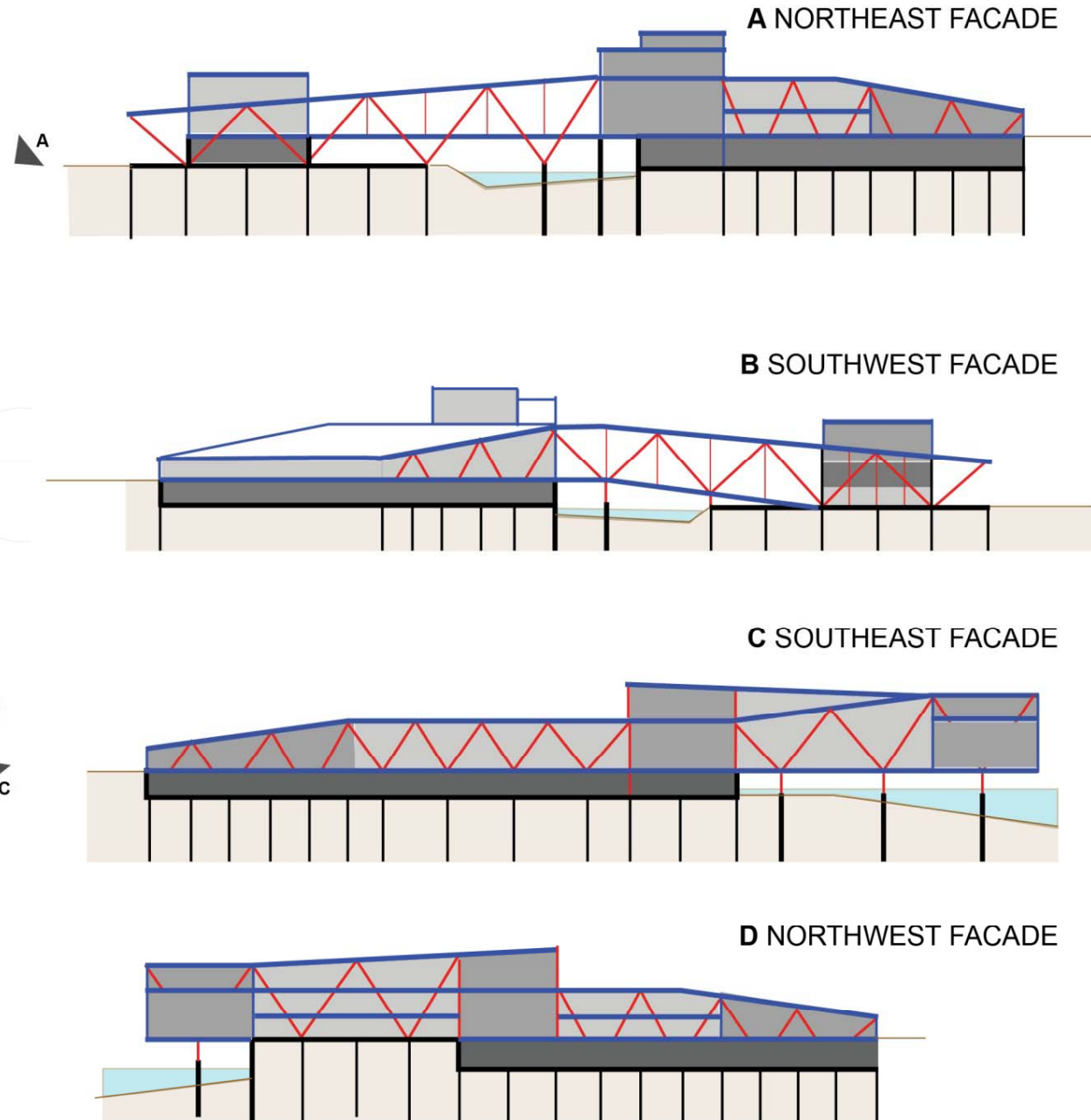


BUILDING CONCEPTS

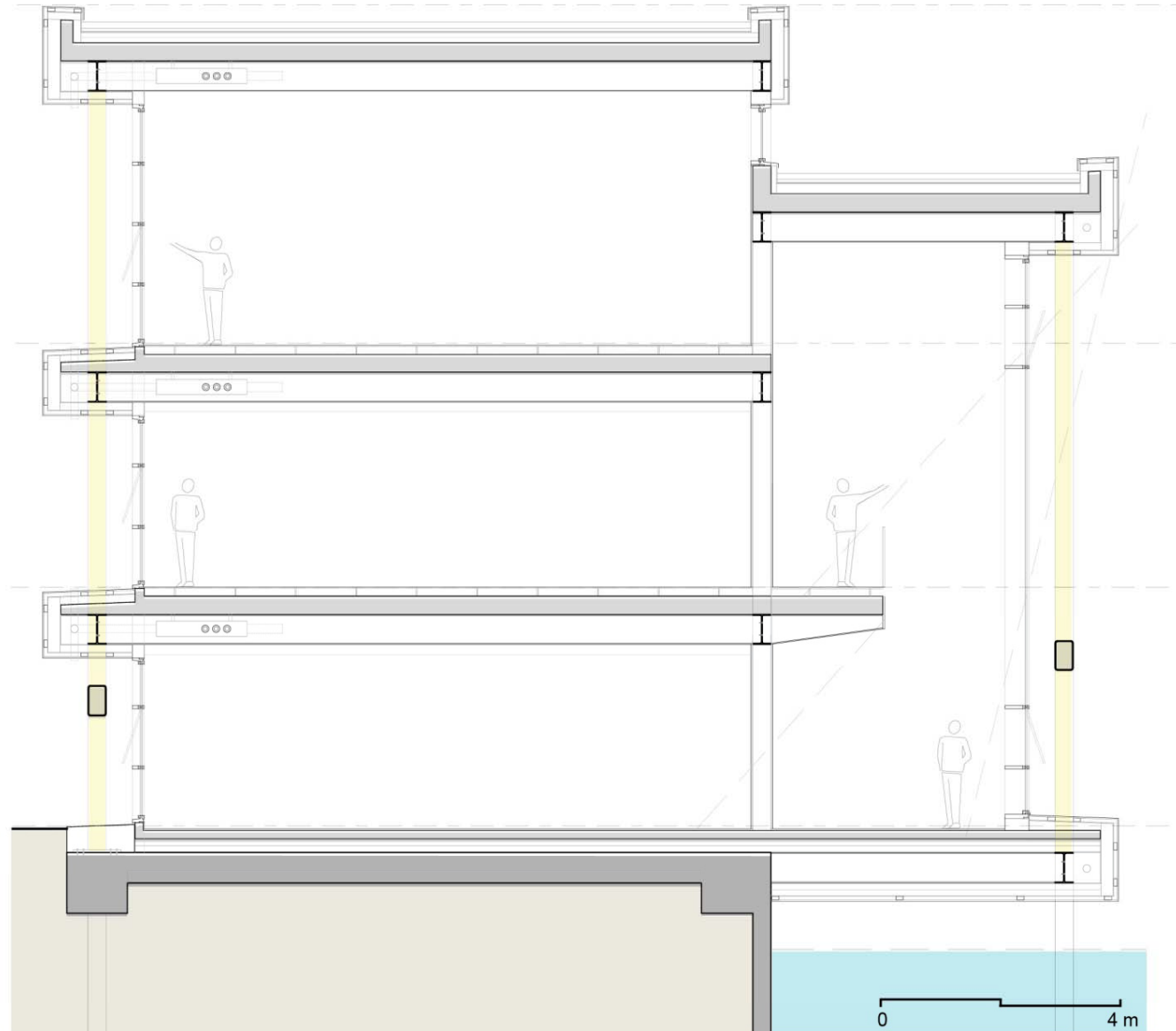
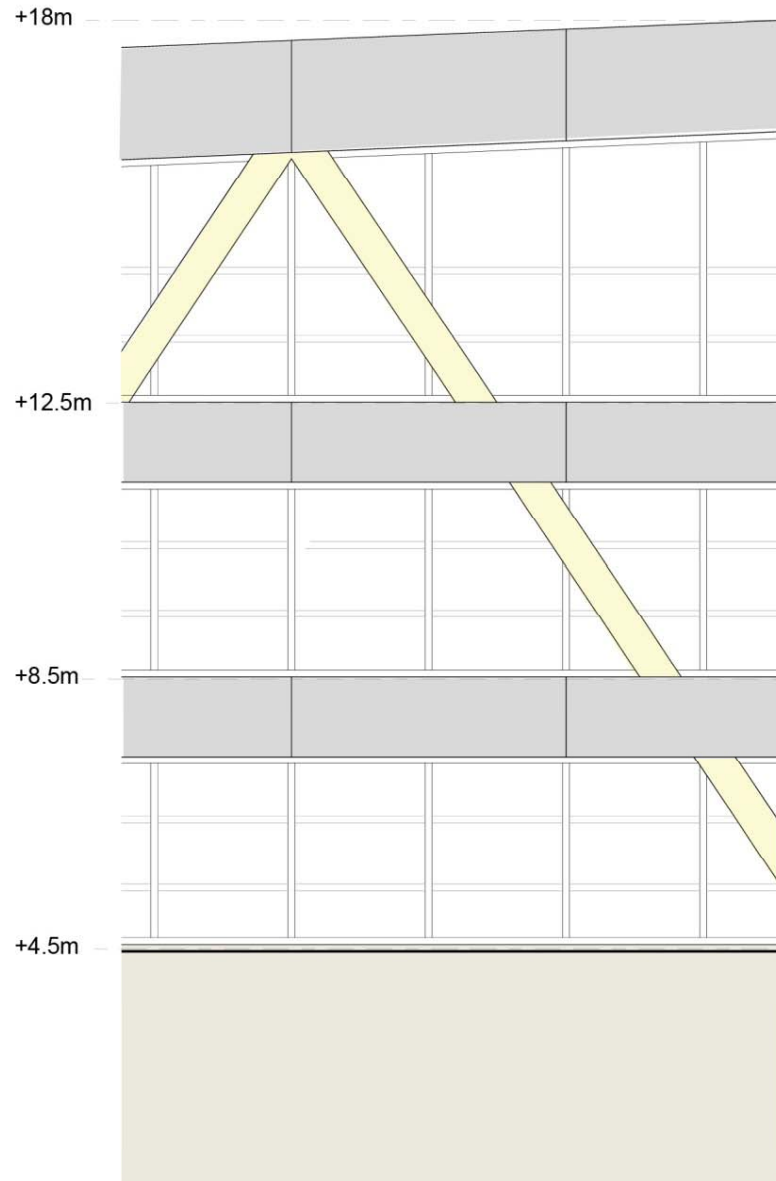
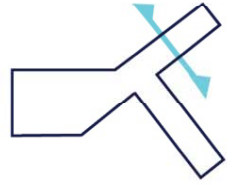
- **Angled Columns** Connecting Element
- **Facade Line** Inside vs Outside
- Masses** Solid vs Void



Facade & Building Composition

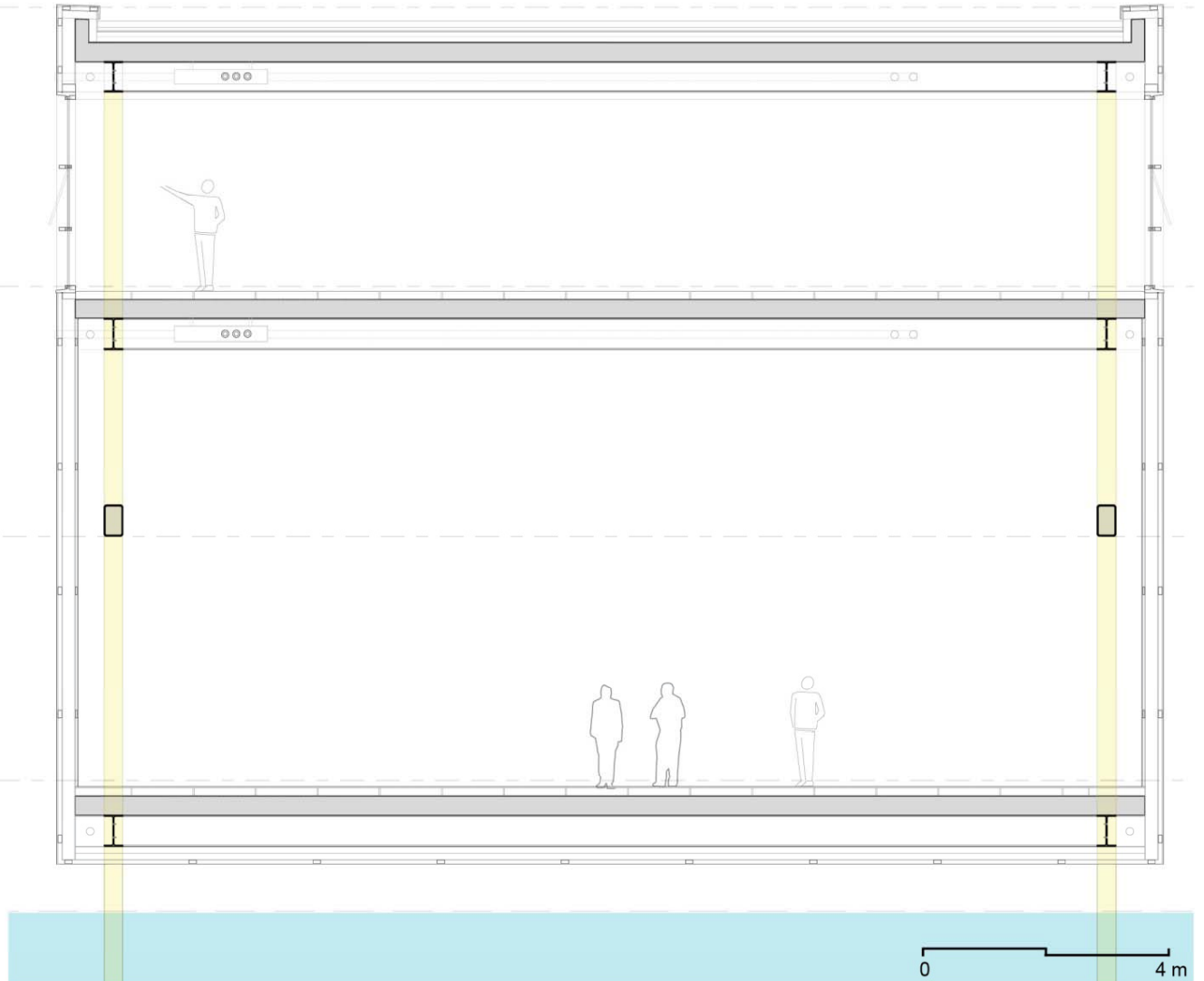
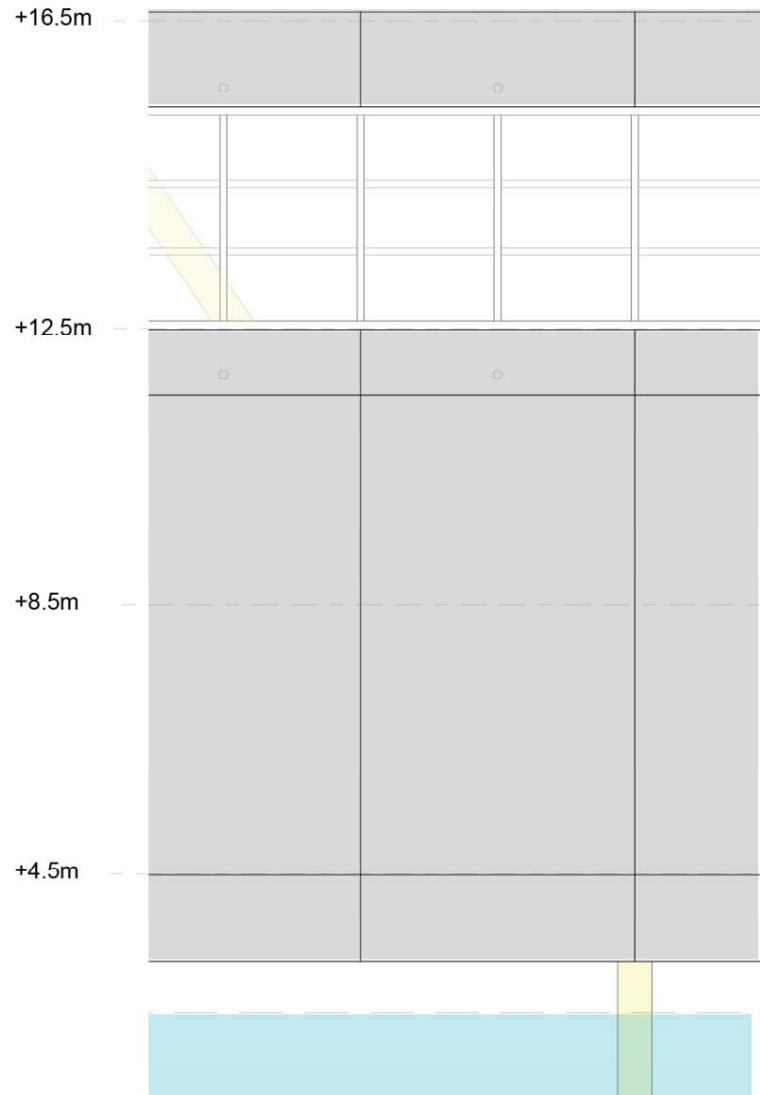
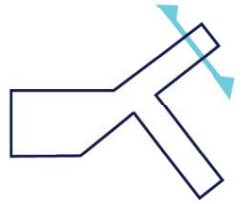


FACADE INSIDE



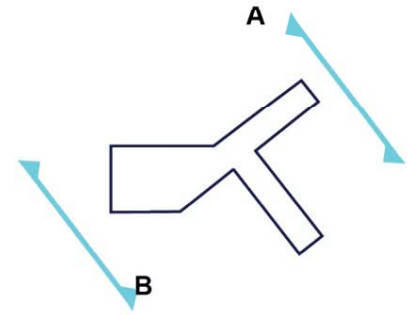
FACADE OUTSIDE

0 2 m



ELEVATIONS

A NORTHEAST FACADE



B SOUTHWEST FACADE



0 16 m

ELEVATIONS

C SOUTHEAST FACADE



D NORTHWEST FACADE

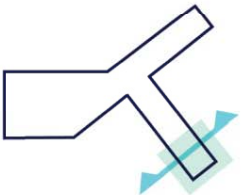


0 16 m

THE CLOSEABLE CAFE

TYPICAL WATER LEVEL

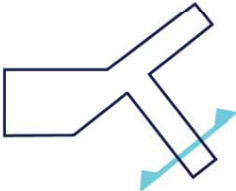
Adapting to Water



THE CLOSEABLE CAFE

MAX WATER LEVEL

Adapting to Water



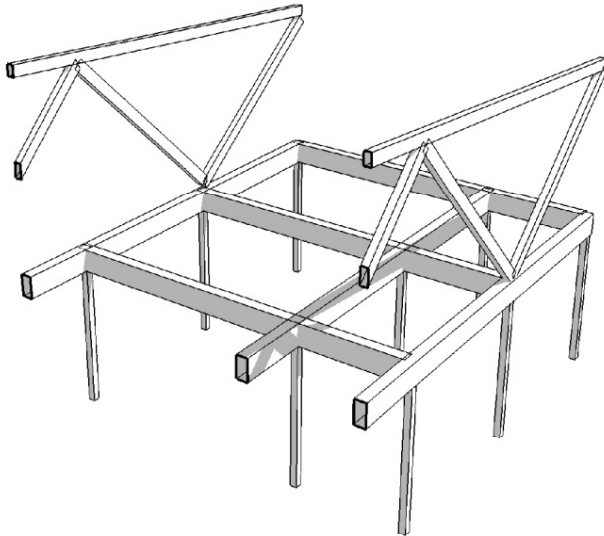
THE CLOSEABLE CAFE

Bayou Context

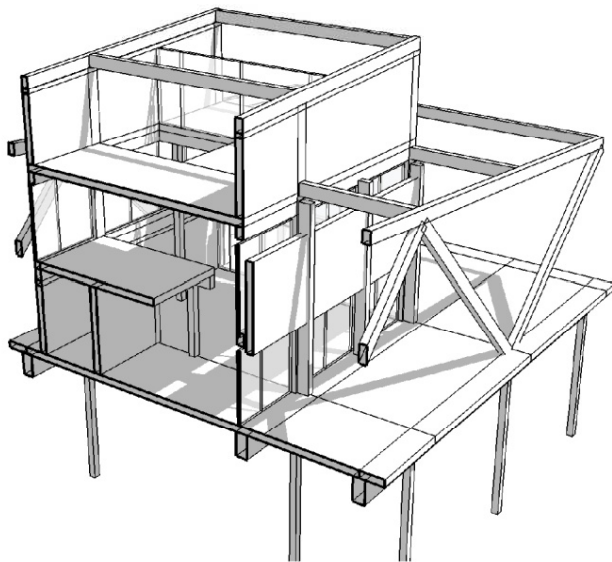


CONSTRUCTION

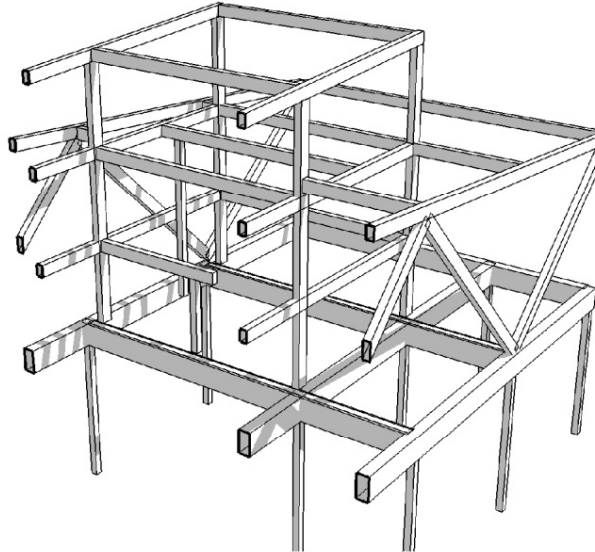
01) FOUNDATIONS & FRAME



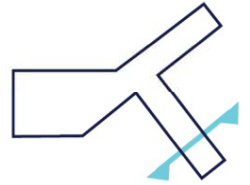
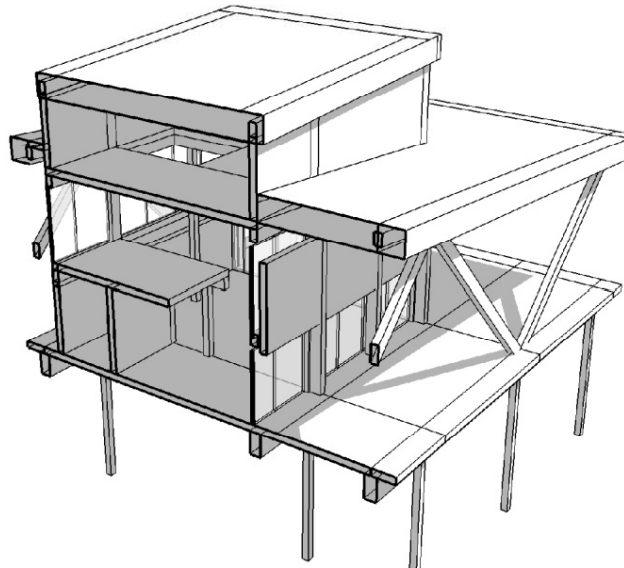
03) WALLS & FLOORS



02) BEAMS & COLUMNS



04) ROOF & FACADE



MATERIALS

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

Typical Columns: IPE 500x300mm Steel
 Typical Beams: IPE 500x300mm Steel

Typical Walls: Steel Frame / Insulation / Vapor Barrier / Finish

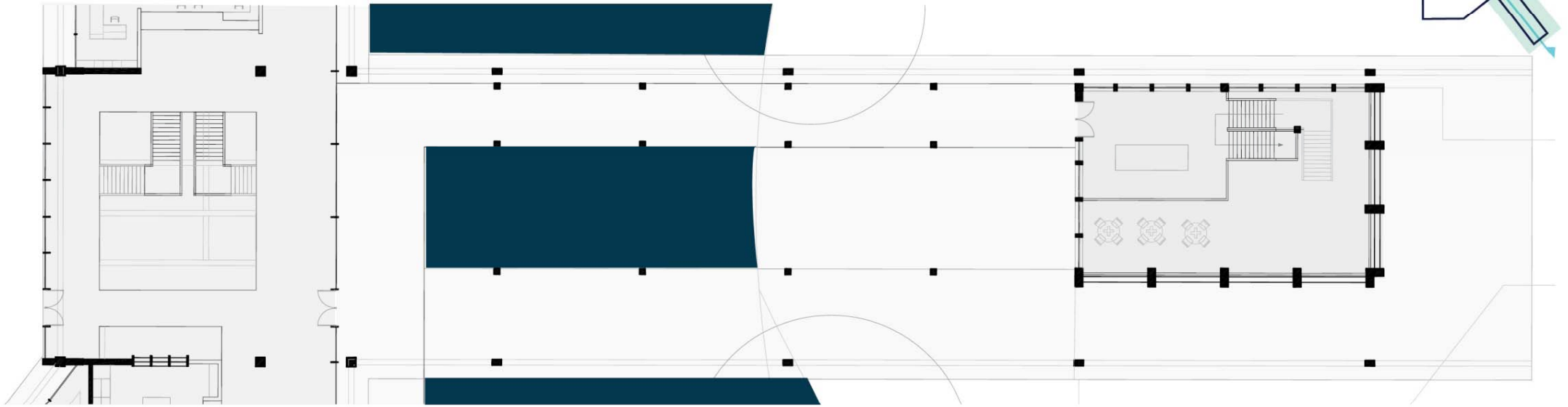
Typical Floors: Concrete Slab / Insulation / Vinyl Flooring

Typical Ground Floor: Concrete Plinth / Insulation / Waterproofing / Concrete Slab / Vinyl Flooring

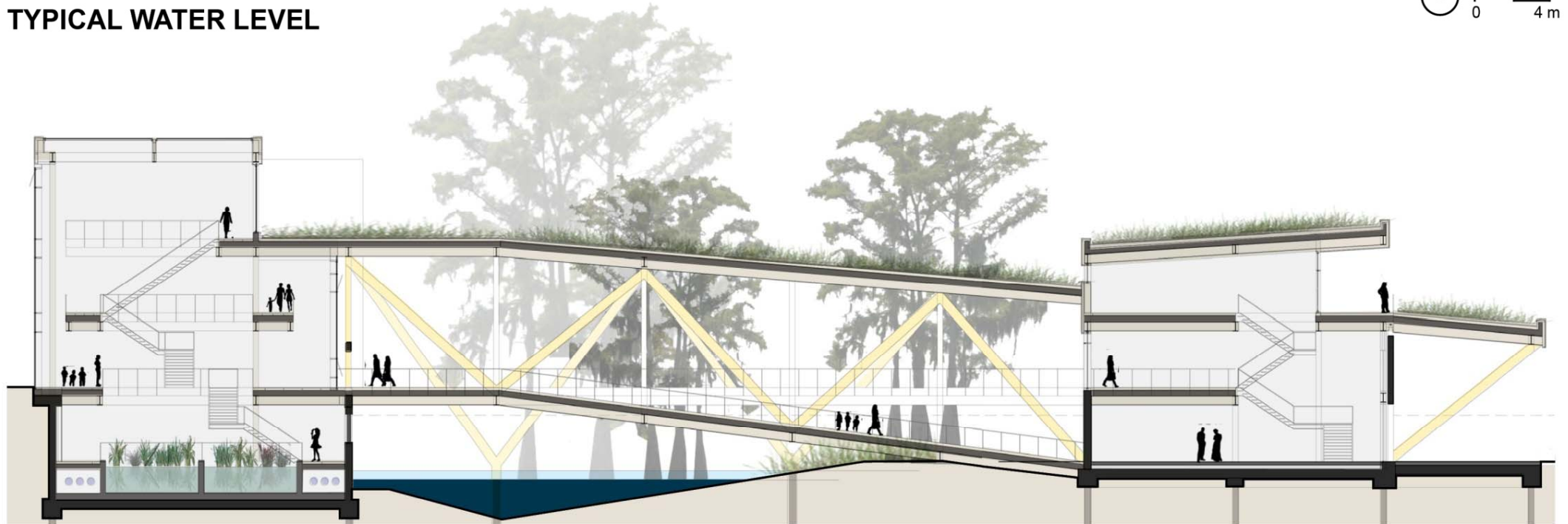
Glass Facade: Steel Frame / Double Glazing Glass
 Aluminum Facade: Steel Frame / Insulation / Aluminum Panels

Typical Roof: Concrete Slab / Vapor Barrier / Thermal Insulation / Filter Map / Drainage Layer / Top Soil / Vegetation

THE NATURE BRIDGE



TYPICAL WATER LEVEL

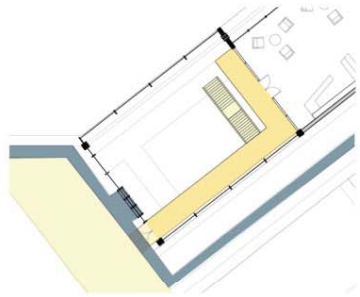


THE NATURE BRIDGE

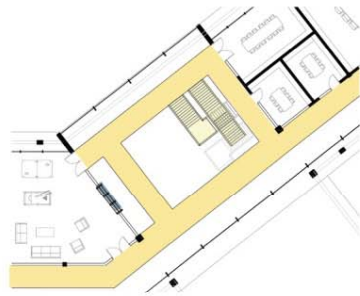


THE CENTRAL ATRIUM

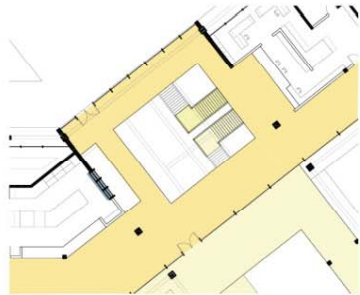
Re-Using Water



+02 Floor



+01 Floor



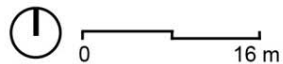
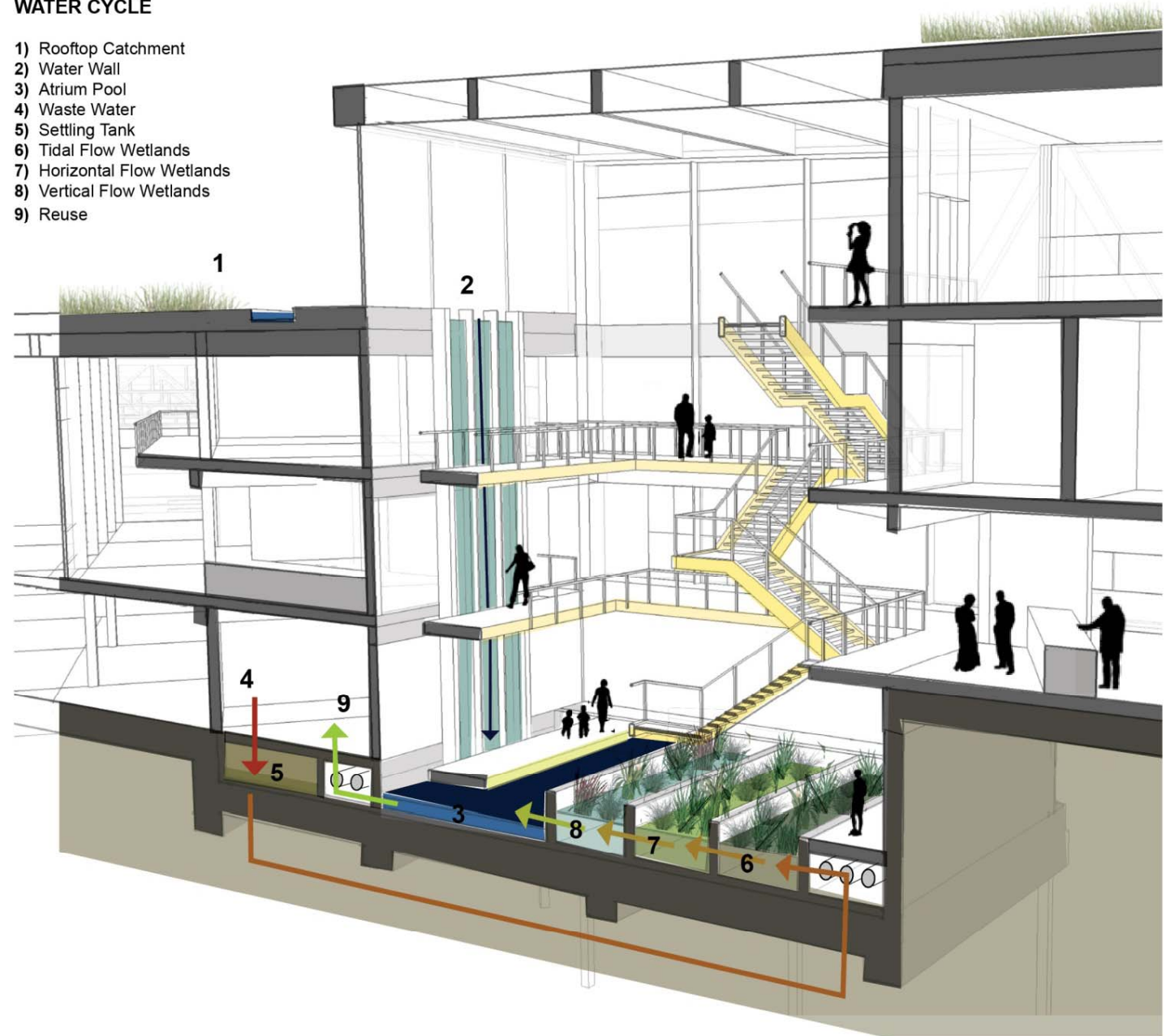
+00 Floor



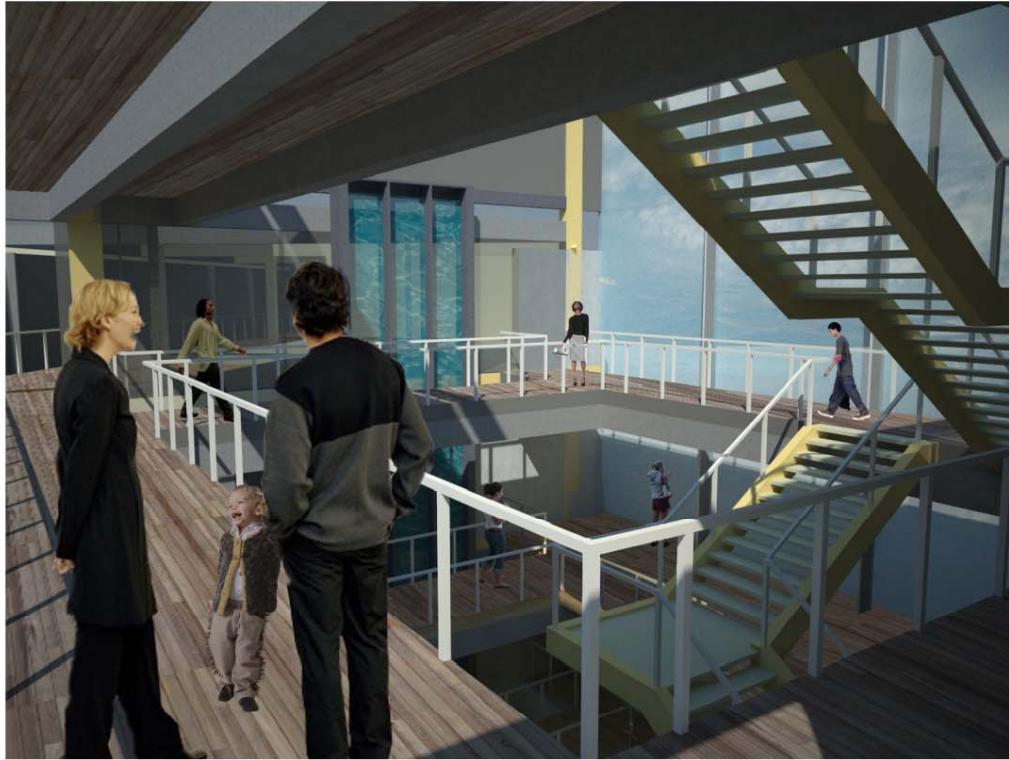
-010 Floor

WATER CYCLE

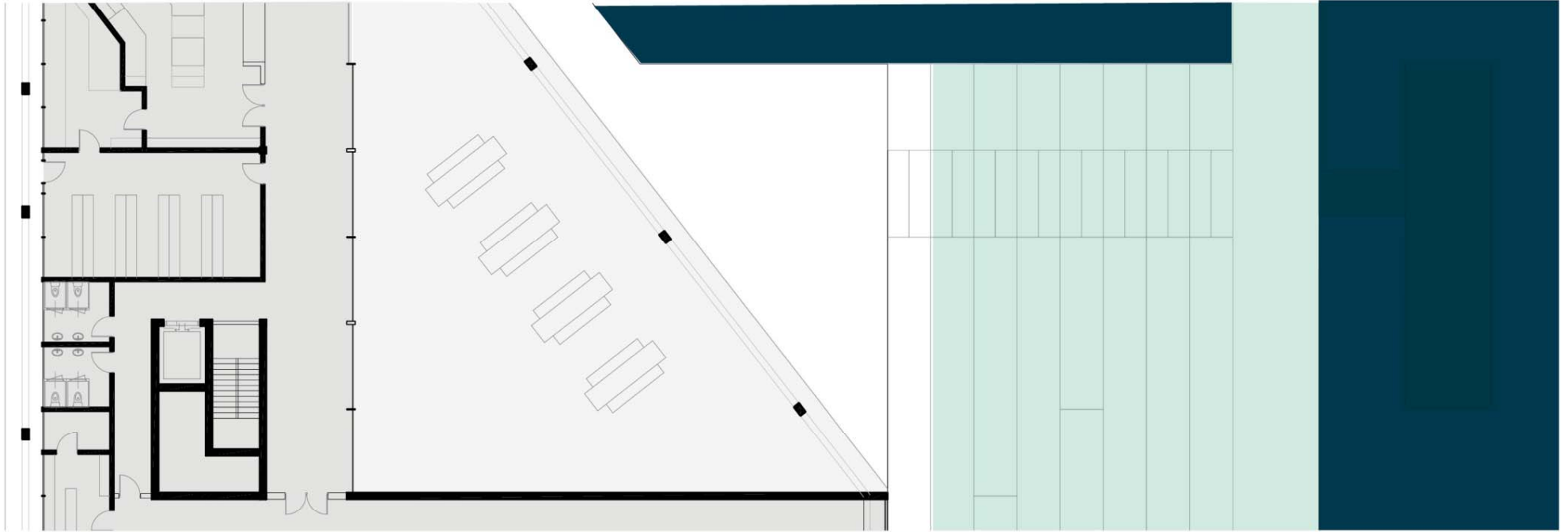
- 1) Rooftop Catchment
- 2) Water Wall
- 3) Atrium Pool
- 4) Waste Water
- 5) Settling Tank
- 6) Tidal Flow Wetlands
- 7) Horizontal Flow Wetlands
- 8) Vertical Flow Wetlands
- 9) Reuse



THE CENTRAL ATRIUM



THE PORCH & LANDSCAPE TERRACE



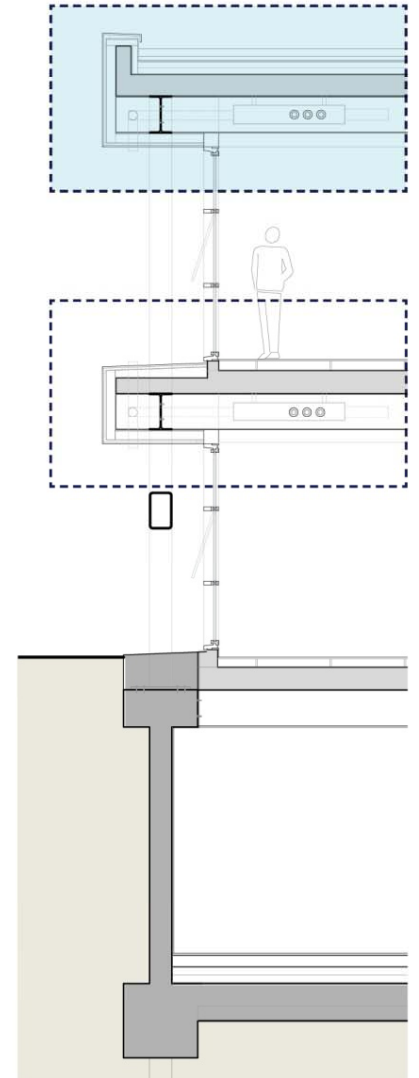
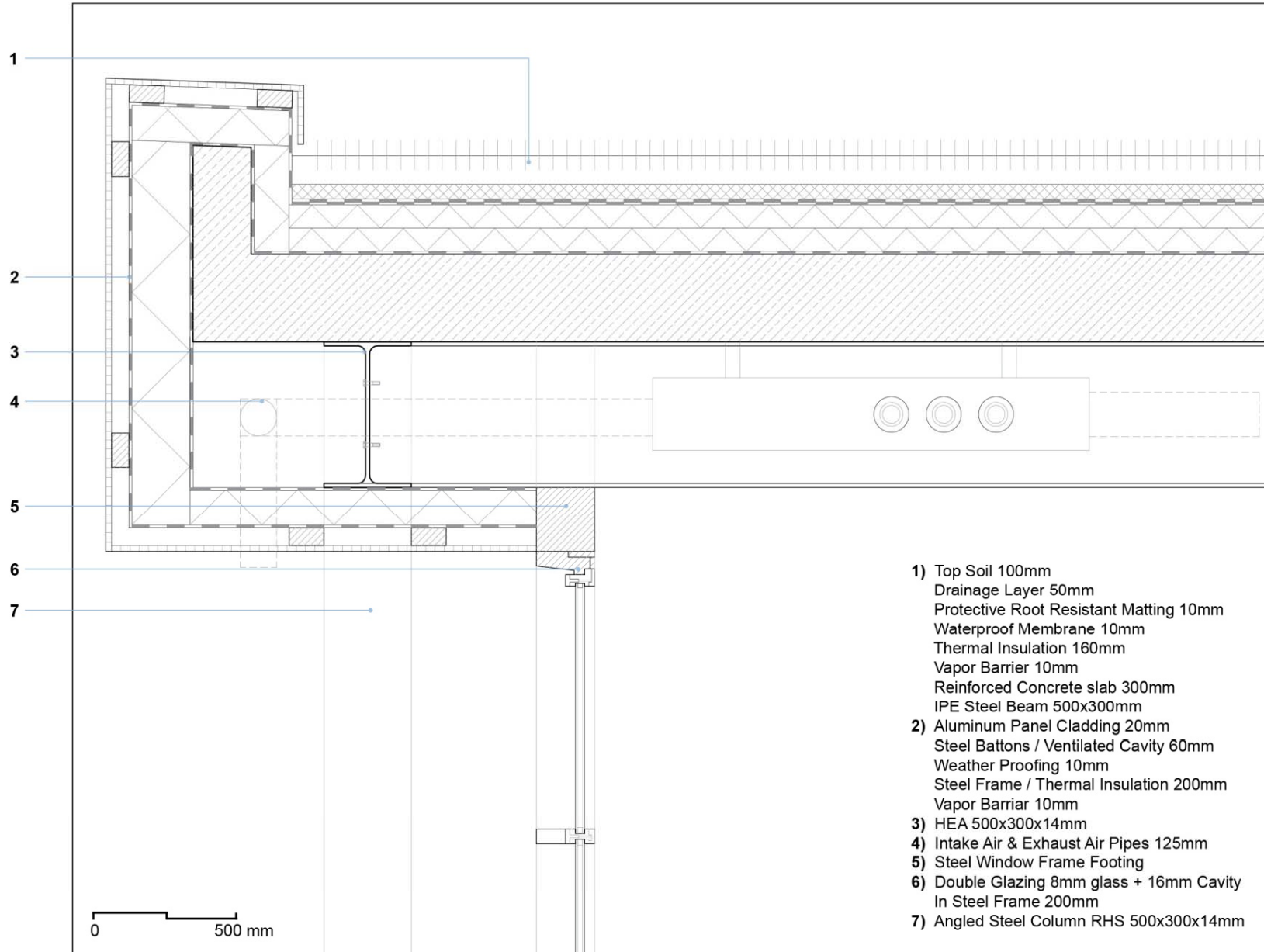
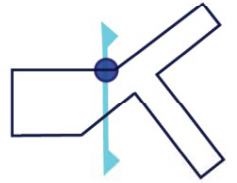
FLUCTUATING WATER LEVELS



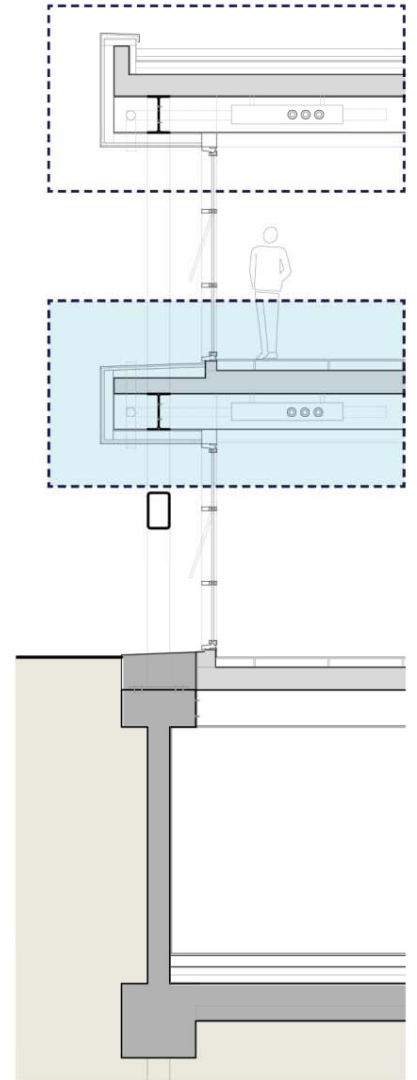
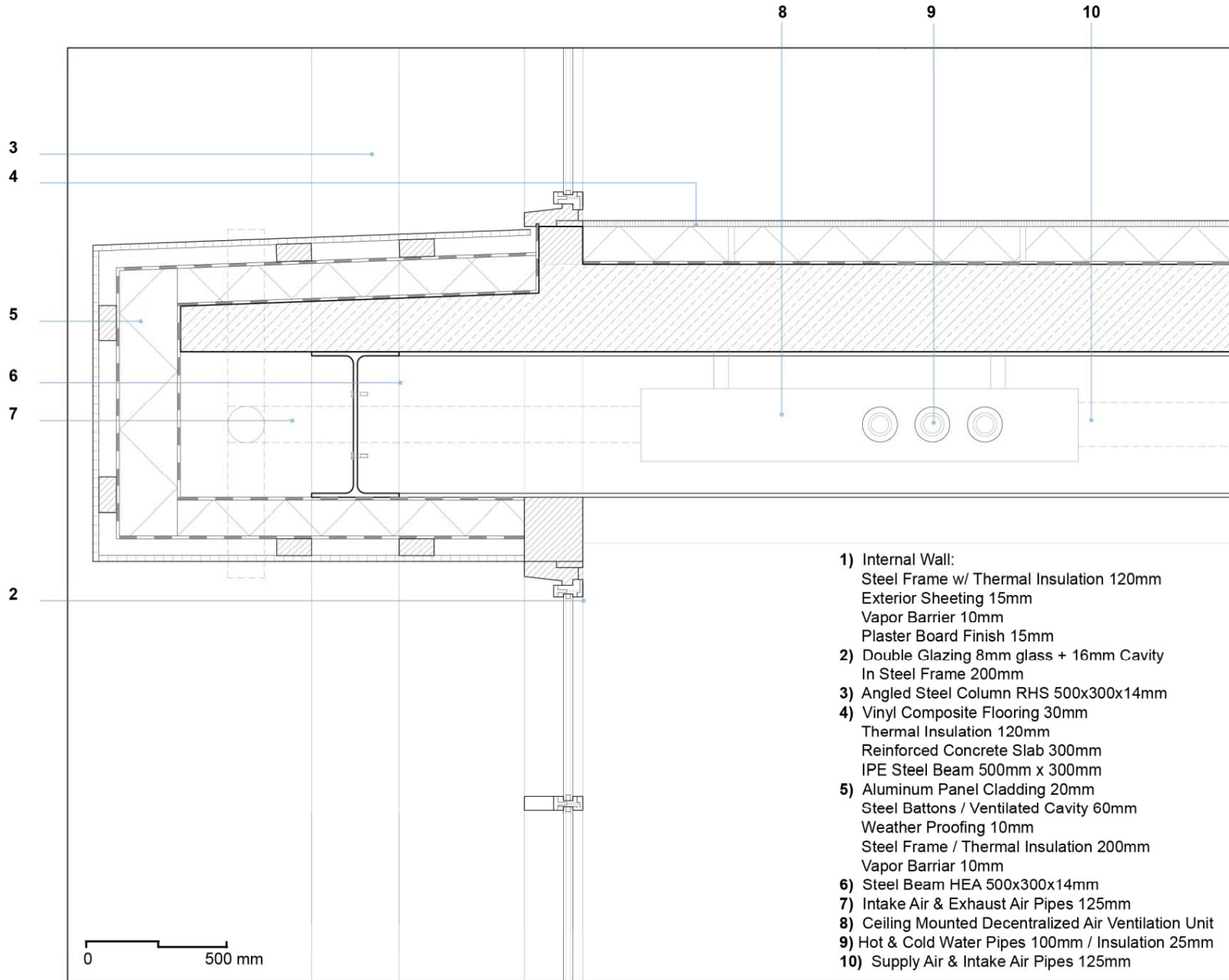
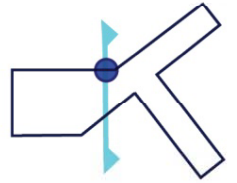
THE PORCH



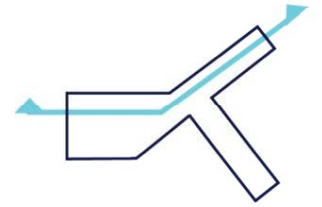
GREEN ROOF: *Detail*



FACADE & FLOOR: *Detail*

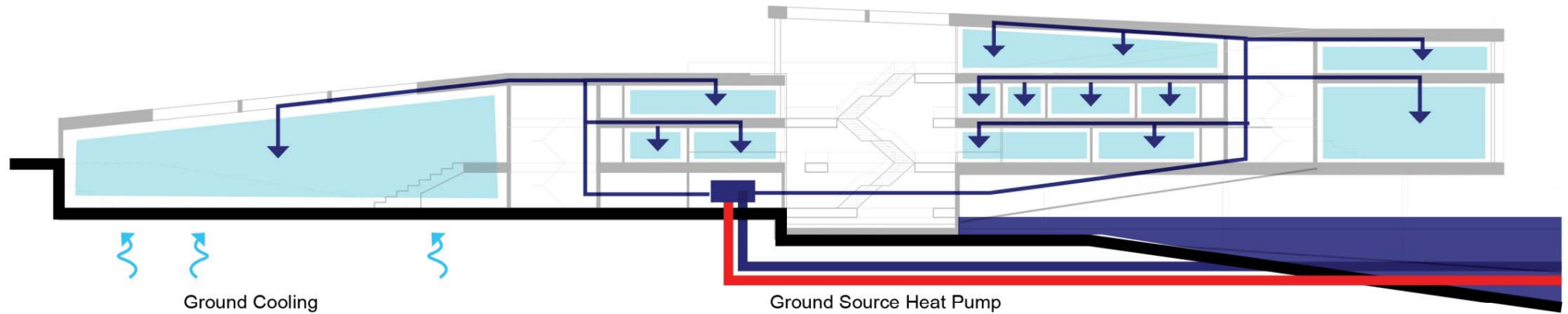


CLIMATE SYSTEMS

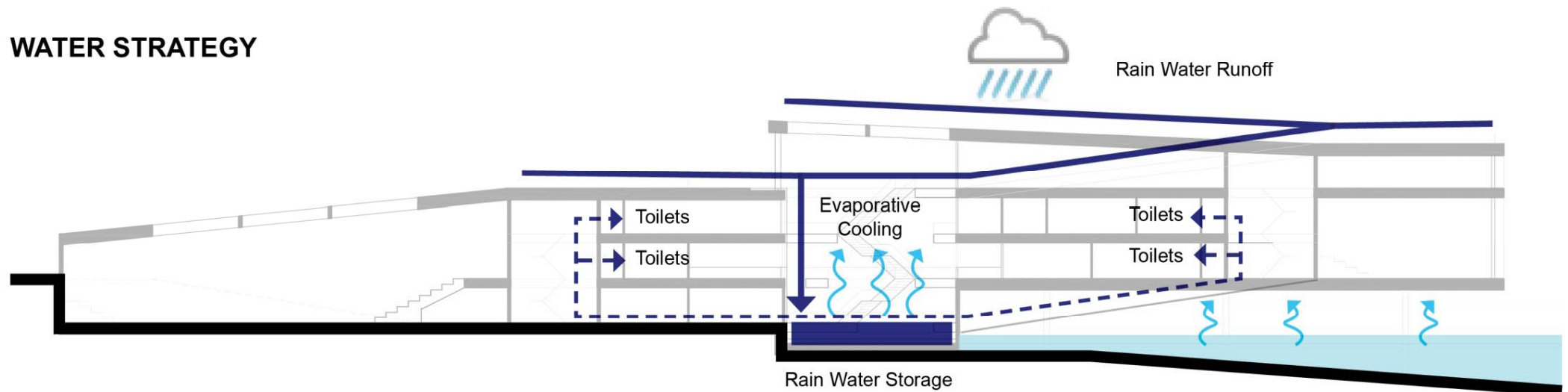


COOLING STRATEGY

- Individually Climatized Rooms
- Pipe Routes for Cold / Hot Water



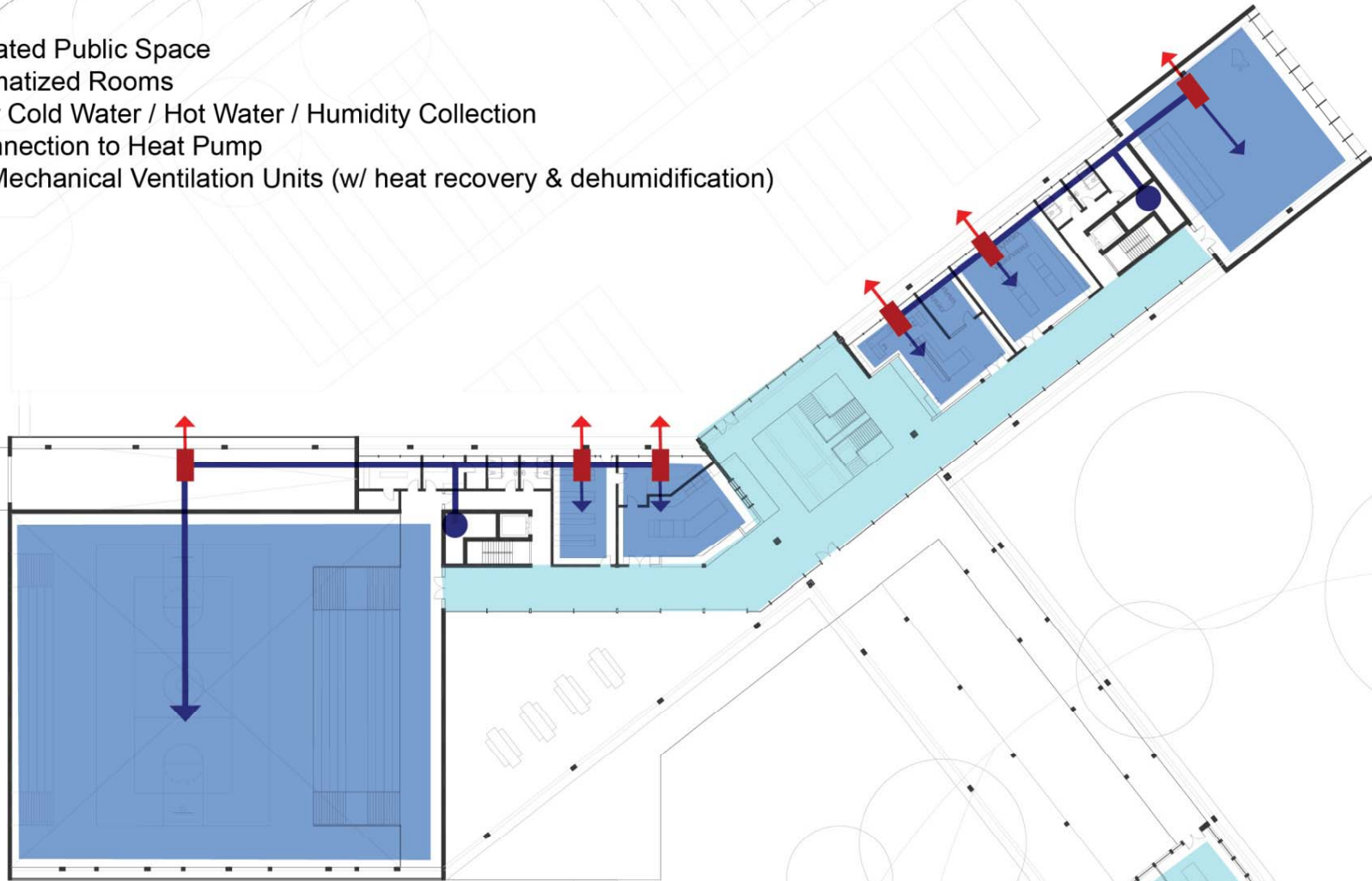
WATER STRATEGY



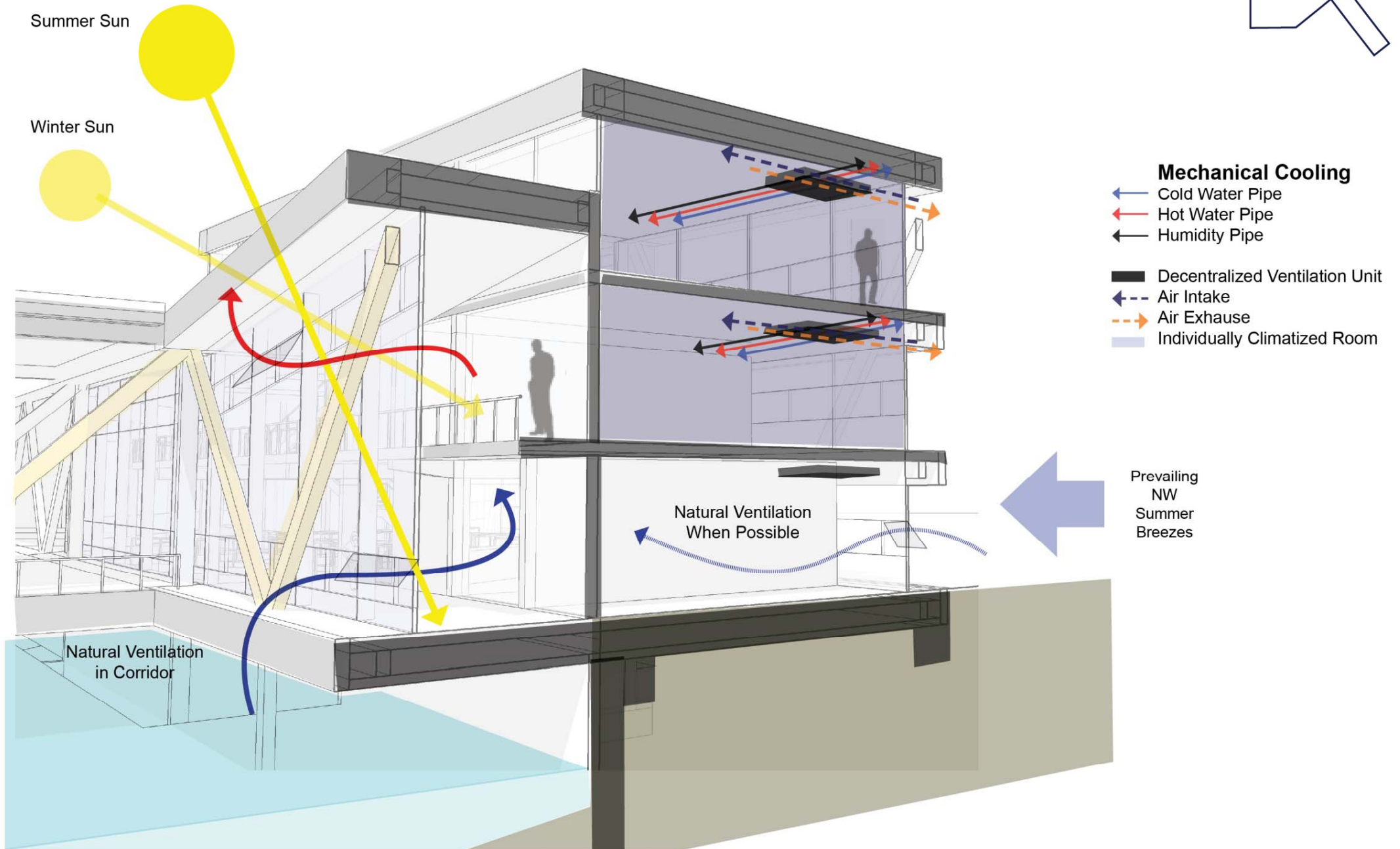
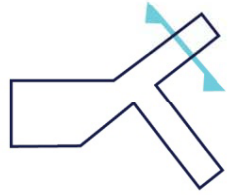
CLIMATE SYSTEMS

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

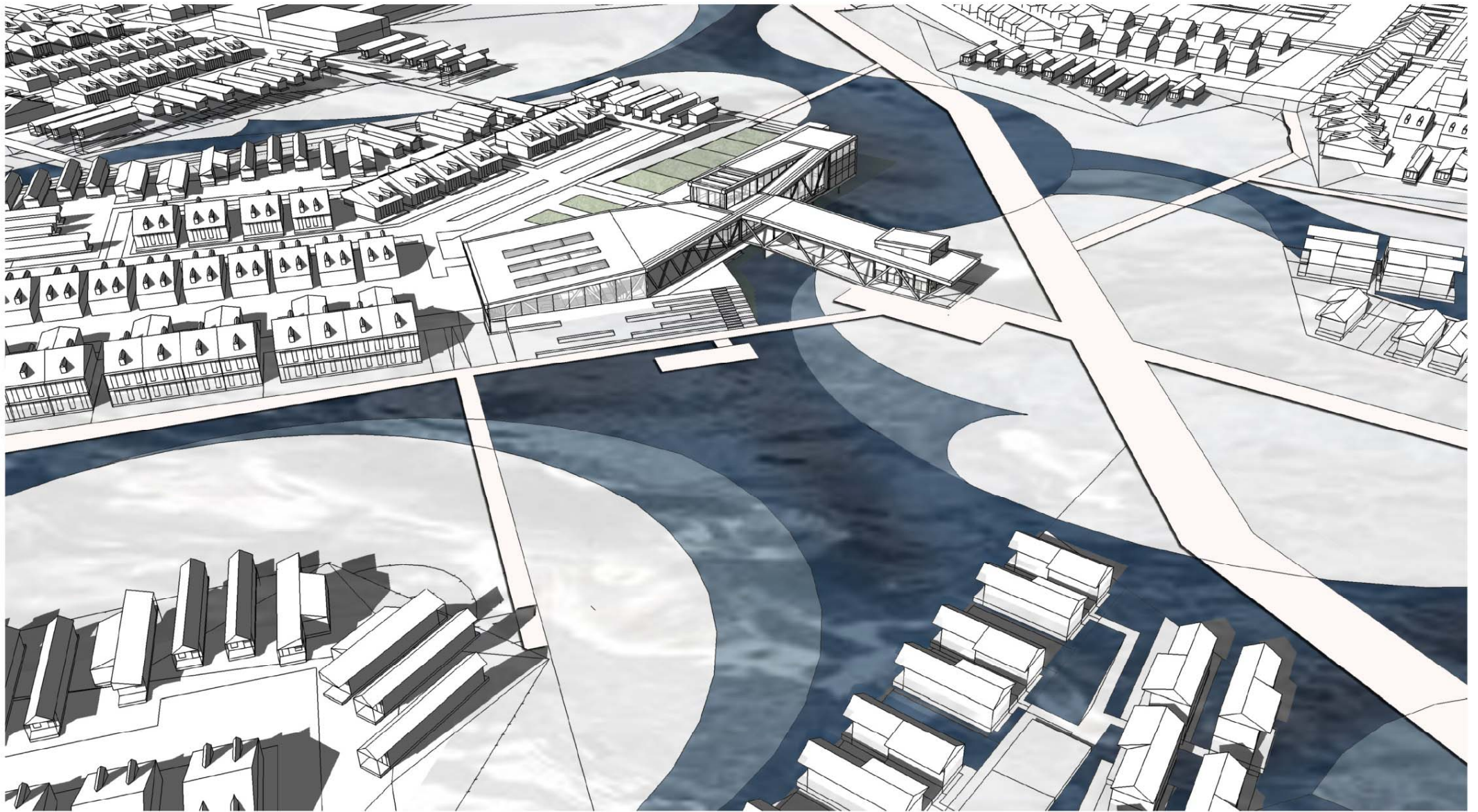


CLIMATE SYSTEMS



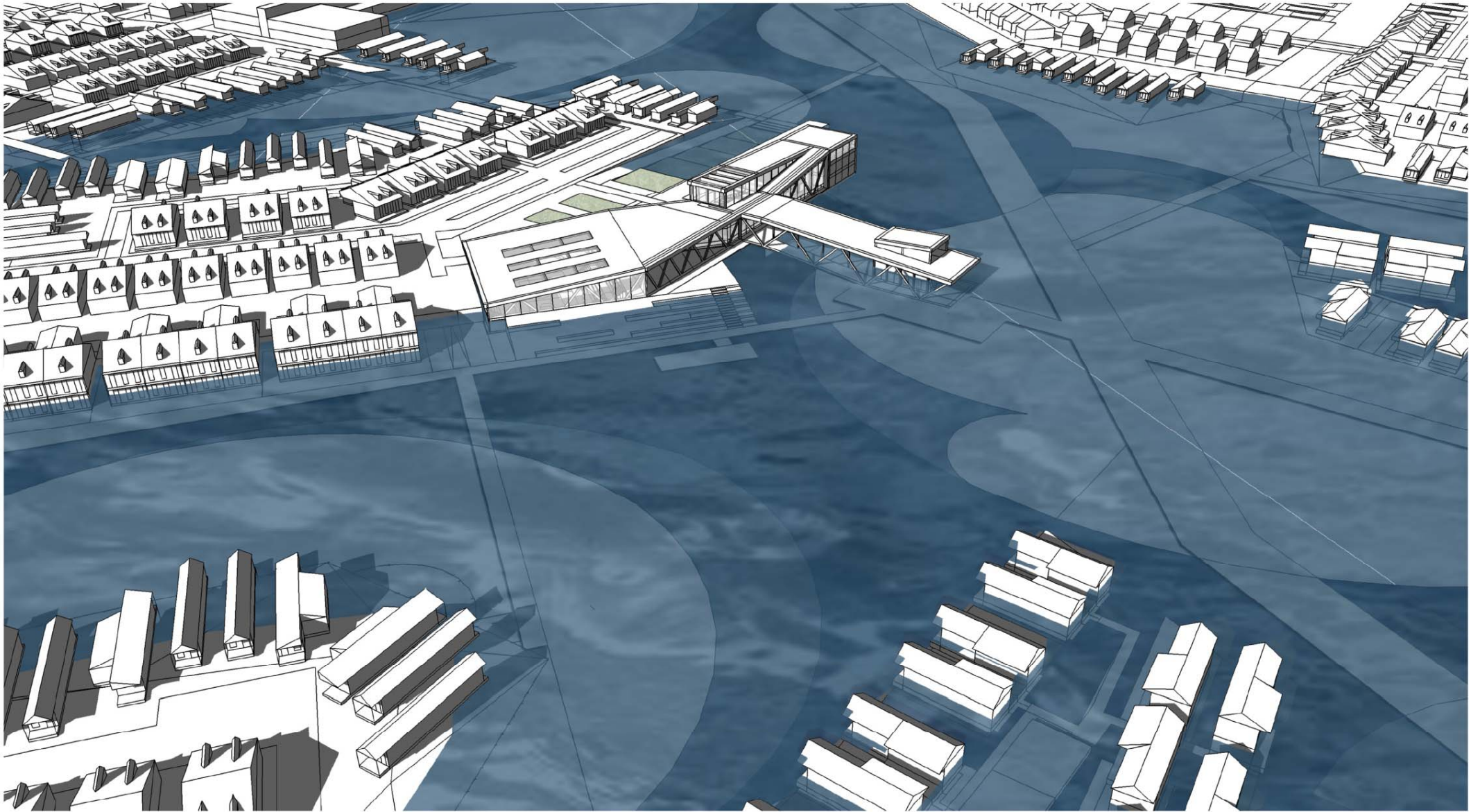
THE URBAN BAYOU

Typical Water Level



THE URBAN BAYOU

Peak Water Level



EVALUATION / CONCLUSIONS

Project uses existing theory (working with nature) and applies it to a specific site

The “fight against water“ doesn’t have to be a fight when urban development and architecture are initially integrated with natural processes

Site specific design is always better than generic technically engineered solutions

Water challenges need to be addressed at all scales (region, city, district, building) to ensure integrated results



THE URBAN BAYOU

*Balancing Natural Processes and Urban Development
in New Orleans*

Thank You!

