TU Delft
Delta Intervention Studio
**P5-Presentation**
Yi Chien Liao 4326202

Design Mentor: Esther Gramsbergen
Building technology mentor: Koen Mulder
External Examiner: Gerard van Bortel

**Water Resilient Living in Houston**
The Porch of Kashmere Gardens neighborhood
Houston: The 4th Biggest City in U.S.
Used to be called **Bayou City**

Houston

1891
Located at subtropical climate zone
Framework of Delta interventions studio
History of Houston development

- Chanalization in Galveston Bay and Houston City
- Population and urban fabric is still growing rapidly
**Problem statement**

Chanalized bayou with concrete is lack of water capacity
How to integrate the restoration of urban stream corridor with water resilient living?
Site selection
Hunting Bayou & Kashmere Gardens region
Located in flooding risk plain
Less desification  Lower income  Lower land value  Earlier developed, but less maintained houses

One of most vulnerable social structure in Houston
Ongoing water management: Project Hunting
- Widen & deepen the main stream
- Create a detention basin in the north-east side of Kashmere Gardens neighborhood
2014 Master plan from government
Greenery park along bayou
The land in between main street & creek would be investigated in this project
Street views

Housing condition
Hard surface
Creek & neglected lands
Urban Strategies
1. **Reduce flood risk**
by increasing water capacity of creek
2. Bring public amenities
to provide an alternative communal space in this area
3. Remove problematic housing plots and desify along the creek
Community Masterplan
Site for Landscape & Architectural design
Zoning plan
Creek -> Bridge -> Landscape -> Architectural programs
Junctional area can be public spaces
Inspiration:
Relationship between landscape + architecture
Inspiration:
Relationship between landscape + architecture
Spatial strategies
Widening / Bridging / Routing
Spatial strategies
Zigzag landscaping / Orthogonal / Accessibility / Permeability
Conceptual bird’s eye view
Landscape+Architecture Design
Program

Design part
- Waterfront landscape
- Public spaces
- Public architecture

Design Items
- Landscape lv. 1
- Row Housing lv. 2
- Apartment lv. 2
- Architecture Design lv. 1

- Interface between Public and private
- GF: Communal using
- 1~3F: 3 Housing units
- Greenery
- Bike path
- Market
- Roof platform
- Toilet
- Kiosk
- Restaurant
- Multi functional hall
- Toilet
- Public Elevator (water proof)
Architectural zoning

- Public square
- Market
- Ramp
- Resilient linear park
- Creek
- Accessibility to water
- Pedestrian bridge
- Entrance
- Core
- Car road bridge
Inspiration
by local architectural characteristic: “Porch“
Inspiration
by local architectural typology: “shotgun house“
Mass Development
Tower / Slope
The Porch of Kashmere Gardens neighborhood
West Elevation
Entrance for water resilient landscape
East Elevation
Various opportunities to approach the water
South Elevation
Route as an intersection
South section
The effect of zigzag strategy
North section
The outstanding Porch Building
North Elevation
Bridge as the boundary of concrete
Ground Floor
Entrance, Structure, Walls
First Floor
Bridge, Kiosk, Green roof platform, Ramp
Void from second Floor: Connection with view and light
Second Floor
Restaurant with adjustable panorama view
Third Floor & Roof
Multi-functional communal hall
Long Section of Porch Building
Public square, Sunken market, Waterfront, creek
Short Section of Porch Building & Market
Sunken market, Porch building, Bridge
Summer
Natural daylight 83° in June / Natural cross ventilation
Insulated envelope / Mechanical cooling ventilation ERV+VRV
Winter
Natural daylight 34° in December / Natural green house effect
Insulated envelope / Mechanical heating ventilation ERV+VRV
Structure system

Load bearing

Cantilever

Rotation
Bridge Construction
Architectonic
Facade
Vertical impression
Folding & sliding louver panel
Sliding windows
Roof construction
Gable wall construction
Floor & facade construction

- Timber truss 200x5000mm
- Steel plate 0.6mm, 1500mm gauge, 50mm thick
- Timber columns 220x2200mm framed by the core section
- Aluminium sliding window with double glazing 6+16+6mm

- Timber plank flooring 20mm
- Parquet board on sub-floor 22mm
- Insulation board panel 25mm
- Steel angle 63x63x6.0mm
- Load-bearing planked panel 1.4mm
- Load-bearing sub-floor 20x1500mm

Framed with water proof adhesive:
- Roll-up shading box 3000mm
- Fabric sun shading colored black
- Wood settinng black
- Zinc weather strip
Facade as a water proof layer
Corner construction

Corner stone block:
- Setting block
- Acoustic block
- Corner column: 200x200 mm
- Cast stone cover component: 50mm
- Copper drainage water pipe: 100mm

Folding & sliding: lower panel 500x3000mm
- Timber strip: 20x30mm
- Stainless steel angle: 20x30mm, 6mm
- Continuous stainless steel channel
- Stainless steel strip
- Hickory, wood-plastic composite
- Cap: for stone drainage
- Stainless steel channel
- Stainless steel strip
- Double glazing

Closing strip:
- Aluminum cap for connector
- Timber column: 100x200mm flanged from back outer
- Rain water channel for sliding & folding lower
- Sliding & folding hinge, 2 sliding, returning
- Sliding & folding hinge, returning
Parapet / Railing / Platform
Construction of facade
Principle floor plan of housing
GF-Prefab Concrete structure
1F~3F- Timber frame + timber panel structure
Facade application on Housing
Architectural Promenade
Variety of landscape
Flooding more than 1:100
Public square
Extreme flooding (more than 1/500)
Thanks for your attention