Leisure Centre along the Buffalo Bayou | GRADUATION PRESENTATION

Kito Samson
Flooding Houston Galveston Bay Area
Global flood risk
3x3x3 Analysis
"No one really shares Houston"

“All of us have a unique view of the city (Houston red.) we inhabit. But some cities are more conducive to undisturbed personal perception than others. Houston is such a city – the absence of shared space sees to this. Predominantly motorised and individualised, Houston limits pedestrian and public experience to interior spaces – be it mall, arena, church or parking garage. Exterior space is dominated by the movement through it; whether parking tarmac, freeway, cloverleaf, frontage road, cul-de-sac. Houston is mine (and everybody else’s), rarely to be shared, merely an extension of my driveway.”

Lars Lerup (2011), former dean of the faculty of architecture, Rice University
Houston Region Population 1850-2010
Houston has a sustained history of exponential population growth.

Source: Greater Houston Partnership, 2015
Comparing density Houston

**Houston**
Population: 6 million
Land area: 4,664 km²
Density: 1,200 inh./m²

**Madrid**
Population: 6 million
Land area: 1,321 km²
Density: 4,700 inh./m²

**São Paulo**
Population: 20 million
Land area: 2,707 km²
Density: 7,500 inh./m²

**Randstad**
Population: 7 million
Land area: 7,650 km²
Density: 915 inh./m²
No natural boundaries
Mega shapes

Source: One Million Acres & No Zoning: Lars Lerup, 2011
Downtown Houston, mega shape #1
On surface parking space in Downtown Houston
Impression Downtown Houston
Different districts
Main Street
Historical district near Market Square Park
Financial district
Climate

Houston weather averages

<table>
<thead>
<tr>
<th></th>
<th>°C</th>
<th>°F</th>
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<tbody>
<tr>
<td>Annual high temperature</td>
<td>25.7°C</td>
<td>77.3°F</td>
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<tr>
<td>Annual low temperature</td>
<td>15.5°C</td>
<td>60.9°F</td>
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<tr>
<td>Average temperature</td>
<td>20.6°C</td>
<td>69.1°F</td>
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<tr>
<td>Average annual precipitation - rainfall</td>
<td>1150 mm</td>
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<td>Days per year with precipitation - rainfall</td>
<td>106 days</td>
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<tr>
<td>Annual hours of sunshine</td>
<td>2633 hours</td>
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<tr>
<td>Av. annual snowfall</td>
<td>-</td>
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Climate Houston - Texas

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<tr>
<th>Average high in °C:</th>
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<th>Feb</th>
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<th>Apr</th>
<th>May</th>
<th>Jun</th>
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<td>16.7</td>
<td>18.3</td>
<td>22.2</td>
<td>25.6</td>
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<td>82</td>
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<td>87</td>
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<td>97</td>
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<td>Days with precipitation:</td>
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<td>10</td>
<td>9</td>
<td>8</td>
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<td>Hours of sunshine:</td>
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<th>Sep</th>
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<tr>
<td></td>
<td>33.3</td>
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<td>31.1</td>
<td>27.2</td>
<td>21.7</td>
<td>17.2</td>
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<tr>
<td>Average low in °C:</td>
<td>23.3</td>
<td>23.3</td>
<td>21.1</td>
<td>16.1</td>
<td>11.1</td>
<td>7.2</td>
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<td>Av. precipitation in mm:</td>
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<td>90</td>
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<td>Days with precipitation:</td>
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<td>9</td>
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<td>7</td>
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<td>10</td>
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<tr>
<td>Hours of sunshine:</td>
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<td>281</td>
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Houston Downtown Development Framework: making Downtown Houston denser
Houston Downtown Development Framework: revitalisation of Main Street and introduction of the Metro Rail
Expand and refine the Theater District

- Make continuous efforts to ensure that Theater District facilities do not lag behind national counterparts in quality or capabilities.
- Add smaller-scale performance venues and support spaces that provide more spontaneity, energy and urban diversity.
- At Bayou Place Phase II, consider arts-related uses, high-rise residential development and removal of the overhead structure above Bagby so that the street can become a key civic corridor.
- If Buffalo Bayou improvements and U.S. Postal Service plans allow, redevelop the existing post office site as a mixed-use extension of the Theater District along the bayou.
- Similarly, examine the Bob Casey Federal Courthouse site as a potential location for performance venues or support spaces if a new federal courthouse is built.
- Study the potential for creating a cultural park for the Theater District by closing Texas Avenue and Prairie Street (made possible by a redesigned I-45 North) while improving access to public garages.
- Work with property owners to add entertainment, such as an IMAX theater, to the area around the Downtown Aquarium.

Promote and enhance the Convention and Sports District

- Tie a new regional visitor center along Avenida de las Americas into Downtown’s historic attractions.
- Encourage coordinated development of the “superblock” area on the west side of the George R. Brown Convention Center with a major civic green space enlivened by entertainment venues and retail, defined by high-rise residential and served by visitor-friendly parking.
- Enhance Avenida de las Americas as a key civic corridor.

Create a binding fabric of smaller-scale cultural and historic attractions

- Seek opportunities to locate smaller civic and private attractions, such as the Allen Center Gallery and Heritage Hall at JPMorgan Chase Bank, on the ground floors of commercial and residential buildings.
- Emphasize cultural facilities that appeal to and are affordable for families.
- Work with Harris County and private landowners to encourage the transformation of the historic areas in the northern part of Downtown into mixed-use neighborhoods with their own museums, galleries and residential properties.
- Encourage compatible infill development to re-establish engaging building frontages along sidewalks.
- Continue improving Allen’s Landing and the Sunset Coffee building.

Develop hotels as the market stabilizes

- Increase the hotel room count.
- Broaden the range of hotel products offered.
- Plan for a second major hotel near the convention center.

Historic Main Street was chosen for Superbowl festivities
“High-end” venues

Alley Theatre
Hobby Center for the Performing Arts
Jesse H. Jones Hall for the Performing Arts
Wortham Theater Center

“Low-end” venues

Bayou Place
Two worlds

Downtown Houston (upper world)

Bayou (lower world)
Two worlds

Downtown Houston
(upper world)

Bayou
(lower world)
Upper world
Two worlds
Lower world
Design location while flooded after tropical storm Allison 2001
Flooding Houston- Galveston Bay area
Flooding Downtown Houston

1 in 500 year flood plain
1 in 100 year flood plain
Normal flood plain
1. Floodplain Types

Intense rainfall is responsible for many types of flooding across Harris County. Basically, Harris County contains four types of floodplains, each with its own flooding characteristics. But there is also a fifth “scenario” that occurs in many areas due to the extraordinary intensity of some of the rainfall. In this fifth scenario, it’s not necessarily an identifiable floodplain, rather the street drainage system’s inability to move stormwater to the nearest channel. There is simply too much rain in too short a time period.

Valley floodplains are generally located in the northwestern portion of the county. The ground in the area is more “defined,” with creek valleys. Flooding can be very deep and usually extends for a few days.

There is only ONE major river floodplain in Harris County. It is along the San Jacinto River. The floodplain is large, deep and swift, and flooding conditions may sometimes last a week or more.

Shallow floodplains exist throughout much of the county and affect thousands of residences and businesses. When the channel capacity is exceeded, flooding begins, but usually lasts hours, rather than days.

Type A: Valley Floodplain

Type B: Major River Floodplain

Type C: Shallow Floodplain

Type D: Coastal Floodplain

Fifth Flooding Scenario

Ponding/Overland Flow

Water level of flooding:
1 in 50 years 0.79m
1 in 100 years 1.79m
1 in 500 years 3.44m

Type C: Shallow Floodplain

Shallow floodplains exist throughout most of the county and affect thousands of residences and businesses. When the channel capacity is exceeded, flooding begins, but usually lasts hours, rather than days.
Challenges of DT Houston

- No one really shares Houston

- No integration of the river and urban landscape

- 1 in 50 year’s flood risk

- Exterior/ outside is considered hostile, unwanted because of the climate and lack of street live, therefor is not being used

- Low interaction and accessibility of venues
Opportunities to take advantage

- **Extensive population** (6 million potential encounters)
- **Skyline of Downtown Houston** (Views and atmosphere)
- **Climate**
- **Development framework** (Revitalization, densification)
- **Location** (Close to Main Street, next to the Buffalo Bayou and the Historical District, part of the Theatre district)
Reference project
“Who doesn’t have a fond recollection of this place from all the years spent living in our densely-packed metropolis?”

One of the architects of SESC Pompeia
High-end architecture
Lessons from Lina

- Accessibility
- A lively street bringing into the complex public live
- A comprehensive and inclusive program
- High-end architecture
- Atmosphere
Design goals

- Design a flood resisting building
- Letting the Houstonian experience the city as well as the waterscape
- Designing an attractive building which gives the Houstonians a common experience
- Providing an attractive program complimenting the program of the theatre district in which people can take advantage of their potentials
- Promote street live and the outdoors
- Integration of the river within the city
Design
Situation before
Removal roads and train tracks
New infrastructure and new river bank line
Continuation of the park and new buildings in the masterplan
One of the city blocks
Block in city
City block
Green roof lifted up
Forming a square
Floors under the green roof
Letting the climate in
Public square and openness
Flooding and views

Temporary program, in case of flooding
Creating an atrium
Natural light and shading
Continuation of the street
Continuing the street
Respecting the river
Adding two cores to the structure
Forming the floors to the demands of the program
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Ceiling structure

* Larger surface for the heat exchange
* Gives strength and stiffness to floors
* Creation of space and place
* Functions as ornament
* Recognisable feature of the building

Ceilin patern
Core of the project

- It creates the space and place.
- Gives shape to the building, its surroundings and the city
- Is housing an important part of the climate system within --> cold rock
- It provides the visitor with an interesting routing
- Is a mediator between the river and the city
Program, climate design and façade
Floor respecting the river and atrium
Columns on grid of 15.5m x 7.8m
Positoning of the façade
Façade concept

glass railing

gap between tiles for drainage

concealed drainage

sliding shutters

walkable zone 1300 mm

openness

façade can be moved to the inside

continuous ceiling

continuous floor plain

90/107
Façade
Façade
Forming of the floors and routing
sun shading through cantilever

sun shading through shutters

cooling through floors

additional mechanical ventilation and cooling when needed

natural ventilation

high temperature fluctuation

medium temperature fluctuation

low temperature fluctuation
Adding walls and boxes to separate the program
Fitting the program within the building/ floor build-up/ rules