Houston

ARC 5935 | Rethinking the Urban Form of Coastal Resilience

Houston

Mapping Liminality

Fall 2018 Ex 01

01 Houston

Metropolis Scale

Houston is a large metropolis with a population of 2.3 million. Located in South east Texas near Galveston Bay and the Gulf of Mexico, it is located in Harris county and the principal city of the Greater Houston Metropolitan Area

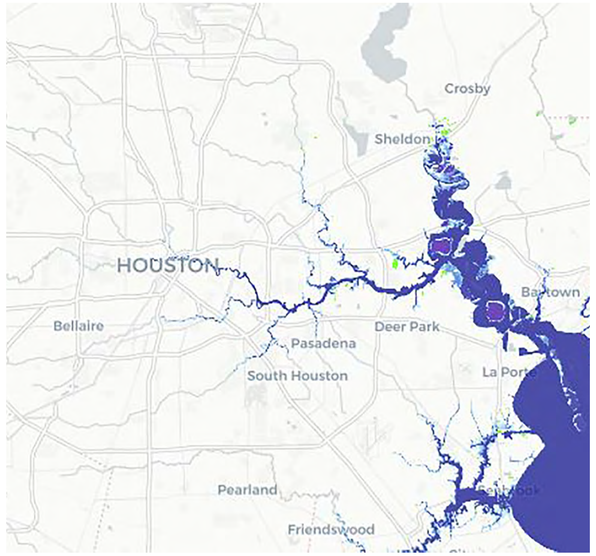
Houston's climate is classified as humid subtropical. The city endures very hot, long, and humid summers, and mild winters. Houston has an air pollution problem and is ranked among the most ozone-polluted cities in the United States.

02 Climate Change

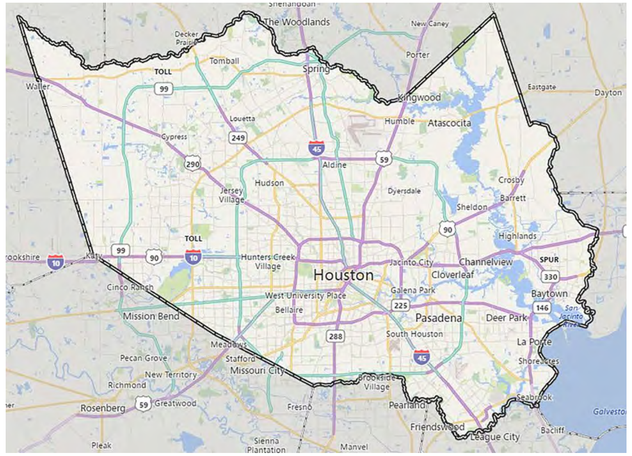
Severe Problem

Flooding is Houston's biggest problem due to the flat wetlands and paved-over coastal prairie which drains slowly and easily floods. In the area, there are Bayous to helps drain the area when it floods.

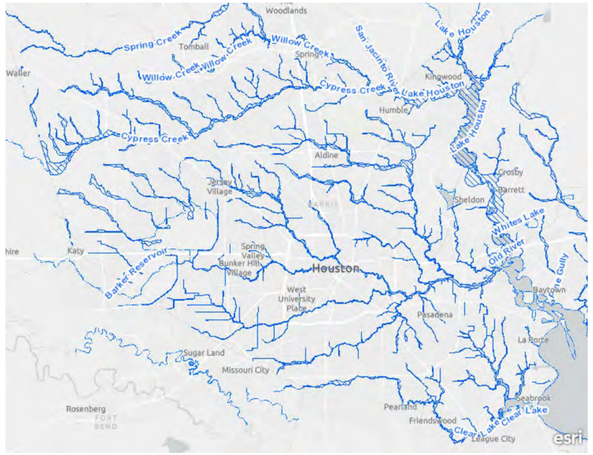
Left: City of Houston, Right: Flooding caused by hurricane in Houston.



6 Feet Sea Level Rise Map



Houston Boundary Line



Waterways

Showing the boundaries of Houston and waterways

Studies show that Texas will experience the worst effects of climate change.

La Porte is a city in Harris County, within the Bay Area of the Houston Metropolitan area. The city fall on the Texas Coastline which is over 1,400 miles long. The climate in the area is hot, humid summers and mild winters.

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Average erosion rate of Texas coast is 4.1 feet per year.

Exisitng Conditions, La Porte — Exisitng Coastline

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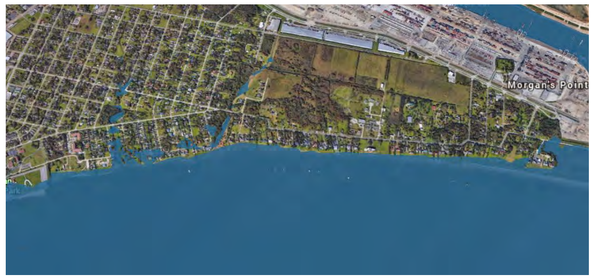
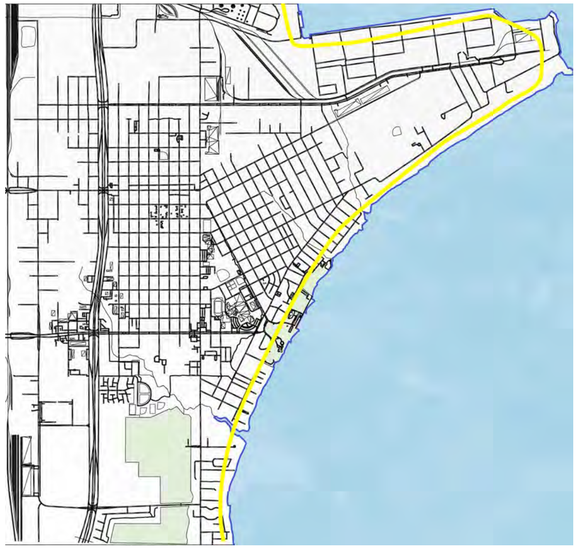
03 Sea Level

Coast

During the last century, sea level has risen by 8 inchies which cause the inundation of the Texas Coastline, as a result of sea level rise and subsidence. The current rate of erosion is now five times faster.



Top: Sea Level Rise in La Porte, Texas in 2100. Bottom: Sea Level Raise Section shown at a residential area and city



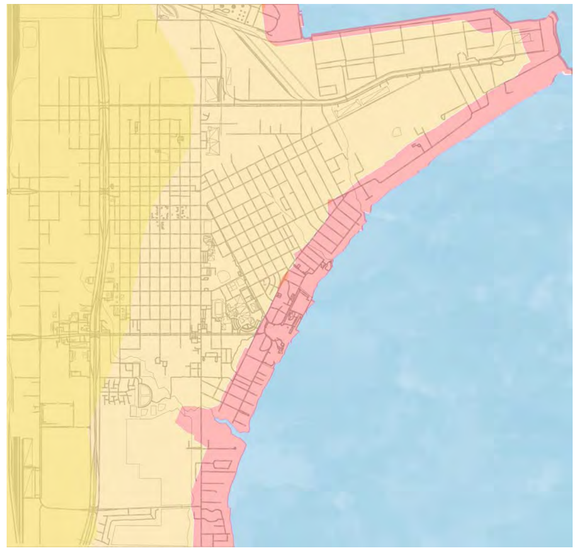
Coastal Erosion — Moderate

04 Current And Anticipated

Climate

At Galveston Bay, Sea level is rising by 25 inches per century and will continue to rise by another 38 inches by 2100. Their have been proposal responding to sea level, by building walls or raising the land but it would be to costly.

Galveston is identified as having the most properties at risk of chronic inundation

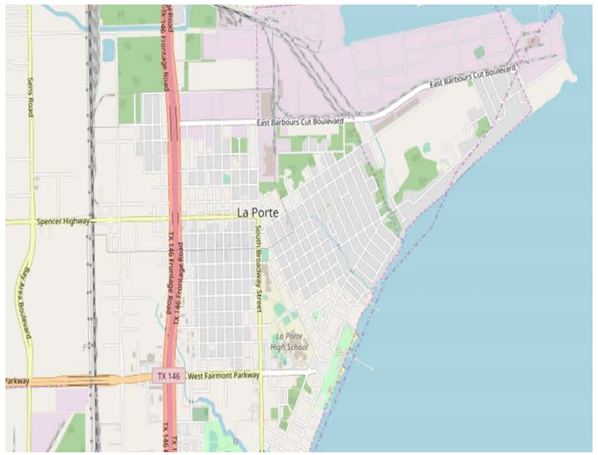


Strom Surge

- Category 1
- Category 2
- Category 3

05 La Porte

City Scale



Map Image: La Porte is located on the Coastal side of Houston

Sea Level - 2ft (2025) — Sea Level - 3.6ft (2050)

Sea Level - 5ft (2075) — Sea Level - 6ft (2100)

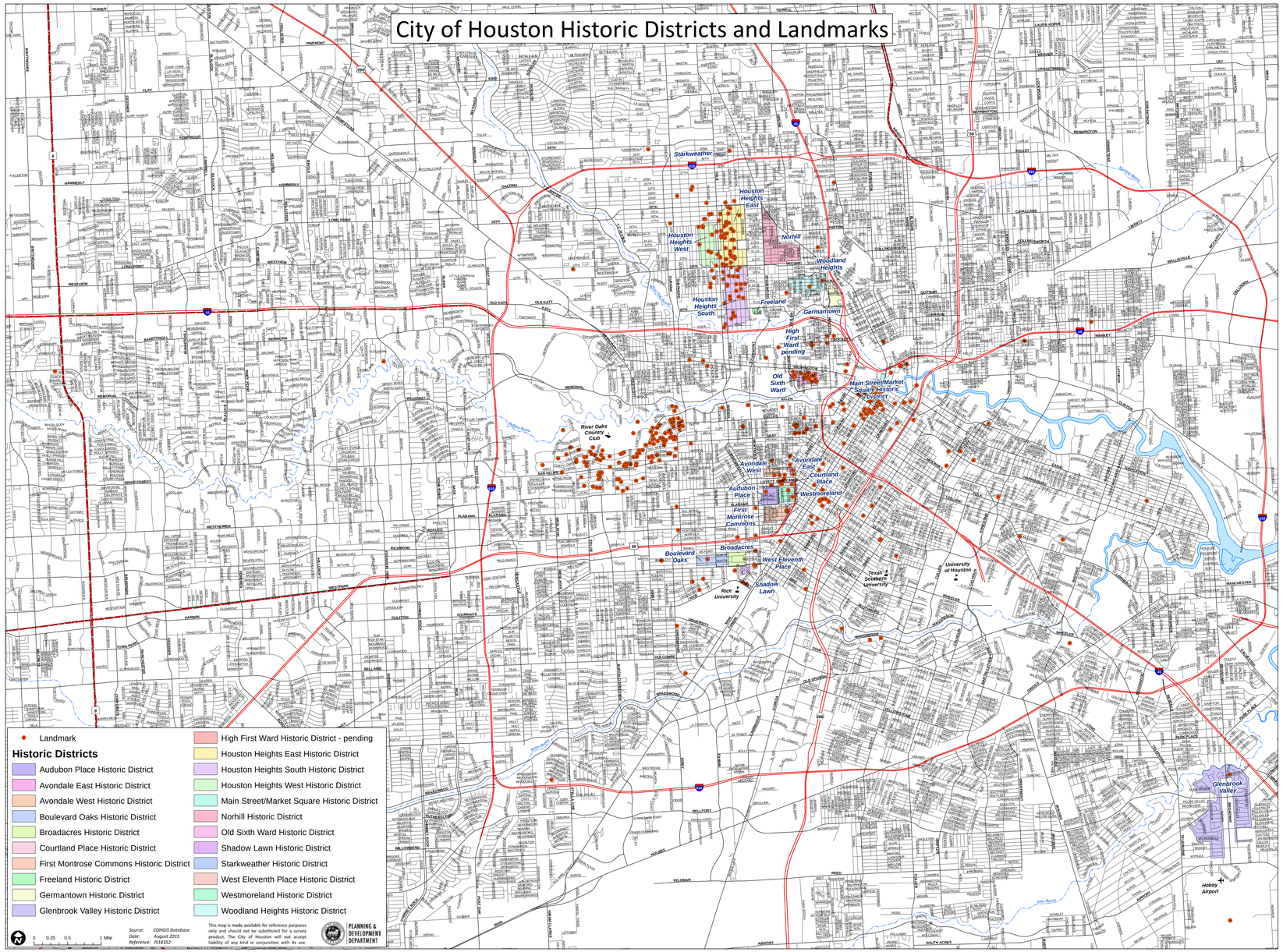
Houston

MAPPING LIMINALITY 2

Fall 2018 Ex 02

06 Historic District

Historic districts and Landmarks are spread out throughout Houston. Mostly Located around the Downtown area, West and North of Downtown.



Historic Districts (houstontx.gov)

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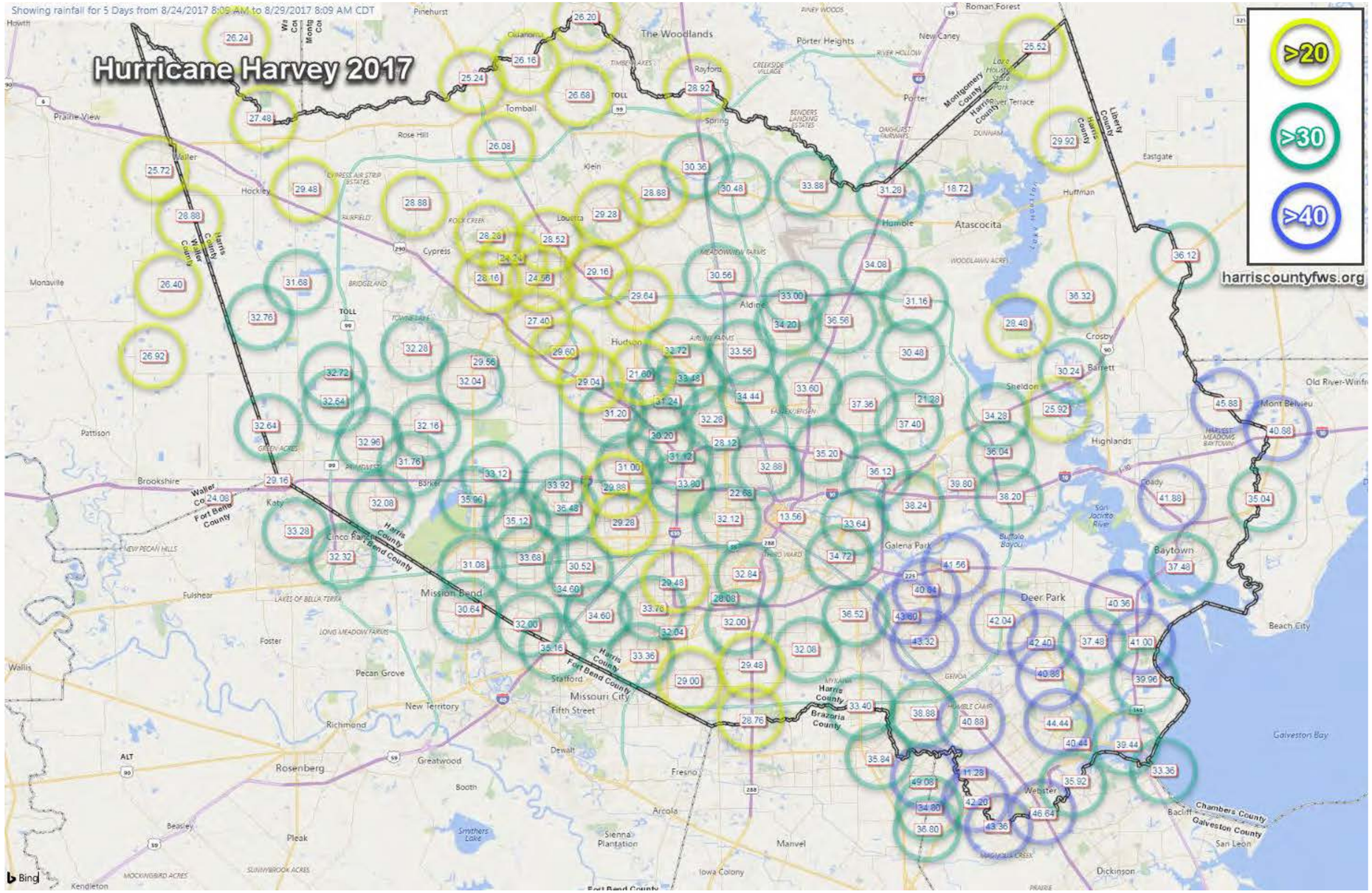
MAPPING LIMINALITY 2

Fall 2018 Ex 02

07 Tropical Storm Allison

Tropical storm Allison devastated southeast Texas in June of 2001. It lasted long for a June storm which dumped torrential rainfall when over land. Houston received the worst flooding which caused tremendous damage, 30,000 became homeless after the storm flooded over 70,000 homes and destroyed 2,774 homes. Downtown was inundated with flooding
that caused severe damages to hospitals

Dropped heavy rainfall along its path, peaking 40 inches.



Tropical Storm Allison RainFall Data (houstontx.gov)

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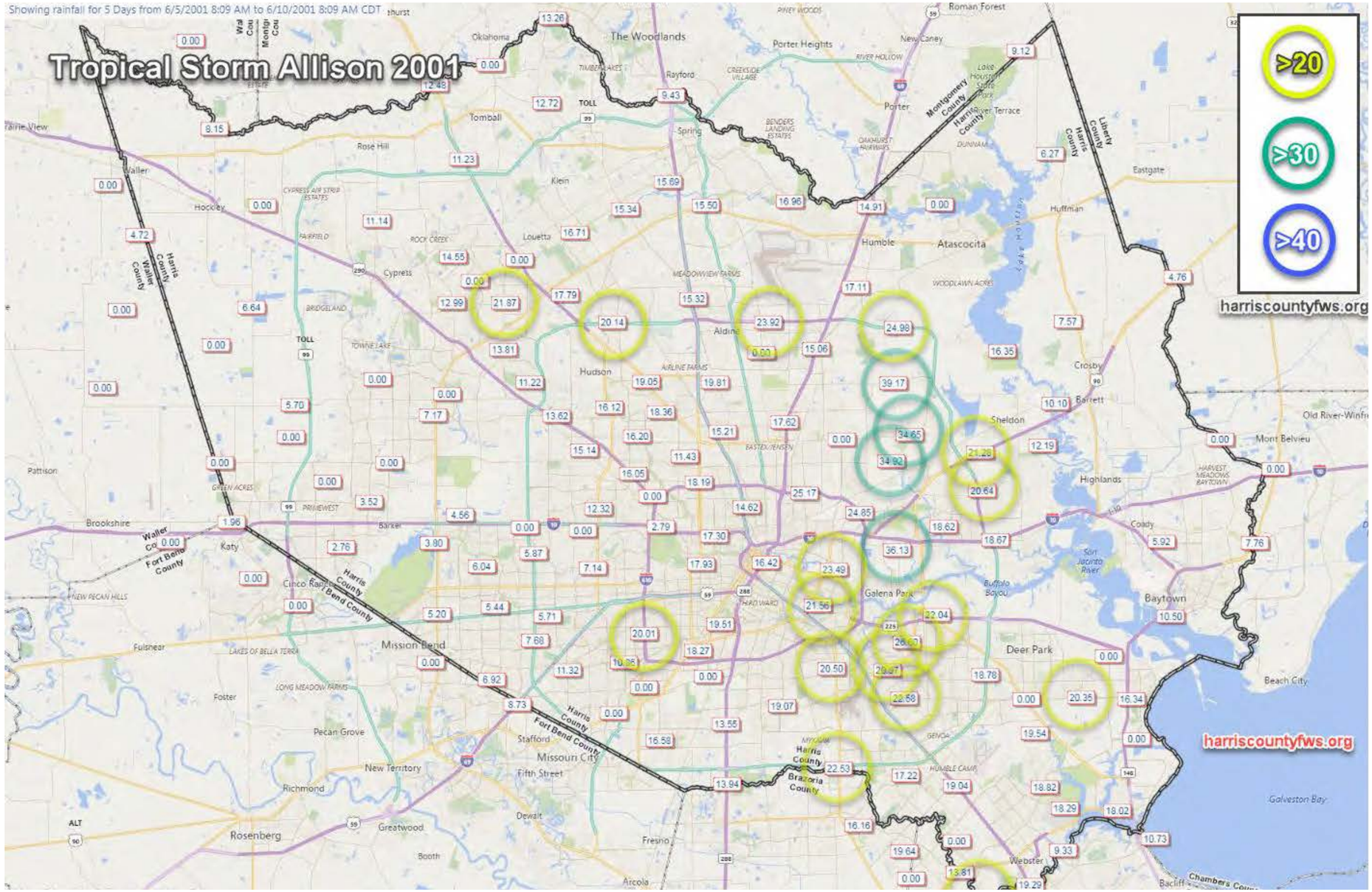
MAPPING LIMINALITY 2

Fall 2018 Ex 02

08 Hurricane Harvey

Hurricane Harvey made landfall in Houston Metropolitan area and Southeast Texas August 2017, which triggered catastrophic rainfall flooding. Thousands of homes were flooded which displaced more than 30,000 people.

Dropped heavy rainfall along its path, peaking 60.58 inches.



Hurricane Harvey RainFall Data (houstontx.gov)

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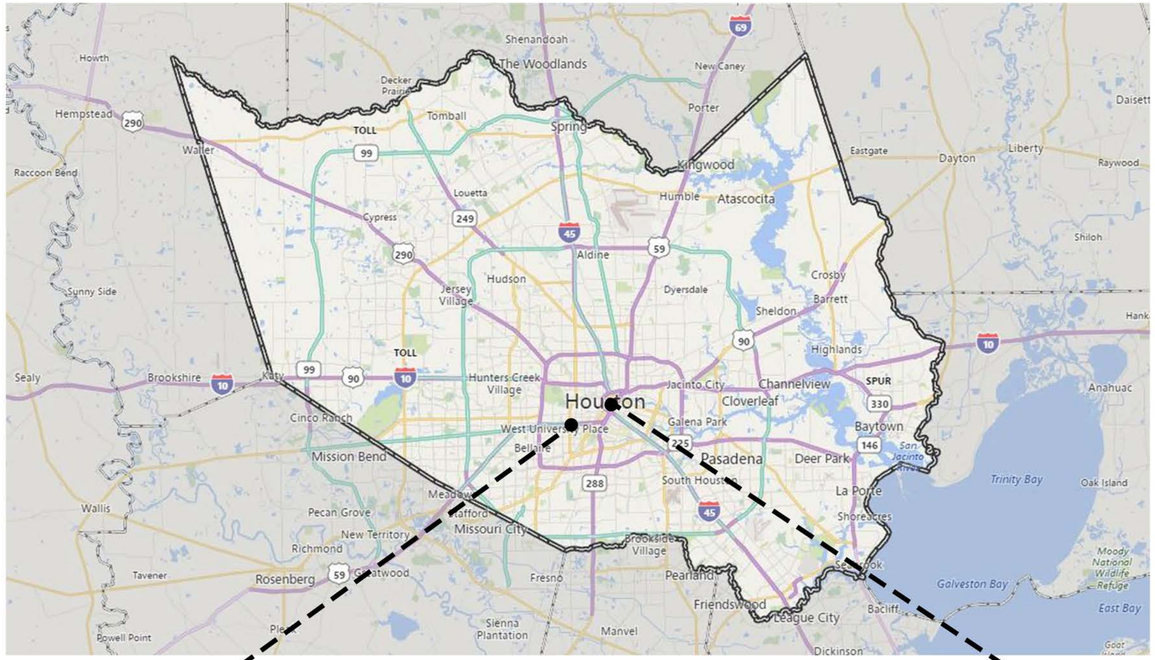
09 Critical Areas

These two areas were chosen because how they were affected throughout either Tropical Storm Allison or Hurricane Harvey

1. West Houston/ Barker Reservoir
2. Downtown Houston



West Houston/
Barker Reservoir

Downtown Houston

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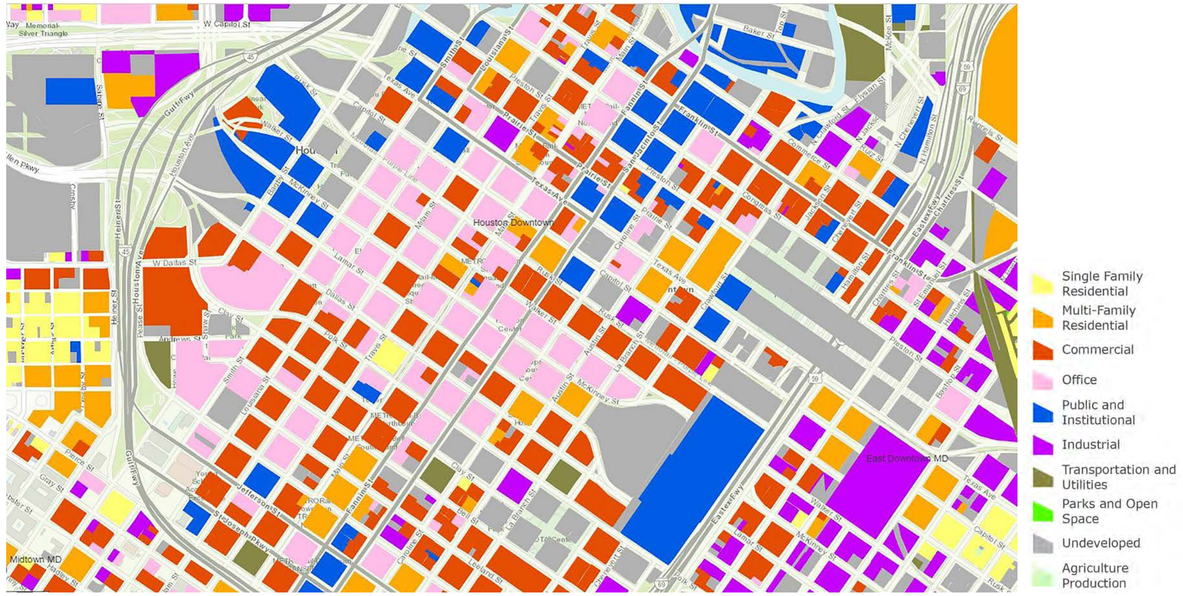
10 Downtown

Downtown Houston is the largest business district in Houston. It contains houston's civic center and is also a major public transportation hub.

Exisitng Conditions, Houston



Land Use Diagram

Houston's Uptown district towers over a residential neighborhood

The Memorial Crematorium and Mortuary sits next to a residential area

Top & Middle: showing the different zoning conditions around Houston. Bottom: Shows Before and after Buffalo Bayou during a flood.

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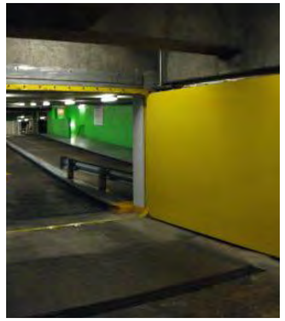
MAPPING LIMINALITY 2

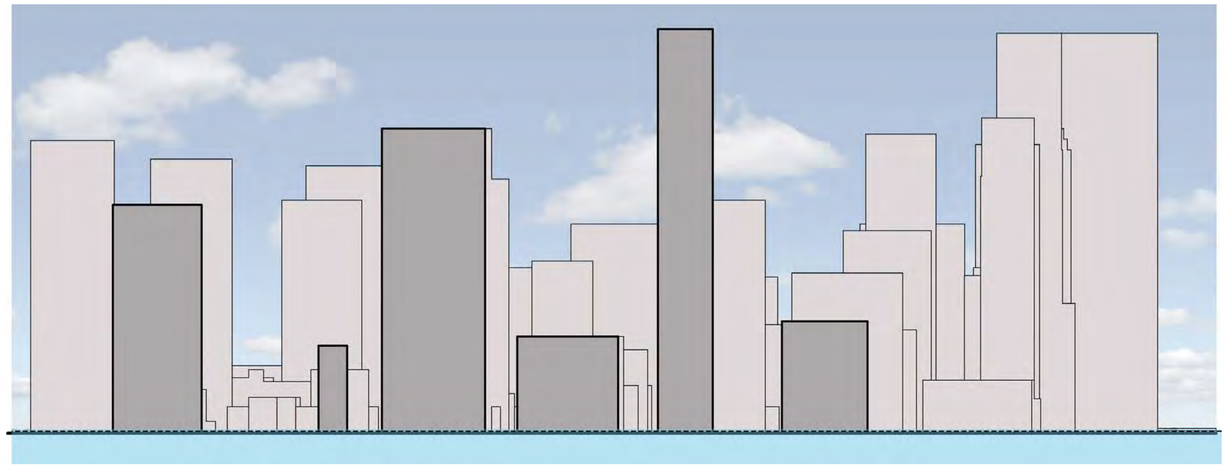
Fall 2018 Ex 02

11 Downtown

The Houston tunnel system connects 95 city blocks below Houston's Streets. During Tropical Storm Allison, it sustained a large amount of flooding due to the fact thats its prone to flooding. After Allison some of the buildings installed floodgates to prevent another occurrence from happening.

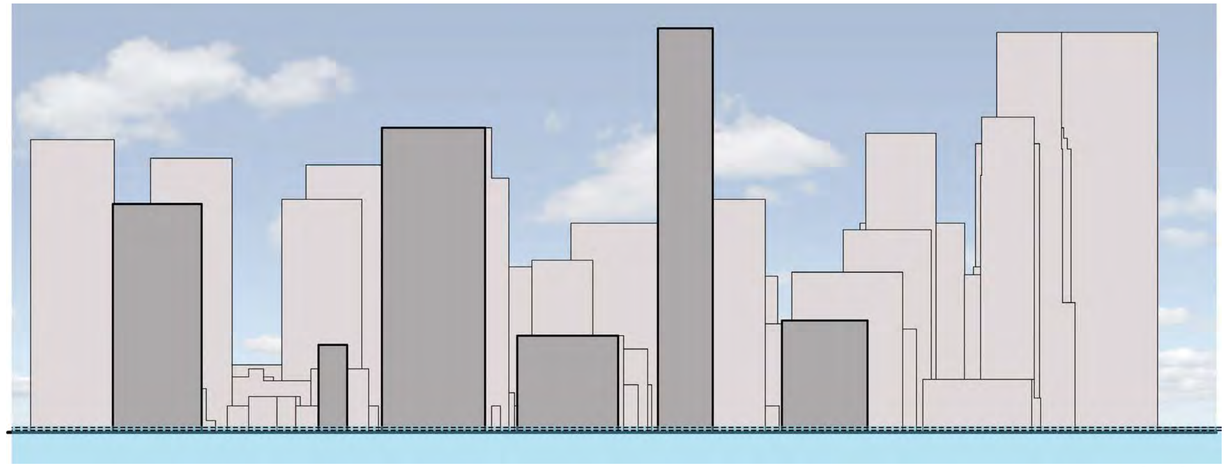


Top & Middle Images: Flooding of the tunnel system during hurricane allison. Bottom: Floodgates installed after Allison



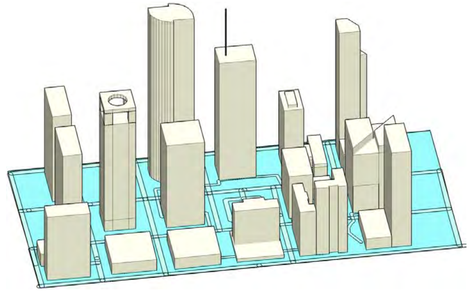
Downtown Houston Flooding during Tropical Storm Allison

1 FT Flooding

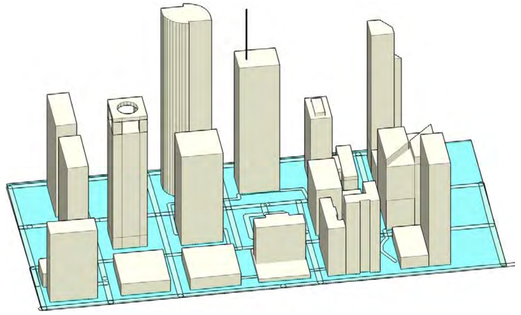


Downtown Houston Flooding during Hurricane Harvey

2 FT Flooding



1 FT Flooding during Allison



2 FT Flooding during Allison

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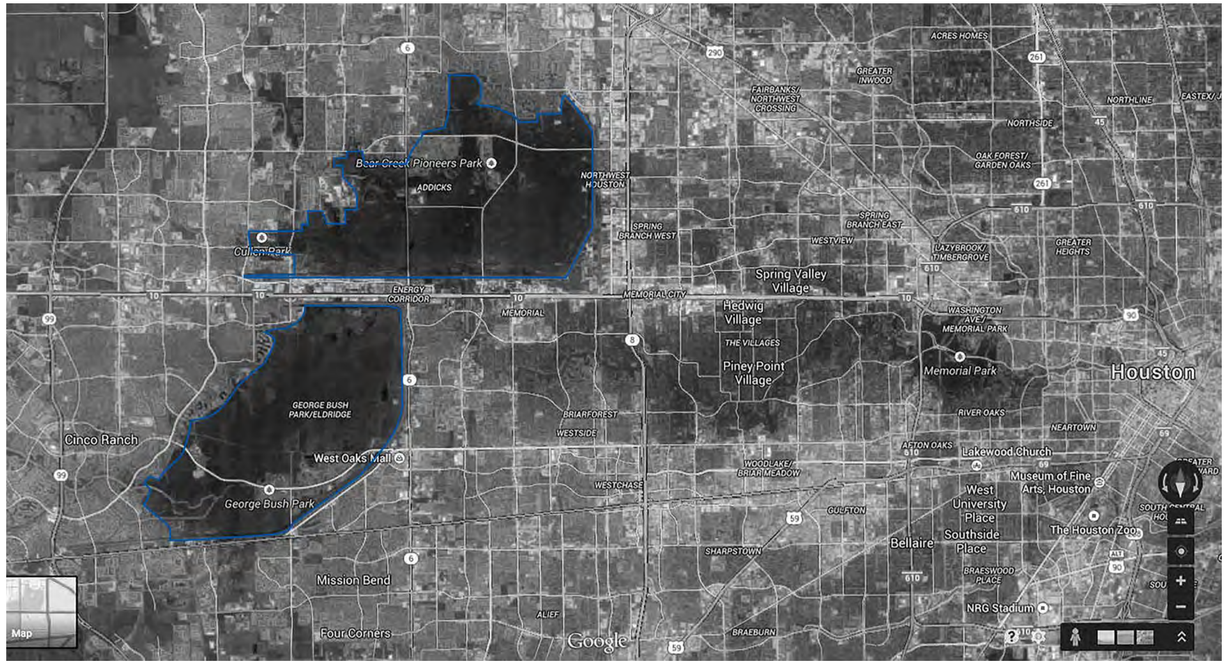
MAPPING LIMINALITY 2

Fall 2018 Ex 02

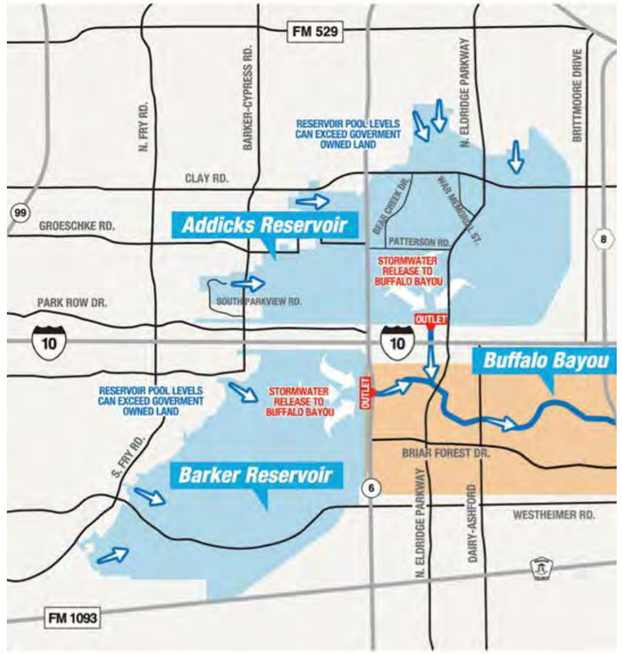
12 Barker Reservoir

Barker Reservoir is a flood control structure which prevents downstream flooding of Buffalo Bayou. It operates with conjunction of the Addicks Reservoir to the northeast. During Hurricane Harvey, the maximum capacity for water storage was reached, Water then had to be realized into the already flooded streets because it reached maximum capacity, this caused the residential areas behind the reservoir to flood heavily and a certain number of homes were damaged.

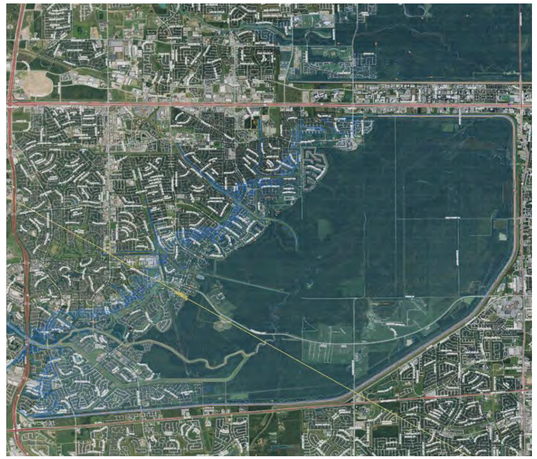


Exisitng Conditions

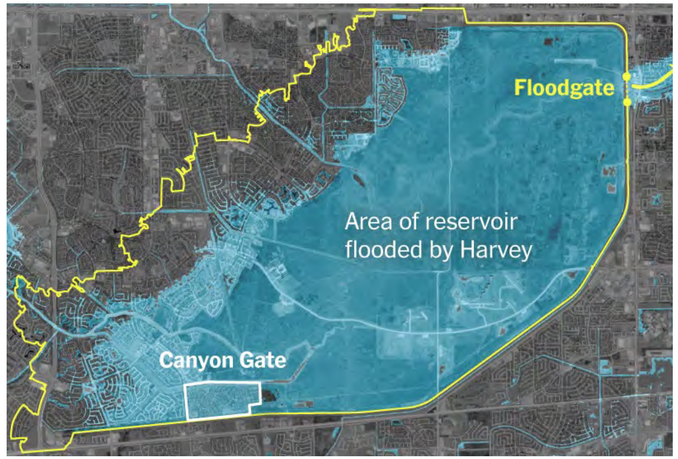
Exisitng Coastline



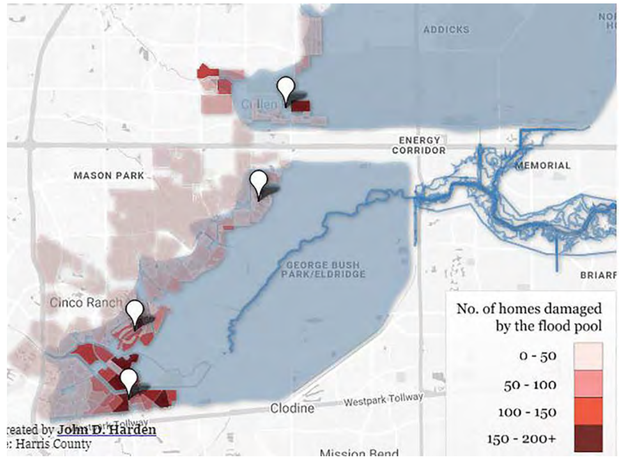
Water Flow Diagram (www.swg.usace.army.mil)



Images showing the different zoning conditions around Houston (www.swg.usace.army.mil)



Flooding during during Harricane Harvey (www.swg.usace.army.mil)



House Damaged after Barker Resvoir (projects.propublica.org/graphics/harvey-reservoirs)

Esther Triana, Sarah Wiener

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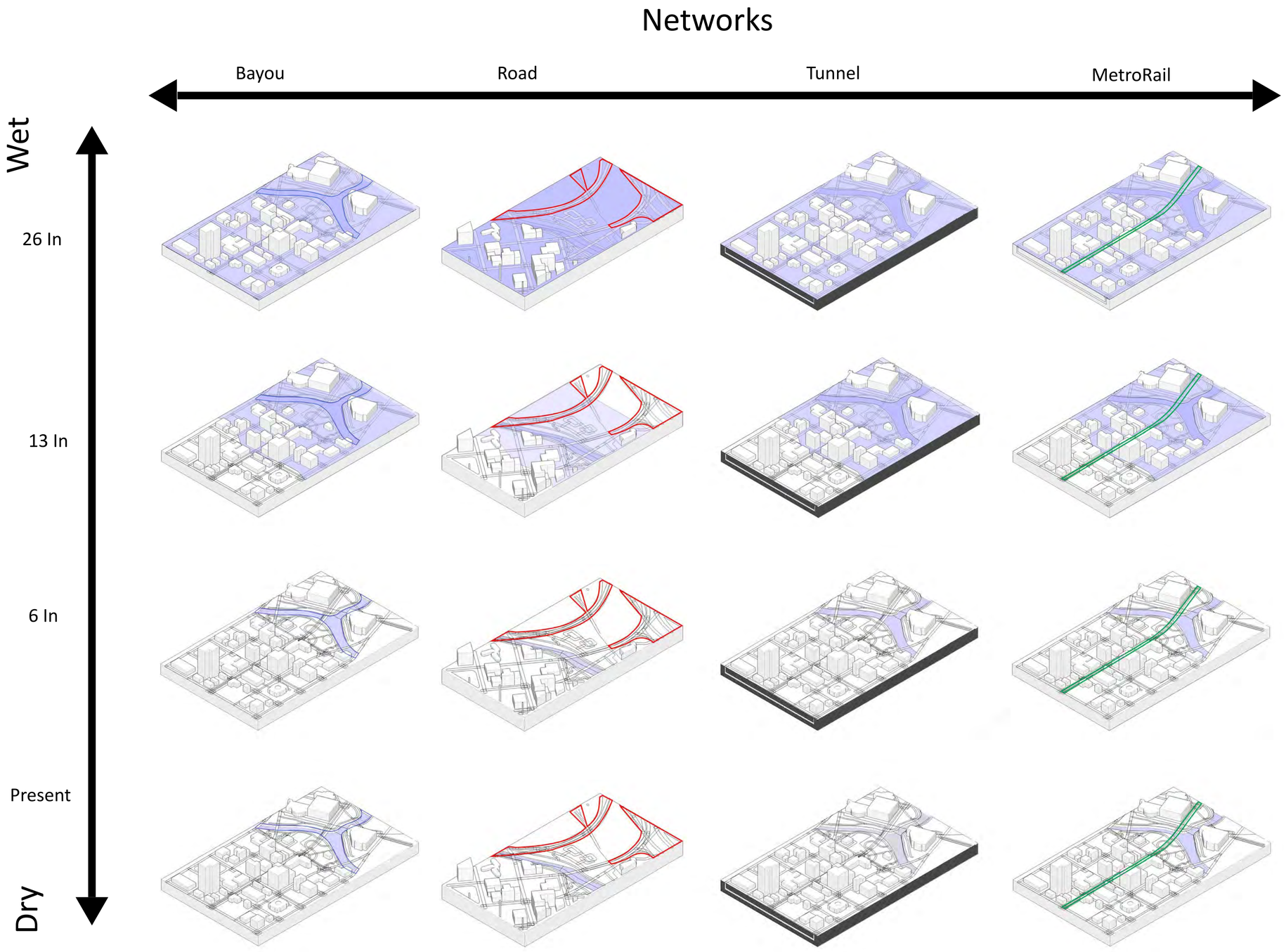
MAPPING LIMINALITY 3

Fall 2018 Ex 03

14 Matrices

Houston contains different types of networks that run along and throughout downtown.



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MAPPING LIMINALITY 3

Fall 2018 Ex 03

15 Matrices

Due to the variety of program found in downtown, you can find high rises, mid rises, and low rises coexisting with each other.

Building Typology:

High Rise

Mid Rise Mixed Housing

Mid Rise

High Rise Housing

Low Rise

"Building Typologies", Hosutontx.gov. Web. 30 Sept 2018.

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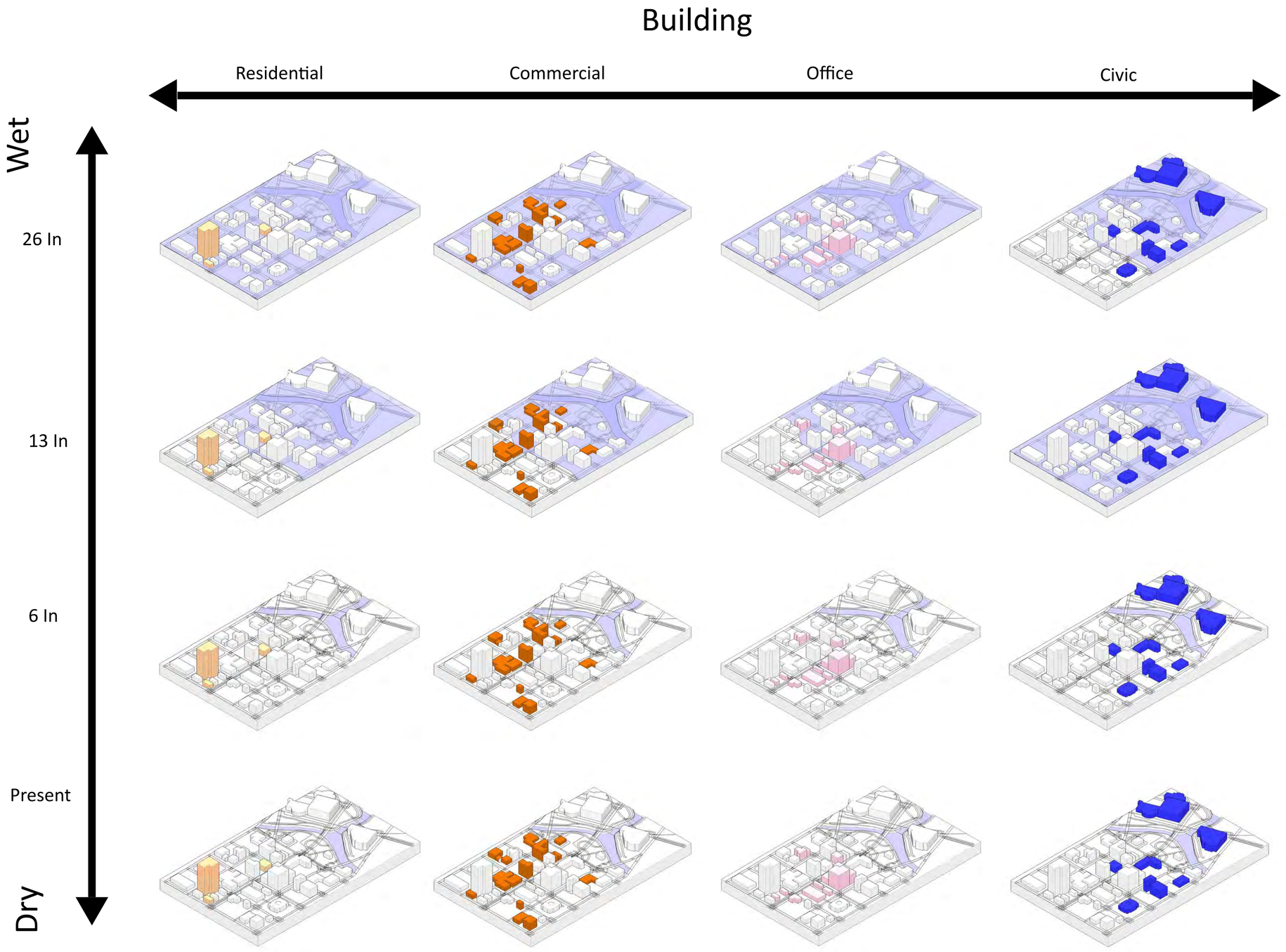


Houston

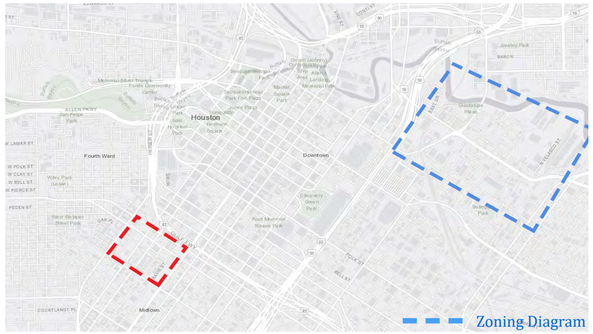
MAPPING CODES + REGULATIONS

Fall 2018 Ex 04

16 Landuse

The city of Houston does not have any zoning codes/laws but development is governed by codes that address how property can be subdivided. the city codes do not address land use. In other words, you have businesses and houses that coexist on the same street or buildings that intrude on residential neighborhoods.

Houston is unique for its lack of formal zoning but the city does have regulations to shape the development. These are some formal regulations that Houston does not use.



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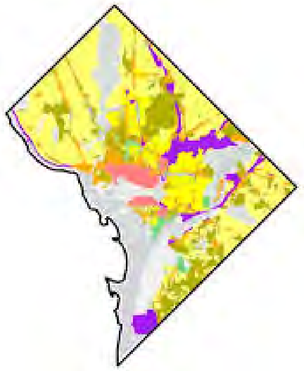
Codes+Regulations

What houston doesnt do:

Houston doesn't mandate single-use zoning



Washington DC Zoning Map", dcoz.dc.gov/page/zoning-maps-district-columbia. Web. 14 Oct 2018.

The City of Houston doesn't mandate the separation of residential, commercial, and industrial developments

Houston doesn't segregate residential developments

Midtown Naighborhood, DigitalGlobe 2012. http://www.earth.google.com [October, 14, 2018]

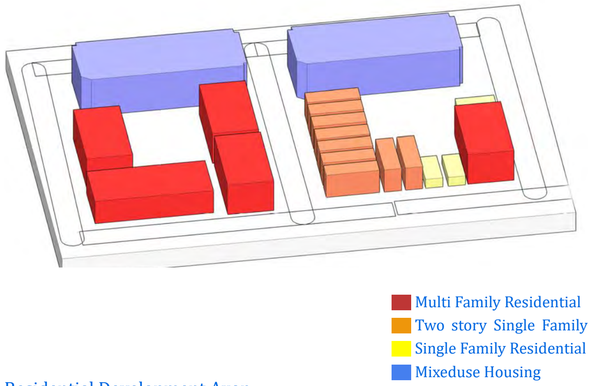
Houston doesn't mandate the separation of different building types.

Houston doesn't regulate density

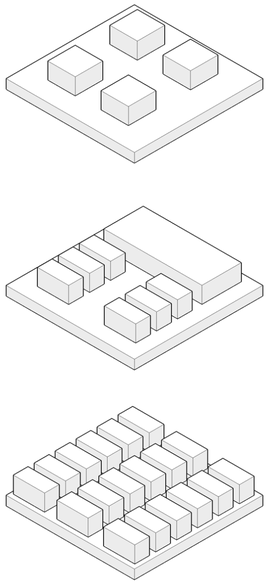
Midtown Neighborhood, DigitalGlobe 2012. http://www.earth.google.com [October, 14, 2018]

Houston doesn't restrict the number of units that can be built per acre.

Land Use Diagram



Residential Development Axon



Density Axons

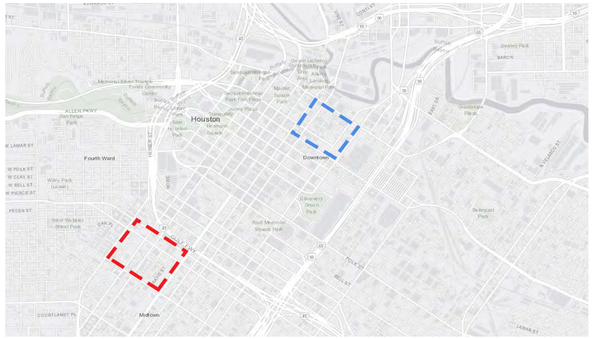
Houston

MAPPING CODES + REGULATIONS

Fall 2018 Ex 04

17 Landuse

The type of regulations Houston uses to regulate the development of the city.

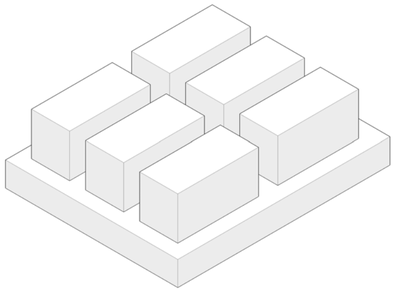


Zoning Diagram
Neighborhood

Codes+Regulations

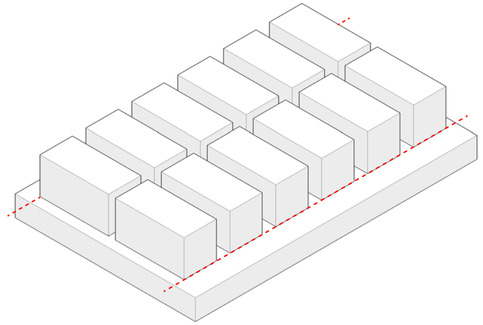
What houston does do:

Houston does mandate minimum lot sizes



The City of Houston does mandate lot sizing to be 50 ft wide and 100 ft in deep residential. This restrictions do not apply to multifamily housing, commercial, industrial.

Houston does mandate minimum lot sizes



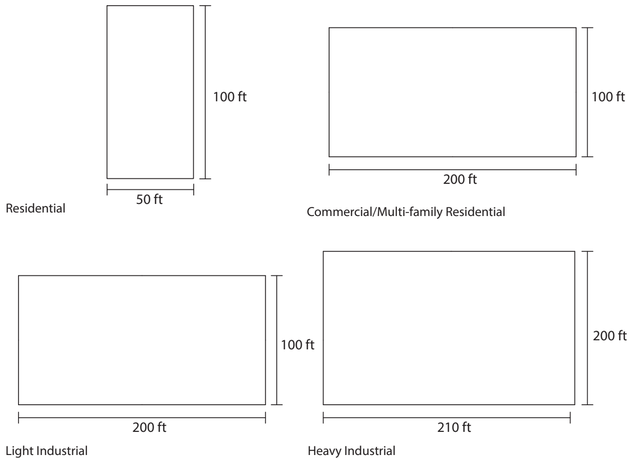
Axon Diagram Showing Front Setback

For single family homes the maximum setback is 25 ft. Commercial and industrial is 5 ft and any building within the central business district has no setbacks.

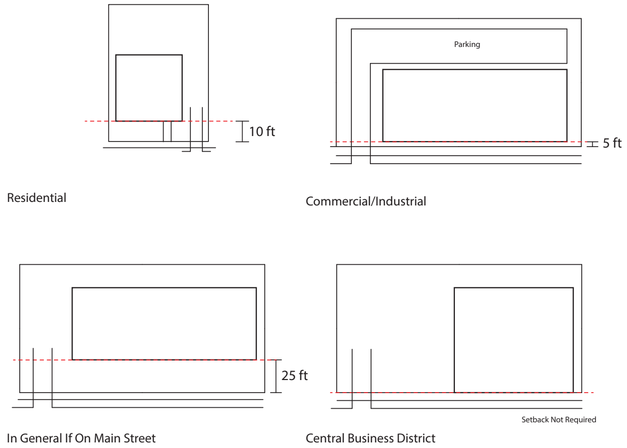
Houston does mandate off street parking

Downtown Houston, , DigitalGlobe 2012. http://www.earth.google.com [October, 14, 2018]

Houston mandates off street parking for every development.



Lot Size Diagrams



Setback Diagrams

Parking lots/Garage Diagrams

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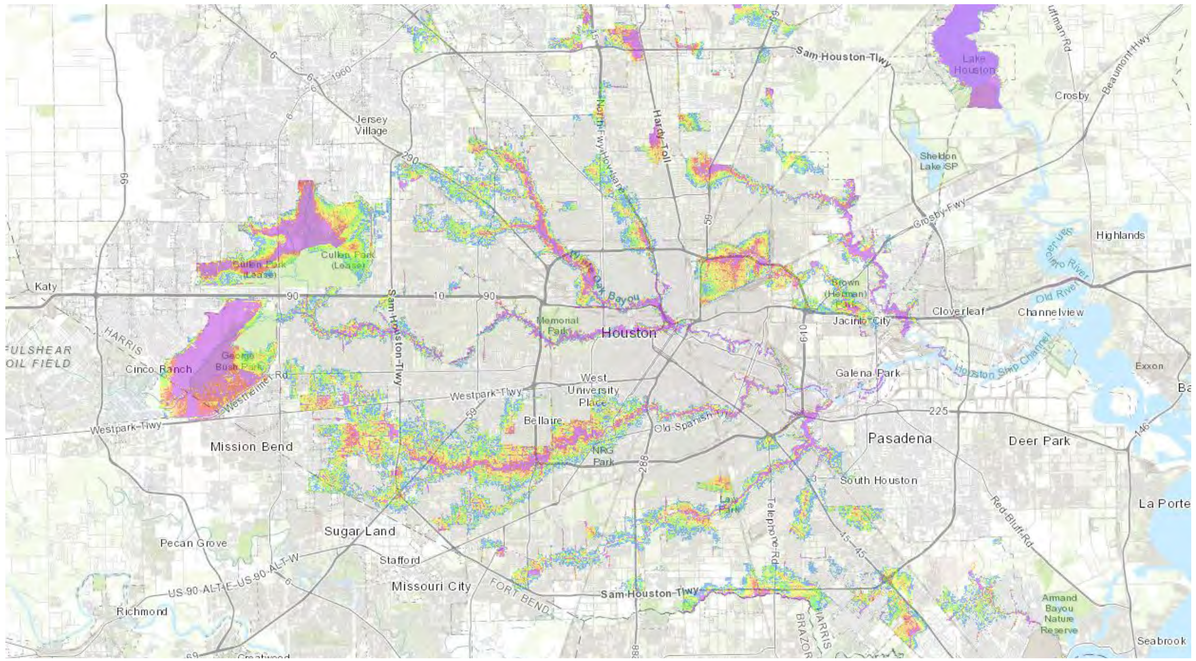
MAPPING CODES + REGULATIONS

Fall 2018 Ex 04

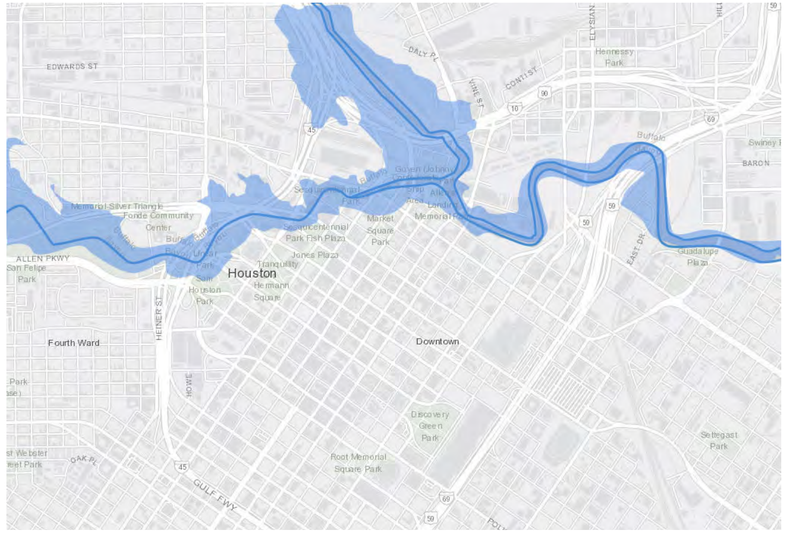
18 Flood Plain

After Hurricane Harvey, Houston passed new flood regulations that are meant to reduce future damage to the city. Homeowners or Commercial businesses that are in the 100-year flood plain are required to have flood insurance and build new homes above 1 Ft. Those in the 500-year floodplain have to elevate by 2ft. Exisiting homes or businesses are not required to be elevated.

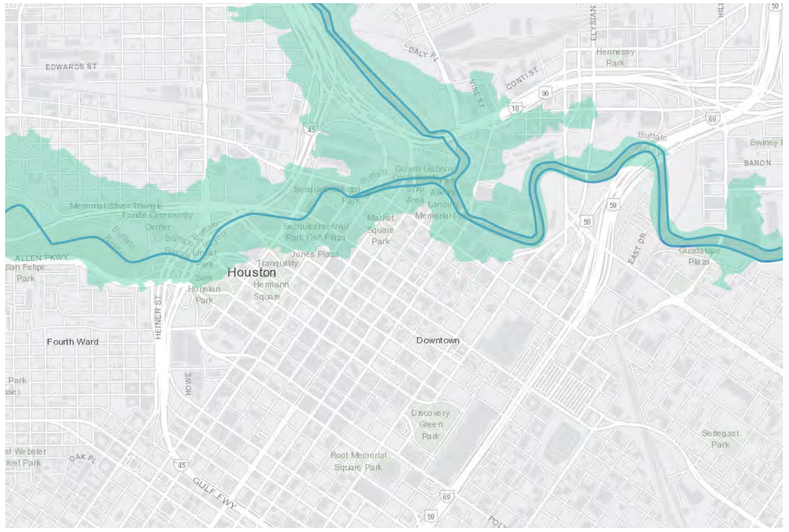
FloodPlain Regulations



Houston Flood Plain Map, ArcGIS



500 Flood Plan Diagram



100 Flood Plan Diagram

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Houston

MAPPING CODES + REGULATIONS

Fall 2018 Ex 04

19 Resilience Projects

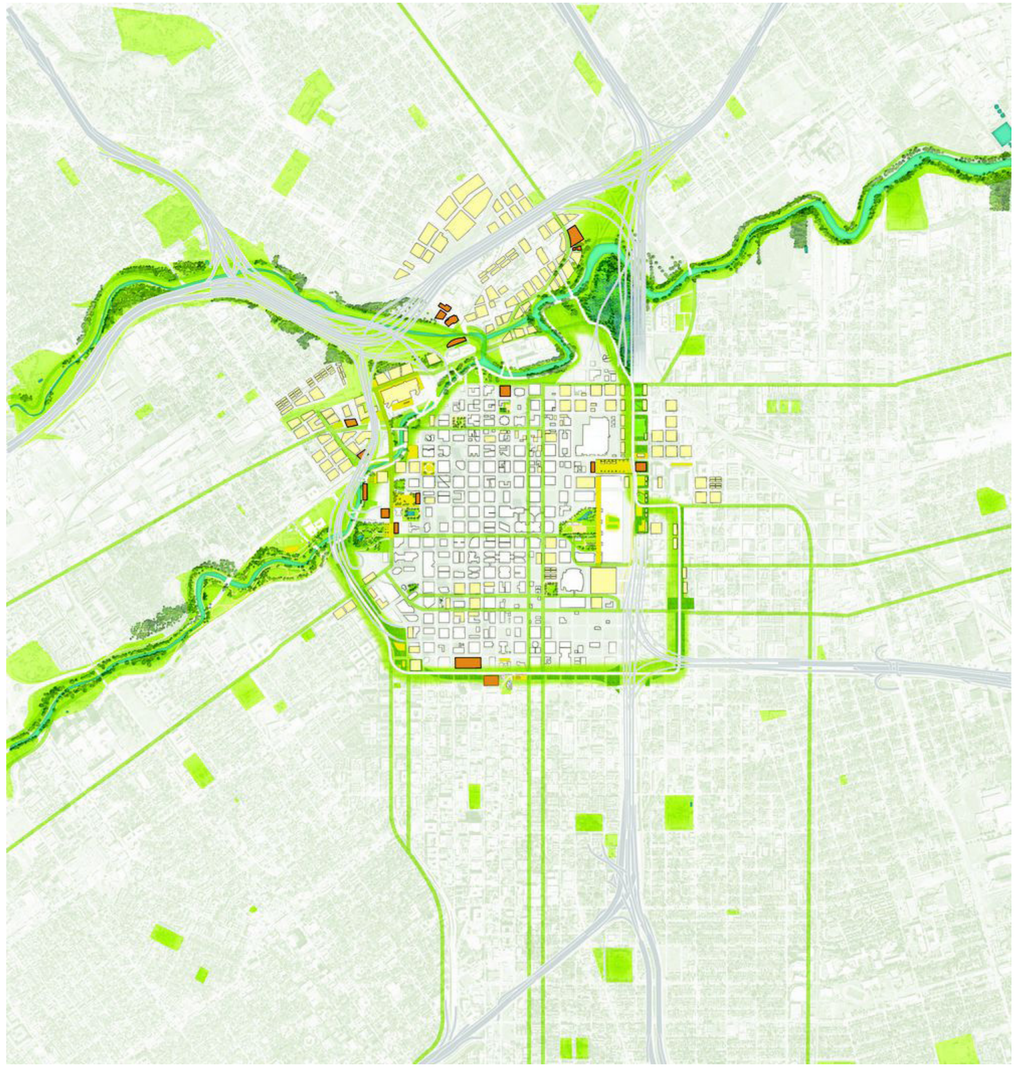
Proposed projects after Hurricane Harvey, trying to create a systems for risk management and preventing severe flooding from storms.

This downtown master plan was released after Hurricane Harvey and it focuses on disaster mitigation. Besides increasing the amount of green spaces, the proposal has set land for retenion areas and shifting away from car dominated urban planning.

The project's important features is its five-mile long Green Loop, a band of parks and bike lanes that would wrap the downtown area and connect it with further-flung neighborhoods. North corner of downtown opens up a large parcel of land that can be used as storm water retention.

Resilience Projects

Houston Downtown Master Plan



"Proposed Green Loop, "https://www.downtownhouston.org/news/article/downtown-future-almost-here/. Web. 14 Oct 2018.

"Rendering of the waterfront along Buffalo Bayou", "https://www. downtownhouston.org/news/article/downtown-future-almost-here/. Web. 14 Oct 2018.

"Rendering of North Canal", "https://www.downtownhouston.org/news/article/downtown-future-almost-here/. Web. 14 Oct 2018.

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