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Disaster Ready: A Conversation about Resilient Healthcare

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Healthcare facilities are critical community resources, especially in times of human or natural disasters

Which is why we must do everything possible to keep them open and functioning

The Challenge

- The number of UK residents impacted by flooding could double by 2050
- Sea levels could rise by 2 metres by 2050
- Western coast of the UK would be most impacted
- Even London could experience severe flooding

Sources: The Guardian, Extreme Heat, 30 June 2017 / The Guardian, UK poorly prepared for climate change impacts, 12 July 2016 / Geology, Sea Level Rise Map, 15 August 2017

Major flooding is likely to happen every year in the UK

Water pours through Abergele Hospital, Wales in flash floods

The Challenge

- 13 of the 14 warmest years on record have occurred in the 21st century
- Likely to become 3C warmer than 19th century by 2050
- Heatwaves could become 4 x more likely in the UK
- Reluctance to ensure facilities can withstand high temperatures could lead to a tripling of heat-related deaths by 2040.

Sources: The Guardian, Extreme Heat, 30 June 2017 / The Guardian, UK poorly prepared for climate change impacts, 12 July 2016 / Geology, Sea Level Rise Map, 15 August 2017

Even Today,

90% of hospitals are at risk of overheating in summer conditions, with some wards reaching 30 degrees while outside temperature is 21.

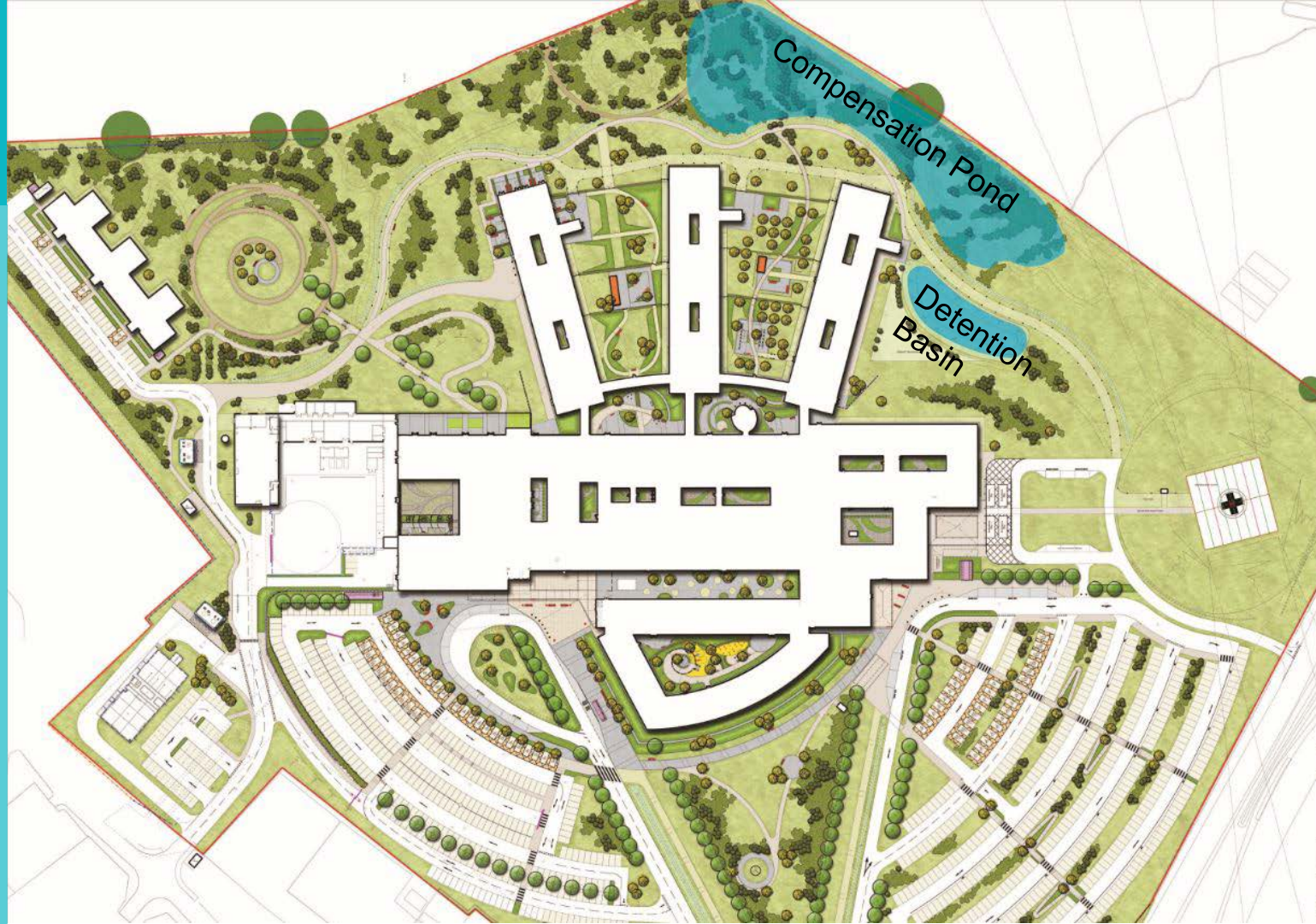
Heatwaves, floods and drought are expected to become more common due to climate change

How are we responding to Climate Change within Design?

NBBJ Project Case Studies

Dumfries and Galloway Acute Hospital

Dumfries and Galloway Acute Hospital



Dumfries and Galloway Acute Hospital

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Royal Liverpool University Hospital

What can we learn from the US?

NYU Langone Medical Center, Ronald O. Perelman Center for Emergency Services // **POST-SANDY**

Medical University of South Carolina, Ashley River Tower // **POST-HUGO**

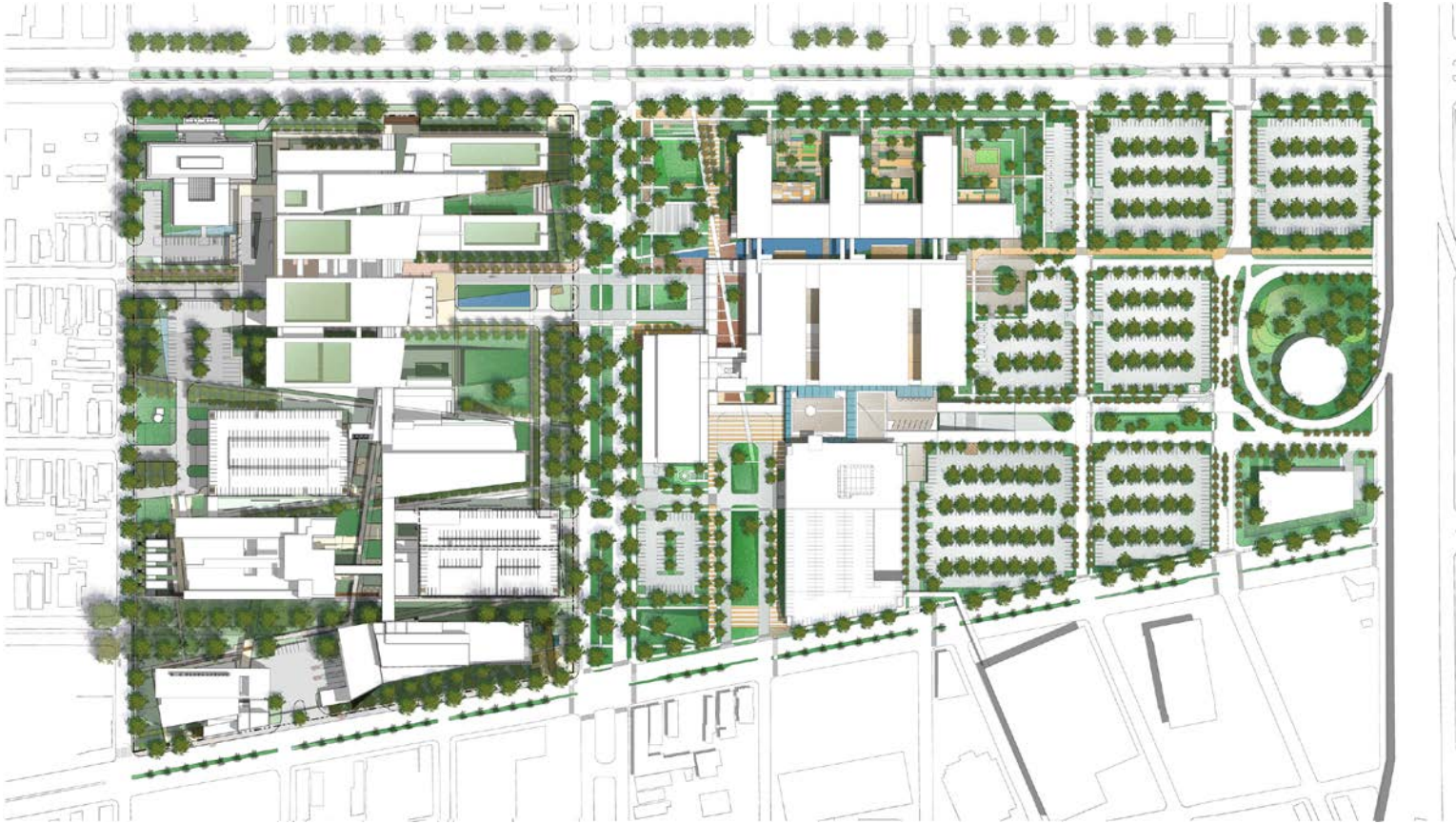
Southeast Louisiana Veterans Health Care System, Replacement Medical Center // **POST-KATRINA**

University Medical Center // **POST-KATRINA**

New Orleans Medical District

“A delta city is in a perpetual state of betweeness,
between land and water,
between stability and vulnerability,
between “nature” and “culture”,
between the living and the dead...
the challenge of Post-Katrina New Orleans is how to construct place from this condition of betweeness.”
Rob Shields from *What is A City? Rethinking the Urban after Hurricane Katrina*

New Orleans Medical District



Hurricane Katrina

- 1.3 million people evacuated
- 400,000 lives displaced
- 1,577 lives lost

Charity Hospital, New Orleans

University Medical Center, New Orleans

Defend in place…
Designed for the facility to fully operate off the grid for **5 days** and **support 1,000 people**

FULLY STOCKED WAREHOUSE

A 6,000-SF warehouse located on-site stores emergency supplies, including food and water.

SELF-SUFFICIENT POWER

The central energy plant stores 320,000 gallons of fuel, enough to provide full power for one week, and the refill pump is located in a waterproof enclosure above the 500-year flood line.

ROOM TO GROW

All single-occupancy rooms can be temporarily converted to double-occupancy in order to accommodate a potential increase in patients due to an emergency.

FLOOD OPERATIONAL

Mission-critical components, including the emergency department, are located at least 21 feet above base flood elevation.

HURRICANE READY

The building envelope is constructed of glass, metal and concrete that can withstand Category 3 storms.

ENERGY EFFICIENT, EVEN IN CRISIS

Rooftops connected to a 1 million+ gallon rainwater storage tank maintain operation of cooling systems and reduce use of city water.

HELICOPTER ACCESSIBILITY

A helicopter landing area on top of the parking garage accommodates Blackhawk-class helicopters to transport patients.

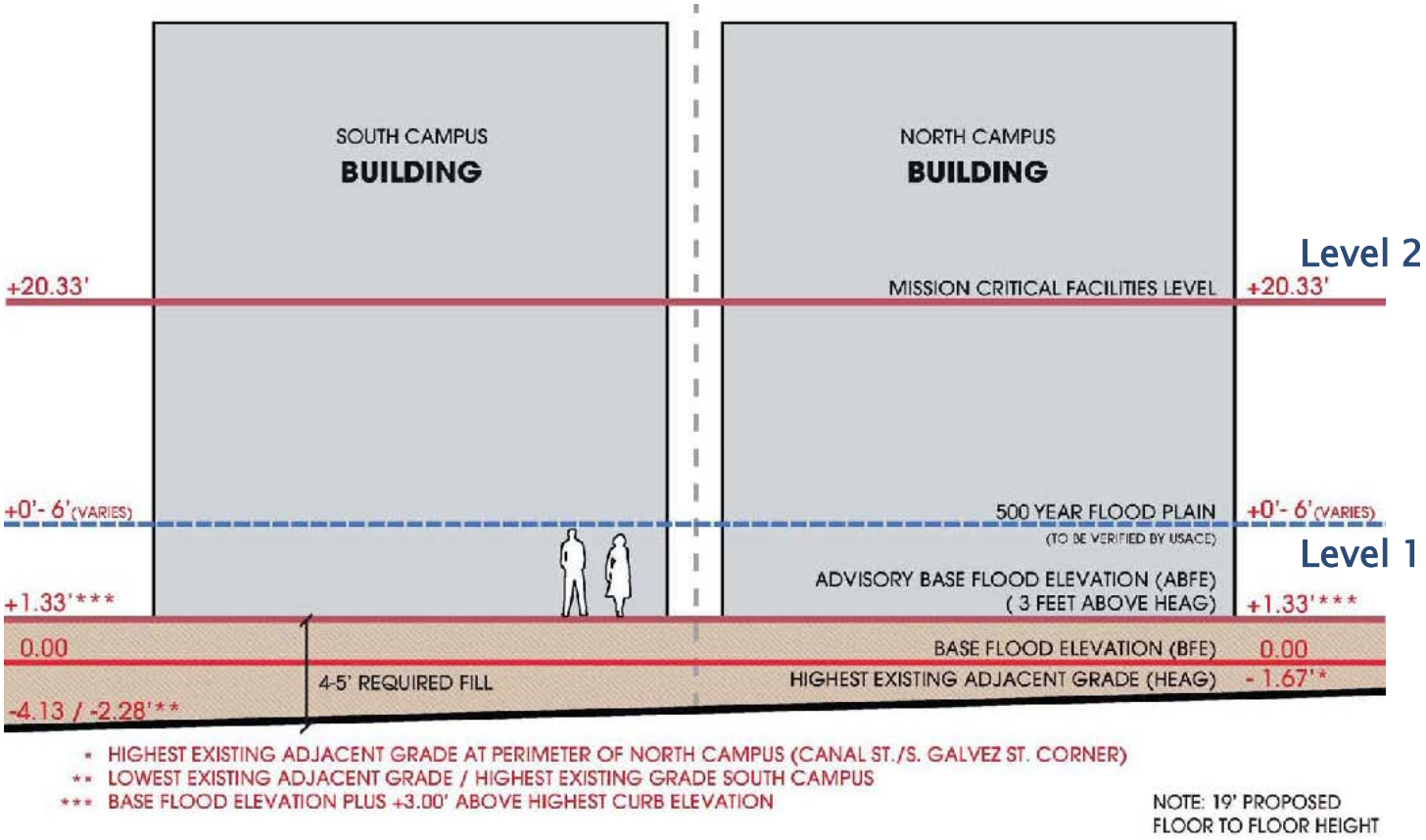
BOAT ACCESSIBILITY

The ramp to the emergency department extends up to the facility's second floor, doubling as a boat dock in the event of flooding.

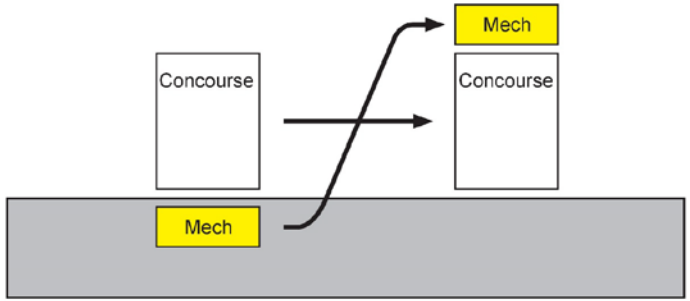
"UP-SIDE-DOWN" HOSPITAL

Primary utility distribution, which connects the hospital to the city power grid, is located on the fourth level to avoid flood damage.

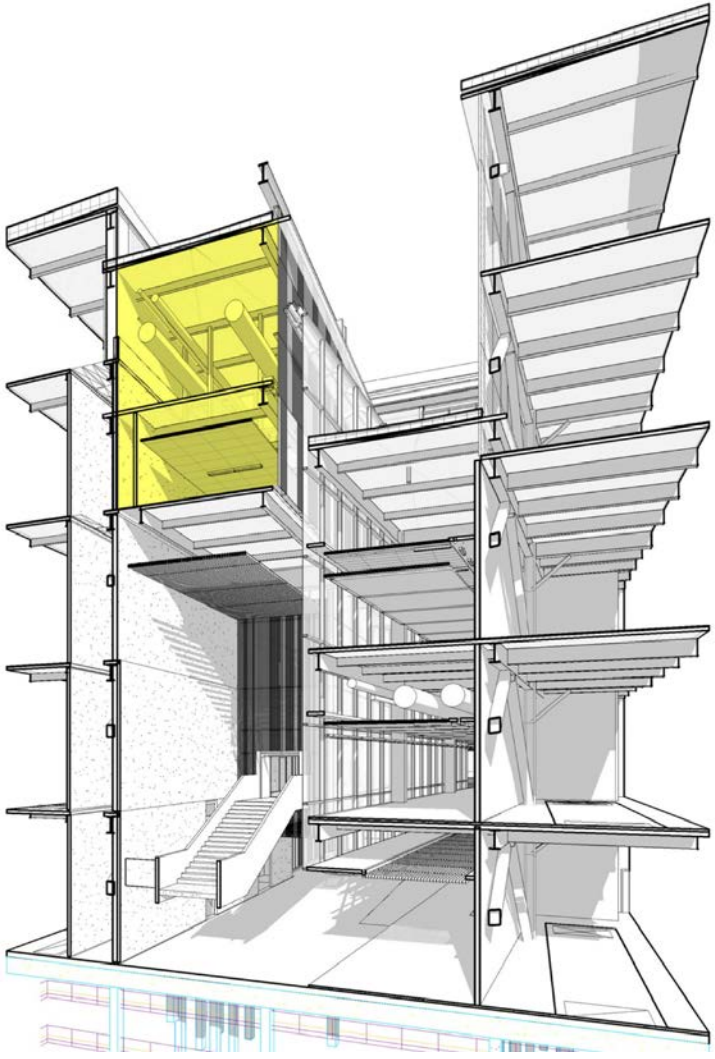
Flood Mitigation



The Upside Down Hospital



The upside down hospital
Concourse section is inverted, moving infrastructure from typical location in basement to site specific location above public space.



An Unprecedented Event

October 29, 2012

- Water levels on campus reached an estimated overall depth of 14 feet
- Over 15 million gallons of water filled buildings on the main campus

NYU Langone Medical Center

Considerations for the Future

- An imaginative approach
- A conversation that can only be solved with partnerships
- Low hanging fruit
- Not only about the buildings, as much about the people and mission continuity

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