IMAGINED ADAPTATIONS

SESSION 5

KEEPING HISTORY ABOVE WATER

IMAGINED ADAPTATIONS

Dennis Carlberg | Boston University & Urban Land Institute

Mason Andrews | Hampton University

Suzanne Mathew | Rhode Island School of Design

Lisa Howe | Building Conservation Associates

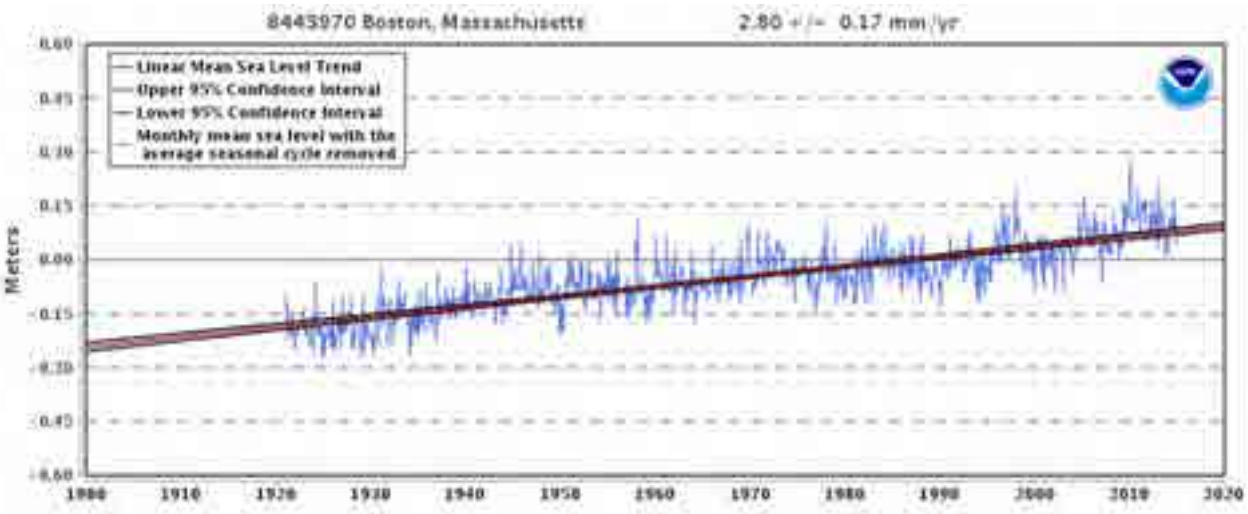
Stephanie Zurek | Union Studio

IMAGINED ADAPTATIONS

Panel Explorations | Considerations

- Climate resilience for historic resources
- Prioritizing tradeoffs for resilience in historic structures
  - Scales
  - Strategies
- What is the quality of community life we create if we don't work collectively toward shared solutions
  - Raised Building Syndrome
  - Connectivity & Continuity
  - Living with Water or Leaving from Water

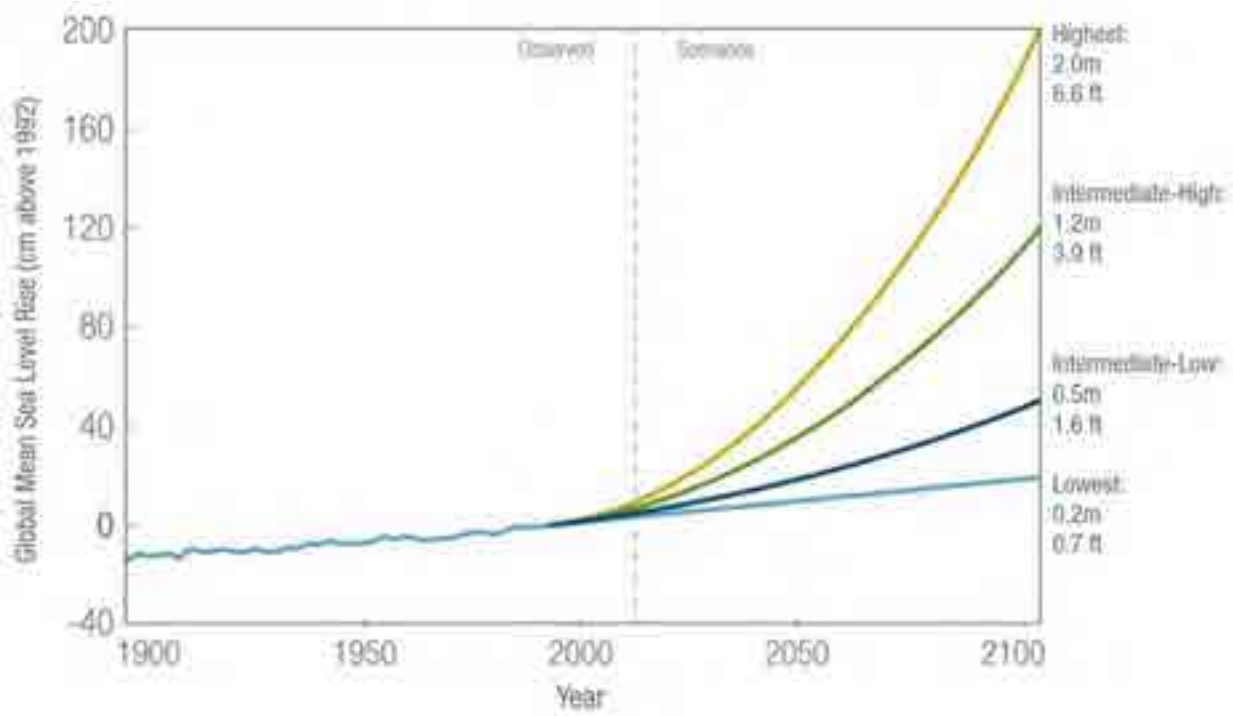
Source: Frank Amaral, NPS, and Emily Michot



Issues

1. Sea Level Rise
   - 11 inches in Boston
   - 3 – 4 times faster
   - Ranked 4th in the US
2. 67% Increase in storm intensity past 60 years
3. Storm frequency increase from 1 in 50 year to 1 in 5 years

Source: NOAA & New England Weather Service



Issues

1. Sea Level Rise
   - Thermal Expansion
   - Land Based Ice Loss
   - Subsidence
   - Wind

Source: National Climate Assessment

sustainability @ BU
It's what you do.

BOSTON UNIVERSITY

0 0.25 0.5 Miles

MHHW + 4.2 ft.

Vertical Datum: NAVD88 9.0 (ft.)
Data and imagery from MassGIS

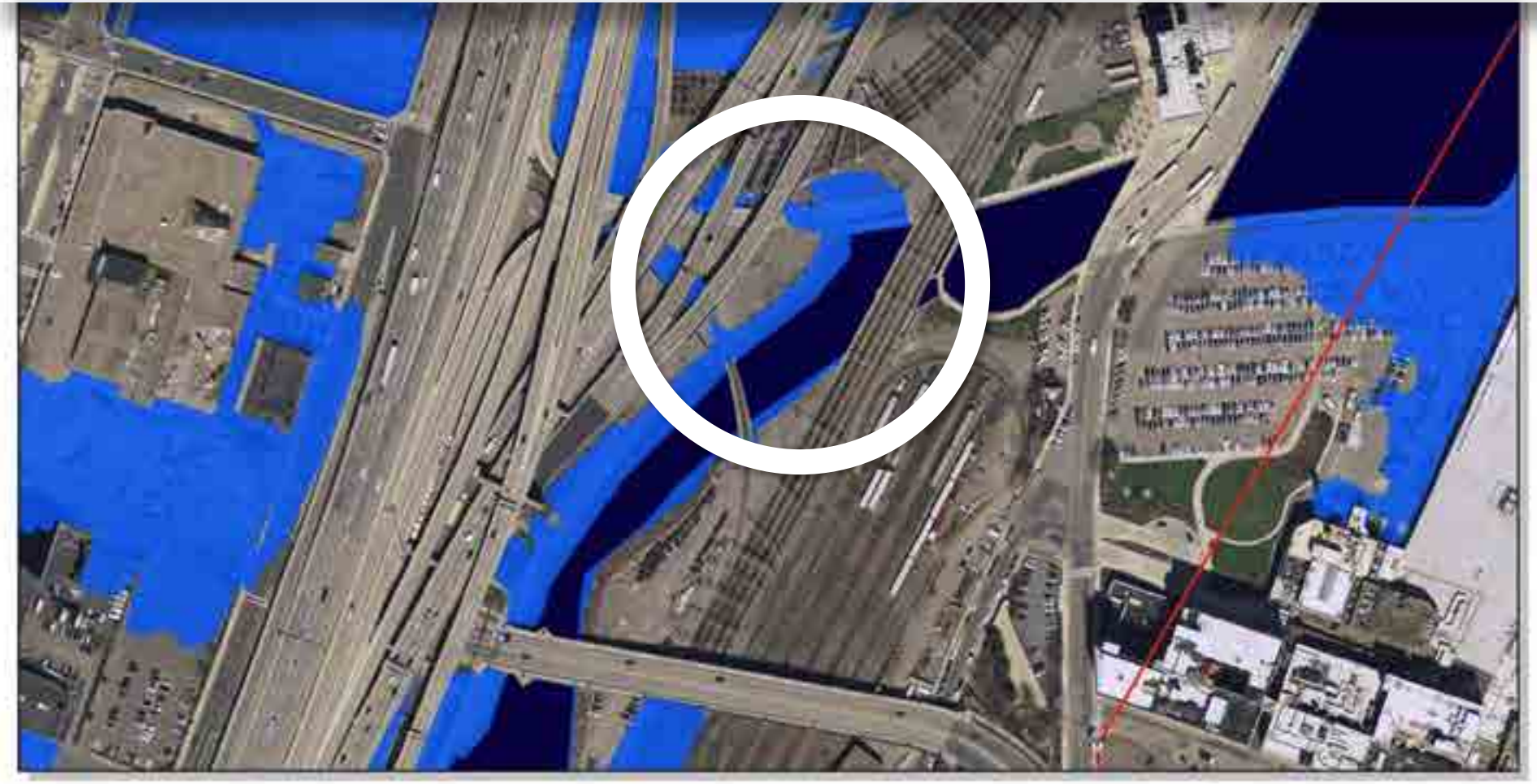
sustainability @ BU
It's what you do.

BOSTON UNIVERSITY

Source: *sustainability*@BU

sustainability @ BU
It's what you do.

BOSTON UNIVERSITY



0 0.05 0.1 Miles

MHHW + 4.2 ft.

Vertical Datum: NAVD88 9.0 (ft.)
Data and imagery from MassGIS

sustainability @ BU
It's what you do.

BOSTON UNIVERSITY

Source: *sustainability@BU*

sustainability @ BU
It's what you *do*.

BOSTON UNIVERSITY

Source: sustainability@BU

Source: sustainability@BU

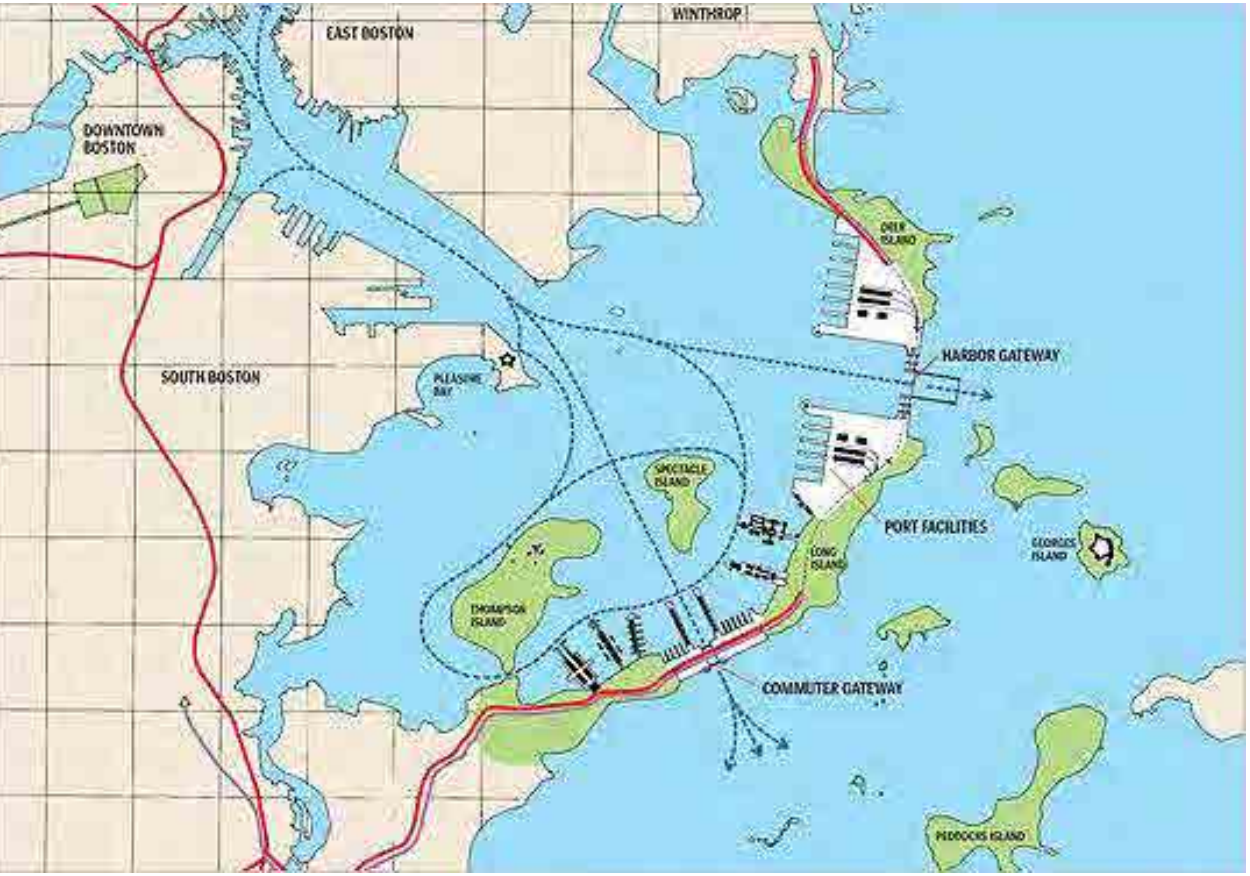
New Buildings

Center for Integrated Life Sciences & Engineering:

1. No Basement
2. Raised Equipment

Source: *sustainability*@BU

Regional



Storm Surge Barrier

1. Inner Harbor Protection
2. Wetlands Restoration
3. Port of Boston Relocation

Source: Antonio DiMambro

Neighborhood

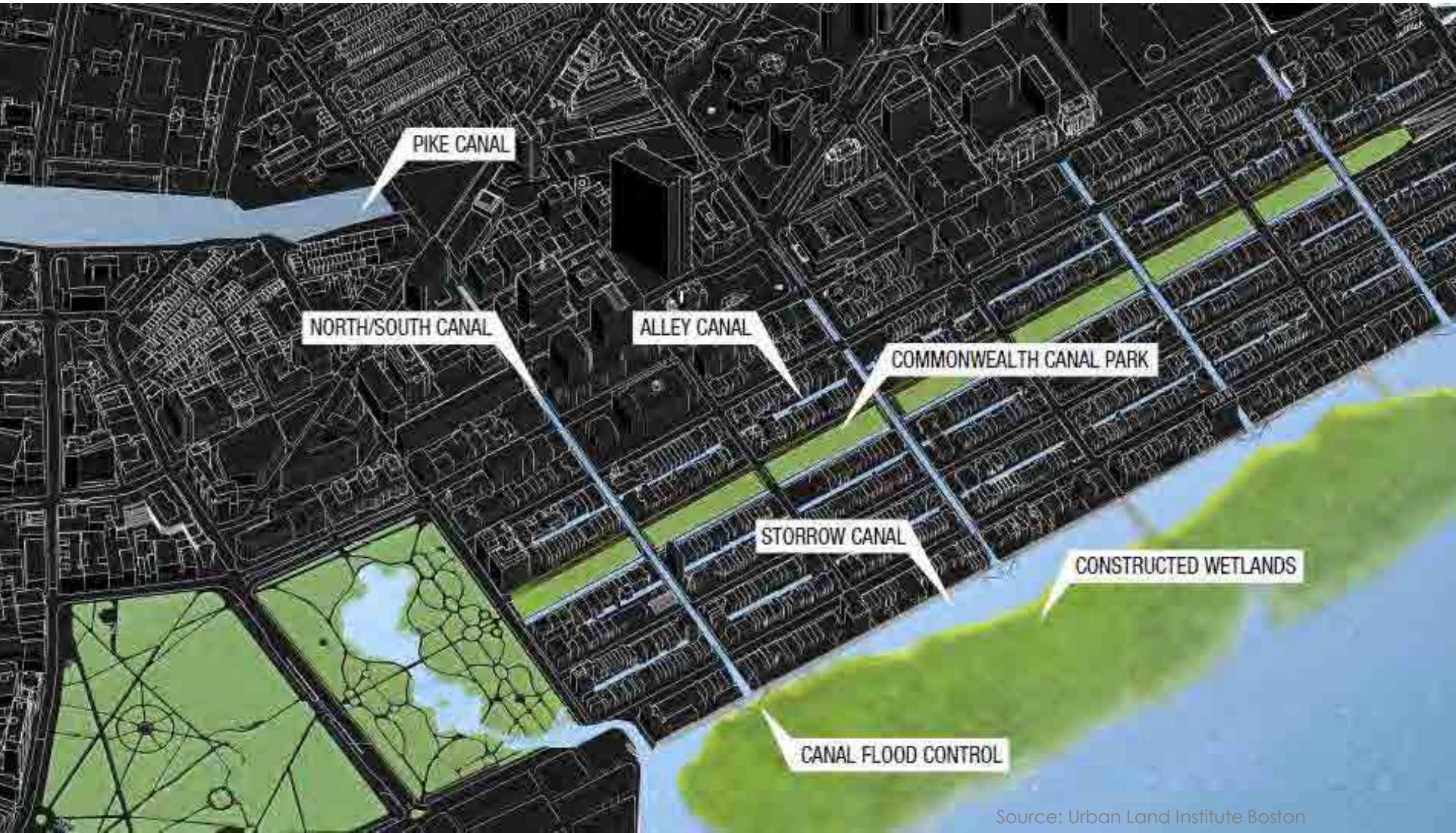
Living With Water

1. Let the water in
2. Canal / Street Integration

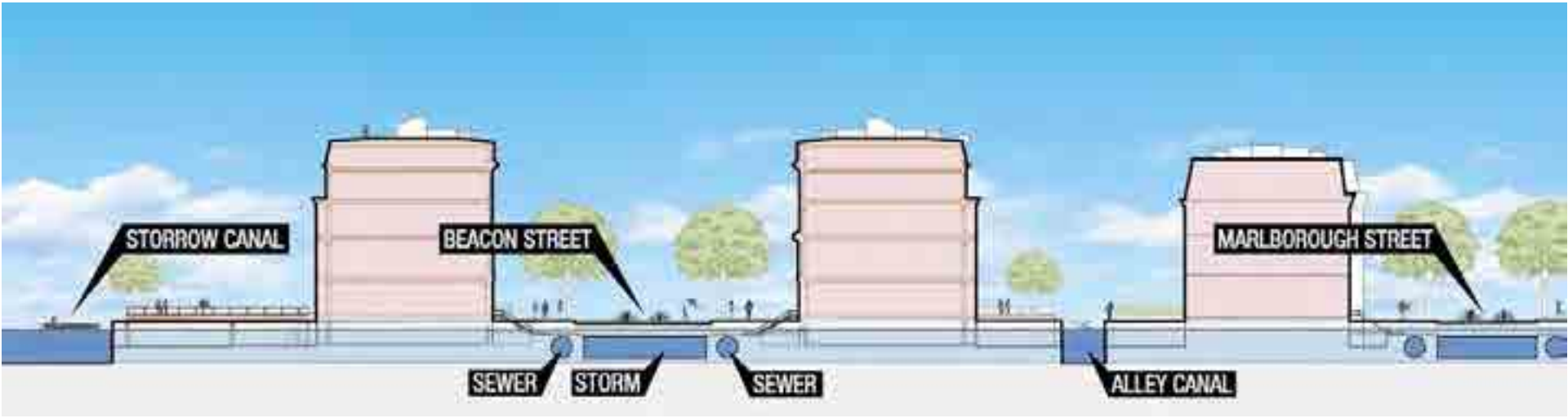
ULI/Kresge Study

1. Infrastructure
2. Regulatory Tools
3. Financing Tools
4. Re-insurance

Source: Urban Land Institute Boston



Source: Urban Land Institute Boston



Source: Urban Land Institute Boston

IMAGINED ADAPTATIONS

Mason Andrews | Hampton University

- Department of Architecture

  A Quarter Low: Tidewater Resiliency Design Challenge – Collaboration between Hampton and Old Dominion Universities

A QUARTER LOW

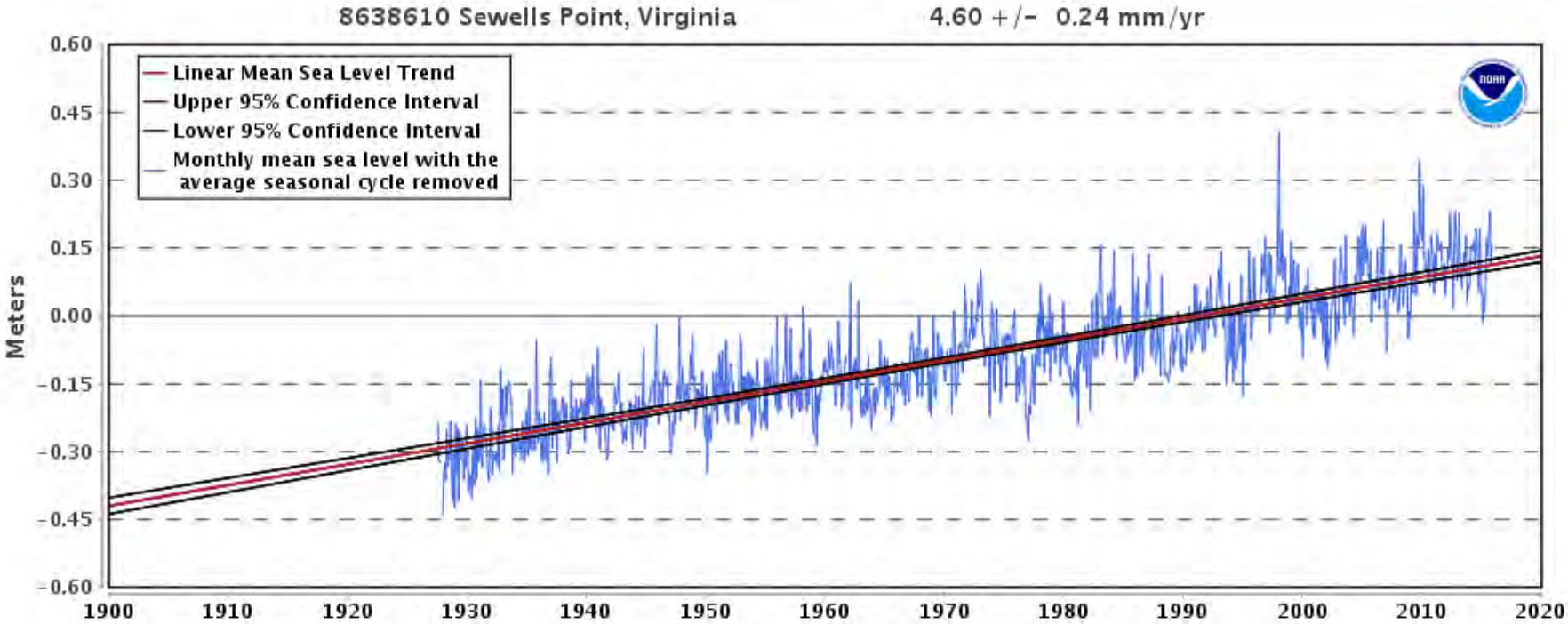
PRESERVATION AT THE DISTRICT SCALE

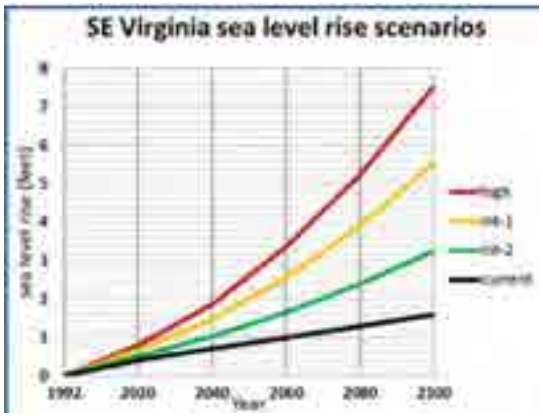
MASON ANDREWS
ASSOCIATE PROFESSOR OF ARCHITECTURE
HAMPTON UNIVERSITY

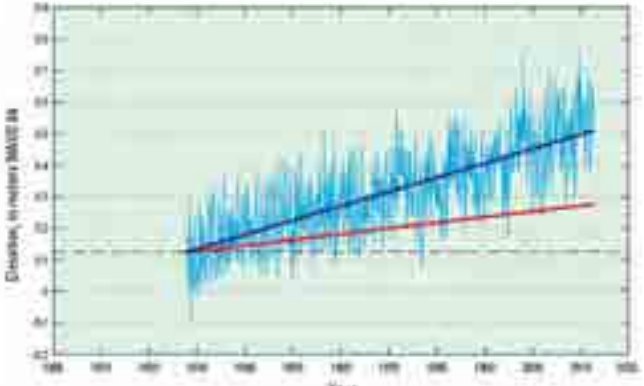
The Horsemen of the Apocalypse

- Sea Level Rise
- Subsidence
- Storms: both big blows and spike in intensity of rains
- Soils of legacy creek beds
- Slack in the Gulf Stream

SEA LEVEL RISE RECORDED & PROJECTED







SUBSIDENCE

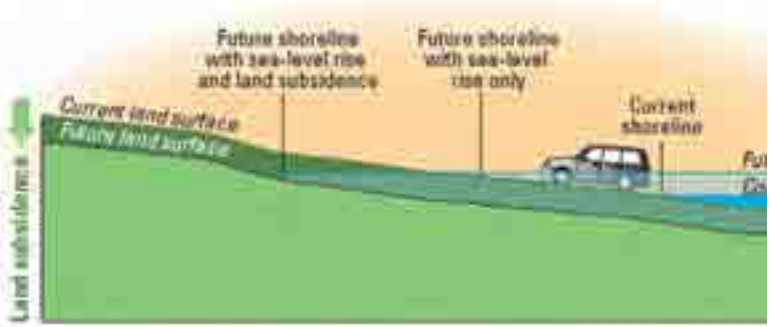


Figure 3. Shoreline retreat caused by a combination of sea-level rise and land su

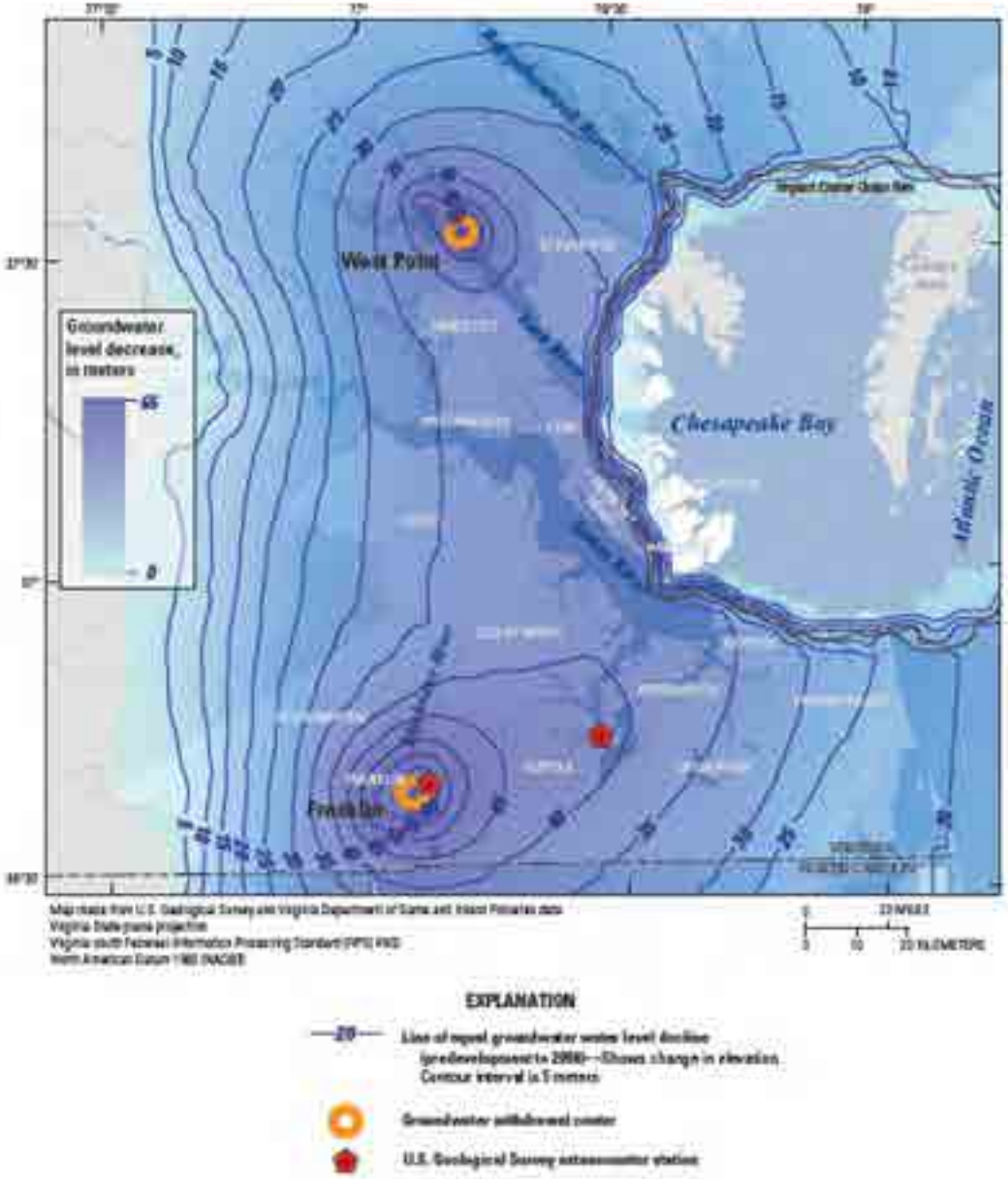
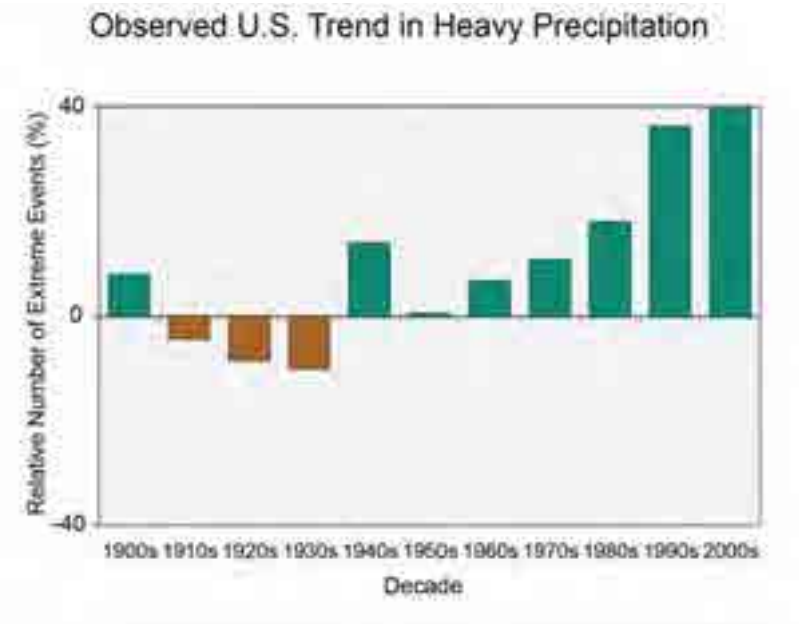
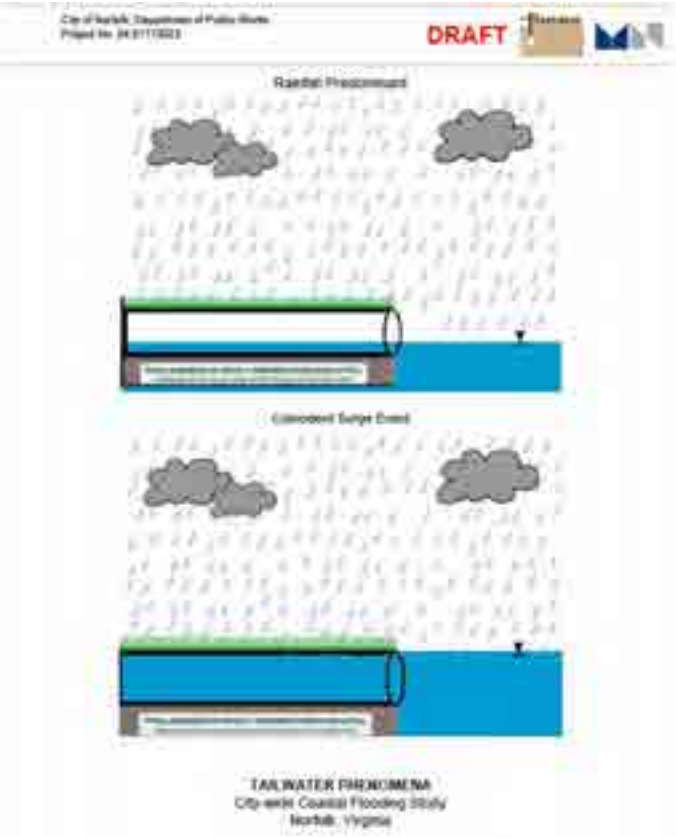


Figure 3. Groundwater water-level decreases from 1900 to 2006. Modified from Heywood and Pope (2009).

STORMS, NORTH WIND, & STORMWATER





SOILS OF LEGACY CREEK BEDS


NATIONAL REGISTER
OF HISTORIC PLACES
GHENT
HISTORIC DISTRICT

CHESTERFIELD HEIGHTS

- WATERFRONT
- ROLLING SHORELINE
- PLANTATION BLACK TOWN WILLINGBORO INTERSTATE
- PREDOMINANTLY AFRICAN-AMERICAN
- LOW TO MODERATE INCOME
- WATERFRONT DESTRUCTIVE HISTORICAL PLACES LISTED DISTRICT
- [illegible]
- WATERFRONT PARK AREA IN NAMED FOR FUNCTIONALLY PRIVATE CITY
- SEAMLESS BREAK BETWEEN PUBLIC HOUSING AND INDUSTRY

WHAT WE SAW

-FINE OLD HOUSES, PREDOMINATELY FOUR SQUARES

-REMNANTS OF UNIT PAVERS ON SOME STREETS

-SUBMERGED STORM WATER OUTFALLS

COMMUNITY ENGAGEMENT WORKSHOPS AND TOURS, FALL 2014

WHAT WE HEARD

-MULTI-GENERATIONAL HOME OWNERSHIP

-VIBRANT PORCH CULTURE

-FLOODING MORE SEVERE AWAY FROM RIVER

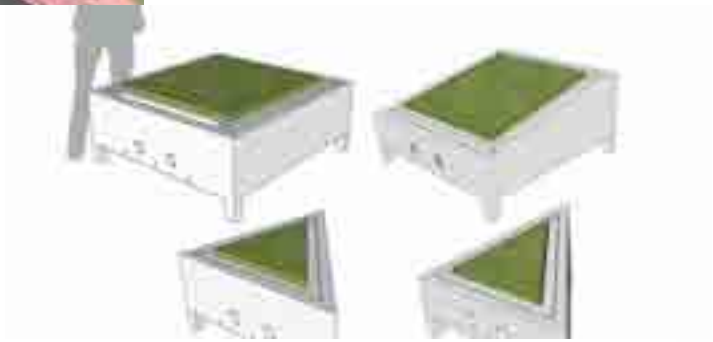
-STORM WATER SYSTEM SOURCE OF MOST FLOODING

-ACTIVE CIVIC LEAGUE AND COMMUNITY LIFE

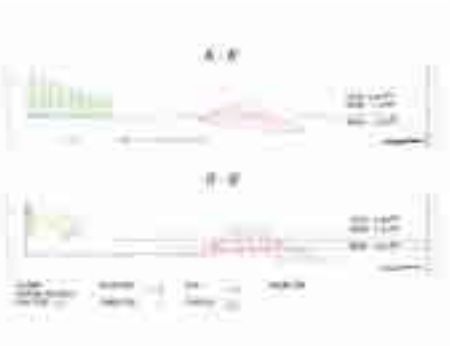
-BASEMENTS BEGINNING TO TAKE ON WATER

-INSURANCE RATES RISING THREATENING RETIRED FIXED INCOME HOMEOWNERS

Experimentation with raising structures by block over cisterns

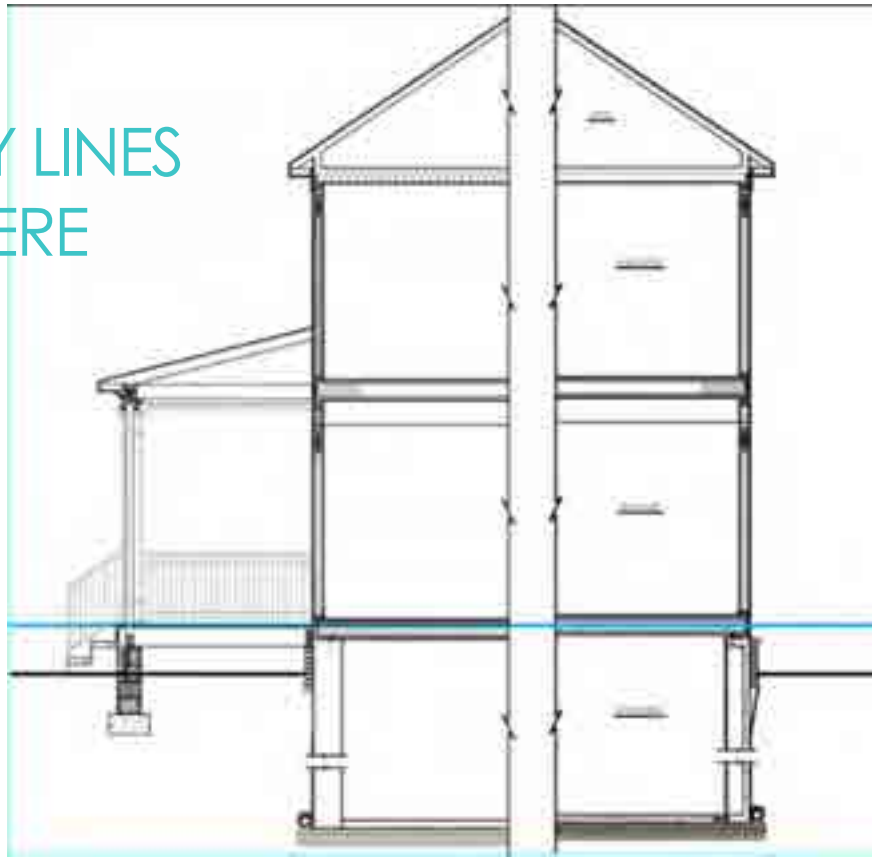


GUIDING PRINCIPLES

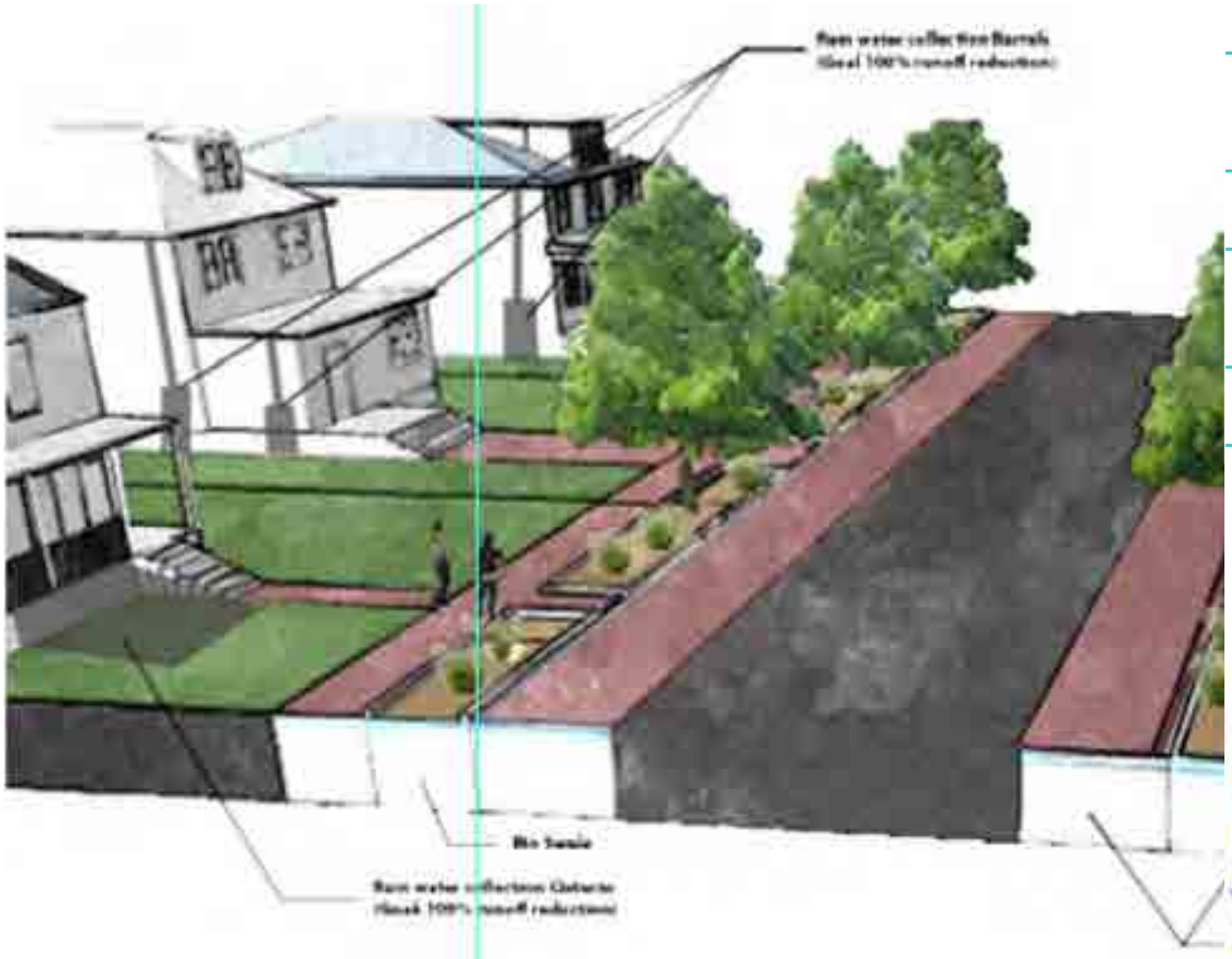


- LEAVE PEOPLE, BUILDINGS, & UTILITIES IN PLACE
- MANAGE WATER AS A DISTRICT NETWORK
- PREFERENCE FOR LOW IMPACT DEVICES
- OVER PIPE & PUMP
- INITIATE COMMUNITY NETWORK IN WHICH ALL SCALES HAVE PART TO PLAY
- STREET BY STREET, BLOCK BY BLOCK, PARCEL BY PARCEL

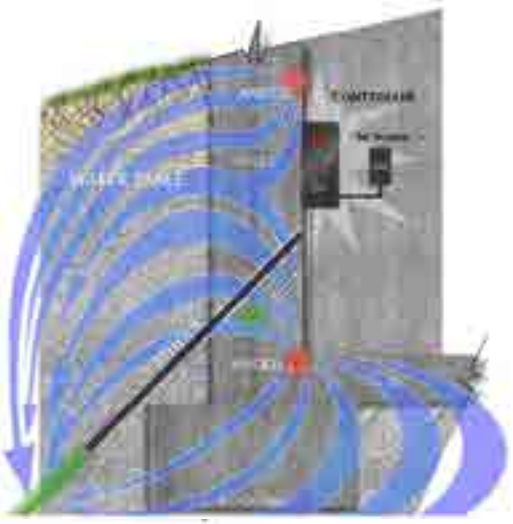
THE URBAN DISTRICT:
WATER KNOWS NO PROPERTY LINES
& IT HAS TO GO SOMEWHERE



THE BASEMENTS OF CHESTERFIELD HEIGHTS



- COLLECT ALL ROOFTOP RUN-OFF & STORE ON SITE AWAY FROM FOUNDATIONS
- MOVE ALL UTILITIES TO FIRST FLOOR OR ABOVE
- AS RENOVATIONS OCCUR TAKE OPPORTUNITY TO REPLACE MATERIALS THAT WILL MOLD
- FLOOD VENTS FOR VENTILATION & STRUCTURAL SURVIVAL
- LET THE WATER IN DO NOT FILL DO NOT WATERPROOF



COASTAL COMMUNITY DESIGN COLLABORATIVE

Coastal Community Design Collaborative

- HAMPTON UNIVERSITY DEPARTMENT OF ARCHITECTURE
- OLD DOMINION UNIVERSITY DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
- "CLOUD" OF PROFESSIONAL, PUBLIC, & ACADEMIC ADVISORS
- JAMES MADISON UNIVERSITY SCHOOL OF ENGINEERING
- CROSS-UNIVERSITY, CROSS-DISCIPLINARY COMMUNICATION ON ADAPTATION TO SEA LEVEL RISE

EPILOGUE

- DUTCH DIALOGUES
- $320,549.00 NDRC

THE HAGUE

- [illegible]
- [illegible]
- [illegible]
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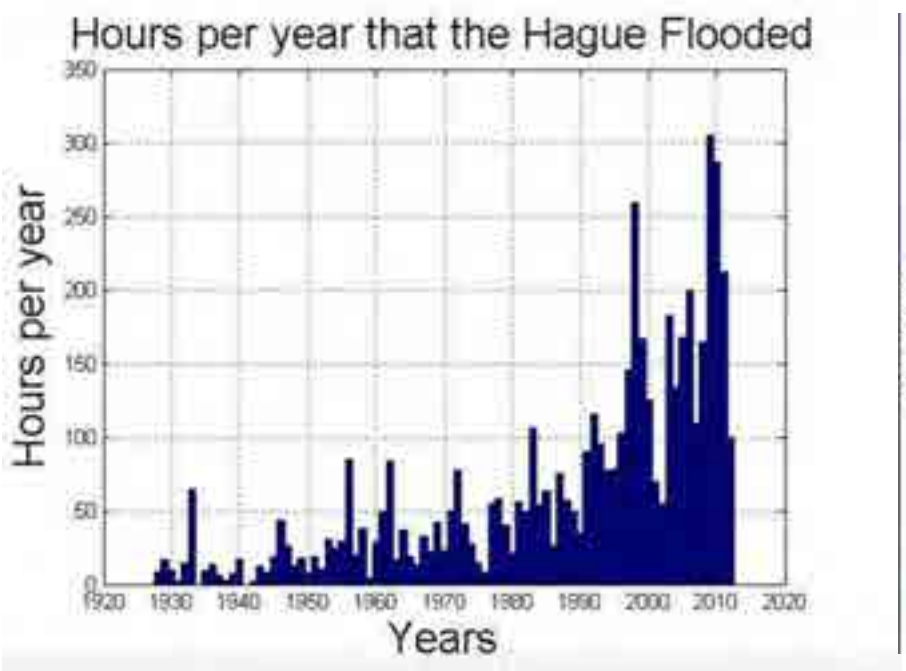
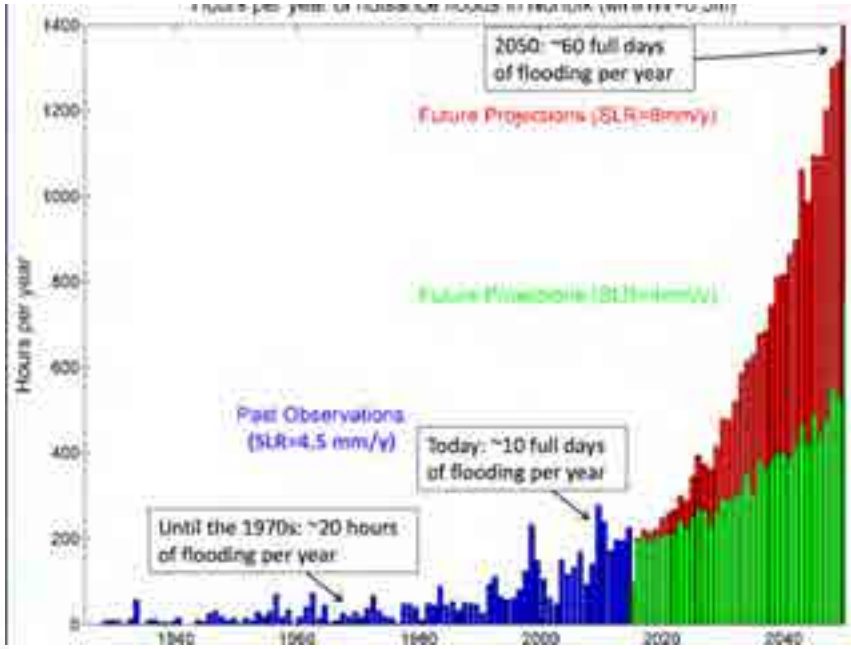
THE HAGUE


NATIONAL REGISTER OF HISTORIC PLACES
GHENT
HISTORIC DISTRICT


Hours per year that the Hague Flooded
Hours per year
Years
0
50
100
150
200
250
300
350
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020


2050: ~60 full days of flooding per year
Future Projections (SLR=8mm/y)
Past Observations (SLR=4.5 mm/y)
Today: ~10 full days of flooding per year
Until the 1970s: ~20 hours of flooding per year
Hours per year
0
200
400
600
800
1000
1200
1400
1940
1960
1980
2000
2020
2040

PRE-EXISTING STUDIES:FUGRO

Evaluation Process

- Engineering (hydrologic and hydraulic) analyses
  - Moffatt & Nichol (PL, MC, H) and Timmons Group (OC)

The Hague: Project Elements

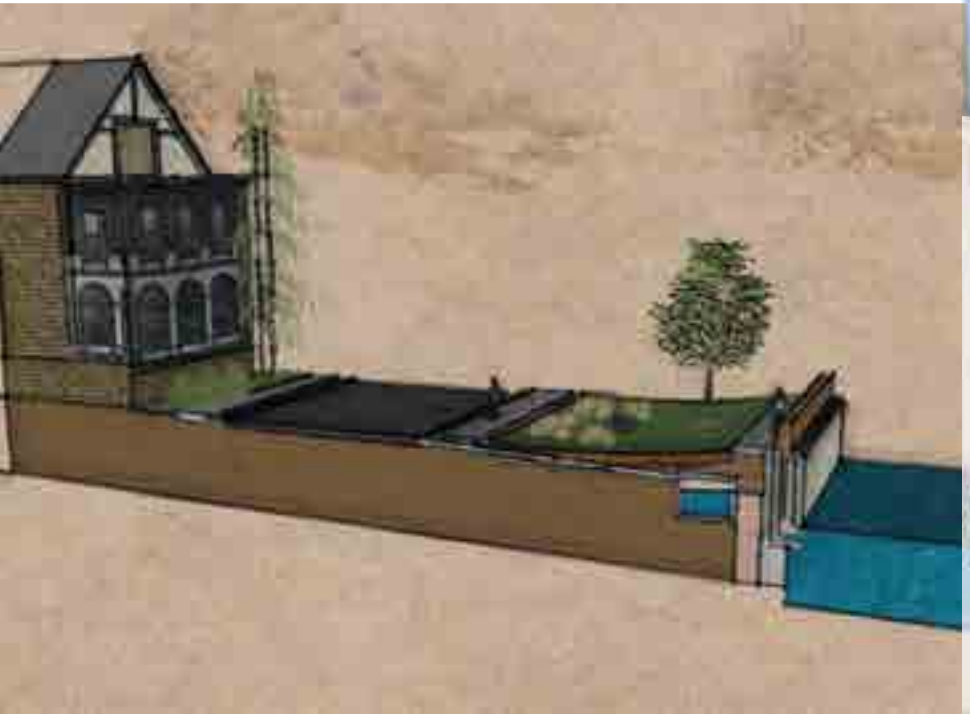
- Capital Project to protect against coastal flooding (tidal surge):
  - Tidal Barrier (floodwall) to protect against tidal surge
    - Tide gate – if navigation access required
  - Pump station to remove rainfall runoff when gate closed
  - Closure walls or berms across where land surface is low around basin/watershed perimeter

BARRIERS

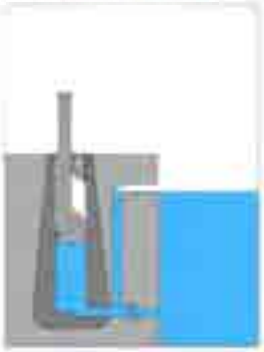
CHECKVALVE

FLOODBARRIER

SUPPORTING CHAMBER (CLEAR WALL SCHEMATIZED)



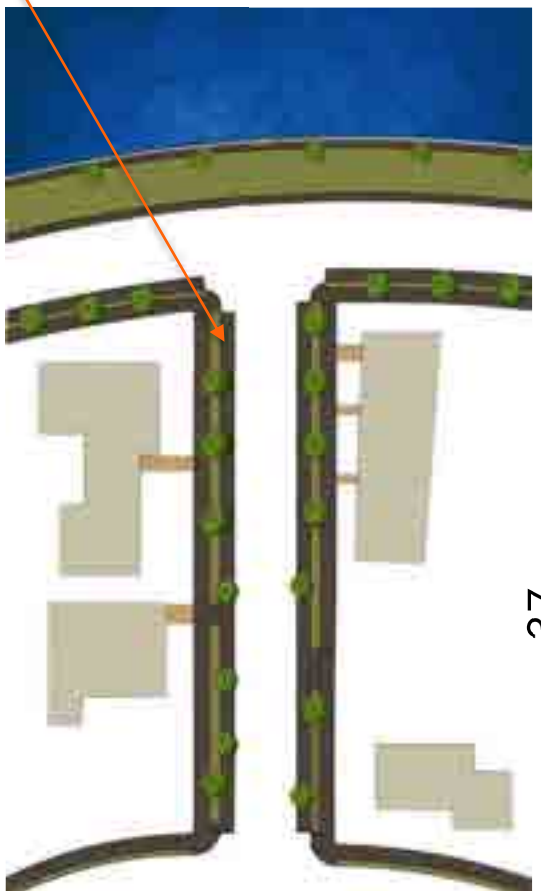
Low Water,
All operational parts of the barrier are invisibly concealed in the ground

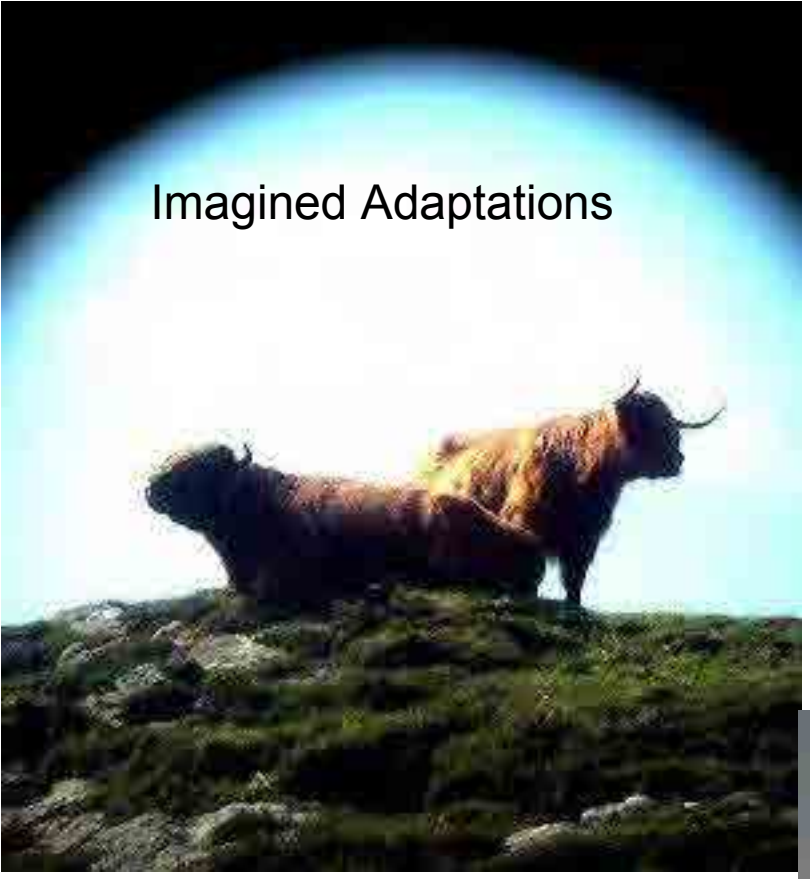


Rising Water,
The floodwater almost rises to the inlet of the barrier. The Check valve in the exhaust pipe prevents the barrier from coming up to early.

Rising Water,
The floodwater rises to the inlet of the barrier. The basin is filled up with water and the wall rises. The support block pushes the wall against the site of the basin and makes a watertight connection.

SPONGES




Imagined Adaptations

Imagined Adaptations

Imagined Adaptations

IMAGINED ADAPTATIONS

Suzanne Mathew | Rhode Island School of Design

- Department of Landscape Architecture
  Imagining the Future Historic in the Landscape Architecture Studio

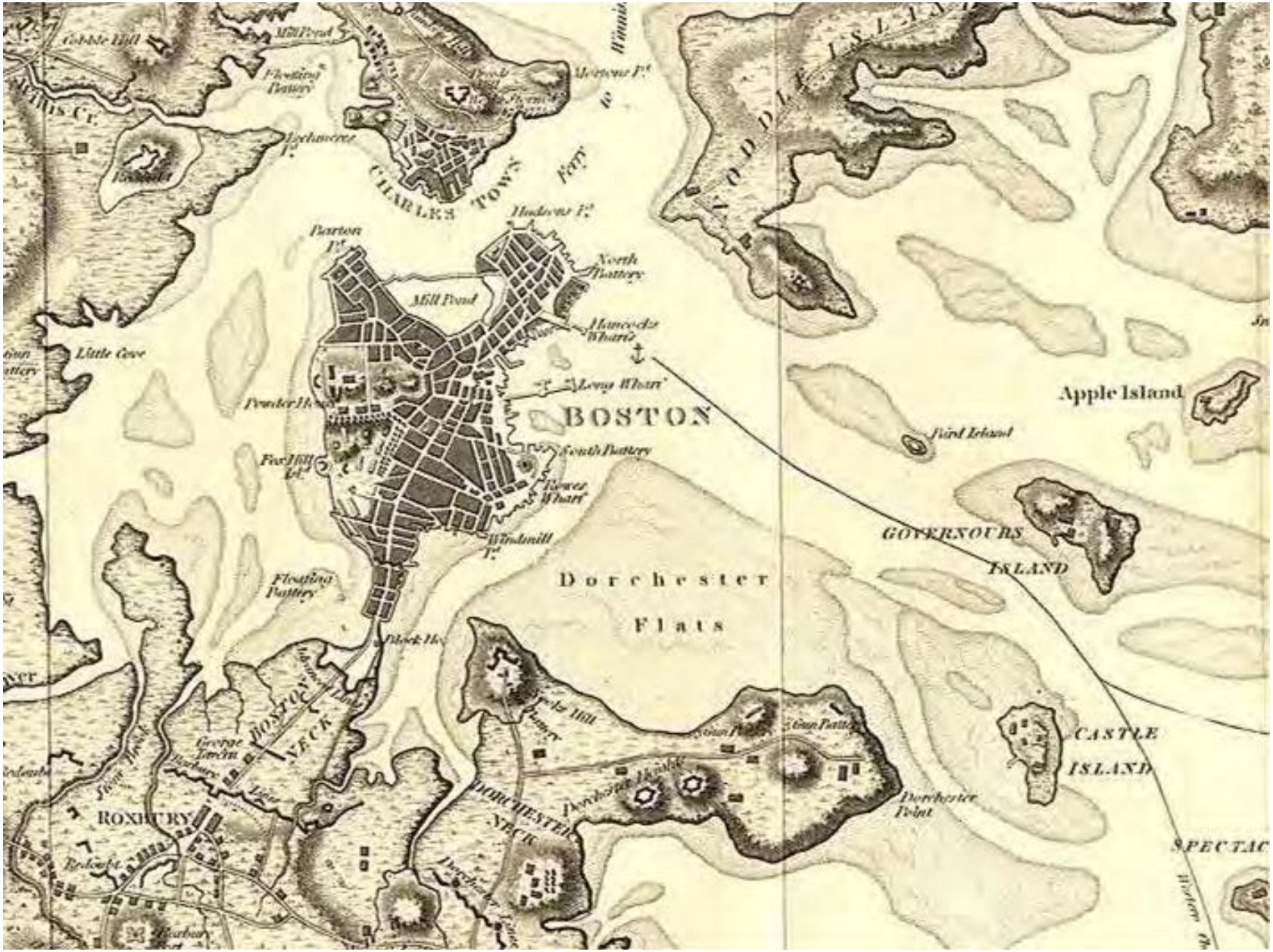
IMAGINING THE FUTURE HISTORIC IN THE LANDSCAPE ARCHITECTURE STUDIO

RISD GRADUATE THESIS STUDIO 2015
PROTOTYPES FOR CHANGE: BOSTON 2050 - 2100

PREMISE + PROCESS: SEA-LEVEL RECLAIMING HISTORIC GROUND IN BOSTON

RISD GRADUATE THESIS STUDIO 2015

Boston Harbor Association 7.5' Mean Higher High Tide Projection



Historic Map of Boston Showing Landmass Before Filling of Backbay and Dorchester Flats

GRADUATE THESIS STUDIO PROCESS

Feedback

Throughout your thesis work I have been impressed with your commitment to a bold strategy and your ability to diagram your ideas clearly. In this last phase you've made significant progress in working out some of the details of that strategy and have made a nice connection to the harbor to the north. As we heard at the review, however, how your "high line" and other programed open spaces will really work, is still a question. Some of the grittiness of the existing buildings in this part of Fort Point Channel gets lost in your renderings – it would be good to capture that so that your project would feel more like you are integrating the old and the new into a vibrant, contemporary and future environment. I know you are well aware of the "placelessness" of much of the new architecture in this district and are looking to counter that with your proposals. I would encourage you to find a way to show in some detail what you imagine the quotidian, day to day life of your new district will be. I think it could be exciting, but right now that is not fully depicted.

Findings + Conclusions

In 2100 water scenario, sea level rise will be 6ft, storm surge will be 5ft, which will bring more than 10ft water elevation to the existing water edge. Since the topography of the Fort Point district is nearly flat, to elevate the water edge could be a short-term strategy to protect the district from flooding in terms of stable water change such as sea level rise. However, the storm surge is temporary and may happen twice a year, so it is crucial to create an inland elevated infrastructure network to enhance the connection when the ground level is temporarily flooded as well as evolve the neighborhood.

The three prototypes test different relationships between the elevated landscape and the context (both existing and proposed), which include the relationship between building, open space and waterfront. The prototype of rooftop connection is located at an intimate space within community. Fresh water will be collected by the roof garden and be conveyed to the ground through the waterfall. Farmers market will be proposed under the landscape infrastructure and enhance community engagement. The prototype of open space connection is located at the transition space between public street and community park. It will be the threshold of the public and semi-public space. The water plaza is created under the viaduct to welcome the gathering and collect stormwater. The prototype of waterfront connection is located at a public space where everyone could access and have fun. The central viaduct and the harbor walk overlap at this place and are transformed into stages and ramps for easy accessibility and gathering. The elevated landscape here is intended to bring people to the waterfront and create a dynamic water edge.

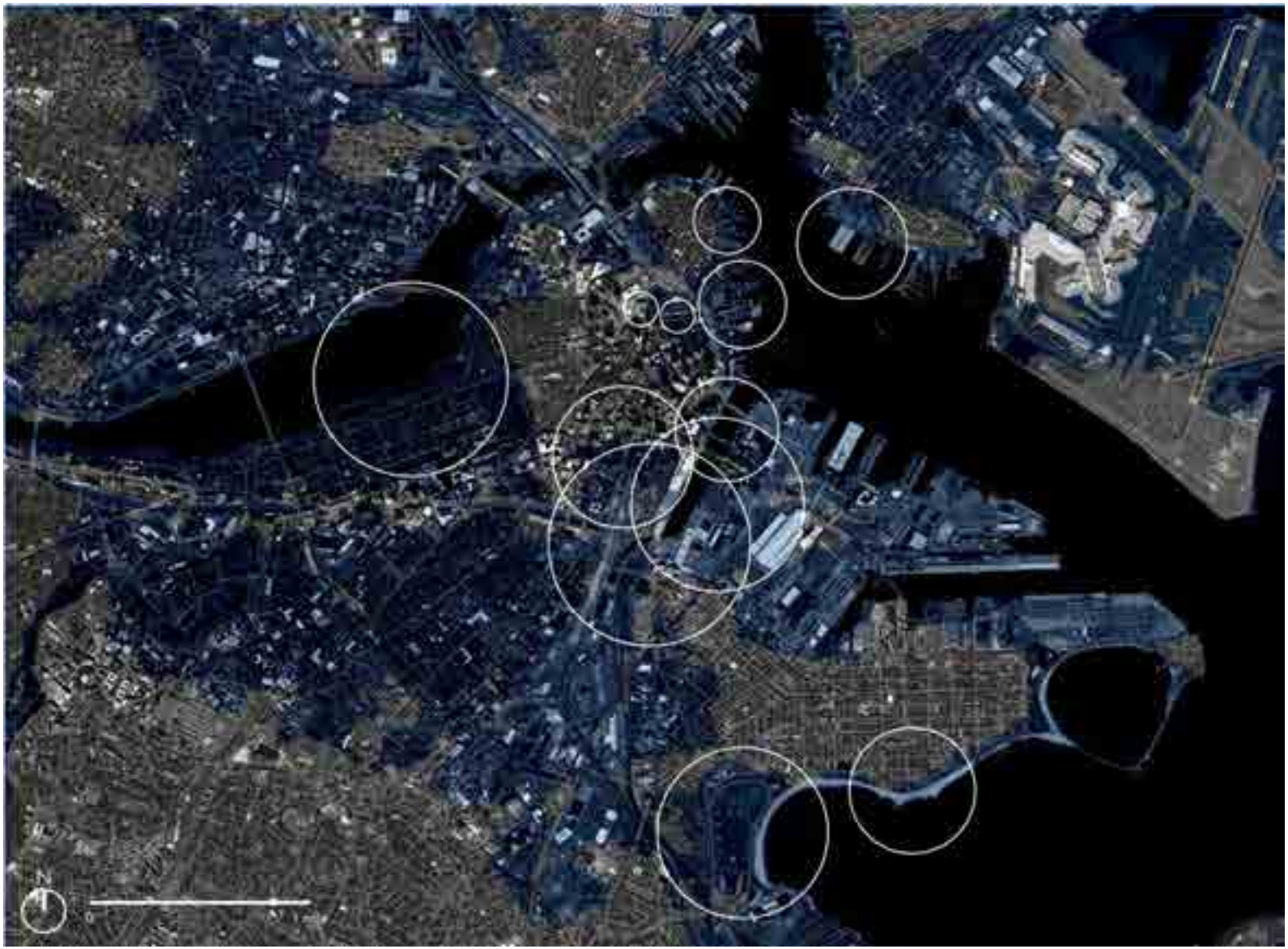
Assessment

In this phase, the overall strategy is diagrammed clearly in the parti diagram. The revised master plan is more clear and caters to the feedback from phase2 review.

According to the feedback from last review, the stance of the elevated infrastructure is not so strong. Since the "highline" like structure is expensive to build and maintain, it is necessary to give a strong reason why it should be built. The temporary flooding scenario could provide support for the elevated landscape, but it is not enough. The stance lacks a layer of user experience to show what the future vision for the district is like in daily life.

If there is a phase 4 for the thesis, the investigation should focus on how the elevated landscape could make unique places which would evolve the neighborhood. The overall site analysis of the water scenario should be presented more clearly to show how the urban fabric will function under the flooding scenario.

SELECTED SITES

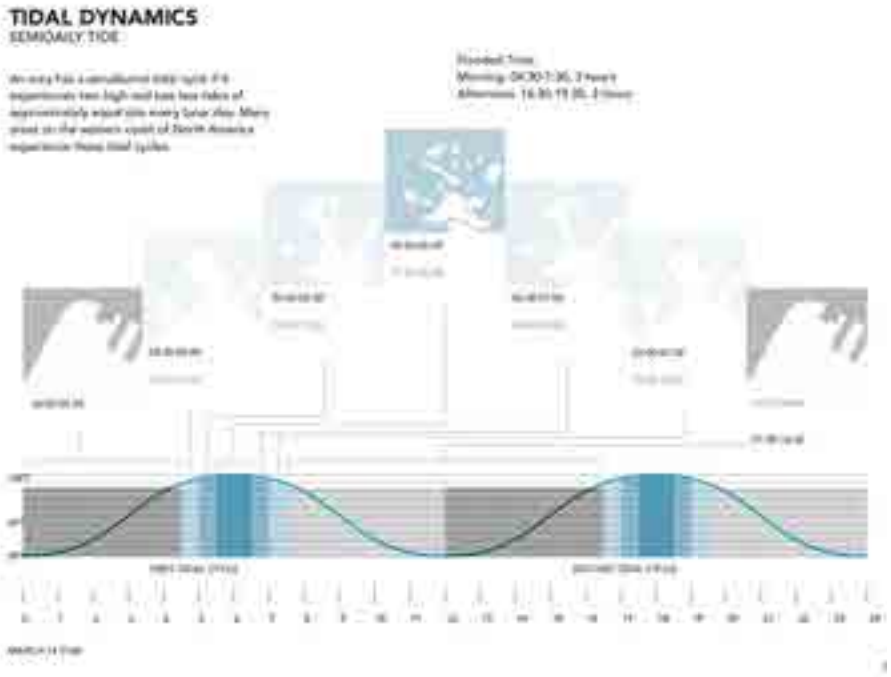


SELECTED SITES – VULNERABLE COASTAL NEIGHBORHOODS

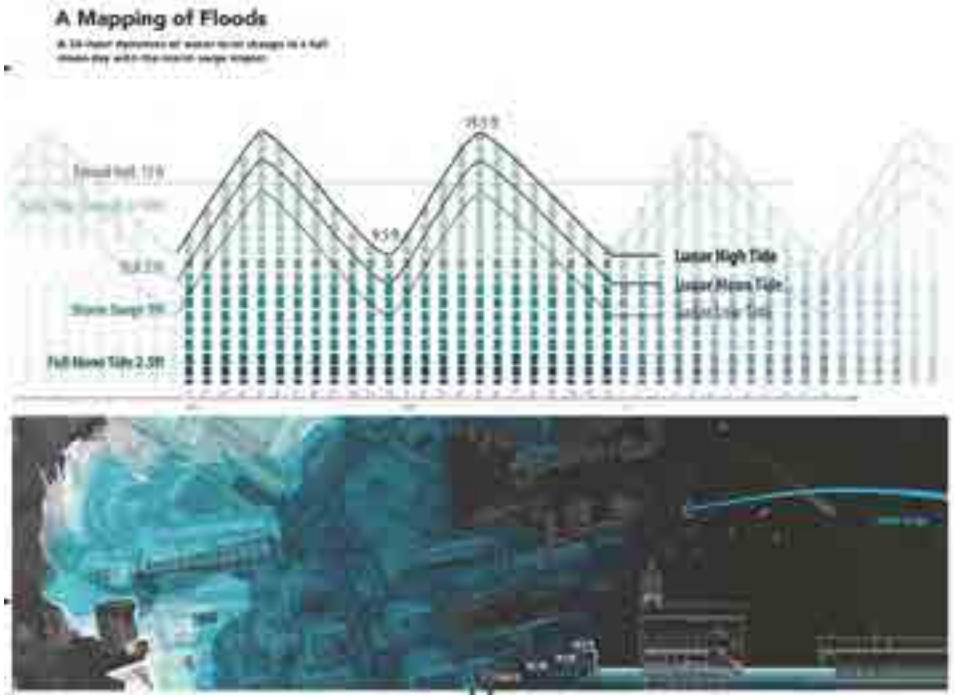
SELECTED SITES – HISTORIC LANDMARKS AND PUBLIC SPACES

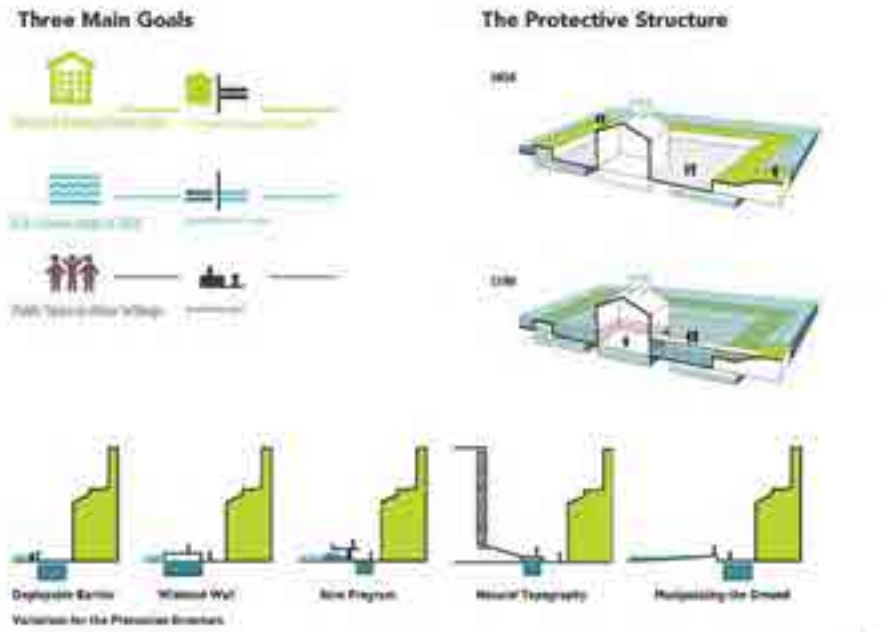
SELECTED SITES – PUBLIC WATERFRONTS AND CULTURAL LANDSCAPES

FLOOD SCENARIO ANALYSIS

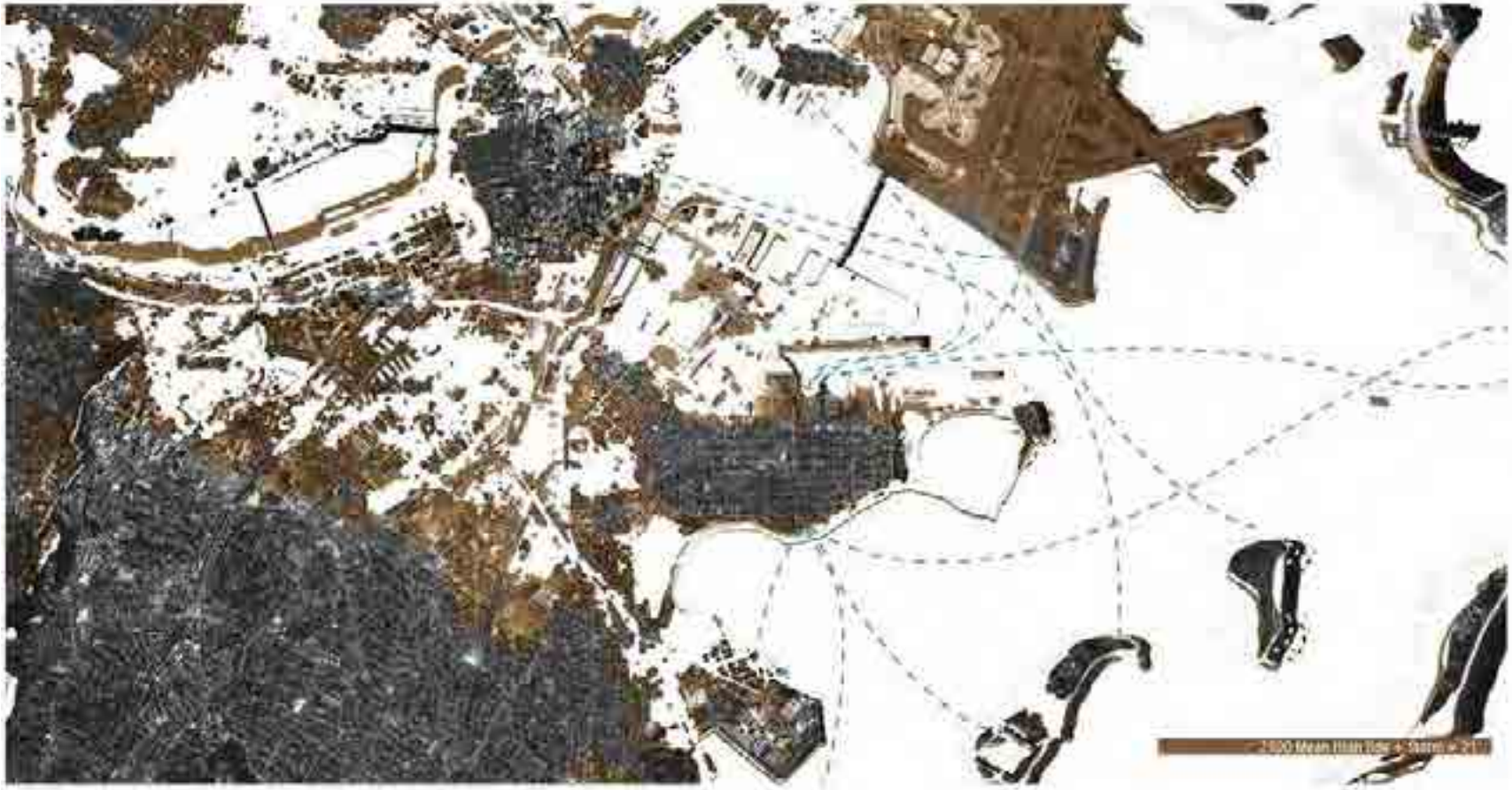


FLOOD SCENARIO ANALYSIS





FLOOD SCENARIO ANALYSIS

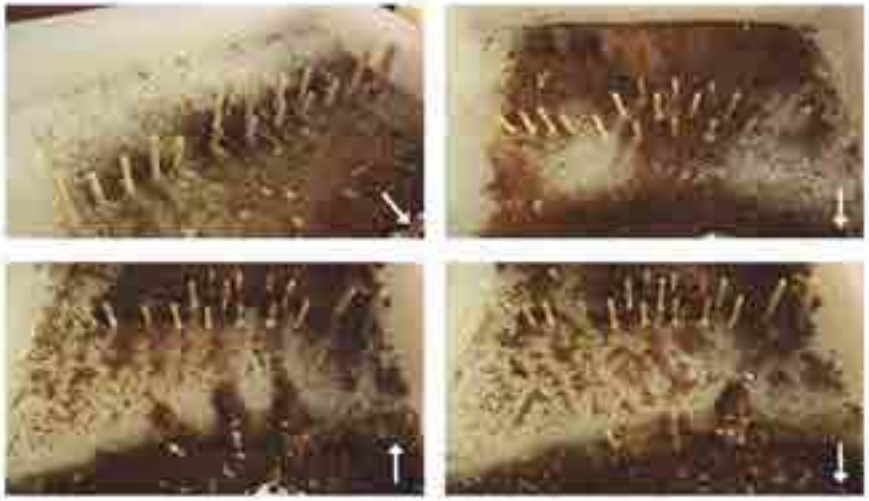


2100: Potential New Water Routes

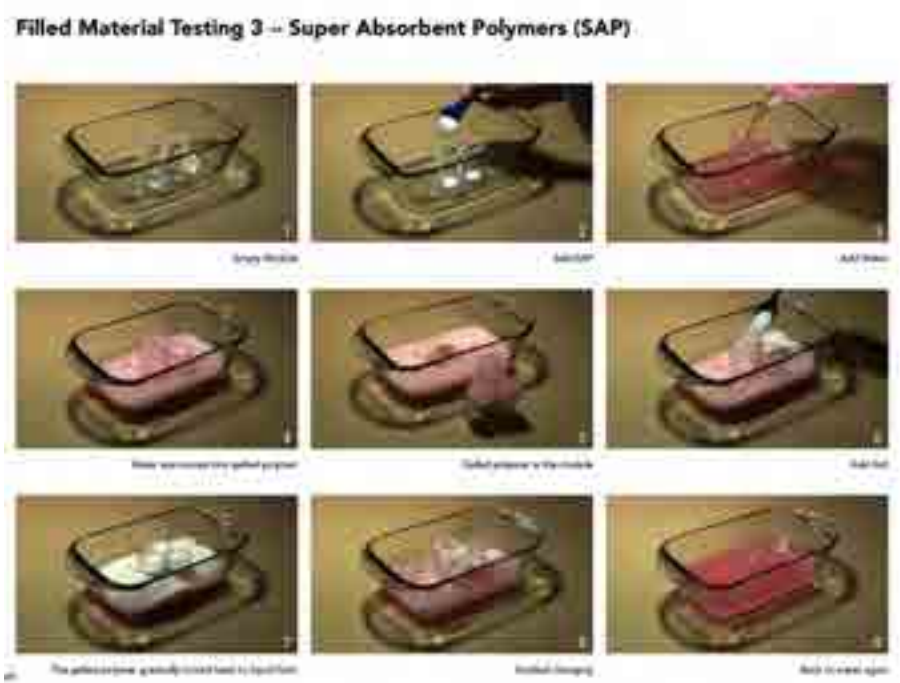
In a case of history repeating itself, South Boston will likely return to dependance on water transportation to connect with the outer world.

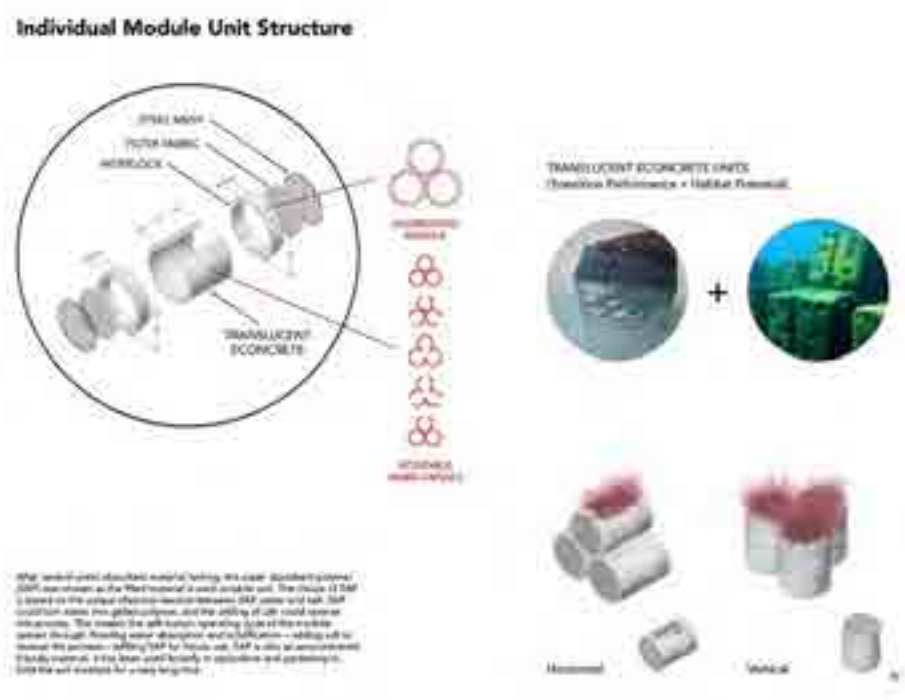
PROTOTYPE TESTING

First Trial: Model Testing of Currents and Sand

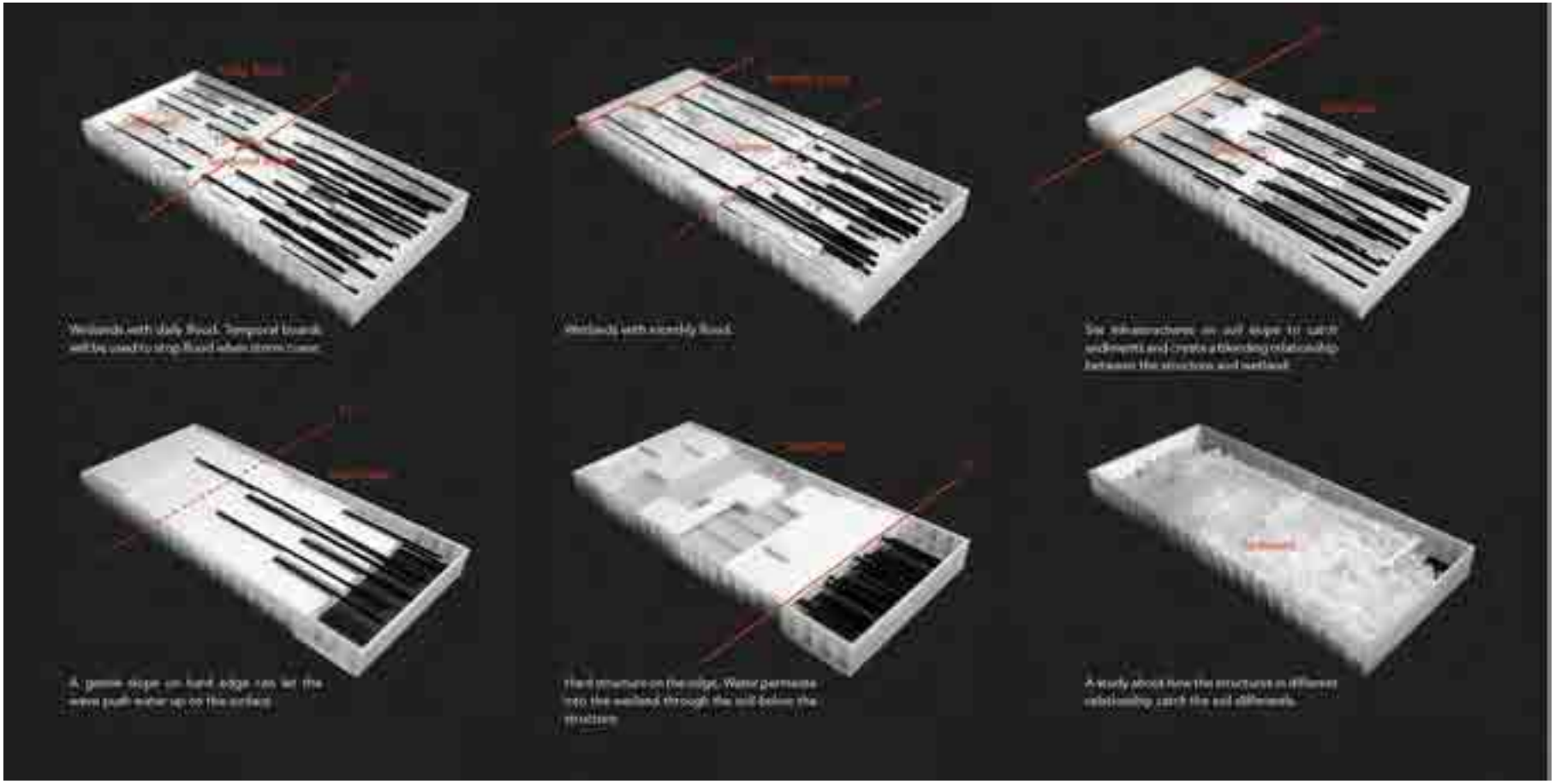


PROTOTYPE TESTING





PROTOTYPE TESTING

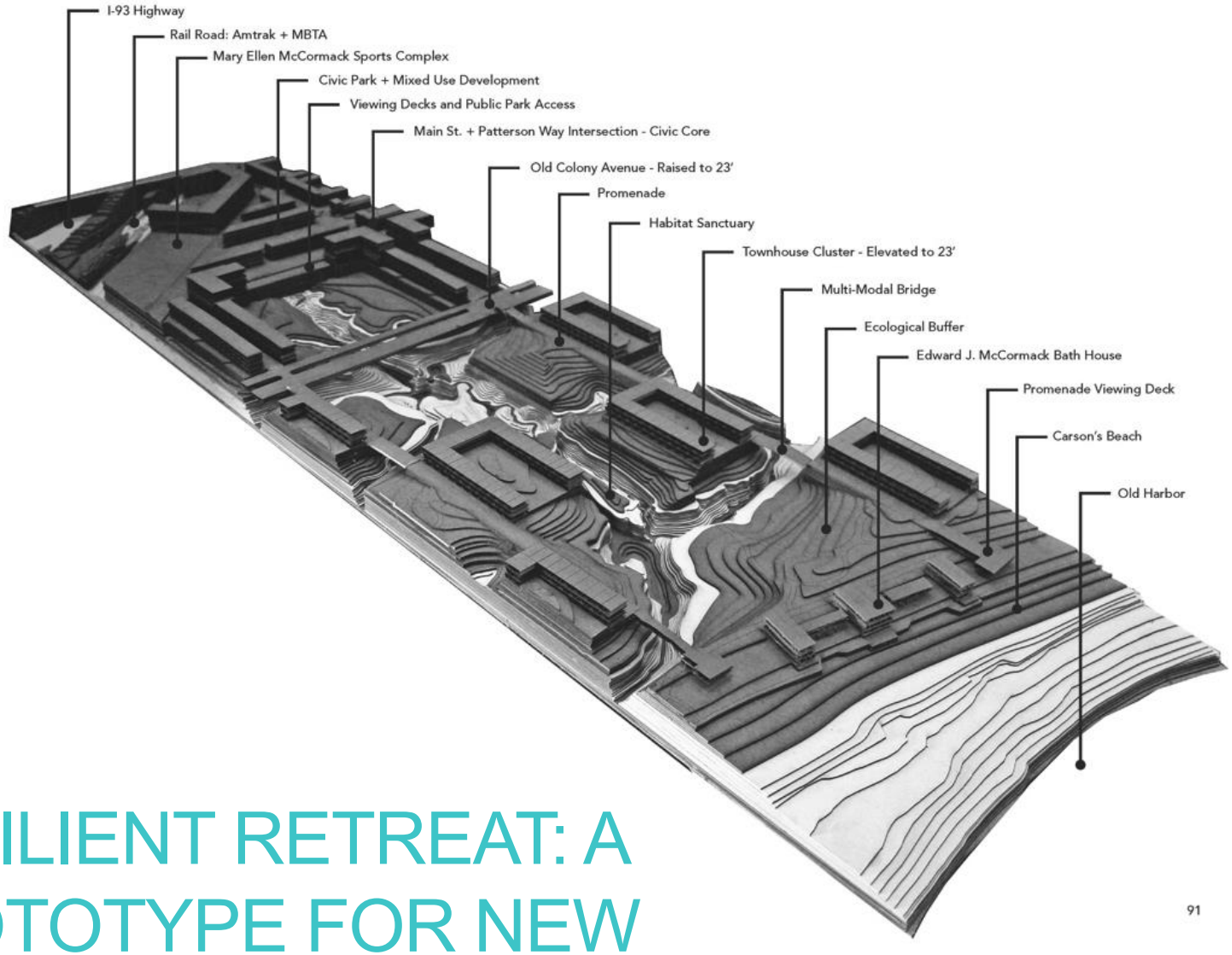


PROJECTING THE FUTURE HISTORIC

STUDENT PROPOSALS

RESILIENT RETREAT: A PROTOTYPE FOR NEW COLONY

CARSON COOPER

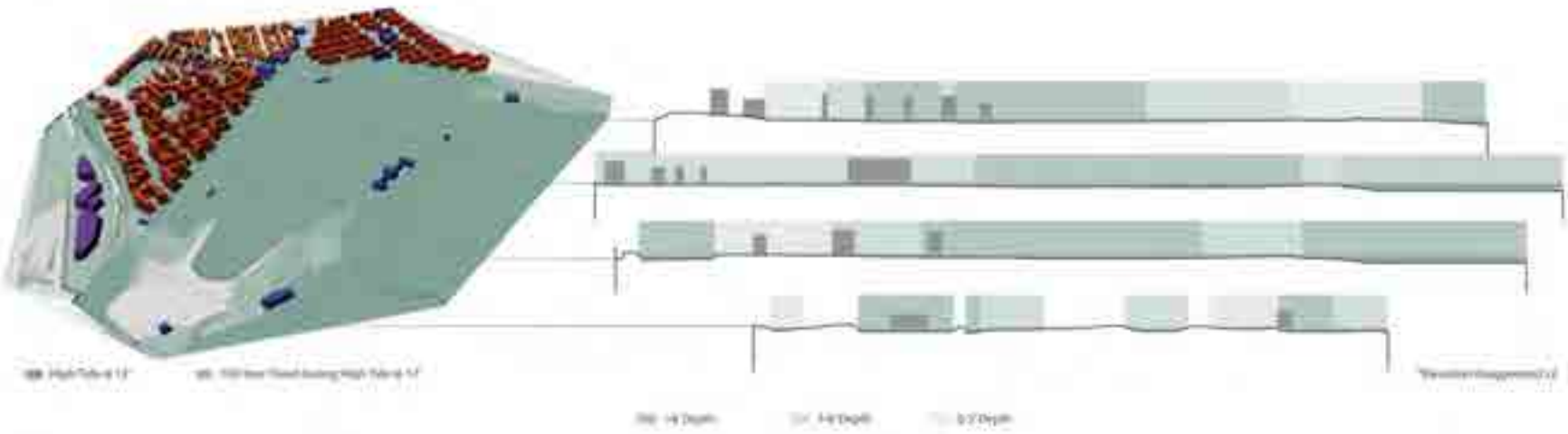


RESILIENT RETREAT: A PROTOTYPE FOR NEW COLONY

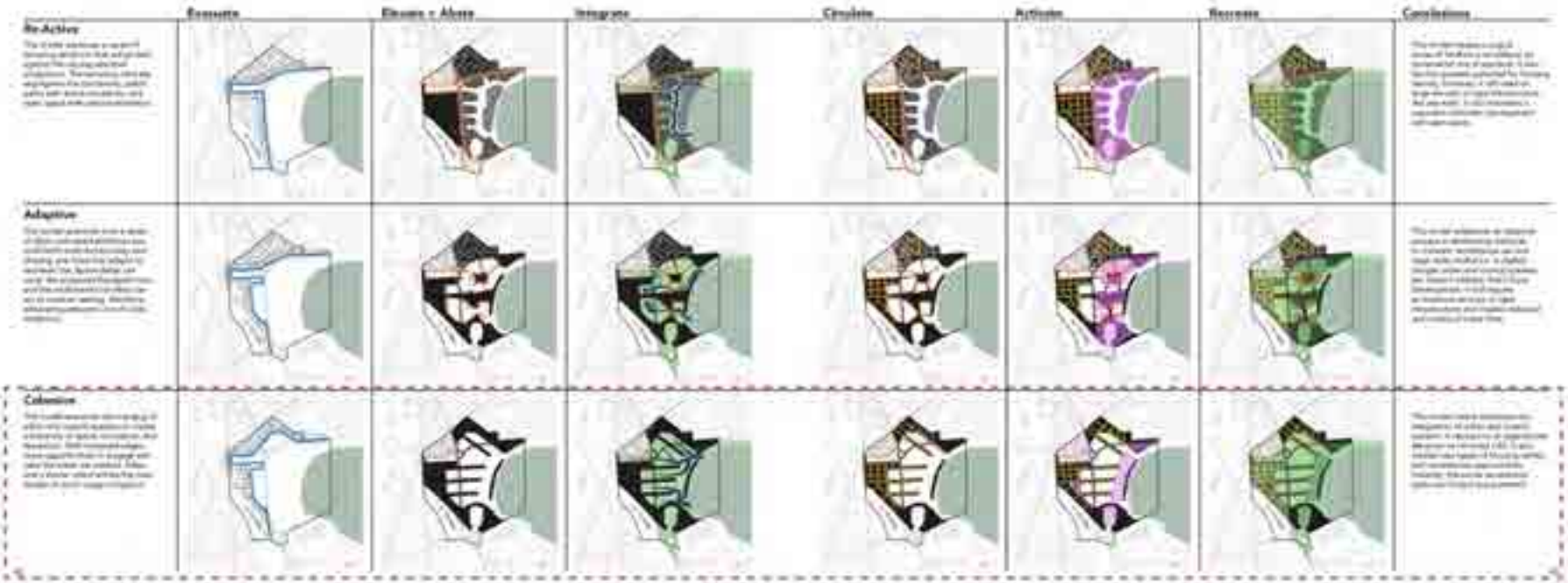
CARSON COOPER

Magnitude of Rising Seas

Projected Flooding in 2050

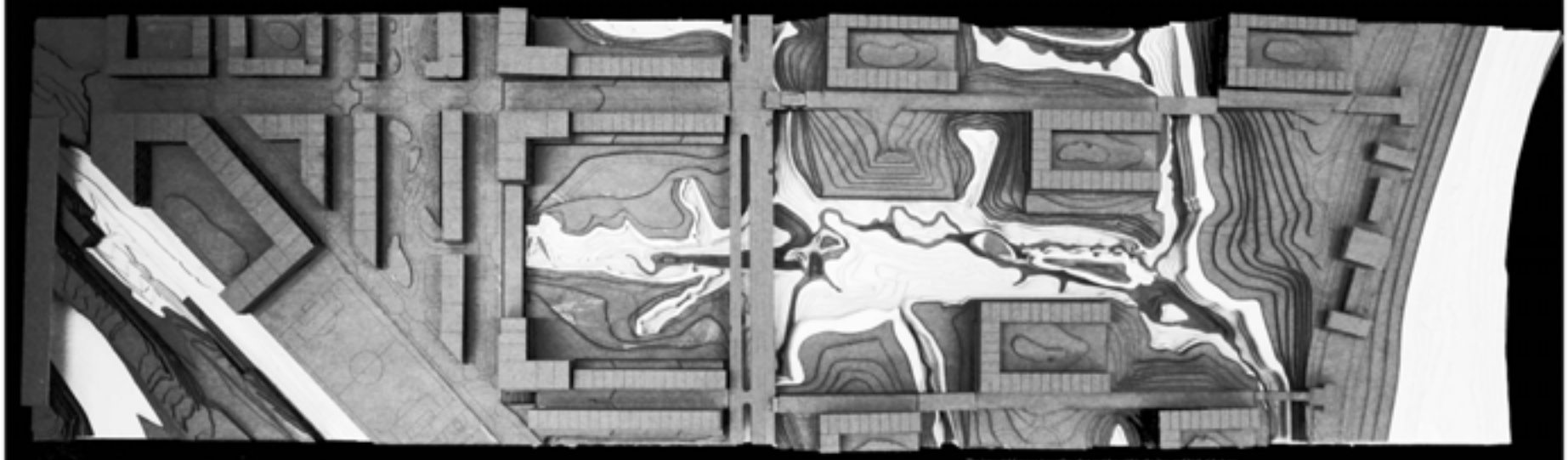


OLD COLONY: LONGSTANDING AFFORDABLE HOUSING COMMUNITY


Re-Active
Adaptive
Cohesive

Comparative Matrix

Modeling The New Tide



1" = 64'
Height Exaggeration = x3

The inter-tidal zones (coastline that resides within the low and high tides) are represented with white chipboard. All land either below or above the inter-tidal zones are represented with brown chipboard. This helps to illustrate the low tide water level at 2' and the high tide water level at 12' in 2050.

Land Use and Circulation

Land Use

Housing Allocation

Unit Sizes and Quantity

1. Old Colony Development
2. Boardwalks + Viewing Decks
3. Joseph M. Tierney Learning Center
   - Public Programs
   - Computer Lab
   - Emergency Shelter
4. Columbia Road - Raised to 23'
5. Joe Moakley Park
   - Soccer/ Football
   - Splash/Water Park
   - Basketball
   - Bio-Swales
6. New Elementary School
7. Open Viewing Lawns
8. Tidal/ Coastal Ecosystems
9. The Civic Balcony
   - Community Programs
10. Water Entry/Exit
11. Townhouse Cluster
12. Promenade Viewing Decks
13. New Colony Park
14. Main Street + Patterson Way
15. Carson's Beach
16. Edward J. McCormack Bath House
17. Pedestrian Promenade with Vehicular Access below grade
18. Mary Ellen McCormack Park
   - Soccer/ Football
   - Basketball
   - Tot Lot
   - BBQ Area
19. Kayak and Beach Equipment Rental
   - Boat Dock
   - Terraced Stone Wall
20. Old Harbor
21. Old Colony Avenue - Raised to 23'
22. Amphitheater and Stage
23. Terraced Stone Walls
   - Seating and Playing
24. Columbus Park Sports Complex
   - Hockey
   - Soccer/Football
   - Track/Field
   - Baseball
   - Tennis
   - Basketball
25. Columbus Traffic Circle

ANOTHER 100 YEARS: GROWING THE CHARLES RIVER ESPLANADE

ZAIXAN WANG

ANOTHER 100 YEARS: GROWING THE CHARLES RIVER ESPLANADE

ZAIXAN WANG

Site Location

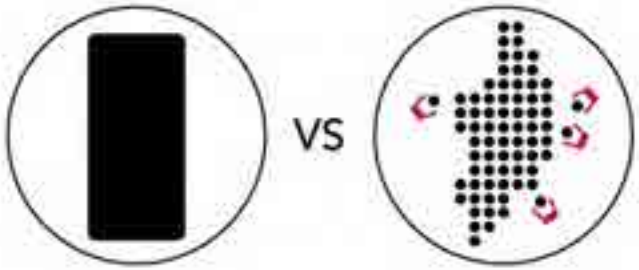
BACK BAY BIRD'S EYE VIEW

Background Image Source: http://blog.jonyudell.com/back-bay-boston/

CHARLES RIVER ESPLANADE: PUBLIC PARK AND CULTURAL LANDSCAPE

Chosen Flooding Scenario by 2050: MHHW+7' (SLR+2' & Storm Surge+5')

The Choice of a Modular System



FIXED SINGULAR INTERVENTION

- ON SITE CONSTRUCTION (BIGGER AND LONG IMPACT)
- HIGH COST
- FIXED AND HARD TO CHANGE

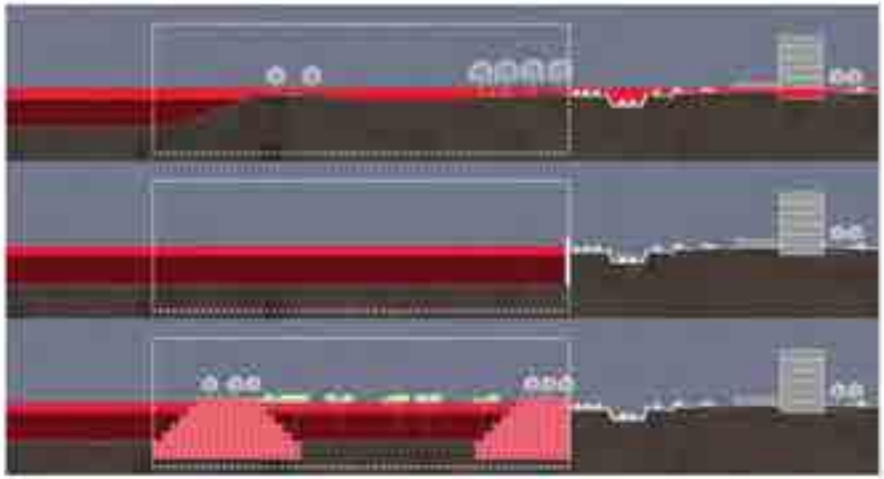
MODULAR SYSTEM

- OFF SITE CONSTRUCTION (SMALLER IMPACT AND FASTER BUILT)
- LOW COST
- FLEXIBLE AND EASY TO CHANGE

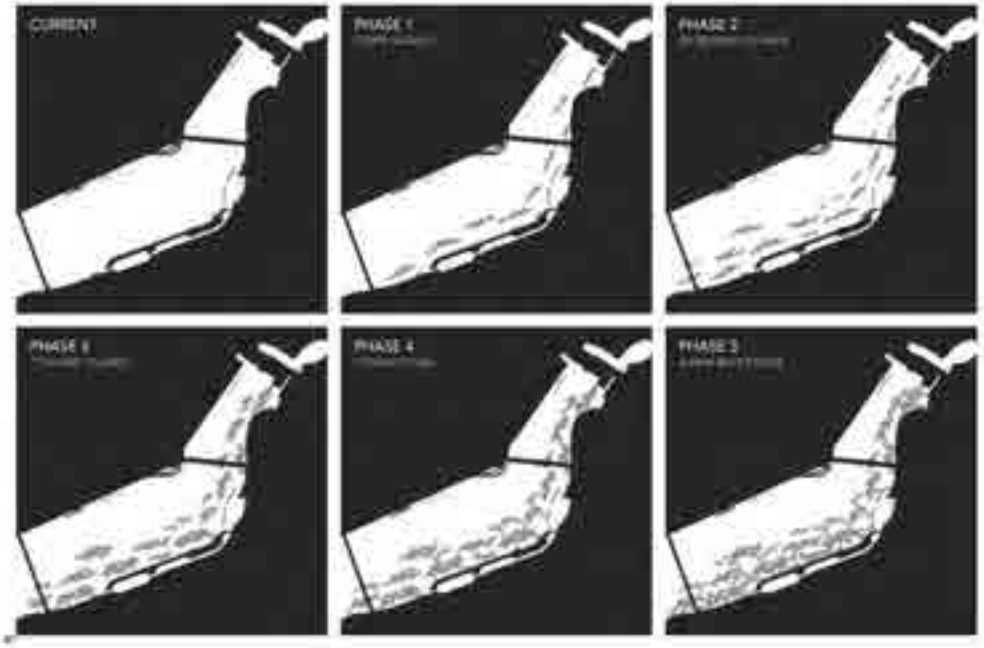
Modular System Form and Structure Testing

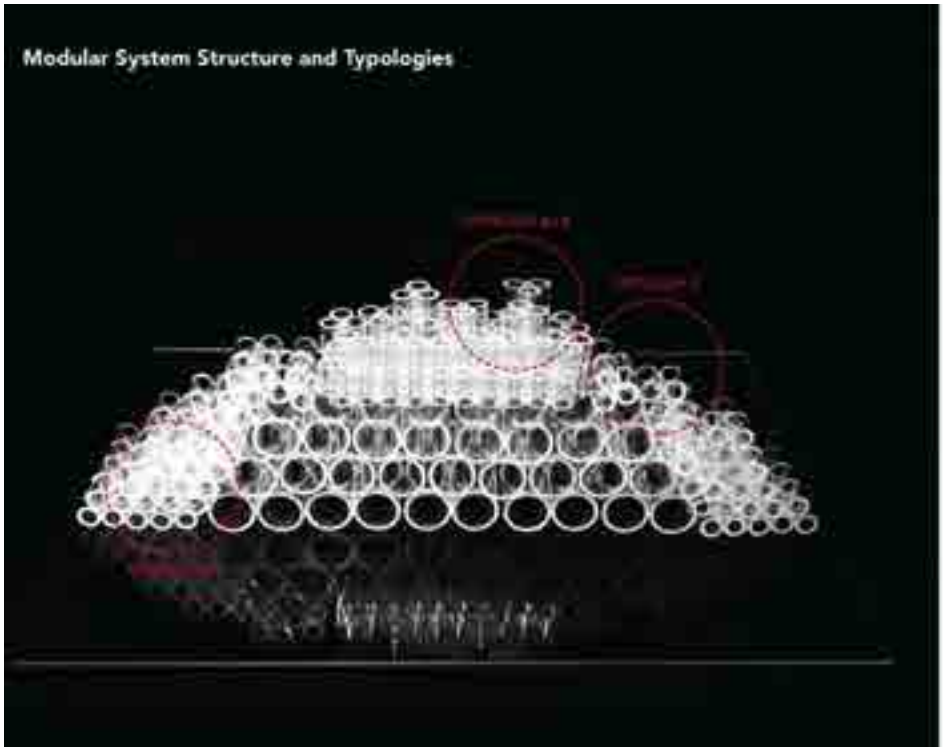
Cubic Modules | Sphere Modules | Cylinder Modules | Variations

Concept of the New Water Edge



Phasing Plan



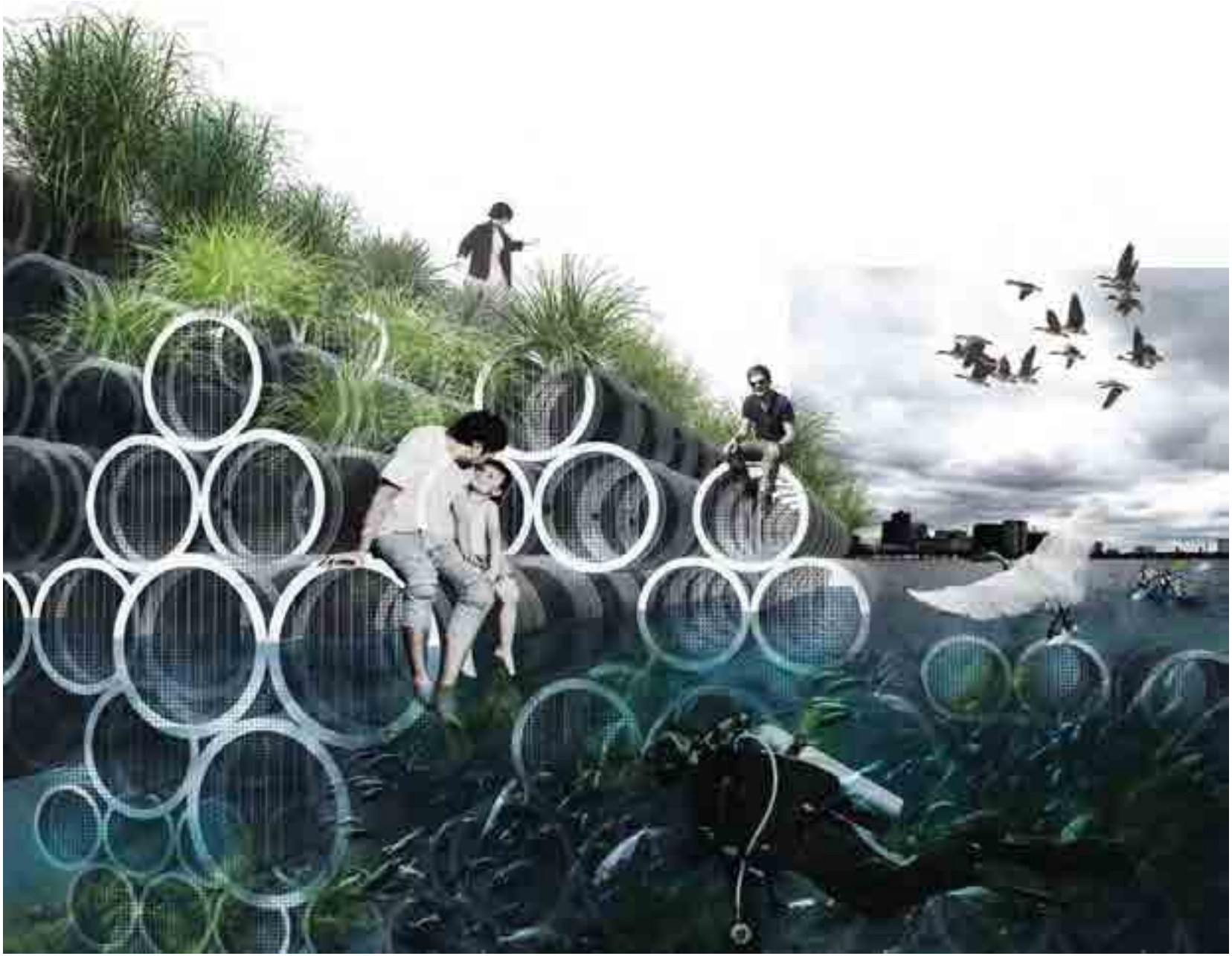


HALOPHYTE PLANT GARDEN

SALT WATER SWIMMING POOL

SHORELINE WETLAND

HABITAT HUB



WALK INTO THE SEA

ZHI WANG

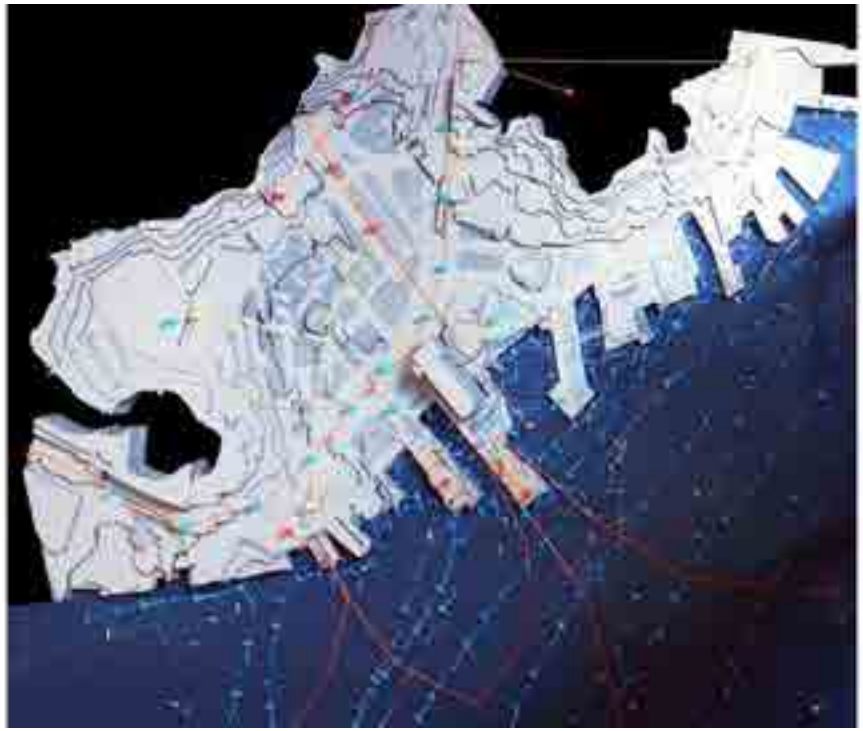
Phase1-A group of piers at downtown Boston

WALK INTO THE SEA

ZHI WANG

Abstract

In phase 2, I overall the phase 1 idea on a specific site, the long wharf. Considering the historical urban spaces of Boston, I proposed a push and pull relationship between human infrastructure and natural force. So I needed techniques to bind the natural erosion into the hard infrastructure, and how to create a strong sequence to lead human activities toward the sea.



Introduction

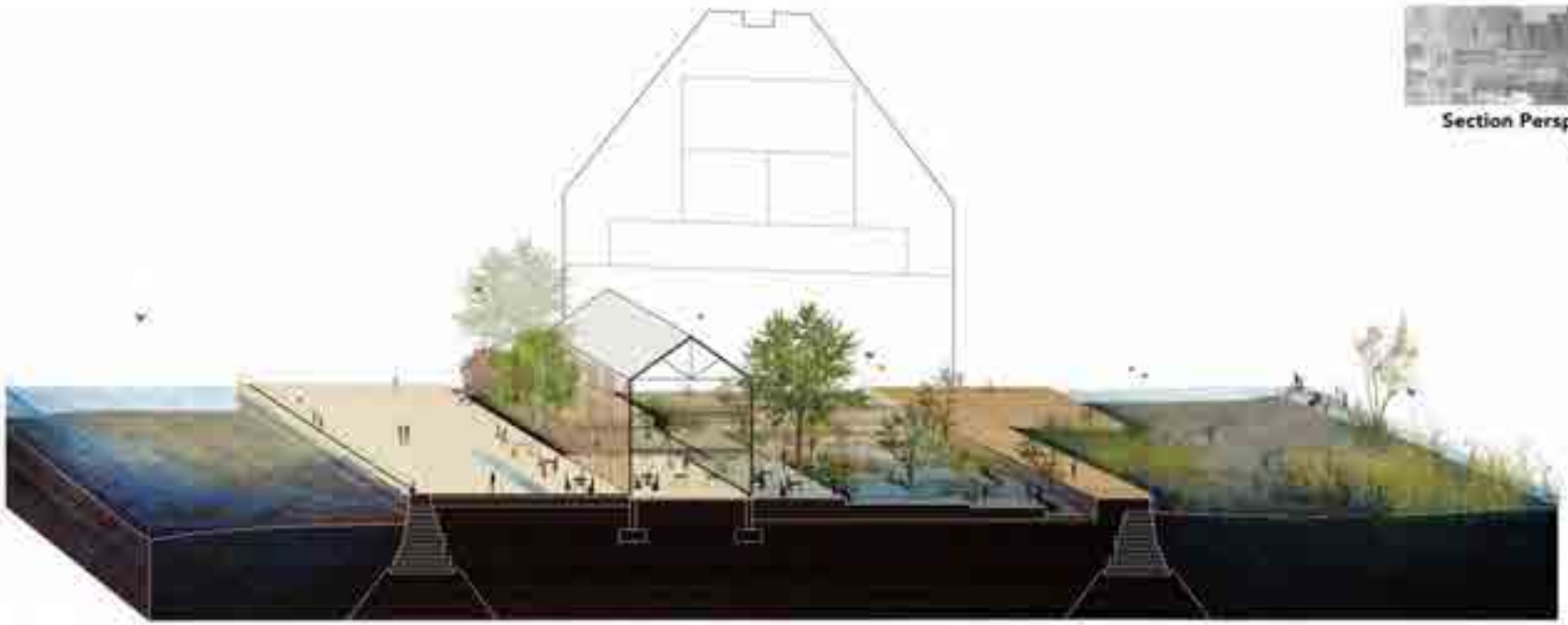
The long wharf is the oldest wharf in Boston. It is a witness of Boston history. In 19th century, when Boston settled on the trading port, the long wharf was the starting point of urban growth expanding into the inland. In 20th century, when the industry reduced, the removed wharf area expanded back into the wharf creating commercials and entertainments. Then in 21st century, partial wharf is thinner by flood, in my proposal, the long wharf is a filter that will stop the flood but take the expanding force of both urban growth and natural change.

The study of this phase focused on how to create a push and pull relationship between human infrastructure and natural force on the site.

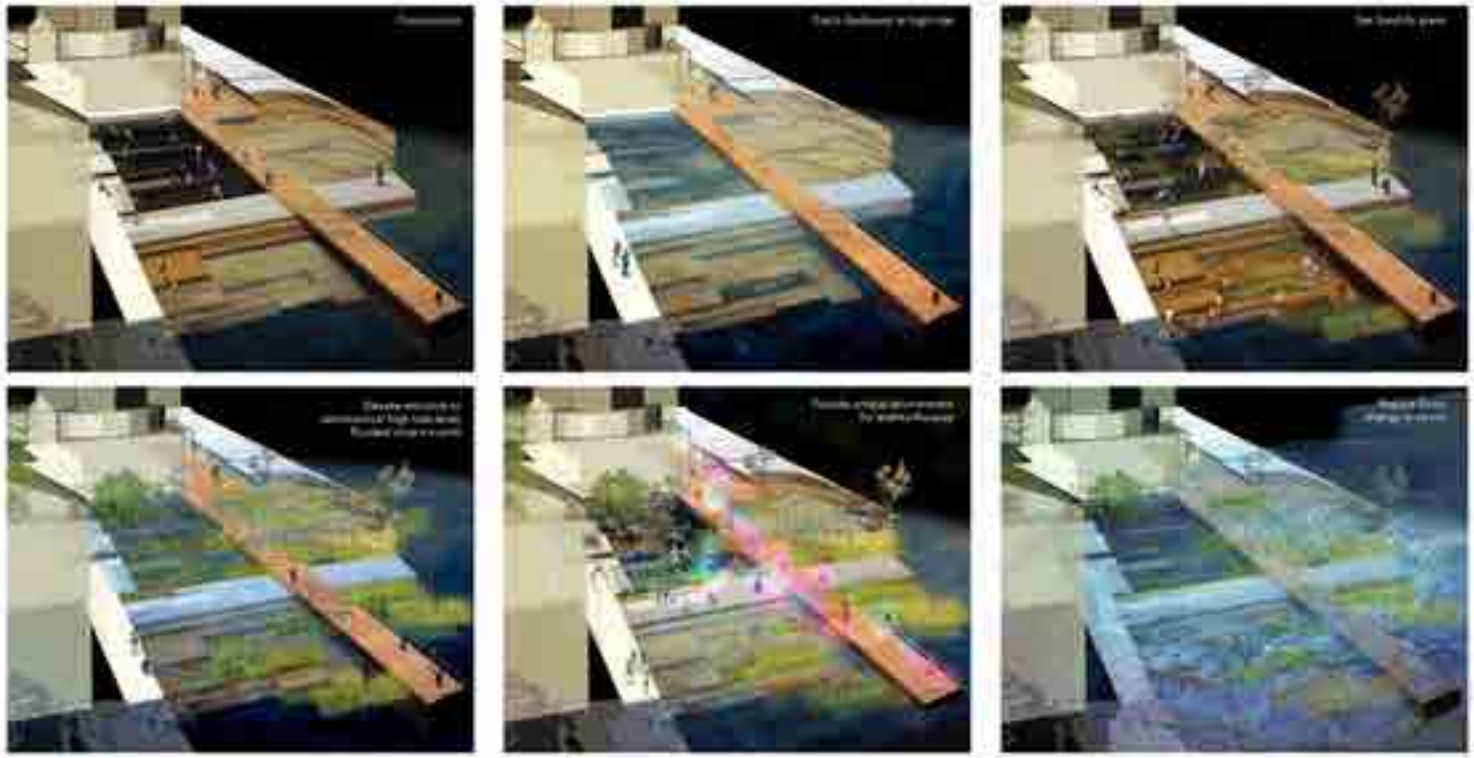
Methods

1. Study on how to create a strong movement leading human activities into the sea.
2. Study on how to lead natural erosion into the hard infrastructure.
3. Study on how to create a strong sequence in the linear space, so that people can experience the change of infrastructure and natural relationship when walking along the site.
4. Study on workers about the ecological system and gentrification change perpendicular to the water edge.
5. Work on the infrastructure ground to make sure the elevation level no stop upon snow, and the space's maximizing and transparent at the same time.
6. By grade the platforms to make acceptance condition change when the tide comes up and down.

LONG WHARF: HISTORIC PIER AND ACTIVE PUBLIC WATERFRONT



Section Perspective
B - B'



Hybrid structure transformation process

Terraces on the wharf

Hybrid structure
having fashion show

CONCLUSIONS---WHAT IS THE FUTURE HISTORIC?

CONSIDERATIONS

- DOES THE VISUAL CHARACTER OF A HISTORIC SITE NEED TO BE PRESERVED, OR CAN ITS IDENTITY EXIST IN ITS FUNCTION/RESILIENCE?
- WHEN CAN FLOODING OCCUR? WHEN IS IT APPROPRIATE TO EMBRACE NEW TEMPORAL DYNAMICS IN A CITY?
- IF DISPLACEMENT OCCURS, WHO WILL BE AFFECTED?
- HOW WILL NEW STRUCTURES MEET OLD IN HISTORIC SITES?

DYNAMIC CHANGES TO DAILY USE

Mapping Building Land Use

Typical Sections

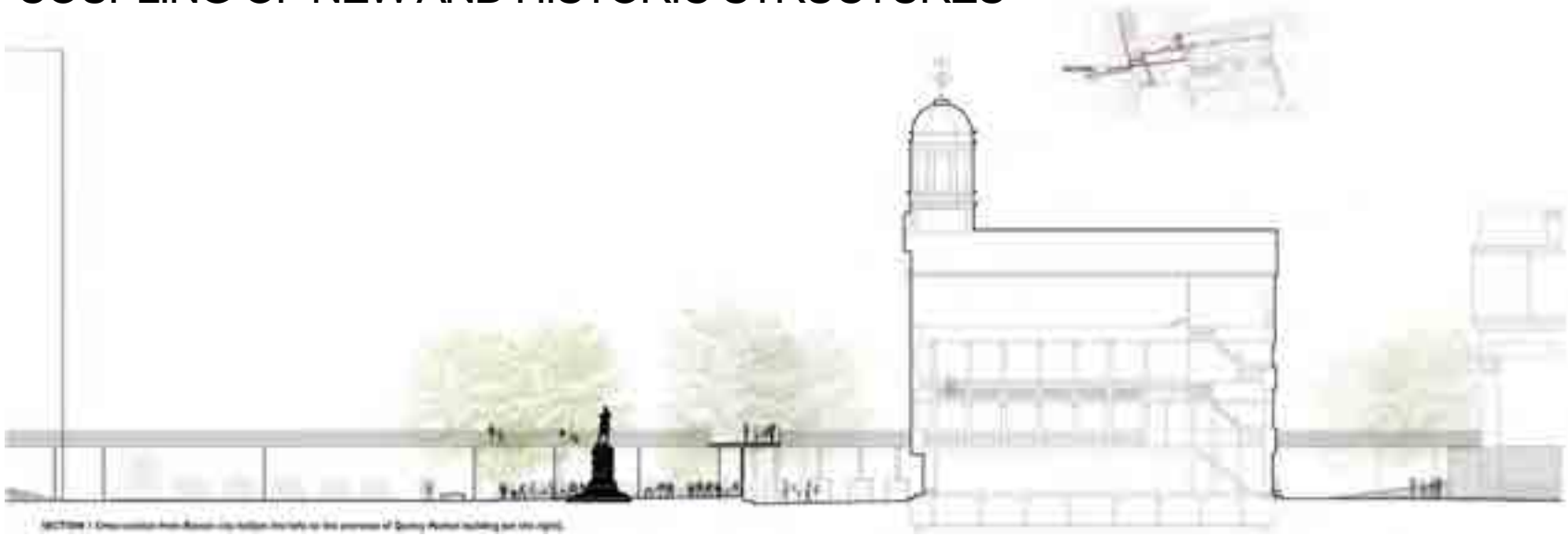
For different relationships between water edge, building, new infrastructure, and open space

Section C-C

Detail Section

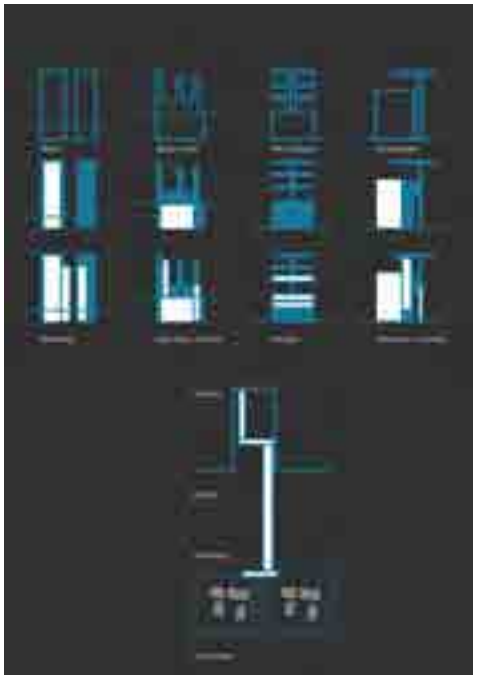
Kaiyue Fan

COUPLING OF NEW AND HISTORIC STRUCTURES



Juan Tan

STRUCTURAL PROGRAMMING AND MECHANISMS FOR MANY SCENARIOS



ADAPTIVE ECOLOGIES AND HARNESSED CHANGE OVER TIME

An Evolving Periphery: 2015 – 2100

2015

2100

Xi Yang

THANK YOU

RISD GRADUATE THESIS STUDIO 2015
PROTOTYPES FOR CHANGE: BOSTON 2050 - 2100

IMAGINED ADAPTATIONS

Stephanie Zurek | Union Studio

Lisa Howe | Building Conservation Associates

- *Case study of resiliency measures for an 18th-c. Newport house and neighborhood*

NEWPORT'S POINT NEIGHBORHOOD AND 74 BRIDGE STREET

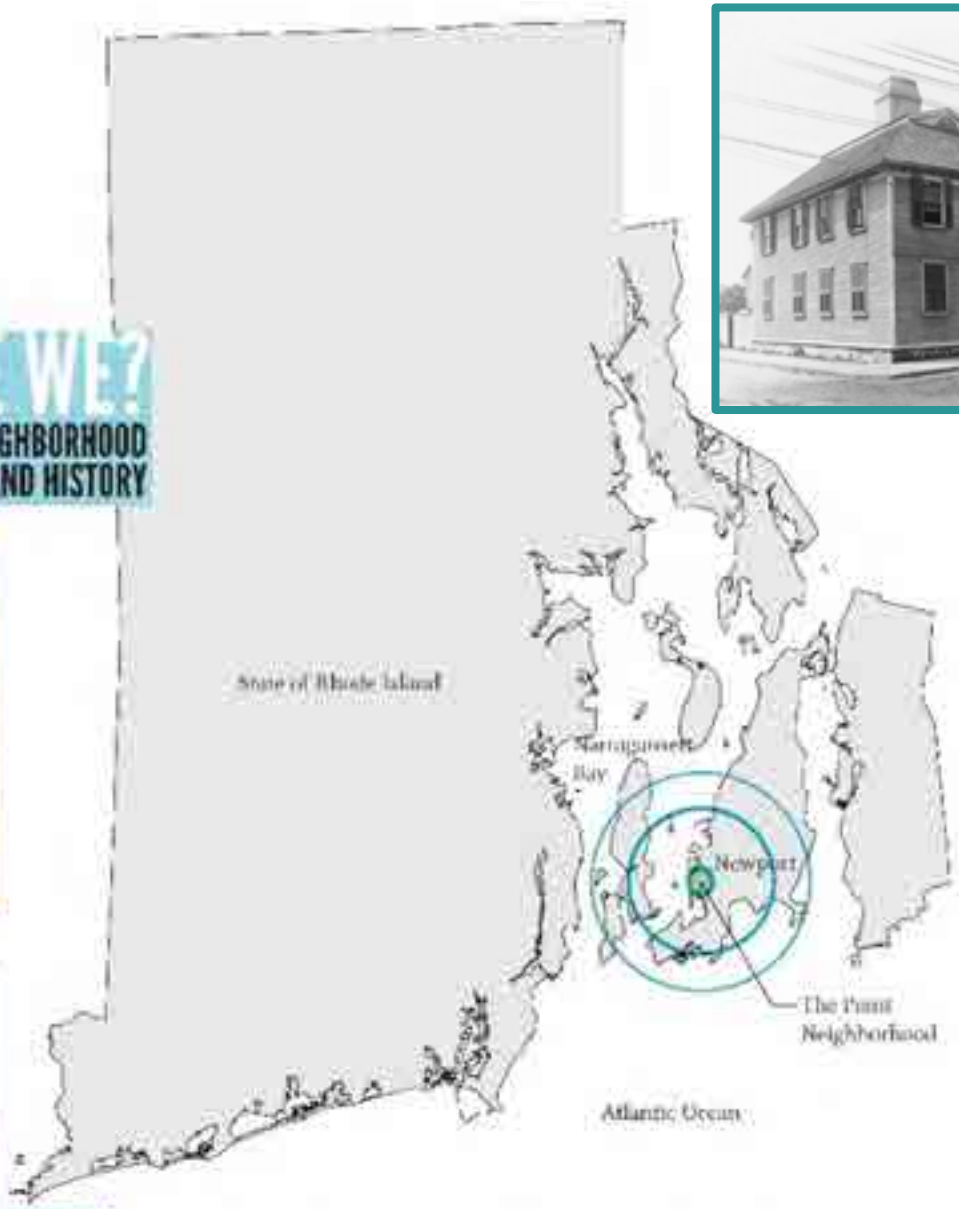
KEEPING HISTORY ABOVE WATER

WHERE ARE WE?

THE POINT NEIGHBORHOOD ORIGINS AND HISTORY

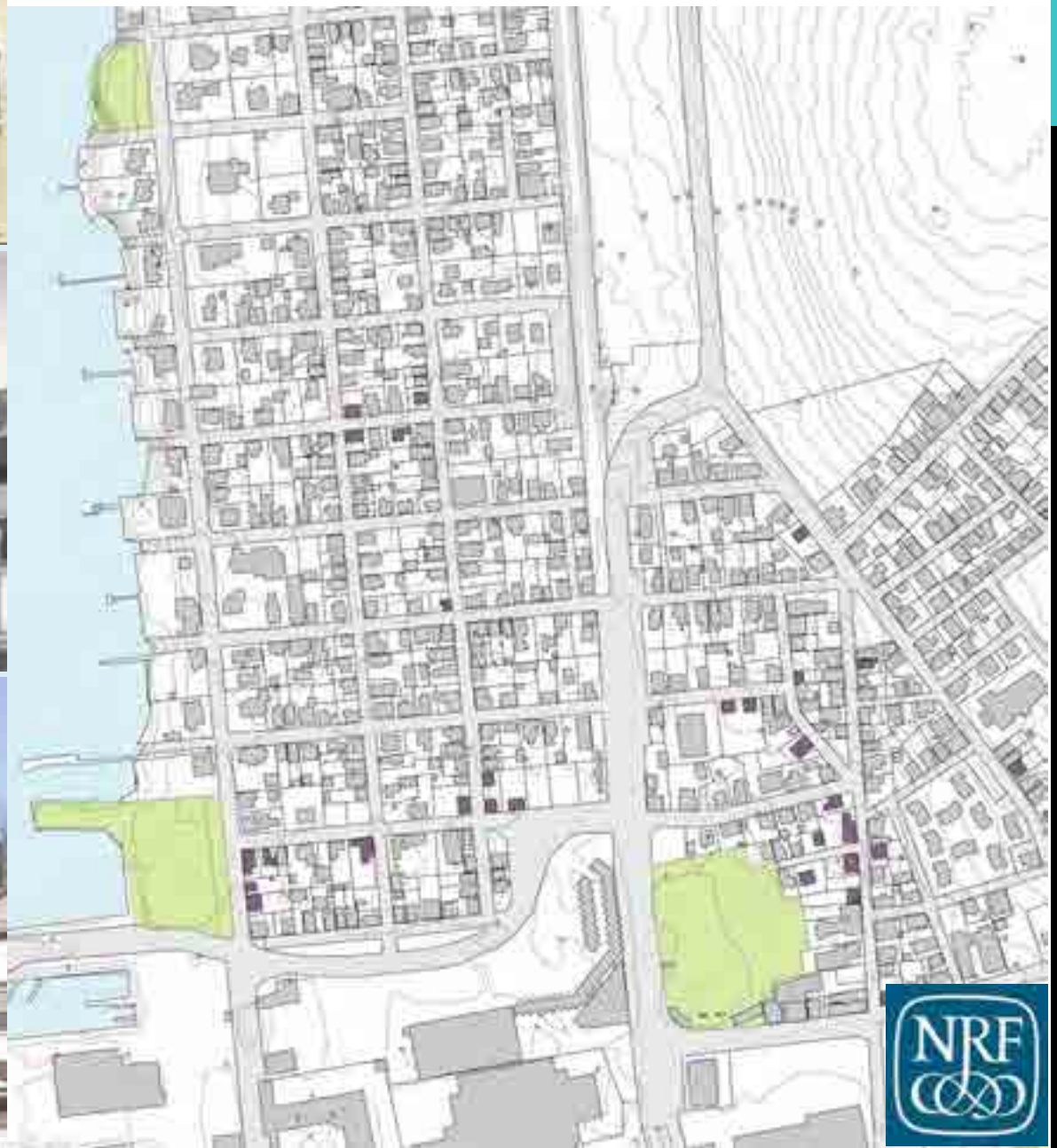
1878 CITY OF NEWPORT
(GALT & HOY BIRD'S-EYE-VIEW)

1777 SHORELINE



VICINITY MAP

HISTORY OF PRESERVATION



WHAT IS AT RISK?

OUR HISTORY AND OUR COMMUNITY

OUR HISTORY:

968 HISTORIC STRUCTURES ARE LOCATED IN NEWPORT'S FLOODPLAIN.

THE ASSESSED VALUE OF THESE HISTORIC STRUCTURES IS $559,992,649

OUR HOMES:

53% OF THE ACREAGE OF NEWPORT LIES IN THE FLOODPLAIN.

53% OF THE PARCELS IN NEWPORT'S FLOODPLAIN ARE RESIDENTIAL LOTS

OUR RESOURCES:

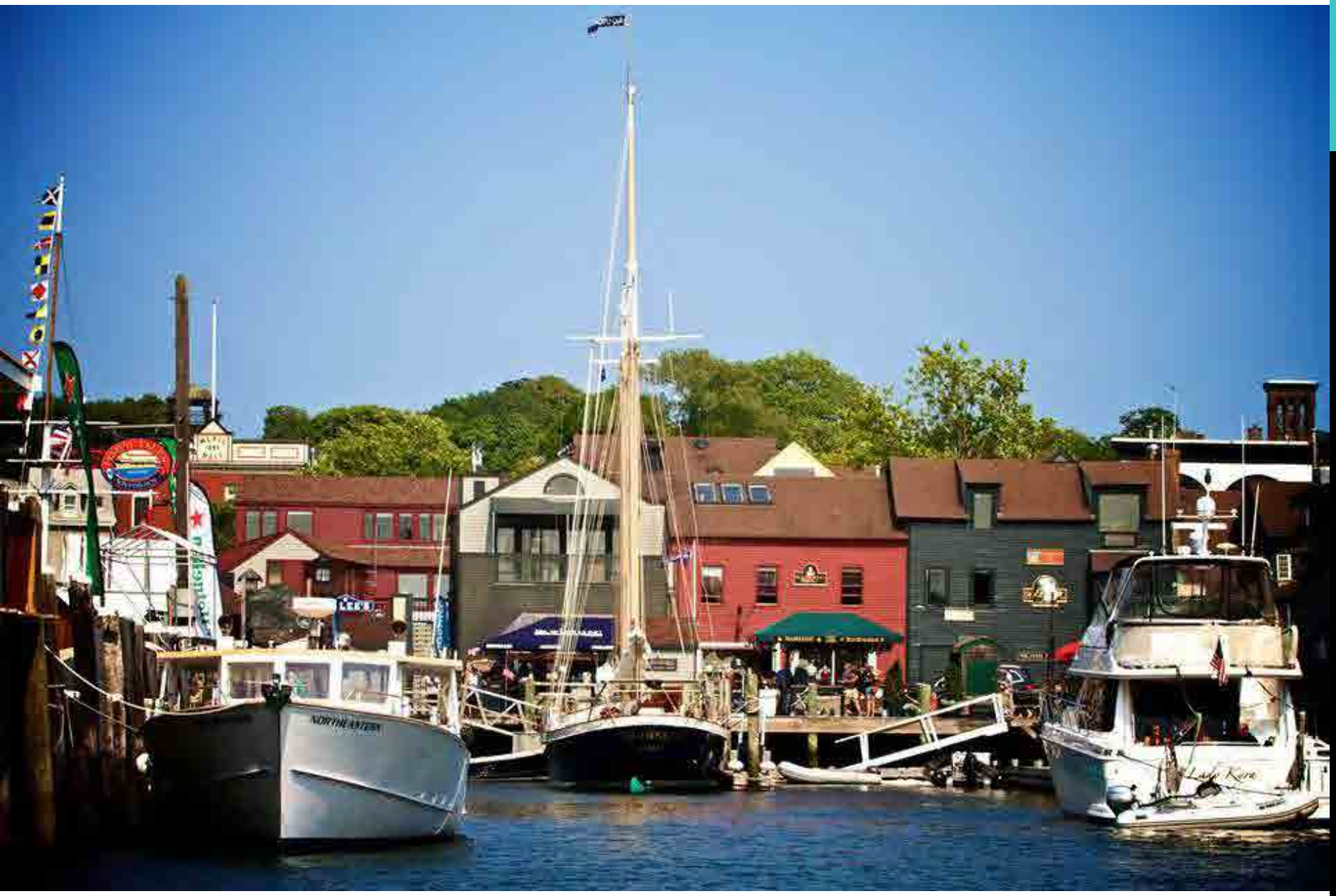
$3,817,860,900 OF POTENTIAL PROPERTY LOSS IN NEWPORT'S FLOODPLAIN.

53% OF TAXES COLLECTED FROM NEWPORT BUSINESSES COME FROM BUSINESSES THAT LIE IN NEWPORT'S FLOODPLAIN.

OUR LIVES:

OUR SAFETY IS THREATENED BY FLOODING AND ACCESS TO EVACUATION ROUTES.

200 NAMED ROADS IN NEWPORT RUN THROUGH THE FLOOD PLAIN.

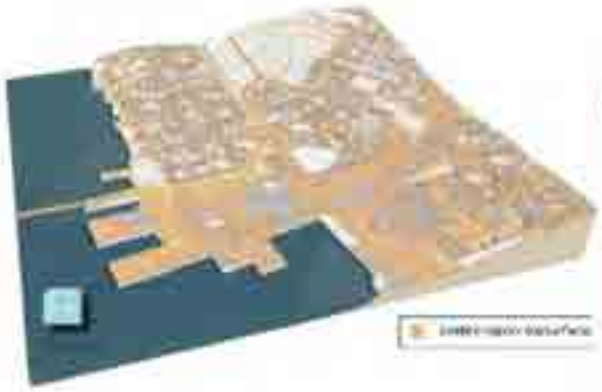


WHATSUPNEWP.COM

MULTI-LEVEL APPROACH:

- STORMWATER MANAGEMENT
- SEA LEVEL RISE
- DESIGN AND POLICY

STORMWATER MANAGEMENT

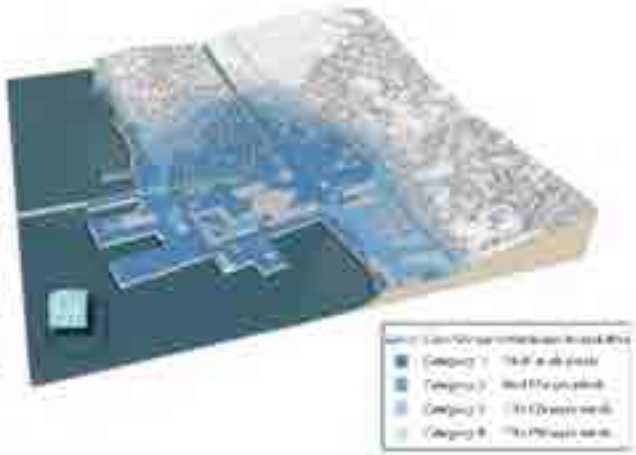


IMPERVIOUS SURFACES

Impervious surfaces uphill increase the volume of water flowing through system downhill.

STORM & SEWER LINES

In 2012, one inch of rain produced about 860,000 gallons of discharge at Washington Street outfall.

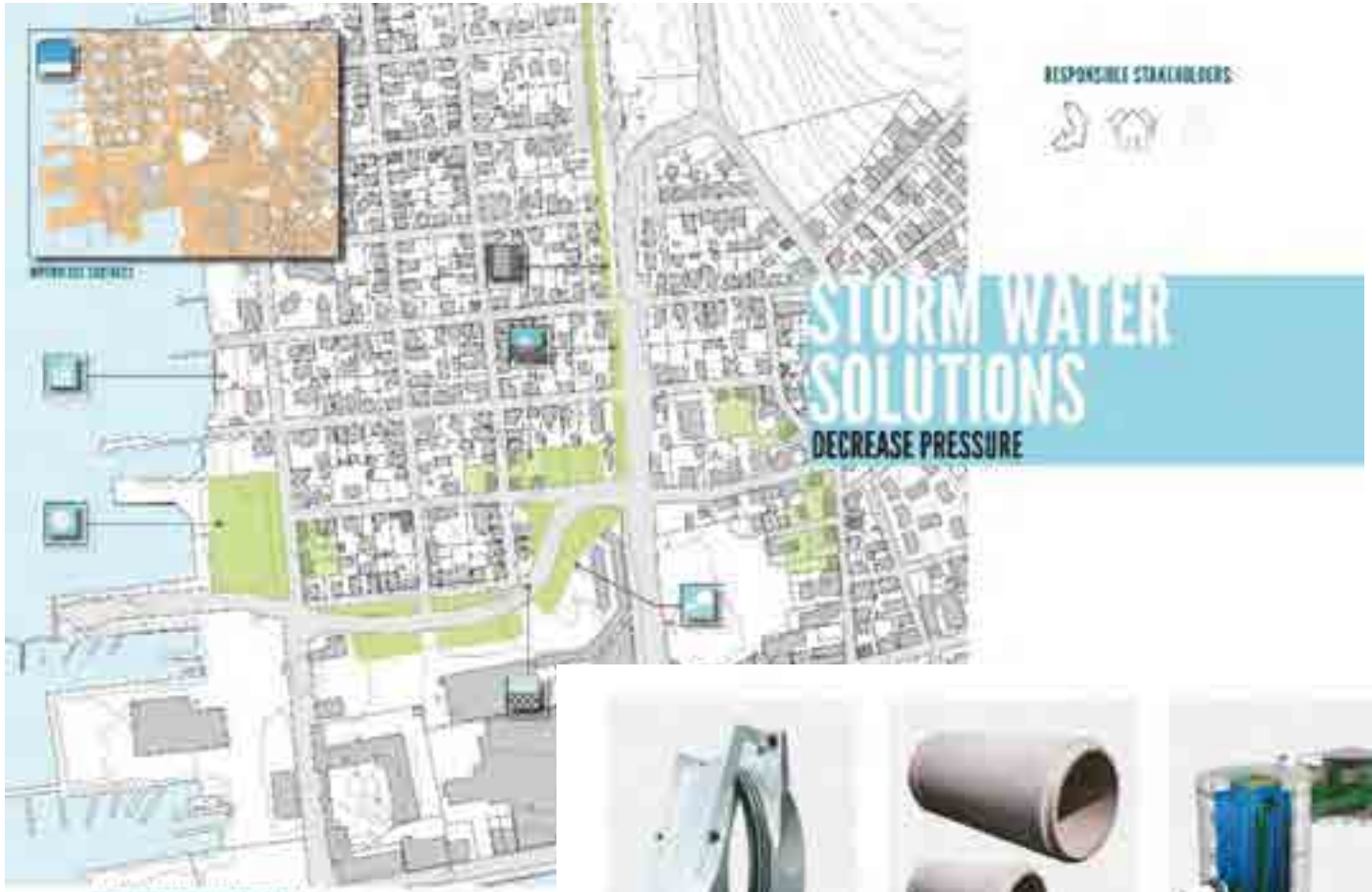


STORM SURGE

Since 1958, very heavy precipitation events in New England have increased by 71%.

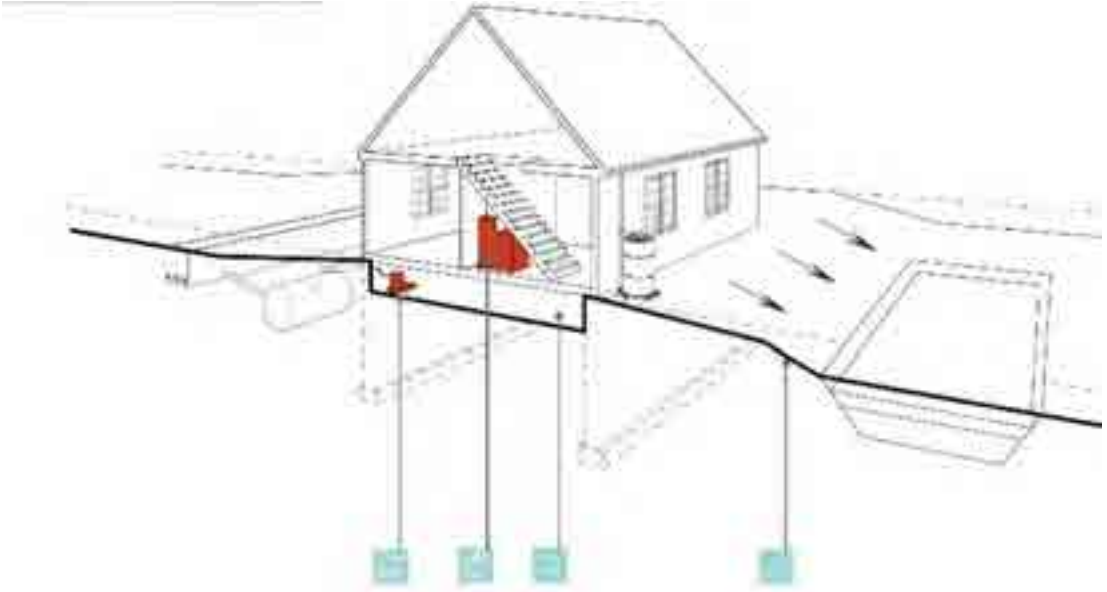
STORMWATER

NEIGHBORHOOD LEVEL SOLUTIONS

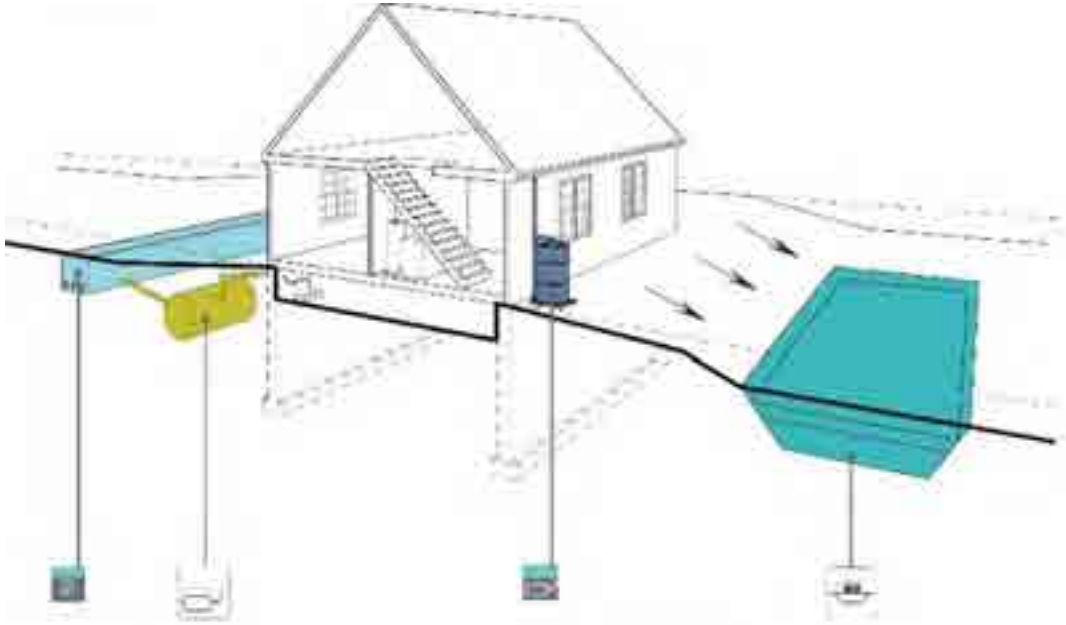


STORMWATER

BUILDING LEVEL SOLUTIONS

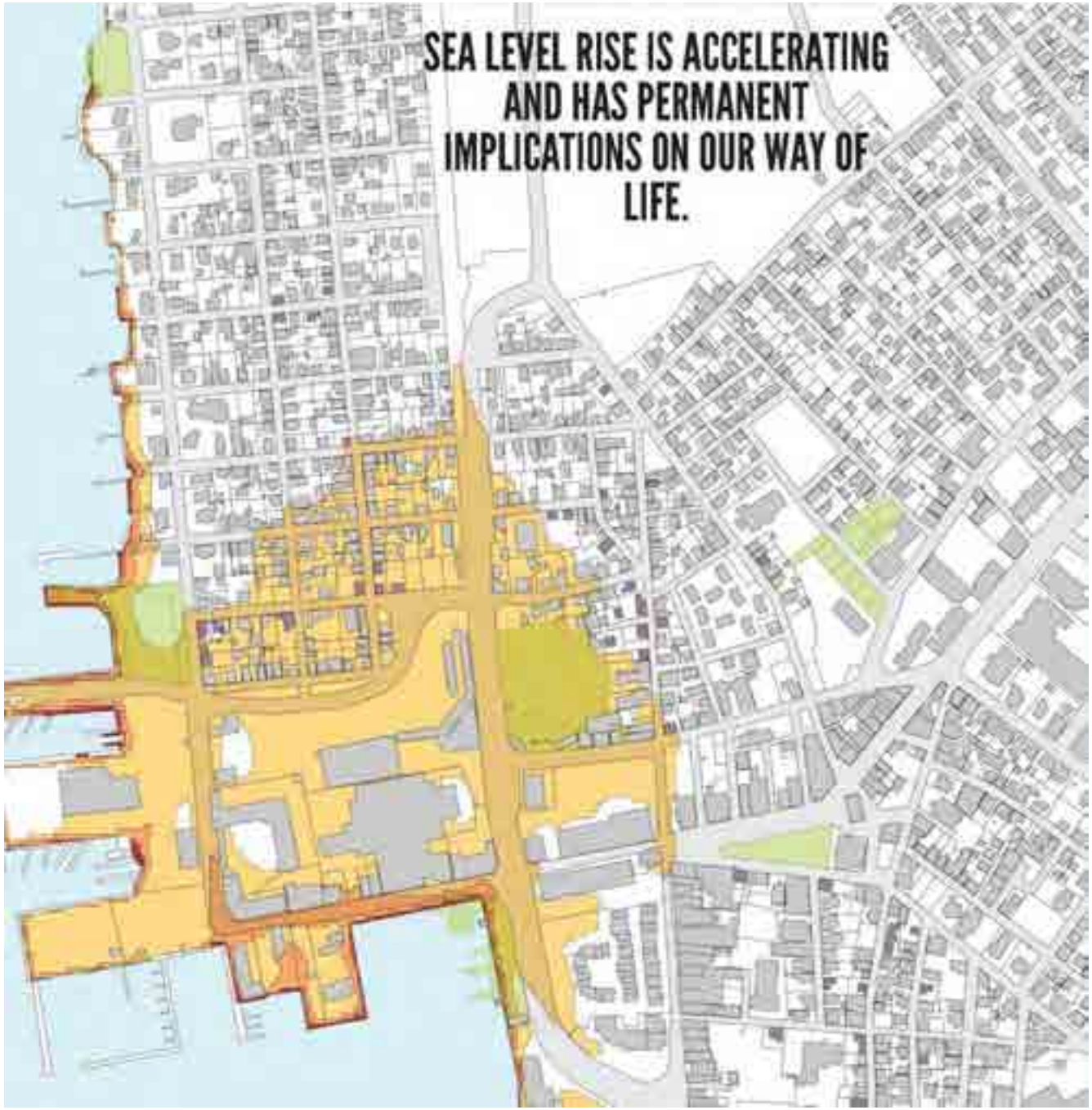


RETROFIT STRATEGIES



RETROFIT STRATEGIES

SEA LEVEL RISE



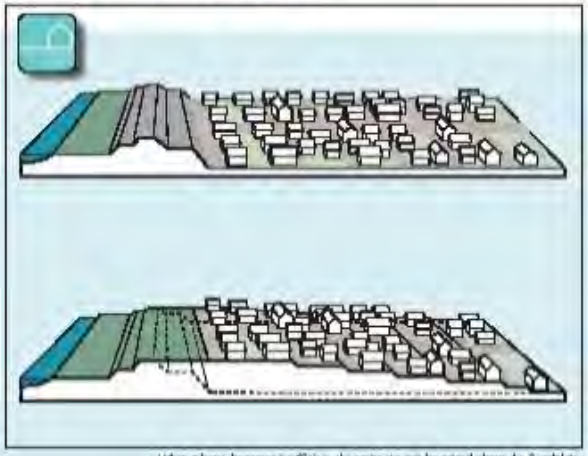
SEA LEVEL RISE

NEIGHBORHOOD SOLUTIONS

LEVEES

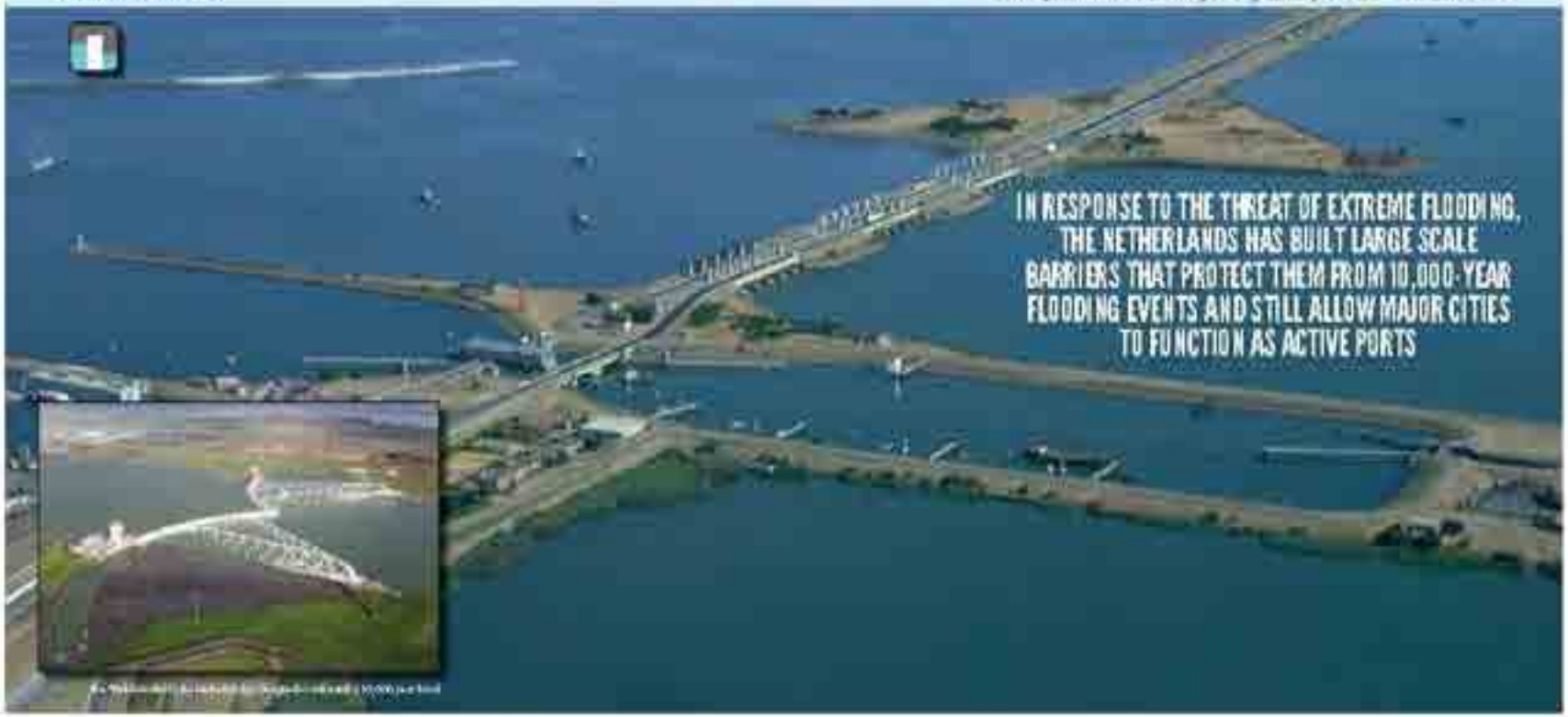
12-meter high meadow levee in Scheveningen, the Netherlands

RAISE STREETS & INFRASTRUCTURE



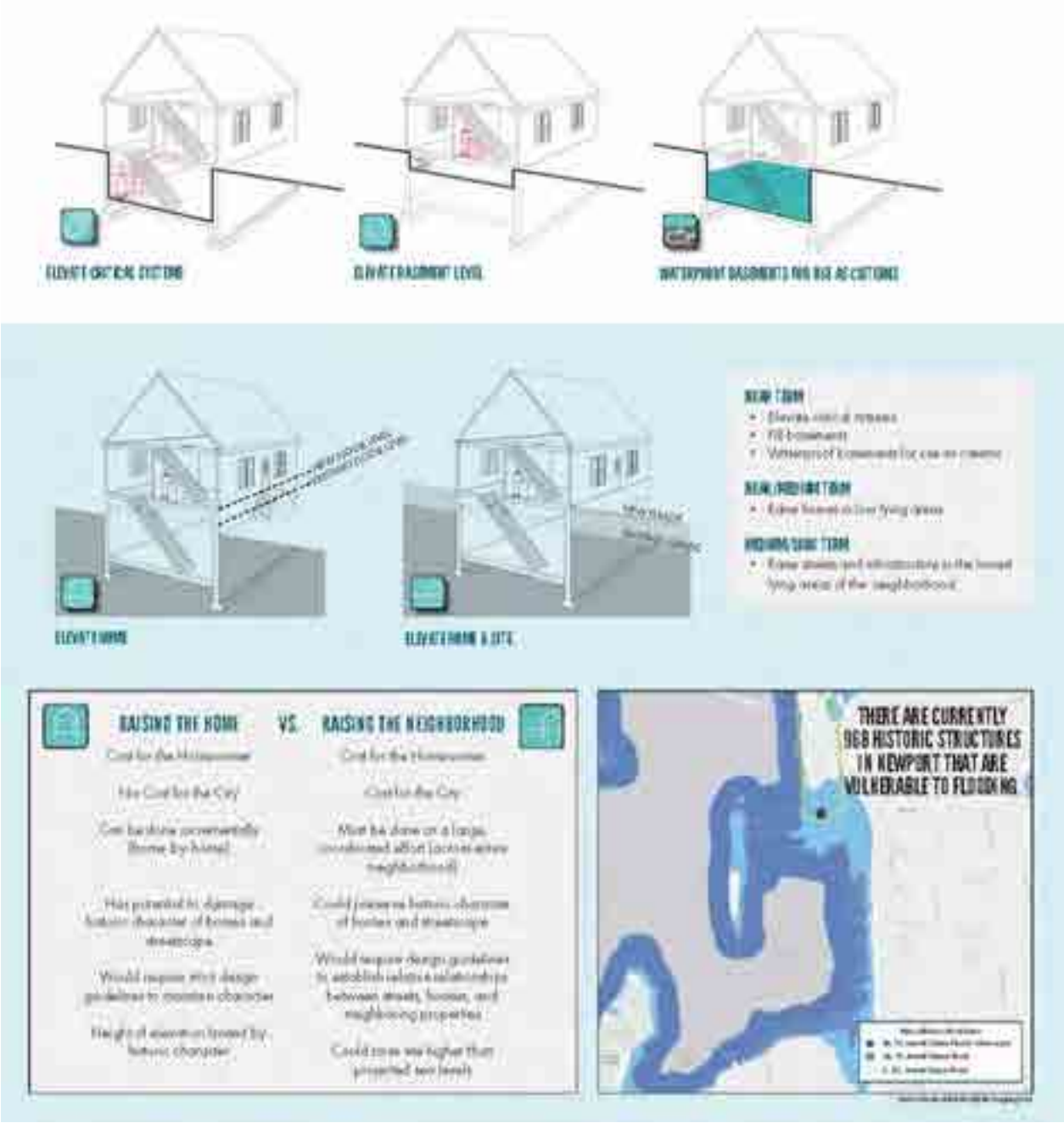
When a levee becomes inefficient, the entire area can be raised above the floodplain.

LARGE SCALE BARRIER



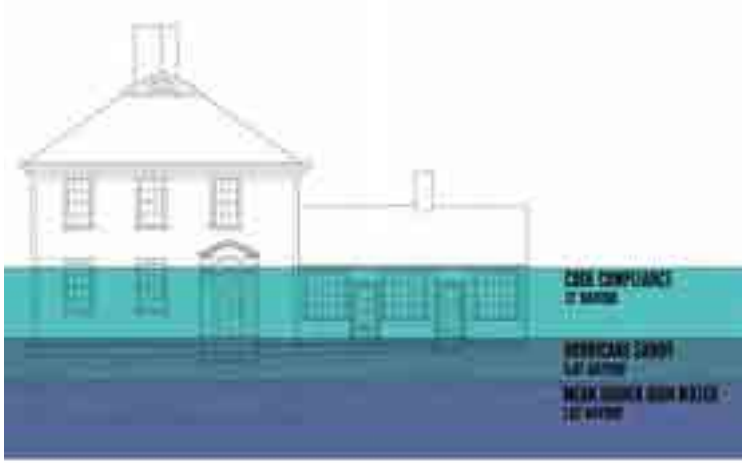
SEA LEVEL RISE

BUILDING LEVEL SOLUTIONS



POLICY AND DESIGN

PRESERVING CHARACTER



POLICY AND DESIGN

PRESERVING CHARACTER

POLICY AND DESIGN

PRESERVING CHARACTER

POLICY AND DESIGN

PRESERVING CHARACTER

POLICY AND DESIGN

DESIGN GUIDELINES

Documenting Character – Upper Narragansett

Many residents also cherish the more residential portion of Upper Narragansett Avenue, before Four Corners. These buildings are set further back from the street and have narrow street frontages, compared to the widths of the lots on which they sit. The frequent street trees and clear definition of private and public space help to create this valued character.

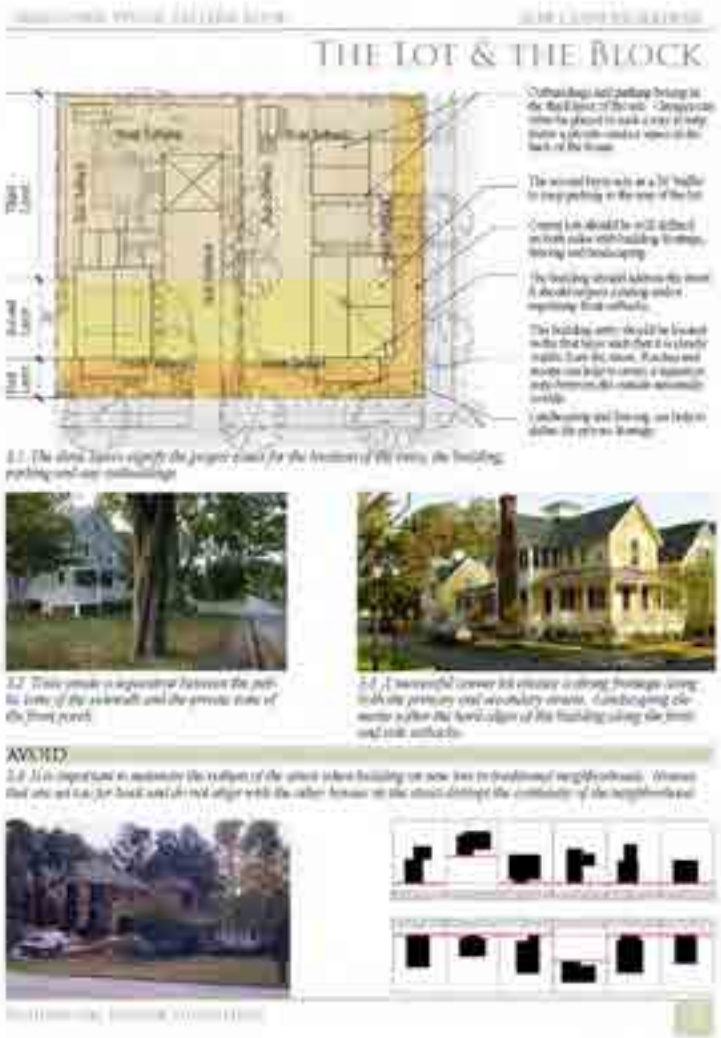
More recent development along Narragansett Avenue, allowed under the current zoning ordinance, has created sections of Narragansett Avenue that are less enjoyable for pedestrians. These sections that could use improvement are characterized by long stretches of parking lots in front of undistinguished buildings. The traditional setbacks are not maintained and the parking at the sidewalk's edge creates a chaotic and unpleasant space. The goal of the new zoning code is to define limitations for development that would prevent the creation of such spaces again.

2.5 Buildings along Upper Narragansett Avenue contain both business and residential uses, but have very residential proportions and details. Frontages are wider and setbacks are deeper. A residential scale prevails.

2.6 Upper Narragansett Avenue has a more residential character with buildings set further back from the street. The buildings are also set back from the side property lines, creating planted sideyards and allowing room for narrow drives.

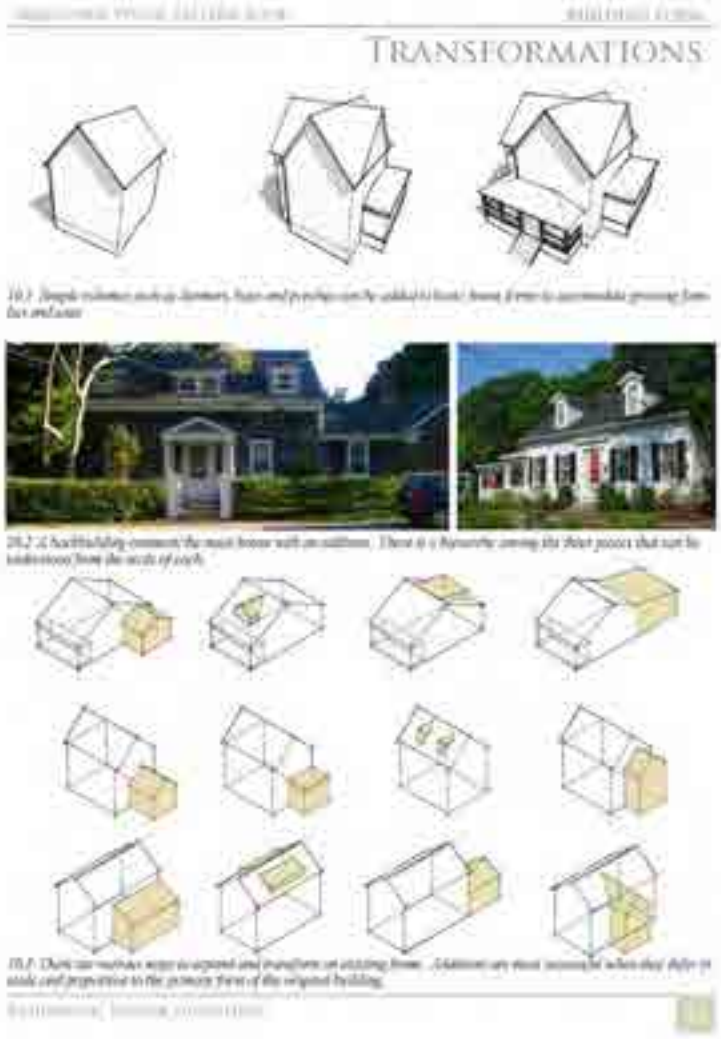
POLICY AND DESIGN

DESIGN GUIDELINES



POLICY AND DESIGN

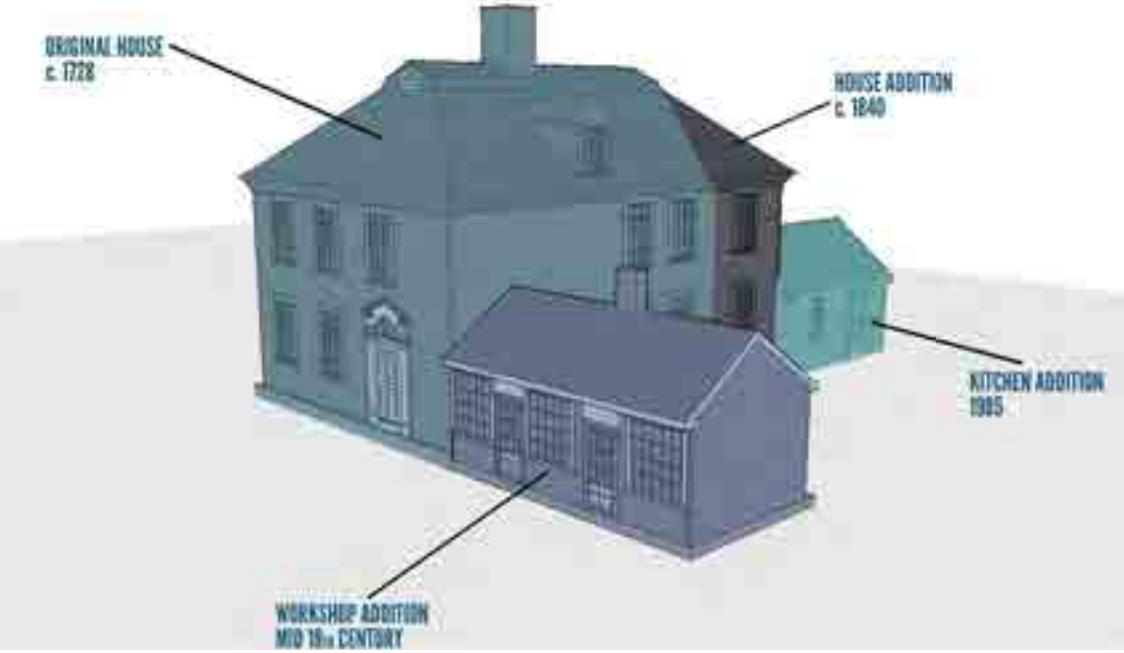
DESIGN GUIDELINES



74 BRIDGE STREET

HISTORY

- Located in Historic Point Neighborhood within Newport Historic District
- Constructed in 1728 by Christopher Townsend, a Newport cabinetmaker
- Additions in 1840, mid 19th C. and 1985
- Stone foundation, plank on frame construction with lime based plaster walls – materials able to dry out after cyclical wetting
- Purchased by NRF in 2014



74 BRIDGE STREET

FLOODING SCENARIOS

+

=

74 BRIDGE STREET

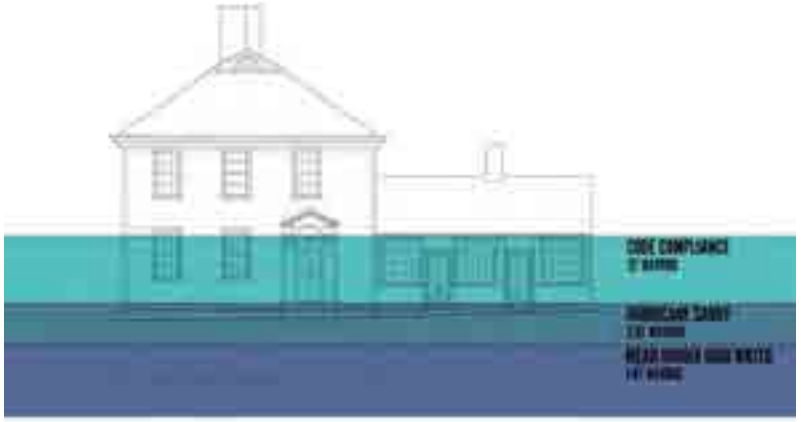
CHALLENGES + CURRENT CONDITIONS

Challenges

- Sea level rise + storm events
- Regulatory issues
- Infrastructure challenges
- Neighborhood Context

Recent Mitigations Efforts

- Use of appropriate restoration materials
- Elevated mechanical to kitchen wing
- Installed sump pump
- Elevated basement electrical wiring to framing



CHALLENGES

WATER INFILTRATION

Floodwater can enter the building through…

- Foundation or wall masonry and mortar joints
- Cracks in external walls
- Vents
- Around windows and doors
- Door thresholds
- Gaps around pipes that pass through walls and floors
- Sanitary appliances caused by back flow from flooded drainage systems
- Manholes
- Entrances to cellars and basements
- From under the floor or foundations.

MITIGATION METHODS

DRY FLOODPROOFING

Dry Floodproofing prevents the entry of flood waters from the enclosed areas of a building

- Build up doorsteps
- Use sandbags during flooding
- Install vent covers and seal gaps around pipes in exterior walls
- Install barriers fitted to exterior doorways and windows
- Maintenance repointing to keep water out
- Evaluate structure for buoyancy and hydrostatic pressure

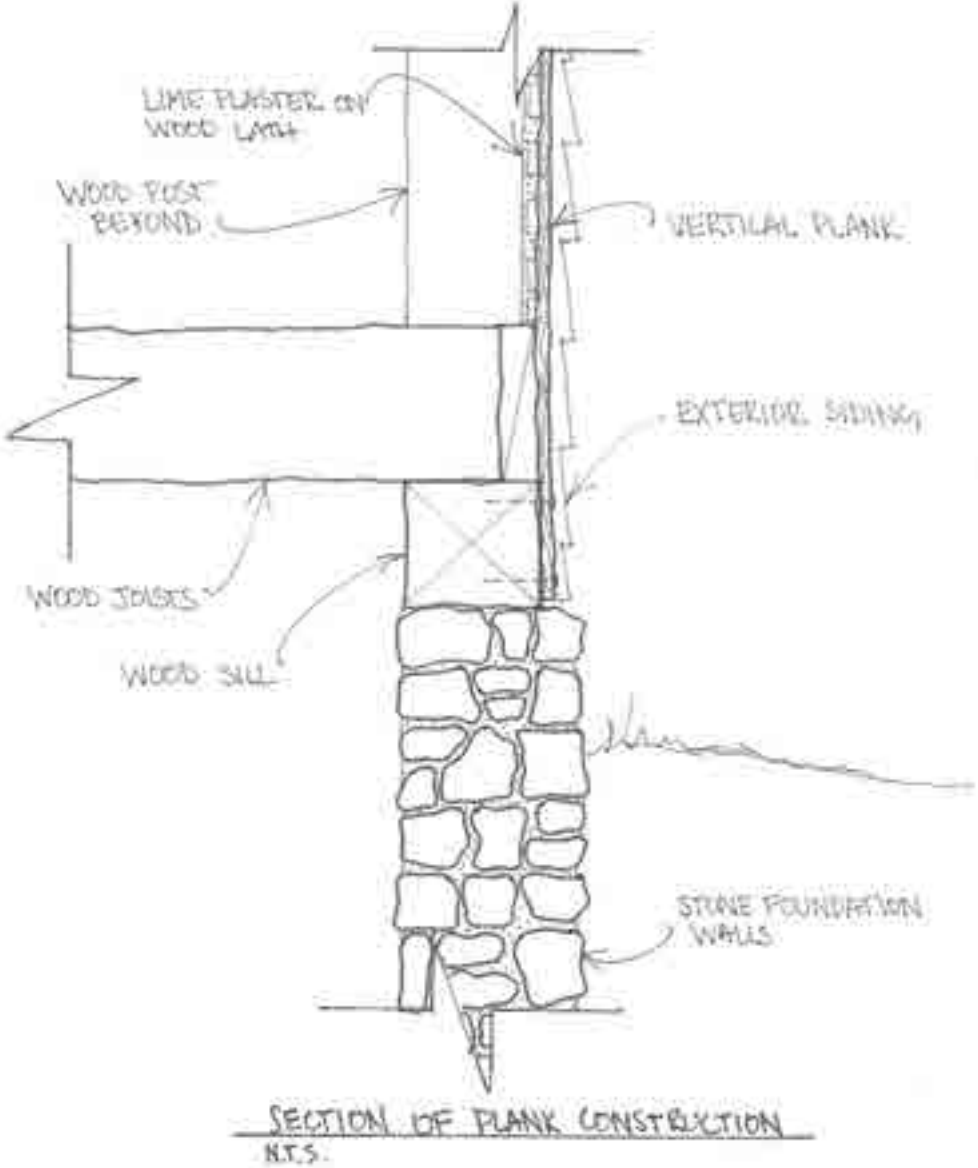
MITIGATION METHODS

WET FLOODPROOFING

Wet Floodproofing allows water to enter the enclosed areas of a building

- Raise utilities above likely flood level – including furnaces, hot water heaters, electrical circuitry
- Fit plumbing with backflow valves
- Provide ventilation through basements and cellars
- Ensure proper foundation drainage
- Install a sump pump with submersible power supply
- Strengthen foundation walls against flood water and debris
- Utilize damage-resistant materials

Note: Historic materials located below the flood level will be exposed to repeated saturation.



MITIGATION METHODS

ELEVATING BUILDING

Elevation

- Raise individual building above expected flood levels (right, Newport Point neighborhood)
- Build up site above expected flood levels (below, Galveston)
- Install a buoyant foundation system (lower right, New Orleans)

MITIGATION METHODS

RELOCATION OR REMOVAL

Relocation

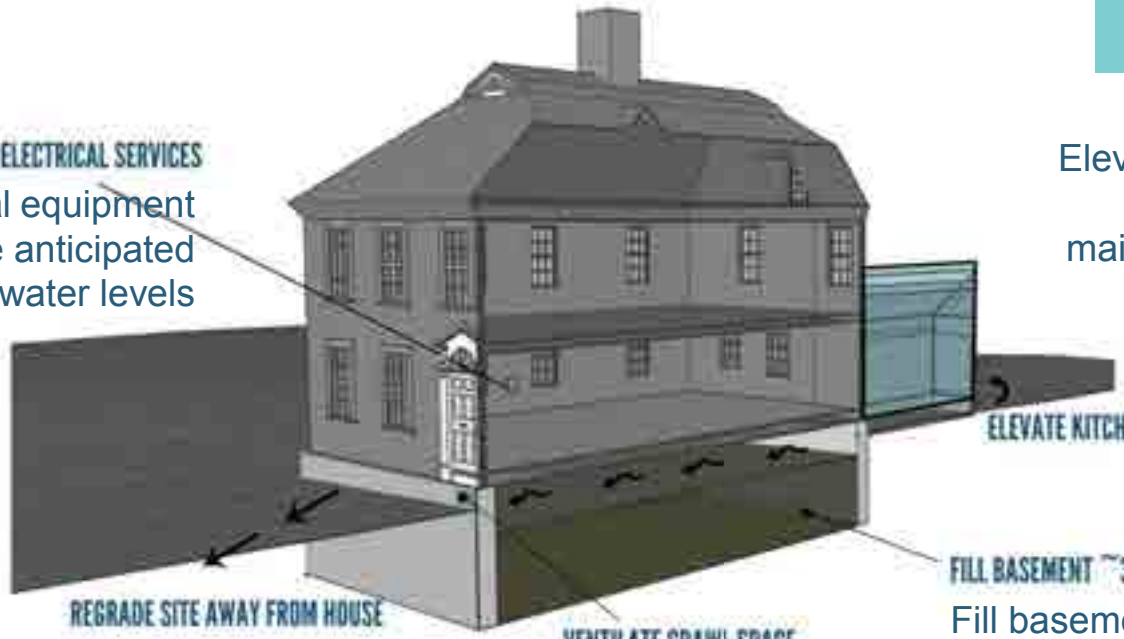
- Relocate building to sit on new foundations on a new site above expected flood elevations

Demolition

- As a last resort… when it is no longer feasible to retrofit, raise or relocate a building, demolition of historic buildings to be considered

74 BRIDGE STREET 2050

NEAR TERM MITIGATION STRATEGIES



Elevate electrical equipment and outlets above anticipated highest high water levels

Elevate kitchen to same level as main floor – raise out of current highest flood levels

Modify landscape to drain all water away from building. Cisterns not feasible due to high water table.

Install vents to allow water to flow through during floods, and to provide air flow to dry out crawlspace after inundation

Fill basement above fluctuating tide levels. Eliminates need for sump pump.

74 BRIDGE STREET 2050

LONG TERM MITIGATION STRATEGIES

Elevate Neighborhood

Massive infrastructure project that requires state and town funding and initiative

Move House to higher ground

Lose context and character of neighborhood

Demolish

Lose vital historic fabric and context

Other Options???

IMAGINED ADAPTATIONS

Dennis Carlberg | Boston University & Urban Land Institute

carlberg@BU.edu | 617-358-5596

Mason Andrews | Hampton University

mason.andrews@verizon.net | 757-727-5440

Suzanne Mathew | Rhode Island School of Design

smathew@risd.edu | 434-249-9117

Lisa Howe | Building Conservation Associates

lhowe@bcausa.com | 617-916-5661

Stephanie Zurek | Union Studio

stephanie@unionstudioarch.com | 401-272-4724