Design-Led Urban Infrastructure: Realizing a Resilient Public Realm

Course Number TH402

Thursday, June 21, 2018, 9:45 AM – 11:15 AM

Learning Units: 1.50 (HSW, GBCI, RIBA)

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Questions related to specific products and services may be addressed at the conclusion of this presentation.

Speakers List

- Amy Chester, Managing Director, Rebuild by Design, New York, New York
- Stephen Engblom, AIA, Senior Vice President/Global Director, Cities, AECOM, San Francisco, California
- Jeremy Alain Siegel, Associate, Senior Designer, BIG – Bjarke Ingels Group, New York, New York
- Jamie Torres Springer, Partner, HR&A Advisors, Inc., New York, New York

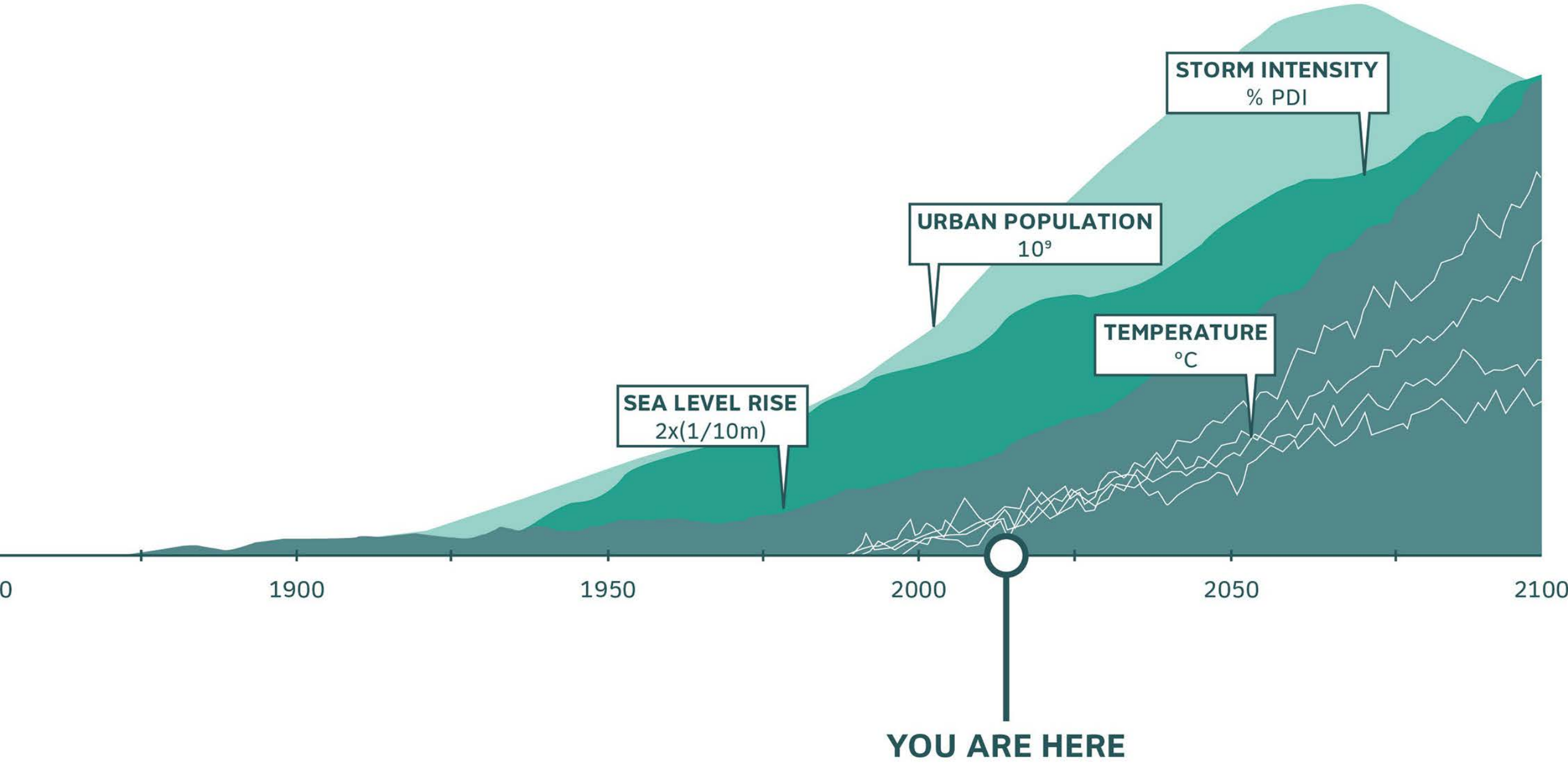
Course / Learning Objectives

1. Discover how to build consensus in the design and financing of a project by working collaboratively with other key stakeholders.
2. Learn how to shift from subjective to objective evaluation of design and project delivery alternatives.
3. Build practical knowledge needed to calculate cost-benefit analyses and communicate with key stakeholders.
4. Learn how to create a meaningful dialogue among architects and other professionals (e.g., engineers, landscape architects, economics, environmental planners, urban planners) in the design of the public realm.

REBUILD BY DESIGN

Creating Resilient Cities

Amy Chester, Managing Director

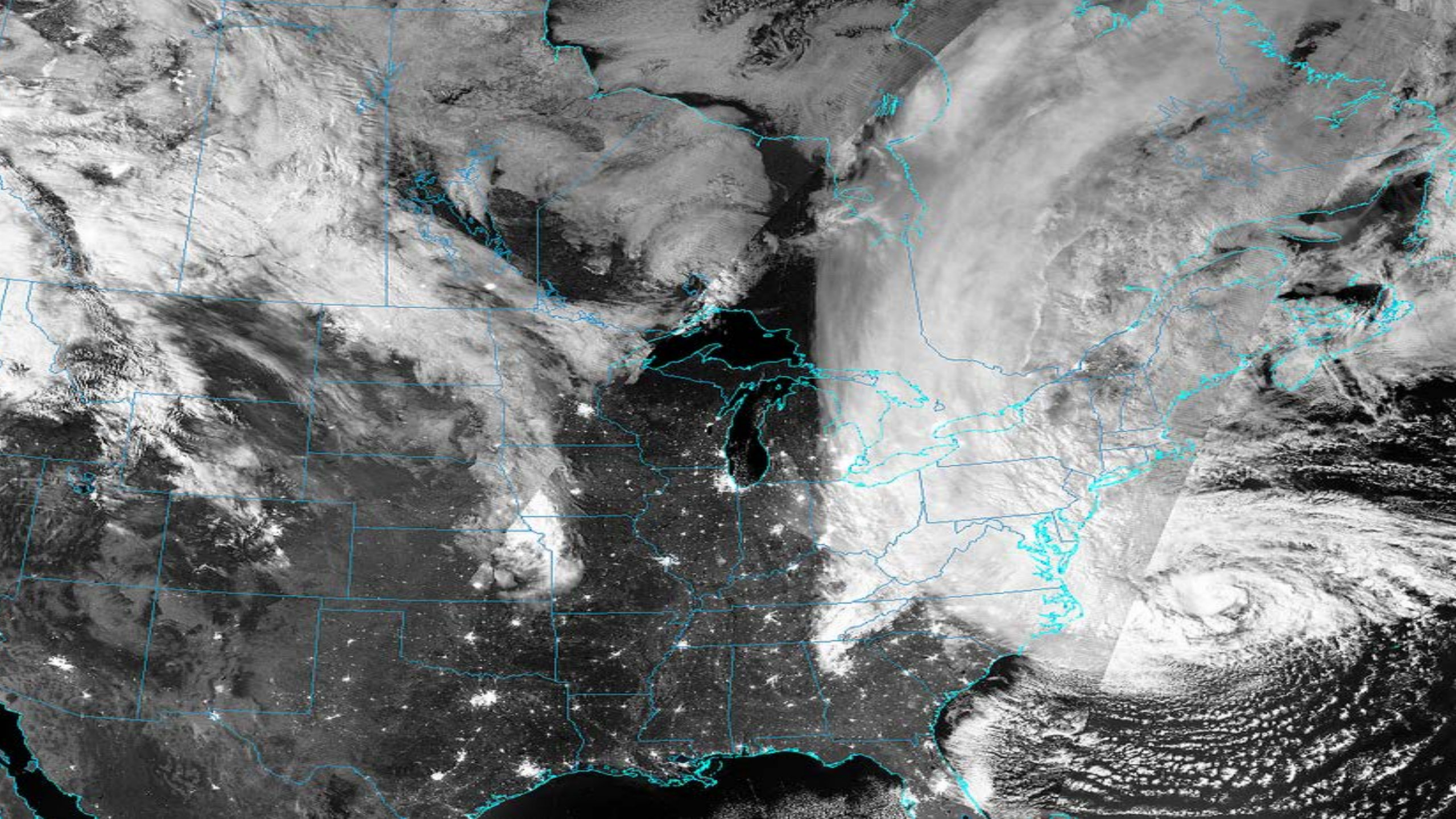

STORM INTENSITY
% PDI
URBAN POPULATION
10⁹
TEMPERATURE
°C
SEA LEVEL RISE
2x(1/10m)
0
1900
1950
2000
2050
2100
YOU ARE HERE


Harvey


Maria


Irma


Jose




PHYSICAL RESILIENCE
SOCIAL RESILIENCE
A'18
AIA Conference on Architecture 2018
June 21-23, New York City

Rebuild by Design is a process that brings together global and local expertise, regional leadership and local vision to tackle multidimensional problems that harness and cultivate strong stakeholder support and government leadership.

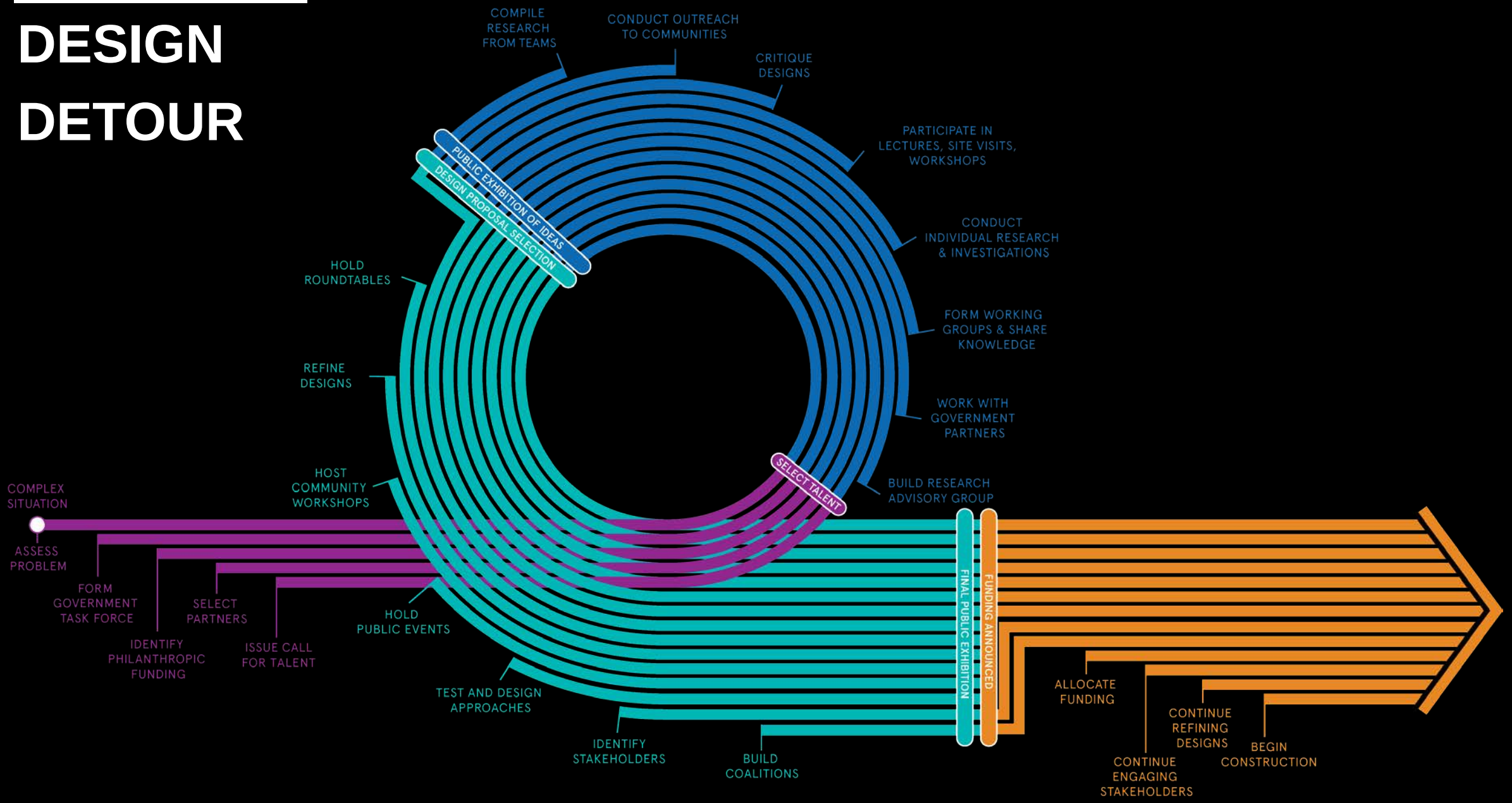
REBUILD BY DESIGN

TYPICAL DESIGN PROCESS

- Site
- Budget
- Program
- Square Footage
- Timeline

IMAGE: MITCAU + ZUS + URBA

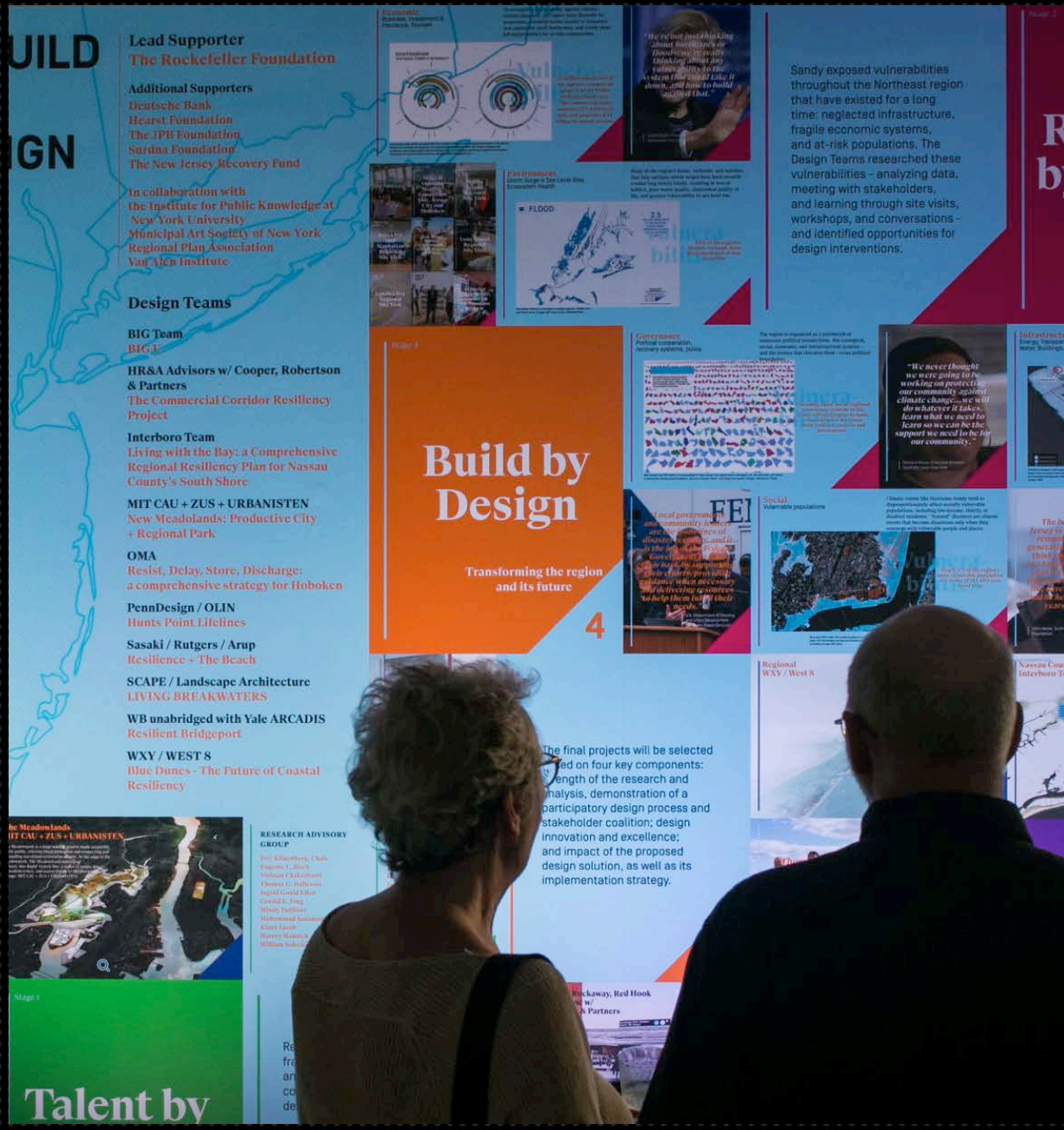
DESIGN DETOUR



HURRICANE SANDY DESIGN COMPETITION

JUNE 2013 – JUNE 2014

- 10 Interdisciplinary Teams
- Northeast United States
- Federal Disaster Dollars (CDBG-DR) to be awarded by HUD
- Focus on the Future, Not Returning to the Past
- Infrastructure should address multiple goals at the same time
- Judged on Innovation, Collaboration and Implementation



REBUILD BY DESIGN

STAGE 1: COLLABORATIVE RESEARCH

Regional Site Visits

The ten teams toured 41 neighborhoods during the course of five multi-day site visits, traversing storm-tossed wetlands, desolated beachfront towns, and city streets marked by boarded-up shops and damaged infrastructure. They met with residents, community organizations, activists, business leaders, experts, and many local government officials who shared their experiences of the storm's effects, provided perspectives on the ongoing response, and offered insights on their communities' priorities for long-term recovery. In addition to gathering insights on these excursions, each team was charged with producing new research that would enhance and deepen their design approaches.

Jamaica Bay

Jersey Shore

Lower East Side, Hoboken, and Jersey City

Bridgeport, Milford, and Fairfield

Long Island

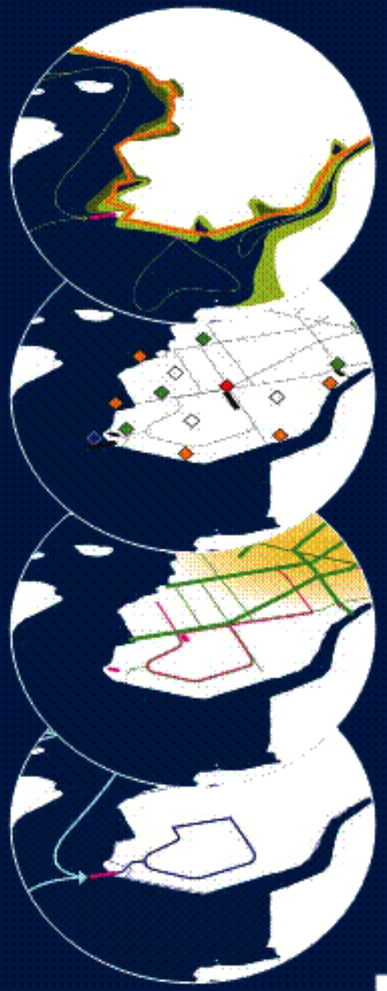
Staten Island

Red Hook and Lower Manhattan

STAGE 2: COLLABORATIVE DESIGN

Design + Program developed with stakeholders

DESIGN



INTEGRATED FLOOD PROTECTION SYSTEM

LIVELIHOODS + LEADERSHIP

CLEANWAY CONNECTIONS

EMERGENCY MARITIME SUPPLY

GOVERNMENT

FEDERAL:
Congressman Jose E. Serrano (NY-15)

US Army Corps of Engineers

STATE:
Assemblyman A. Crespo 85th District

NYS Department of Environmental Conservation

NYS Department of Transportation

CITY:
NYC Economic Development Corporation

Office of the Mayor of New York City

NYC Department of Environmental Protection

NYC Office of Emergency Management

NYC Department of City Planning

NYC Department of Transportation

NYC Department of Parks and Recreation

LOCAL:
Community Board #2

Community Board #2 - Environmental Committee

+ COMMUNITY

LOCAL ORGANIZATIONS:
The Point Community Development Corporation

Sustainable South Bronx

Mothers on the Move

Bronx River Alliance

Rocking the Boat

Majora Carter Group

The Blk Projek

Youth Ministries for Peace and Justice

South Bronx Unite

OTHER COMMUNITY ADVOCACY:
New York City Environmental Justice Alliance

Environmental Defense Fund

Pratt Center for Community Development

Adam Liebowitz

Mathews Nielsen

WXY

and more...

+ INDUSTRY

ADVOCACY:
Hunts Point Economic Development Corporation

BUSINESSES:
The Hunts Point Terminal Produce Cooperative Association

Hunts Point Cooperative Market

New Fulton Fishmarket at Hunts Point

Smitty's Filet House (fish wholesaler)

Nathel & Nathel (produce wholesaler)

Vista Food Exchange

Anheuser-Busch Distributors

Il Forno Bakery

Oak Restaurant & Grill

LABOR:
Brotherhood of Teamsters Local 202

United Food and Commercial Workers

and more...

COLLABORATIVE DESIGN

- Analysis of All Stakeholders
- Government Agency Meetings
- Meetings w existing coalitions
- Forming new coalitions
- Creating unusual events (bike tours, dance parties, movie screenings, parade)
- Design Charrettes
- Brainstorming sessions
- Site tours
- Wholesale Presentations at existing meetings

HAVE FUN DURING EVENTS

Citymaking Bridgeport

Saturday March 15 1-4pm

REBUILD BY DESIGN

Bridgeport Public Library
Pop room, 1st. floor
925 Broad St, Bridgeport CT

Bike Tour Along the Pequonnock
Design Your Ideal City: Workshop
Bike Repair: Demonstration and Clinic
Living With Water: Urban Design Station
Hack Your Bike!
Bike Art
DJ and Live Music
Free food from Pantanal, Ms Thelma's, and Rootsman
Win a Free Bike!!

This afternoon festival highlights the many ways people around the Bridgeport can take an active role in making their city.

Citymaking Bridgeport is a community outreach program of Rebuild by Design, a design competition of President Obama's Hurricane Sandy Task Force, and led by the U.S. Department of Housing and Urban Development (HUD). rebuildbydesign.org

Contact: jchou@vanalen.org, 212-924-7000 x20

INCLUSIVE

REBUILD BY DESIGN

LETTERS OF SUPPORT

PROJECTS

A
BIG Team
The BIG U
Manhattan, NY

B
HR&A Advisors, Inc. with Cooper, Robertson & Partners
Commercial Corridor Resilience Project
Asbury Park, NJ; Rockaways, NY; Red Hook, NY

C
Interboro Team
Living with the Bay: A Comprehensive Regional Resilience Plan for Nassau County's South Shore
Nassau County, NY

D
MIT CAU + ZUS + URBANISTEN
New Meadowlands: Productive City + Regional Park
Meadowlands, NJ

E
OMA
Resist, Delay, Store, Discharge: A Comprehensive Strategy for Hoboken
Hoboken, NJ

F
PennDesign/OLIN
Hunts Point Lifelines
Bronx, NY

G
Sasaki/Rutgers/Arup
Resilience + The Beach
Union Beach, Asbury Park, Toms River, NJ

H
SCAPE/Landscape Architecture
Living Breakwaters
Staten Island, NY

I
WB unabridged with Yale ARCADIS
Resilient Bridgeport
Bridgeport, CT

J
WXY/West 8
Blue Dunes – The Future of Coastal Protection
Atlantic Coastline

FUNDING ANNOUNCED: $930 Million USD

NEW YORK CITY:

- **$335M:** The BIG U in Manhattan, NY
- **$20M:** Lifelines in Hunts Point, Bronx, NY

NEW JERSEY:

- **$230M:** Resist, Delay, Store, Discharge in Hoboken,Weehawken, Jersey City, NJ
- **$150M:** New Meadowlands in Little Ferry, Moonachie,Carlstadt, Teterboro, NJ

NEW YORK STATE:

- **$125M**Living with the Bay in Nassau County, Long Island
- **$60M:** Living Breakwaters in Tottenville, Staten Island, NY

CONNECTICUIT

- **$10M**: Resilient Bridgeport in Bridgeport, CT

REBUILD BY DESIGN

PROJECTS

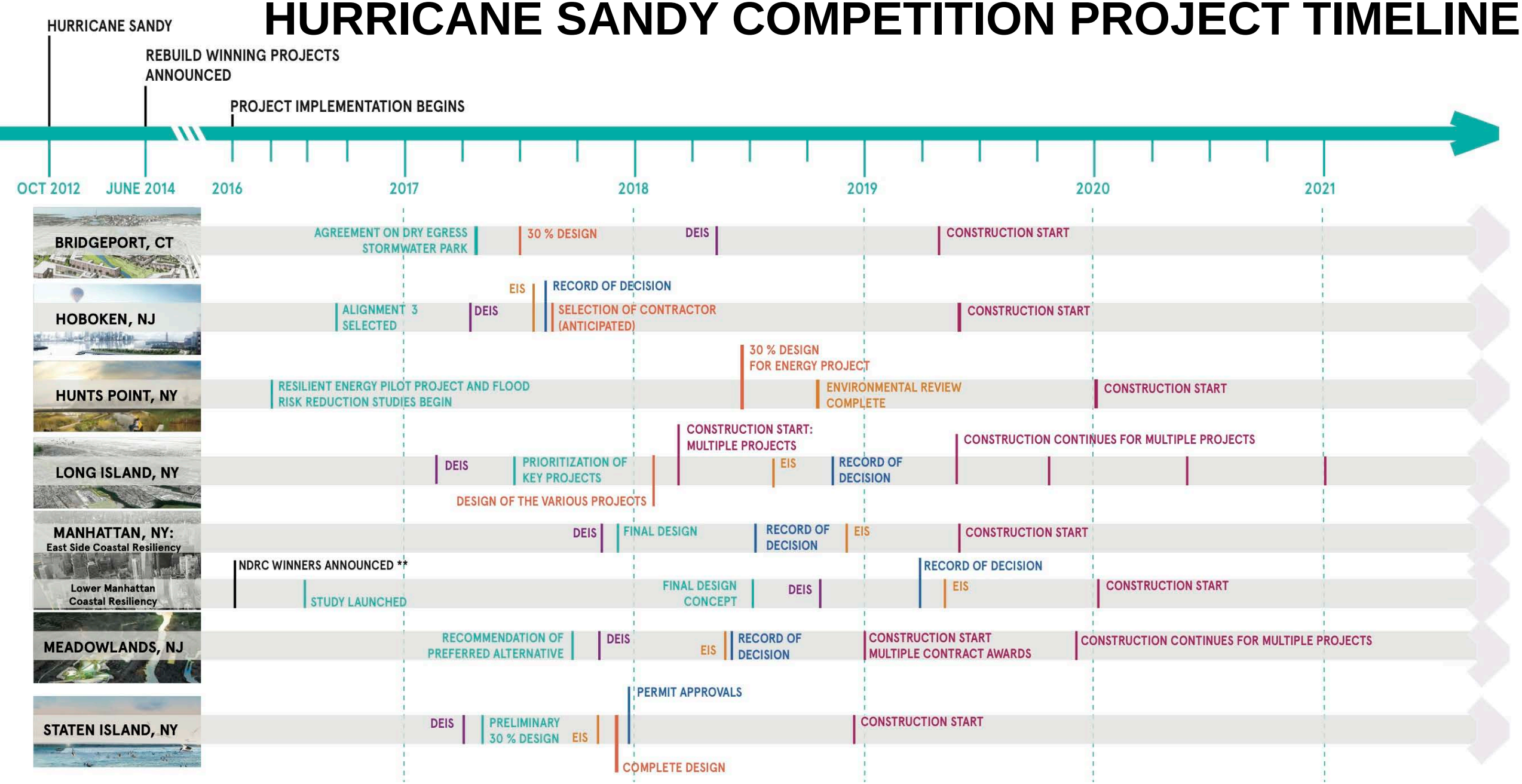
Protect: Infrastructure, Public Housing, Small and Large Businesses, Food Supply Network, Energy Supply and Neighborhoods

Restore: Ecology, Wetlands, Oyster farming, Bird Habitat, Rivers, Natural Systems

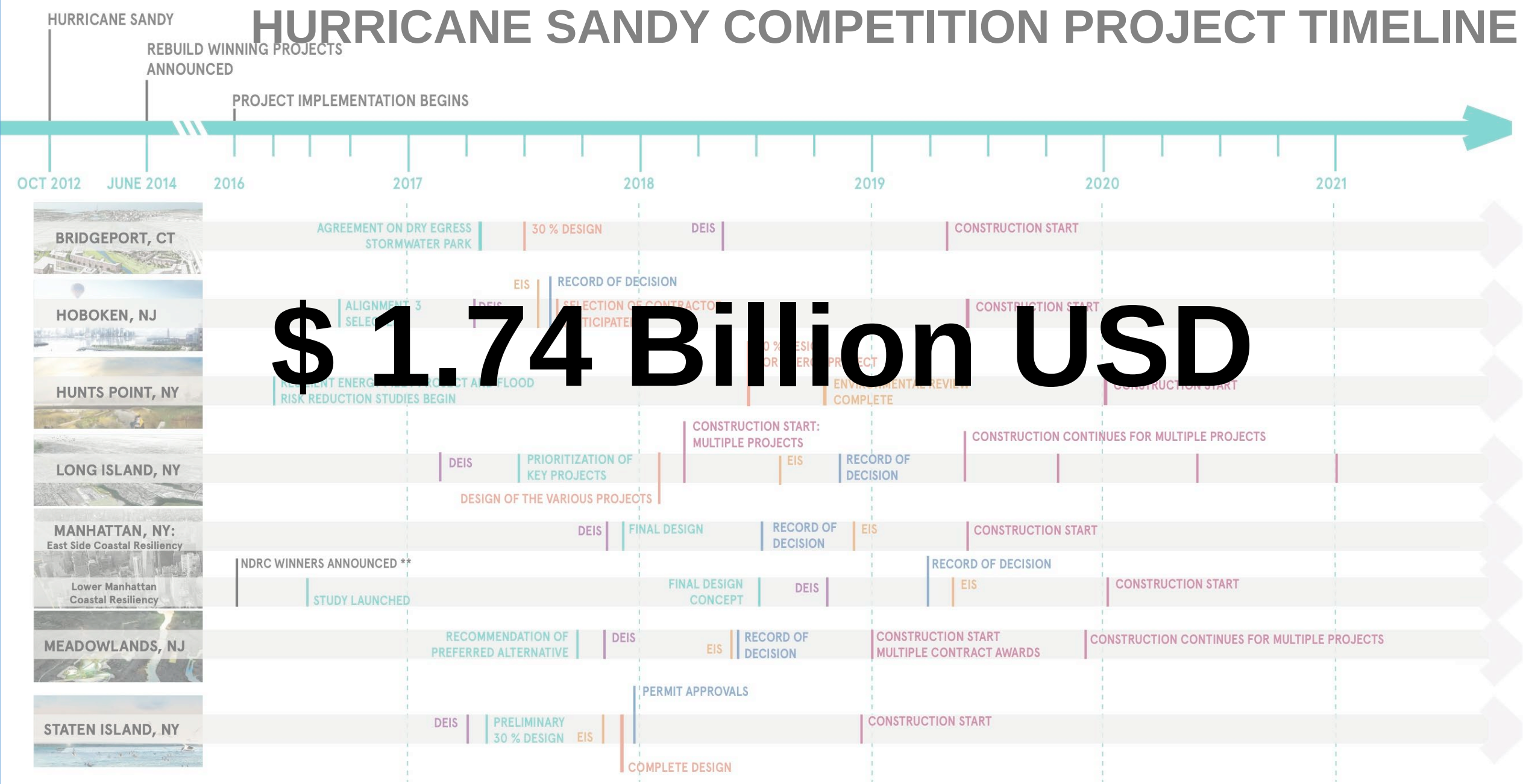
Create: Jobs, Access to Fresh Food, Access to the Waterfront, Resiliency Centers, Housing, Transportation Options

Increase: Economic Vitality, Livability and Social Resiliency

HURRICANE SANDY COMPETITION PROJECT TIMELINE



HURRICANE SANDY COMPETITION PROJECT TIMELINE



$ 1.74 Billion USD

CITY ENGAGEMENTS

100 RESILIENT CITIES + REBUILD BY DESIGN

- **Athens:** Promoting stewardship for Lycabettus Hill
- **Amman:** RBD_U: program on Waste, Water, Transportation
- **Atlanta, GA:** Student design competition for Ted Turner Drive Resilience Corridor
- **Boulder, CO:** Effort to create a Resilient and Sustainable Mobile Home Park
- **Juarez, MX:** Design Competition for Juan Gabriel Plaza
- **Los Angeles, CA**: Creating a process around updating building codes to encourage resilience
- **Mexico City:** Master Plan framework for Xochimilco
- **Oakland, CA:** Workshop Series on Effective Engagement
- **San Juan, PR**: Community Led Master Plan/Resilience Pilot
- **San Francisco:** Regional competition to address SLR and other stresses

REBUILD BY DESIGN

San Francisco Bay Area

Challenge: Global design competition selected ten teams to develop and implement sustainable adaptation strategies along the San Francisco Bay shoreline to sea level rise, earthquakes, equity, transportation and housing.

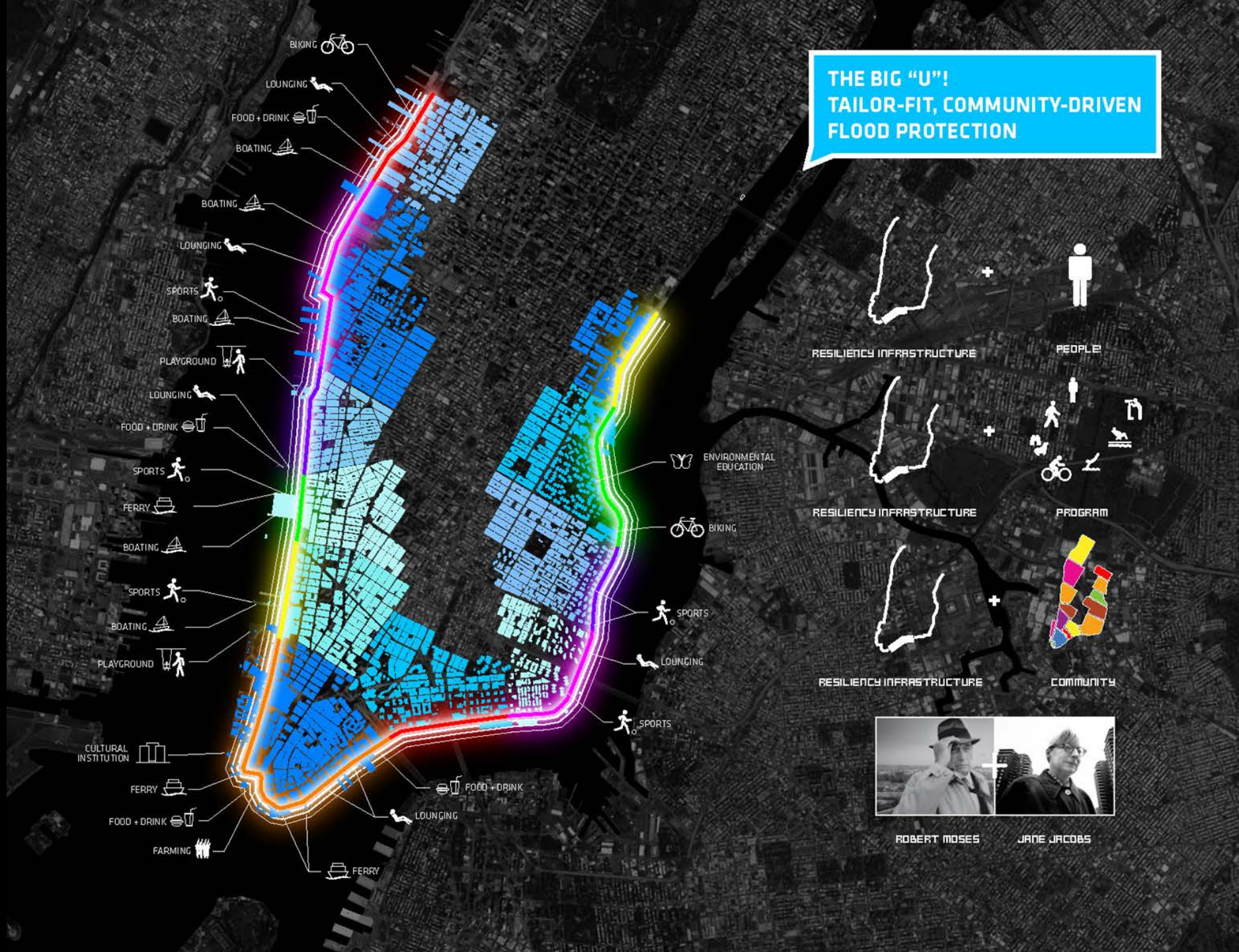
Process: Model leads interdisciplinary design teams through a research and design process to work with local government and communities to address challenges.

Outcome: 10 comprehensive regional strategies that will address todays shocks and stresses and plan for the future

REBUILD BY DESIGN

Shift from subjective to objective evaluation

Jeremy Alain Siegel, Associate, Senior Designer, BIG



PROGRAM

+

INFRASTRUCTURE


WALL ?
+15' 1-FOOT SPLASH ALLOWANCE
+14' FEMA 2050 500-YEAR FLOODPLAIN
+6' Existing Bulkhead
+0' Mean Sea Level
Riverbed


WALL ?
+15' 1-FOOT SPLASH ALLOWANCE
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+6' Existing Bulkhead
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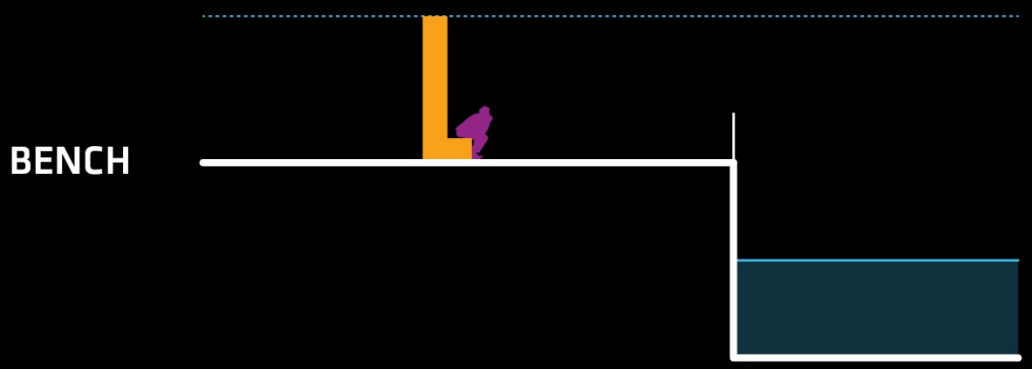
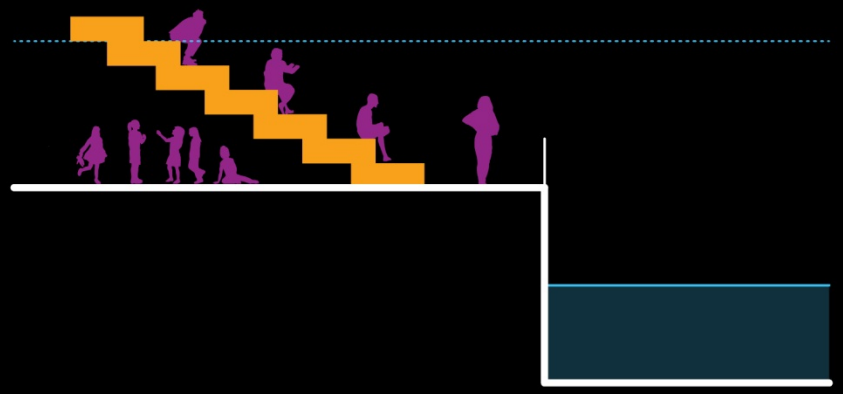
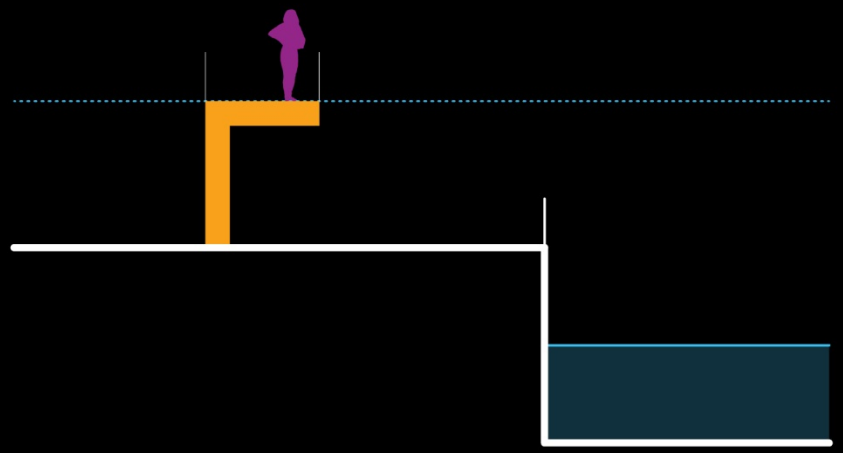
Riverbed


BENCH

SEATING-SHELTER

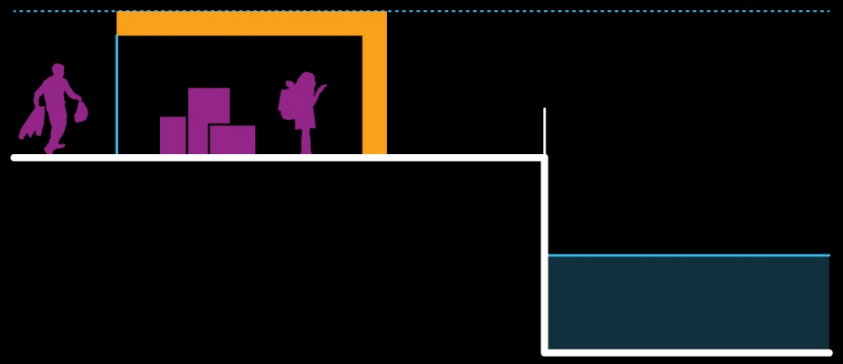


FLY-OVER

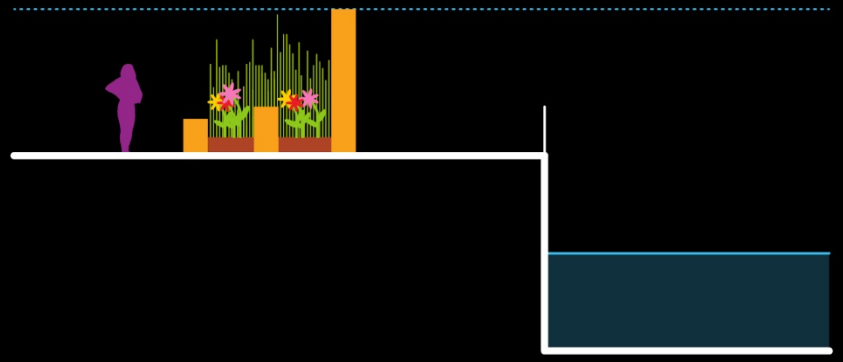


BIKE-POINT

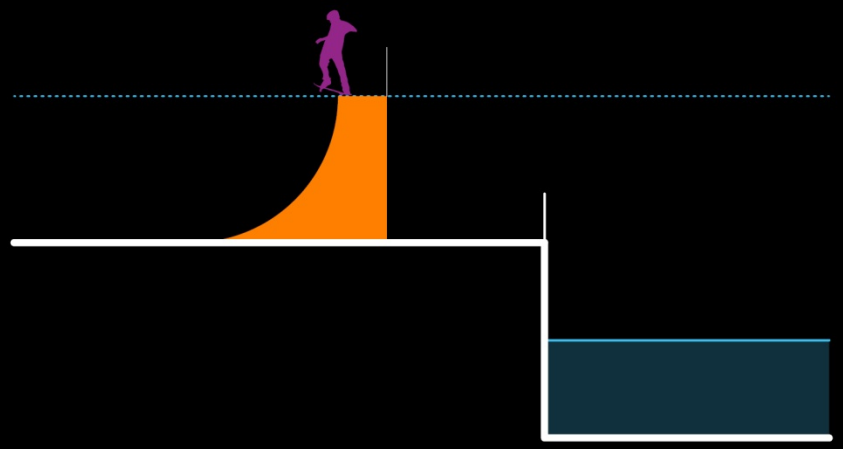
SHOP



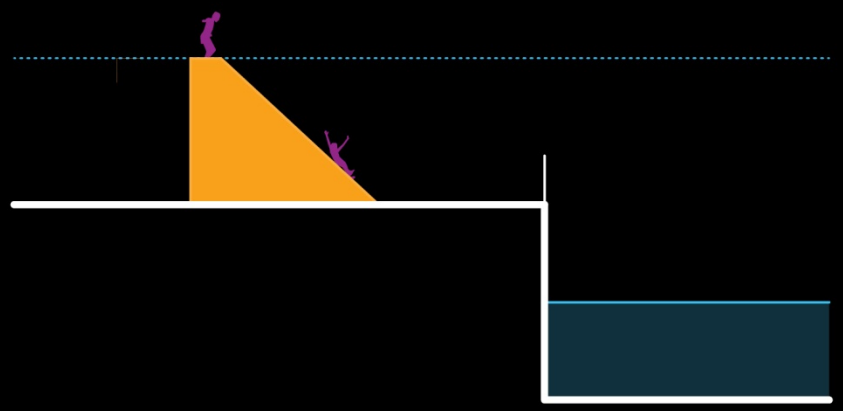
GARDEN



SKATE



SLIDE



L.E.S. RISK

-130,000 Residents
-86,000 Low-Income, Elderly, Disabled

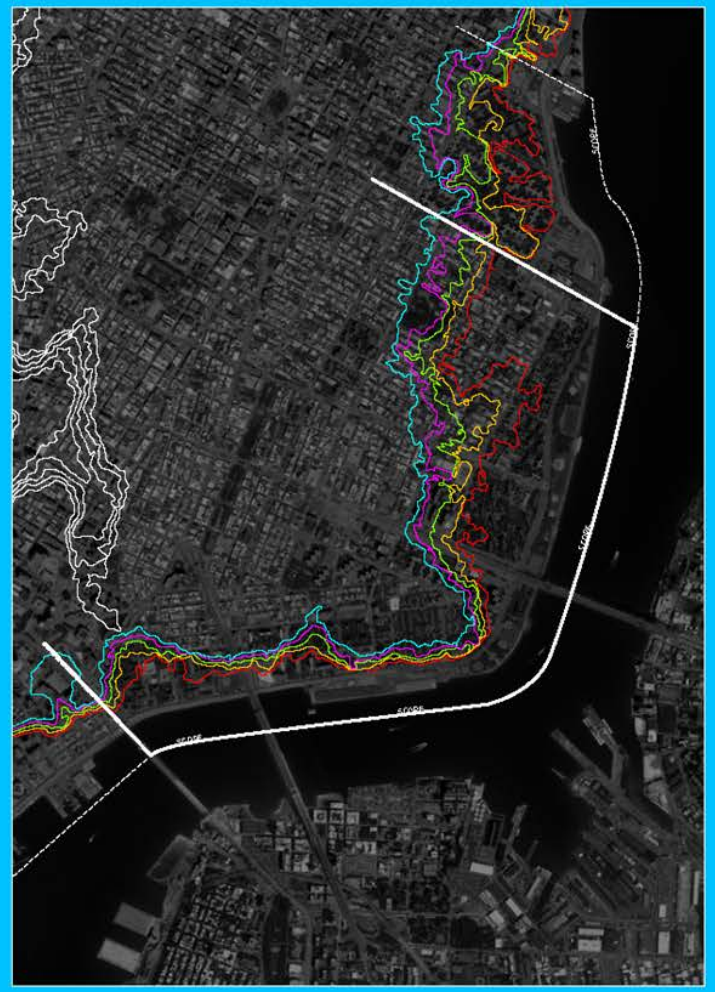
-29,500 Public Housing Units

-617 Acres
-75 City Blocks
-0 Subway Stations

-Numerous Small Businesses

-1 Power Plant
-1 Cross-River Sanitary Pump Station

-3 Miles of Waterfront



PUBLIC DESIGN PROCESS

HUD - Rebuild by Design

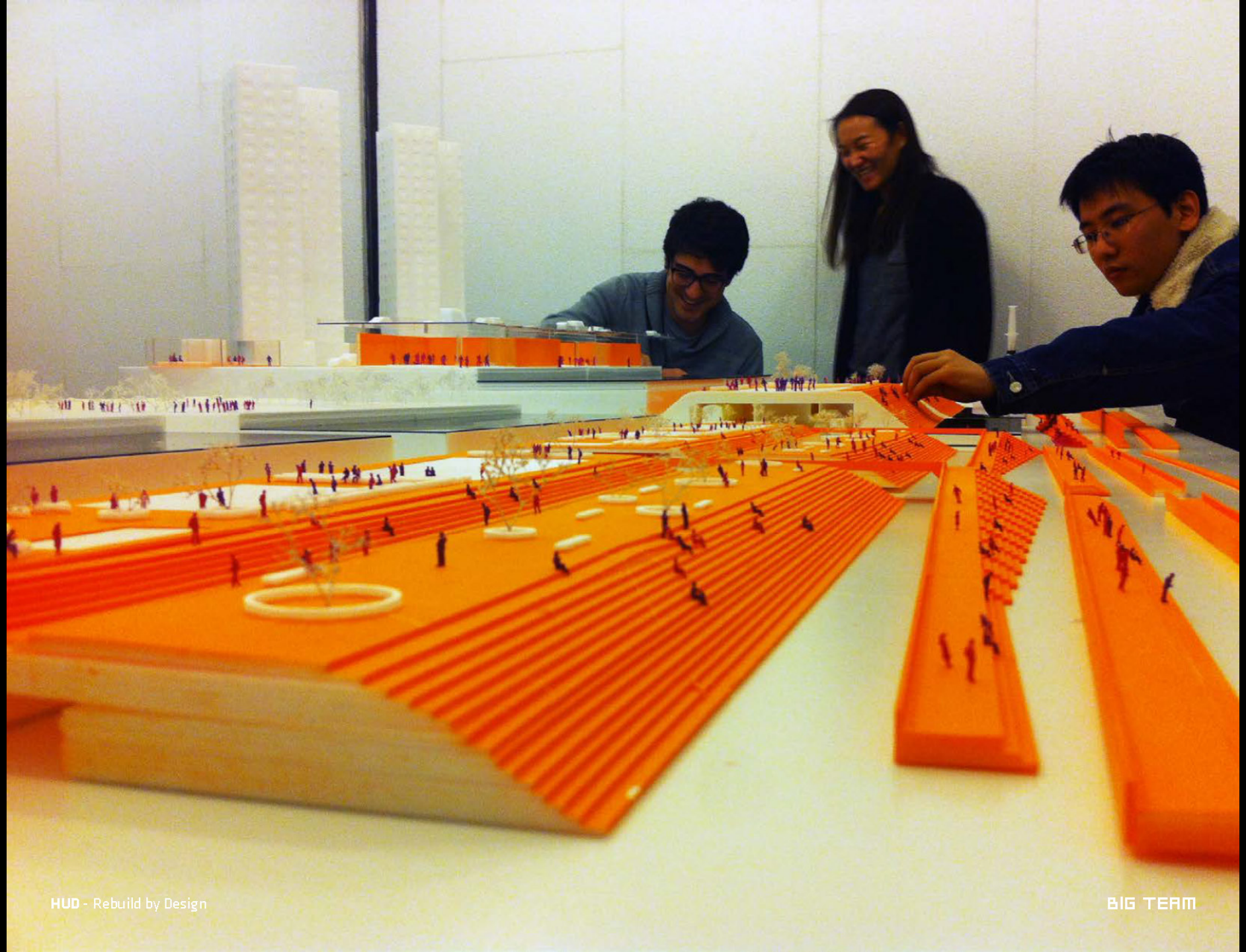
BIG TEAM

LES READY!

MEMBER ORGANIZATIONS

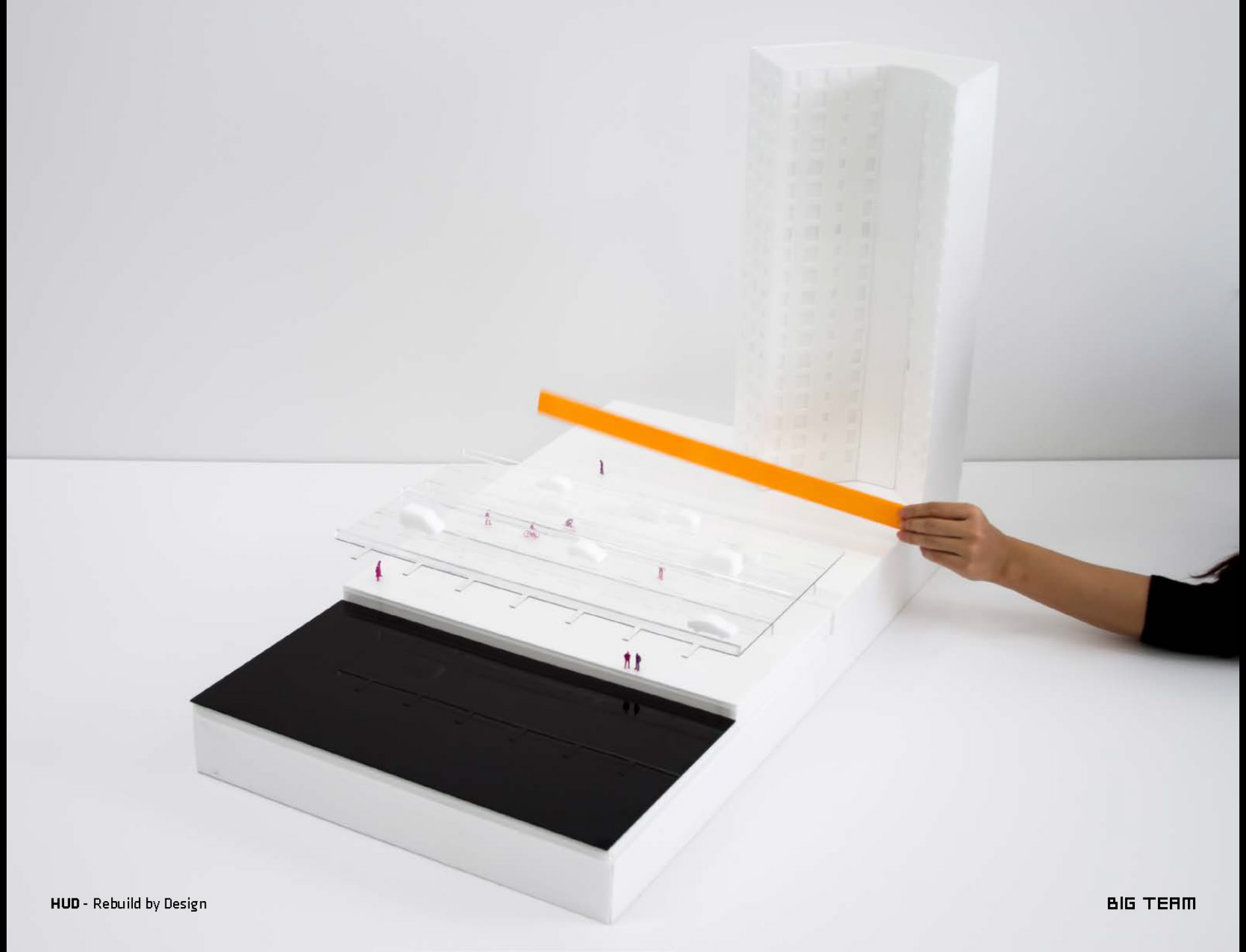
AMERICAN RED CROSS
ASIAN AMERICANS FOR EQUALITY
ASSOCIATION OF LATINO BUSINESS OWNERS AND RESIDENTS (ALBOR)
CATHOLIC CHARITIES
CHINESE PROGRESSIVE ASSOCIATION
COMMUNITY BOARD 3
COOPER SQUARE COMMITTEE
EAST SIDE TABERNACLE
FEGS
GOOD OLD LOWER EAST SIDE (GOLES)
GRAND ST. SETTLEMENT
HAMILTON MADISON HOUSES
HENRY STREET SETTLEMENT
LOWER EAST SIDE POWER PARTNERSHIP
NAZARETH HOUSING
NEW YORK DISASTER INTERFAITH SERVICES (NYDIS)
OCCUPY SANDY
OPERATION HOPE
RYAN-NENA COMMUNITY HEALTH CENTER
SIXTH STREET COMMUNITY CENTER
THE SALVATION ARMY
TWO BRIDGES NEIGHBORHOOD COUNCIL
UNIVERSITY SETTLEMENT
URBAN JUSTICE CENTER - COMMUNITY DEVELOPMENT UNIT
VILLAGE EAST TOWERS
WORLD CARES CENTER

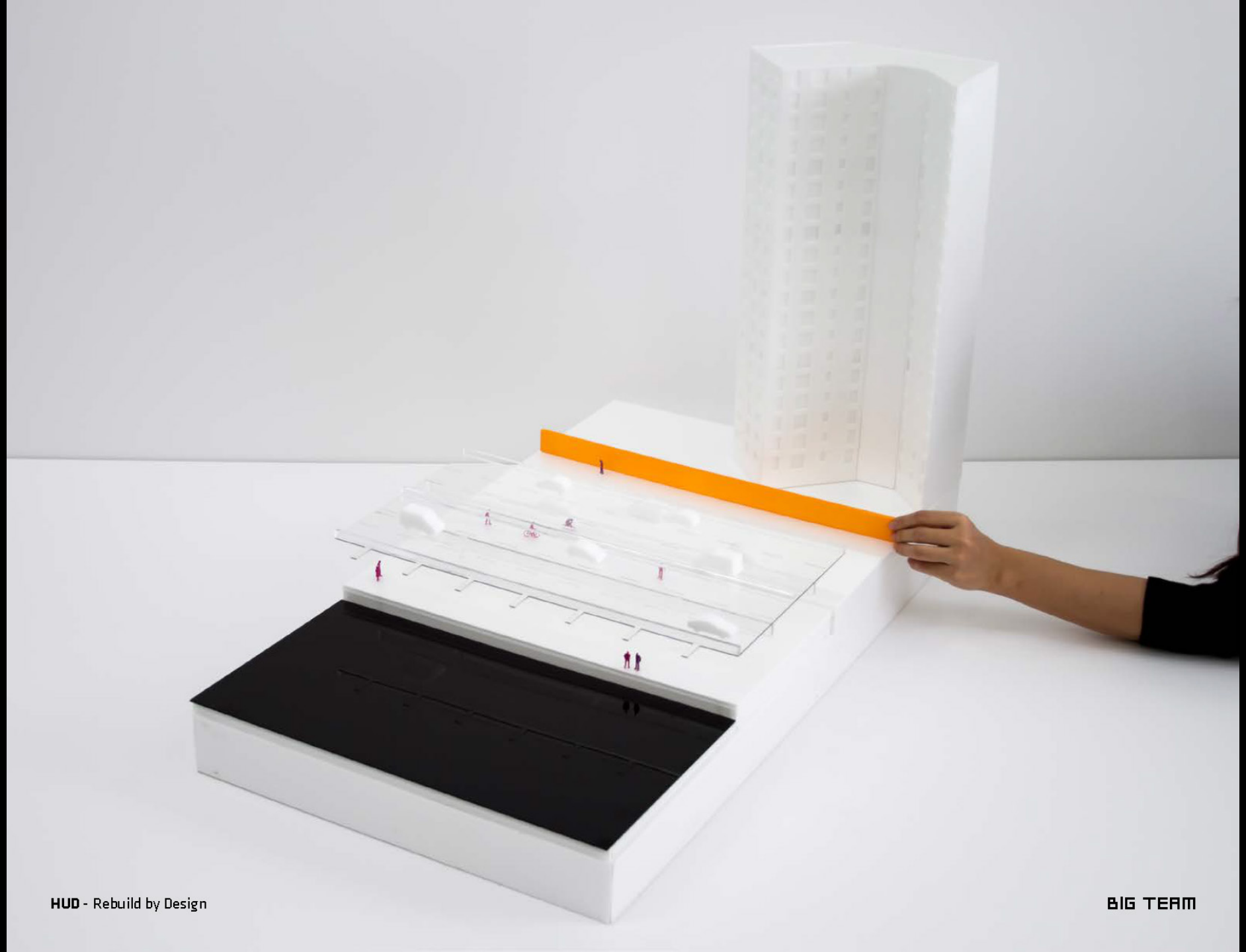

BIG "U" @ LES:
CORE PLANNING GROUP



TWO PUBLIC WORKSHOPS


ROUND 1: MODELS OF
PROTECTION OPTIONS



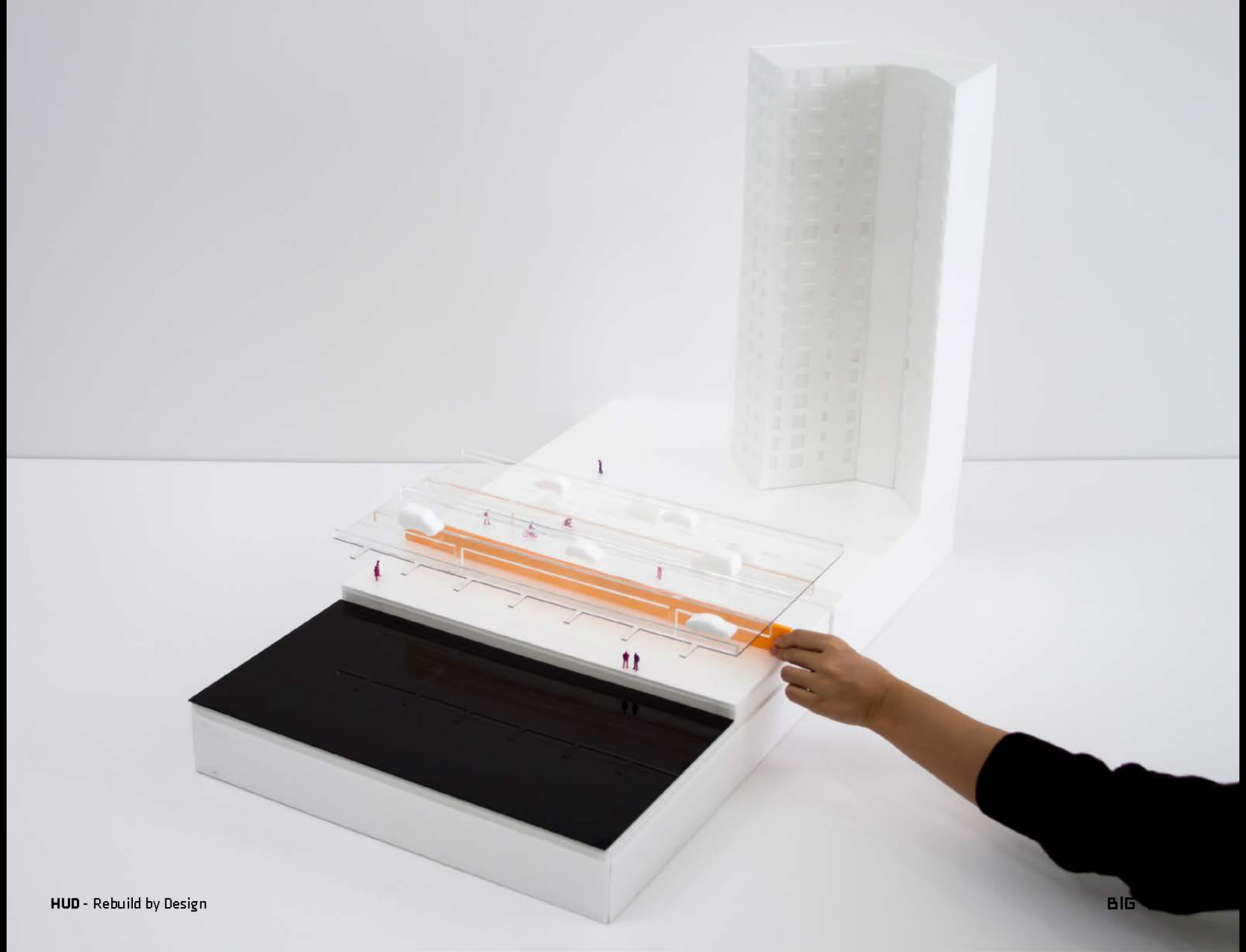


HUD - Rebuild by Design

BIG TEAM

HUD - Rebuild by Design

BIG TEAM



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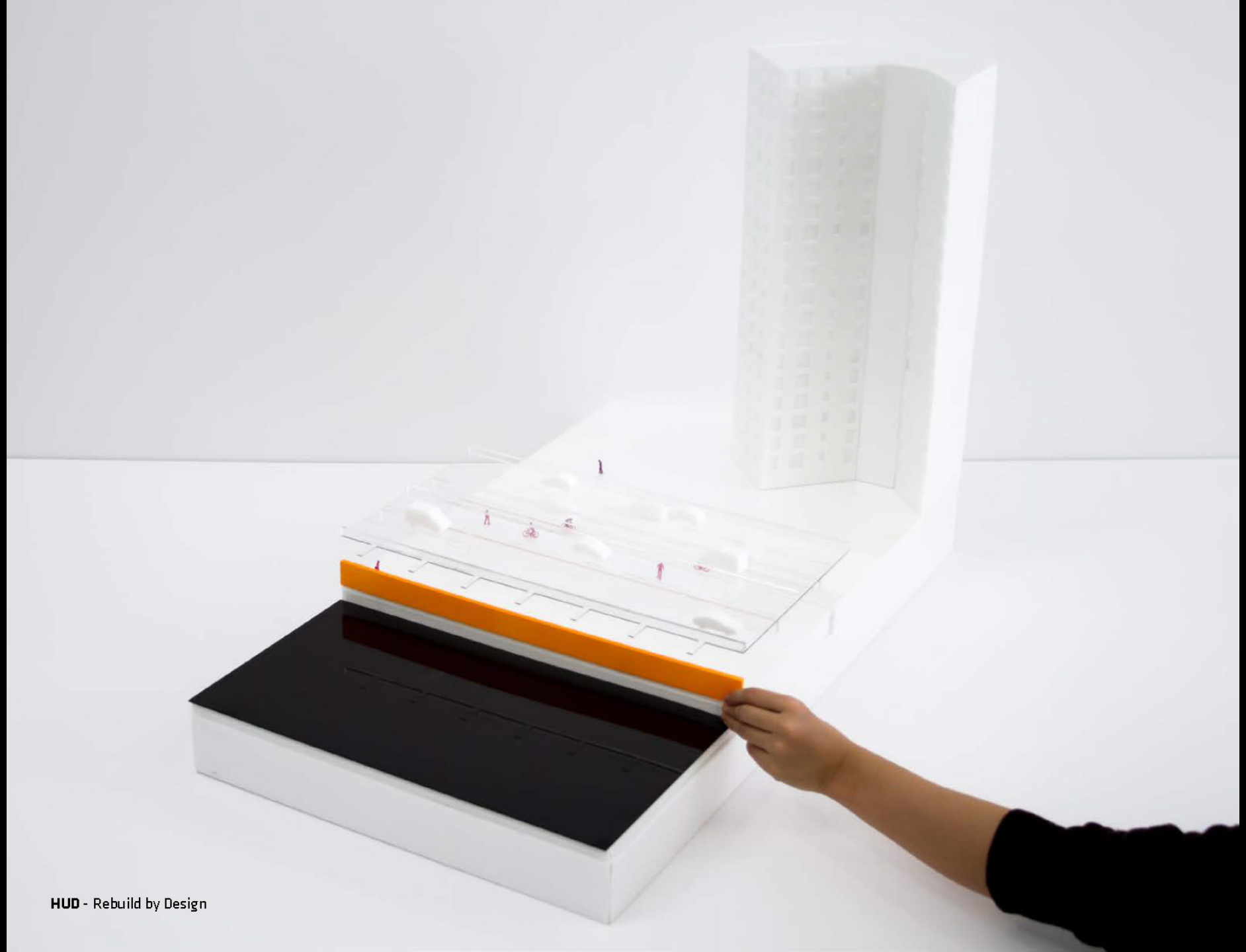
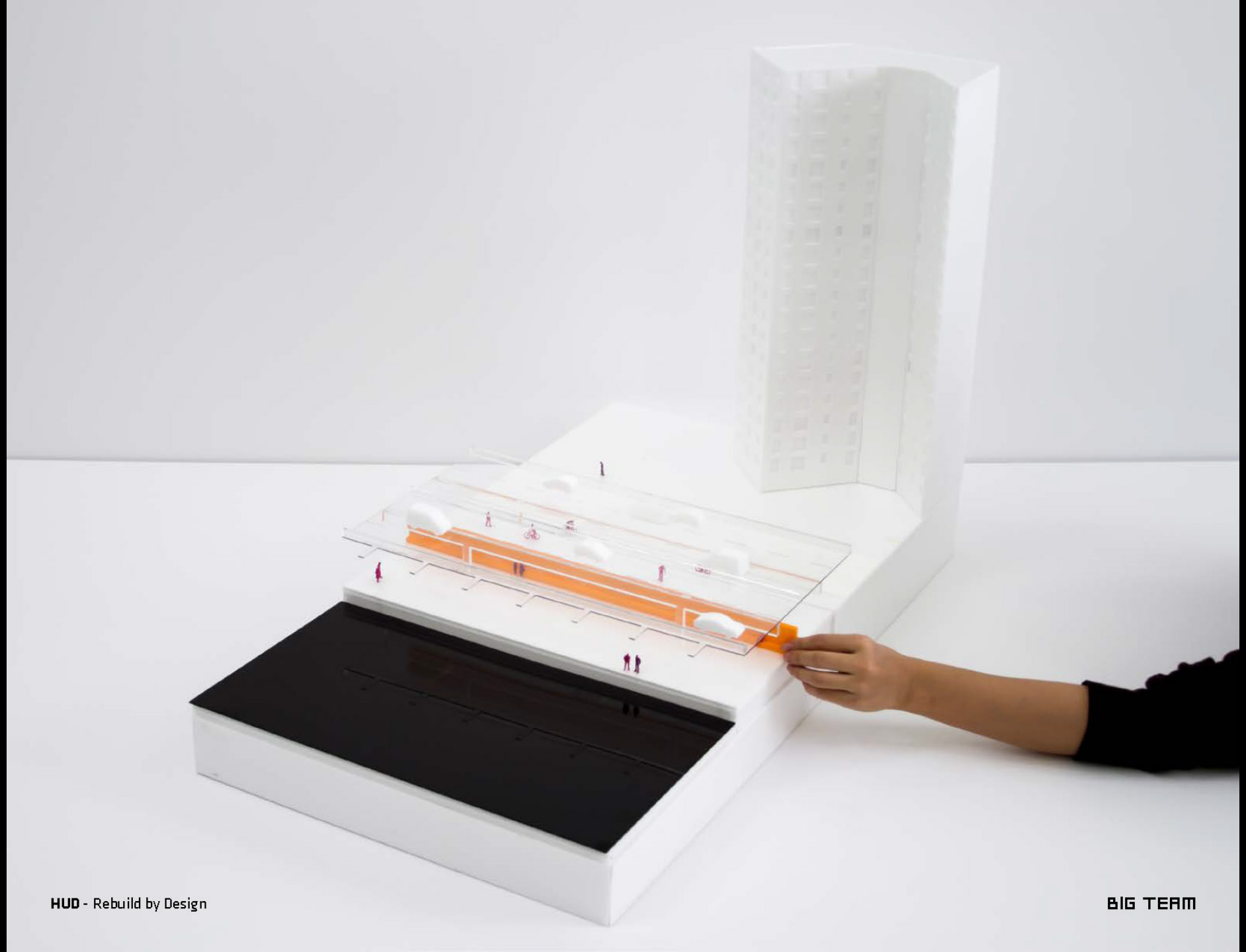


HUD - Rebuild by Design

HUD - Rebuild by Design

BIG TEAM



HUD - Rebuild by Design

BIG TEAM

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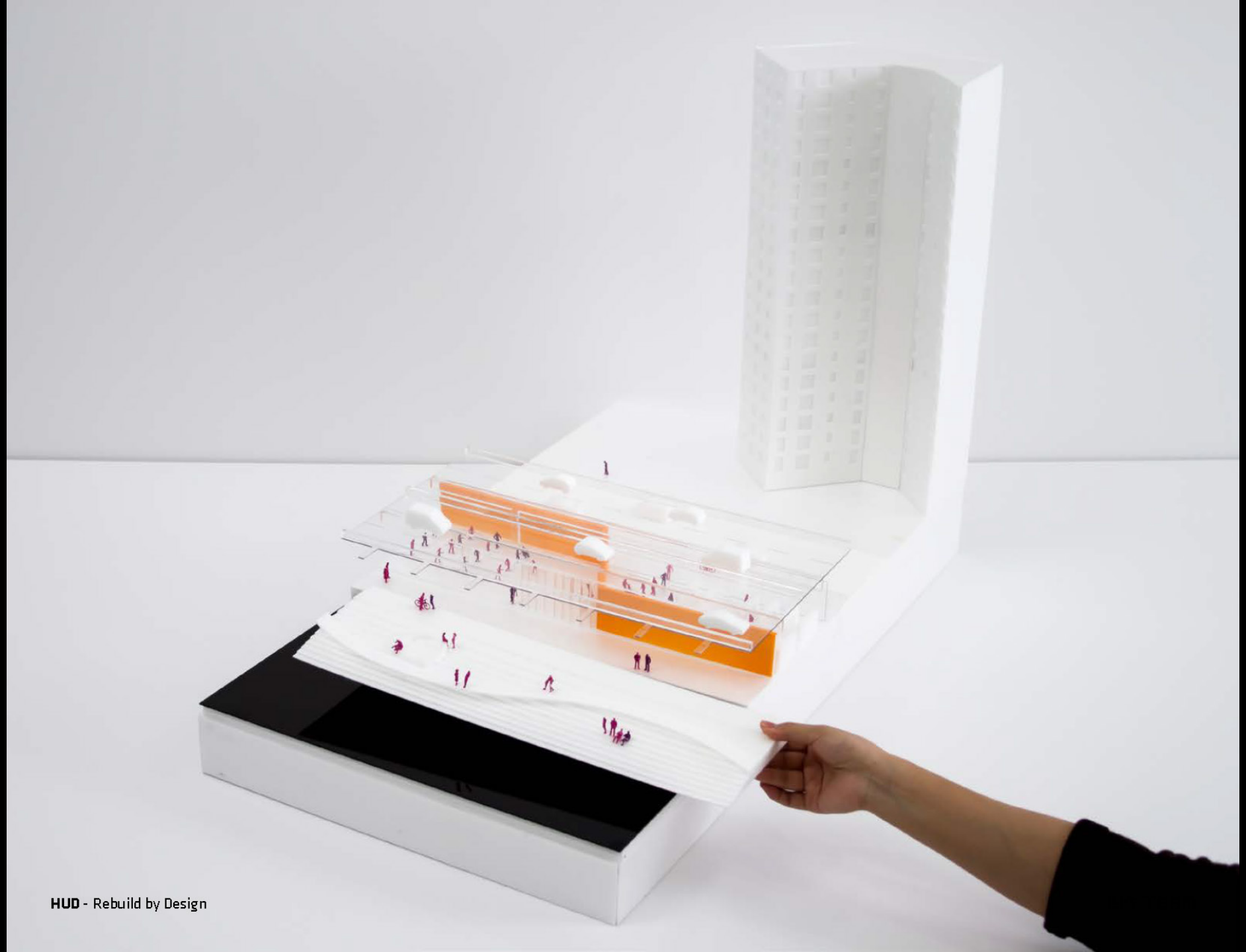

HUD - Rebuild by Design

HUD - Rebuild by Design

BIG TEAM

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BIG TEAM

HUD - Rebuild by Design

BIG TEAM


ROUND 1: DISCUSSION
FACE

ROUND I

ATTENDANCE & SUMMARY FINDINGS

Roughly 15 community members attended the February 10 meeting, held at the Madison Houses Community Center. Approximately 45 community members attended the February 26 meeting, held at the Lower East Side Girls' Club.

Outreach for the events was managed by GOLES (Good Old Lower East Side) through building-to-building flyering, mailers, and face-to-face interactions. After a less than satisfactory turnout for the Feb 10 meeting, GOLES provided transportation to ensure that all interested community members could attend the Feb 26 meeting.

February 10

February 26

TWO BRIDGES SUMMARY: LIKES AND DISLIKES

In the Two Bridges area, workshop participants liked:

- Burying the FDR to improve waterfront access and increase programmatic opportunity
- Maintaining views and access to the water
- Increasing programmable space
- Providing recreation facilities

Participants disliked:

- Darkness
- Walls
- Visual obstructions
- Loss of planned waterfront improvements

EAST RIVER PARK SUMMARY: LIKES AND DISLIKES

By East River Park, workshop participants liked:

- Improving park access over the FDR
- Visual connection into the park and to the water
- Access for all populations (regardless of physical ability and socioeconomic status)

Participants disliked:

- Losing/sacrificing recent park improvements
- Visual obstructions (impeding upland views of the park or views to water)

PROGRAM SUMMARY

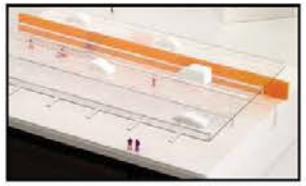
Participants liked a range of program elements, but particularly focused on programs that were beneficial to and desired by the local resident population. These included no-fee recreation opportunities, more green open space for relaxing and socializing, and community services including spaces/programs for teens and seniors, jobs/skill training facilities, and spaces like pop-up libraries with free internet access, scholastic coaching, and support services.

TWO BRIDGES PROTECTION OPTIONS

In LES South/Two Bridges, the team presented a series of five protective options, illustrated by interactive models. Participants discussed the options in small groups at tables before beginning to work on designing their own waterfront schemes.

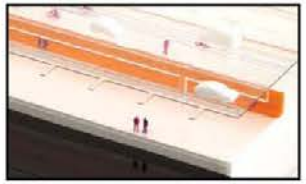
"WET FEET"

Because LES South's 100-year flood plain contains primarily NYCHA housing, Wet Feet explored a flood accommodation strategy. Ground floor residents are removed to a new public housing structure built on the affected campus's land. Ground floor residential units are retrofitted to accommodate flood waters, and are used for community programming that will enhance local quality of life.



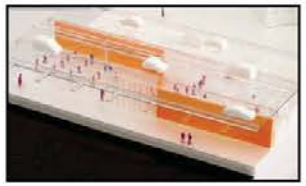
BASIC 9' WALL

The most basic flood protection, a 9' wall would protect upland areas from flood tides and storm surge. Different wall placements have different effects on upland neighborhoods.



ENHANCED WALL: BIG BENCH / BIG STAIRS

Big Bench and Big Stairs added functionality to the basic wall. Seating areas on the outboard side of the wall create the opportunity to use the area for programs. Big Stairs incorporated storage areas suitable for CitiBike stations or other urban amenities on the upland side.



ENHANCED WALL: PAVILIONS BELOW FDR

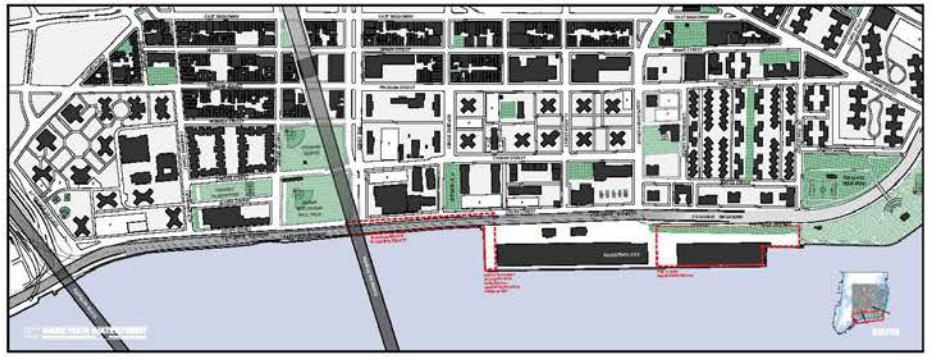
The straight 9' wall is re-invisioned as a zig-zagging barrier that creates a series of "rooms" to house program. Floodable spaces on the outboard side could be used flexibly for recreation, performance, and gathering. Flood-secured spaces on the upland side could become permanent shops or community facilities that bring light, amenities, and community to an underserved area.

WALL ALTERNATIVE: BURY THE FDR

Rather than building a barrier to the waterfront, the final option removes the biggest obstacle in LES South: the FDR Drive. By burying the FDR beneath a 9' high protective berm, this option increases waterfront access, creates new areas for program and passive recreation, and mitigates air and noise pollution from the highway.

COMMUNITY WORKSHOPS

TWO BRIDGES FEEDBACK: SURVEY RESULTS



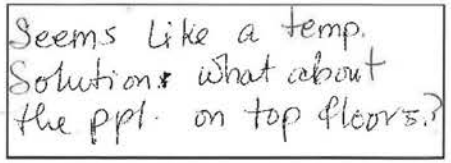
TWO BRIDGES PROTECTION: TOP CONCERNS FROM SURVEYS

Ground Floor Flood Proofing	Wall at Residence Edge	Wall with Bench	Wall with Stairs & Storage	Pavilions below FDR; optional wetland	Bury FDR Under Berm
Impractical	Deployable preferred	Blocks views	Blocks views	Blocks views	Seems expensive
Interesting	Blocks light	Potential Safety Issues	Potential Safety Issues	Needs to be accessible	Needs more greenery
Inconvienent (for seniors)	Increases CO2 near residential	Deployable Preferred	Deployable Preferred		

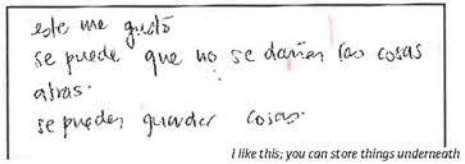
For the LES South/Two Bridges area, survey respondents strongly preferred burying the FDR Drive. Comments indicated that this option offered the best visibility, provided much-needed open space, and delivered the most effective flood protection. The main concern about burying the highway was its anticipated expense.

IN THEIR OWN WORDS:

1.Ground floor flood proofing

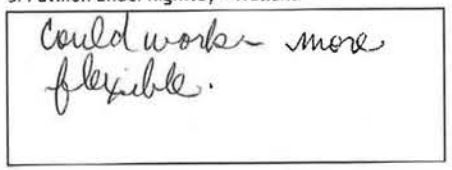


4. Pared + Escaleras y estación de bicicletas

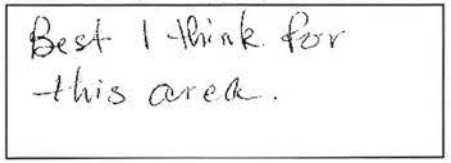


I like this; you can store things underneath

5. Pavilion under highway + wetland



6. Berm + underground highway



TWO BRIDGES FEEDBACK: TABLE DISCUSSIONS

Some tables found the Wet Feet and Pavilion concepts promising, but nearly all tables approved of burying the elevated FDR. In general, participants disliked walls and obstacles that blocked visual connection to the water , on the grounds that they were likely to increase crime in an area that already feels unsafe.

"WET FEET"

Some participants who were opposed to walls due to safety and access concerns preferred this option. Participants were concerned about residents not being able to exit buildings or procure supplies during floods. Others worried about getting NYCHA's agreement for this plan.

BASIC 9' WALL

This seemed to be most participants' least favorite option - there were many concerns about interfering with light, visibility, and physical access, in addition to directing CO_2 into the neighborhood. Many people suggested deployable or retractable walls as an alternative.

ENHANCED WALL: BIG BENCH / BIG STAIRS

In addition to concerns voiced about the basic wall, participants believed that this option would attract homeless people. One table saw an opportunity to use the bench for skateboarding. The storage capacity of Big Stairs was moderately well received.

ENHANCED WALL: PAVILIONS BELOW FDR

Participants feared the wall-like elements of the pavilion design, although the potential for expanded programming sparked a fair amount of interest. Participants were excited about arts and community programming (e.g. pop-up libraries or skills training programs), but wary of big-box or high-end retail. They also worried about floods on the outboard side. Some were concerned about air quality in the pavilions.

WALL ALTERNATIVE: BURY THE FDR

This option had by far the most support. It expands access to the waterfront and creates room for programs. Many people felt this option was unrealistically expensive, while others worried about ventilation and flood-proofing the highway. The orange foam led some to believe that the berm did not include green space.

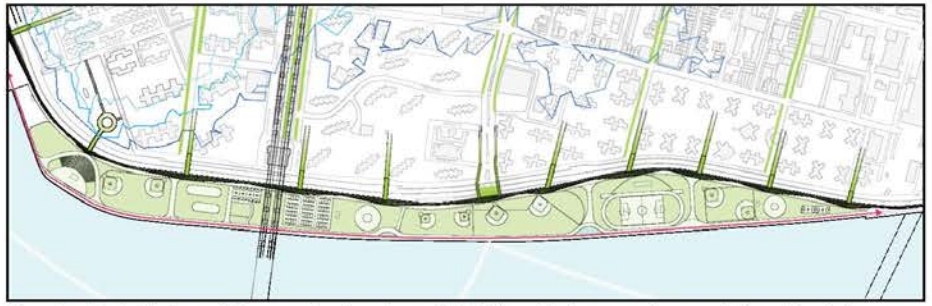
ROUND 2: PRESENTATION OF INITIAL PLANS

COMMUNITY WORKSHOPS

DESIGN CONCEPTS: EAST RIVER PARK

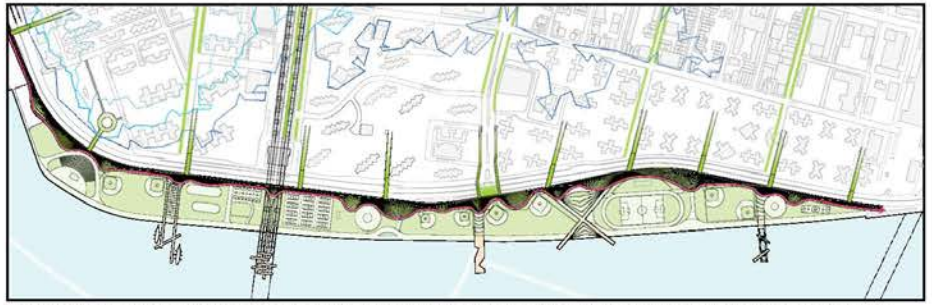
The team presented two additional design options for LES North / East River Park. Both options centered around building a protective berm along the western edge of the park.

OPTION 1: NARROW BERM



Occupying the right-of-way of the current park service vehicle & bike path, the narrow berm carefully avoids existing program areas and does not require removal of existing trees. New park access is created through additional pedestrian overpasses at strategic streets. All overpasses are widened and given landscape treatments. Upland, significant park access corridors are augmented with rain gardens, bio-swales, and other green infrastructure.

OPTION 2: WIDE BERM



Option 2: WIDE BERM: The wide berm expands upon the narrow berm, incorporating increased park access and upland green streets into a plan with more robust programmatic offerings. The widened berm bulges out between existing program areas, creating large passive recreation spaces and areas for seating, viewing the water, or BBQing. At the water's edge, new features draw visitors out from the shore: an in-river, filtered Harbor Pool for swimming, a pair of lookout piers, a dedicated fishing pier, a potential ferry or water taxi dock, and more.

FUTURE VISION: COVER THE FDR

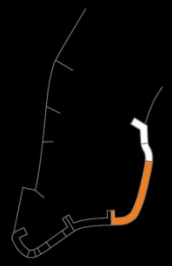
Although not presented as a formal option given its costs and long-term logistics, covering the FDR is very much a future possibility for both of these scenarios.

HUD - Rebuild by Design

BIG TEAM

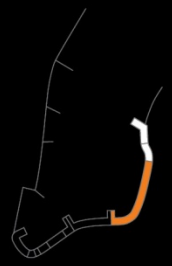
THE BRIDGING BERM

NEW SCENIC BIKEWAY ALONGSIDE BERM!



THE BRIDGING BERM

ADA ACCESSIBLE RAMPING CONNECTIONS



THE BRIDGING BERM

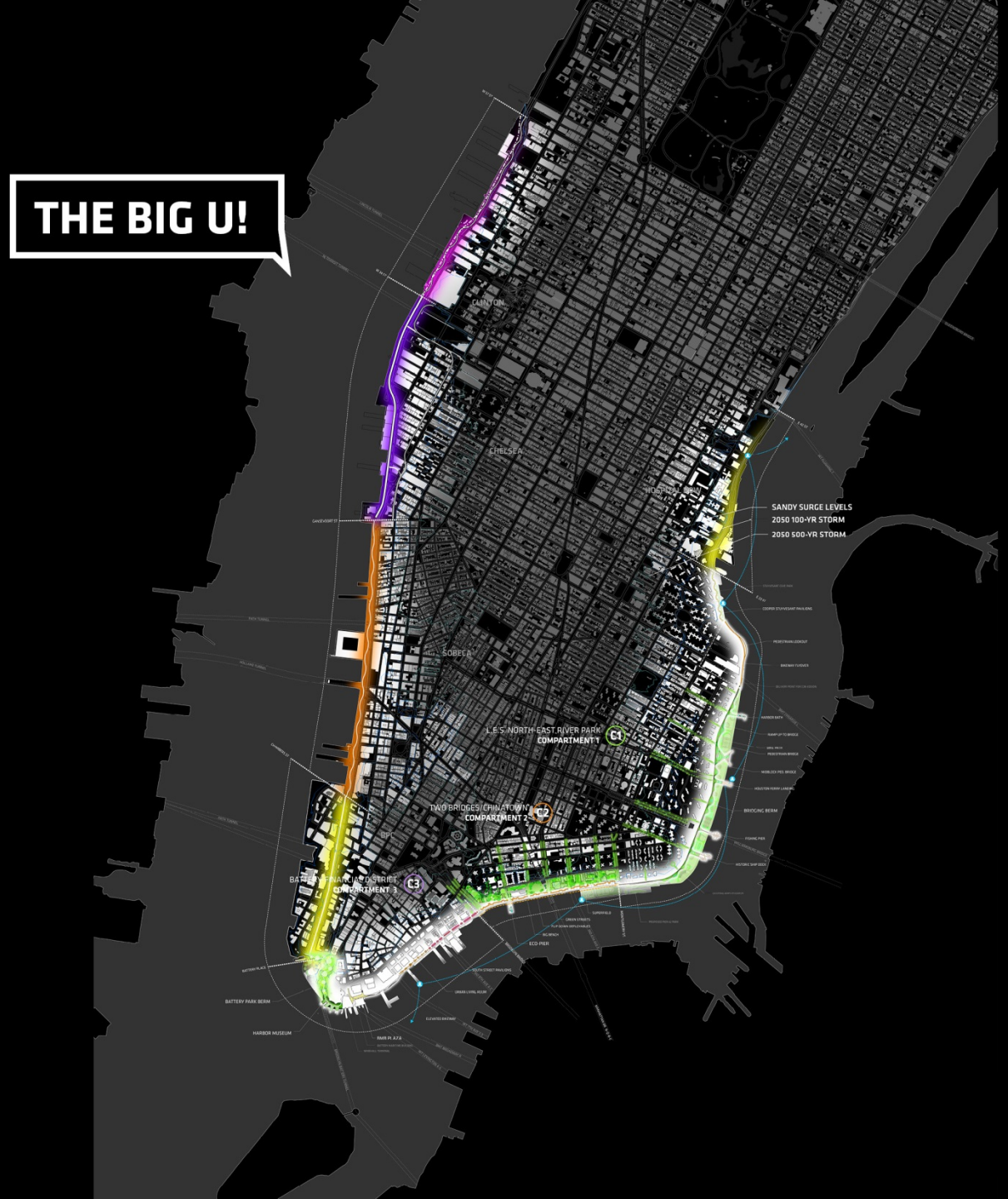
NEW TOPOGRAPHY AND VISTAS OVER PARK

THE BRIDGING BERM

10TH STREET HARBOR BATH


C1-C3
SANDY SURGE LEVELS
2050 100-YR STORM
2050 500-YR STORM
HOSPITAL ROW
GANSEVOORT ST
PATH TUNNEL
HOLLAND TUNNEL
SOBECA
L.E.S. NORTH-EAST RIVER PARK
COMPARTMENT 1
C1
CHAMBERS ST
TWO BRIDGES/CHINATOWN
COMPARTMENT 2
C2
BPC
BATTERY FINANCIAL DISTRICT
COMPARTMENT 3
C3
BATTERY PLACE
BATTERY PARK BERM
SUPERFIELD
GREEN STREETS
FLIP DOWN DEPLOYABLES
BIG BENCH
ECO-PIER
SOUTH STREET PAVILIONS
URBAN LIVING ROOM
ELEVATED BIKEWAY
BMB PLAZA
BATTERY MARITIME BUILDING
WHITEHALL TERMINAL
STUYVESANT COVE PARK
E 23 ST
COOPER STUYVESANT PAVILIONS
PEDESTRIAN LOOKOUT
BIKEWAY FLYOVER
DELIVERY POINT FOR CON-EDISON
HARBOR BATH
RAMP UP TO BRIDGE
BIKE PATH
PEDESTRIAN BRIDGE
MIDBLOCK PED. BRIDGE
HOUSTON FERRY LANDING
BRIDGING BERM
FISHING PIER
WILLIAMSBURG BRIDGE
HISTORIC SHIP DOCK
EXISTING AMPHITHEATER
PROPOSED PIER 42 PARK
MONTGOMERY ST
BROOKLYN BRIDGE
MANHATTAN BR. N,Q,R,D
HUD - Rebuild by Design

THE BIG U!


SANDY SURGE LEVELS
2050 100-YR STORM
2050 500-YR STORM
L.E.S. NORTH EAST RIVER PARK
COMPARTMENT 1
C1
TWO BRIDGES/CHINATOWN
COMPARTMENT 2
C2
BATTERY PARK BERM
HARBOR MUSEUM

BUILDING RESILIENCE THROUGH DISASTER RECOVERY – FUNDING & MAJOR STAKEHOLDERS

Jamie Torres Springer

HR&A Analyze. Advise. Act.

Financial losses from adverse events have grown exponentially over the past 36 years, **rising from $50 billion per year to $200 billion**.

1980 - 2014

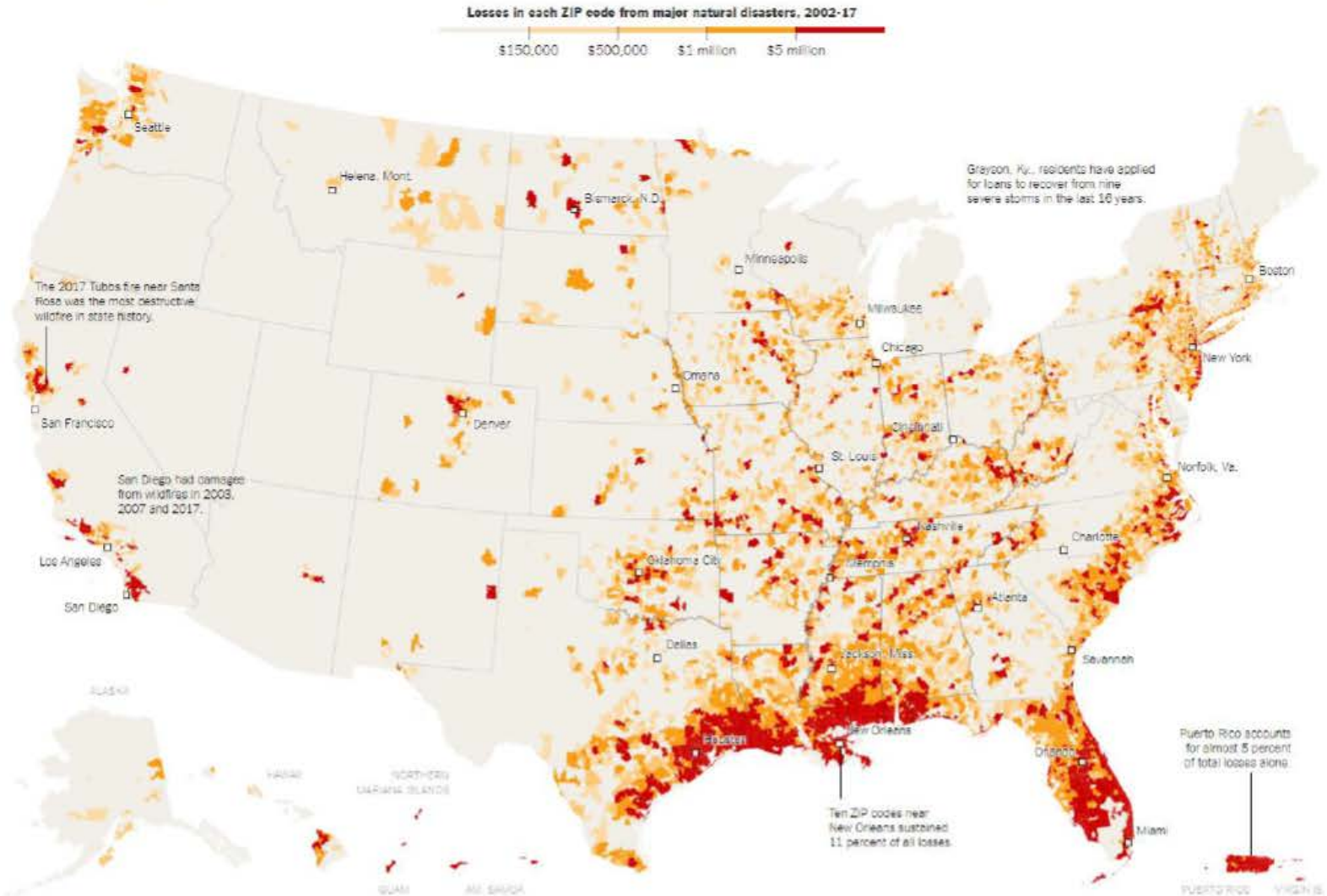
$4.2T

GLOBAL LOSSES

75%

ATTRIBUTED TO EXTREME WEATHER EVENTS

A wide range of hazards has triggered almost **900 federal disaster declarations** and billions in damages since 2002.



Source: New York Times

These hazards cannot be considered in isolation. **Increasing climate-related risks are combined with vulnerabilities** to threaten both high value economic assets and vulnerable populations.

Hazards

Storm Surge & Tidal Inundation

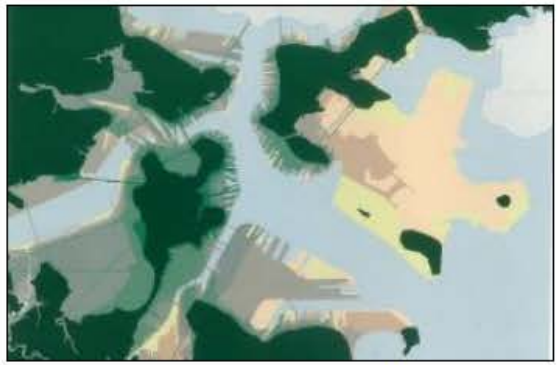
Sea Level Rise

Heavy Precipitation

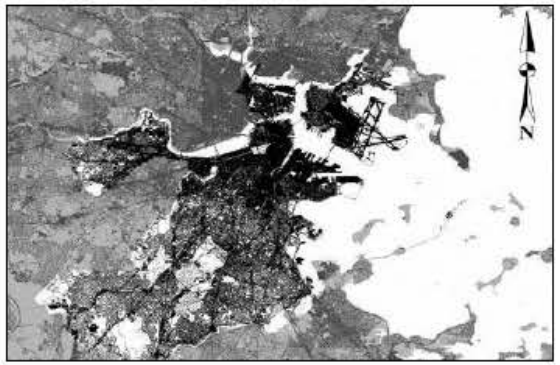
Extreme Heat

Vulnerabilities

Aging Infrastructure & Housing



Low-Lying, Built on Infill



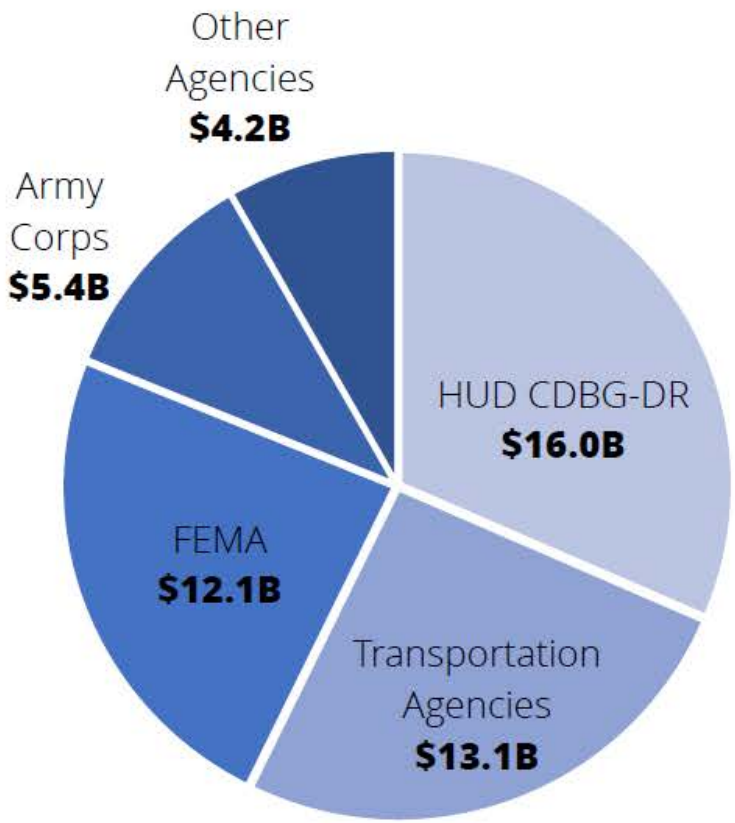
Impervious Surfaces

Storm Drain & Sewer Systems

After a major disaster, Congress appropriates **disaster recovery funds** through multiple agency programs.

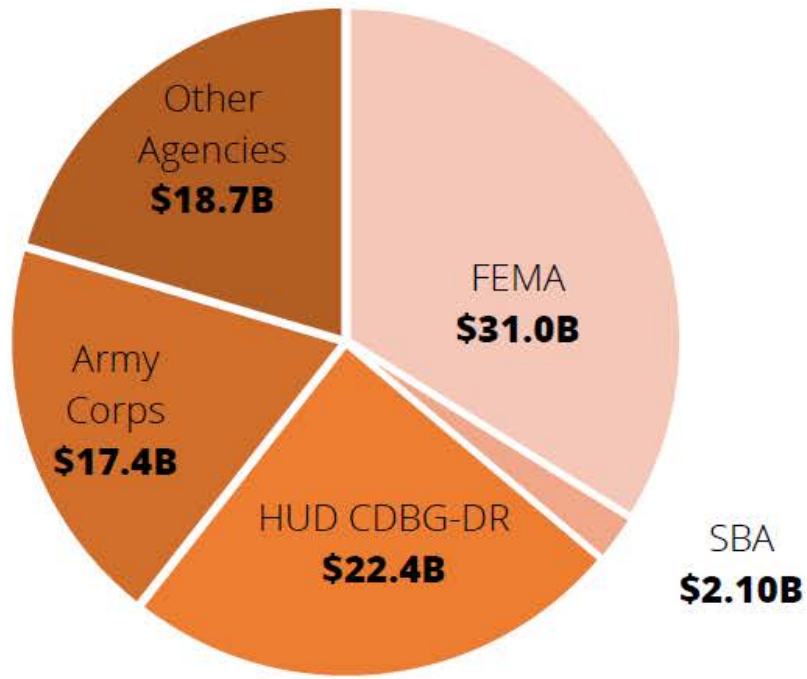
$50.8B 2013 DISASTER RELIEF APPROPRIATIONS:

Superstorm Sandy



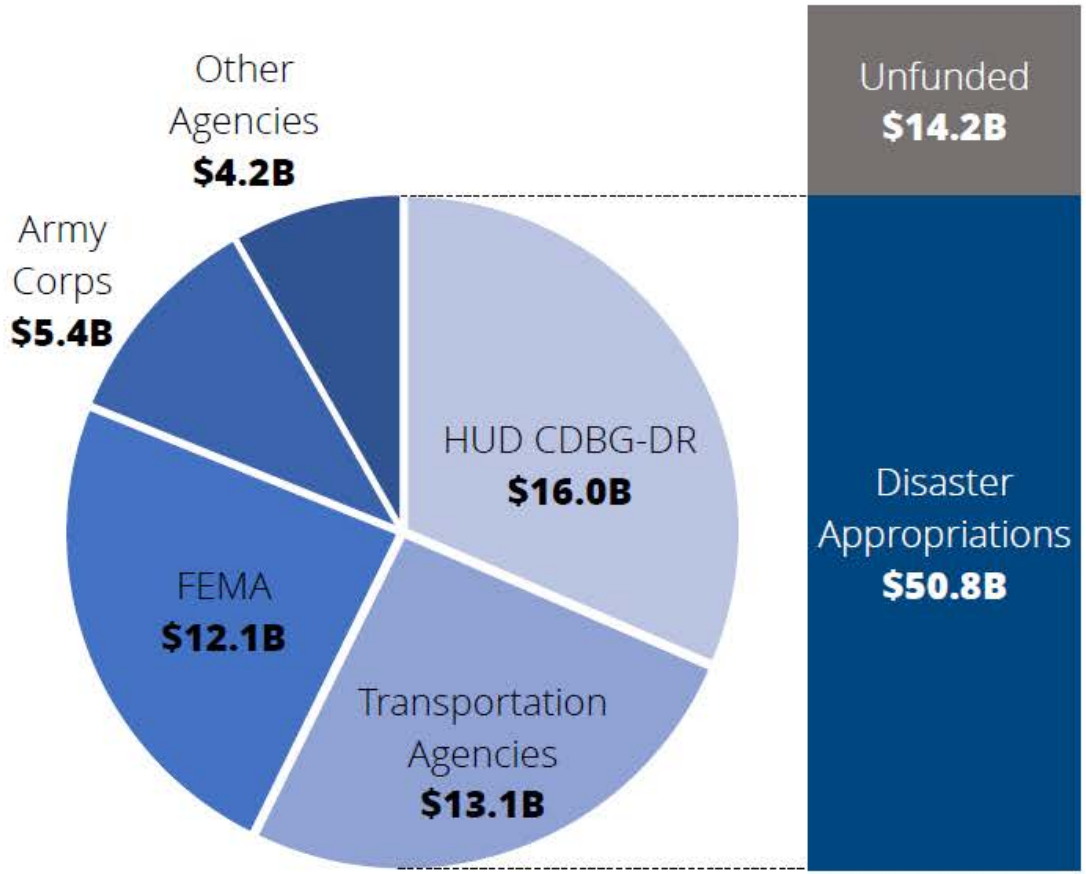
$91.5B 2017 DISASTER RELIEF APPROPRIATIONS:

Hurricanes Harvey, Irma, and Maria, and California Wildfires

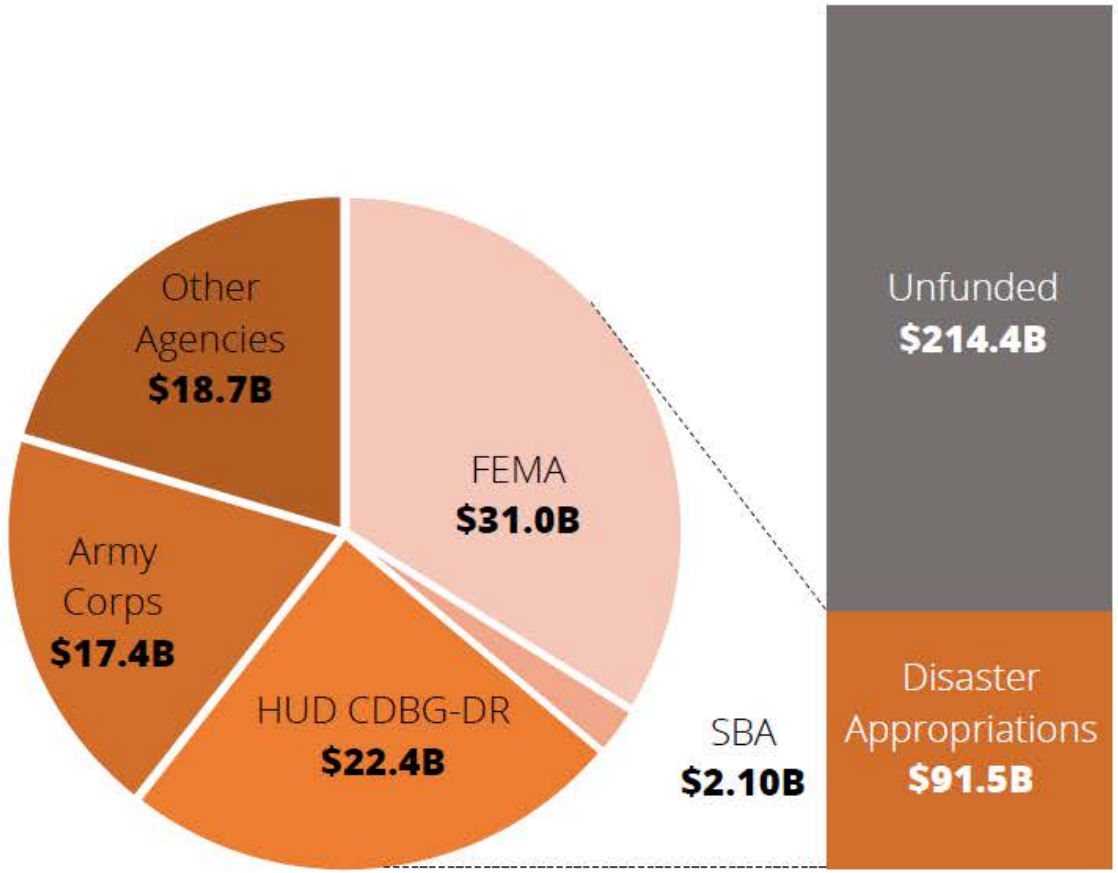


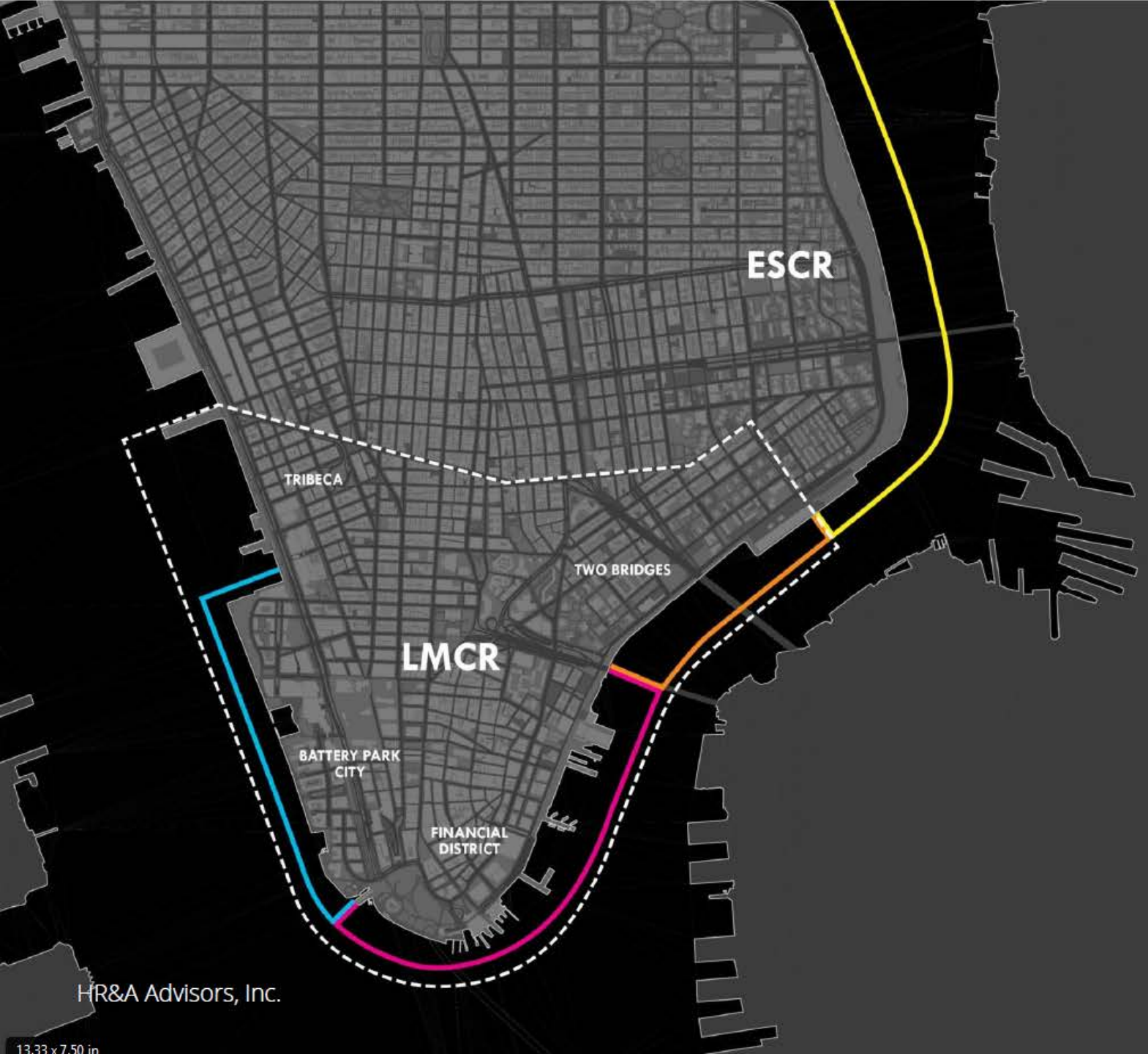
However, federal recovery funding is **unable to cover damages or support adequate mitigation.**

$65B ESTIMATED DAMAGES FOR 2013



$306B ESTIMATED DAMAGES FOR 2017





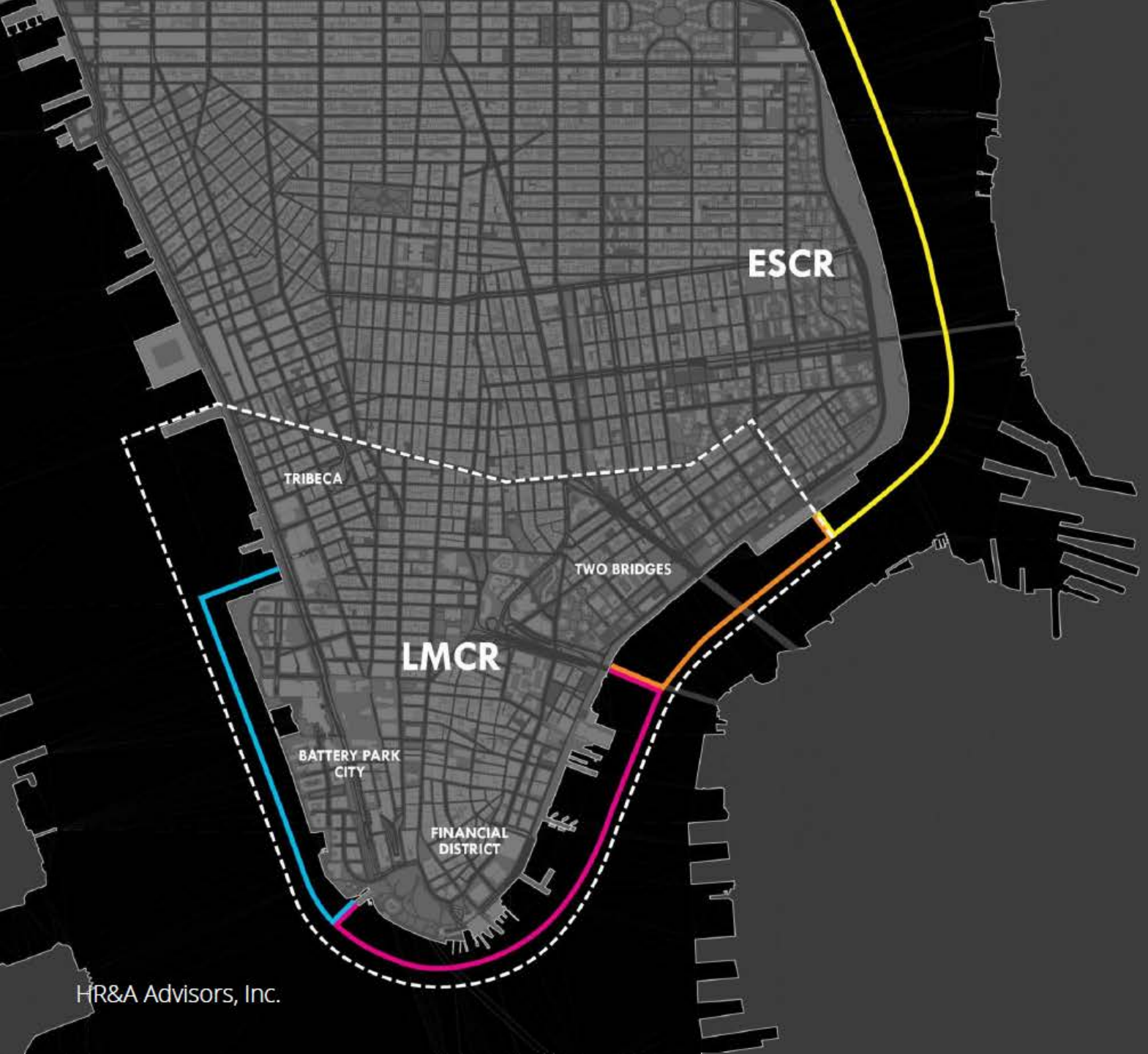
East Side Coastal Resiliency
Project Budget: $505M

Lower Manhattan Coastal Resiliency

Two Bridges
Project Budget: $203M

Financial District + Battery Park City
Project Budget: TBD

13.33 x 7.50 in



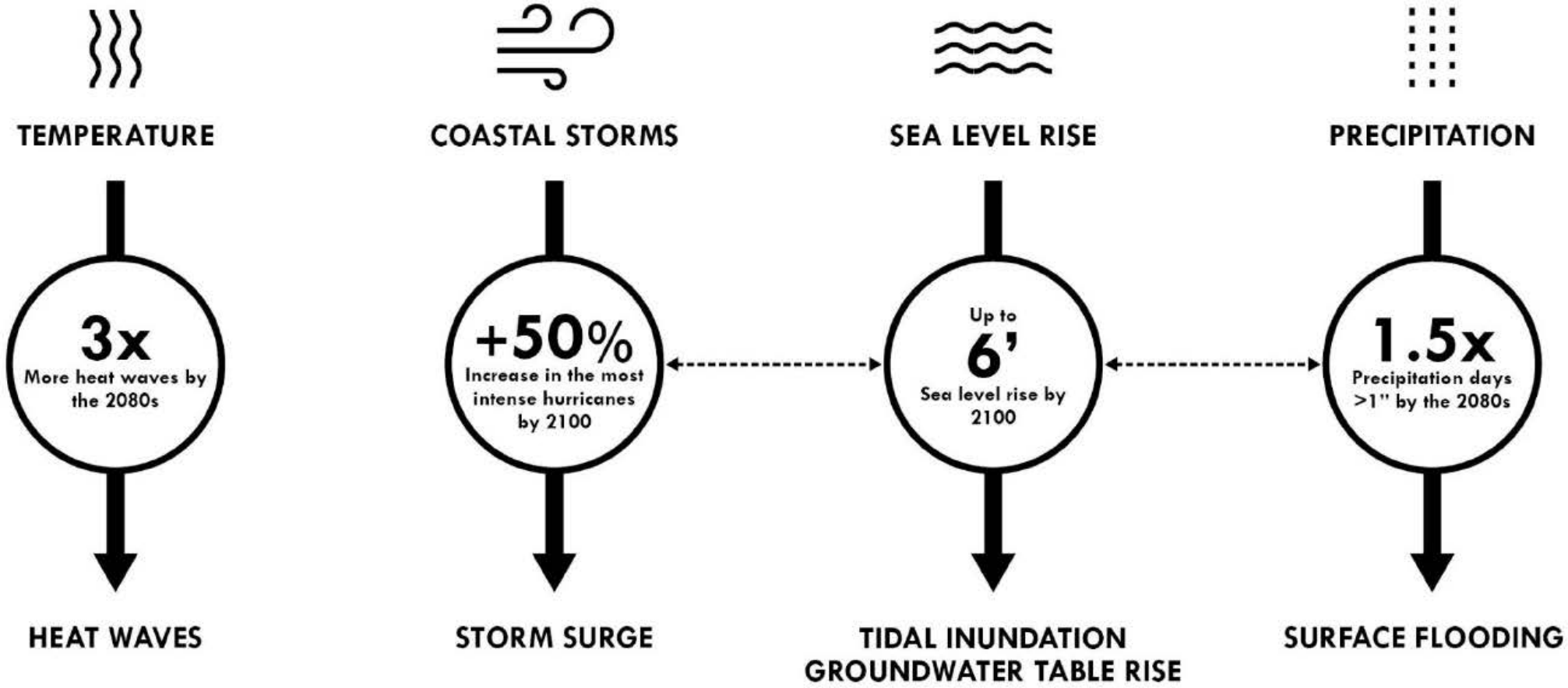
East Side Coastal Resiliency
Project Budget: $505M
Funding Secured:
$355M (CDBG-DR)
$150M (City Capital)

Lower Manhattan Coastal Resiliency

Two Bridges
Project Budget: $203M
Funding Secured:
$176M (CDBG-DR)
$27M (City Capital)

Financial District + Battery Park City
Project Budget: TBD
Funding Secured:
$108M (City Capital), $8M for BPC
$60M (DPR)

Climate hazards are increasing in **severity and frequency**.

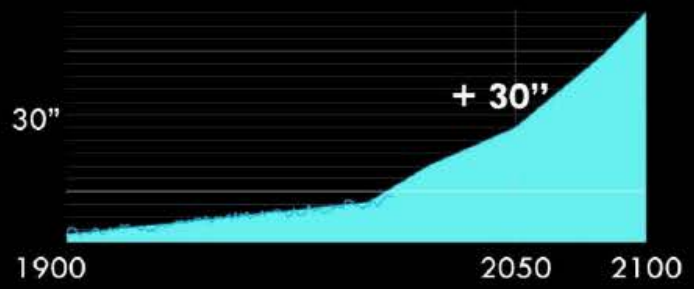


By 2100, sea level rise will submerge the district's edge and cause **monthly tidal inundation**.

11%
of buildings at risk
from monthly tidal inundation

29%
of impacted buildings in FiDi

$4B
assessed value at risk
from monthly tidal inundation



2100 HIGH TIDE (MHHW) FLOOD AREA
STUDY AREA
0 500 1000 1500 FT
N

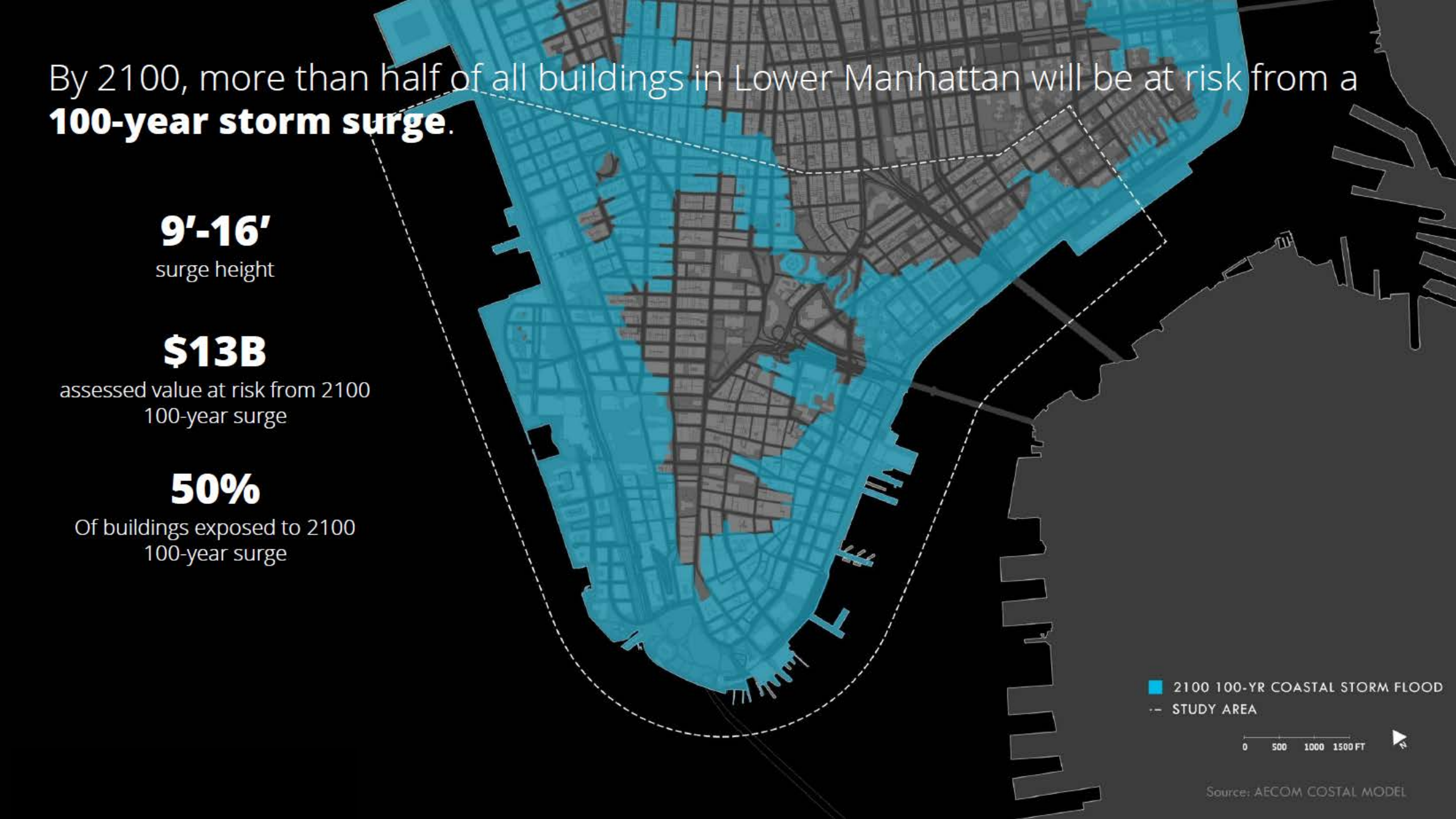
Source: NPCC 2015

By 2100, more than half of all buildings in Lower Manhattan will be at risk from a **100-year storm surge**.

9’-16’
surge height

$13B
assessed value at risk from 2100 100-year surge

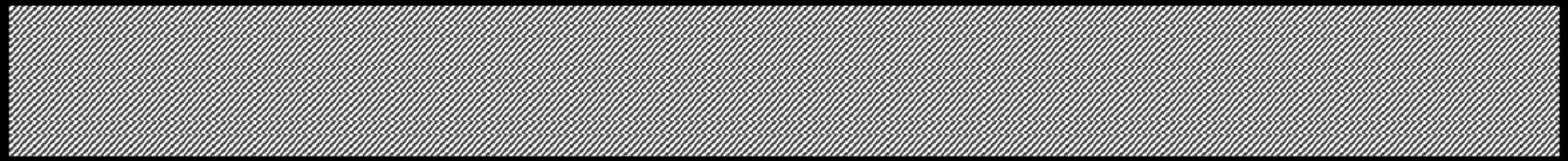
50%
Of buildings exposed to 2100 100-year surge



Long-term funding solutions require designing projects to generate **multiple benefits**.

EXPANDED COST-BENEFIT ANALYSIS

Project Costs



Project Benefits

Citywide Benefit	Environmental/ Social Benefits	Avoided Damage/ Insurance Savings	Enhanced Property Value

APPROACHES TO MONETIZING BENEFITS

General Fund State & Federal Appropriations	Impact Bonds Philanthropic Funding	Incremental Value Assessment Insurance Levy	Value Capture

Creating meaningful dialogue among architects/others in public realm design

Stephen Engblom, AIA, LEED AP

Toolkit Based on ONE NYC Principles

SUBWAY

PEDESTRIAN & BIKE IMPROVEMENTS

STREET GRID CONNECTIONS

HOUSING GROWTH

BQX

INDUSTRIAL JOBS

AFFORDABLE HOUSING

CONCENTRATED DENSITY

PARKS & OPEN SPACE

STREETSCAPE IMPROVEMENTS

ACCESSIBLE WATERFRONT

ACCESS TO JOBS

RAISED GROUND

BERM

FORTIFY ARCHITECTURE

FLOOD GATE

DEPLOYABLE

BQX FLOOD PROTECTION

SMART-GRID

GHG EMISSIONS REDUCTION

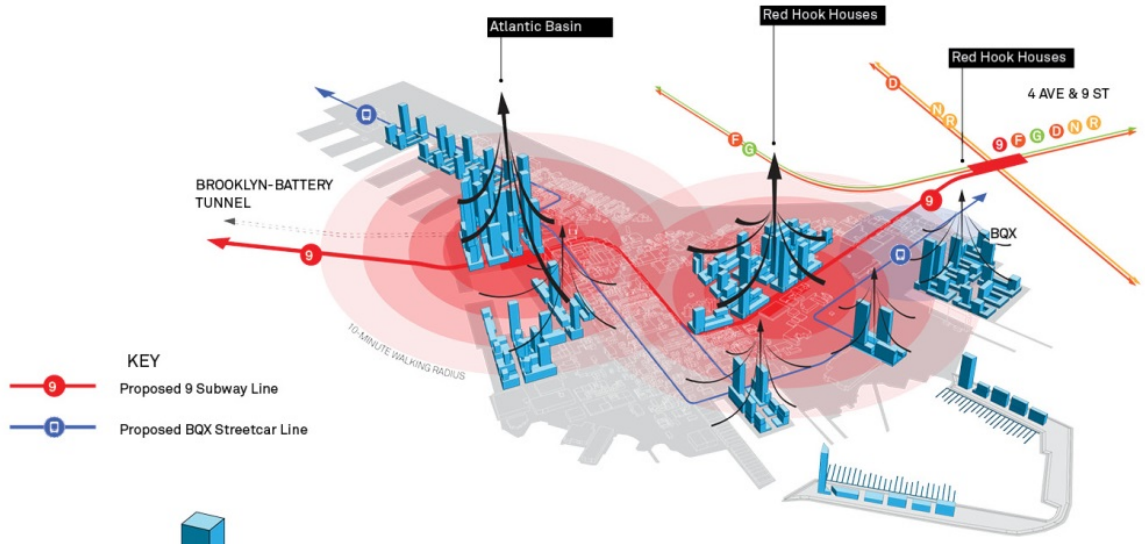
MASSING ORIENTATION

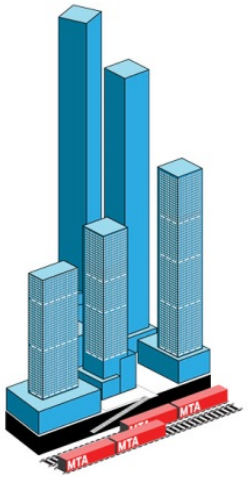
BIODIVERSITY

LOCAL RENEWABLE ENERGY

PERVIOUS SURFACE

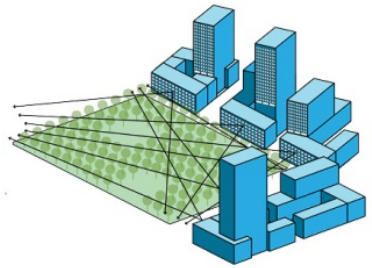
Tools for Housing



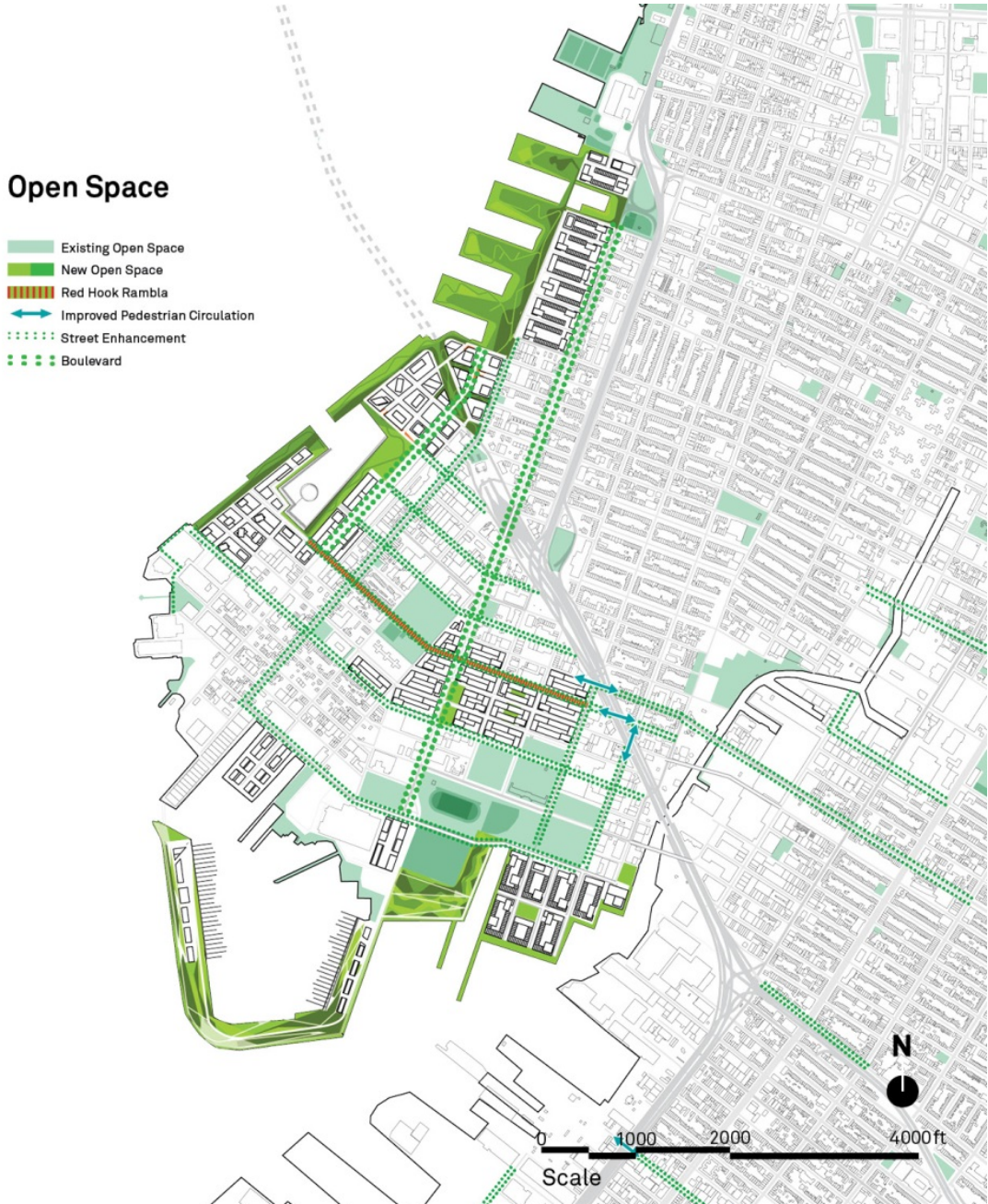


Concentrate development around the new subway station and leverage opportunities to maximize density

Vernacular architecture that respects the existing neighborhood context



Organize architecture around ample open space




BROOKLYN

SW Brooklyn Framework Study

SW Brooklyn
- Capex: $9B
- Real Estate Valuation: $45B

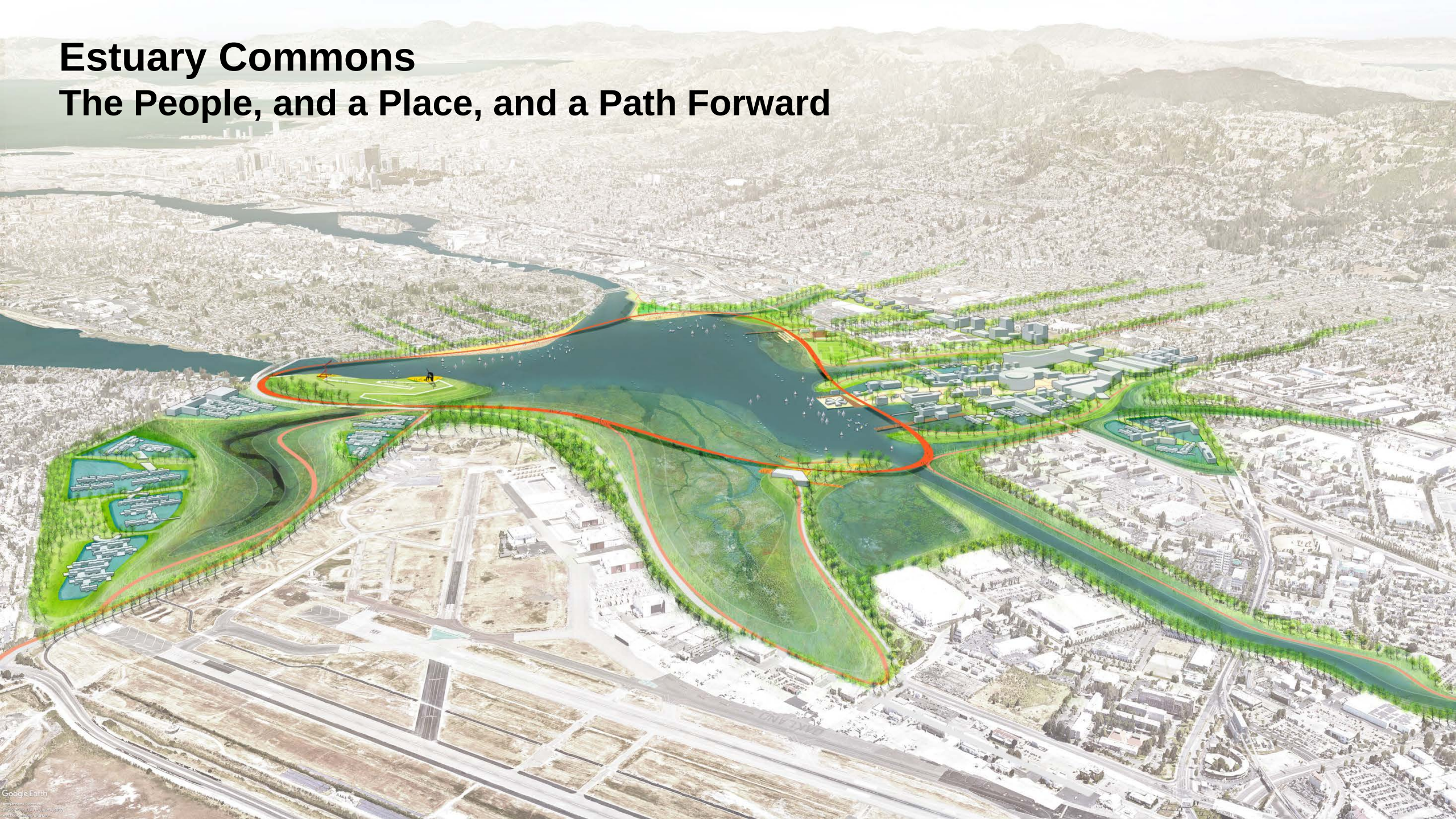
FY 18 – 21 $69M

	Existing Condition	In-Fill Development	25M SQ FT	35M SQ FT	45M SQ FT
	LIMITED Transit Options Job SHORTAGE LITTLE Tax Revenue Housing SHORTAGE	LIMITED Transit Options Job SHORTAGE LITTLE Annual New Revenue 6623 Housing Units	LIMITED Transit Options 2500 New Jobs $50M Annual New Revenue 29540 Housing Units	SUBWAY with 3 New Stations 8750 New Jobs $90M Annual New Revenue 39540 Housing Units	SUBWAY with 3 New Stations 15700 New Jobs $130M Annual New Revenue 49540 Housing Units
	3000 Affordable Housing Units -- FEW Streetscapes	4323 Affordable Housing Units -- 1.7 MILES Streetscapes	6250 NEW Affordable Housing Units -- 1.3 MILES Streetscapes	8750 NEW Affordable Housing Units -- 3.0 MILES Enhanced Streetscapes	11250 NEW Affordable Housing Units 3065 PRESERVED Affordable Housing Units 5.7 MILES Enhanced Streetscapes
	LIMITED Coastal Protection	2.4 MILES Coastal Protection	2.4 MILES Coastal Protection	4.5 MILES Coastal Protection	4.5 MILES Coastal Protection
	0.5 MILES Waterfront Access LIMITED Open Space	2.1 MILES Waterfront Access 74 ACRES Open Space	0.8 MILES Waterfront Access LIMITED Open Space	2.1 MILES Waterfront Access 50 ACRES New Open Space	2.1 MILES Waterfront Access 100 ACRES New Open Space

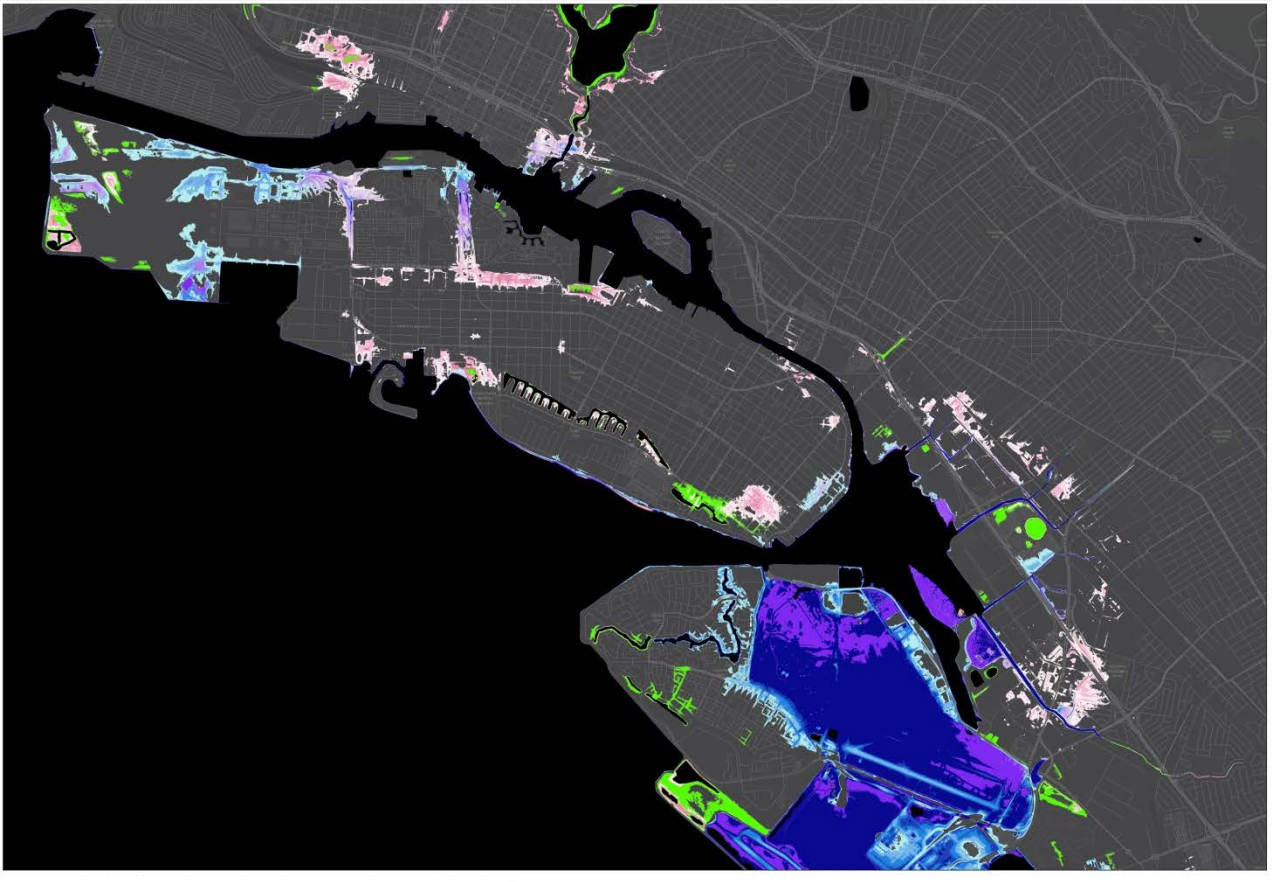

CITY OF OAKLAND
RECREATION

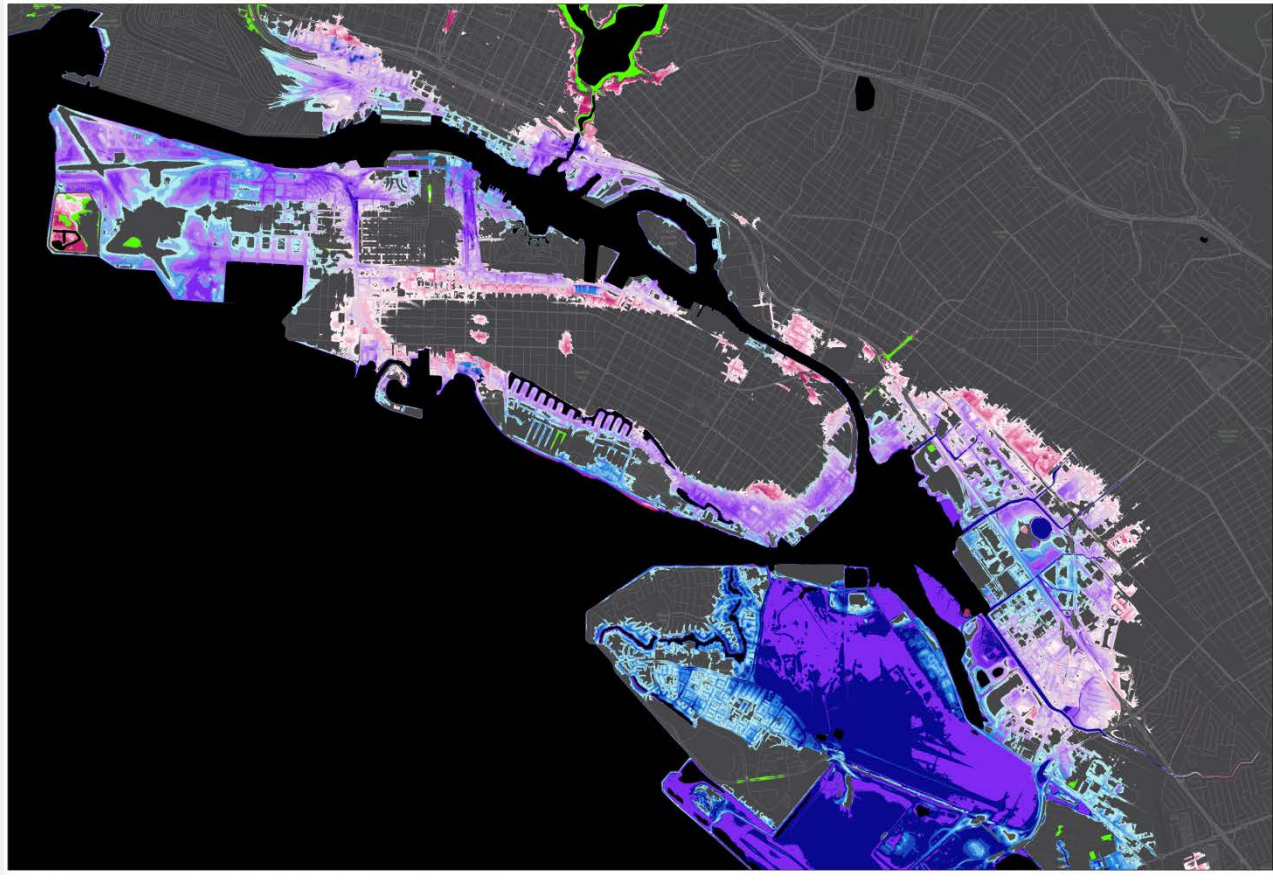
Estuary Commons

The People, and a Place, and a Path Forward



Combined Threat: Emergent Groundwater and Inundation
36 and 66 inches of Sea Level Rise





Combined Groundwater Sea Level Innundation (depth in feet)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4+

Sea Level Rise Innundation (depth in feet)

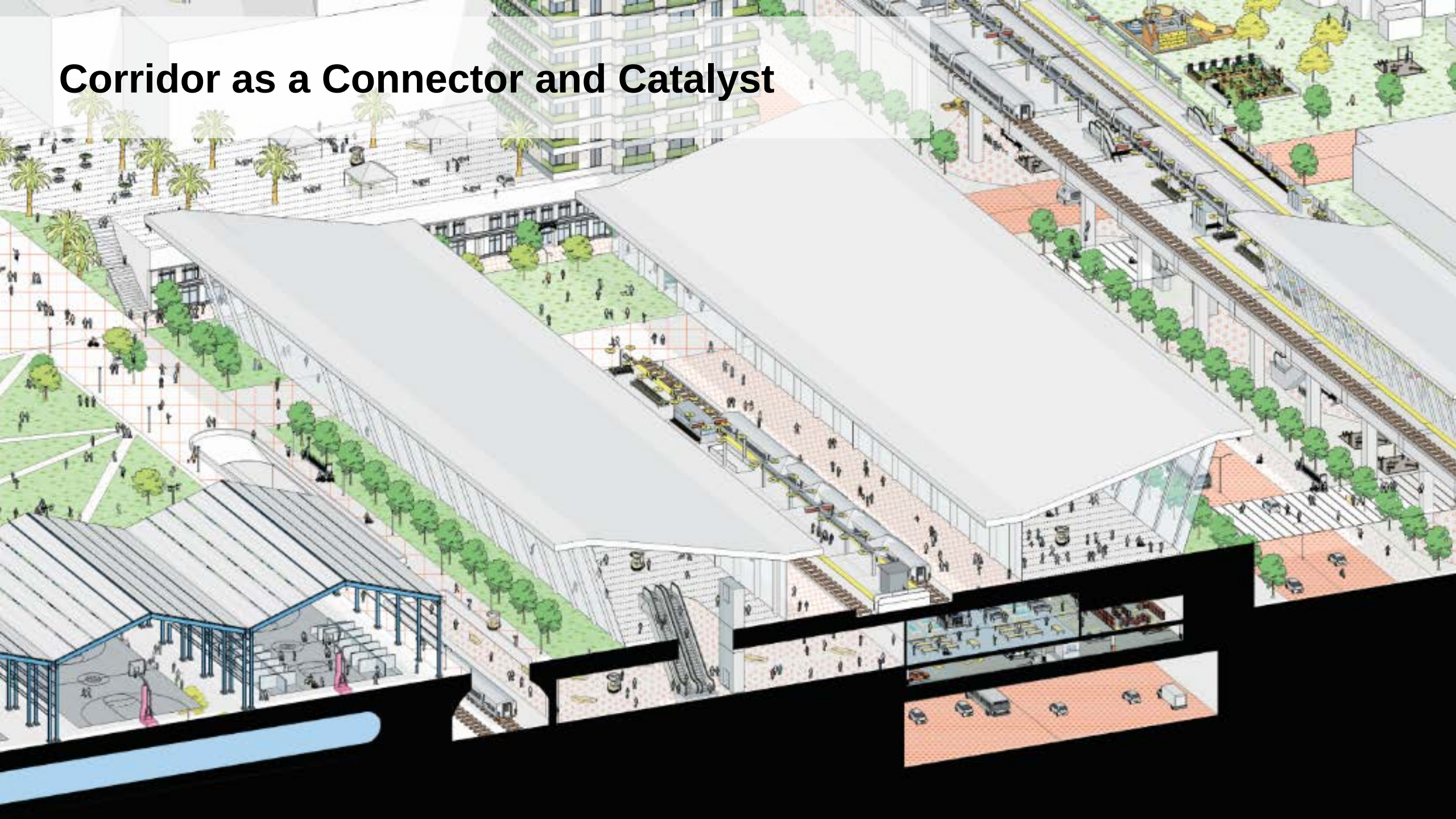
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4+

Emergent Groundwater (depth in feet)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4+

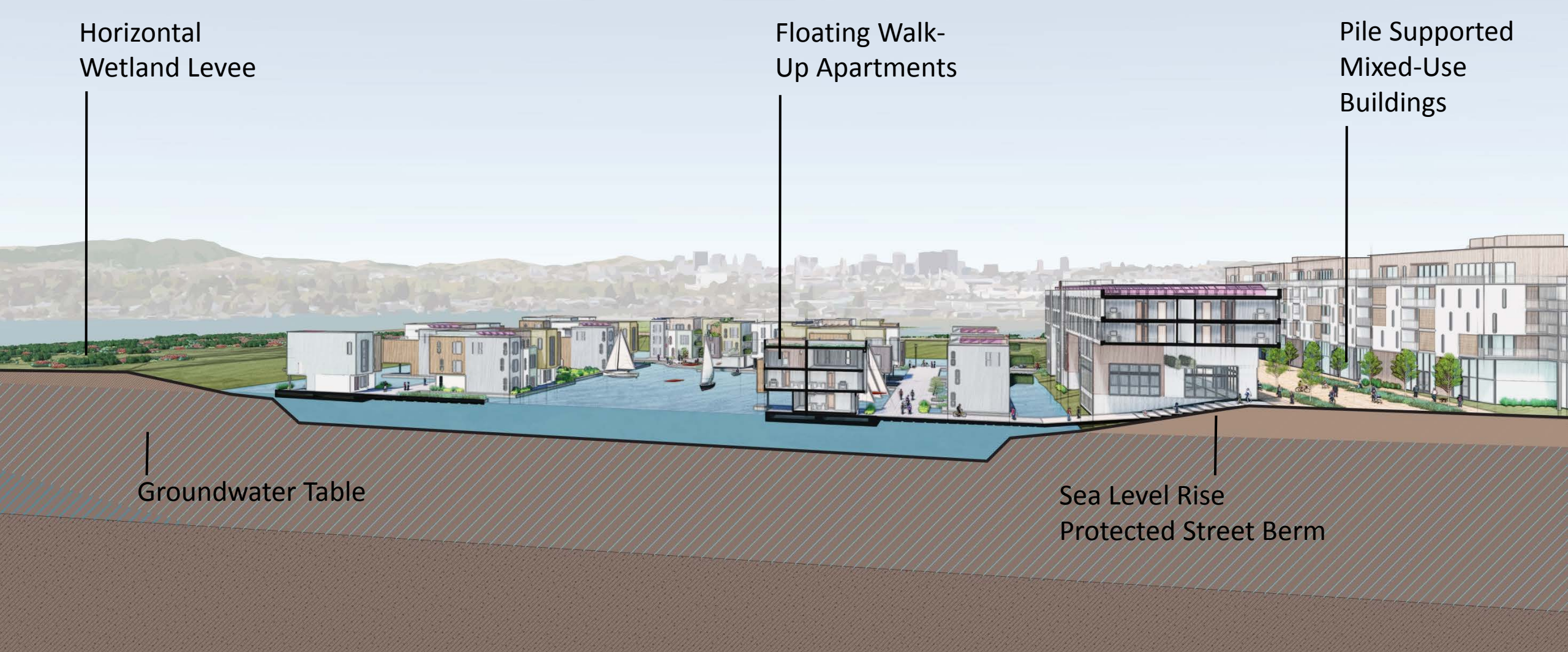
Lowlying Area

Corridor as a Connector and Catalyst



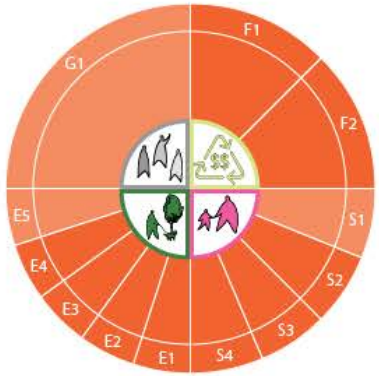

LOCALLY
6101

San Leandro Bay Tidal City

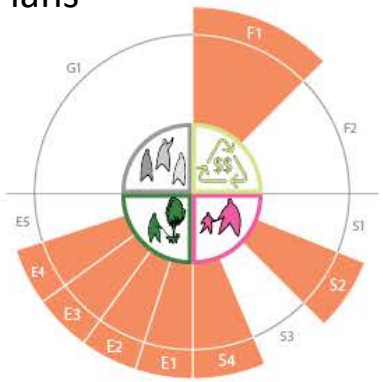


Community Resilience Investment Decision-Making Tools

Current



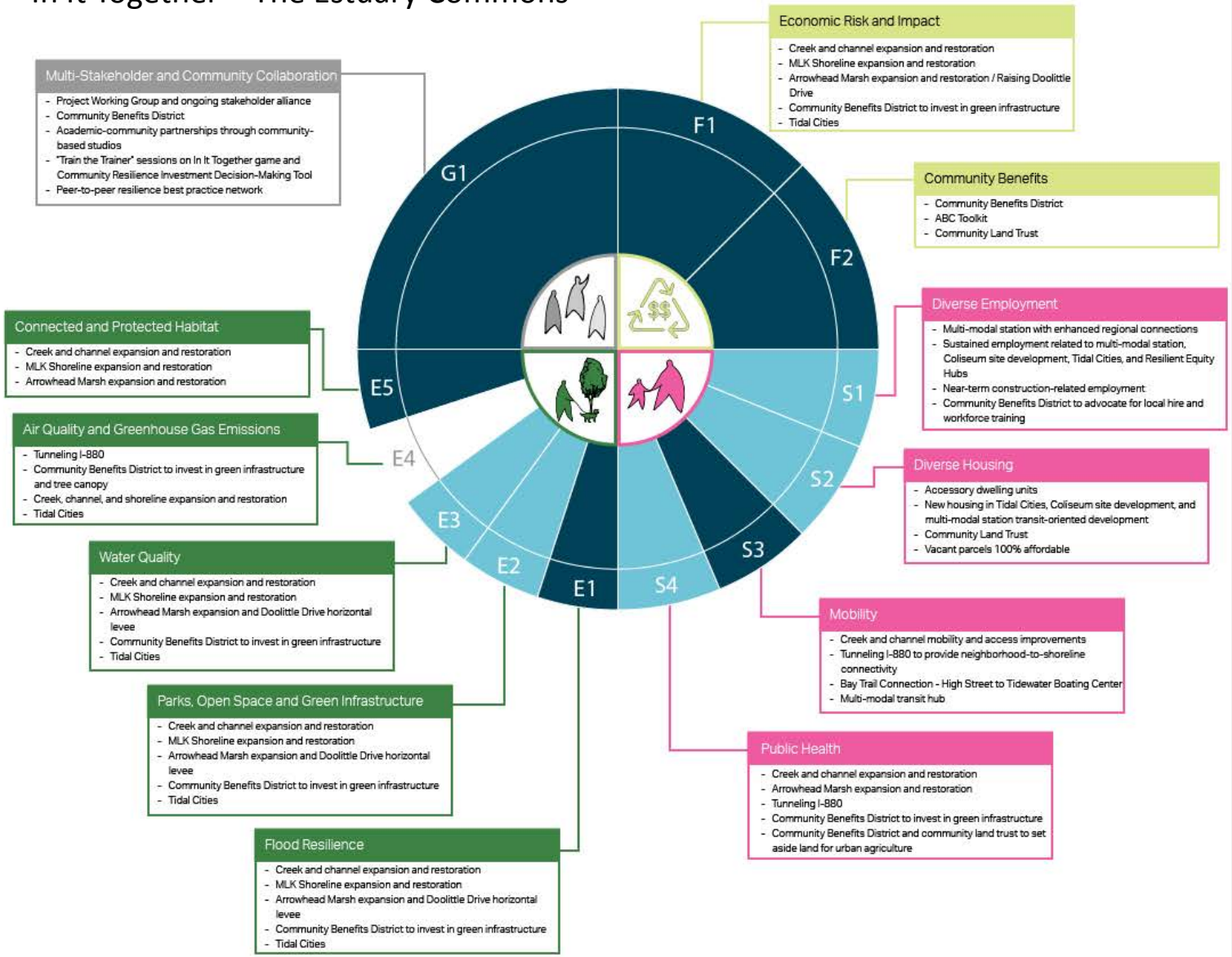
Proposed Individual Plans



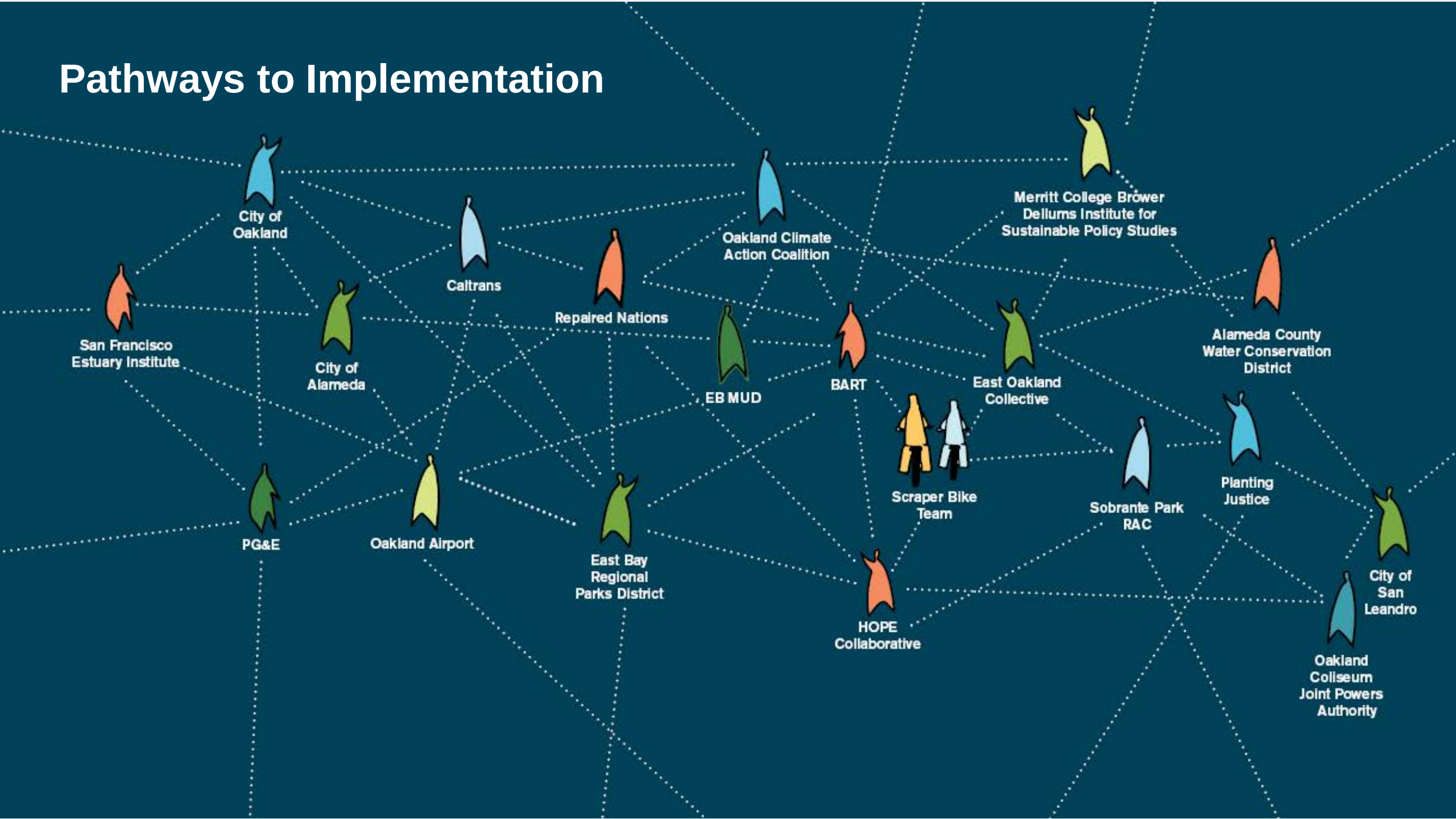
Legend

- Significantly Positive (++)
- Positive (+)
- Neutral
- Negative (-)
- Significantly Negative (--)

In It Together – The Estuary Commons



Pathways to Implementation



~San Leandro~
Bay
~Coliseum~

EAST
BAY

Scenario and stakeholder engagement role-playing games

Contact Information

Stephen Engblom, AIA

Senior Vice President/
Global Director, Cities

AECOM

Email:
stephen.engblom@aecom.com

@stephengblom

Amy Chester

Managing Director

Rebuild by Design

Email:
achester@rebuildbydesign.org

Jamie Torres Springer

Partner

HR&A Advisors, Inc.

Email:
jspringer@hraadvisors.com

Jeremy Alain Siegel

Associate, Senior Designer

BIG – Bjarke Ingels Group

Email:
jas@big.dk

Thank you!