

REBUILD
BY
DESIGN

Resilient Businesses Make Strong Communities: Action Plan for Commercial and Neighborhood Resiliency in the Sandy-Affected Region

HR&A Advisors with Cooper, Robertson & Partners



Cooper, Robertson & Partners, Inc.
Architecture, Urban Design

W Architecture and Landscape Architecture, LLC



Rebuild By Design

U.S. Department of Housing & Urban Development

Resilient Businesses Make Strong Communities: An Action Plan for Commercial and Neighborhood Resiliency in the Sandy-affected Region

HR&A Advisors with Cooper, Robertson & Partners

Final Report, March 2014

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Executive Summary
Resilient Businesses Make
Strong Communities

Who We Are

Built to address a complex problem at many scales. Sandy's impacts were widespread in the northeast. The storm did vast damage and calls for vast solutions that are complex to design and implement and difficult to finance given the built-out nature of this region. The escalating threat of climate change makes these problems even more challenging. But the storm also impacted neighborhoods, from Lower Manhattan to Long Beach; from Red Hook to Asbury Park. And it impacted the lifeblood of those communities, in their retail and service centers and their employment hubs. To ensure that problems at this scale – the neighborhood, the commercial corridor, the small business – are addressed in such a complex environment, a truly multidisciplinary team was needed.

A multidisciplinary team. Our team combines expertise in economic strategy, urban planning and design, landscape design, engineering and hazard mitigation, and community engagement to produce pragmatic, compelling proposals aimed at enhancing the resiliency of commercial corridors and their surrounding neighborhoods throughout the Sandy-affected region.



Cooper, Robertson & Partners, Inc.
Architecture, Urban Design

HR&A Advisors, is a leading real estate, economic development and sustainability consulting firm that works with public and private sector clients across the Sandy-affected area and around the world to produce and deliver successful visions for economic development. HR&A led the team together with architecture and urban design firm Cooper, Robertson & Partners. Both firms have a deep understanding of how climate change is impacting communities, and are involved in ongoing resiliency planning and community outreach projects throughout the region and around the world.

W Architecture and Landscape Architecture, LLC

Our partners included:

W Architecture, an interdisciplinary studio that builds on links between architecture and landscape architecture to create spaces that engage both nature and urbanism.



Dewberry Consultants, specializing in hazard mitigation and emergency management, who create practical solutions for communities across the country during recovery and resiliency planning.



Southwest Brooklyn Industrial Development Corporation, a community development corporation focused on supporting neighborhood growth through business advocacy and expanded employment opportunities for local residents.



Parsons Brinckerhoff, a leading international planning, engineering, and construction management firm, which provided cost estimates for the team's proposals.

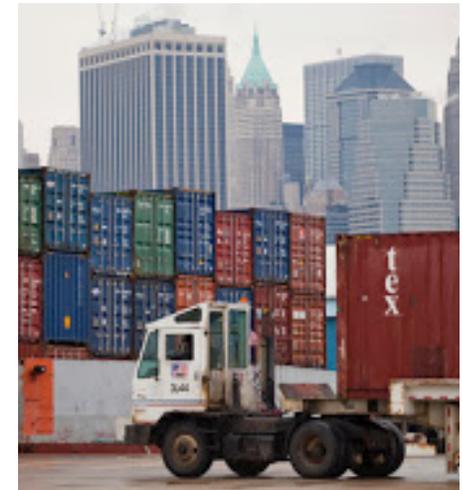
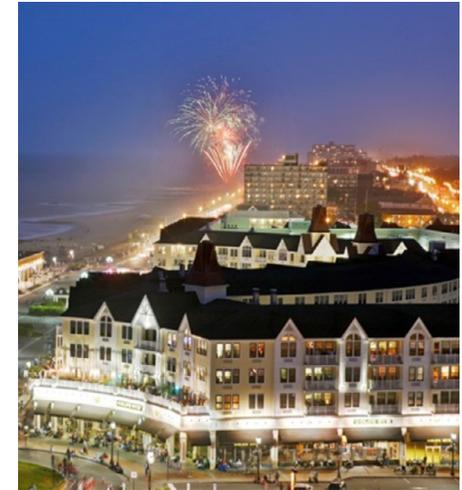
What We Focused On

The Commercial Corridor Resiliency Project. For the last eight months, the HR&A/Cooper Robertson team has focused on creating innovative concepts to enhance the resiliency and economic vitality of the Sandy-affected region's coastal commercial corridors and the neighborhoods that surround them.

Retail is the lifeblood of communities, providing jobs, critical goods and services, and neighborhood gathering places. From the waterfront of Red Hook to Washington Street in Hoboken, to the shopping centers in Hyanis, retailers and their inventory, primarily located on ground floors and basements, are particularly vulnerable to storm impacts. Design, policy, and organizational solutions must be deployed to foster more resilient commercial activity in coastal communities.

Resilient businesses make strong communities. We have seen how commercial resiliency is tied to the physical and economic resiliency of whole communities. As local commercial activity goes, so goes the vitality of a neighborhood; and protecting these areas cannot be separated from protecting whole neighborhoods.

Flood protection and commercial revitalization go hand in hand. Our project combines tools that support commercial activity and neighborhoods in innovative ways: it shows how local associations of merchants can promote vitality and build resiliency; it introduces commercial property itself as an element of flood protection infrastructure; it shows that resiliency planning must include planning for growth and vibrancy or the costs of mitigation may not be supportable.



Four types of commercial businesses predominate in the region, including neighborhood business, destination retail, boardwalk entertainment and retail, and industrial businesses.

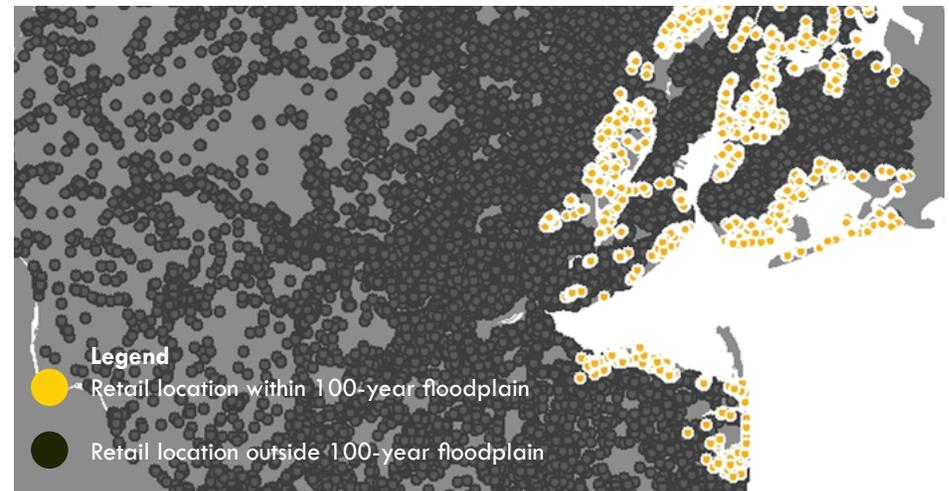
Why It Matters

The role of commercial corridors. There is 100 million square feet of commercial space, predominantly retail and services, in the 100-year floodplain in the Sandy- affected region, and 56 million square feet of industrial property in New York City alone. Promoting resiliency of these corridors supports broader stability and resiliency of their surrounding communities.

A major employment driver for coastal communities during stable periods. These businesses generate \$34 billion in annual sales. Much of this activity is created by small businesses, with 85% of businesses in the region under 10,000 square feet. In New York City and New Jersey, vulnerable businesses employ 175,000 workers, or as much as 20% of employment in coastal communities.

A critical asset in acute conditions. From the conversion of Red Hook's IKEA to a Recovery Center (bottom right) to communication centers and suppliers of basic necessities, those corridors that remained in stable operation after Sandy were integral to relief. All corridors provided neighborhood gathering places and tourist destinations to help restore a sense of normalcy in the recovery. Coastal commercial was vital after the storm and the fact that it was severely impacted itself worsened the shock of the acute condition.

Commercial properties are heavily exposed to the impacts of natural disasters. For retail and service businesses, a ground-floor location, which allows interaction with the consumer base, also leaves businesses vulnerable to flooding, causing property damage, loss of inventory, and interruption of business operations. 74% of businesses closed their doors for an average of seven days after Sandy. Local business owners reported lengthy response times for applications for public financial support as well as administrative burdens that served as enormous obstacles to recovery.



Regional mapping of commercial property throughout the 100-year floodplain in New York City and New Jersey.



FEMA officials set up an office in IKEA in Red Hook, Brooklyn, to aid recovery shortly after Hurricane Sandy.

What We Did

Research Stage. In Rebuild By Design's Stage II, we completed a regional analysis to identify at-risk commercial corridors, specific threats to commercial businesses, and obstacles to implementing strategies for resiliency. We filtered a long-list of 24 coastal commercial corridors based on economic and physical characteristics and selected three study areas for further analysis.

Project and Program Design Stage. Since November 2013, we have worked to create priority design opportunities and a framework for implementing and financing commercial corridor resiliency at building, corridor and district scales. Through over 30 meetings with local business owners, business advocacy groups, formal and informal merchants' associations, local elected officials, and City, State and Federal agencies, the team gathered information about business needs, solicited feedback on design concepts, and gauged interest and support for these ideas.

We met with members of each key stakeholder group multiple times, including Red Hook Restore and the Beach 116th Street Partnership, both emerging merchants' associations; and Madison Marquette and iStar Financial, development partners in Asbury Park, revisiting these groups throughout our design process to incorporate feedback and develop support in our proposals.



Beach 116th Street Partnership Executive Director, Krzysztof Sadlej, looks on at a public workshop for local business owners; HR&A partner Jamie Springer with Restore Red Hook founder Monica Byrne; Asbury Park community members discuss design concepts after the Rebuild One City parade.

Our Solution Set

A multi-scaled and multi-pronged approach focused on both physical design and implementation and financing of resiliency improvements. No single scale of intervention could address the complexity of commercial corridor resiliency. Critical challenges identified included lack of information about operational resilience, inability to finance more costly improvements, and diseconomies of scale in adopting protections. Solutions that boost economic vitality help to fund themselves, and both local technical assistance and organization and larger-scale infrastructure and planning efforts are required. We developed a full suite of interventions for commercial businesses and properties that worked at multiple scales to create more resilient businesses, buildings, corridors, and communities.



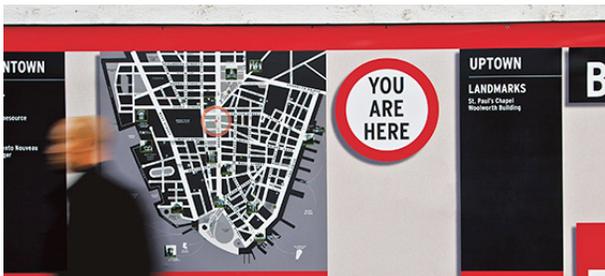
Businesses & Buildings

Building mitigation improvements and activities by building owners and tenants, including behavioral changes, such as creation of preparedness plans and use of deployable flood protection systems, and capital investment in building and tenant spaces.



Corridors & Neighborhoods

Corridor/neighborhood protection and revitalization through public capital investment with private involvement, such as flood barriers, raised streets and flood-protective streetscape and defensive building improvements, potentially accomplished through projects that also revitalize commercial areas.



Collective Action

Organizational capacity through local entities such as merchants' associations, business improvement districts and local development corporations to provide support for behavioral changes and technical assistance to applicants for capital funding, as well as general economic development support in at-risk areas. Some entities may be robust enough to guarantee loans for corridor-wide improvements.

What follows is a summary of the HR&A/Cooper Robertson team's recommended initiatives that combine the tools outlined above in specific communities and in regional programs that promote mitigation investments.

Three Focus Areas, Four Initiatives

We developed cost-effective, funding-eligible and implementable design proposals for three study areas within the Sandy-affected region: the Red Hook neighborhood in Brooklyn; Beach 116th Street in Rockaway Park, Queens; and Asbury Park on the New Jersey Shore.

These areas represent the range of commercial typologies in the Sandy-affected coastal area: post-industrial waterfronts with industrial and neighborhood commercial uses (Red Hook); neighborhood-serving retail corridors (Beach 116th Street); and shorefront destinations (Asbury Park). They also represent the range of solutions we have seen in the aftermath of Sandy that define what further efforts are needed: a commitment to a long-term, large-scale infrastructure protection, met with uncertainty about this type of protection and what to do in the interim (the integrated flood protection system in Red Hook); an area that will continue to be exposed to substantial flood risk (Beach 116th Street, on a barrier island); and an area defined by its exposure due to its beachfront character (Asbury Park).

In addition to initiatives presented for each of these study areas, a fourth initiative, including regional programming, capacity-building and a funding framework is critical to supporting these efforts and to replicating them across the region.



Vision for Red Hook: A protected maritime community through integrated flood protection and community planning & economic development.



Vision for Beach 116th Street: A beach-to-bay corridor protected through individual building mitigation and re-building of significant infrastructure for resiliency.



Vision for Asbury Park: A vibrant shore town protected with beachfront integrated flood protection and revitalized coastal lakes to support a year-round economy.

Priority Initiatives: Red Hook, Brooklyn

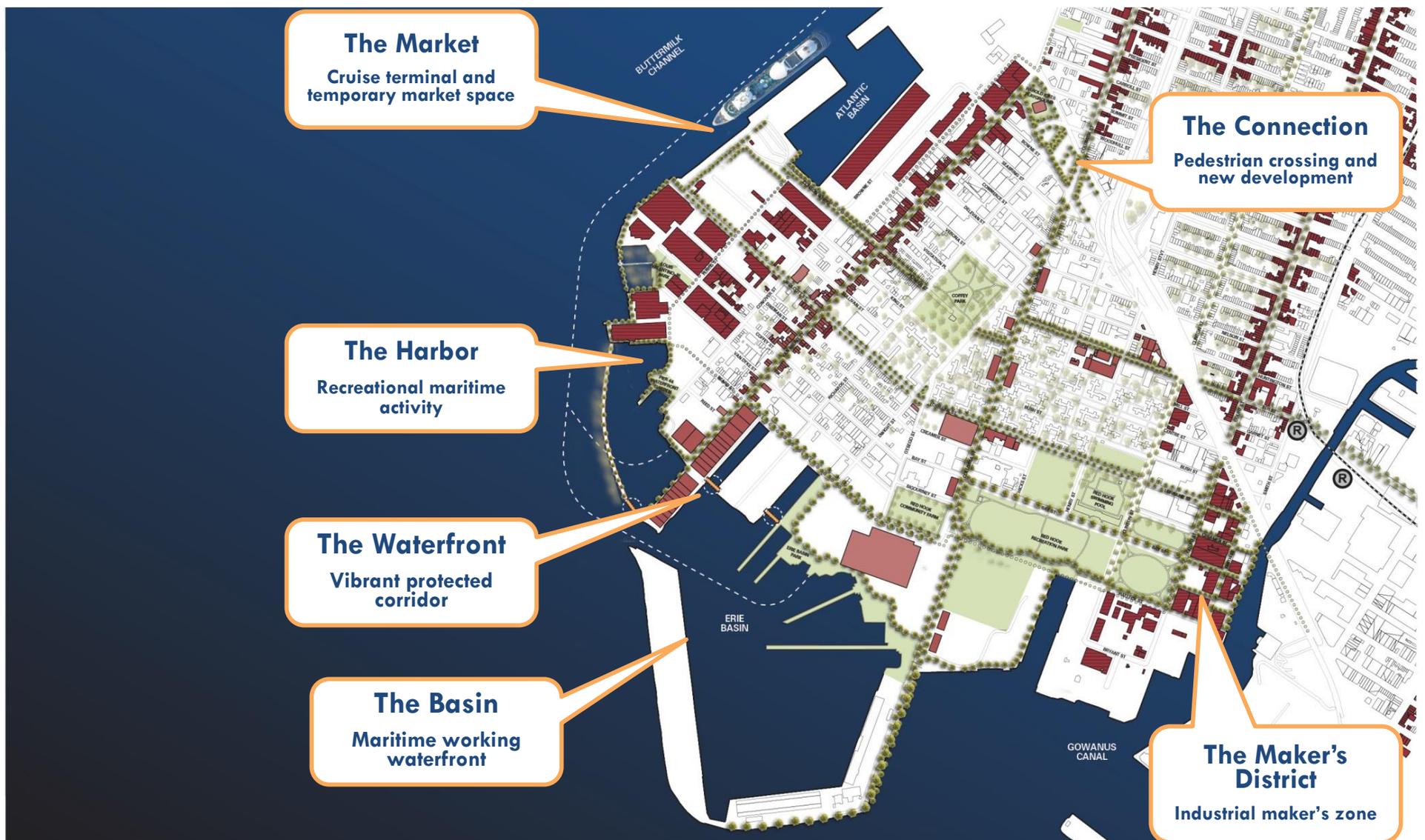
Red Hook's 12,000 residents and 8 million square feet of commercial property were severely impacted by Sandy and are almost entirely in the 100-year floodplain, including most of its 6,000 residents of public housing. Flood protection measures can be designed to promote revitalization and diversification of manufacturing and innovation economy uses, neighborhood retail, and waterfront destinations to lower the 24% unemployment rate.

Initiative Summary

- **Design and construct an innovative integrated flood protection system**, incorporating retrofit of existing properties, resilient strategies for new development, and a combination of deployable and permanent interventions in the public realm, providing protection for the maximum number of businesses, buildings, and housing units.
- **Launch a neighborhood planning process in which flood protection components are designed to include commercial or mixed use preservation or expansion**, such as new vitality in Red Hook Houses, connectivity along key corridors like Columbia Street, and an elevated Brooklyn Greenway.
- **Create a new or adapted Local Resiliency Corporation to serve as a planning partner and support or finance commercial and community revitalization**, incorporating existing merchants groups and additional community objectives.
- **Provide enhanced resources to support resiliency improvements by individual businesses and buildings in the short-term**, including technical assistance, direct funding and loans (see page 14).



Priority Initiatives: Red Hook, Brooklyn



This plan provides an overview of the key initiatives in Asbury Park at building, corridor, and district scales.

Priority Initiatives: Beach 116th Street, Rockaway Park, Queens

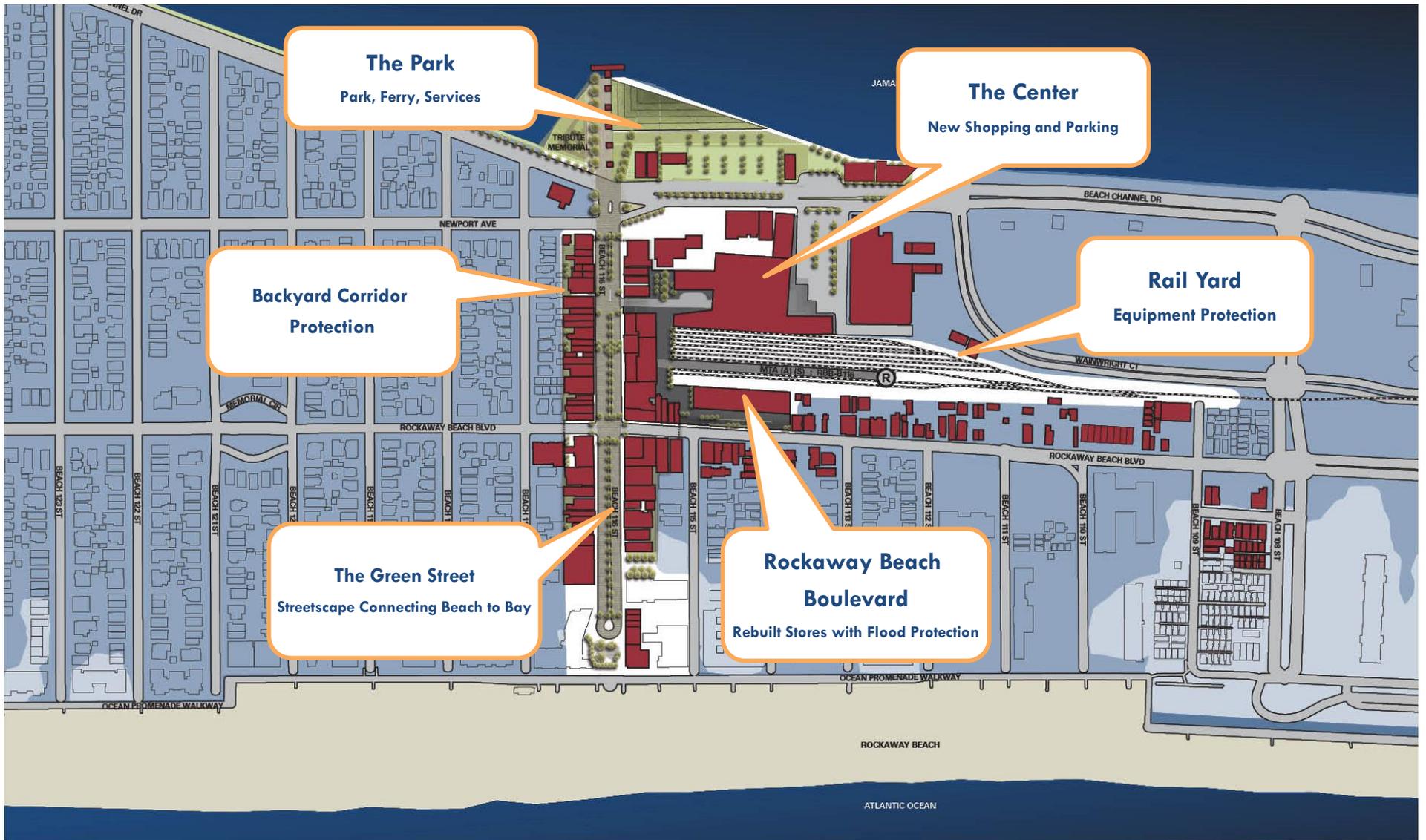
The Beach 116th Street corridor includes 140,000 square feet of vital retail and services for the community, such as a grocery store and gas stations. Individual building and business mitigation is key, accompanied by resiliency support programs by the Beach 116th Street Partnership, as well as protection of MTA assets. Resilient growth is key to the corridor's economic health and facilitating future ferry access at Beach 116th or Beach 108th Streets.

Initiative Summary

- **Design and construct flood protection for the MTA subway station and rail yard through an elevated commercial redevelopment strategy,** and enhancement of adjacent development parcels.
- **Support capacity-building for the Beach 116th Street Partnership to support local business resiliency.**
- **Create an economic development plan focused on corridor and neighborhood-scale flood protection improvements** including potential new retail around the MTA station, a new bayside park, corridor protection strategies, and potential ferry landing.
- **Provide enhanced resources to support resiliency improvements by individual businesses and buildings in the short-term,** including technical assistance, direct funding and loans (see page 14).



Priority Initiatives: Beach 116th Street, Rockaway Park, Queens



This plan provides an overview of the key initiatives at Beach 116th Street at building, corridor, and district scales.

Priority Initiatives: Asbury Park

Asbury Park's commercial corridors and nodes of economic activity suffered during and after Sandy, and are susceptible to damage from sea level rise, storm surge, and more frequently, flooding from adjacent coastal lakes. These areas are economic drivers for the City and crucial to continued growth and health. Protection requires large-scale interventions along the beachfront, and infrastructure and landscape improvements surrounding each of the three coastal lakes.

Initiative Summary

- **Design and construct innovative flood protection infrastructure in Asbury Park.** The vital beachfront community has potential to create a flood defense combining boardwalk and building protections and to leverage inland water body defenses to re-connect the shorefront to the community.
- **Create edge protections for Wesley, Sunset, and Deal Lakes.** Revitalization of these lakes will provide flood protection while also restoring recreational access, improving local ecology, and providing new opportunities for economic growth.
- **Provide enhanced resources to support resiliency improvements by individual businesses and buildings in the short-term,** including technical assistance, direct funding and loans (see page 14).



Priority Initiatives: Asbury Park



This plan provides an overview of the key initiatives in Asbury Park at building, corridor, and district scales.

Priority Initiatives: Regional Small Business Mitigation Programs

To support recommendations in the communities we focused on in New York City and along the New Jersey Shore, small business resiliency programs that combine funding for improvements, technical assistance, and capacity-building are critical to ensuring implementation.

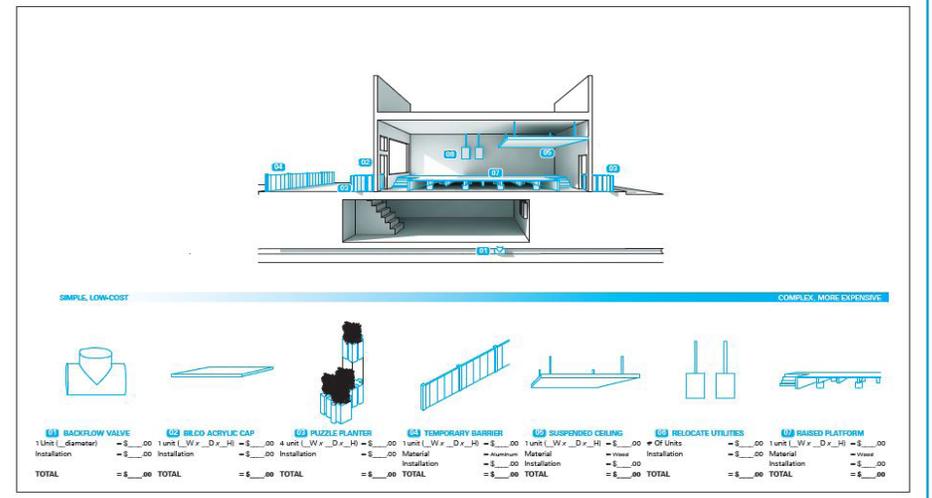
Initiative Summary

New York City expects to grant \$110 million for mitigation investments to approximately 600 business recipients through its Business Resiliency Investment Program. Additional funding would enable the City to incentivize a greater proportion of the almost 22,000 small businesses in the Sandy-affected area. The additional efforts would help local merchants' associations and Business Improvement Districts to provide technical assistance to businesses and buildings so that they can make simple behavioral changes and small-scale investments. It could also support a loan and/or enhanced grant component leveraging philanthropic funds and Community Reinvestment Act (CRA) motivated capital to support capital improvements through a public-private leveraged loan model, like funds created in the aftermath of Hurricane Katrina.

On the New Jersey Shore, funds would be made available for grants and low-cost loans to support business- and building-level mitigation, leveraging additional private capital and providing technical assistance programming. A Shore-based public-private partnership would be created to promote resiliency and revitalization through planning and support for local merchant associations, and to serve as a funding conduit.



MOCK BUILD-OUT OF INTERVENTIONS



Additional Recommendations

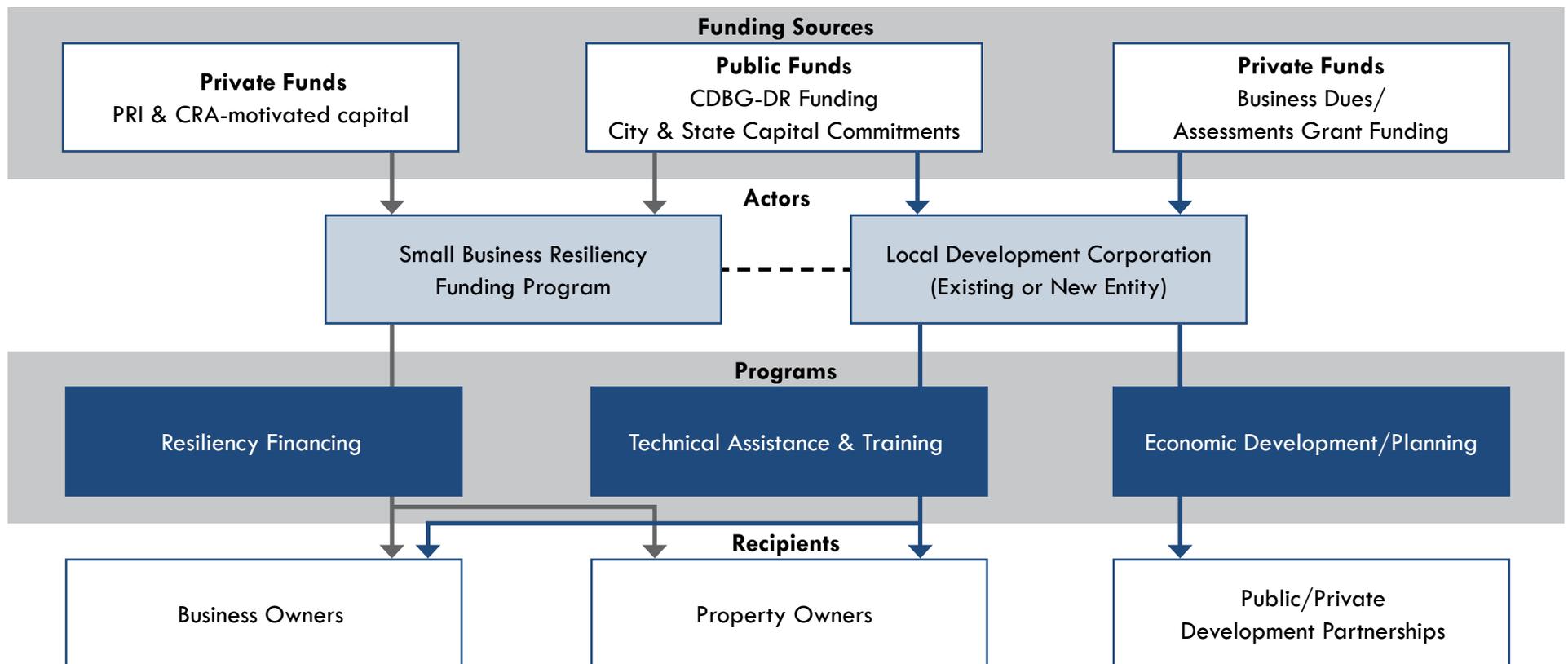
In addition to the need for direct investment in mitigation projects and programming described in the priority initiatives, our outreach and research during this project yielded a number of critical recommendations for further action by public entities, including the following:

- Update and modify building codes and FEMA guidelines to promote commercial resiliency. In many cases, relatively inexpensive and simple interventions – such as wet-proofing a commercial ground floor – are prohibited by local building codes and unrecognized as mitigation by FEMA. These should be revisited in light of the recommended building-level measures in this report.
- Encourage a more robust relationship between flood insurance for commercial property and preparedness, as well as partial mitigation. As in the housing sector, little information is available on actuarial decision-making by both National Flood Insurance Program practitioners and private insurance providers for flood-prone commercial property. Efforts that may be highly effective in avoiding damages during flood events are not adequately recognized in premium adjustments, including both basic preparedness and partial mitigation. In addition, if premium reductions result from future efforts, creating an efficient market in which these reductions can be capitalized to finance capital improvements is a critical need for the Sandy-affected region. The financing of energy efficiency improvements is a strong model for this type of effort.
- Address “split incentive” and separate actor problems. In many mitigation circumstances, tenant may benefit from improvements paid for by owners and vice versa. Policies and programs should be designed to resolve this misalignment of incentives – among the potential solution, the Federal government should clarify that requirements for funds to be provided to small businesses do not prevent larger businesses entities who are landlords to small businesses from receiving CDBG-DR grant funding over a certain gross receipts threshold.
- Streamline funding application processes. While this project proposes resources to help small businesses understand and apply for public funding for mitigation, streamlining loan and grant program processes in the aftermath of a disaster, including a single common application portal across programs offered by multiple jurisdictions, would be highly effective in reducing the need for technical assistance and application support.anning and support for local merchant associations, and to serve as a funding conduit.

Implementation Structures

Our proposals, particularly those that combine public investment with private support, represent game-changing recommendations for the way the region, and particularly business communities currently approach resiliency. In the Implementation Strategy chapter of this report, we identify primary actors, sources of funding, and critical next steps to move toward project implementation. In each study area, implementation would provide flood protection to critical commercial corridors, community open spaces, and landmark features of each community, as well as strengthen the areas' commercial vibrancy and economic health. New funding of \$285 million is proposed for planning, design and implementation of capital improvements, technical assistance, capacity building and incentives. Proposals for funding through Rebuild by Design, including Community Development Block Grant Disaster Recovery (CDBG-DR) and other mitigation support funds, and for corresponding implementing entities, are summarized on the following page.

Implementing these initiatives through public-private partnerships and through community-based planning processes and programming is critical to success. The example below illustrates our recommended implementation structure for the Red Hook initiative.



Proposed Project Costs

Pilot Area	Priority Projects	Primary Implementing Entity	Recommended RBD Project Funding (\$ millions)
New York City	Expanded Business Resiliency Investment Program	NYC Economic Development Corporation	\$50
	Merchants' Association Support Program	NYC Department of Small Business Services	\$10
Red Hook	Integrated Flood Protection System*	City and State of New York	\$140
	Community Planning Process	Red Hook Residents, Workers, Business Owners	\$5
	Local Resiliency Corporation	Local Community-Based Organizations	\$2
Beach 116th Street	MTA Rail Yard Flood Protection Intervention	Metropolitan Transit Authority and City of New York	\$13
	Beach 116th Street Partnership Resiliency Programming	NYC Department of Small Business Services	\$0.6
	Community Planning Process for Corridor Interventions	City of New York with Rockaway Residents, Workers, Business Owners	\$2
New Jersey Shore	Business Resiliency Investment Program	NJ Economic Development Authority	\$30
	Merchants' Association Support Program	NJ Economic Development Authority	\$6
Asbury Park	Beachfront Integrated Flood Protection System & Community Planning Process	NJ Governor's Office of Recovery & Rebuilding and City of Asbury Park	\$22
	Coastal Lake Protections	NJ Governor's Office of Recovery & Rebuilding and City of Asbury Park	\$4
Total Recommended RBD Project Funding			\$284.6

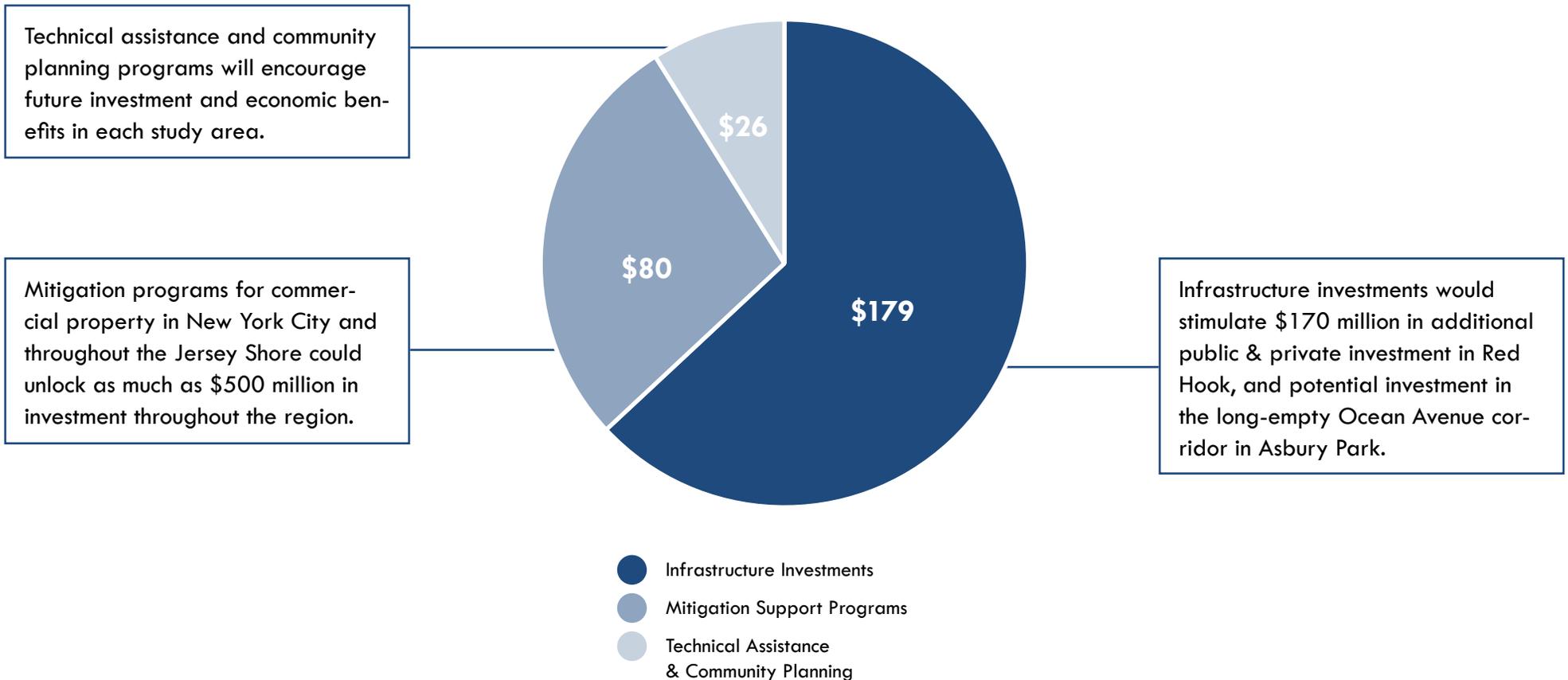
* Assumes project funding leverages \$100M in funding commitments from the City and State of New York combined and approximately \$70M in private investments on private property to future improvement.

Cost Breakdown

Significant infrastructure investments are supported by individual building and business mitigation programs, and crucial technical assistance programs and community planning to ensure that implementation meets community needs and expectations.

The figure below represents the breakdown in costs between these programs by infrastructure costs, mitigation support programs, mainly aimed at individual buildings and businesses, and technical assistance and planning programs.

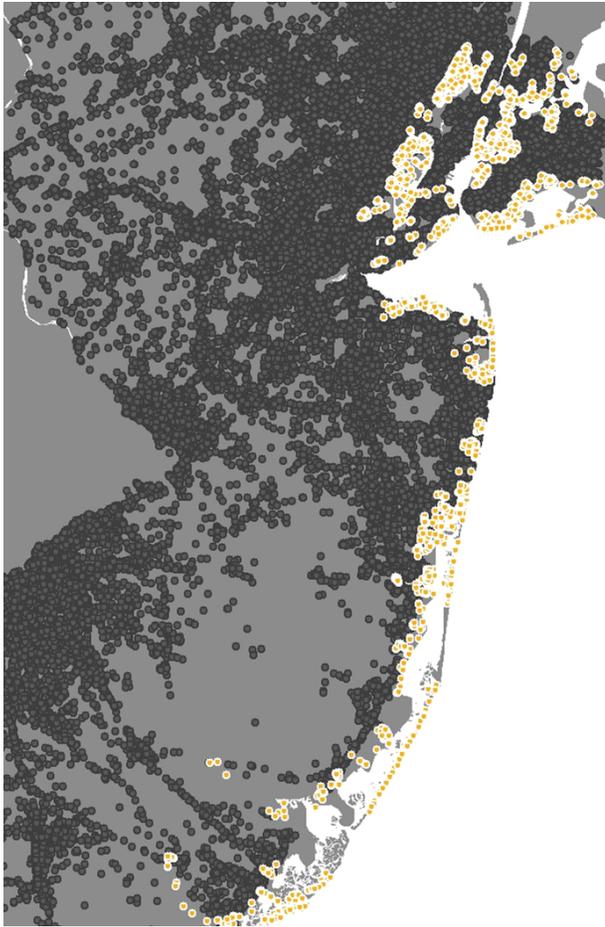
Priority Initiative Investments (\$ millions)



I. Research & Analysis

Commercial Corridor Resiliency

Research Overview: Identifying the Challenge



We mapped at-risk retail, entertainment, and recreational uses throughout New York City and New Jersey to understand the volume of vulnerable commercial property in the region.

Legend

- Retail location within 100-year floodplain
- Retail location outside 100-year floodplain

The HR&A Advisors/Cooper, Robertson & Partners team focused on the resiliency challenges of key commercial corridors across the Sandy-affected region. We explored solutions that integrate design and engineering of buildings and infrastructure with programs, financing tools, and management strategies.

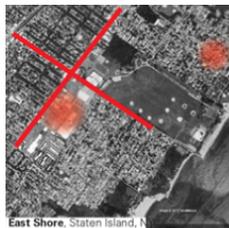
Commercial property, including local retail and services, forms the critical backbone of a community, supporting it in everyday conditions and serving as a lifeline for supplies, information, and recovery efforts after storm conditions, as proven in the days following Hurricane Sandy. There is 100 million square feet of commercial space in the 100-year floodplain (based on best available FEMA mapping) across the Sandy-affected portions of New York and New Jersey, supporting \$34 billion in annual sales and over 175,000 jobs, or 20% of employment within this zone. Small retail businesses predominate in these waterfront communities and are often concentrated in vibrant clusters or corridors. Because of their waterfront location, these corridors are often surrounded by less dense populations than their inland comparables, they depend on seasonal activity from tourists and beachgoers, and they lack capacity for collective action. We found these corridors impacted deeply by Sandy, with 74% of businesses closed for at least seven days following the storm, and heard numerous stories of businesses unable to reopen, despite small business recovery support programs from federal, state, and local governments.

These facts compelled us to create innovative protection and recovery solutions that would be financeable and implementable.

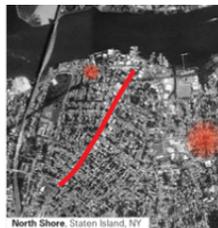
We conducted research in two main phases: the first, a regional analysis with the aim of identifying test sites for solution development, and the second, a targeted analysis of the conditions of sites that represent typologies found throughout the region. This two-phase approach led to specific design and implementation strategies that could be replicated in other places.

Regional Assessment

In the first phase, we performed a regional scan of the entire eastern seaboard, from Annapolis, Maryland to Hyannis, Massachusetts. This scan produced a set of 24 coastal commercial corridors, which we identified through an analysis of land elevations, retail sales data, and post-Sandy planning work.



East Shore, Staten Island, NY



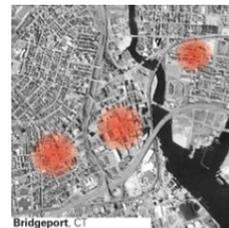
North Shore, Staten Island, NY



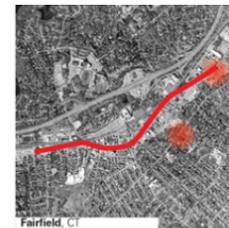
Jersey City, NJ



Hoboken, NJ



Bridgeport, CT



Fairfield, CT



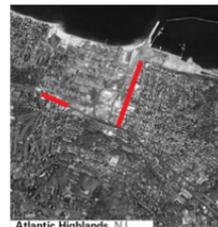
Red Hook, Brooklyn, NY



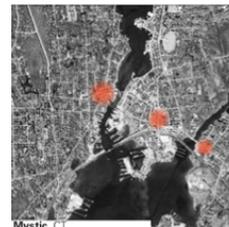
Hunts Point, Bronx, NY



Asbury Park, NJ



Atlantic Highlands, NJ



Mystic, CT



New Haven, CT



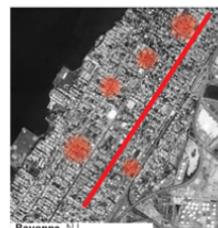
Long Beach, Queens, NY



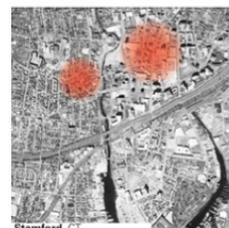
Oceanside, Queens, NY



Sea Bright, NJ



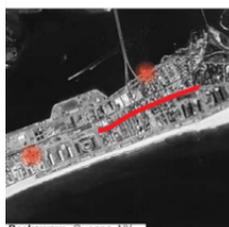
Bayonne, NJ



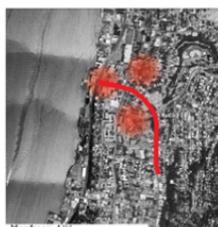
Stamford, CT



Westport, CT



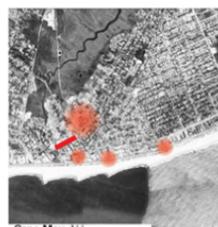
Rockaways, Queens, NY



Yonkers, NY



Atlantic City, NJ



Cape May, NJ



Hyannis, MA



Annapolis, MD

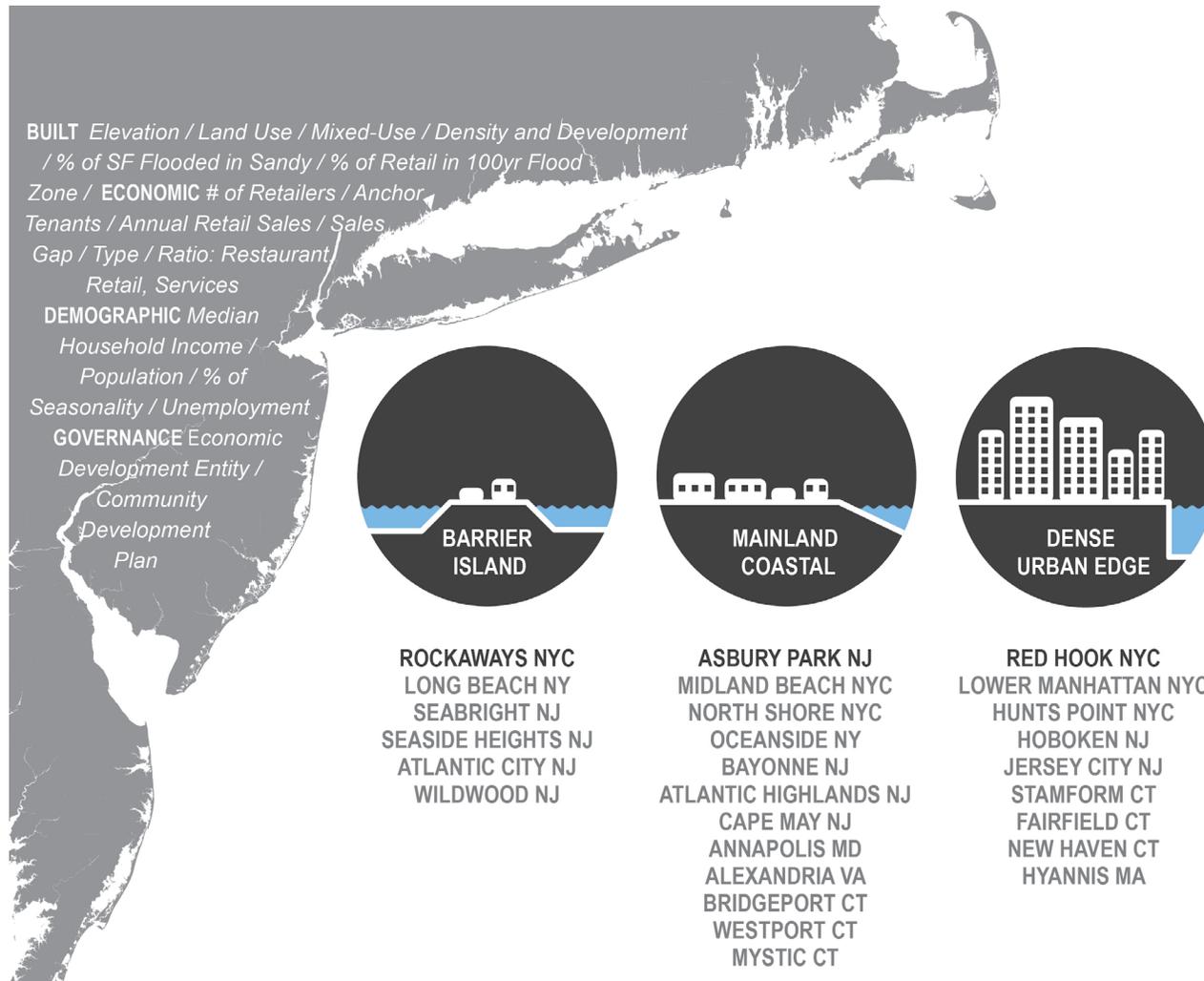
Site Categorization

The team then categorized these sites based on risk, elevation, relationship to bodies of water, economic and demographic characteristics, and the existing business community's level of formal organization. We identified three physical typologies that recurred throughout the region: barrier islands, mainland coastal communities (semi-urban edge), and dense urban edge. Using these typologies, we filtered our long-list of sites to assess those with the most diverse conditions and potential for design and implementation interventions to improve resiliency of commercial corridors.



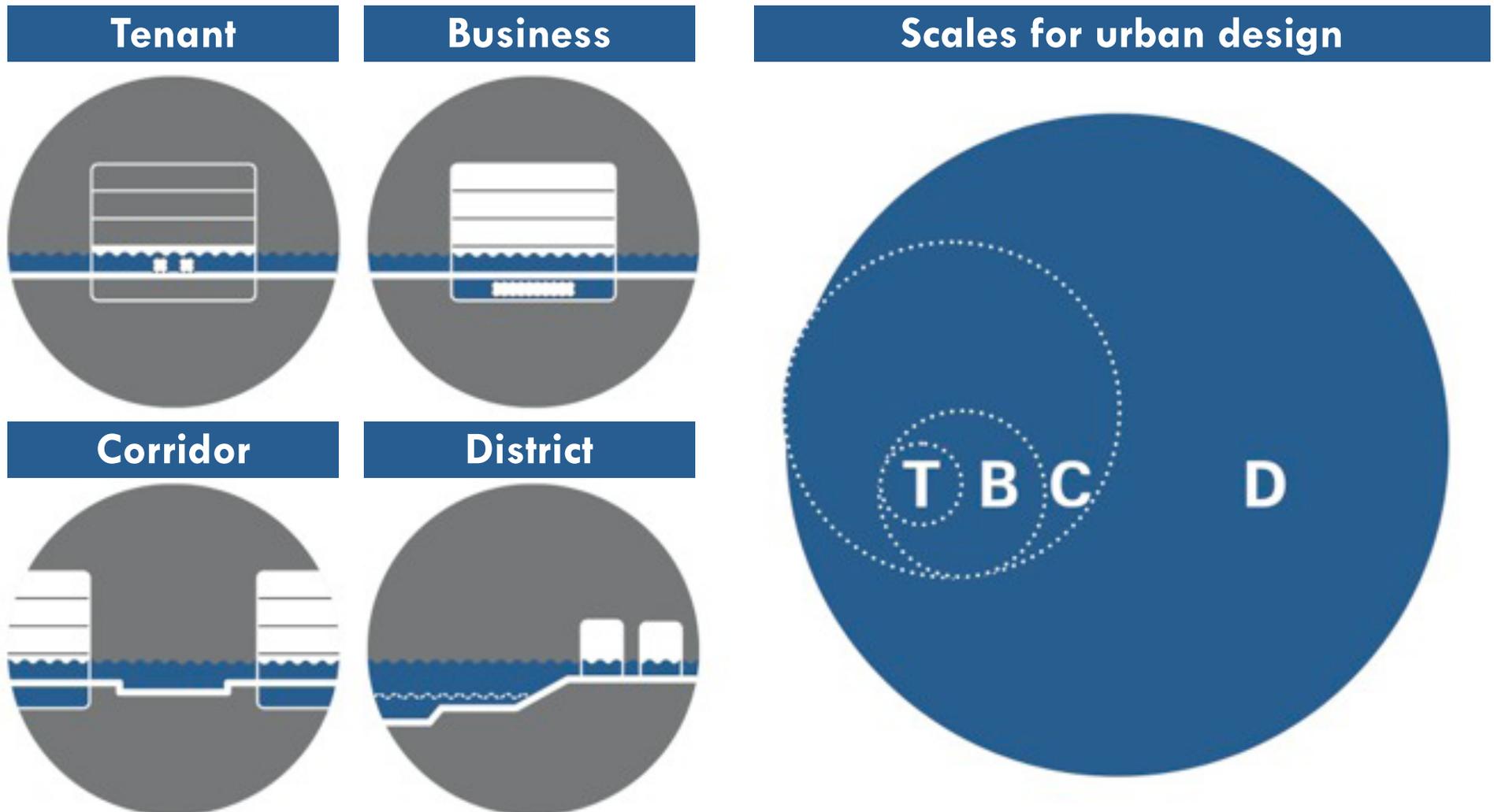
Pilot Study Site Selection

Throughout Stage II, we engaged business owners, community stakeholders, and local economic development organizations to advance our collection of information about Sandy's short- and long-term impact on both local businesses and the building typologies and neighborhoods in which those businesses are located. Three sites were selected for further study in Stage III based on their unique economic, demographic, and physical qualities, which are representative of typologies found throughout the Sandy-affected region. Further research on each site is included in this chapter.



Assessing Commercial Vulnerability

We employed the design and implementation strategies discussed previously at four physical scales. Early in the research process, we recognized that commonly known flood protection strategies need to be combined with new innovations that maintain business viability. Development of design opportunities was aimed to work at all four scales and provide solutions that work together to create a system of flood protection while encouraging commercial growth and economic stability.



Strategies for Design Opportunities

A central premise driving our design recommendations in Stage II was the lack of compatibility between conventional flood protection strategies and the nature of commercial buildings and businesses. Strategies such as elevation, flood gates, and sandbags hinder ground-floor shopping and the streetscape experience that make many commercial corridors so vital to communities. A number of strategies are also challenging to finance and implement, especially for small businesses, which may lack the capital, capacity, and expertise. Based on our understanding of these obstacles to commercial resiliency, we created a framework for design solutions and strategies for implementation that work at the crossroads of flood protection and commercial vibrancy, comprised of the below components. These strategies were then applied to each of the three study sites.

Design Strategies



Protect ground floor commercial spaces from flooding using individual or block-level protection measures;



Shift commercial activity by supporting new, sometimes denser, development on higher ground; support new kinds of retail space that can be removed during a storm or designed to flood;



Elevate businesses and/or content and merchandise, particularly as new development occurs, providing innovative measures for access; help businesses below flood elevations to raise their inventory and key equipment; and



Connect coastal commercial corridors to adjacent, dense areas, increasing proximity to economically resilient neighborhoods and critical transportation.

Implementation Strategies



Manage implementation by providing technical assistance to individual businesses, and encourage collective action through merchants' associations and other organizations;



Finance individual or collective resiliency measures for businesses that could otherwise not support the investment needed for improvements, potentially tying financing to collective action;



Incentivize development of new kinds of commercial spaces in critical areas to make communities more economically resilient; and



Regulate codes and building standards to incorporate strategies for resiliency, including allowing floodable ground floors with removable programming and requiring emergency preparedness.

Design Strategy Development: Tenant and Building-Level Resiliency

In tandem with our regional and site-specific analyses, we developed a toolkit of design and behavioral interventions to address the vulnerability of commercial businesses. We further synthesized this toolkit into a matrix to consider overarching strategies for design and implementation solutions at different scales of the built environment. These design sets were created for commercial typologies found in each of our pilot study areas and throughout the region, with the intention of analyzing the vulnerabilities and potential strategies for protection of each.

Approach

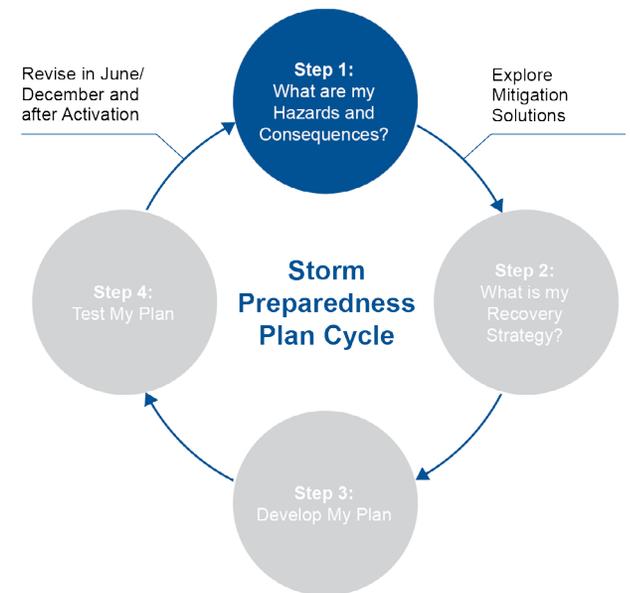
For coastal businesses in the northeast, behavioral strategies and physical mitigation go hand in hand. Only through education about hazards can the designs, construction and protection of small business and the critical infrastructure begin to truly reduce risk so that businesses and their communities can become resilient and grow.

Behavioral strategies, including creating a business preparedness plan and setting a recovery strategy, can help businesses understand their unique risks and be better prepared in advance of the next extreme weather event. The figure at right shows the typical cycle for creating a recovery plan, ideally as soon as possible after a storm event and to be refreshed for each season's particular storms.

Physical mitigation strategies are of course also crucial, and collective implementation of building strategies can help communities become more resilient. Many retrofitting mitigation methods recommended for these study sites are transferable to other vulnerable business communities. Within a business resiliency program, it is essential that buildings and small businesses receive technical evaluations to ensure that work is appropriate and effective for mitigation.

Mitigation:

Any sustainable action that protects people and property, and ensures continued operation of critical infrastructure so that societal function is maintained during disasters and emergencies.



Design Strategy Development: Tenant and Building-Level Resiliency

Additional considerations for implementation of business and building-level resiliency interventions include:

- Preserving access and compliance with the Americans for Disabilities Act (ADA);
- Local building codes, and required compliance with other programs, such as the National Flood Insurance Program (NFIP) regulations;
- Geotechnical concerns, if flood-proofing basement foundations; and
- Local regulations regarding installation of equipment, such as back-flow valves and sump pumps.

In each of the three pilot study areas, business owners reported loss of supplies, inventory, and after Sandy, a number of obstacles to recovery, including:

- Delays in restoring power;
- Lack of timely response for aid and heavy administrative burdens put in place by the U.S. Small Business Administration (SBA) and Federal Emergency Management Agency (FEMA); and
- Lack of prepared recovery programs and mechanisms.

In response to this feedback, we prioritized a first line of defense for businesses and buildings, including mitigation of tenanted space and the building envelope, as well as preparedness planning to prevent the loss of critical documents, equipment, and inventory. In Red Hook and on Beach 116th Street, we conducted case studies focused on businesses inhabiting building types that are commonly found in the area; these businesses represent the building typologies most commonly found in these corridors. Case studies served as a guide for interventions that are transferable to other urban locations throughout the Sandy-affected region.



Mucking out after a flood. With planning, inventory can be raised before storm, potentially speeding recovery.



Deployable flood protection used during Venice's acqua alta.

Design Strategy Development: Corridor & District-Level Strategies

We also explored corridor and district-level strategies, which were aimed at enhancing commercial vibrancy along with flood protection.

In beachfront locations like Asbury Park, where businesses and buildings are exposed not only to storm surge flooding, but also severe wave action, destructive debris, and wind damage, these interventions may provide a greater level of defense. In these areas, building-level protections may be too expensive for tenants to bear, or may not protect an exposed area as efficiently as a corridor or district-wide strategy. We approached these integrated strategies as multiple pieces of a larger system of protection, with each portion created to suit its surroundings during normal and acute conditions. This methodology resulted in a set of interventions for each flood protection system that would provide the maximum protection when executed either as a single strategy or joined together. These varied strategies are complex to conceptualize and implement, but they are crucial to protecting commercial corridors.

These improvements are accomplished by enhancing connectivity to commercial corridors, either through the use of transit or progressive urban design; using streetscape improvements that include resilient features to enhance drainage and stormwater management; and encouraging collective adoption of resilient behavioral or physical strategies, such as investment in deployable flood protection systems for a proximate cluster of businesses.

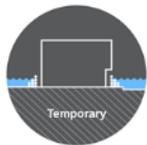


Van Brunt Street in Red Hook, Brooklyn, the neighborhood's "main street," home to small-scale retailers, restaurants, and small offices.

Design Strategy Development: Stage II Toolkit

To categorize the variety of scales and typologies of risk, the team created the below matrix of physical interventions. These interventions are developed to encourage redundancy where applicable. These solutions were then applied to each pilot study site to test for potential projects.

Design Strategies



TEMPORARY

- Sand bags/earth sacks
- Sheeting/panel/barrier systems
- Sump pumps and generators



MERCHANDISE/FURNISHINGS

- Elevate merchandise
- Move displays above BFE



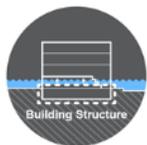
BUILDING INTERIOR

- Water/mold resistant finish materials
- Safeguard hazardous materials



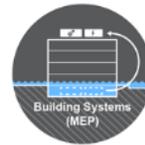
BUILDING FAÇADE

- Watertight and reinforce doors, windows, storefront and hatches
- Sliding/hinged gasketed gates or anchors for shutter systems at openings
- Plug utility and service openings
- Operable fenestration for ventilation
- Anchor elements that could become wind-blown debris
- Secure roofing and façade materials
- Add waterproofing layer underneath cladding, above sheathing
- Water/mold resistant cladding materials



BUILDING STRUCTURE

- Raise building
- Raise ground floor level
- Secure load path from roof to foundation
- Floodproof foundations



BUILDING SYSTEMS (MEP)

- Raise or isolate critical equipment
- Seal fuel tanks
- Raise fuel oil and plumbing vents
- Add backwater valves
- Add quick connection points for temporary systems
- Raise ventilation intakes and exhausts
- Additional ventilation and extract fans
- Protect emergency power equipment
- Add battery powered emergency lighting
- Add redundant telecomm and fire-safety



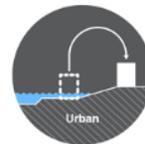
LANDSCAPE

- Defensive landscape barriers/berms
- Absorptive landscape/softscape - open space, bioswales and tree-pits
- Plant wind and floor resistant plants



STREETSCAPE/PROPERTY LINE

- Raise sidewalks
- Secure street furnishings
- Sheeting/panel/barrier system pre-set clips and anchors



URBAN

- Temporary or deployable pre-fabricated structures
- Relocate buildings
- Add compatible uses to support existing businesses
- Flood shield sharing program
- Evacuation signage/wayfinding
- Evacuation centers
- Shared back-up power sources

Focus on Implementation

Early in Stage II, we identified the difficulty many small business have in accessing the funding and assistance required for both recovery and mitigation. This became a central principle of our work moving forward and into Stage III. In both Stages, HR&A reached out to Community Development Financial Institutions (CDFIs) and large institutional banks to gauge interest in and feasibility of a program that provided financing to small businesses specifically targeted toward incentivizing investments in resiliency. Through this outreach and outreach to local business communities in our study areas, we identified the following specific obstacles to implementation.

Financing of resiliency improvements is challenging, for three reasons:

- **Patient capital is required.** Many coastal businesses are financially challenged, even before accounting for flood risk, due to seasonality and/or low density. Businesses may be able to finance improvements but would require below-market borrowing rates, and given an inability to pledge collateral, a combination of grants and loans will likely be necessary for successful project execution.
- **Incremental cash flow must be identified.** Businesses and property owners are unlikely to seek – and may be unable to finance – improvements unless incremental cash flows are generated through reduced expenses or new revenue opportunities. Creating conditions in which additional cash flows would accrue to borrowers – such as tax abatements for small-scale property owners or reductions in insurance premiums tied to resiliency improvements – requires action and coordination by the private sector and local, state and federal government.
- **Collective action is key.** In many corridors, a system of flood barriers, raised streets, flood-protective streetscape improvements and preparedness for collective evacuation of inventory and equipment is necessary for effective mitigation, but many corridors do not have capacity for coordination or district-level planning and investment.

In Stage III, we developed a framework to overcome these challenges, detailed in the Implementation Strategy chapter of this report. The following sections address area conditions in each of the three case study sites: Red Hook, Beach 116th Street, and Asbury Park.

Red Hook, Brooklyn, NY

Site Profile: Red Hook, Brooklyn, NY

Red Hook is a historic maritime community. From the nineteenth century through the first half of the twentieth century, Red Hook was a vital center of commerce. Its thriving port was a center of shipping and grain distribution and the dockyard industry made critical contributions to wartime efforts. The advent of containerization in the 1950s shifted the dynamic of Red Hook's waterfront industry, and within a decade the larger ports and accommodations in New Jersey pulled business away and Red Hook's economy began to decline. Historically buoyed by its maritime industry, Red Hook was forced to cultivate new opportunities to keep businesses in the area.

Today, Red Hook's waterfront economy is supported by a new mix of industrial, commercial, retail and creative uses. The community is home to approximately eight million square feet of commercial property and produces \$171 million in annual retail sales through a combination of anchors like IKEA and Fairway and small, local businesses on Van Brunt Street and other areas. The community is also host to 4,500 employees working in retail and other services, including construction, professional services, and wholesale trades.

Over 10,000 residents live in the study area, west of the Brooklyn-Queens Expressway. A substantial number live in one of the city's largest public housing developments, Red Hook Houses.



Commercial buildings (in red) are located primarily along the water's edge and along north-south corridors. The 100-year floodplain (light blue) covers most of the Red Hook neighborhood. Map and narrative data gathered from NYC PLUTO data and ESRI.

Red Hook's Physical Vulnerability

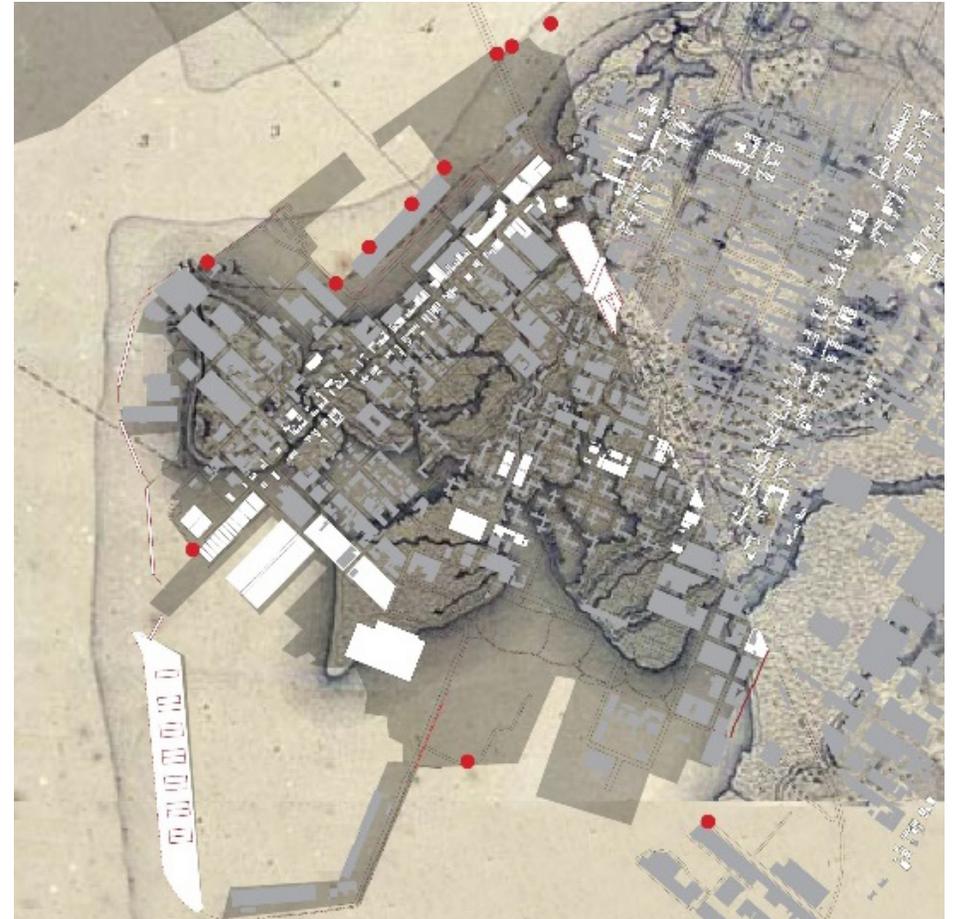
Before Red Hook was a thriving maritime center, the region was one of the swampy wetlands so critical to the health of the New York Harbor. The “Hook” was an island connected by these wetlands to the mainland and Brooklyn Heights. The area was filled first to make farm fields, and then mill ponds, to mill grain. The figure at right overlays an early plan of Red Hook using the current build-out of streets, buildings, and stormwater outfalls. The highlighted buildings (in white) are those identified as historic, though only two buildings are actually landmarked by the City. The forms of the two man-made basins, the Erie and the Atlantic, are unique to Red Hook. The Erie Basin was the largest man-made harbor on the eastern seaboard when it was built in 1864.

Because of its low elevation, the area is highly flood-prone. Sandy flooded nearly all of Red Hook, with the exception of upland areas at Coffey Street and small areas within Red Hook Houses.

The legacy of the former wetlands remains with the community via recurrent flooding in low-lying areas. Imlay and Pioneer Street residents report frequent issues with wet basements and storm sewer overflow.

The current stormwater system is a combination stormwater/sewer system with a sewage treatment facility in the Brooklyn Navy Yard, four miles north of Red Hook. Storm sewer water must be pumped to this location. A pumping station at the corner of Beard and Van Brunt Streets is in need of repair, and potentially elevation, to prevent future damage.

Stormwater outfalls are fitted with tide gates to keep rising waters during floods from coming back into the community. When these gates close during a flood, however, stormwater can back up into the system and cause flooding in the streets and in buildings, particularly at the lowest points in the area (i.e., basement units).



Red Hook's Commercial Context

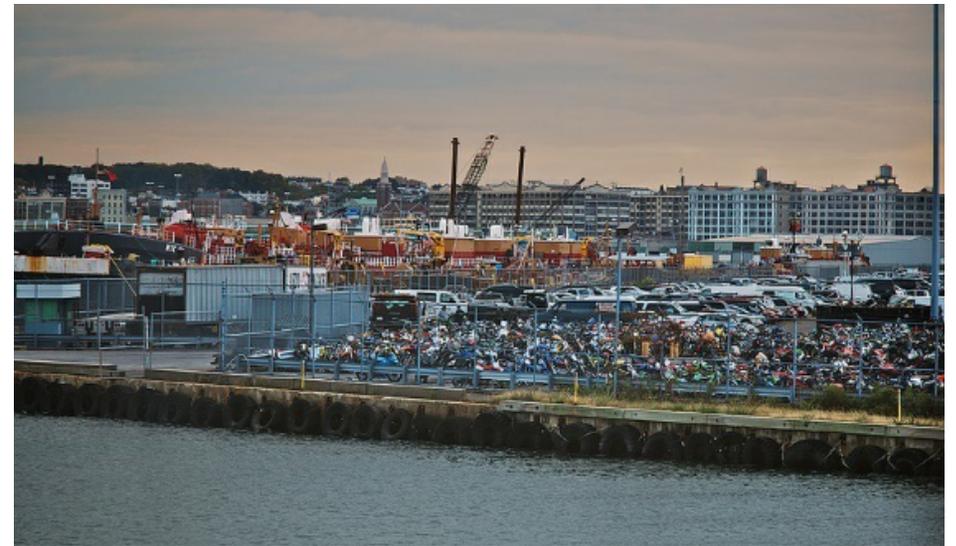
During Stage II and into Stage III, we focused on key commercial corridors throughout the neighborhood. We identified corridors that already function as centers of commerce and activity, including Van Brunt Street (pictured at right) and portions of Beard Street, where IKEA and Fairway are located. We also researched those corridors that are not fully populated with commercial activity, but which provide crucial connections from one portion of the neighborhood to another, or to pockets of stronger economic health within Brooklyn. Columbia Street falls into this latter category, running the length of Red Hook, from the Brooklyn Battery Tunnel, through Red Hook Houses, and to Beard Street and IKEA. The aim for each of these corridors was to enhance both flood protection and commercial vibrancy. Our design and implementation concepts, discussed later in this report, build on the intersection between physical and economic resiliency for these communities.

On Van Dyke Street and throughout Red Hook's waterfront are manufacturing and warehouse buildings, many of which are now used for production of food, artisanal products, and creative offices, though the area's industrial roots remain in pockets. Especially along the waterfront, these buildings and businesses drove our thinking on flood protection strategies that would preserve business operations and the neighborhood's unique character.

During our time in Red Hook, we met with business and property owners to perform mitigation strategy case studies and to discuss implementation strategies with the various stakeholder groups that had formed in Sandy's wake. These interactions are detailed further in the following case studies and in our Participatory Process section.



Red Hook's Commercial Context



At top left: Fairway on Beard Street, attracting shoppers from nearby neighborhoods and accessible from the water and street system; at bottom left: Cacao Prieto, an artisanal distillery specializing in chocolate and whiskey and an example of Red Hook's next-generation of industrial businesses; at right, remaining industrial operations at Atlantic Basin and the tow pound at Erie Basin.

Red Hook's Physical Vulnerability

A central feature of resiliency in Red Hook is the need to preserve the working waterfront and facilitate waterfront access. To understand working waterfronts and possible future uses, we studied precedents of other working waterfronts, which are displayed on the following page. In particular, we noted the uses and the extent of public access.

The Red Hook Cruise Ship terminal is located in the Atlantic Basin. Fenced off from public use, a large swath of waterfront is utilized for parking for the facility. The community expressed interest in seeing food or flea markets in the area, given that cruise ships dock only 40 days a year, and the facility could allow public use at other times.

Red Hook also lack facilities for recreational boating. There is no place for boats and passengers to dock to allow for a day of exploring the neighborhood, and no place for a boat to pull up for repairs or refueling. Creating recreation boating facilities would increase waterfront activity and use.

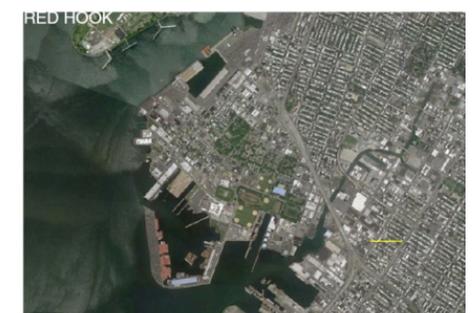
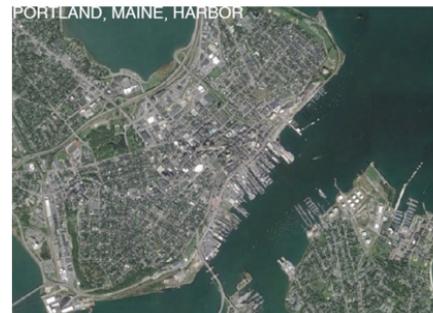
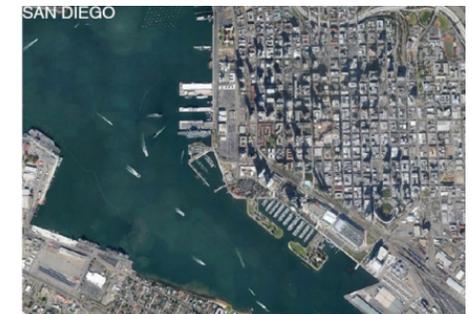
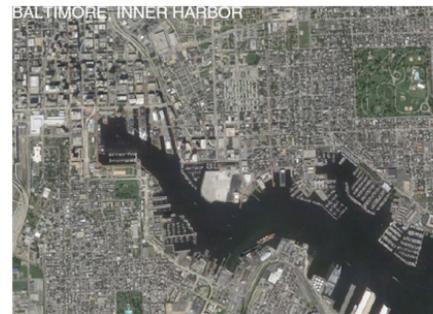
The following waterfronts included lessons for Red Hook's continued revitalization:

Portland, Maine joins various waterfront uses, i.e. maritime repair, fishing piers and fish markets, recreational boating, ferries and other public transportation, and industrial uses along a central public street, Commercial Street. Some of the piers are open to the public, while others are not. We also found that Portland's cruise ship terminal doubled as a rental space, increasing its potential for use.

Comparisons with the **San Diego waterfront** focused on designs for public access to the cruise ship terminal pier during times when cruise ships are not in port. Our design proposal recommends a design like San Diego's to allow public use when a ship is not at dock and take advantage of this key location.

The Inner Harbor in Baltimore contains a collection of historic ships and docking areas, for recreational boats' temporary (daily) and longer-term uses, along its edges.

In all of these ports, as in many commercial ports, a Harbormaster was present. Our Stage III proposal sought to integrate protection for key areas of the waterfront to enhance opportunities for recreational and commercial boating. This concept extends to the land side of the Red Hook Cruise Ship terminal along Atlantic Basin.



Working Waterfronts



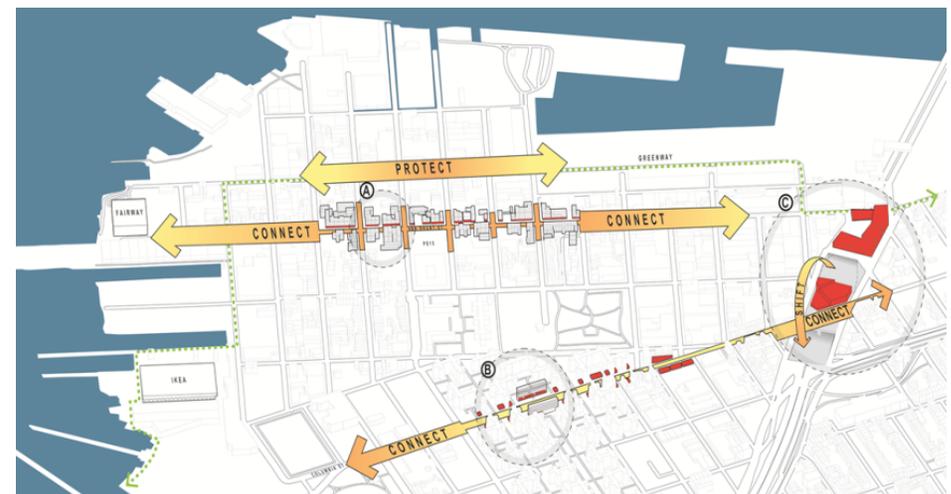
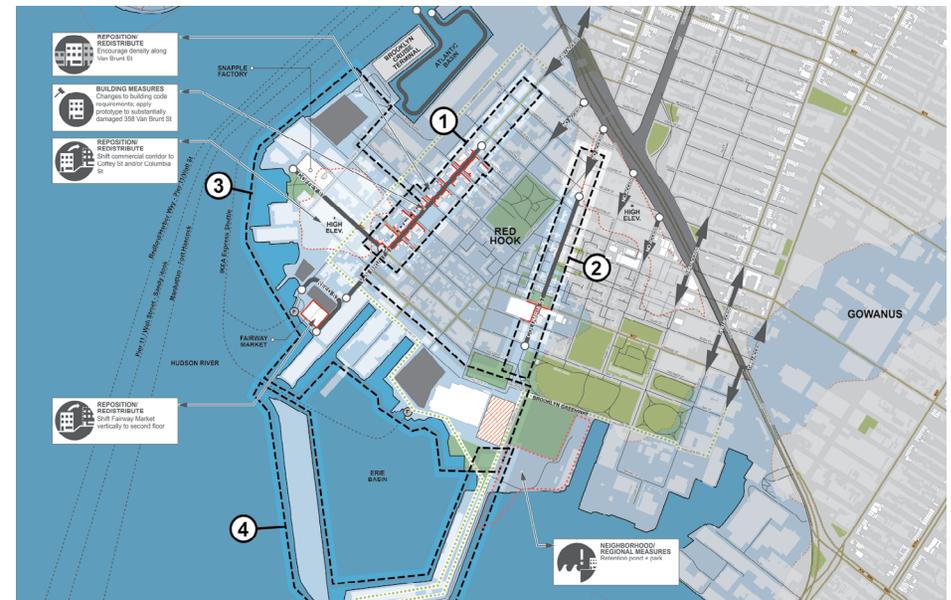
Clockwise from top left: Baltimore's Inner Harbor is a destination for recreation and entertainment, with waterfront access; San Diego's cruise terminal is open to the public when ships are not at port; Portland, Maine's harbor mixes recreation and industry; Red Hook's waterfront remains primarily industrial, with pockets of access and activity.

Red Hook: Diagnosis and Design Development

An early identification of project opportunities, the graphics on this page call out points at which interventions are most needed to improve both commercial vibrancy and resiliency. These interventions include waterfront protection and access, as well as critical commercial corridors. These guided the location and type of priority design opportunities put forth at the conclusion of Stage II. Strategies focused on creating wet-proofed ground floors to allow retail and commercial activity to continue along Van Brunt Street and Columbia Street, as well as maintaining or improving waterfront access throughout the neighborhood.

Stage II Design Opportunities: Initial project concepts in Red Hook included: 1) flood protection for existing stores and buildings along Van Brunt Street; 2) an increase in commercial activity on higher ground on Columbia Street, 3) connection of the neighborhood on the waterfront to Red Hook Houses and encouragement of denser development along both corridors; 4) development of new public housing to relocate ground-floor tenants to higher elevations in new structures; and 5) connection of Red Hook north to Brooklyn neighborhoods along Columbia Street through reconfiguration and flood protection of the Hugh L. Carey (fka Brooklyn-Battery) Tunnel.

Stage II Implementation Strategy: To implement these projects, we recommended new regulations supporting innovative commercial development and support for collective action by Red Hook businesses, along with expansion of funding for business & building-level mitigation.



Stage II plans (above) identified hazards and were used to record project opportunities, while axons (below) were used to communicate our strategies and priority initiatives.

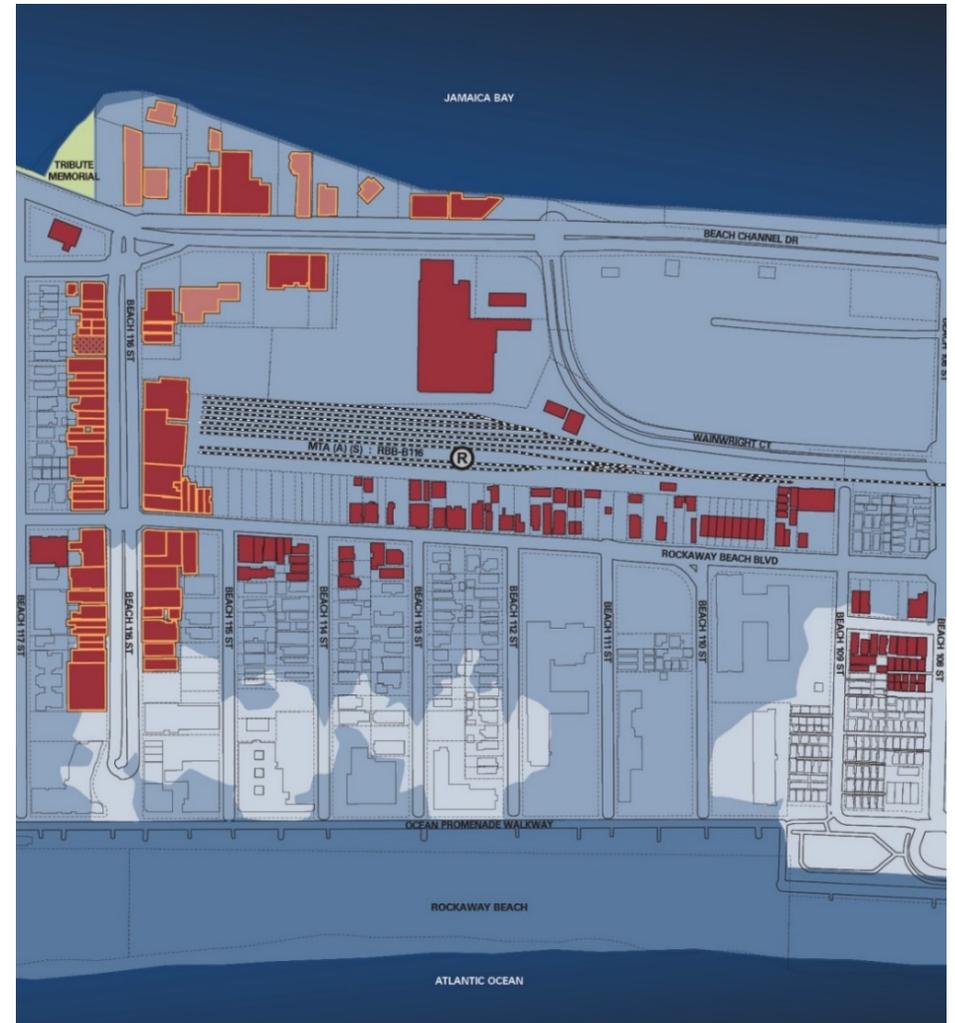
Beach 116th Street, Queens, NY

Site Profile: Beach 116th Street

The Beach 116th Street corridor is a commercial cluster in Rockaway, Queens, with approximately 70 commercial buildings, some of which contain small-scale residential on upper floors. Between Beach Channel Drive to the north and the beach to the south, there are approximately 900 employees at 120 businesses. Local businesses are mixed with national fast/casual, drugstore, and bank chains. Professional services include real estate, insurance, personal care, and beauty establishments.

The corridor is also the terminus of the A and S trains, with a terminal house fronting onto Beach 116th Street in the middle of the bay block. Direct transit access brings beachgoers by the car-full in the summer, while the corridor is largely frequented by locals for the rest of the year. The corridor is not lacking in socioeconomic challenges, as many community members are hesitant to visit Beach 116th Street and consider the beach blocks to be unsafe, due to a number of single-room occupancy buildings that are semi-abandoned and in disrepair.

Flooding during Sandy was severe in and around this critical commercial corridor for the Rockaways. Like other barrier islands, flooding came from both the ocean and the bay. While much wave action from the ocean was dissipated by beach protections, bay flooding severely impacted much of the corridor.



The image above shows commercial buildings (in red) and the 100-year floodplain over the study area at Beach 116th Street. Data gathered from NYC PLUTO data and ESRI.

Beach 116th Street's Commercial Context

Beach 116th Street is also home to the relatively new Beach 116th Street Partnership, a merchants' association founded after Sandy to support local businesses and strengthen the corridor's identity. The Partnership became a key stakeholder in our outreach and provided a forum for discussion about resiliency, specifically geared toward local businesses. In partnership with the New York City Department of Small Business Services (SBS), local business owners participated in a storefront improvement program, hosted a holiday retail event, and hired an executive director to guide the Partnership's mission going forward.

At right is a typical Beach 116th street block, with corner deli, casual food services; further down the street (bottom image), the railhead building is joined to a commercial strip. Running perpendicular to this block, along Rockaway Beach Boulevard, is a stretch of approximately a dozen lots that are now vacant after having been destroyed by an electrical fire in the aftermath of Sandy. The rear end of these lots abuts the MTA passenger platforms.

Since Sandy, some businesses have taken it upon themselves to make resilient improvements, but the majority of business owners are not equipped, or do not have the time, to make many necessary improvements themselves. During Stage III, we performed tenant and building evaluations to understand the level of mitigation necessary for buildings on Beach 116th Street. Findings are detailed on the following pages.



Locally-owned convenience and specialty stores line Beach 116th Street in Rockaway Park.



The MTA station is part of the urban fabric, connected to adjacent retailers.

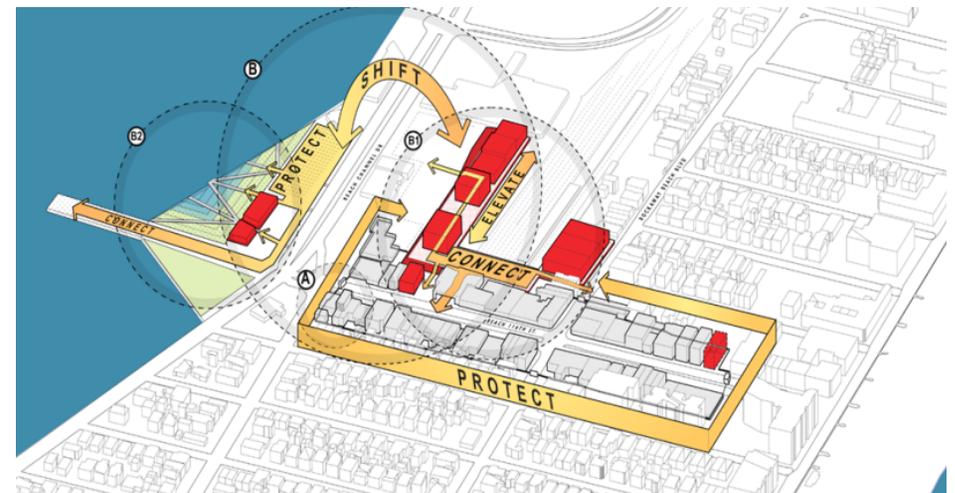
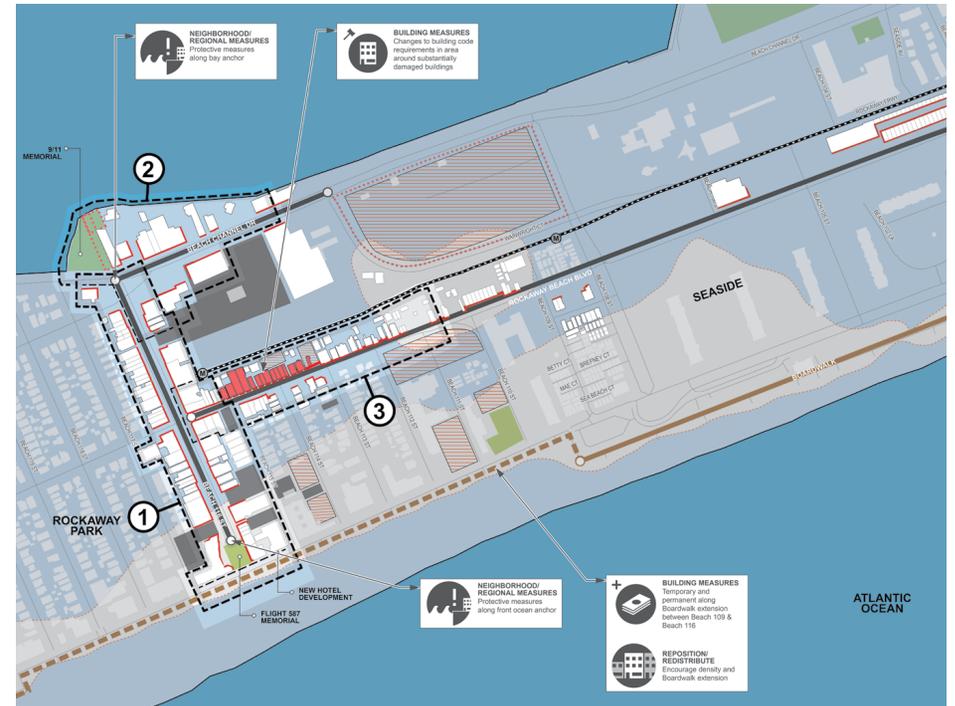
Beach 116th Street: Diagnosis and Design Development

Project opportunities initially identified for the Beach 116th Street corridor included both business- and building-level interventions, as well as a corridor- and district-wide strategy to improve resiliency and connectivity.

In Stage II, we focused on the corridor's Jamaica Bay side, which is unprotected from flood risks, and the MTA station, which is adjacent to a number of lots on which buildings were damaged by flooding and then by a subsequent electrical fire.

Stage II Design Opportunities: Beach 116th Street can become a resilient goods hub for local residents and a shopping, dining, and hospitality destination for visitors through projects including: 1) temporary and permanent measures to protect merchandise and equipment in street-level businesses; 2) rear-lot expansions to provide additional, elevated space during flooding; 3) a “shift” development of retail from the bay edge to a municipal parking lot, which would replace bayside retail with a wetland park to strengthen the edge; and 4) new elevated commercial development in and around the MTA train station at the level of the train platform.

Stage II Implementation Strategy: An innovative resiliency fund seeded with federal funds and incorporating Community Reinvestment Act capital from financial institutions could support these improvements, as well as a newly-formed merchants' association.



Asbury Park, NJ

Site Profile: Asbury Park

Asbury Park is home to approximately 16,000 residents, one of the largest year-round populations on the Jersey Shore. The town is largely divided along socioeconomic lines to the east and west, with the NJ Transit line acting as a de facto barrier between Asbury's revitalizing beachfront community to the east and its struggling lower-income communities to the west. With a median household income of \$32,500, and with 25% of households earning less than \$15,000 per year, Asbury Park falls well below the State's average of nearly \$72,000.

Within Asbury Park, the Cookman Avenue corridor and beachfront are experiencing a highly localized influx of creative and artisanal businesses, including locally-made souvenir shops, restaurants, and specialty food stores. To date, all of these businesses are locally-owned or are outposts of independent businesses further inland within the State, and few chains or franchises exist within the town. These businesses cater largely to seasonal tourists and residents moving into recently renovated loft apartments on Cookman Avenue.

Lake Avenue runs parallel to Cookman Avenue and adjacent to Wesley Lake to provide a "back door" to businesses and buildings along the corridor.



The image above shows commercial buildings (in red) and the 100-year floodplain over the study area in Asbury Park. Data gathered from FEMA flood maps and ESRI.

Site Profile: Asbury Park

Recently-built multifamily development has slowly expanded towards the beachfront, though many development parcels along Ocean Avenue remain vacant. The majority of beachfront land and development is owned either by one of two private land owners or by a joint venture between the two companies, which also own and operate the commercial properties along Asbury's vibrant boardwalk commercial businesses. Along with these major owners, iconic structures like Asbury Park's historic Convention Hall, music venues such as the Stone Pony and the Wonder Bar, and the abandoned Casino also occupy the beachfront.

These community assets are highly vulnerable to flooding from storm surge and were deeply affected during Sandy. Along the boardwalk and Ocean Avenue, storm surge and wave action carried large pieces of debris, both from the ocean and broken pieces of the destroyed boardwalk, into buildings, breaking storefronts and creating a destructive whirlpool inside shops and business offices. Along Lake Avenue, inundation from the coastal lakes flooded basements and ground floors of buildings along Lake and Cookman Avenues. This flooding caused less severe property damage than closer to the ocean but reminded business and building owners of their properties' vulnerability.

To the north, Asbury is bounded by Deal Lake and Sunset Lake, both of which caused moderate flooding onto adjacent Sunset Park and the nearby Main Street and Memorial Street double corridor. A critical area for Asbury Park, Sunset Park is viewed as a common ground for different socioeconomic groups in Asbury and the nearby Main and Memorial Streets cluster. This hub, currently home to a Dunkin Donuts and small deli, could eventually provide a northern anchor to the energy developing further south on Main Street near Cookman Avenue.



Boardwalk retail is accessible from the beach side and Ocean Avenue side, with the street side more heavily utilized in winter.



Sunset Park, the meeting ground for Asbury's east and west communities.

Commercial Context: Cookman Avenue & Lake Avenue



Top row: A renovated building on Cookman Avenue with commercial ground floor and upper-level lofts; a new food and beverage establishment on Cookman; bottom row, both images: Cookman Avenue's "back door" on Lake Avenue, including residential units and businesses, sloping toward Wesley Lake.

Commercial Context: Boardwalk & Ocean Avenue



Top row: at left, The Stone Pony on Ocean Avenue; at right, a vacant development parcel on Ocean Avenue; bottom row: at left, repurposed shipping container retail shops on the boardwalk, closed for winter; at right, the historic Casino and carousel structures at the juncture of the boardwalk and Lake Avenue.

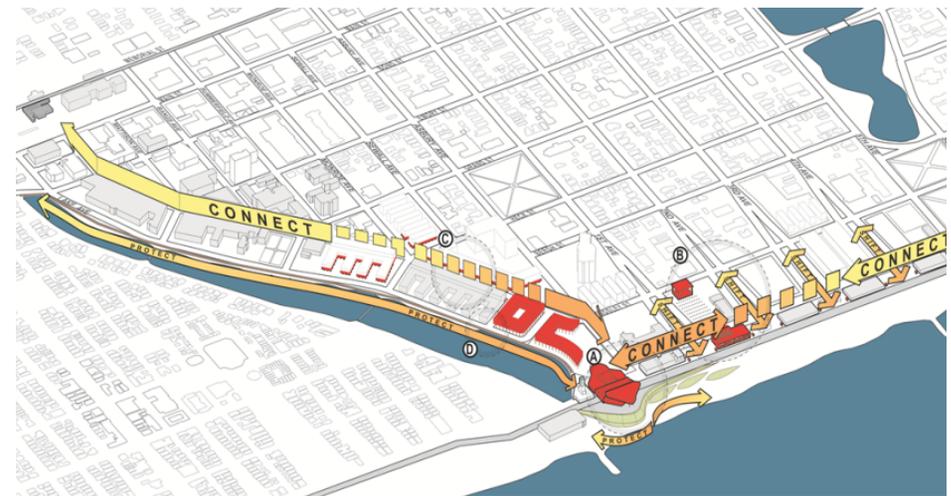
Asbury Park: Diagnosis and Design Development

Project opportunities initially identified for Asbury Park included beachfront building protections; coastal lake flood mitigation; and economic development strategies for businesses along Main Street.

In Asbury Park, we focused on the primary sources of damage caused by Sandy. Debris and wave action coming onto and over the boardwalk crippled beachfront businesses, many of which are seasonal. Coastal lake flooding along Lake Avenue in some cases flooded the backs of buildings along Cookman Avenue, home of Asbury Park's revitalizing commercial activity.

Stage II Design Opportunities: Protective solutions for this vibrant shorefront community and live music destination can also connect boardwalk activity to the town economy and provide year-round employment through projects including: 1) introducing new temporary and floodable attractions along the boardwalk; 2) reconfiguring the edge of Wesley Lake to provide habitat, recreation, and flood protection while expanding mixed-use development along this corridor to connect the boardwalk to downtown and Main Street activity; 3) creating a new year-round job center in the former boardwalk casino to serve as a linchpin between boardwalk and city and provide a major new flood protection; and 4) developing new, resilient buildings on open development lots behind Ocean Avenue.

Stage II Implementation Strategy: New regulations supporting temporary and wet flood-proofed commercial development, and incentives to support new development, would support these improvements.



Hazard and project opportunity identification plan for Asbury Park, and accompanying strategy axon.

Stage III Preview

As we moved into Stage III, we prepared to move forward with both priority design opportunities and program design simultaneously in order to create a framework to implement resilient initiatives for commercial corridors. Our outreach and outcomes reflect a multi-scaled and multi-pronged approach that focused on both physical design and resiliency interventions, as well as a strategy for implementing and financing resiliency improvements. We believe that a program geared toward business and building mitigation will be strongest when married with larger-scale corridor- or district-level improvements such as sidewalk berms, porous roadways, and other design and engineering strategies.

As described in greater detail in the next chapter, we engaged local business owners, business advocacy groups, formal and informal merchants' associations, local elected officials, and City and State government entities. Outreach was focused on gathering information about the specific needs of our study area's business communities; sharing information about our priority design concepts and implementation strategies; and gauging interest and support around these ideas, as well as determining the political appetite for larger-scale design solutions.

II. Participatory Process

Commercial Corridor Resiliency

Stakeholder Outreach

Community organizations, business and property owners, municipal agencies, state offices, and interested stakeholders provided essential input. Through outreach with these groups, we tested the feasibility of our implementation strategies; gauged interest in our design project recommendations; and built support for adoption of these projects in the future.

Community Organizations/Businesses



CDFIs/Funders



Government



Stakeholder Outreach

We met with community stakeholders and local government agencies consistently throughout the process.

New York

Red Hook Business Owners and Property Managers

Monica Byrne, Owner, Home/Made

Pino Deserio, Facilities Manager, IKEA

Mike DiMarino, Owner, Linda Tool

Charles Flickinger, Owner, Flickinger Glassworks

St. John Frizell, Owner, Fort Defiance

Mary Kyle, Owner, Dry Dock

Kevin & Caroline Moore, Owners, Kevin's Restaurant

Greg O'Connell, Principal, The O'Connell Organization

Restore Board Members (inclusive of some of the above individuals)

NY Rising Red Hook Planning Committee Members

Beach 116th Street Partnership Board Members

Krzysztof Sadlej, Executive Director Thomas Hughes, Owner, Station

Liquors John Lepore, Owner, Allstate Insurance

Lana Meli, Owner, Lana's Loft

Mark Mina, Owner, MSM Corporation

Maureen Walsh, Owner, Walsh Properties

New York City and State Agencies

NYC Office of Long-Term Planning and Sustainability New York State

Office of Storm Recovery Metropolitan Transit Authority

NYC Department of Small Business Services

NYC Department of City Planning

NYC Economic Development Corporation

New Jersey

Asbury Park Property Owners and Managers

Brian Cheripka, Vice President of Land, iStar Residential

Anselm Fusco, Senior Vice President, Madison Marquette

Carrie Turner, 2nd VP/Property Management, Madison Marquette

NJ/Asbury Park City Agency and State Office Representatives

NJ Governor's Office of Recovery & Rebuilding

NJ Economic Development Authority

City of Asbury Park, Economic Development

City of Asbury Park, City Planning

City of Asbury Park, City Council

Engagement Process

We organized separate outreach processes geared toward the business communities in each of the three study areas, holding a series of workshops, roundtables, individual interviews, and informational meetings to gather data, share our findings, and educate business owners and property owners in each location.

With all stakeholders, the objectives aligned with the process illustrated below. Initially, we focused on gathering information about Sandy's impacts on individual businesses and specific communities. We used this information to identify existing tools and design new resiliency measures. We then shared design concepts that responded to those considerations. Feedback on these concepts was incorporated into our refined design proposals. When possible, we provided education about behavioral and physical strategies that could be implemented by business and building owners. Finally, we discussed project implementation and strategies for expressing support with stakeholder groups, with an emphasis on government agencies.



Business Community Outreach



We conducted roundtables and workshops with local business owners to introduce our preliminary framework; gauge reactions and concerns; and identify the greatest obstacles these parties now face in applying for financing and accessing capital. The design team used these sessions to understand business- and building-level vulnerabilities and brainstorm interventions that minimize disruption to storefront activity. We also hoped to generate enthusiasm and buy-in for a business resiliency financing program.

We also conducted interviews with major business and property owners at stores and organizations in each of the three communities. Discussions involved Red Hook’s IKEA, Fairway, the O’Connell Organization, and the Restore Red Hook (Restore) merchants’ association; business owners who are members of the Beach 116th Street Partnership; and Asbury Park’s major property owners and developers, iStar Residential and Madison Marquette.

Interviews with individual property owners focused on shifting private stakeholder thinking toward comprehensive resiliency measures and discussing opportunities for these stakeholders to enhance resiliency, both throughout their businesses and properties, and also as part of a corridor- or neighborhood-wide effort.



Community Outreach: Red Hook

We met with members of ReStore, a group founded in Sandy's wake to raise funds for business recovery and now working toward formation of a formal merchants' association. ReStore's feedback was crucial in understanding the obstacles businesses faced after Sandy and gauging their readiness to think about future resiliency. The group was responsive to our focus on a funding strategy and emphasized the need for accessible financing and organizational capacity. In particular, the group identified the need for a Local Development Corporation (LDC) that could support both resiliency initiatives and economic development efforts.

Southwest Brooklyn Industrial Development Corporation (SBIDC) led outreach to individual business and property owners. We visited numerous properties to understand how an integrated flood protection system might work in cooperation with local businesses and how corridor strategies could enhance commercial vibrancy. Many business owners reaffirmed the need for a streamlined funding process for resiliency funding (as well as recovery funding) and an interest in establishing an LDC.

We also interacted with the New York Rising Community Reconstruction (NYRCR) Program planning process in Red Hook. Through discussion with the Planning Committee, we concluded that many of the NYRCR Planning Committee's principles and priority projects aligned with our design concepts, including protection of property and building stock along the water's edge, and strategies for governance and organization of resiliency initiatives.

Following the Planning Committee meeting, team members participated in an open-house format public meeting as part of NYRCR and produced in coordination with the objectives of the Red Hook Planning Committee. We organized a program information station around the RBD process, competition objectives, and specific project objectives. Community members provided initial feedback, including perceptions and responses to plans for business resiliency programming. We then presented its concepts for commercial resiliency in Red Hook to members of the public in attendance. Community attendees provided valuable feedback; pointed out key intersections requiring interventions to enhance connectivity; and emphasized their hope that projects discussed through the Rebuild by Design and NYRCR process would move to implementation.



Community Outreach: Red Hook



At left: The team presented concepts at the NYRCR open house in Red Hook as part of a special “Red Hook Resiliency Innovations” session.

HAVE A SAY! MAKE RED HOOK MORE RESILIENT

Your Input Is needed!

Come share your thoughts on project ideas and innovative ways to make Red Hook a stronger community.

OPEN HOUSE

Realty Collective
351 Van Brunt Street

Sat, Feb 22 | Sun, Feb 23
11am-6pm | 11am-6pm

stop by anytime!



NY RISING COMMUNITY RECONSTRUCTION PROGRAM

Focus sessions on Saturday and Sunday
12pm- 1pm: Infrastructure & Coastal Resiliency
1pm- 2pm: Social Resiliency & Economic Development

Special Event: Red Hook Resiliency Innovations
Saturday, February 22 | 3pm-6pm

Guest speakers Include: HUD Rebuild by Design
Brooklyn Greenway Initiative + others!

For detailed info on the process visit
the Red Hook Committee blog:
<http://redhookcrp.wordpress.com/>

State Contact Info: info@stormrecovery.ny.gov | www.stormrecovery.gov/community-reconstruction-program
Twitter: #NYRising, @NYStormRecovery | Facebook: NYStorm Recovery

Community Outreach: Beach 116th Street

In both Stages II and III, we engaged with the Beach 116th Street Partnership and its Executive Director, Krzysztof Sadlej, to focus on the pressing issues surrounding resiliency, mitigation, and enhancement of the Beach 116th Street corridor's economic and physical resiliency by creating a stronger business cluster and reinforcing the corridor's value to the surrounding community. Initially, we held meetings with Partnership members to introduce business and building interventions that could be implemented locally to enhance resiliency, as well as to suggest behavioral strategies that could protect business operations.

In March, the Beach 116th Street Partnership hosted a community outreach workshop, which aimed to engage local business owners and interested community members in a conversation about design proposals, at all scales. New York State Assemblyman Phillip Goldfeder also visited the event and delivered encouraging words to the Partnership and attendees. The presentation included a toolkit of solutions for building-level interventions, as well as suggestions for mitigating the cumulative effects of ocean and Jamaica Bay flooding through physical, site-specific, corridor-level interventions. These ideas spurred lively discussion, with questions focused on the potential for project implementation; feasibility of the proposals; and relationship of design interventions to the surrounding area.



The team at an early meeting with Partnership members.



Station Liquors owner Tom Hughes reported carrying merchandise home to protect it from Sandy.

Community Outreach: Beach 116th Street

**MARCH 13
2014 - 6:30 PM**

Innovating for a Resilient Rockaway

SOLUTIONS FOR SMALL BUSINESS

Hosted by the Beach 116th Street Partnership
Support from The Municipal Art Society of New York
Presentation by Rebuild by Design's HR&A Advisors
and Cooper, Robertson & Partners team

What can I do to protect my small business?
What are my options?
How do I finance resilient improvements?

231 Beach 116th Street
Thursday-March, 13th
6:30 PM - 8:30 PM
www.shopbeach116.com/news-events/resilientrock/



At top left, the invitation to "Innovating for a Resilient Rockaway" on Beach 116th; moving clockwise, Partnership and community members view and discuss the HR&A/Cooper, Robertson team's work, and team members present design concepts.

Community Outreach: Asbury Park

In Asbury Park, we explored the potential for implementation of a business resiliency project with property owners in Asbury Park. Specifically, we convened interviews with Carrie Turner of Madison Marquette and Brian Cheripka, Vice President of Land of iStar Residential.

Madison Marquette’s retail tenants were particularly hard-hit during Sandy, and many relied on their own funding and Madison Marquette’s assistance to reopen. While retail tenants and merchants are not formally organized, Madison provides representation for their tenants to the Chamber of Commerce. Both firms expressed interest in business- and building-level resiliency programming and technical assistance. Madison Marquette in particular continued to act as a sounding board for our design concepts and provided feedback on the best placement of a beachfront integrated flood protection system, as well as the most crucial short-term interventions for beachfront businesses.

In March, team members participated in Rebuild by Design’s Rebuild One City event, a parade focused on unifying communities from east and west Asbury Park and opening the discussion about resiliency to the community. The parade route followed the corridors identified in our study area, traveling along Springwood to Lake Avenue, and ending at Langosta Lounge, a locally- owned business on the boardwalk. At the endpoint, community members discussed resiliency initiatives with design team members and members of other ongoing initiatives to create a more resilient Asbury Park.



Parade participants march along Lake Avenue, led by band members.



The parade concluded at Langosta Lounge, a locally-owned business which reopened after suffering severe damage during Sandy.

Community Outreach: Asbury Park



LEARN MORE ALONG THE PARADE AND AT: LANGOSTA LOUNGE, 1000 OCEAN AVENUE, MARCH 22, 2014 BETWEEN 2PM-4PM

REBUILD BY DESIGN

BUILDING A BETTER CONNECTION BETWEEN LAKE, OCEAN & BOARDWALK

- Boardwalk Protective Edge
- Open Space Protective Berm
- Building Facade Protection
- Lake Ave Protective Landscape

COURTESY OF BOSTON PUBLIC LIBRARY

GREETINGS FROM ASBURY PARK N.J.

HR&A Cooper, Robertson & Partners Architecture, Planning, Design
 Dewberry W Architecture and Landscape Architecture, LLC

On the left, Asbury Park community members from local schools, businesses, and residential communities marching together to support resiliency initiatives in Asbury Park and on the Shore. At right, placards with information about resilient design concepts lined the parade course and were displayed at Langosta Lounge.

Implementation-Focused Outreach



We reached out to financial organizations to discuss concepts for a resiliency investment program and gauge the appetite of the financial community for lending to small businesses throughout the region. These conversations confirmed our assumptions about the challenges of financing business resiliency. Moreover, they launched discussion and research around alternative forms of financing.

Bringing these concepts to the attention of potential funders has primed the community for future proposals to begin programming. In particular, Enterprise shared lessons learned from programs in post-Katrina New Orleans. TruFund and Accion spoke to recovery programs they administered in Louisiana and New York following disasters. LIIF, Deutsche Bank, and the Donor’s Collaborative provided feedback on capital sources to leverage a funding program; Deutsche Bank in particular emphasized the potential to create a program that encouraged business owners to purchase property and invest in their communities. We synthesized this feedback into our implementation strategy and believe these lessons can be applied to future resiliency investment funding efforts throughout the region.



New York City Government Agency Outreach



Team members visited and revisited government agencies and representatives in New York and New Jersey to ensure that design concepts aligned with the City and State’s goals and were of interest to prospective grantees.

In New York City, conversations included the NYC Department of City Planning (NYC DCP), NYC Economic Development Corporation (NYC EDC), NYC Department of Small Business Services (NYC SBS), and the NYC Office of Long-Term Planning and Sustainability (NYC OLTPS). At NYC DCP, we addressed community planning and building-level case studies, which aligned closely with NYC DCP’s work after Sandy and were of interest to the staff. At NYC EDC, our concepts largely overlapped with the City’s Business Resiliency Investment Program (BRIP). We worked to create innovative strategies that could be applied to the program, allowing it to serve more businesses and provide a greater level of technical assistance to individual business owners.

Through these meetings, we identified the local organization or government agency “champions” for implementing strategies for resiliency who could act as the recipient for CDBG-DR or other funds to seed a commercial resiliency program in the study areas. Specific actors for each priority project are noted in the Implementation Strategy chapter of this report.



New Jersey Government Agency Outreach

In New Jersey, we reached out to local government in Asbury Park to discuss strategies that could be piloted in the city, including a beachfront integrated flood protection system and improvements along lake-adjacent corridors to enhance resiliency. Team members discussed the concepts with City Councilmembers and City Planning staff, as well as the State Office of Emergency Management to ensure that plans did not interfere with existing mitigation work for the area.

To build support for a Shore-wide Resiliency Investment Fund, we briefed the New Jersey Governor's Office of Recovery & Rebuilding (NJ GORR) and New Jersey Economic Development Authority (NJ EDA) on our mid-term progress, and then again during the final month of Stage III. NJ EDA was enthusiastic about the prospect of expanding its current post-Sandy programming beyond recovery and to resiliency programs aimed toward businesses, business organizations, and municipalities. Based on their feedback, we believe that State agencies who would administer these projects would readily adopt them and support their progress.



The Commercial Corridor Resiliency Project Film

We also produced a film that conveys the aspirations and interests surrounding the three test sites and articulates the needs of stakeholders to the Rebuild by Design jury and the public. Filmmaker Ian Moubayed accompanied team members to the public meeting in Red Hook; the workshop with the Beach 116th Street Partnership; and a parade in Asbury Park highlighting the Rebuild By Design process. Ian interviewed business owners in each of the three communities to inquire about the specific challenges they faced during rebuilding efforts. We also engaged elected officials and other relevant stakeholders to join in the film by expressing their support for the key project theme: **Resilient Businesses Make Strong Communities**. The following stakeholders participated in our film:

Red Hook

Monica Byrne, Owner, Home/Made & Board Member, ReStore Red Hook
Mike DiMarino, Owner, Linda Tool
St. John Frizell, Owner, Fort Defiance
Ron Kyle, Board Member, Dry Dock
Kevin Moore, Owner, Kevin's Restaurant
Greg O'Connell, Principal, The O'Connell Organization
Carlo Scissura, President and CEO, Brooklyn Chamber of Commerce

B. 116th Street

Phillip Goldfeder, NY State Assemblyman, District 23
Thomas Hughes, Owner, Station Liquors
John Lepore, Owner, Allstate Insurance
Krzysztof Sadlej, Executive Director
Maureen Walsh, Owner, Walsh Properties
Attendees of the Beach 116th Street Workshop

Asbury Park

Tom Gilmour
Mayor Myra Campbell
Marilyn Schlossbach
Madison Marquette

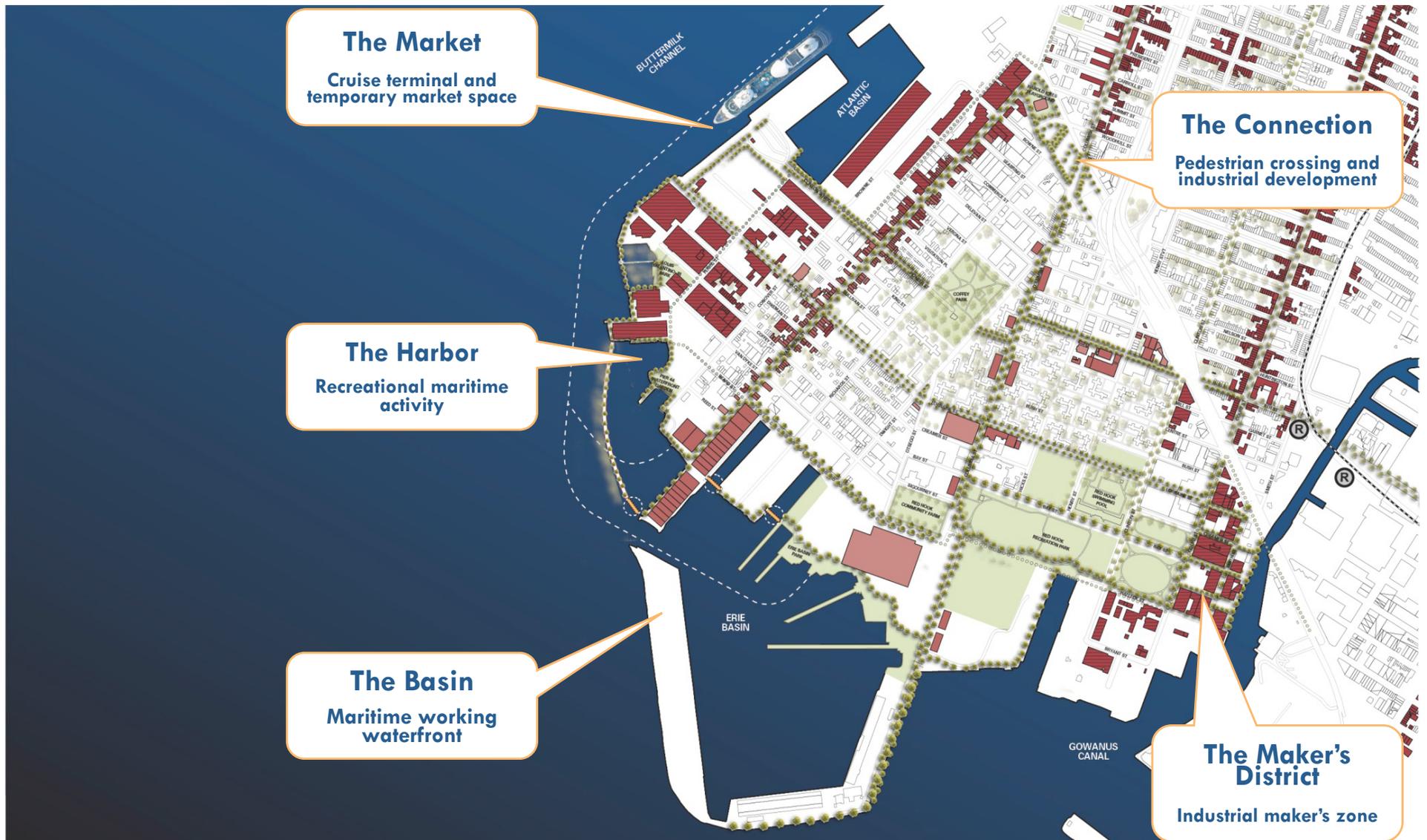


III. Design Proposals

Commercial Corridor Resiliency

Red Hook, Brooklyn, NY

A Protected Maritime Community



Design Solutions

Design Challenge

Resiliency for Red Hook involves integrating flood resistance through measures that maintain and enhance waterfront maritime and commercial activity while allowing for public access to the waterfront. Our design proposal also considers crucial stormwater management issues and planning.

Design Proposal

Building and Business Level Interventions: As part of an expansion to the City’s Business Resiliency Investment Program, tenants and property owners would benefit from building retrofits and applying preparedness plans to prevent damage and disruption. Coordination and construction of an Integrated Flood Protection System will take years, and the area will require interim protection. A combination of technical assistance, organizational capacity, and focused funding is necessary to incentivize adoption of these measures.

Neighborhood Connectivity: We explored strategies for enhancing connectivity and commercial vibrancy in Red Hook. Additional initiatives include connecting Columbia and Court Streets to neighborhoods east of the Brooklyn-Queens Expressway (BQE). At Columbia Street this requires a shift of the Hugh L. Carey (formerly Brooklyn-Battery) Tunnel entrance and decking over the existing entryway, connecting the street to the Columbia waterfront district, and providing a potential new development opportunity. At Court Street, streetscape improvements are needed to create a walkable route under the BQE.

Integrated Flood Protection: The priority design initiative for Red Hook is an Integrated Flood Protection System (IFPS) to provide community-wide protection. Based on varied conditions throughout the neighborhood, we recommend different physical forms of intervention for portions of the community, building to a comprehensive system of protection.

- At Atlantic Basin, the off-limits cruise ship area is redesigned to create a publicly-accessible open space that can be used for a temporary market linked to the Van Brunt commercial corridor. Flood protection for “the Market” is provided through deployable flood barriers that can be integrated into street furnishings.
- South of Valentino Pier, we envision a “Harbor” accessible for recreational boating, with an in-water flood protection element to break wave action in one of the neighborhood’s few high velocity wave (V) zones.
- Along waterfront properties along Beard Street at the edge of Erie Basin, we anticipate a mix of public and private protections, including reinforced building structures, deployable flood gates, and elevated promenades to protect the waterfront, Beard Street, and inland property. These protections could be financed through private activity as new development on these sites occurs and as land value is created through future regulatory actions.
- Wrapping around the neighborhood to the “Maker’s District” on the Gowanus, protection strategies include building retrofits and new development of flood-proof structures with modern manufacturing and production spaces, and a reinforced bulkhead coupled with a raised promenade.
- Neighborhood protection would tie into high ground near the Hugh L. Carey (Brooklyn-Battery) Tunnel, through an elevated Business & Building Strategies

Business & Building Strategies



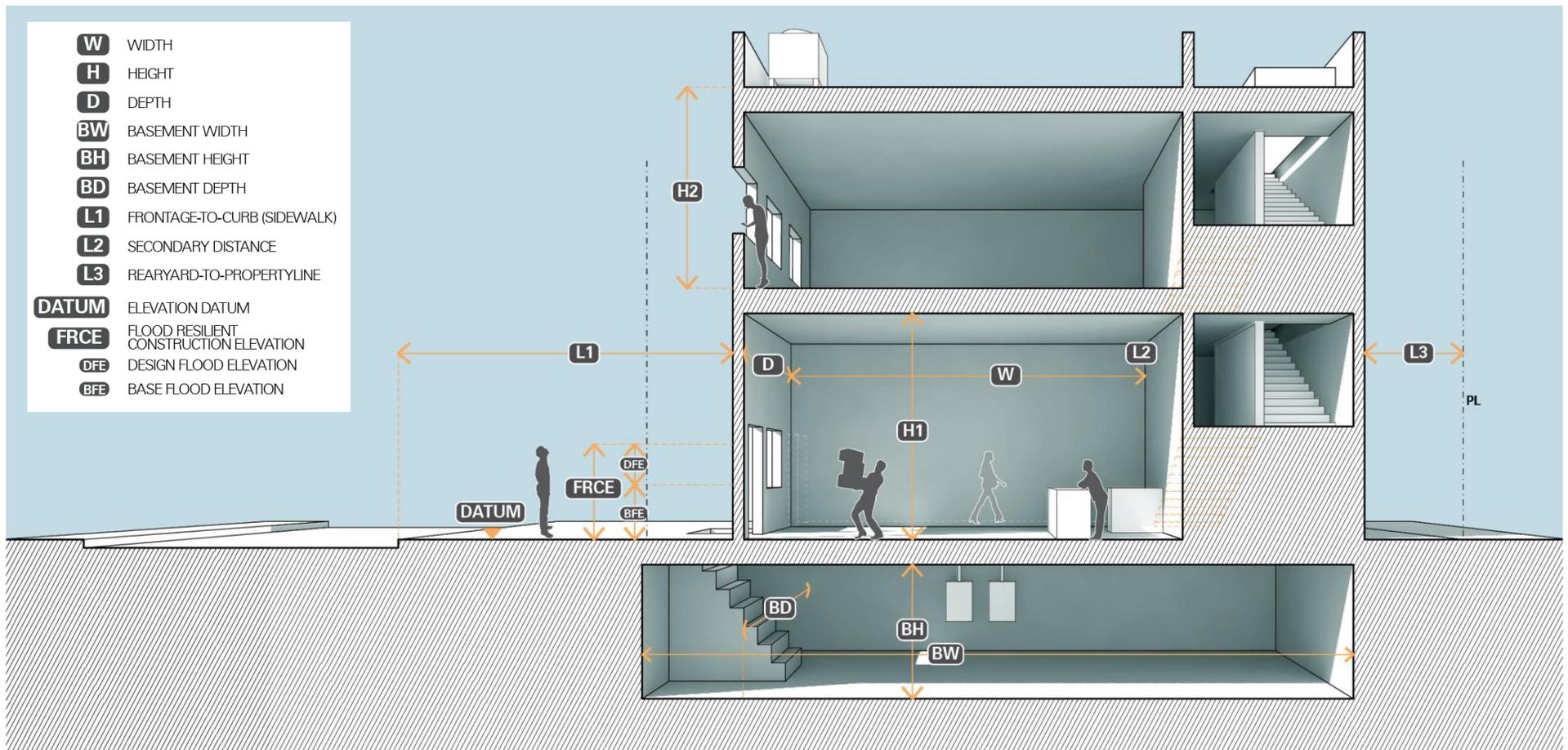
Business & Building Strategy: Party Wall Typology



Typology

The majority of commercial property in the retail corridors in Red Hook are 'mom and pop' scale and fall in line, sharing a party wall between adjacent properties. This creates a fabric that would be hard to replicate in new development at a corridor or district scale. The character that this fabric brings to Red Hook is one of its most precious assets and one that its residents defend with passion. Our Business and Building Strategies have been established to preserve, protect, and complement this typology and the characteristics it brings to the neighborhood.

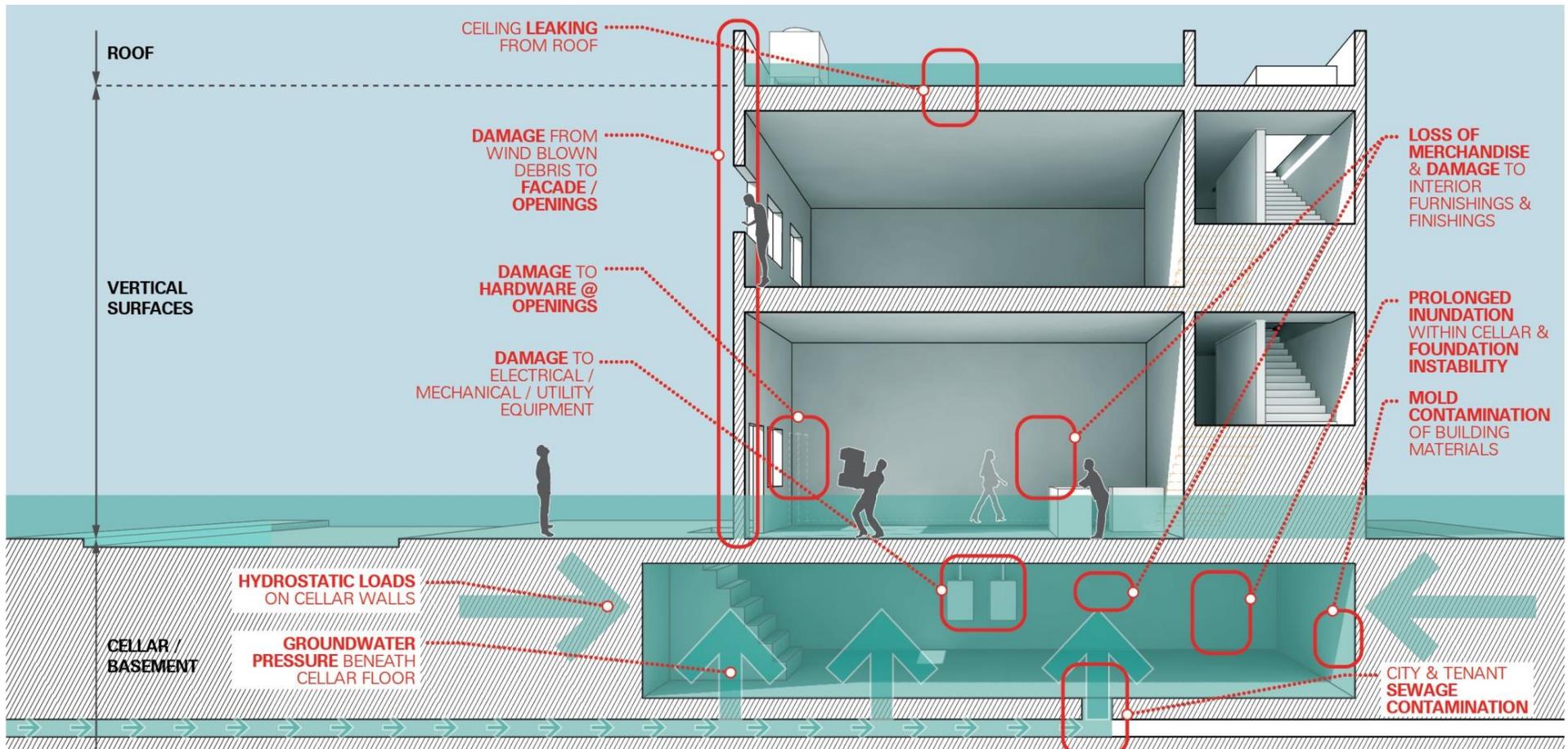
Business & Building Strategy: Party Wall Typology



Existing Conditions

Most of the properties within this typology are mixed-use structures. They are commercial at grade with typically not more than one to three floors of walkup residential above. Most have basements that are accessible for deliveries through their adjacent sidewalks and most have rear yards that are not fully built out to the extent allowed by current code.

Business & Building Strategy: Party Wall Typology



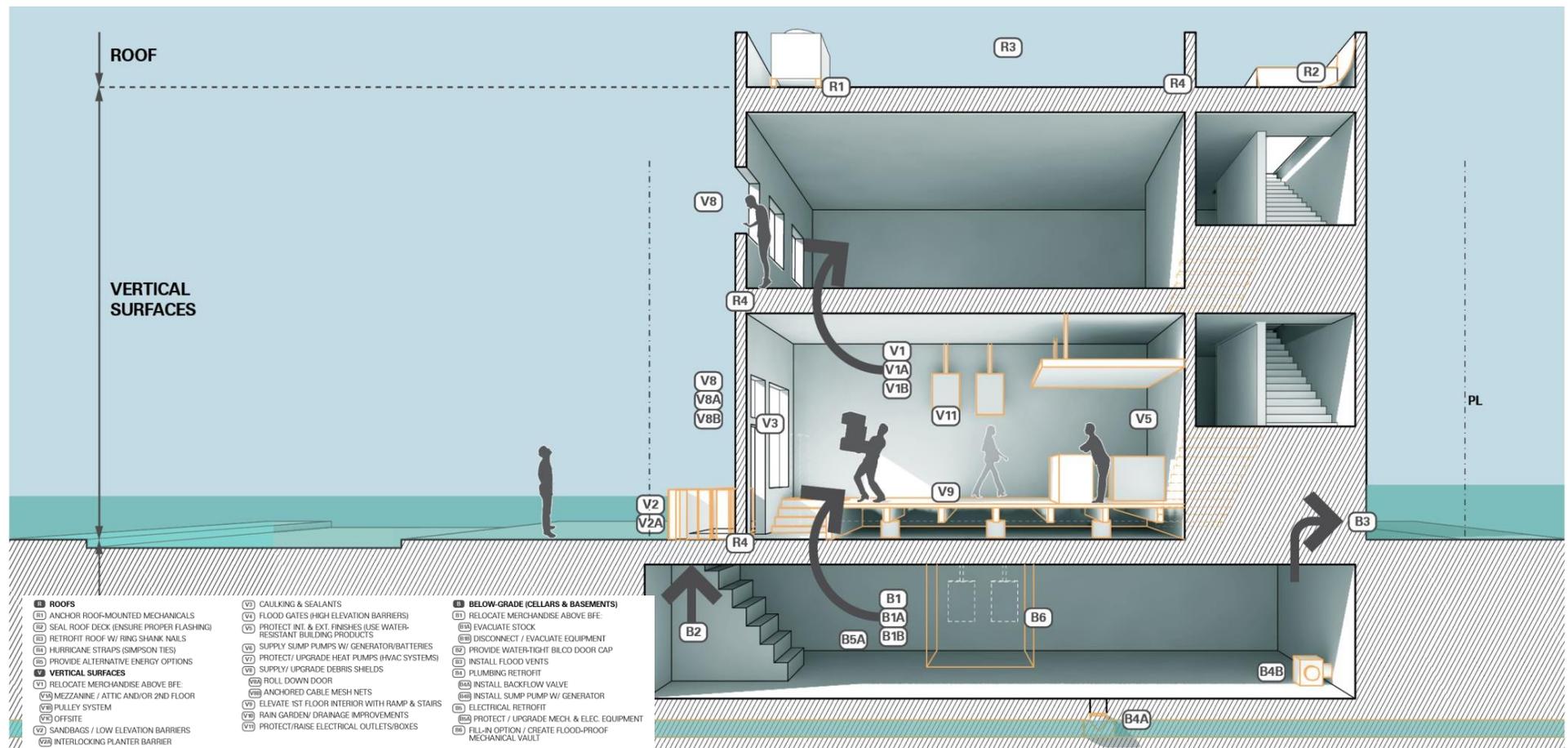
Hazard Risks

Roof: Wind can disconnect mechanical equipment and penetrate roof deck and soffit, allowing water entry.

Vertical surfaces: Water or wind can penetrate window openings, exposing interior contents to water damage. In addition, surge, heavy rain and inadequate stormwater management can damage interior finishes, equipment and contents.

Basements & cellars: Water intrusion from drains, leaky foundation masonry, and sidewalk doors damages contents, equipment, furnaces, and utility components.

Business & Building Strategy: Party Wall Typology



Storm Preparedness Interventions

Create a storm preparedness plan, evacuate at-risk first floor and basement equipment and stock to safe location, and back-up and store records off-site

Building Mitigation

Roof: retrofit HVAC and other roof-mounted equipment with ties and straps; secure roofing materials and soffit.

Vertical surfaces: install window shields to upper floors and door/window shields or temporary door barriers on first floor. **Basement/Cellar:** repair leaking basement masonry, install backflow valves in drains, elevate electrical panel and other utilities, evacuate equipment and stock off-site or to higher floors

Building Mitigation Case Study: Van Brunt Street Business

Existing Conditions

Van Brunt Street is home to numerous restaurants and shops in multi-story mixed used party-wall buildings. In most cases, the first floor and basement are leased to a retail shop, café, or office, while upper floors are used for residential apartments or offices. Fort Defiance is a locally-owned and -operated, single-location café and bar. The business leases the first floor and basement of a three-story masonry building.

Customer seating, food preparation, and serving are confined to the first floor. The basement is used for storage of food, beverage inventory, and critical operating equipment, including the main ice making machine, water filtration system, and cooler compressors. A small office area is also in the basement. Openings in the building include a pedestrian door and windows for outdoor service. There is also a sidewalk hatch opening, typical of Brooklyn, for exterior basement access.

Electronic management information consists of storing data using commercial off-the-shelf software on the business owner's computer. Electronic data is backed up weekly on a separate hard drive.

Sandy's Impact

Although flooding entered the building through gaps in the door and windows, the primary path was through the sidewalk hatch to the basement. The business owner also reported substantial seepage through the basement walls. The seepage rate reportedly appeared in some locations to flow at a rate that looked like a steady stream from a leaky faucet.



Building Mitigation Case Study: Van Brunt Street Business

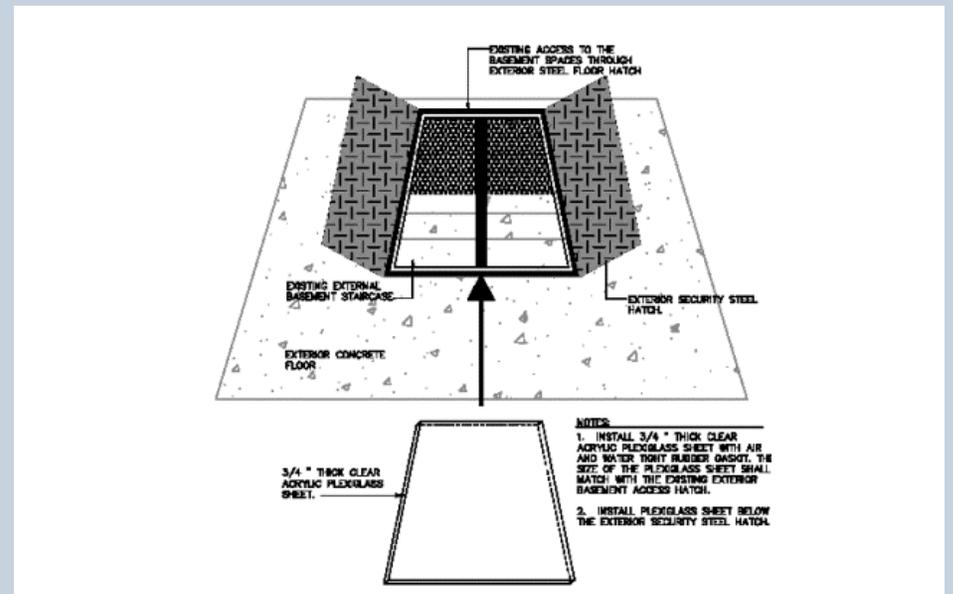
Existing Conditions

Flooding filled the basement and rose to a depth of about one-and-a-half feet in the ground-floor restaurant. Extensive repairs and restorations were required, including replacement of wood paneling and molding, furniture, and most basement equipment. However, while the basement walk-in refrigerator motor was damaged, the door seal remained watertight, while the basement became submerged.

Sandy's Impact

- Install a temporary floodbarrier at exterior doors and windows;
- Install flush-mounted, watertight sidewalk hatch door leading to the basement. The existing hatch frame has room into which a temporary flood barrier could be inserted, as shown at right;
- Clean and re-point masonry joints in the interior and rear basement walls to reduce seepage, replacing broken bricks where feasible;
- Conduct a plumbing survey to determine the status and terminus of drain lines leaving the basement. Cap the lines no longer in use to reduce potential backflow;
- Develop a more prescriptive plan to evacuate the basement equipment, stock, and supplies before a predicted severe storm event; and
- Disconnect and evacuate basement equipment where feasible; empty the walk-in cooler unit of perishable food; move heavy equipment into the walk-in cooler unit; and assure door gasket remains water tight.

Mitigation costs for this business total approximately \$9,000 and produce a robust benefit-cost ratio.



Business & Building Strategy: Mid-Size Manufacturing Typology



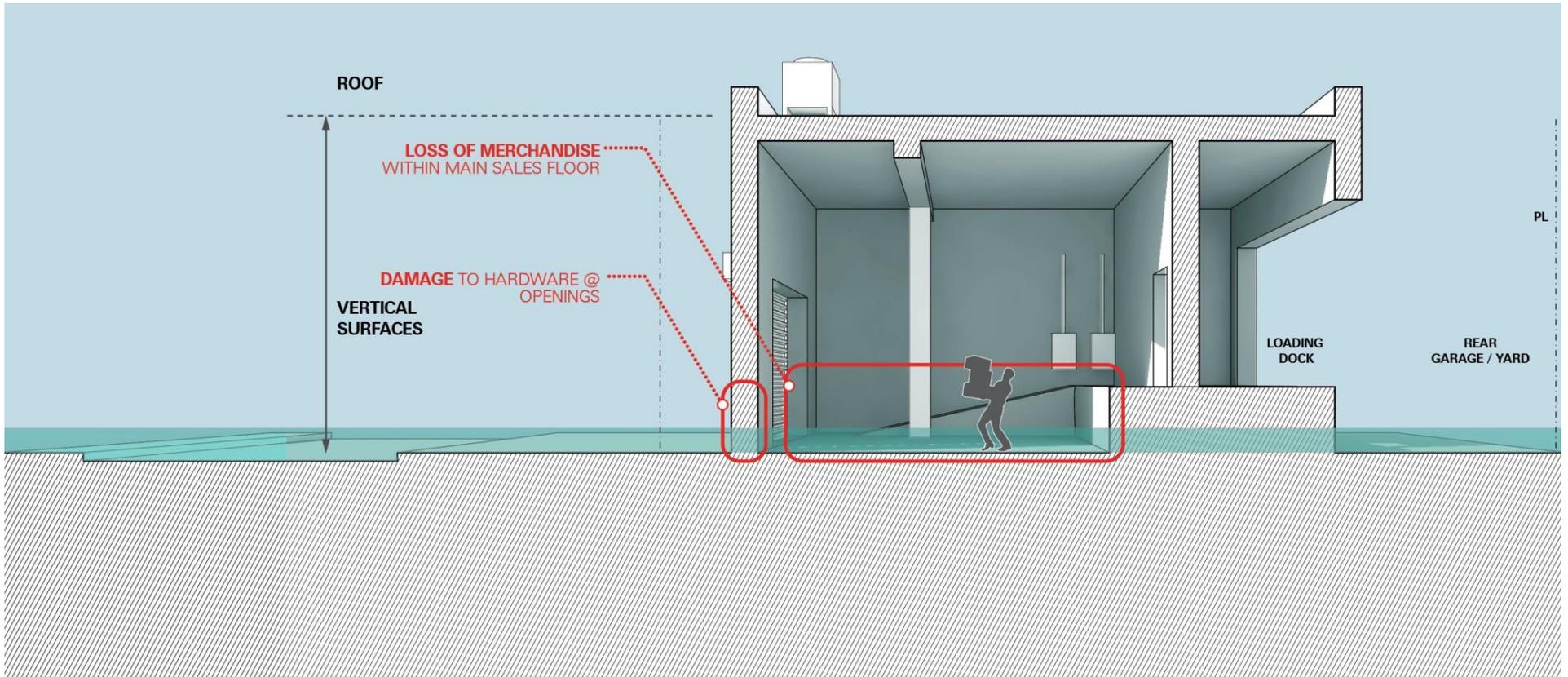
Typology

Red Hook is ringed by mid-sized manufacturing buildings that create the identity and character of its still-working waterfront. This typology is found both detached and attached and is typically not more than one floor. Buildings consist of predominantly open floor area with small operations offices that front on their upland streets. While the buildings themselves are often quite resilient, their equipment and stock is usually at risk.

Business & Building Strategy: Mid-Size Manufacturing Typology



Business & Building Strategy: Mid-Size Manufacturing Typology

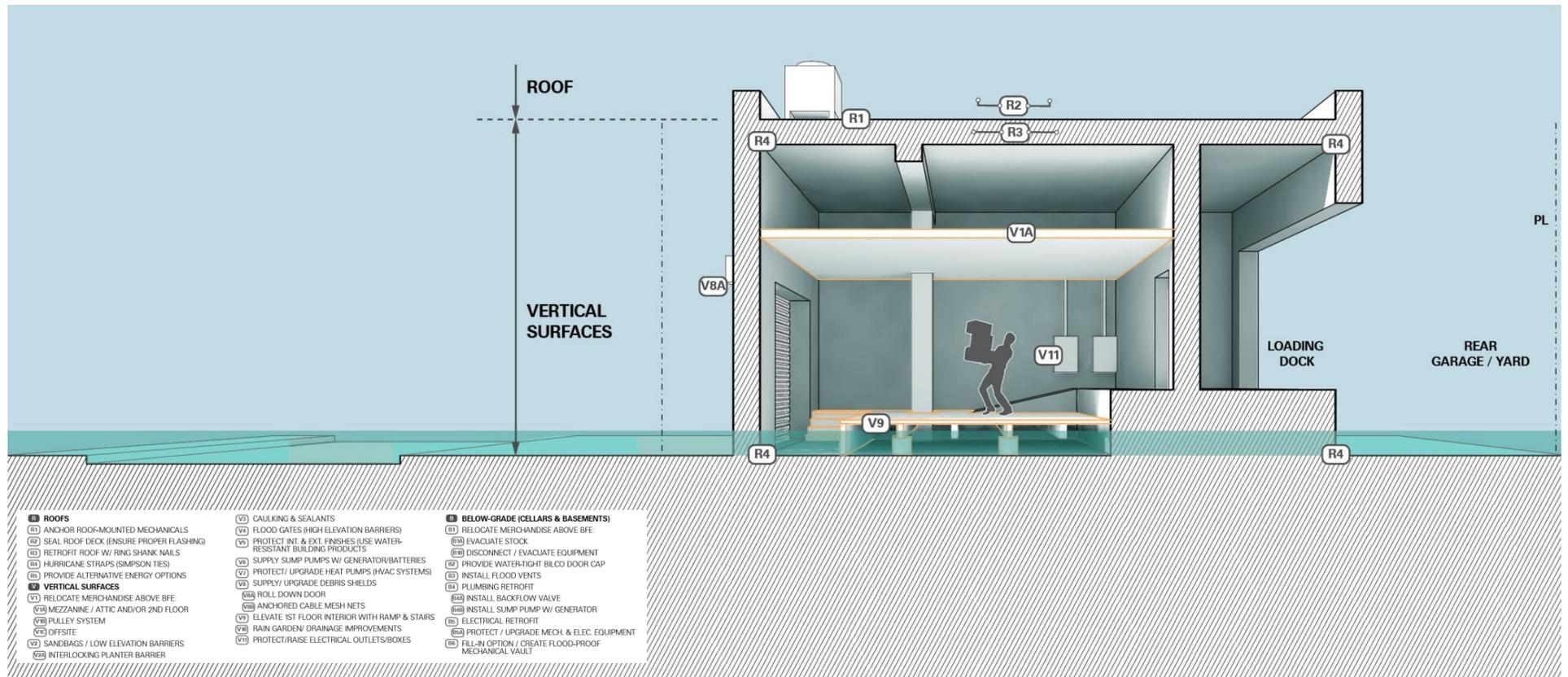


Hazard Risks

Roof: Wind can disconnect mechanical equipment and penetrate roof deck and soffit allowing water entry.

Vertical surfaces: Water or wind can penetrate window openings, exposing interior contents to water damage. In addition, surge, heavy rain and inadequate stormwater management can damage interior finishes, equipment and contents.

Business & Building Strategy: Mid-Size Manufacturing Typology



Storm Preparedness Interventions

Create a storm preparedness plan, evacuate at-risk first floor and basement equipment and stock to safe location, and back-up and store records off-site

Building Mitigation

Roof: retrofit HVAC and other roof mounted equipment with ties and straps; secure roofing materials and soffit.

Vertical surfaces: install window shields to upper floors and door/window shields or temporary door barriers on first floor. **Basement/Cellar:** repair leaking basement masonry, install backflow valves in drains, elevate electrical panel and other utilities, evacuate equipment and stock off-site or to higher floors

Building Mitigation Case Study: Mid-Size Manufacturing

Existing Conditions

The mid-size manufacturing building studied in Red Hook houses a business that makes systems parts from high grade steel and specialty metals, primarily for the aerospace industry. The business owner also owns the one-story, high-bay, masonry building. The building, located a few blocks from the waterfront and Gowanus Canal, measures 125 feet long by 100 feet deep (12,500 square feet).

Although entrances to the building are at street level, the interior main operations floor is elevated about three feet above the street level, elevating much of the main floor above base flood elevation (BFE). A vehicle access door provides street-level access into an interior loading area, where large steel bars used as raw materials are unloaded and finished product is loaded for shipping. The main plant floor contains computer-controlled metal turning and milling machines, quality-control measuring stations, drawings and specifications for parts, and finished products. Office space for management and technical staff is elevated on an upper mezzanine level.

Openings in the building include two steel pedestrian doors, one steel overhead door, and a line of windows along two walls near the top of the building. Business records, including design drawings and specifications for finished products, are primarily paper documents, scanned for electronic back-up. On-site information management resources include individual computers connected through a terminal server and sequential server software. Electronic data is saved on a separate hard drive weekly. Paper files and electronic servers are stored on the mezzanine level.



Building Mitigation Case Study: Mid-Size Manufacturing

Sandy's Impact

Flooding during Sandy entered the building primarily through gaps in the overhead door frame and building connection at the vehicle access door. Water in the building reached a depth of about three feet, just below the main floor level, and within inches of over ten million dollars of specialized computerized manufacturing equipment. Floodwater also entered the building via backflow in combined sanitary/storm sewers that impacted the street-level utility room and employee locker room and restroom. Damage was sustained to the boiler motor, electrical panels, and locker room fixtures. The business owner indicated that the business did not experience a loss of power during Sandy. Based on FEMA post-Sandy data, the BFE at the site is 12 feet, and ground surface elevation is six to seven feet. While the storm did not damage equipment, the facility was out of operations for an extended period of time, and more than a year later has not fully caught up to backlog. As the business owner also owns the building and is the sole occupant, a broader range of mitigation options is feasible.

Post-Sandy Mitigation Recommendations

Recommendations for mitigation concepts were presented to the business owner, including:

- Installation of temporary floodbarriers at exterior doors;
- Replacement of two pedestrian doors with watertight doors to decrease the time and labor required to install the temporary flood barriers, combined with use of temporary flood barriers;
- Temporary flood barriers at the loading dock high bay door or around the perimeter of the loading bay;
- Installation of an operable backflow preventer in the sewer line;
- To prevent the building's green roof from taking on too much water weight, activate a backflow preventer with a roof rain shutoff valve to prevent overflows;
- Add weep holes to the roof parapet to provide emergency drainage from the roof;
- Revise configurations for storing small tools and equipment, particularly gauges and calibrated measuring devices, to an elevation above the BFE.

The mitigation investment for the manufacturing facility were estimated at approximately \$55,000, and produced a very robust benefit-cost ratio (approximately 40).

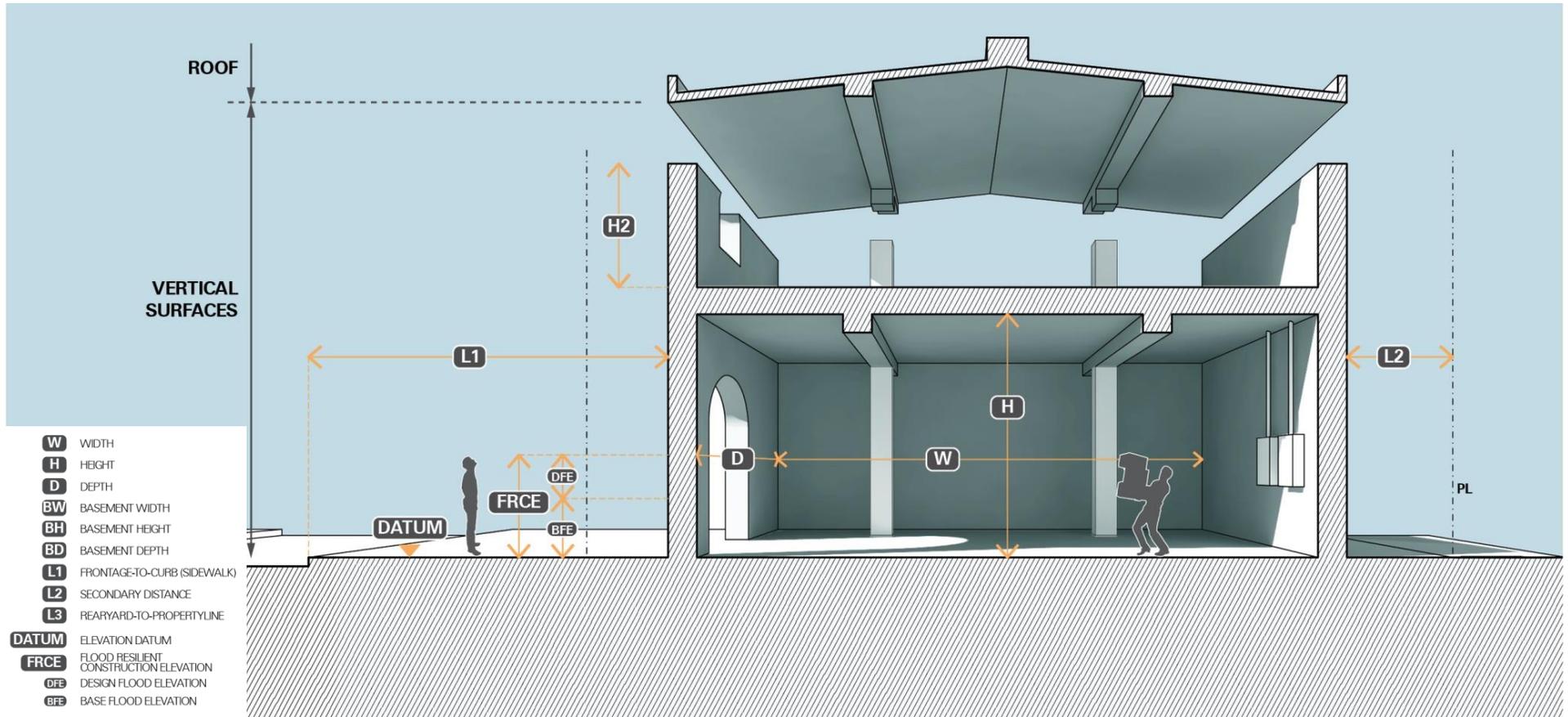
Business & Building Strategy: Repurposed Warehouse Typology



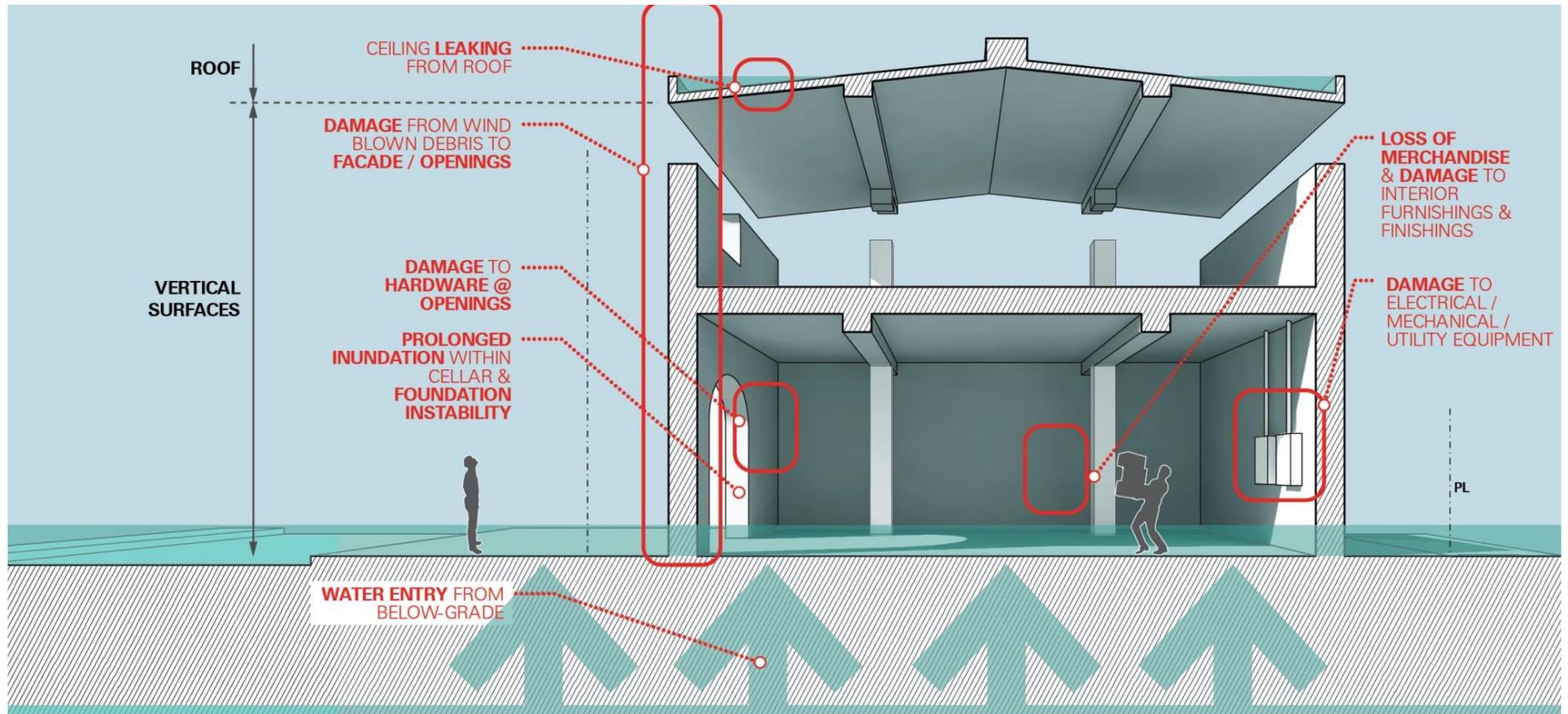
Typology

Red Hook's history as a port and trading center provides a legacy of large, strongly built warehouse and manufacturing buildings along or close to the waterfront. Many of the large warehouse buildings predate the Civil War and were built using masonry bearing walls and heavy timber interior framing. Similar buildings constructed from the late 1800s onward appear to also have been constructed using masonry bearing walls with structural steel interior framing. Many of the warehouse buildings have been redeveloped and leased to small manufacturers, professional service firms, and specialty contractors.

Business & Building Strategy: Repurposed Warehouse Typology



Business & Building Strategy: Repurposed Warehouse Typology

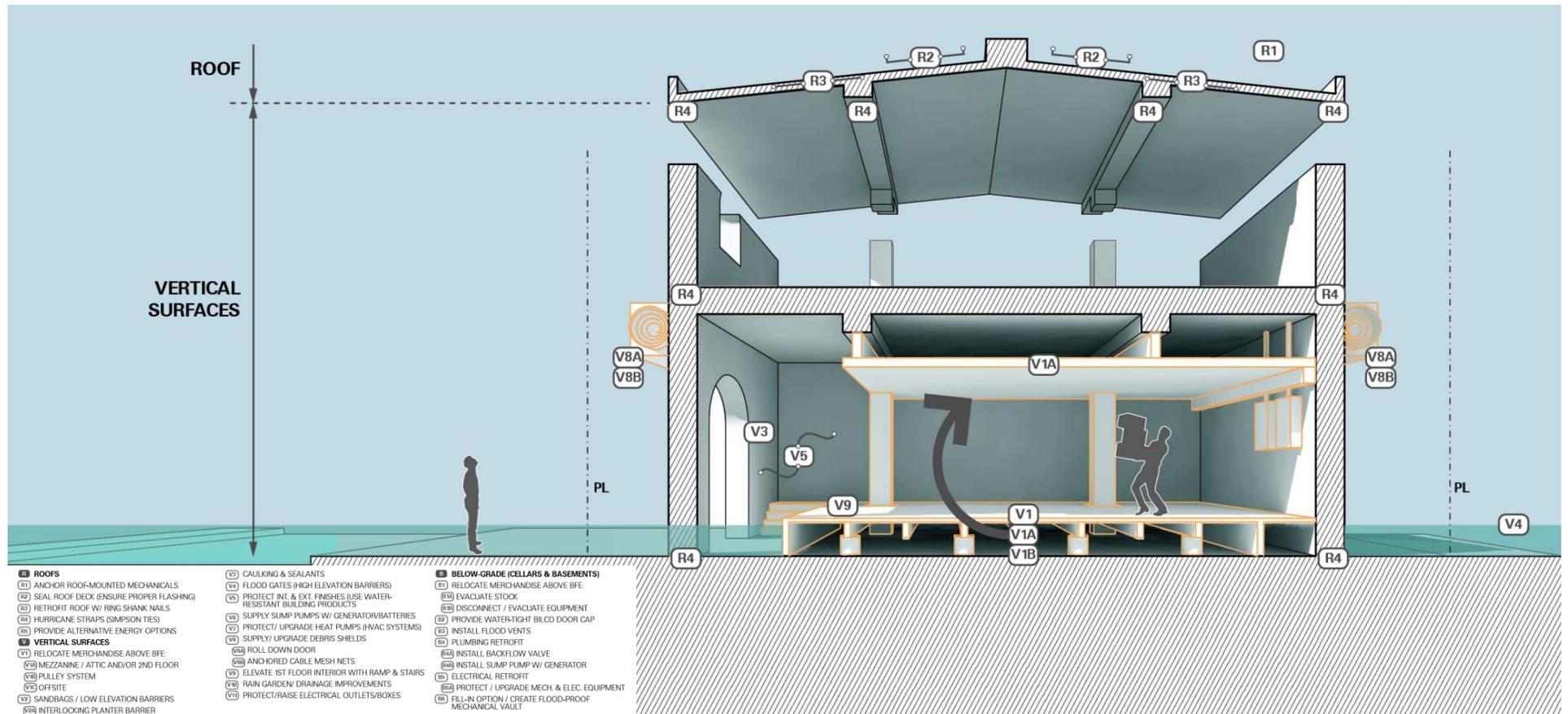


Hazard Risks

Roof: Wind can disconnect mechanical equipment and penetrate roof deck and soffit allowing water entry.

Vertical surfaces: Water or wind can penetrate window openings, exposing interior contents to water damage. In addition, surge, heavy rain and inadequate stormwater management can damage interior finishes, equipment and contents.

Business & Building Strategy: Repurposed Warehouse Typology



Storm Preparedness Interventions

Create a storm preparedness plan, evacuate at-risk first floor and basement equipment and stock to safe location, and back-up and store records off-site

Building Mitigation

Roof: retrofit HVAC and other roof mounted equipment with ties and straps; secure roofing materials and soffit.

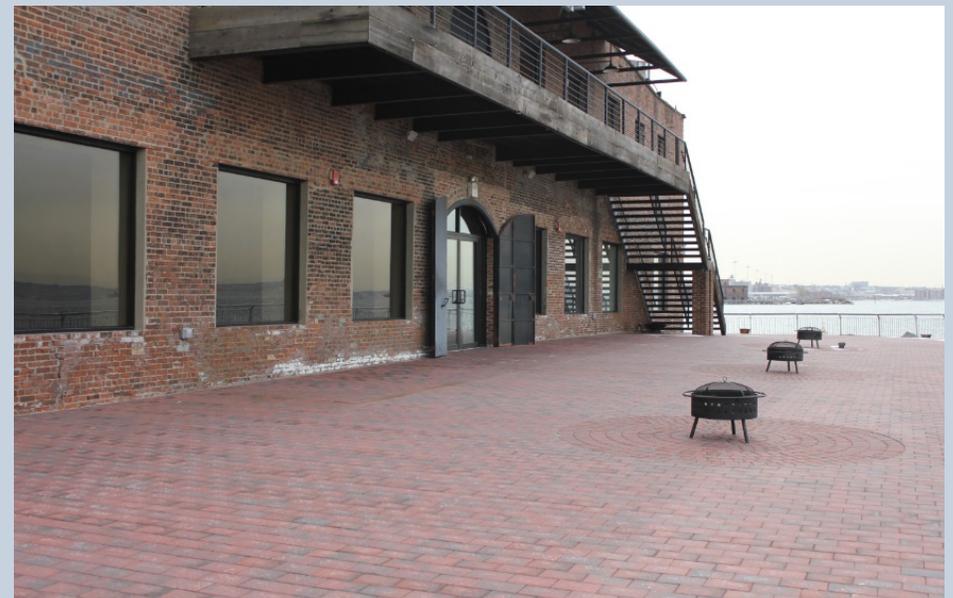
Vertical surfaces: install window shields to upper floors and door/window shields or temporary door barriers on first floor. **Basement/Cellar:** repair leaking basement masonry, install backflow valves in drains, elevate electrical panel and other utilities, evacuate equipment and stock off-site or to higher floors

Building Mitigation Case Study: Repurposed Warehouse Tenant

Existing Conditions

Red Hook's history as a port and trading center provides a legacy of large, strongly built warehouse and manufacturing buildings along or close to the waterfront. Many of the large warehouse buildings pre-date the Civil War and were built using masonry bearing walls and heavy timber interior framing. Similar buildings constructed from the late 1800s onward appear to also have been constructed using masonry bearing walls with structural steel interior framing. Many of the warehouse buildings have been redeveloped and leased to small manufacturers, professional service firms, and specialty contractors.

The Liberty Warehouse Building has been repurposed into retail, business, artisan craft, winery, restaurant, and rental event space with six first floor rental units. The second floor and limited third floors feature apartments and office space. The building is 410 feet long by 144 feet deep, with just under 60,000 square feet of leased space on each of the first and second floors. Less space is available on the third floor. The majority of openings are large doorways with metal shutters. There are also two old standard metal doors; a large metal roll-down gate leading into the arcade area; and the large frame wood and glass door for Red Hook Winery.



Building Mitigation Case Study: Repurposed Warehouse Tenant

One ground-floor tenant, Flickinger Glassworks, has been at the location for nearly thirty years. The business restores glass fixtures, creates new products, and sells “art glass” pieces from their small front display area. The establishment features large kilns, which are super- heated to produce glass art through bending or using steel molds. A member of the team spent extensive time with Flickinger Glassworks to learn about their business operations, provide hazard mitigation recommendations for their space, and suggest storm preparedness measures for their business.

Sandy's Impact

Located on the upper New York Bay, the facility sustained extensive internal contents damage, but the building was largely unharmed. As the leased businesses did not carry policies through the National Flood Insurance Program (NFIP), the storm's losses were responsible for one tenant's bankruptcy. Others sustained months off-line as they struggled to replace equipment and return to normal operations.

Flickinger Glassworks, which took on nearly five feet of water, was severely impacted by Sandy. The business faced thousands of dollars' worth of damage to kilns, finishing equipment, and several thousand steel molds, and lost paper design and custom order records. The brackish flood water exacerbated impacts by creating long-lasting interruptions to producing new work and resuming regular sales.



Building Mitigation Case Study: Repurposed Warehouse Tenant

Post-Sandy Mitigation Recommendations

For Liberty Warehouse to be protected from a 100-year flood, elevation must be five feet above the business interior floor elevation.

Recommendations for mitigation concepts were presented to the business owner, who has started implementation, including:

- Continue to elevate kiln motor assemblies (critical equipment);
- Install temporary flood barriers at exterior doors and windows;
- Substitute watertight pedestrian doors to decrease the time and labor required to install the temporary flood barriers;
- Install temporary plywood at double-glass entrance door and two front window assemblies once office equipment and records have been evacuated 24 hours in advance of an event as the business is closed;
- Install temporary plywood at the rear door opening;
- Enclose the heavy steel doors between tenant spaces with a watertight frame and seal frame joints and edges with water-resistant, environmentally safe insulating foam in preparation for a disaster. Although temporary flood barriers are technically feasible for sliding doors between the neighboring businesses, the location makes access to install the barriers impractical; and
- In preparation for an advancing storm, use small hydraulic lifts to elevate the polishing machines, placing temporary supports beneath each machine. Economical options for temporary support include automotive jack stands or concrete masonry blocks.



The mitigation investment for the small artisan business within the Liberty Warehouse Building was about \$7,500, producing a robust benefit-to-cost ratio of approximately 20.0. For building-level mitigation, these strategies are applied over all openings of the building, resulting in a total mitigation cost of approximately \$80,000.

Corridor Strategies



Corridor Strategies

The main north-south upland commercial corridors in Red Hook are Van Brunt Street, Columbia Street and Court Street (the latter two to a lesser degree). These corridors are not continuous, and are separated from the main commercial corridors in Brooklyn. They also lack adequate transit connectivity as there are only two bus lines, the B57 and the B61, that connect Red Hook to the rest of Brooklyn. Design strategies link the corridors to the more vibrant upland corridors, allowing continuous pedestrian and vehicular passage into the neighborhood.



Van Brunt Street Corridor



Columbia Street Corridor

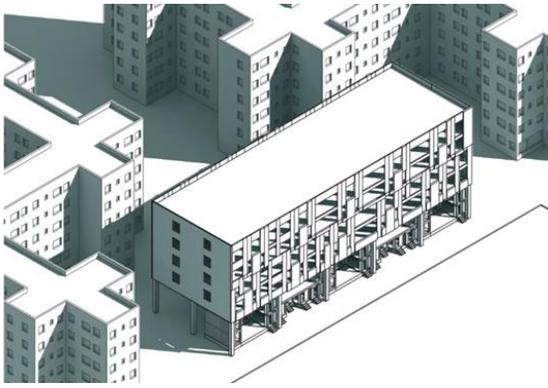
Corridor Strategy



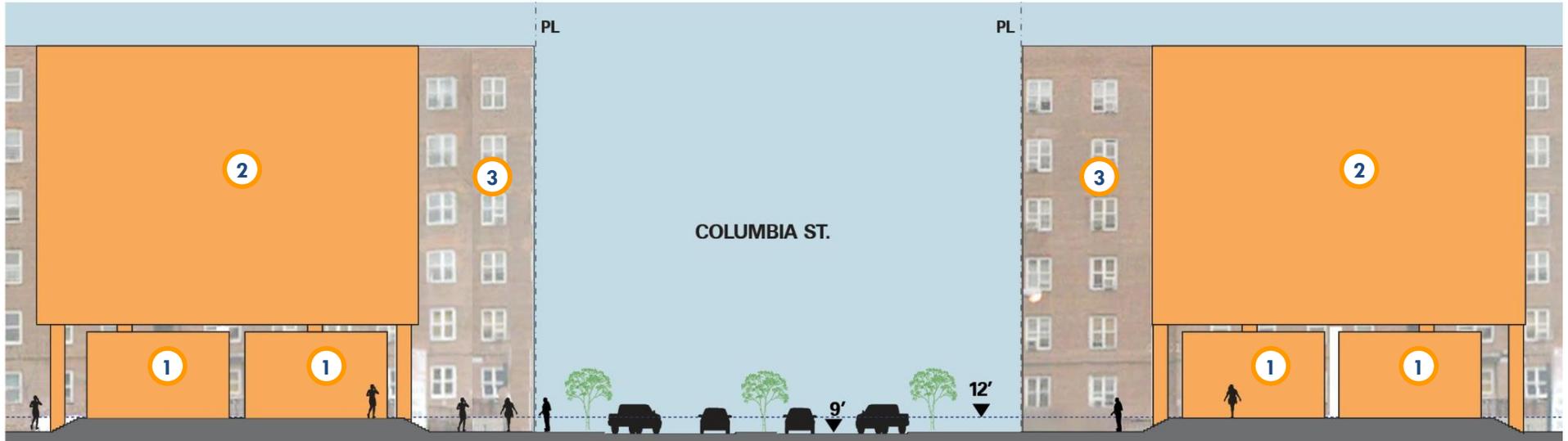
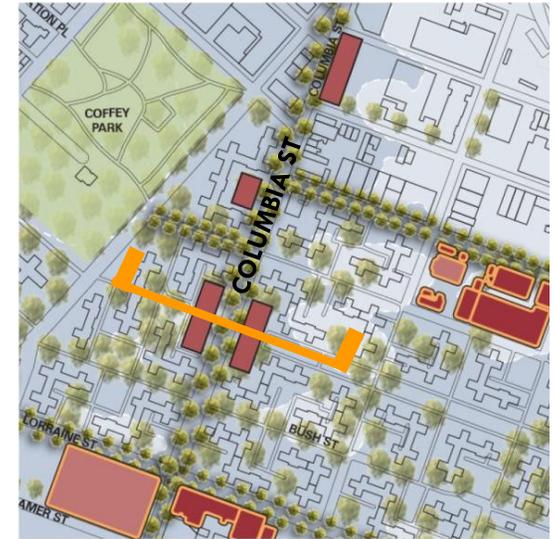
Van Brunt Street Revitalization

Commercial use on Van Brunt Street is hindered by routine flooding, both from stormwater drainage issues and more severe storms. Solving these issues for existing buildings is discussed in the preceding section, while new infill is also inhibited by these challenges. New, flood-proofed commercial uses could be encouraged through the incorporation of wet flood-proofing techniques, enhancing ground-floor activation and bringing new residents and visitors to the area. Streetscape improvements including upgraded sidewalks, lighting and street trees complete the improvements and create a more vibrant corridor.

Corridor Strategy



- 1 Elevated retail
- 2 Resilient NYCHA housing
- 3 Existing NYCHA housing



Corridor Strategy

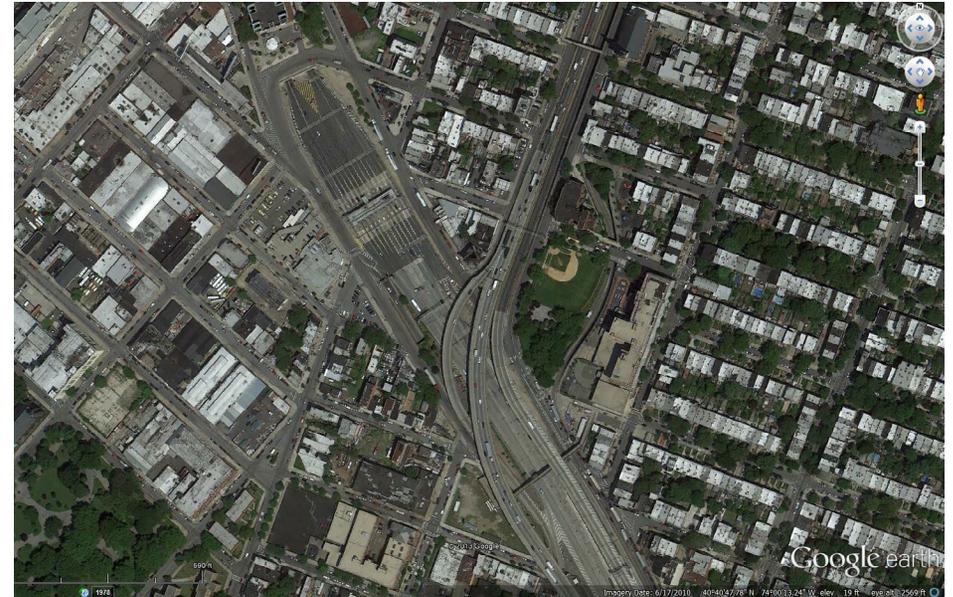


Columbia Street is currently home to some limited commercial space and anchored by IKEA on Beard Street. To improve commercial connectivity along and encourage pedestrian movement, we propose creating new hubs of activity and affordable housing on underutilized parcels adjacent to Red Hook Houses, as in the drawing above of a mixed-use building including community-serving retail that is wet flood-proofed and affordable or public housing on the upper floors.

Corridor Strategy: Connectivity & Transit

Shifted Tunnel Entrance & Columbia Street BRT

Moving the entrance to the Hugh L. Carey (formerly Brooklyn- Battery) Tunnel east to higher ground would reduce the risk of flooding of the tunnel and provide the opportunity to link north and south segments of Columbia Street together, thus linking Red Hook to the Columbia Waterfront District. The new tunnel entrance to the east would open up development opportunities at its old site and would act as a connection between Columbia and Van Brunt Streets. Pedestrian and vehicular connections between adjacent neighborhoods and commercial areas would open up and would help strengthen the vitality of Red Hook commerce. Columbia Street south of the Gowanus Expressway passes directly through Red Hook Houses and has many vacant sites that could be developed to strengthen the neighborhood commercially. Another key connection for Red Hook would be to develop a dedicated Bus Rapid Transit line proceeding through the tunnel to connect Red Hook to Lower Manhattan.

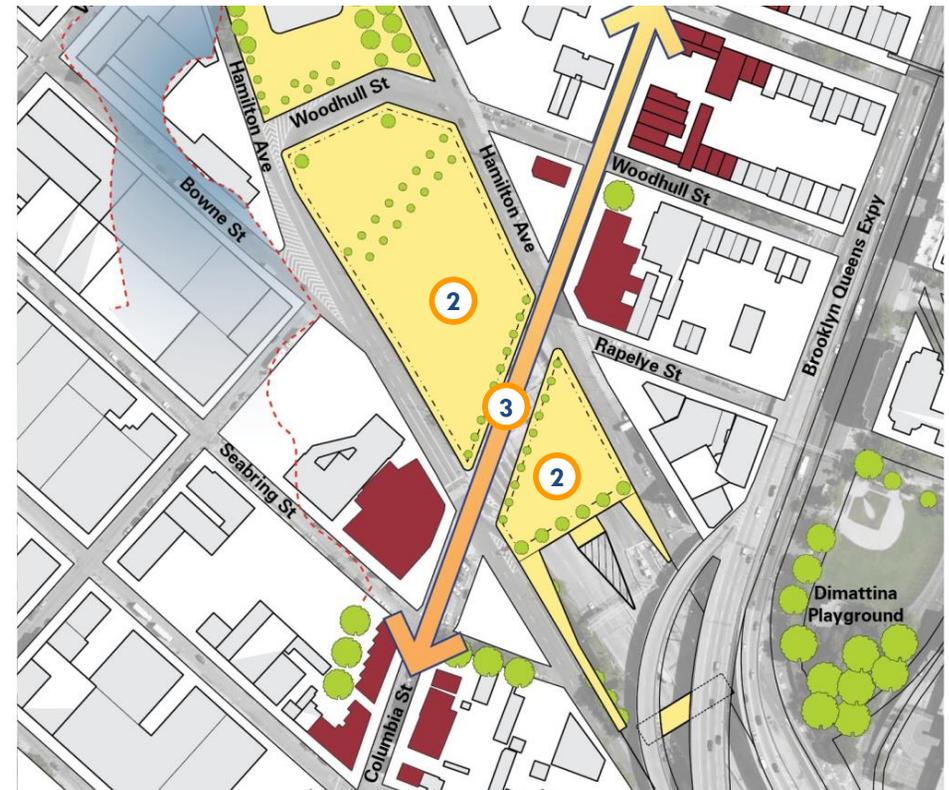
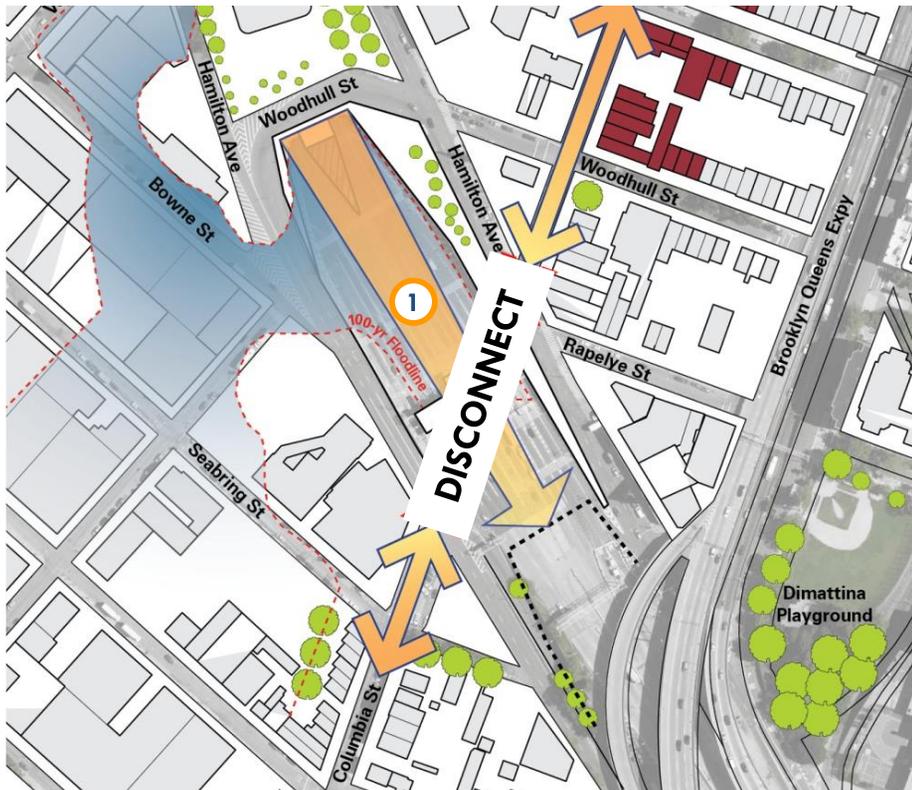


Corridor Strategy: Connectivity & Transit

- 1 Tunnel shifts out of flood risk
- 2 New proposed development
- 3 Columbia Street connection

Shifted Tunnel Entrance

Moving the entrance to the Hugh L. Carey (formerly Brooklyn-Battery) Tunnel east to higher ground would reduce the risk of flooding of the tunnel and provide the opportunity to link north and south segments of Columbia Street together, thus linking Red Hook to the Columbia Waterfront District. The new tunnel entrance also provides over 100,000 square feet of potential developable area for new buildings or open space.

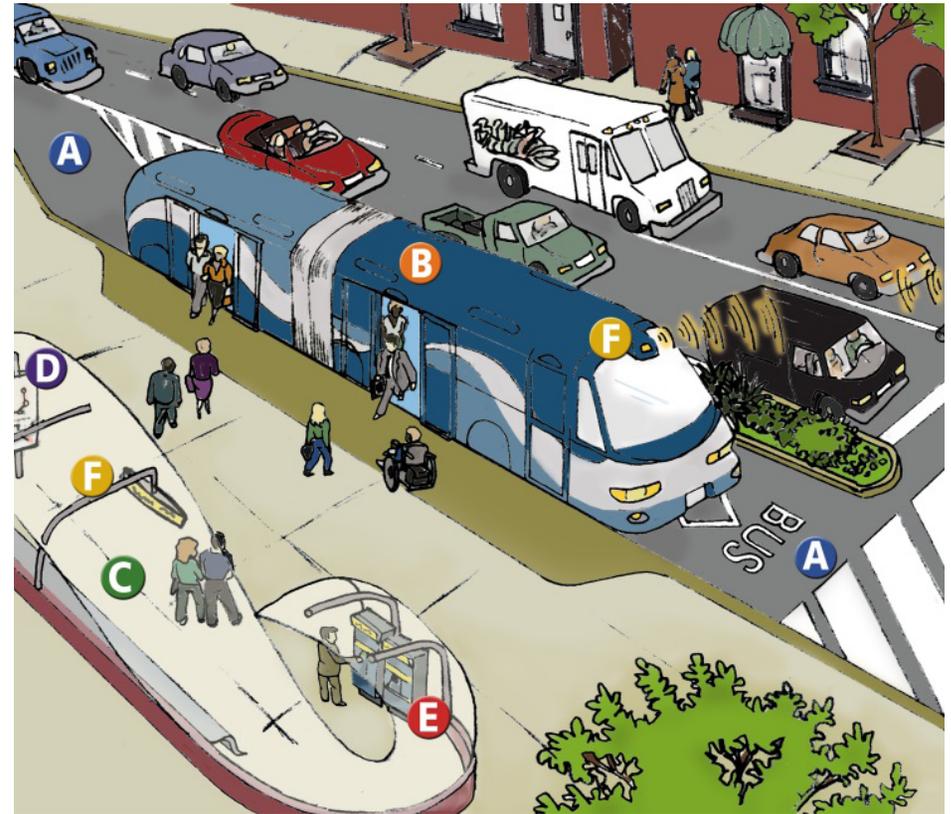


Corridor Strategy: Connectivity & Transit

Columbia Street BRT: One of the biggest challenges facing Red Hook is its lack of access. Its current public transit network consists of only two bus lines and the Smith/9th Street Subway Station across the Brooklyn-Queens Expressway in Gowanus. We propose Bus Rapid Transit that would begin in Lower Manhattan, run through the Hugh L. Carey (Brooklyn-Battery) Tunnel, connect to Governors Island, run modified local stops down a more resilient Columbia Street Corridor, and end at IKEA at the foot of Columbia Street. The project would piggyback on initiatives to relocate the tunnel entrance to the east where higher ground would allow it to sit at a more elevated flood-resistant location. Connecting Red Hook to the nation's second largest CBD more directly would elevate property values, create employment opportunities, and help to make a more resilient community.



Precedent: Bogota Bus Rapid Transit



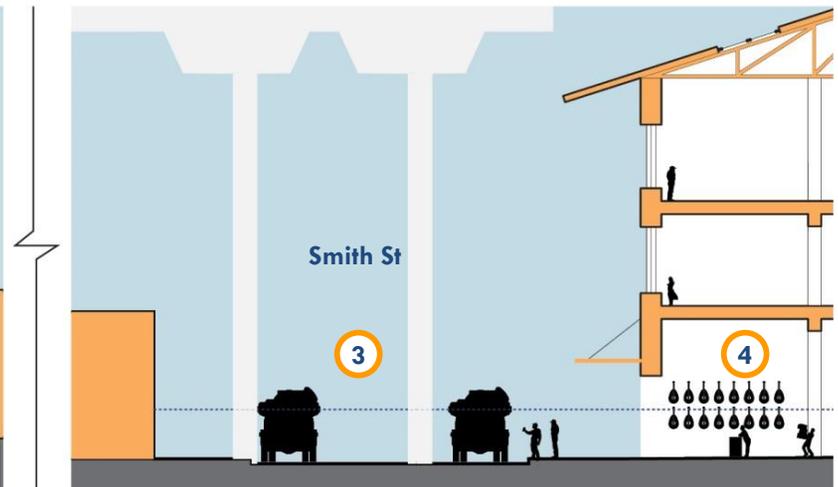
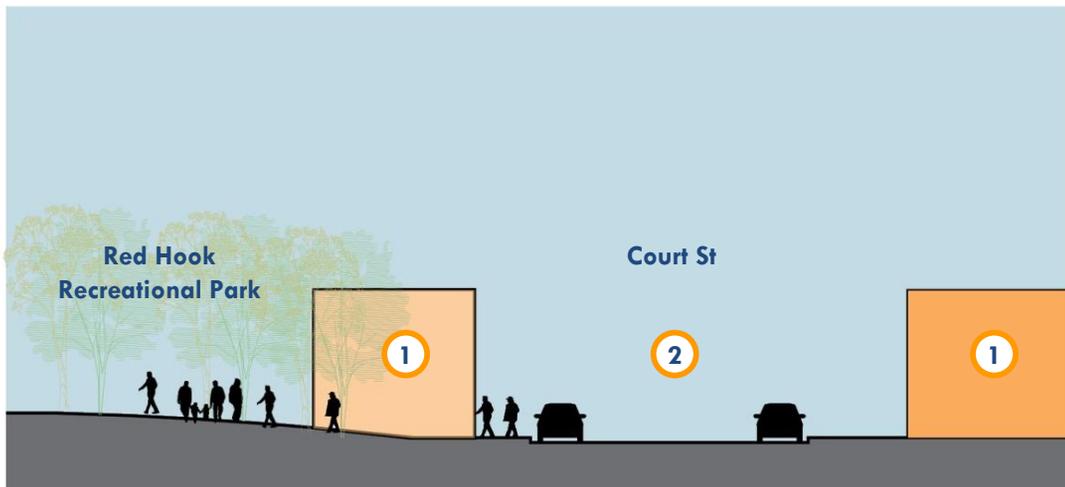
Corridor Strategy: Connectivity & Transit

- ① Faster fare collection
 - ② Bus bulbs (widened sidewalks) for passenger loading
 - ③ Designated bus lane
 - ④ Displaced parking
- (P) BRT route
 - (E) Local bus route
 - (P) BRT stop
 - (E) Local bus stop



Corridor Strategy

- 1 Infill with commercial to strengthen corridor
- 2 Maintain pedestrian and vehicular accessibility
- 3 Maintain industrial vehicular accessibility
- 4 New industrial building with flood-protective canal-side wall



Corridor Strategy

East-West Connections

The movement of commercial streets in the north south orientation tends to segment Red Hook into districts. These districts could be better connected to create a more integrated and resilient community. In addition, mass transit like the subway and ferry exists at the east and west sides of the community and could be better linked to all through clear east-west connections across the neighborhood.

The only subway station near Red Hook is at the Court Street/Smith Street and 9th Street intersections, far to the east. Presently connection east west from this Subway station to Red Hook is prevented by barriers of the Brooklyn Queens Expressway. We propose to change the streetscape to allow pedestrian movement east-west along 9th Street connecting Red Hook directly to the subway and then continuing across the neighborhood thru Coffee Park at Pioneer Street to link with the proposed ferry stop at Atlantic Basin.



District Strategy: Integrated Flood Protection



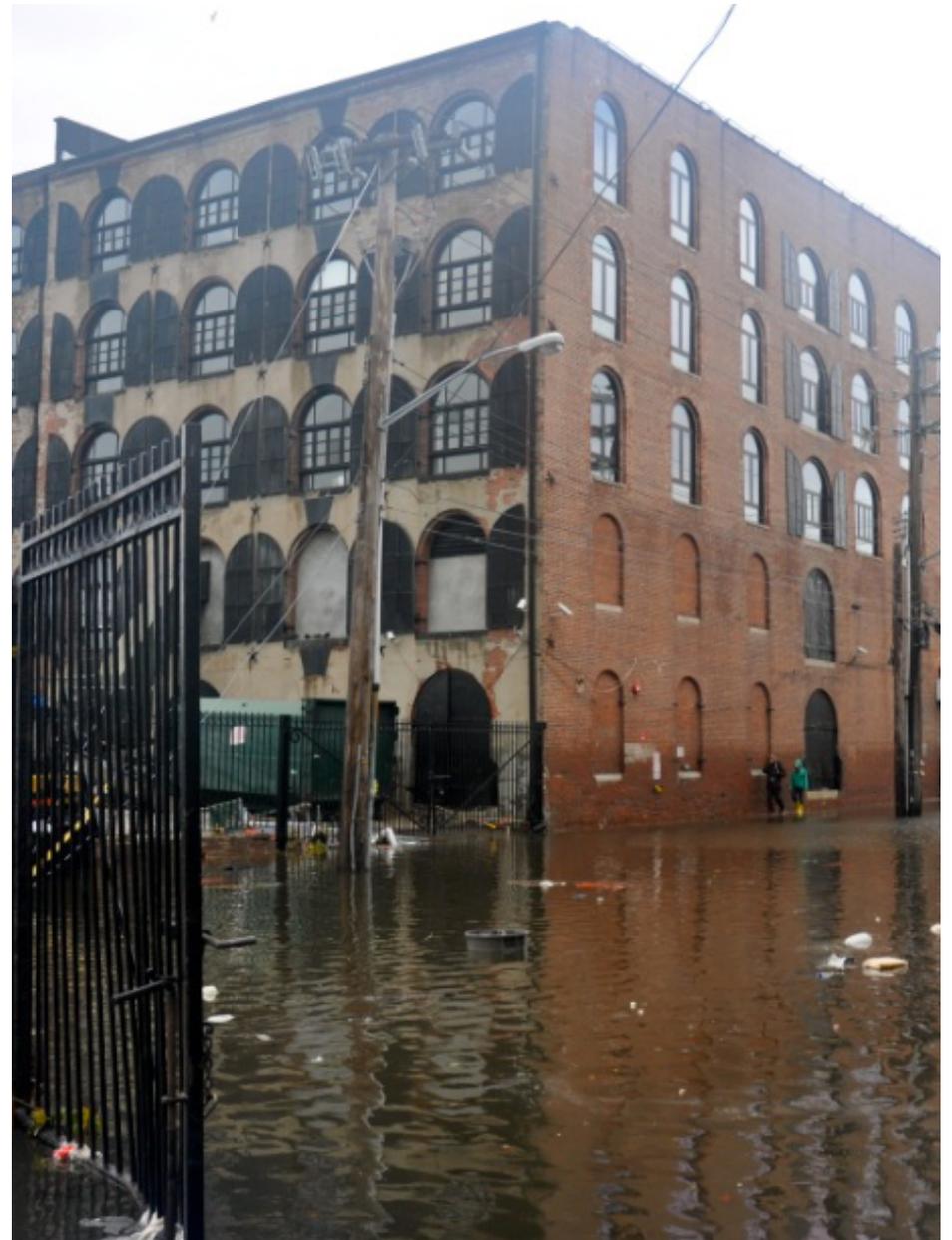
District Strategy: Integrated Flood Protection

Integrated Flood Protection Overview

Three strategies for integrated flood protection were explored, each with a different relationship to the water's edge and inland streets, with the understanding that they can also work together in many configurations. Our preferred concept utilizes inland interventions where water's edge protection is inefficient and may prevent waterfront access, connecting to high points, or future development sites that will be elevated or build elevated edge protections prior to redevelopment, and also water's edge concepts when they can be integrated into new development or edge revitalization. The priority concept is represented in the following drawings.

The Integrated Flood Protection project incorporates the principles but forward by the New York Rising Community Reconstruction Planning Committee for Red Hook:

- Enhance waterfront access.
- Preserve and respect the character of the neighborhood.
- Maintain maritime capacity and enhance water-based uses.
- Design protective infrastructure to be multi-functional and provide community amenities.
- Maximize protection of building stock.
- Address flood protection needs of sites and structures outside, as well as inside, the line of protection, and in the interim while being designed and built.
- Encourage everyone to build resiliently.
- Address flood insurance premiums
- Address and improve current and future drainage issues.
- Employ local residents in the implementation and construction of integrated flood protection.
- Be carbon neutral.
- Be flexible to future and changing community needs.
- Be informed by ongoing input from the Red Hook community.



District Strategy: Integrated Flood Protection

Edge Protection: Atlantic Basin

As described in the Research and Analysis chapter, Atlantic Basin is limited to cruise and shipping uses. Our design proposal recommends opening the cruise ship parking area to the public when cruise ships are not in port. Based on the San Diego model, moveable security measures can be installed, which should not impact cruise terminal use. Flood protection is provided by a demountable system, integrated into light poles. These are set back from the working wharf edge, and help create a space at the end of Pioneer Street. The proposal includes a reconfigured pedestrian and vehicular area to allow for a clear pedestrian walkway and bikeway between the water's edge and Van Brunt Street. Creating this promenade includes repair to the wharf edge, adding to the available space for ships and allowing space for a ferry landing. This passage connects Van Brunt Street to the parking area, which can be used for temporary festivals and markets. Linking the temporary uses as well as the cruise passengers to the Red Hook commercial street will create better pedestrian movement throughout the neighborhood and improve access to the waterfront and the view across Buttermilk Channel to Governors Island.



District Strategy: Integrated Flood Protection



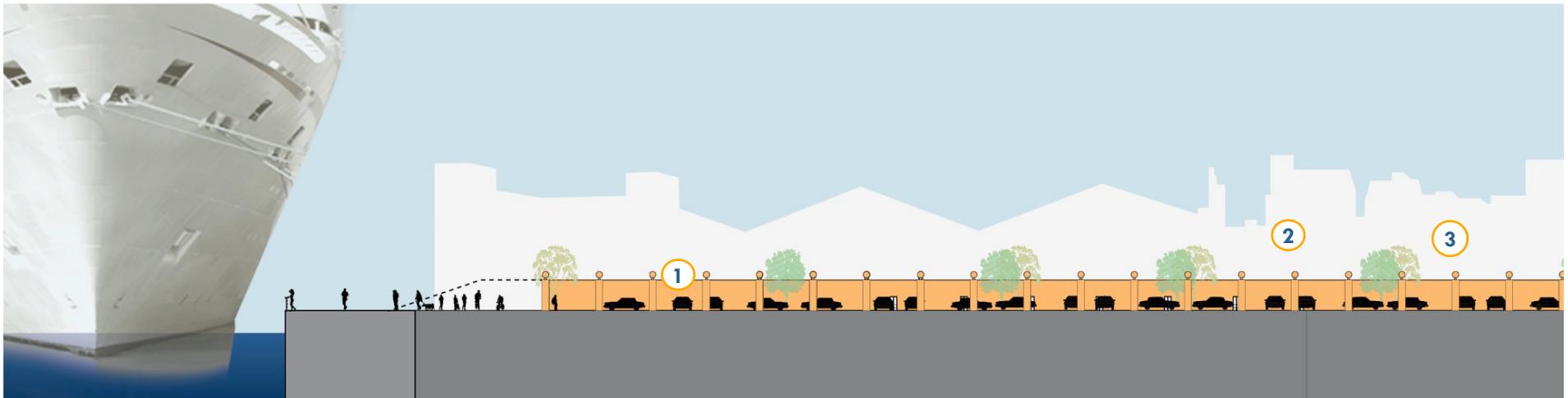
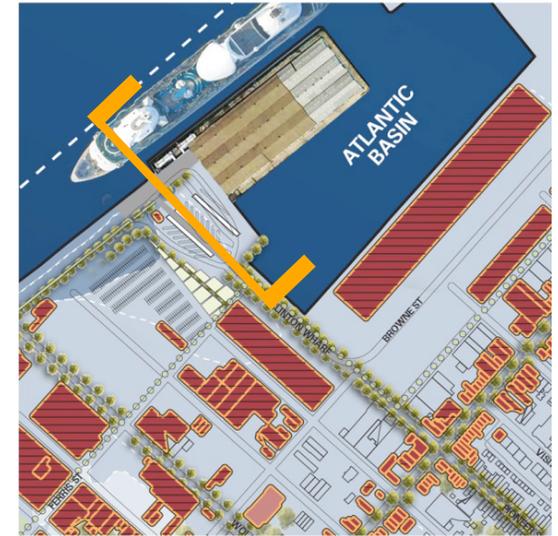
Existing condition



Proposed connection

District Strategy: Integrated Flood Protection

- 1 Temporary flood barrier
- 2 Preserve maritime industry within Atlantic Basin
- 3 Open cruise ship parking area to public use



District Strategy: Integrated Flood Protection

Recreational Harbor

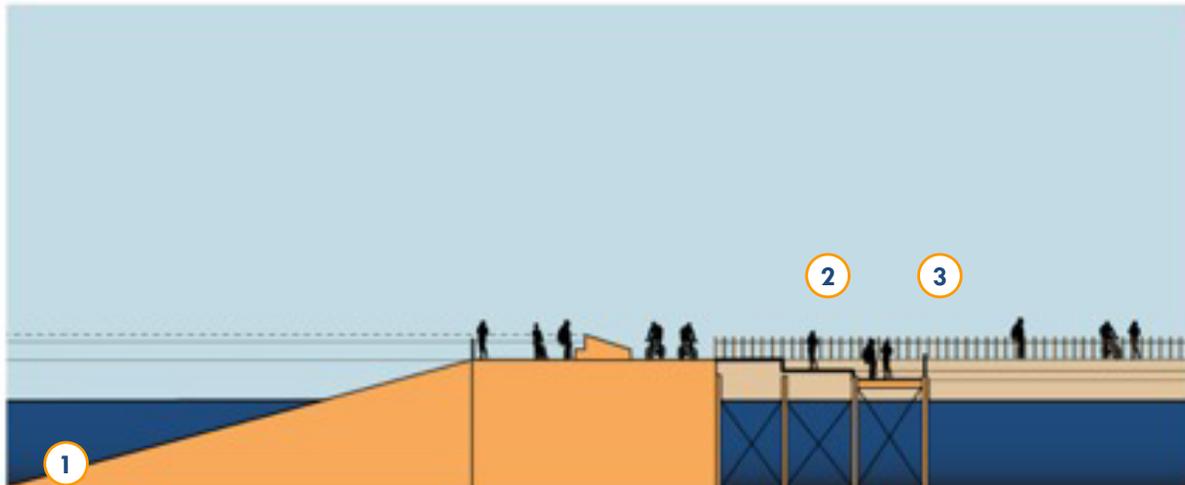
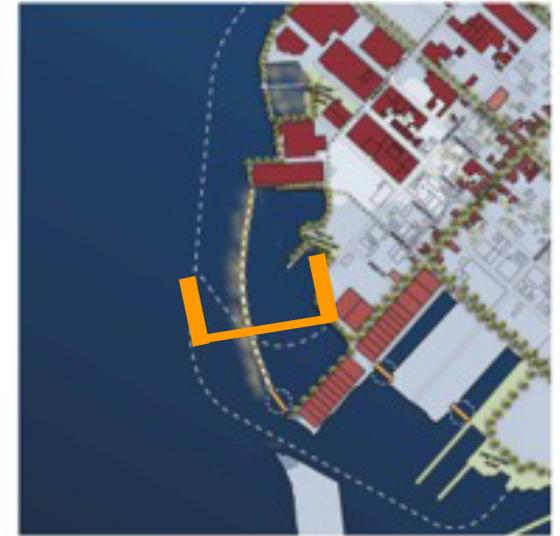
At the foot of Van Brunt, a proposed recreational harbor is created by a new breakwater flood barrier and flood gate, bowing out slightly like a barrier island to rebuff waves. At the top of the breakwater a wide public promenade provides public access at the outer edge, for activities like fishing during normal conditions. The design integrates a sea wall into the promenade design to provide required flood protection height. Transient recreational boating and human-powered craft are housed in the new basin interior, and the existing water taxi landing is maintained.

Further south, along Beard Street, protection strategies are moved to the existing inner harbor edge. Many of the sites (the former Revere Sugar Refinery site, IKEA site) along this section of Beard St. contain vacant land that can be modified to meet the required additional 6 feet of elevation through integrated flood protection that creates an elevated public promenade. Continuing the flood protection along this line would require the addition of two 75-foot flood gates at the inlets at either side of the Revere Sugar site.



District Strategy: Integrated Flood Protection

- ① Rip-rap edge
- ② Wetland edge: “Liberty Promenade”
- ③ Floating dock
- ④ Mainland Red Hook



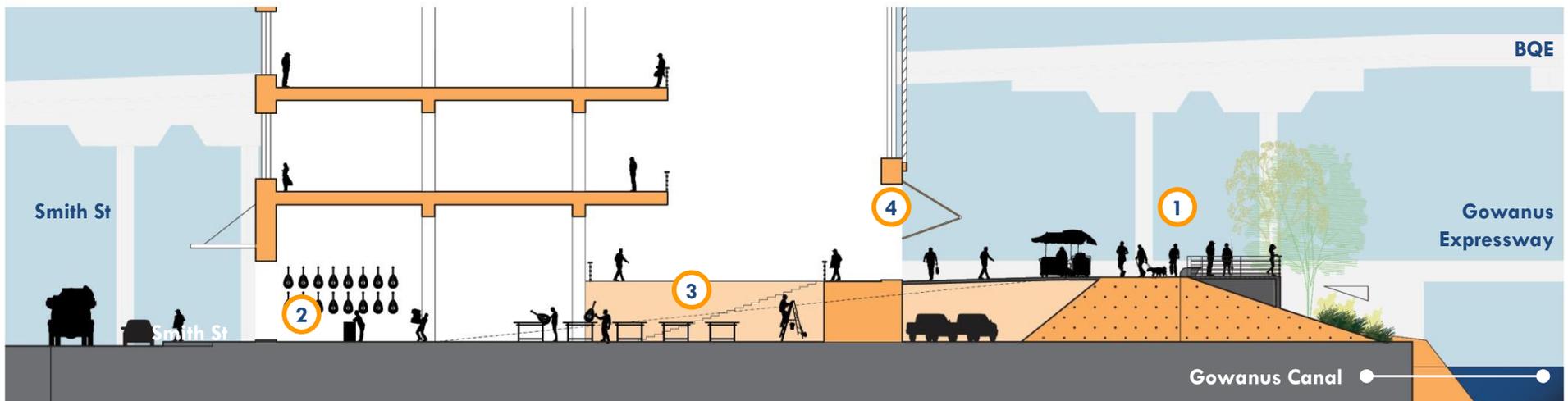
District Strategy: Integrated Flood Protection



An in-water portion of the flood protection system could reduce wave action in a storm event, and recreational access to the waterfront during normal conditions (shown above).

District Strategy: Integrated Flood Protection

- ① Elevated berm and pedestrian pathway providing flood protection
- ② Front of house serves as maker's outlet
- ③ Back of house serves as workshop
- ④ Canal wall provides flood protection



District Strategy: Integrated Flood Protection



educated flood risk on the Gowanus Bank incorporates retrofitting existing buildings and enhancing development of new commercial structures with wet and dry-flood-proofing techniques. Canal-side interventions, such as restoring the bulkhead and creating a bermed promenade can provide additional protection and spur additional activity in the area, encouraging a “Maker’s District” in which industry can continue to grow.

District Strategy: Alternate Integrated Flood Protection Concepts



Inland Protection



Edge Protection

District Strategy: Alternate Integrated Flood Protection Concepts

Inland strategy

Beard Street connects the high points of Coffey Street on the neighborhood's southeast corner to the high points of Red Hook Park three-quarters of a mile to the east. By elevating the street approximately 30 inches and connecting it to these high points, the street would stop more frequent flooding and provide protection from sea level rise. The additional three feet of protection required for 100- year floods can be accommodated through building edge protection, or by raising the first floor of buildings the additional three feet and dry proofing lower levels. Without a raised street, the approximate six-foot elevation to the new protected building elevation can be reached through an upper and lower sidewalk system.

As Beard Street crosses lateral north-south streets, ramps are required. The diagram on the following page demonstrates the proposed conditions at the intersection of Beard and Van Brunt Streets. The effect of the raised street level is minimal when compared to a six-foot tall berm. Berms integrated into park space will provide additional protection to the 100 year flood level. These can easily be worked into bleacher seating and other park features.



Alternate District Strategies

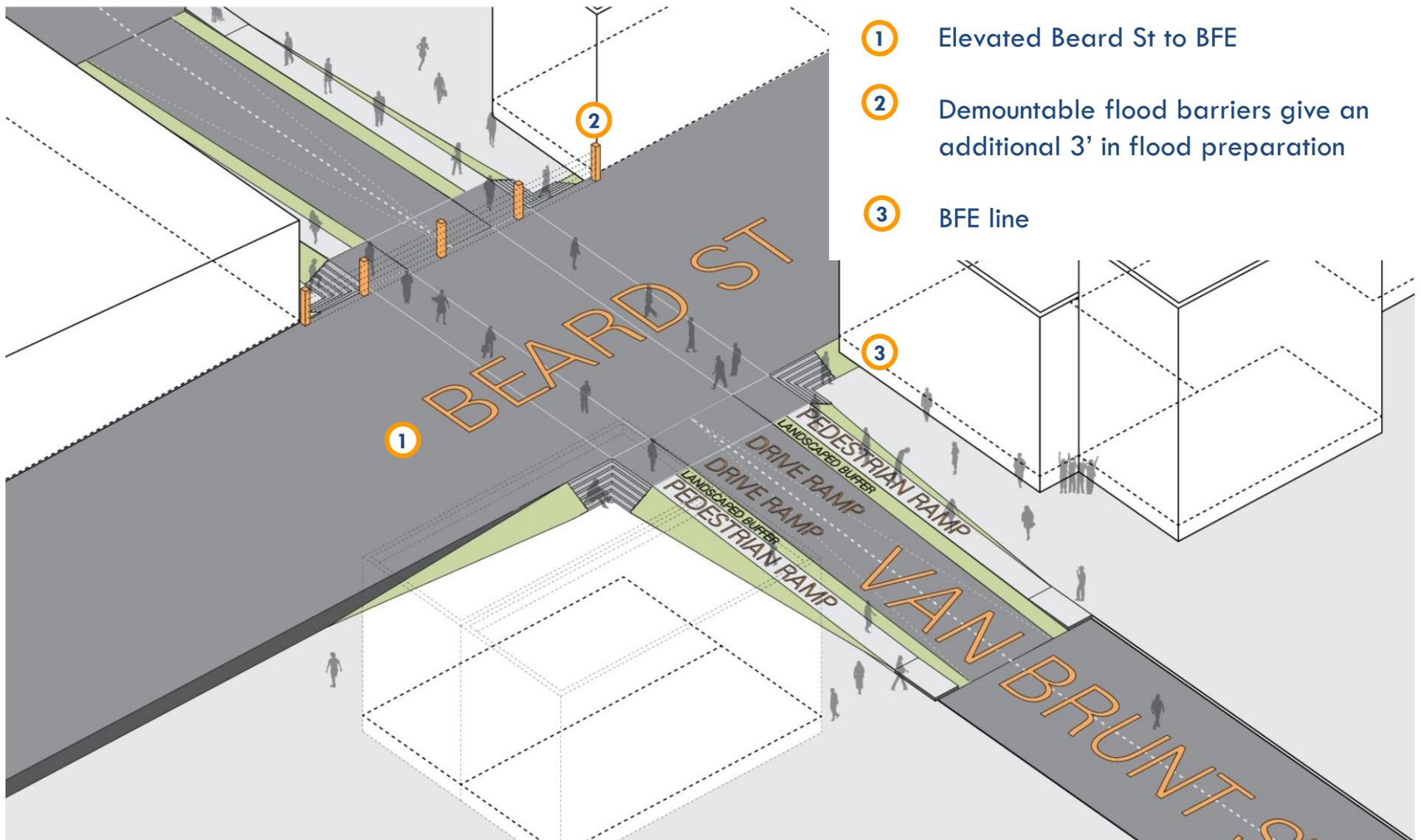
Stormwater infrastructure is fitted with back-flow preventers to keep rising waters during floods from coming back into the community. When these close during a flood, however, the stormwater can flow into the community from the sewers, since it can't get out to the harbor and the pumping station is over capacity. In addition, this water may be contaminated with sewage, since even a small rainstorm of several hours can exceed the capacity of the system to keep these flows separated.

Storm water management during floods is thus an important issue in Red Hook. Our design proposal includes stormwater retention/detention in pipe fields under the reconfigured promenade and large parking areas of the Atlantic Basin and the large open playing fields of the Red Hook Recreation Area. We also create a new wetland basin for fresh water around the Valentine Pier area. These areas can help store stormwater during heavy rains, but during flood events, they may need to be pumped out to the harbor to keep from overflowing and flooding the surrounding areas.



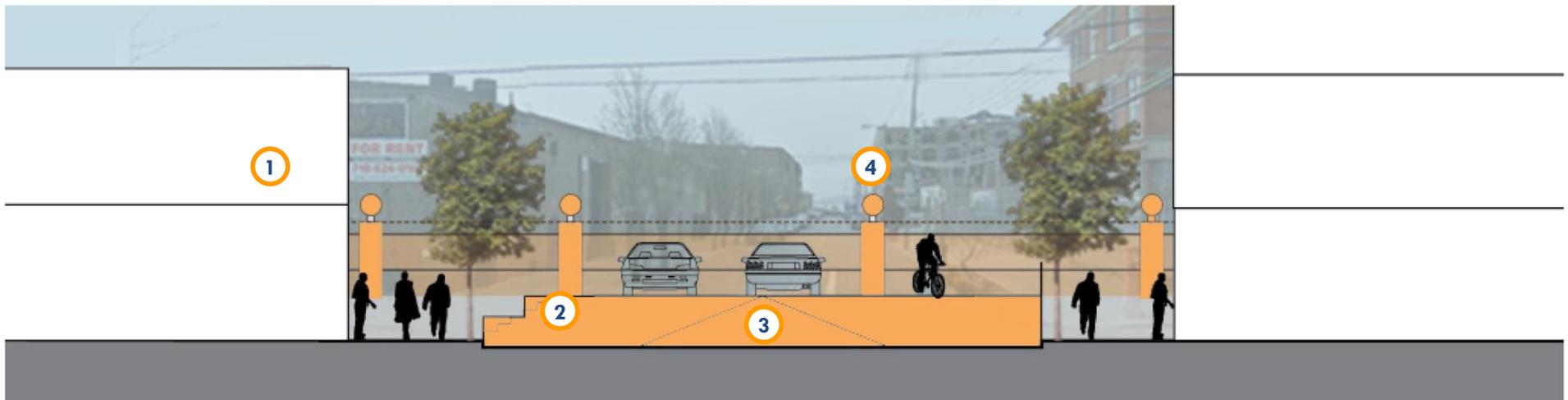
Alternate District Strategies

As the elevated Beard St crosses streets, like commercial Van Brunt, ramps are required. Our drawing of this intersection of Van Brunt and Beard tests the resulting effect on the sidewalks and adjacent historic buildings. As the ramp is relatively short, the effect is minimal.



Alternate District Strategies

- ① Adjacent buildings along Van Brunt St
- ② Stepped access to median
- ③ Elevated ramp to Beard Street from Van Brunt St (Also applicable to: Conover St., Richards St., Dwight St.)
- ④ Demountable flood gates (Additional 3')

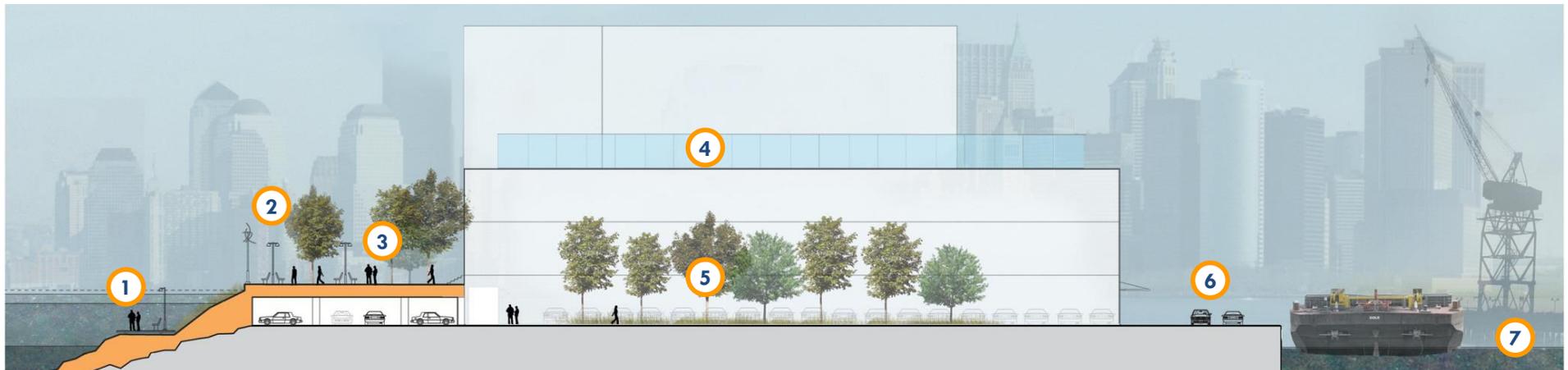


Alternate District Strategies

Water Protection – Erie Basin

Edge protection is provided in a way that maximizes harbor usage, while allowing for pedestrian access to the waterfront and complete flood protection for all properties. Erie Basin is currently home to several industrial and waterfront uses. Public access is on the east edge only and not permitted along half of the southern edge and on the entire western arm, which is a City of New York impound lot. If protected, a flood gate would be installed at the present boat entry to the basin with a new pedestrian bridge allowing for better connection of the basin to the neighborhood.

- ① Armored edge (rip-rap)
- ② Wind turbines
- ③ Public promenade
- ④ Greenhouse/commercial building
- ⑤ Parking/store watercollection
- ⑥ Service road
- ⑦ Erie Basin: Wharf



Current Flood Risk

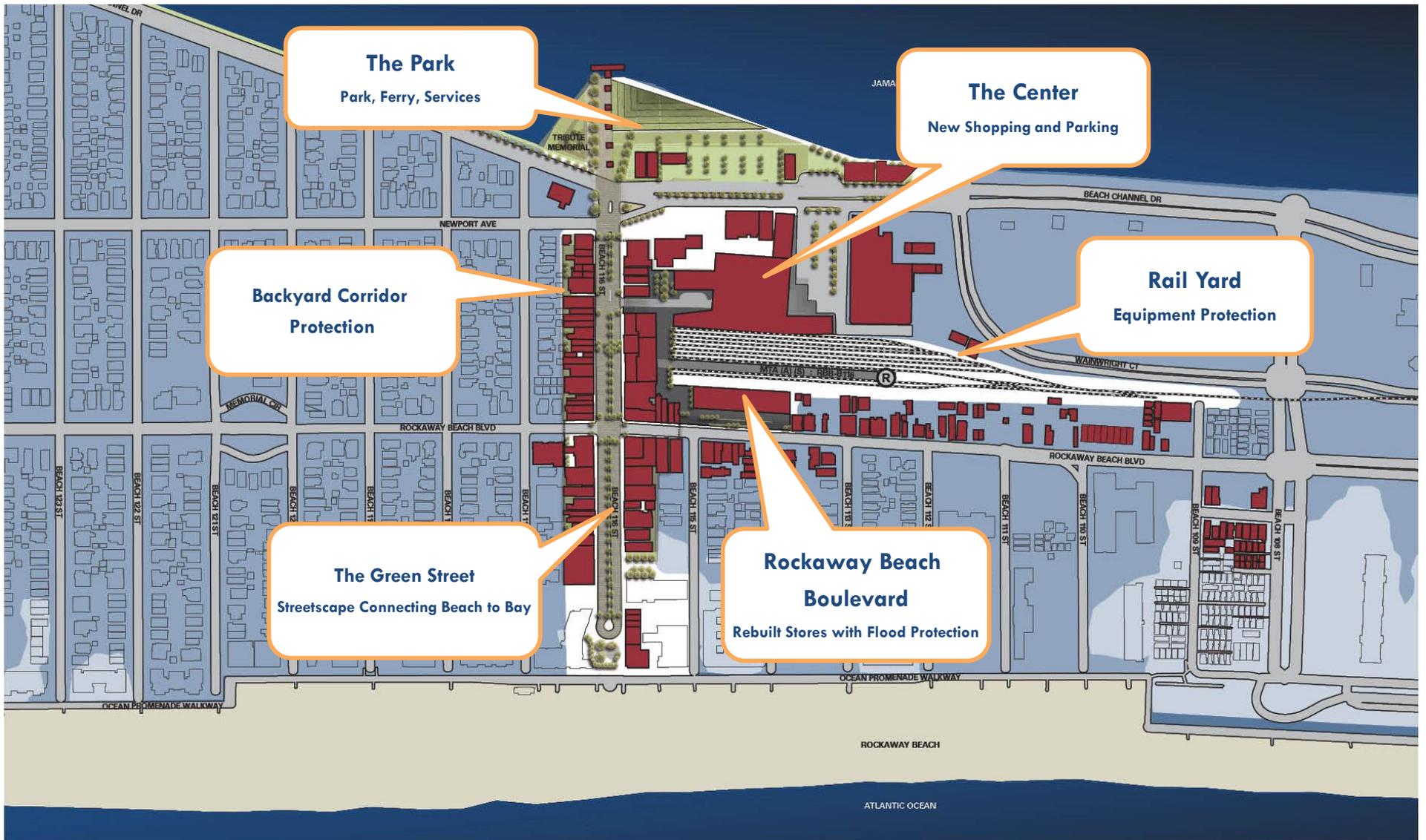


Reduced Risk with Implementation



Beach 116th Street, Queens, NY

A Vibrant Beach to Bay Corridor



Design Solutions

Design Challenge

The Beach 116th Street corridor is a small-scale local commercial corridor that connects the Atlantic Ocean beach to the southern edge of Jamaica Bay. The entirety of the commercial corridor is below the level of the 500-year floodplain. The half of the corridor that sits north of Rockaway Beach Boulevard is entirely below the 100-year floodplain. Our proposal creates a more resilient commercial corridor by minimizing the impact on existing storefronts, strengthening and improving the quality of the MTA property, rebuilding the Rockaway Beach Boulevard properties that were lost to a fire caused by Sandy, and relocating at-risk bay-front retail to new elevated areas on the south side of Beach Channel Drive.

Design Proposal

Building and Business Level Interventions:

One of our **priority design concepts** at Beach 116th Street emphasizes individual business mitigation, which is cost effective and provides substantial mitigation to individual buildings and operating businesses. Implementation and adoption will require substantial technical assistance and financial support, and could spur further action and planning to enhance resiliency of the full corridor. Corridor Protection:

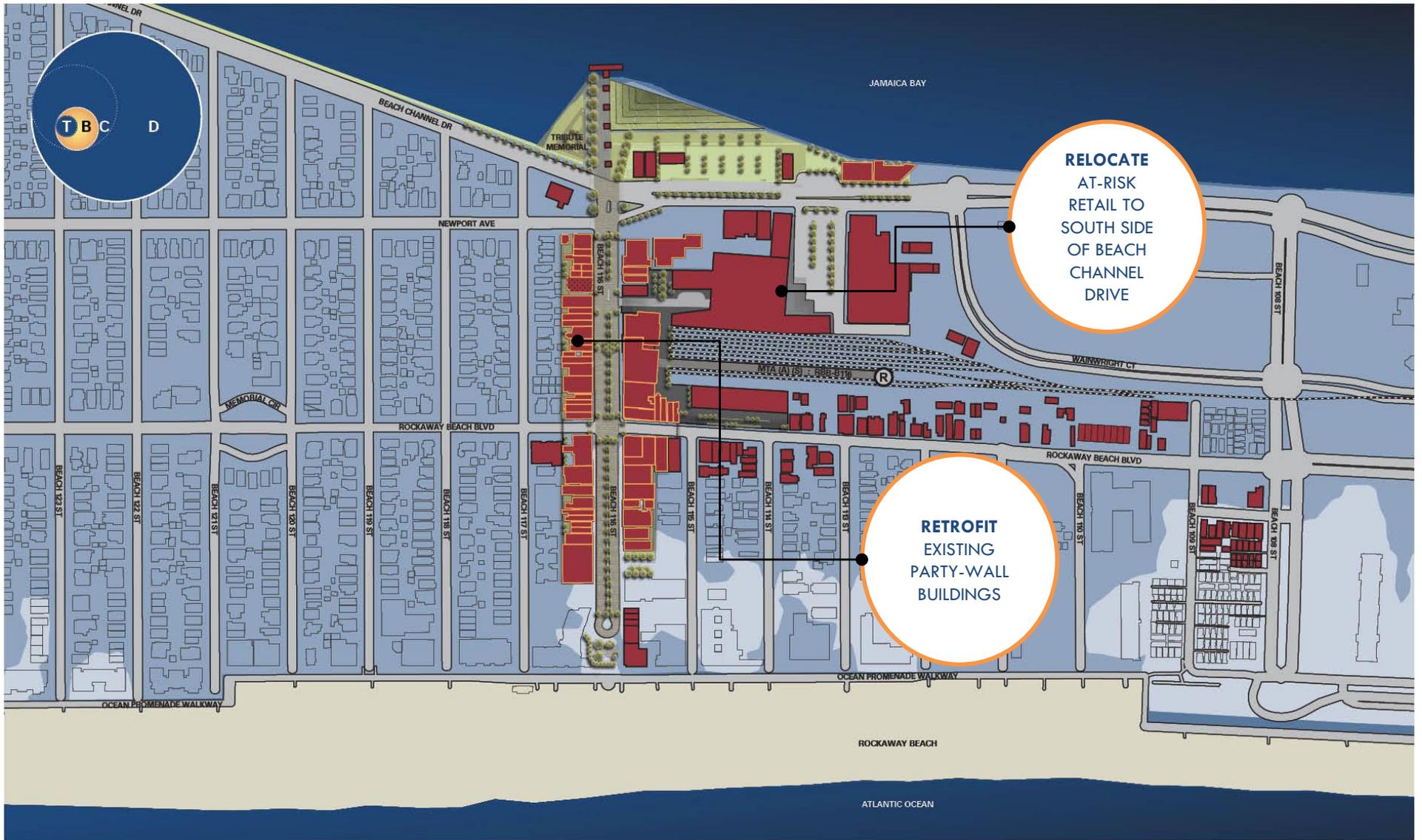
We propose a planning initiative for an unprecedented corridor protection project linking a system of protections along the property line of each commercial property on Beach 116th Street to form a resilient corridor. Interventions could vary based on each lot's existing condition, from berms to floodwalls, creating a protected area that will provide a safe place for businesses and residents to return after a disaster.

District Interventions:

Protecting critical infrastructure is another **priority design concept**. Mitigation of the MTA terminus at Beach 116th Street could combine commercial revitalization, urban planning, and flood protection. To protect the rail yard, an integrated platform would be constructed above base flood elevation (BFE), extending north and south from the station headhouse into the current municipal parking lot and onto the lots that were destroyed by a post-Sandy fire. This platform will provide a new elevated datum to be programmed with open space, landscaping, and new commercial activity (on Rockaway Beach Boulevard). This elevated element could also tie into the corridor protection pilot if executed. Parking displaced from the municipal lot will be replaced in an elevated parking structure north of the train station, providing adequate parking for shoppers, residents, and visitors during beach-going months.

Additional interventions to study in future planning initiatives include extending ferry service to Beach 116th or Beach 108th Street, enhancing connectivity and creating new economic activity on the corridor. Resilient streetscape improvements will also be an important part of enhancing resiliency, especially in protection from smaller but more frequent storms.

Business & Building Strategies



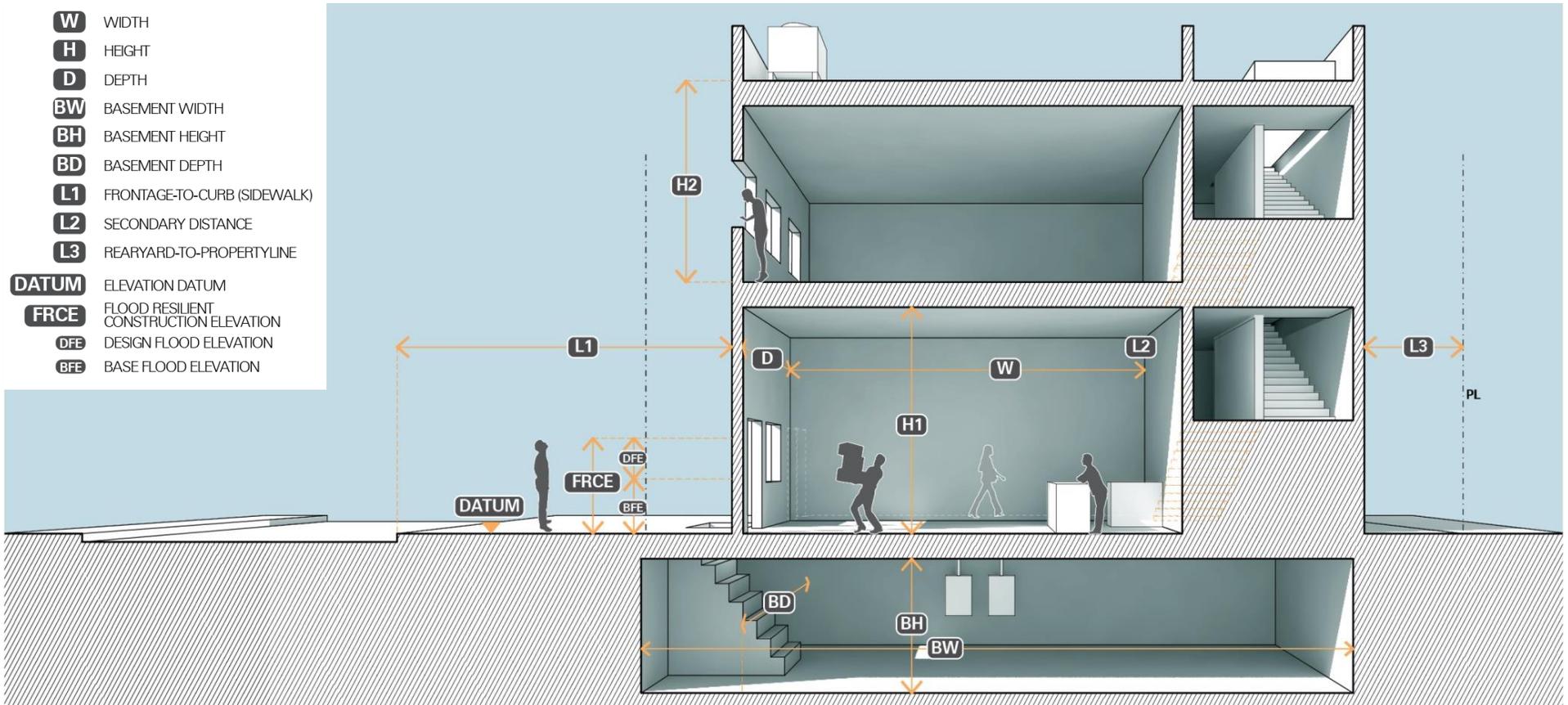
Business & Building Strategy: Party Wall Typology



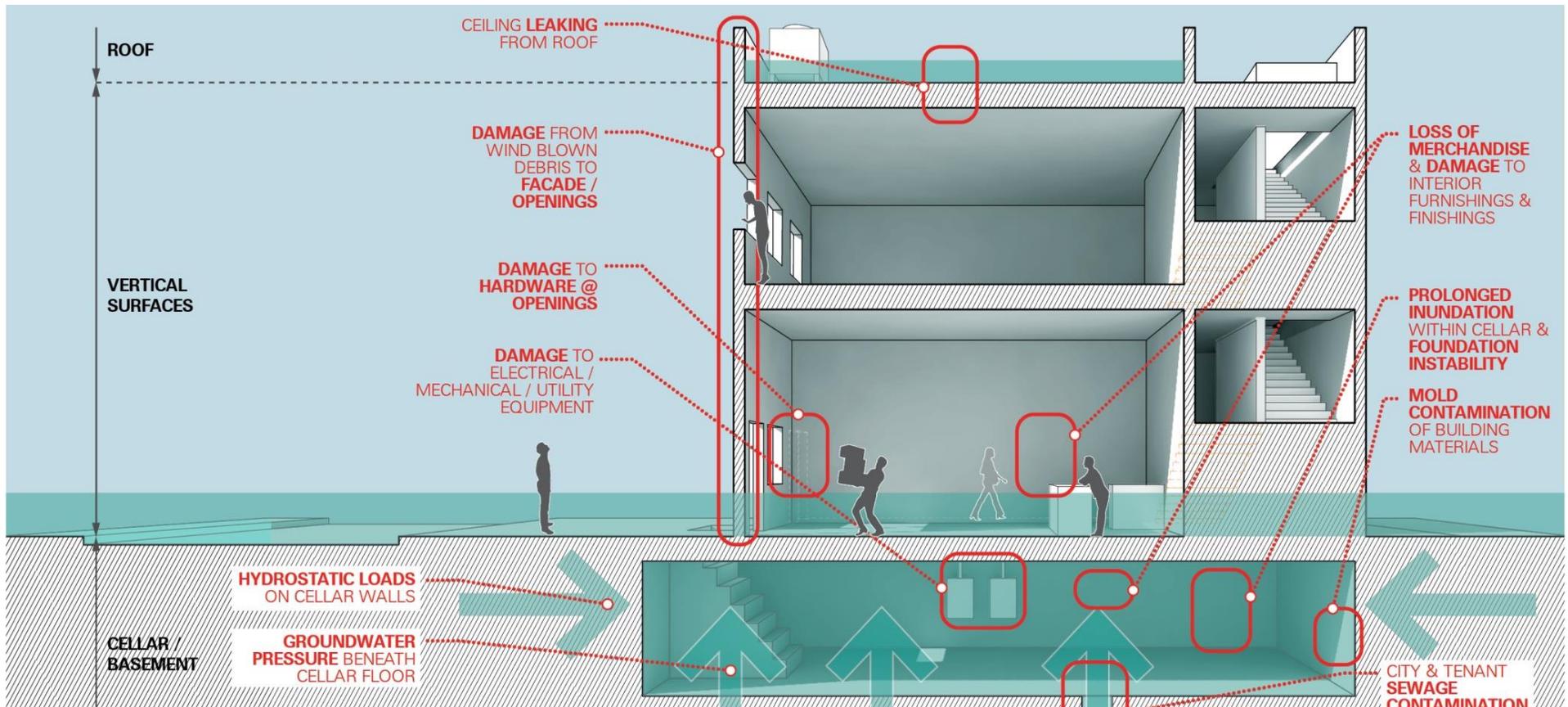
Typology

Buildings along Beach 116th Street are predominantly two-story buildings with shops, banks, restaurants, service providers on first floors and apartments on second floors. During Sandy, basements endured flooding, due mostly to seepage through old masonry joints or from sidewalk hatches. Near Jamaica Bay, ground-floor businesses took on up to four feet of water. Building-level mitigation could reduce the risk of property damage, loss of inventory, and shorten the period of business disruption.

Business & Building Strategy: Party Wall Typology



Business & Building Strategy: Party Wall Typology

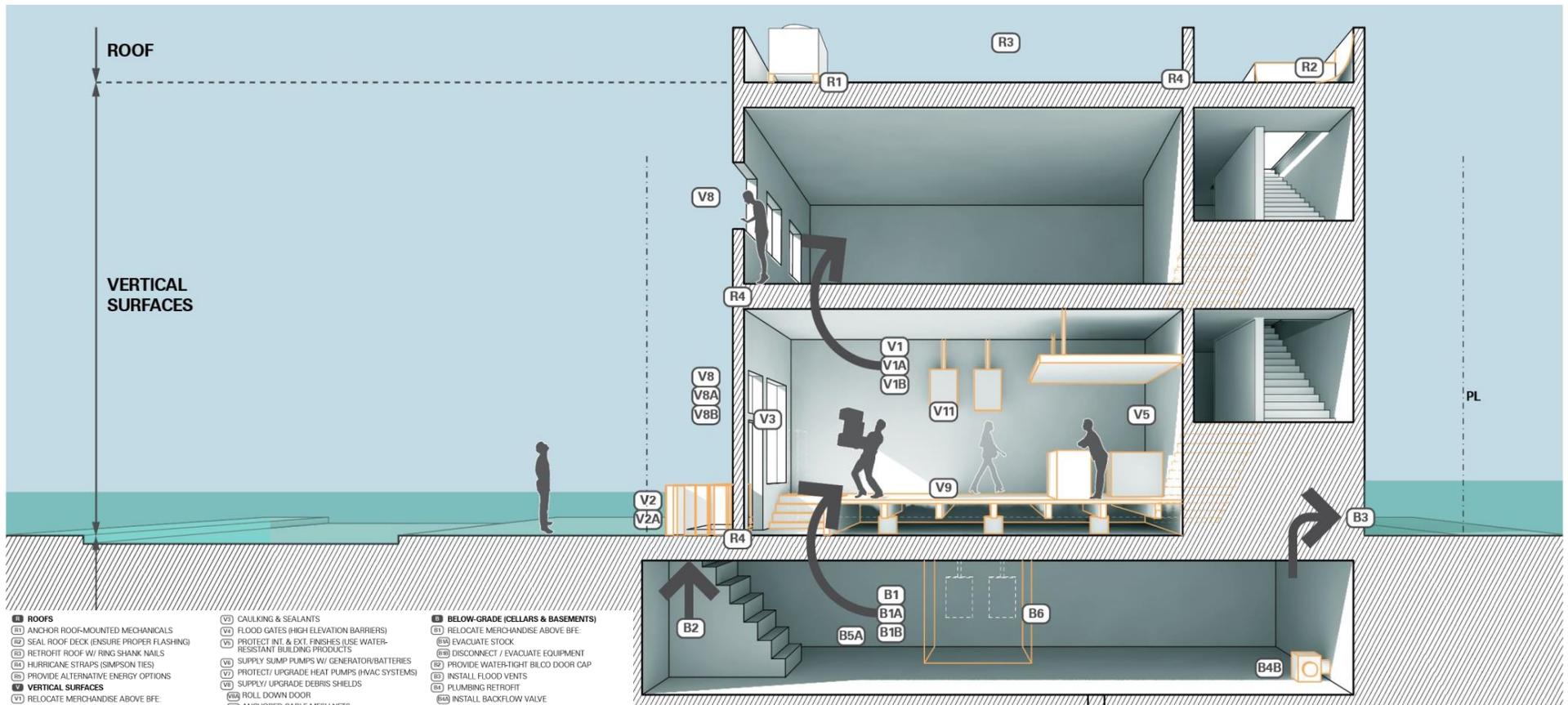


Hazard Risks

Roof: Wind can disconnect mechanical equipment and penetrate roof deck and soffit allowing water entry.

Vertical surfaces: Water or wind can penetrate window openings, exposing interior contents to water damage. In addition, surge, heavy rain and inadequate stormwater management can damage interior finishes, equipment and contents.

Business & Building Strategy: Party Wall Typology



Storm Preparedness Interventions

Create a storm preparedness plan, evacuate at-risk first floor and basement equipment and stock to safe location, and back-up and store records off-site

Building Mitigation

Roof: retrofit HVAC and other roof mounted equipment with ties and straps; secure roofing materials and soffit.

Vertical surfaces: install window shields to upper floors and door/window shields or temporary door barriers on first floor. **Basement/Cellar:** repair leaking basement masonry, install backflow valves in drains, elevate electrical panel and other utilities, evacuate equipment and stock off-site or to higher floors

Building Mitigation Case Study: Beach Channel Drive Service Provider

Existing Conditions

This Allstate Insurance office has occupied the end unit of a retail strip along Beach Channel Drive for over two decades and assumed the adjacent interior unit in early 2012. Today the space is just under 2,000 square feet. The business owner keeps many business documents in electronic files and made significant investments in the office space upon expansion. Paper records were maintained in lateral file cabinets.

Sandy's Impact

- Hurricane Sandy devastated the physical office. Staff were compelled to quickly create an alternate location to serve clients impacted by Sandy. A mobile trailer unit, located in a nearby parking lot, served as a temporary office for several months, after which the office moved into a conference room space in another office on Beach 116th Street.
- The firm returned to its location within several months. Upon returning, the business owner purchased the building and installed mitigation measures to improve the building's resiliency.

Post-Sandy Mitigation Recommendations

- Install window shield to large side window near side door;
- Install flood-proofing gasket seal kits to entrance door and vestibule door, along with side door; and
- Update Business Continuity of Operations Plan to capture Sandy "lessons learned."

Mitigation measures, including those already installed, total approximately \$9,500 and provide significant protection.



Building Mitigation Case Study: Beach 116th Street Corner Store

Existing Conditions

Station Wine & Liquors is an owner-occupied commercial space on Beach 116th Street. The owner leases the upstairs office area to another business. The wine shop owner also owns the adjacent lot, which he presently utilizes for parking. The first-floor space is divided into retail floor space upfront and a storage room to the back, accessed by both a front door and rear door. The space is just under 2,000 square feet. The owner and his staff placed sandbags at the front door prior to Sandy. A higher-grade replacement window now fronts the shop, and a double entry vestibule door retrofits the front door. It was unclear whether the front door shutter is designed to perform as a storm shield or serves as a security shield.

Sandy's Impact

Sandy destroyed merchandise and damaged the storefront resulting in significant business interruption. The sandbags placed in front of the door did not hold back the storm surge, and debris came into the building from the broken front window and front door. A water line marked near the register shows water levels reaching five feet. All stock kept below this height was destroyed, along with the register, store computers, cooler units, and business records (though these were off-site). The store was closed for several weeks following Sandy as the shop owner cleaned the store, re-ordered stock, and tended to administrative aspects, such as applying for SBA benefits. The owner now has full flood insurance coverage for the building and contents, assuring him that he will be better positioned for a future flood or storm damage, though no mitigation investments have been made to date.



Building Mitigation Case Study: Beach 116th Street Corner Store

Post-Sandy Mitigation Recommendations

Team members made the following mitigation and storm preparedness recommendations:

- Install window shield to large front window (pictured at right);
- Install flood-proofing gasket seal kits to entrance door and vestibule door, along with rear door;
- Continue to keep most expensive stock on high shelves at store's rear (pictured at bottom right);
- Evacuate electronics and expensive equipment – move cooler to rear of store in advance of a storm;
- Flood proof rear exterior electrical and HVAC panel boxes; and
- Elevate rear HVAC unit.

Costs for the mitigation measures described total \$10,000 for a significant level of protection, supplemented with behavioral strategies to protect stock and business records.



Building Mitigation Case Study: Beach 116th Street In-Line Store

Existing Conditions

Rockapup, a small, single-location business, has operated on Beach 116th Street for four years. The business owner leases the basement and first-floor retail area of approximately 2,000 square feet. Her business includes pet supply retail, grooming, and training. The first-floor space is divided between retail space and a pet grooming area. The grooming area is partially waterproofed to accommodate animal bathing. The rear door features an interior shield which would provide flood protection. The property's owner is not based locally and has not yet invested in capital improvements for mitigation. All resiliency improvements to date have been installed by the business owner (lessee).

Sandy's Impact

During Sandy, the owner evacuated small animals to her nearby second-floor apartment in advance of the storm. Water filled the basement, entering through a sidewalk hatch in front of the basement area. Following the storm, the business owner cleaned the basement space, which she re-purposed into an open training area and a small workshop for the production of custom products. She has also purchased a sump pump and other equipment to prepare for a flood and clean up in the aftermath. New basement finishes are also water-resistant.



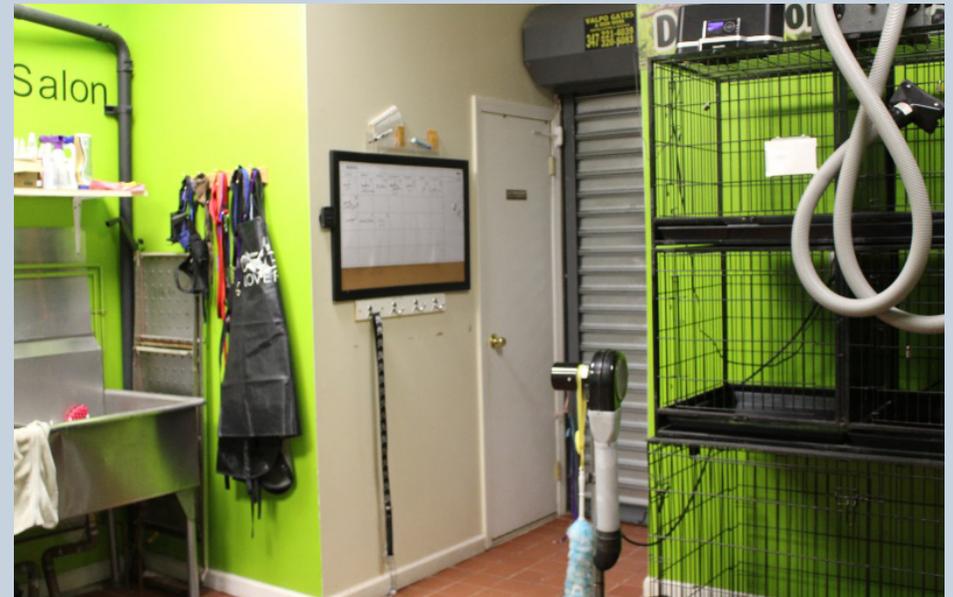
Building Mitigation Case Study: Beach 116th Street In-Line Store

Post-Sandy Mitigation Recommendations

We provided the following recommendations :

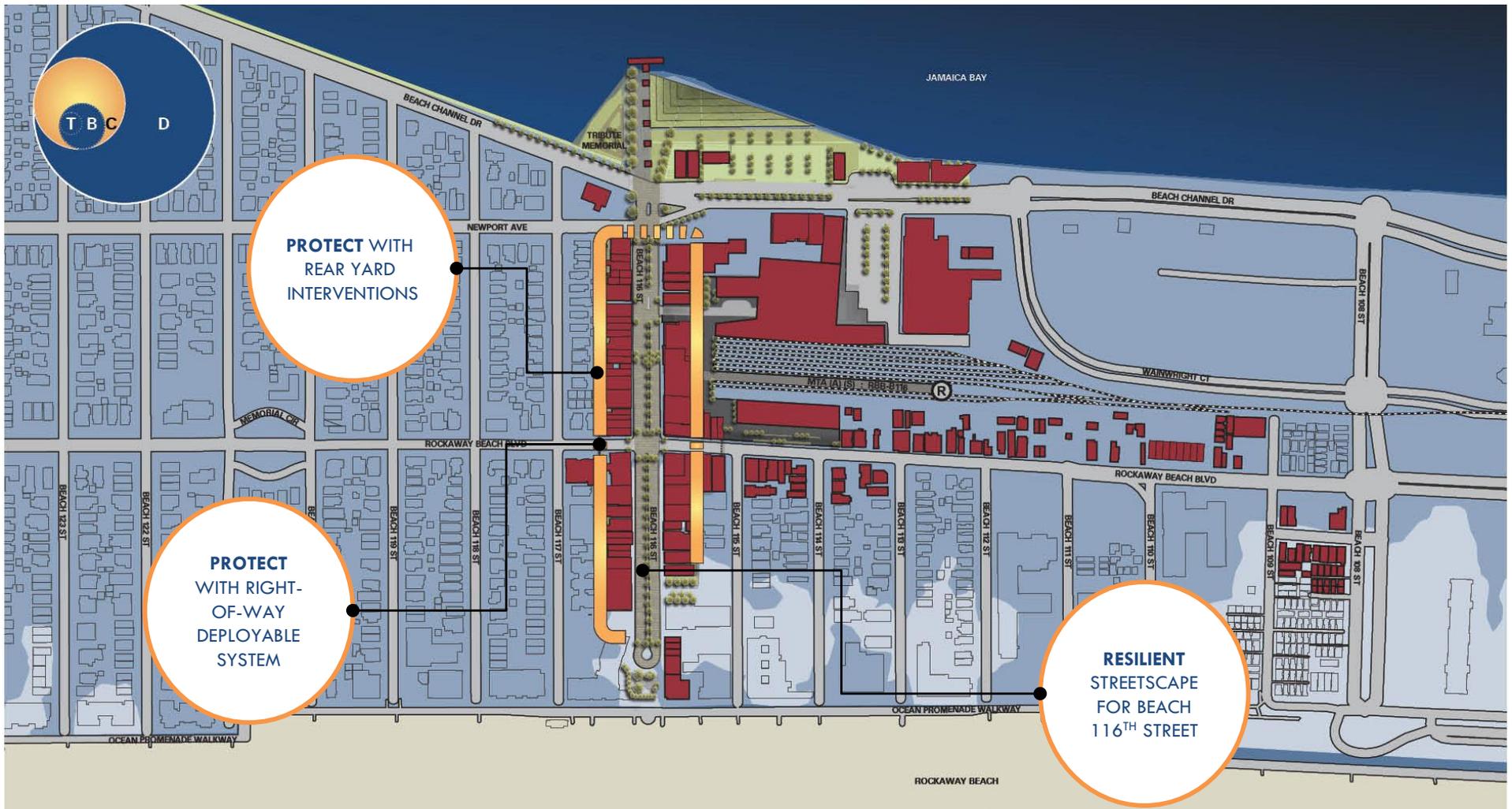
- Install window shield to large front window;
- Install flood-proofing gasket seal kits to entrance and rear door if security door is not rated to flood-proofing standards
- Evacuate cash register, electronics and expensive equipment to rear grooming area or off-site in advance of a storm;
- Install basement drain backflow valve – the property owner’s responsibility; and
- Construct a shield for the sidewalk hatch and store on-site to be ready to deploy in advance of a storm.

The recommended mitigation measures would likely cost about \$9,300 to install.

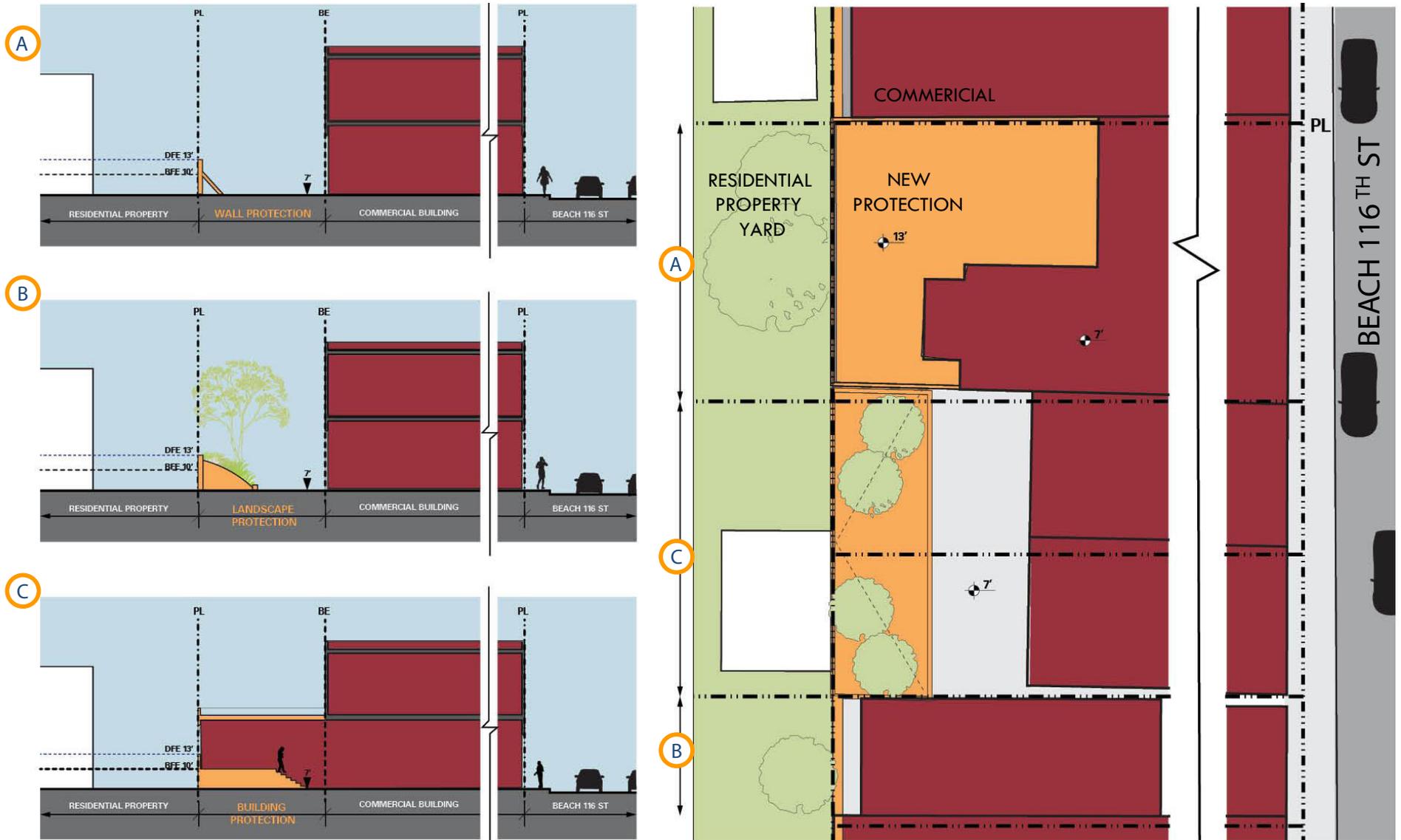


Corridor Strategies

Corridor scale protection at Beach 116th Street is a pilot for a new way of thinking about protecting coastal communities' most vulnerable commercial corridors. The design calls for a rear yard flood protection system that can be built as-of-right within existing property lines. A continuous rear yard barrier against tidal flooding protects the whole corridor, as opposed to mitigating on a building-by-building basis, and mitigates potential for one property's vulnerability to affect another (ie, flooding in one building leaking into a neighboring basement).

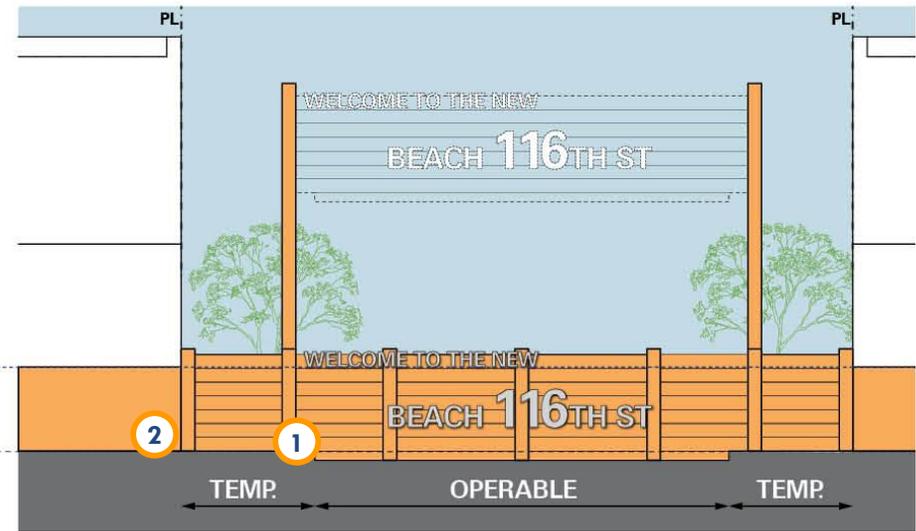
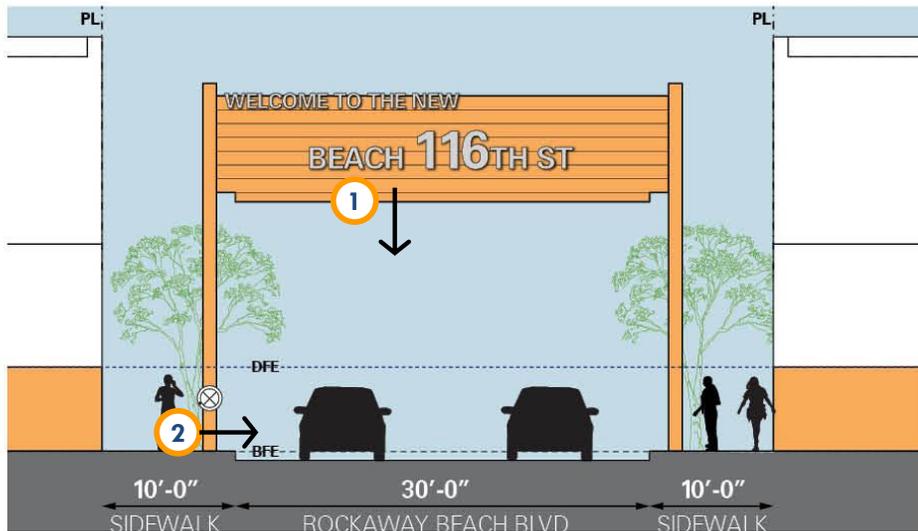
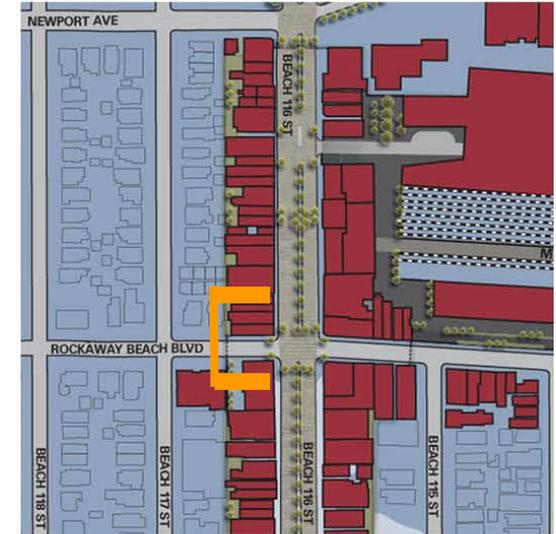


Corridor Strategy



Corridor Strategy

- ① Manually-operated dropdown gate
- ② Deployable sidewalk gate

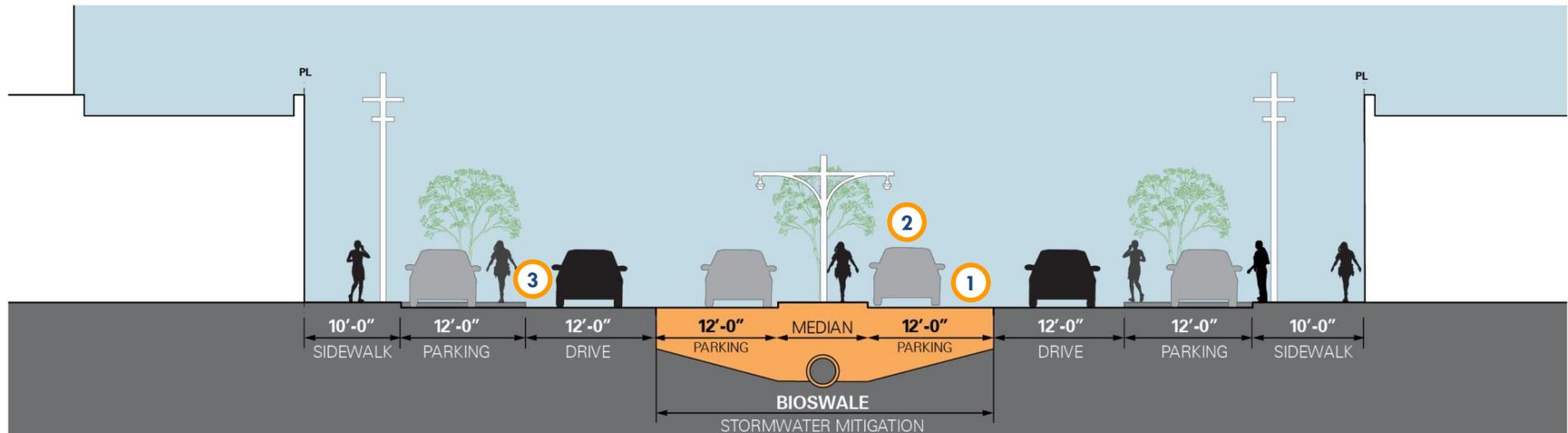


Streetscape

A protected corridor would be designed with a new streetscape that improves the quality of the business environment and could double as green infrastructure to help mitigate the effects of minor storms that would not necessarily trigger the need to deploy the parts of the larger system.

Corridor Strategy

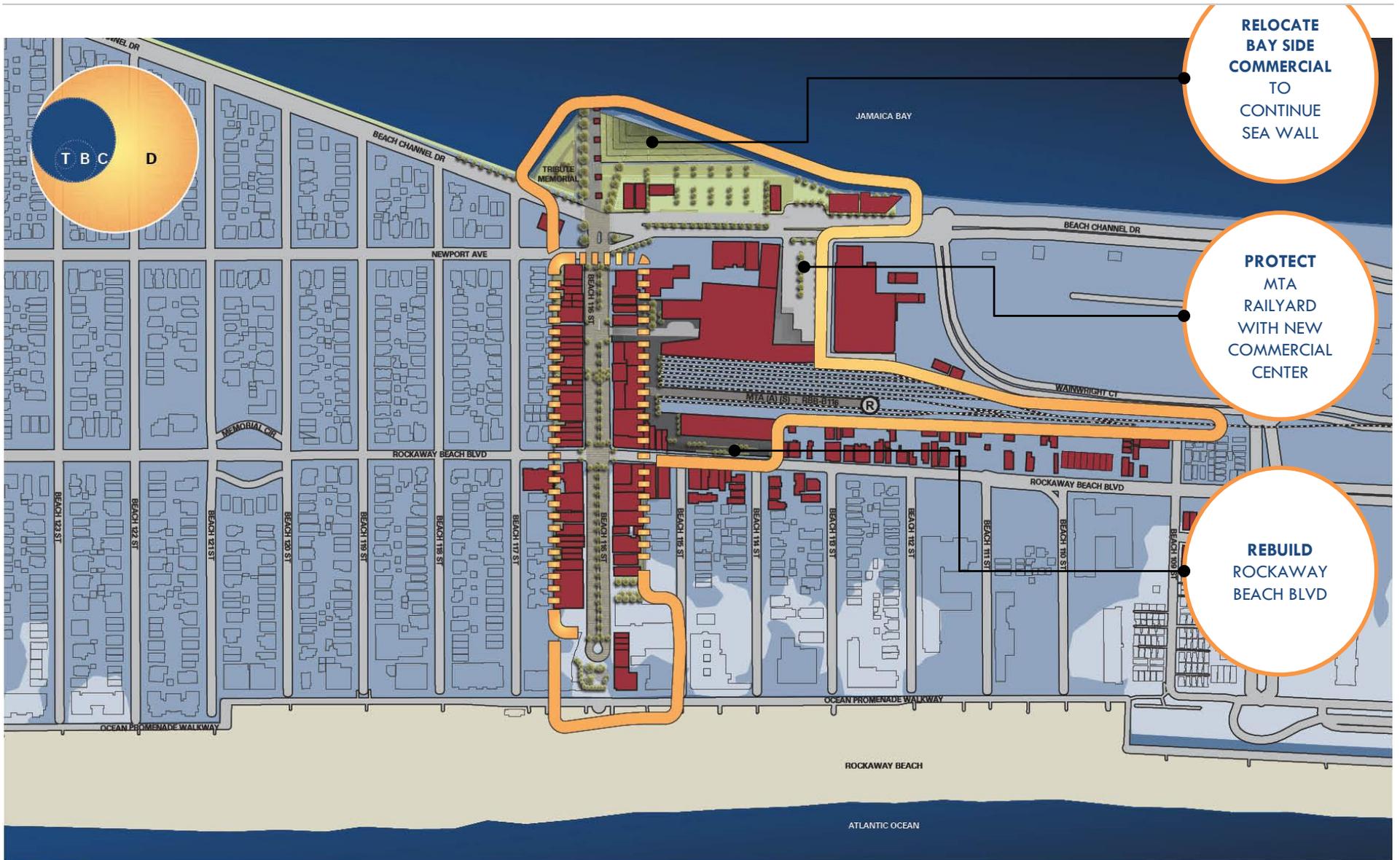
- 1 Bioswale for stormwater mitigation
- 2 Maintain parking
- 3 Pop-out curb to enhance pedestrian movement



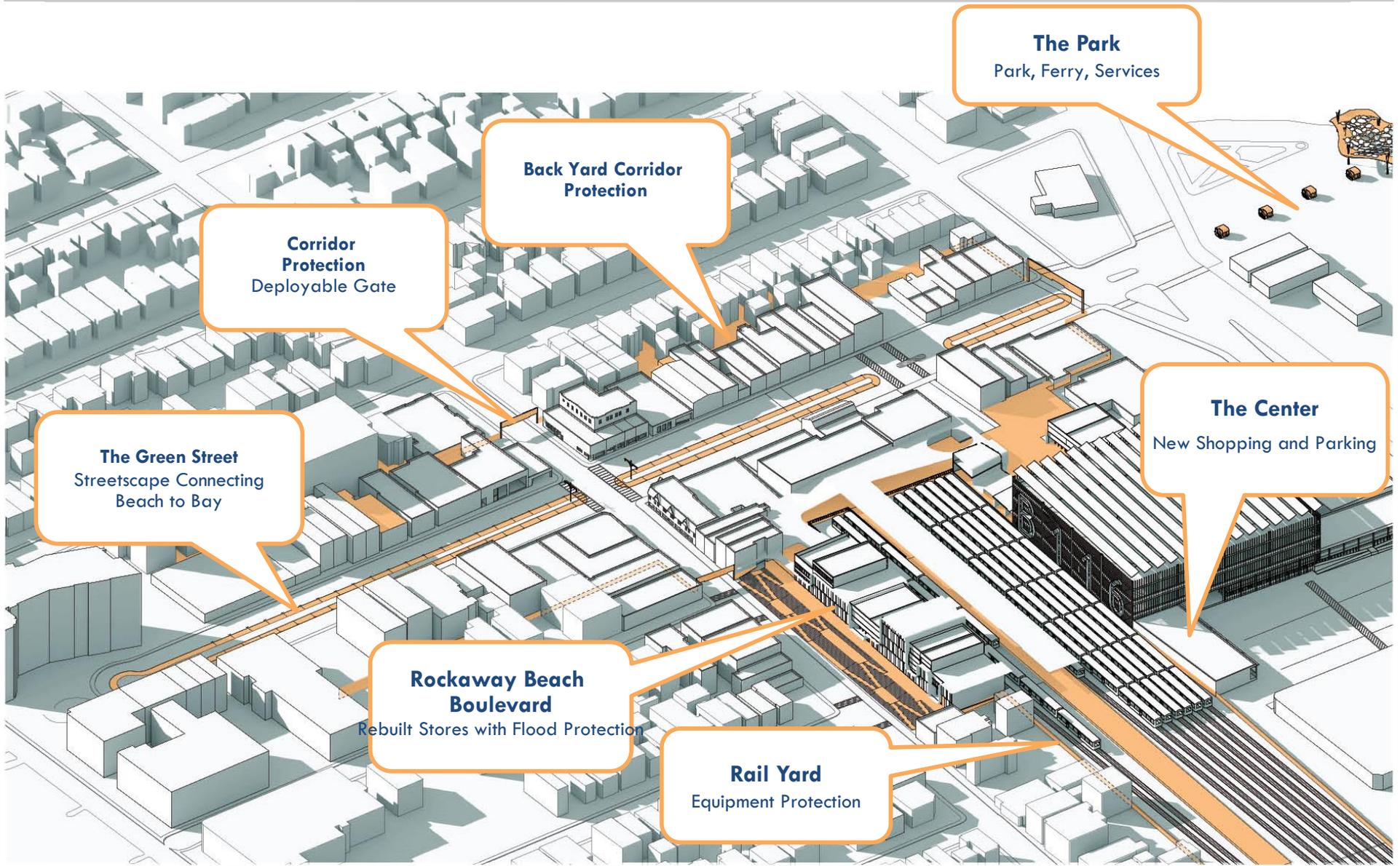
Corridor Strategy



District Strategies



Corridor and District Strategies



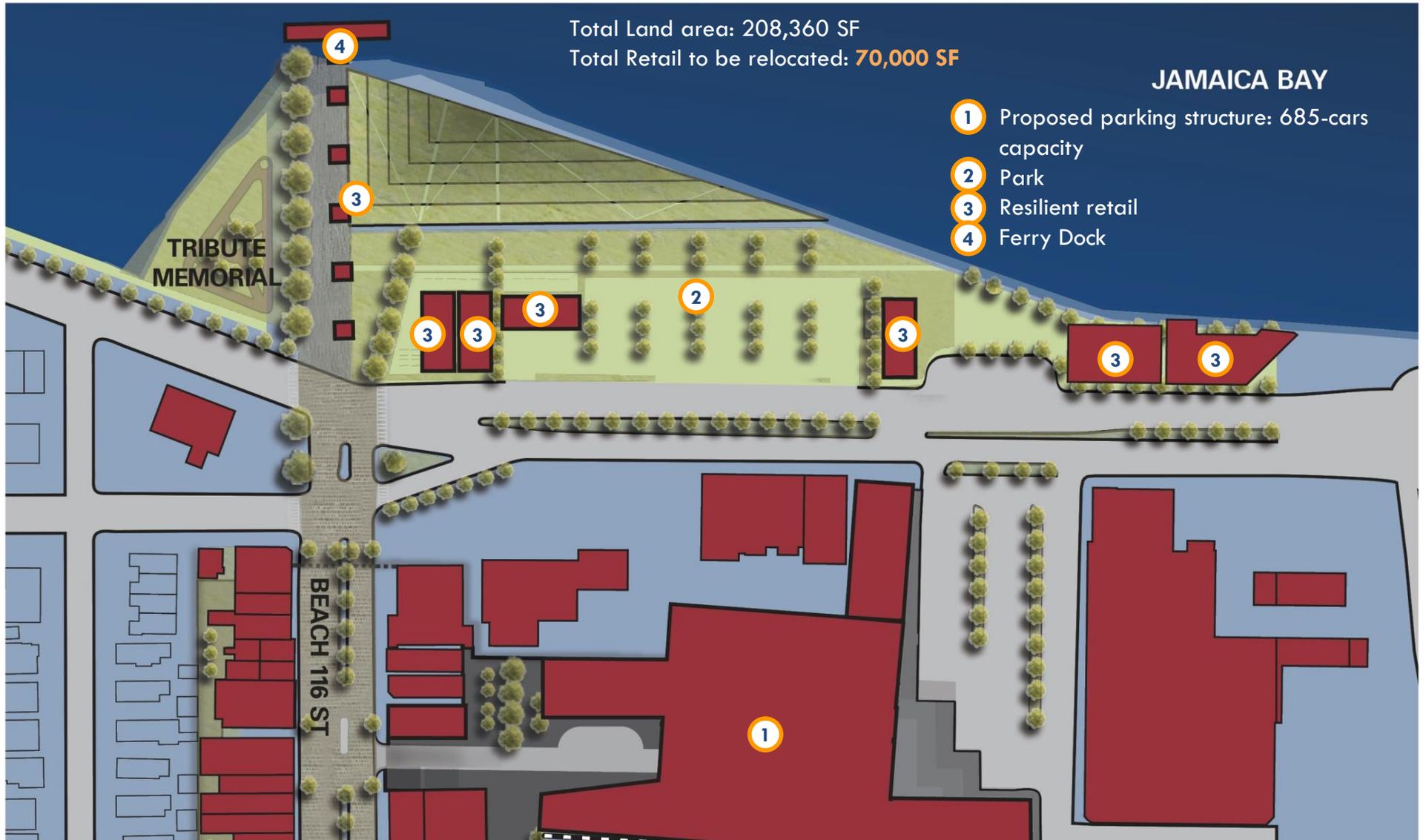
District Strategy

Relocate Bayside Commercial Properties to Complete the Seawall

There is approximately 70,000 square feet of commercial space at risk along Jamaica Bay and Beach Channel Drive near Beach 116th Street. A parking structure with a floodable ground floor (lined with a flood resistant wall on the rail yard side) will provide replacement parking for spaces removed from the municipal lot and Waldbaums parking (approximately 250 spaces), making room for properties currently situated in the floodplain along Jamaica Bay to be relocated across Beach Channel Drive and redeveloped as resilient buildings, which also protect the MTA rail yard. The latter portion of this strategy will require public intervention to swap public for private land, and represents a longer-term strategy for further study. Protection of the MTA rail yard could be pursued in the near-term with appropriate funding.



District Strategy



District Strategy



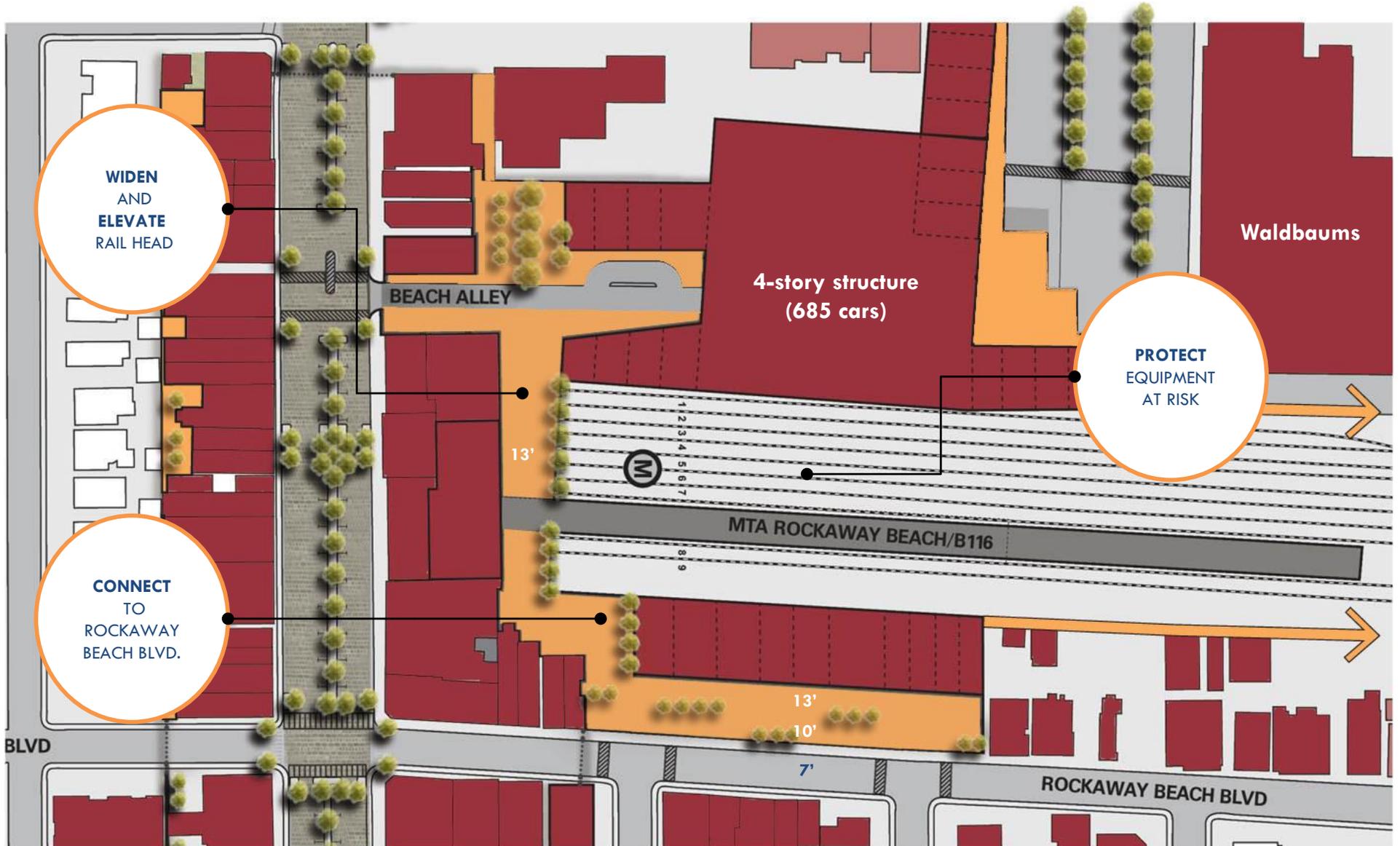
District Strategy

Railhead Development

Raising the elevation of the MTA terminus will protect both the MTA's essential switch equipment and rails, and tie a protected datum into the rest of the corridor, setting a precedent for accessible, elevated commercial and mixed-use property supporting a resilient district. An elevated platform (at design elevation of 13 feet) will wrap around the east and south sides of the rail yard, open to the current municipal lot to the north and Rockaway Beach Boulevard and new development to the south. At the north end, elevated space could become an open plaza, while the platform to the south will provide an elevated base for restoring commercial property that was substantially damaged by a fire during Sandy and subsequently demolished.

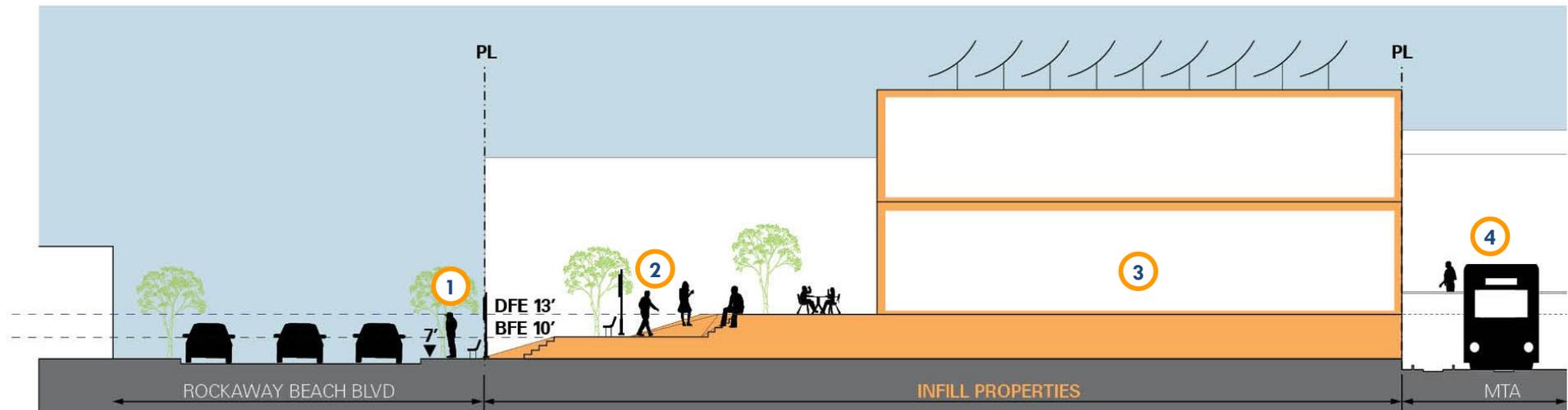
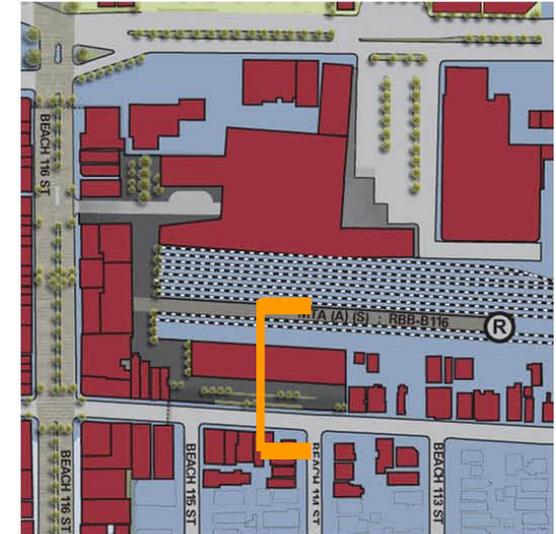


District Strategy



District Strategy

- ① Bus stop on Rockaway Beach Boulevard connected to the MTA Rockaway Park Station
- ② Stepped flood protection and access to MTA platform
- ③ Replacement retail buildings
- ④ MTA station

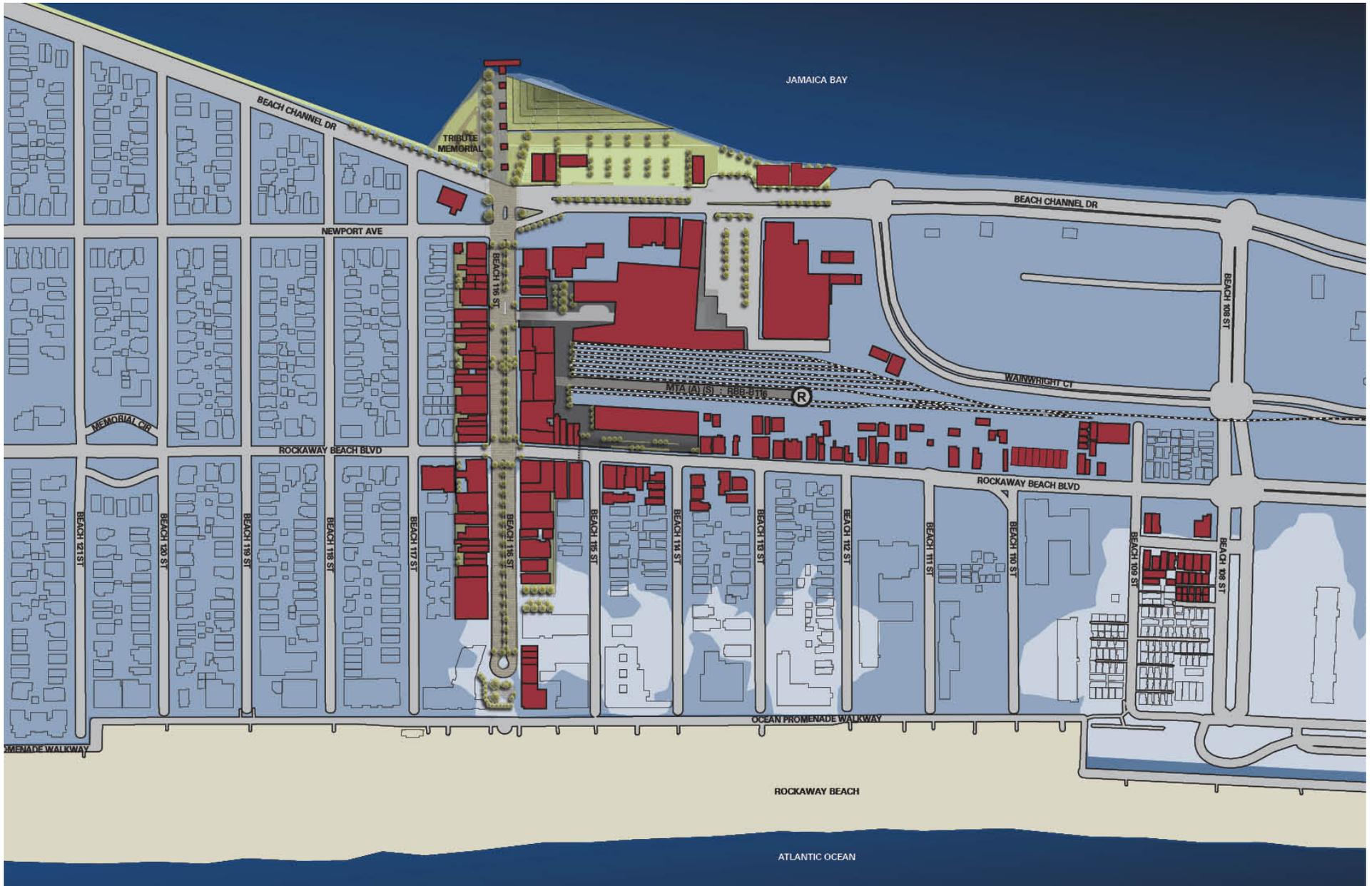


District Strategy

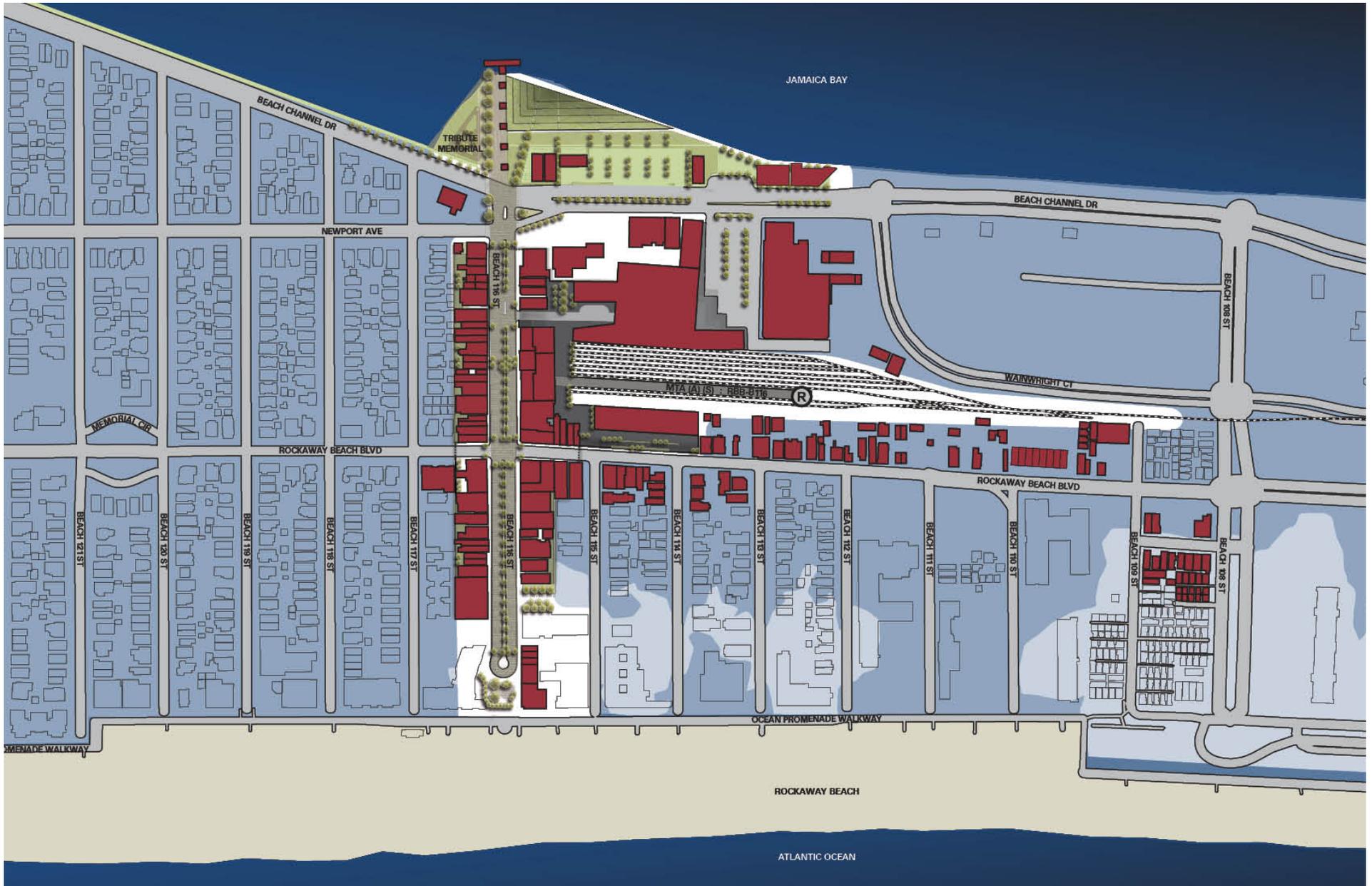


The redeveloped section of Rockaway Beach Boulevard establishes retail and public space at a new resilient elevation with a connection to a protected and revitalized A train station.

Current Flood Risk



Reduced Risk with Implementation



Asbury Park, NJ

A Unified, Resilient Shore Community



Design Solutions

Design Challenge

We identified three joined corridors in Asbury Park that were impacted by Sandy flooding. The Boardwalk/Ocean Avenue spine is threatened by storms, both by flooding and also by large debris carried in with storm surge. Businesses along this corridor are predominantly seasonal, and many are in semi-temporary structures, leaving them vulnerable to significant damage. Dual frontages on Lake and Cookman Avenues leave buildings vulnerable to flooding from Wesley Lake, while the northern end of Main Street and Memorial Drive are threatened by Sunset and Deal Lakes.

Design Proposal

These three locations are the focus of our priority design concepts in Asbury Park, including:

- A layered approach to integrated flood protection along the boardwalk and Ocean Avenue to strengthen the economic lifeblood of the community. Along the boardwalk, protection includes reinforcement of the existing structure, without raising protection over the boardwalk's edge and disturbing the community's views to the ocean. At the property line behind the boardwalk, we have designed a concept for deployable building protections that act as barriers to prevent debris from damaging storefronts. The system would be connected across public open spaces by deployable flood walls, stored on or near the boardwalk during normal conditions.
- Protection of the coastal lakes, including Wesley, Sunset, and Deal Lakes, will provide flood protection while also restoring recreational access, improving local ecology, and providing new opportunities for economic growth. Protection can be accomplished through a combination of soft and hard interventions, intended to protect from flooding while providing access to the bodies of water.
- In addition to larger-scale interventions, we propose near-term implementation of a Shore-wide program to fund and assist with business and building-level mitigation. These strategies can provide reduced risk in terms of physical damage and safety, and all businesses to recover more quickly and return to normal operations. Most boardwalk edge buildings would benefit from capital improvements, while businesses would greatly benefit from training on behavioral strategies to prepare for a storm event.

Additional initiatives focus on unifying Asbury Park's east and west communities, through enhanced connectivity between the economically-challenged community to the east of Springwood Avenue and the revitalizing Cookman-Lake Avenues corridor. At the northern end of Main Street and Memorial Drive, a meeting place for the diverse populations of the Asbury Park community, we propose interventions to tie into high ground at the New Jersey transit rail embankment and the Main Street Bridge landing.

Business & Building Strategies



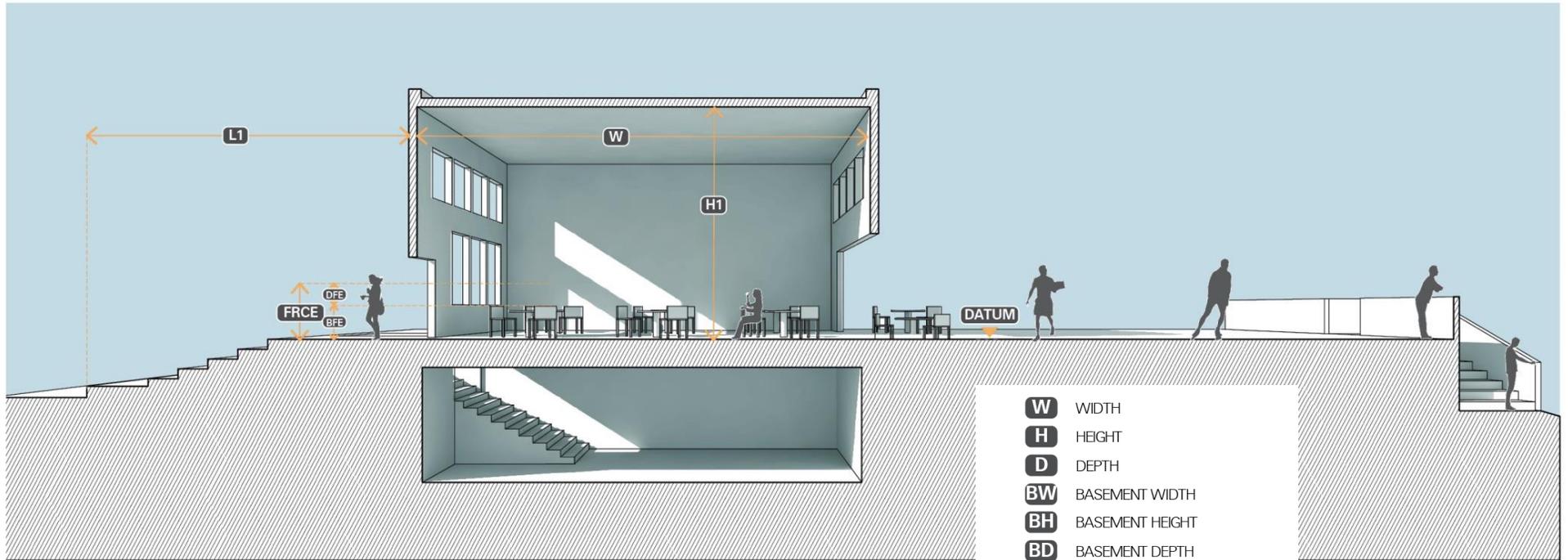
Business & Building Strategy: Boardwalk Pavilion Typology



Typology

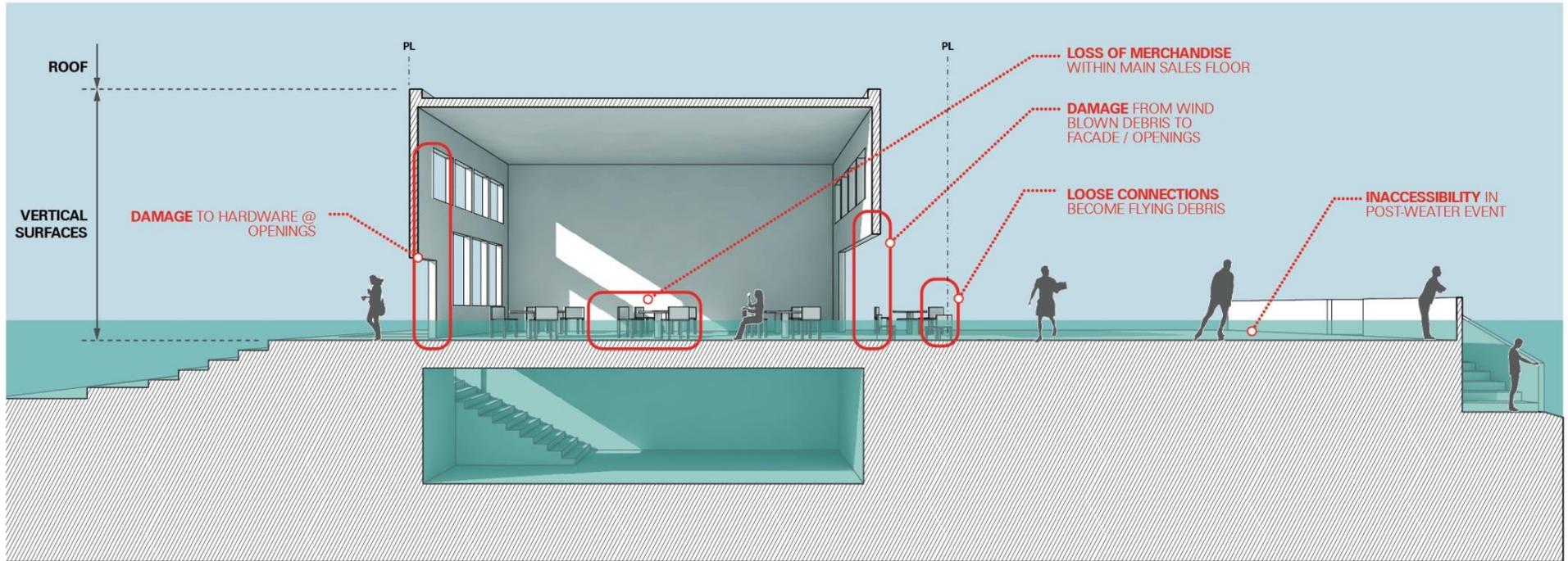
Protection of businesses and structures along the boardwalk, as along much of the Jersey Shore, is key to reducing the significant levels of damage seen after Sandy. Interventions are focused on preventing large debris from damaging storefronts and compromising the structural integrity of boardwalk structures.

Business & Building Strategy: Boardwalk Pavilion Typology



- W** WIDTH
- H** HEIGHT
- D** DEPTH
- BW** BASEMENT WIDTH
- BH** BASEMENT HEIGHT
- BD** BASEMENT DEPTH
- L1** FRONTAGE-TO-CURB (SIDEWALK)
- L2** SECONDARY DISTANCE
- L3** REARYARD-TO-PROPERTYLINE
- DATUM** ELEVATION DATUM
- FRCE** FLOOD RESILIENT CONSTRUCTION ELEVATION
- DFE** DESIGN FLOOD ELEVATION
- BFE** BASE FLOOD ELEVATION

Business & Building Strategy: Party Wall Typology



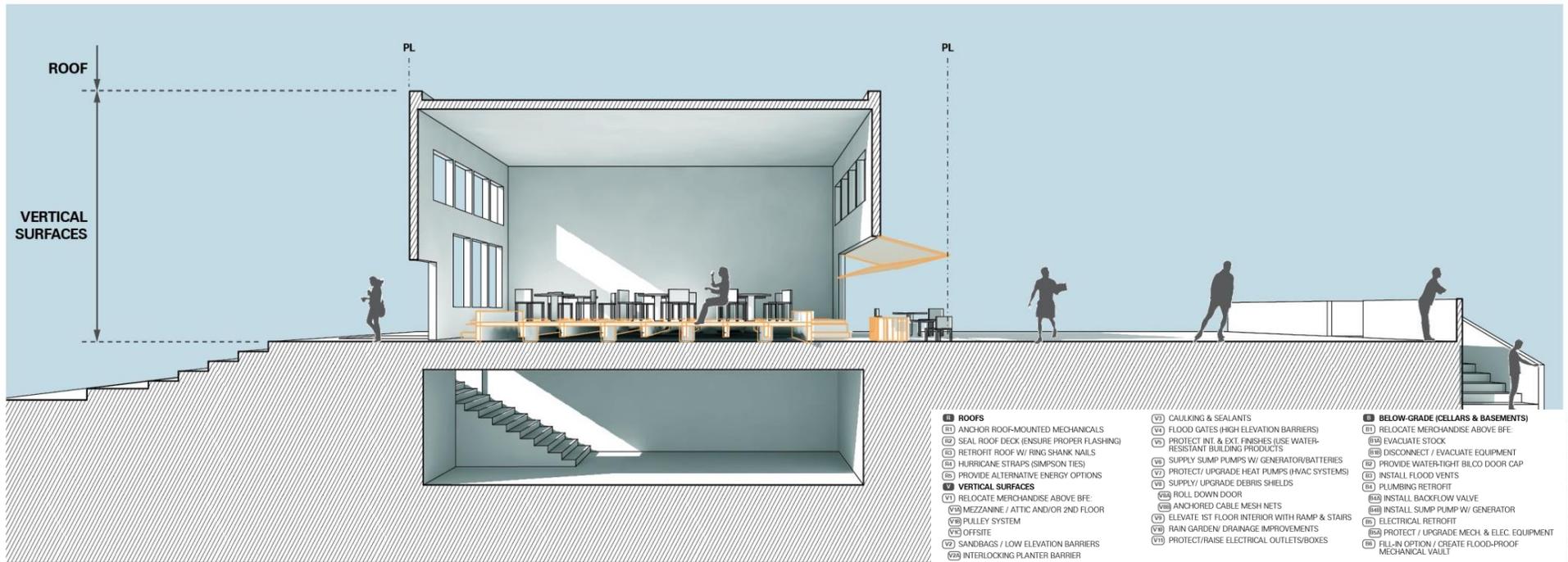
Hazard Risks

Roof: Wind can disconnect mechanical equipment and penetrate roof deck and soffit allowing water entry.

Vertical surfaces: Water or wind can penetrate window openings, exposing interior contents to water damage. In addition, surge, heavy rain and inadequate stormwater management can damage interior finishes, equipment and contents.

Basements & cellars: Water intrusion from drains, leaky foundation masonry, and sidewalk doors damages contents, equipment, furnaces, and utility components.

Business & Building Strategy: Party Wall Typology



Storm Preparedness Interventions

Create a storm preparedness plan, evacuate at-risk first floor and basement equipment and stock to safe location, and back-up and store records off-site

Building Mitigation

Roof: retrofit HVAC and other roof mounted equipment with ties and straps; secure roofing materials and soffit.

Vertical surfaces: install window shields to upper floors and door/window shields or temporary door barriers on first floor. **Basement/Cellar:** repair leaking basement masonry, install backflow valves in drains, elevate electrical panel and other utilities, evacuate equipment and stock off-site or to higher floors

Corridor Strategies



Corridor Strategy

Protect & Revitalize the Boardwalk

Asbury Park's primary physical assets, the beach and boardwalk, are home to two-sided commercial properties, with frontage on both the boardwalk and Ocean Avenue creating a condition that leaves it potentially vulnerable, doubling the amount of frontage required to be resilient. In this sense, commercial properties act more like a spine with a corridor on the upland side and an edge on the seaward side. Typically, patrons of boardwalk businesses approach from the boardwalk side during summer months and from the Ocean Avenue side during winter months. Strategies for resilience along the boardwalk are supported by a layered approach to protection that includes three lines of defense.



Corridor Strategy



Corridor Strategy

Pavilion and Upland Property Protection

Just upland from the boardwalk, the Pavilion Integrated Flood Protection System incorporates building, landscape, and deployable gate measures to protect the boardwalk and Ocean Avenue commercial properties. In this system, durable light-weight fold-down shading devices double as barriers to protect the buildings' vulnerable façade areas from dangerous debris carried by waves during storm events. In the open spaces where avenues meet the boardwalk, a famous Asbury Park urban design feature, programs like miniature golf and the sprayground are outfitted with a more resilient seaward edge that doubles as seating and seawall. This system of protections is connected to the boardwalk protection system at boardwalk entry ramps to unify the larger system and protects the entirety of Ocean Avenue.



Boardwalk Edge



Boardwalk Pavilion & Open Space



Elevated Commercial Property

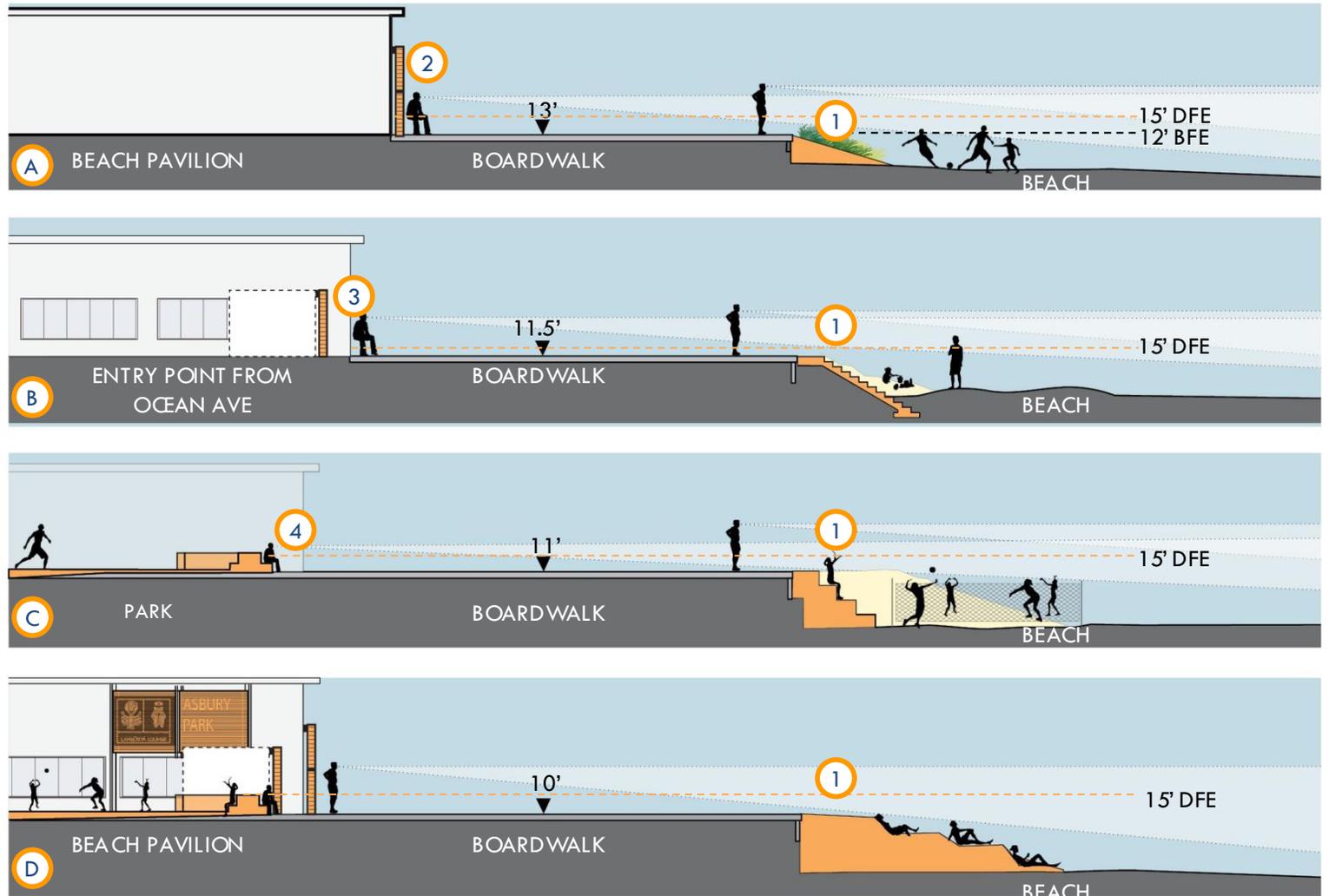
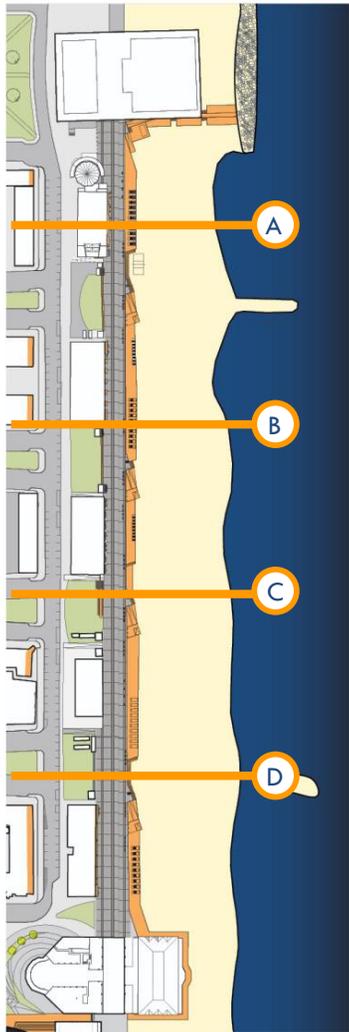
Corridor Strategy

- ① Boardwalk edge protection
- ② Building protection on boardwalk pavilions
- ③ Deployable gate on boardwalk entry points
- ④ Landscape protection on boardwalk open space
- ⑤ Elevated commercial property

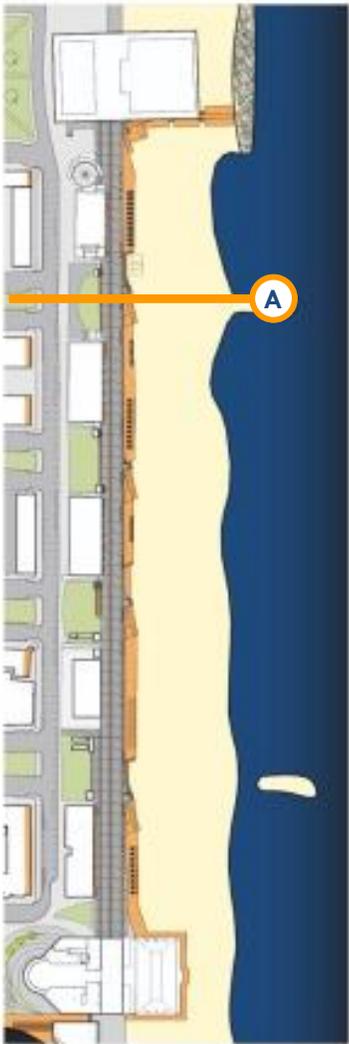


Corridor Strategy

- ① Boardwalk edge protection
- ② Building Protection
- ③ Deployable Gate
- ④ Landscape Protection



Corridor Strategy



DFE
BEE
13'

Standing view from the façade of the Pavilion

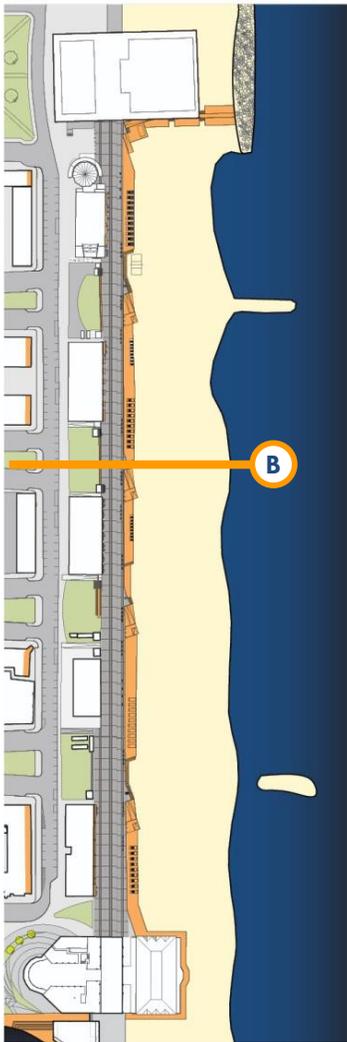


DFE
BEE
13'

Seated view from the façade of the Pavilion

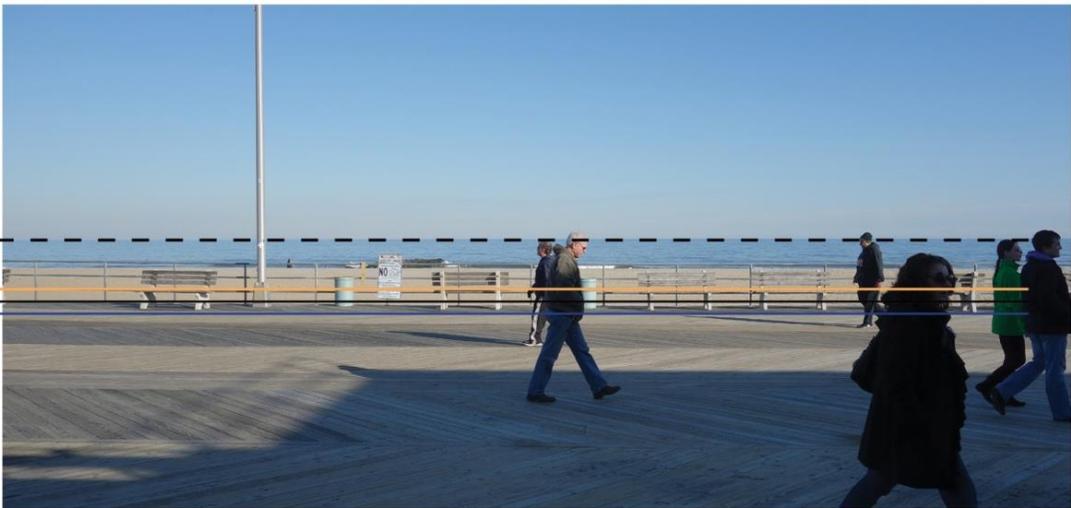


Corridor Strategy



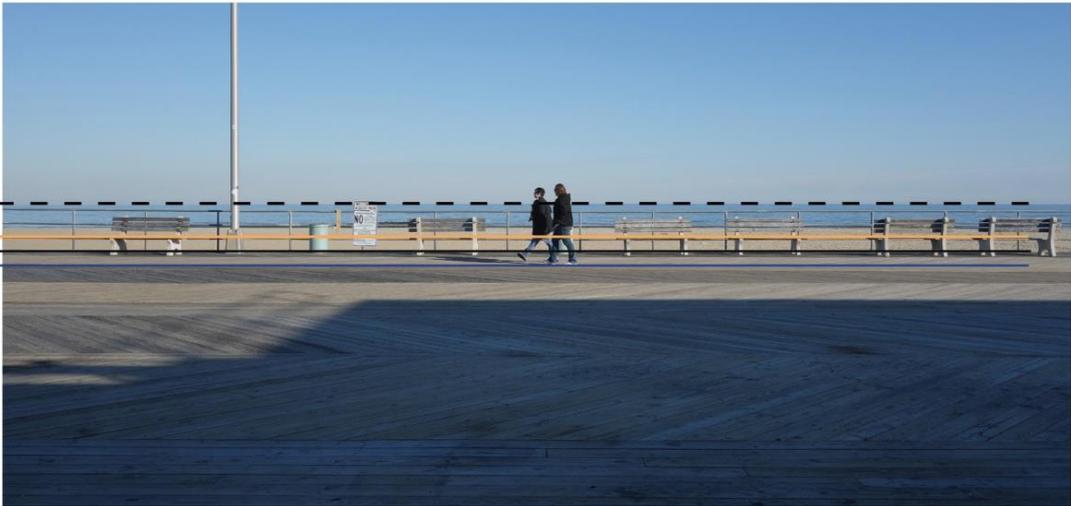
DFE
BFE 11.5'

Standing view from the façade of the Pavilion



DFE
BFE 11.5'

Seated view from the façade of the Pavilion



Corridor Strategy



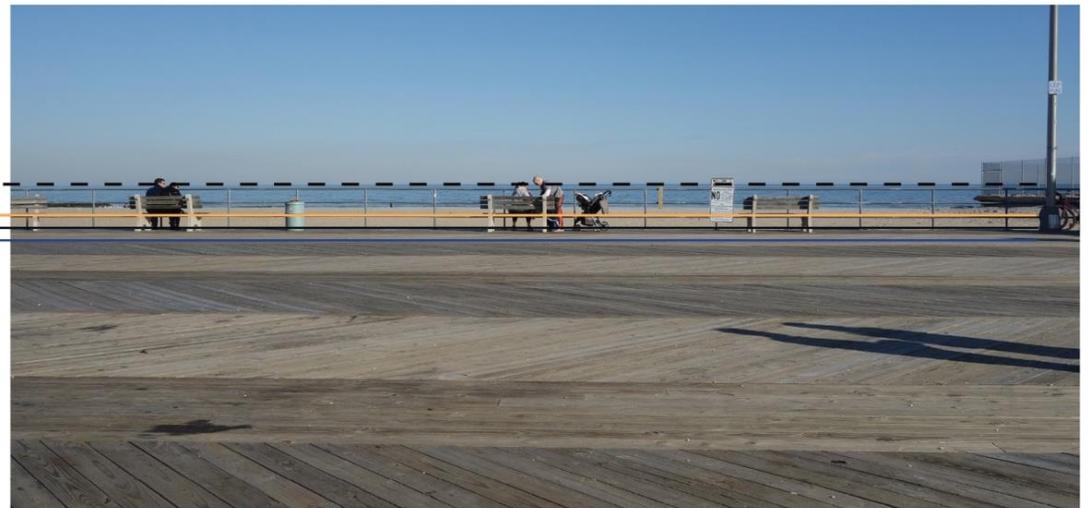
DFE
BFE 11'

Standing view from the façade of the Pavilion

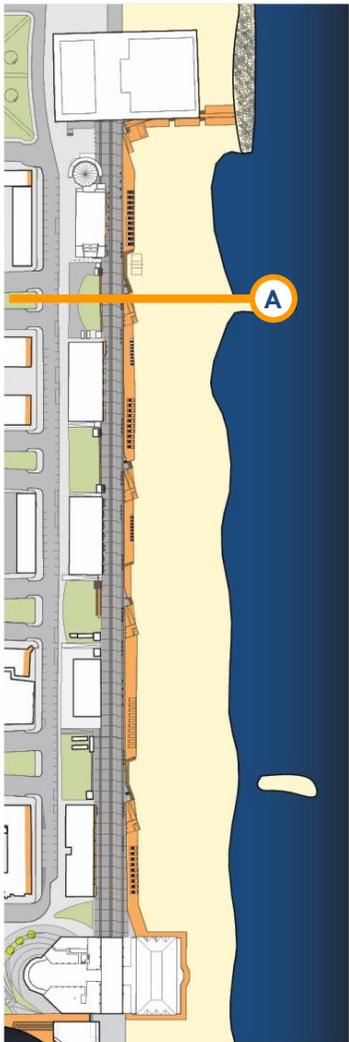


DFE
BFE 11'

Seated view from the façade of the Pavilion

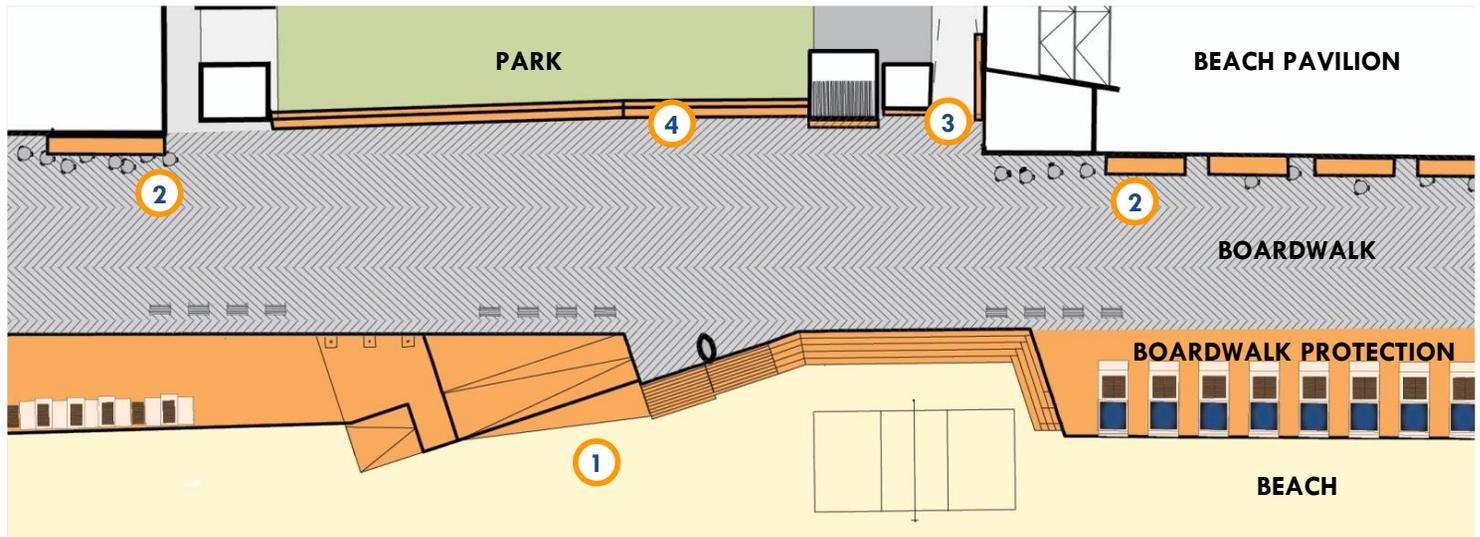
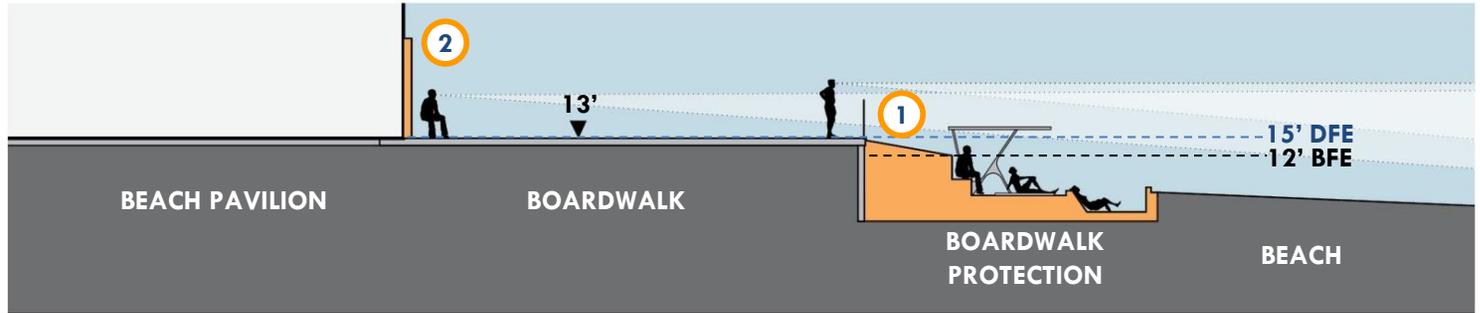


Corridor Strategy



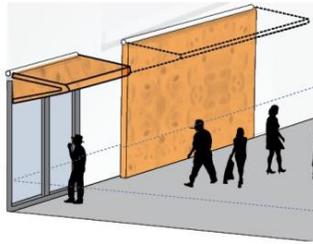
2 Building protection

4 Landscape protection

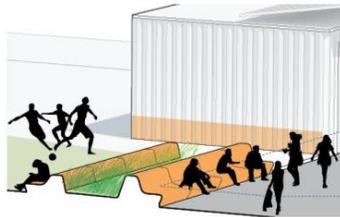


Corridor Strategy

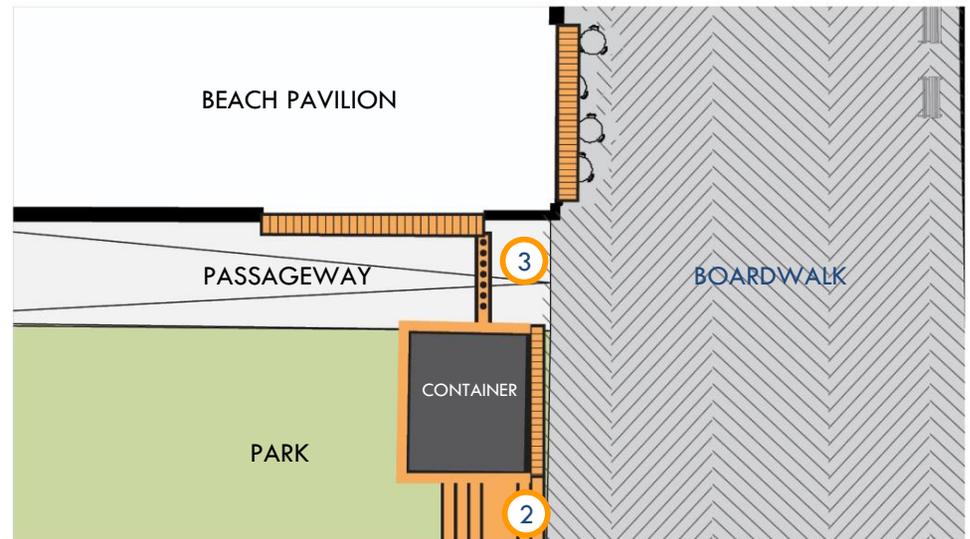
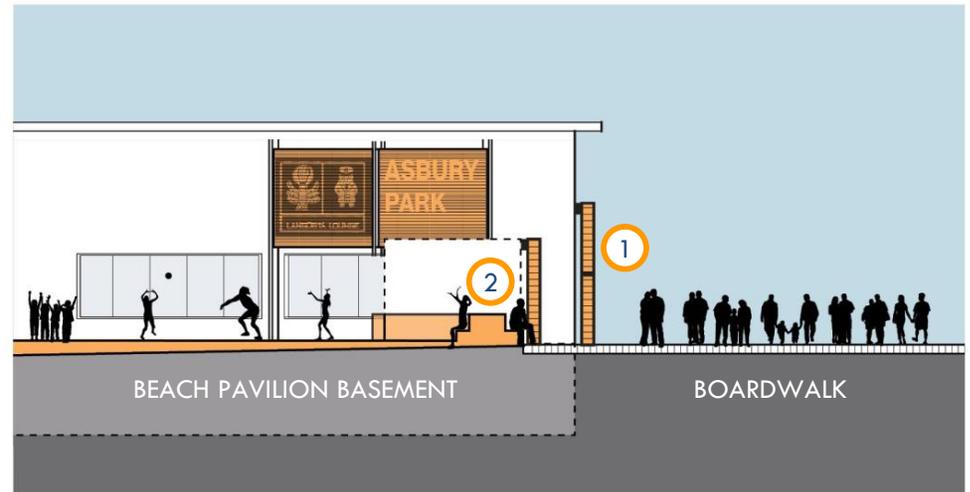
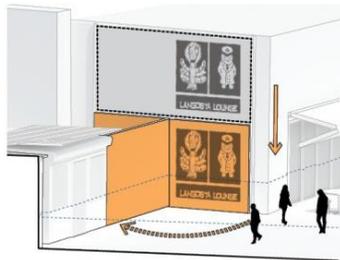
- 1 Building protection/hardened pavilion



- 2 Landscaped Protection/berm



- 3 Deployable flood wall



Corridor Strategy

Ocean Ave. Street Improvements

Street level along Ocean Avenue is approximately nine feet above sea level and is the lowest-lying area within the city outside of the coastal lakes. A wide boulevard, it is recognizably too wide to support a thriving, connected commercial corridor. An additional potential initiative would narrow Ocean Avenue to create both a more vibrant pedestrian corridor and opportunities for a front porch-style commercial development on the upland side of the street. The new porch would match or exceed the height of its counterpart on the boardwalk side of the street, would offer elevated diagonal views of the ocean between pavilions, and could be programmed with outdoor seating in support of new businesses in the ground floor of new properties.



Corridor Strategy

- 1 Elevated space
- 2 Proposed extended sidewalk
- 3 Additional curb area added to property

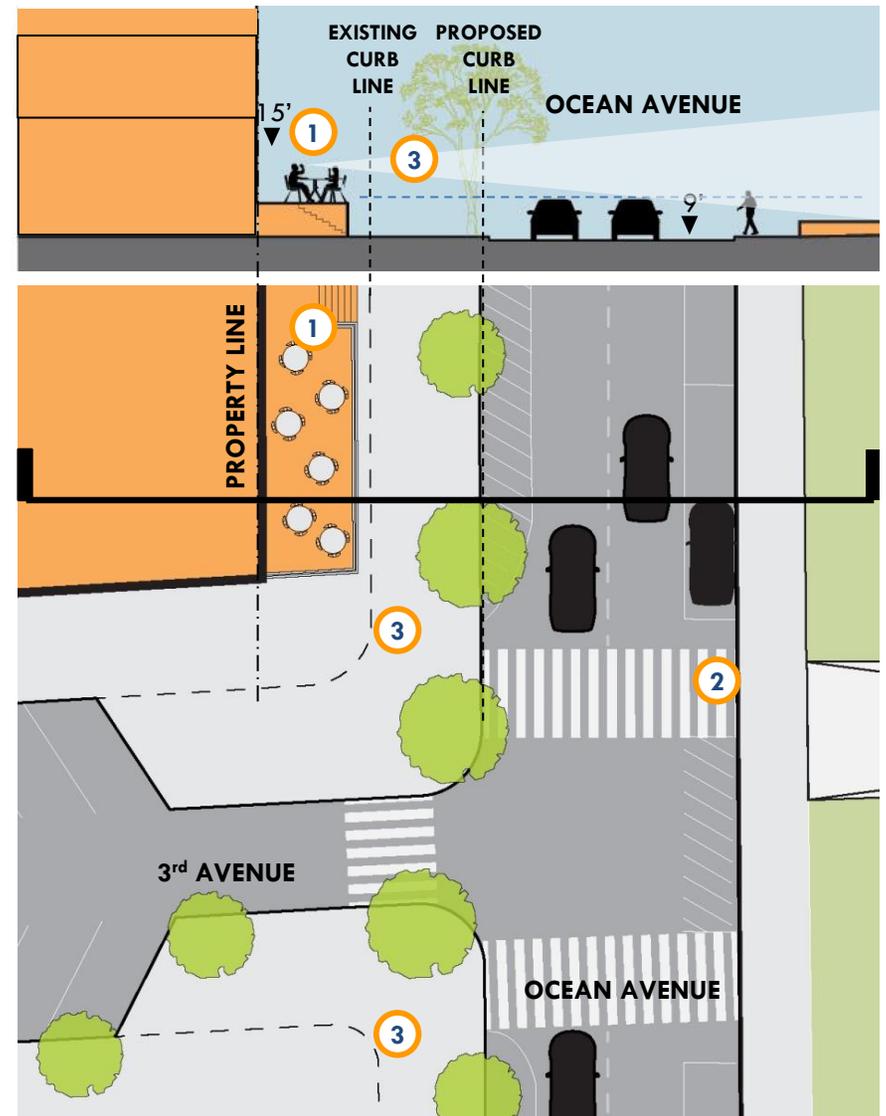
EXISTING STREET PARKING
 79' road width
 92 parking spaces available

PROPOSED STREET PARKING
 59' road width
 Additional 1,000 SF of semi-public retail space
 74 parking spaces available

Narrowing Ocean Avenue creates an opportunity for elevated shared space in the right of way that can double as both spill-out seating and flood protection.



TriBeCa Community School
 Tribeca, NYC

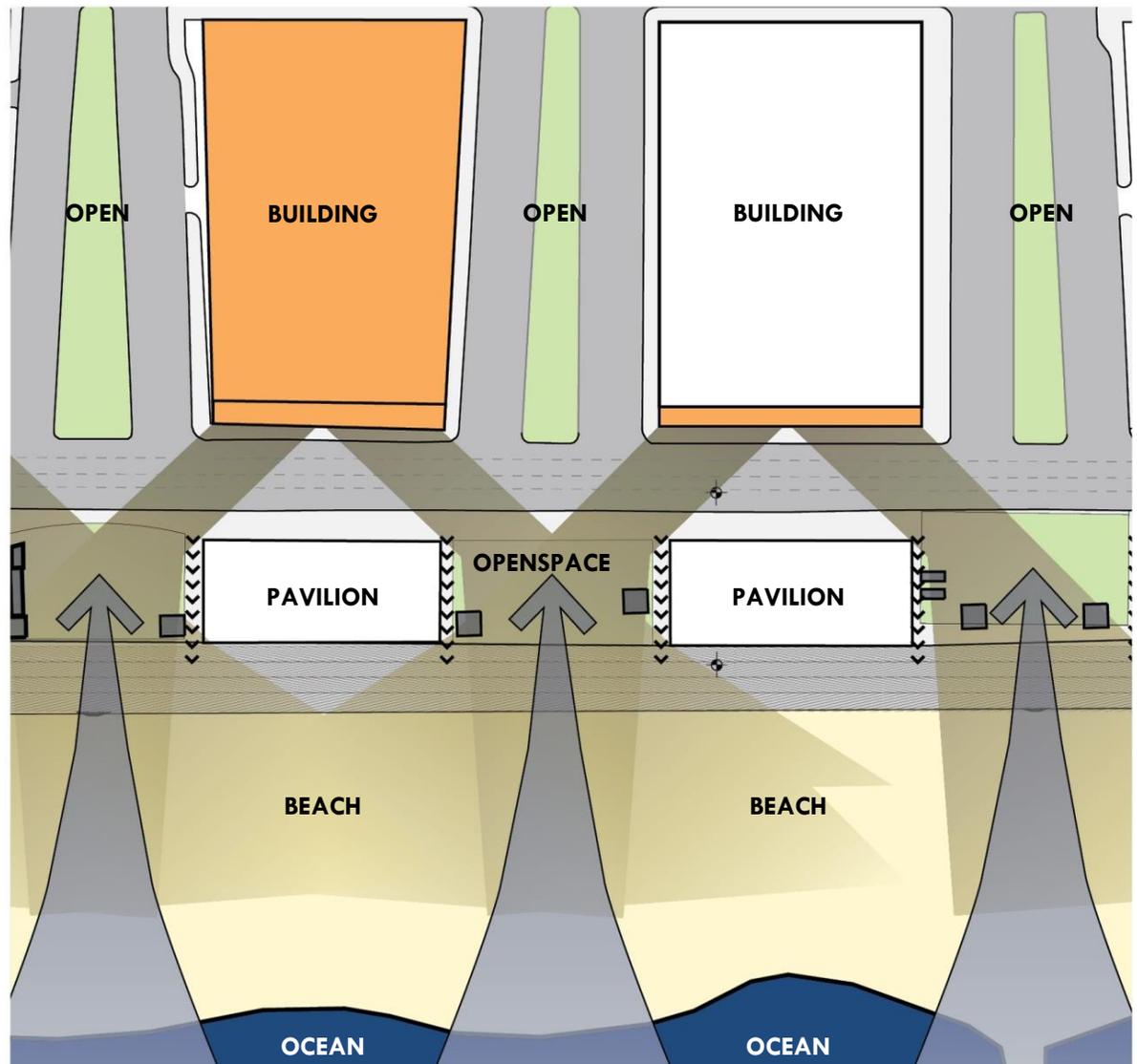
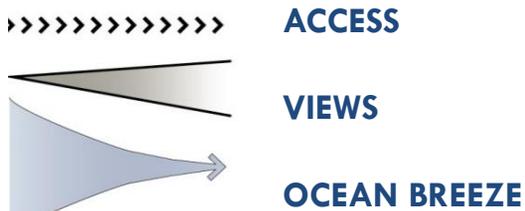


Corridor Strategy

Goals:

- Preserve the historic design of Avenues in Asbury Park
- Capture view corridors for Ocean Avenue program

While it is a universal preference to enter commercial properties at grade along vibrant corridors, this proposal suggests that elevating patios along the west edge of Ocean Avenue might provide ocean and beach views to seating for dining in these locations while creating a more resilient double-loaded avenue.



Corridor Strategy

Lake Avenue Proposal

As activity on the Cookman/Lake Avenue corridor builds, frontage on Lake Avenue that was once used only to service properties with more viable commercial frontage on Cookman Avenue is more frequently used as an entrance to businesses and residential units. Portions of the area fronting on Lake Avenue sits four to six steps below the level of the sidewalk, and is in the floodplain. This project for Lake Avenue recommends a more resilient northern edge to Wesley Lake to improve the quality of the streetscape and to protect the street from future coastal flooding events. Strategies for vacant land along Lake Avenue should be adopted to ensure that ground floor programs are active and engage the lakefront.



Corridor Strategy



Lake Avenue

The current lake edge is a concrete wall. Inland of the wall there is a small area of turf and then 60-degree parking and a roadway. Like the others on the shore, the lake has poor water quality with pathogen contamination, algae blooms, aquatic weed overgrowth and eutrophication. The design proposal increases parking space and creates a lakeside path from which dunes rise, adding the additional elevation required for flood protection.

Corridor Strategy

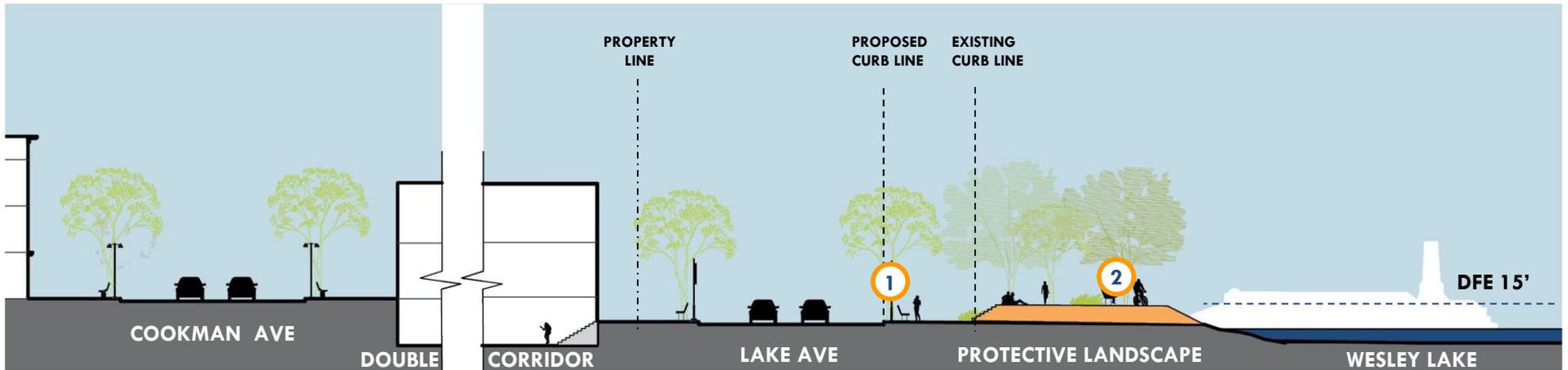
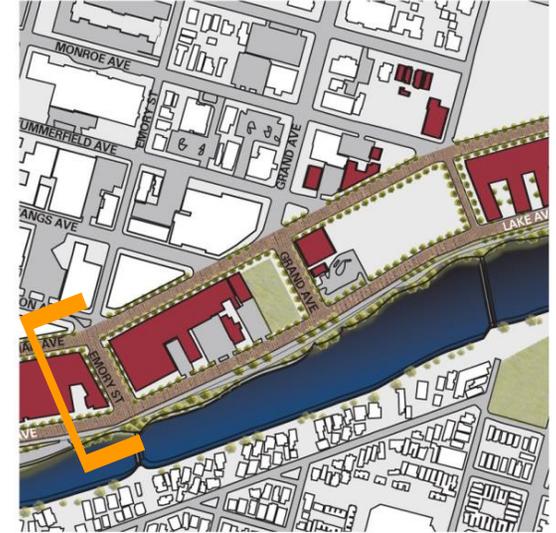


Lake Avenue

From the high point of these berms, the topography slopes towards the water, creating wetland edges in the deeper spaces and reinforced riprap edges in less generous areas. Native plants replace the turf, to support pollinators and better filter the water. A second path weaves through the dunes, for a slower walk along the water. This will result in a gently undulating landscape along the lake edge that provides for human recreation as well as helps to improve water quality and to provide shade and habitat for animals.

Corridor Strategy

- ① Road diet
- protective landscaped berm in place of island parking and angled parking
- ② Protective landscaped berm

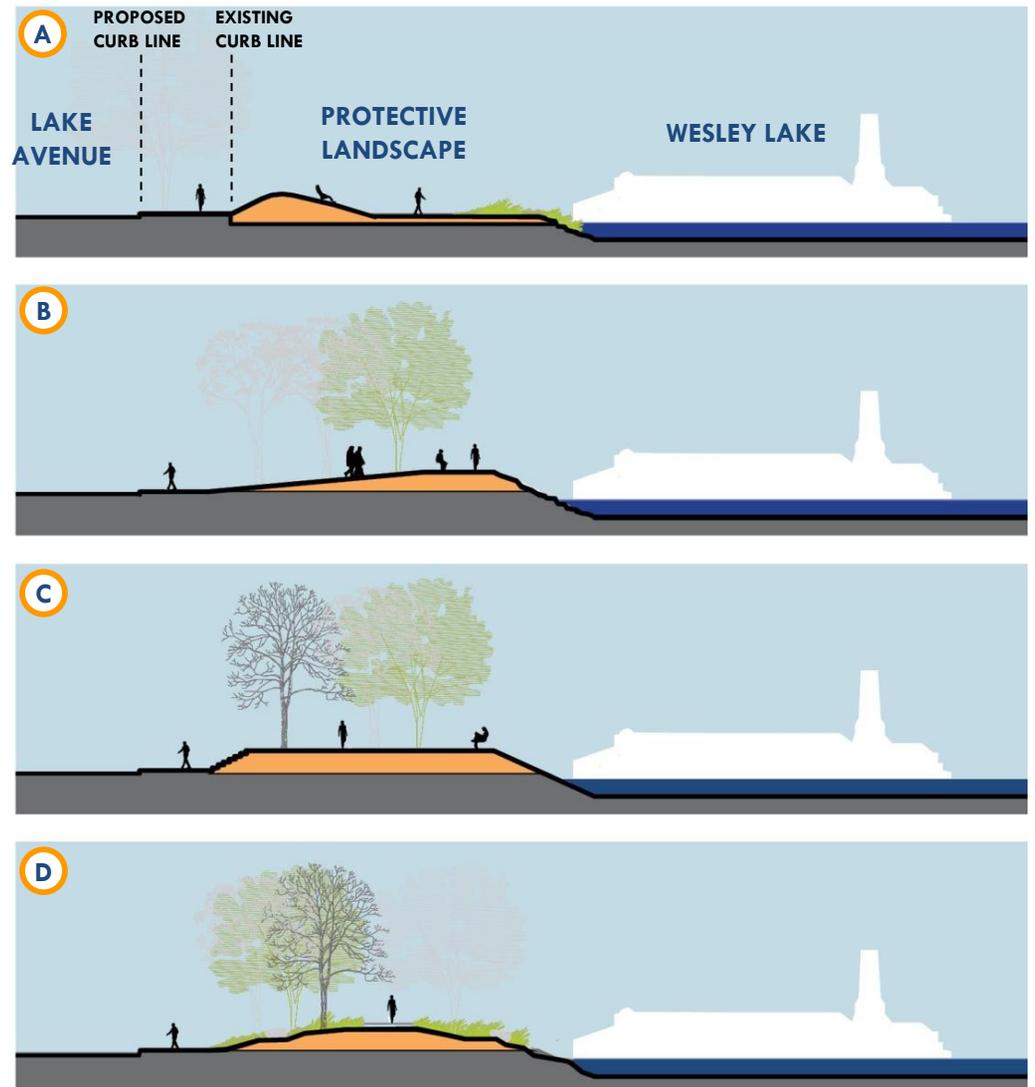


Corridor Strategy

- A** Berm recessed into Lake Ave
- B** Sloped to Wesley Lake edge
- C** Plateau park
- D** Distributed landscape



**Landform Ueda, Charles Jencks
Edinburgh, UK**



Corridor Strategy

Deal Lake Park & Sunset Park Proposal

This initiative creates a more resilient western end of Sunset Park. This end of the park is the melting pot of Asbury Park. It is the site of Jazz Fest and a growing farmers' market, and is seen as the most democratic space in the city. Investment in an altered landscape that is subtly elevated to protect the lake from flooding from the northwest has been designed to support a series of permanent multi-purpose structures. A band shell that backs onto Main Street and faces east is much-needed infrastructure for summer concerts and Jazz Fest and a series of canopies are proposed to help protect the weekly farmer's market. In times of emergency, a park that is safely situated above the floodplain can serve as home base for recovery and aid programs once the area is safe for return.



Corridor Strategy

- 1 Deployable protection on Deal Lake Drive
- 2 Landscape protection on the park
- 3 Protective wall along the rail track



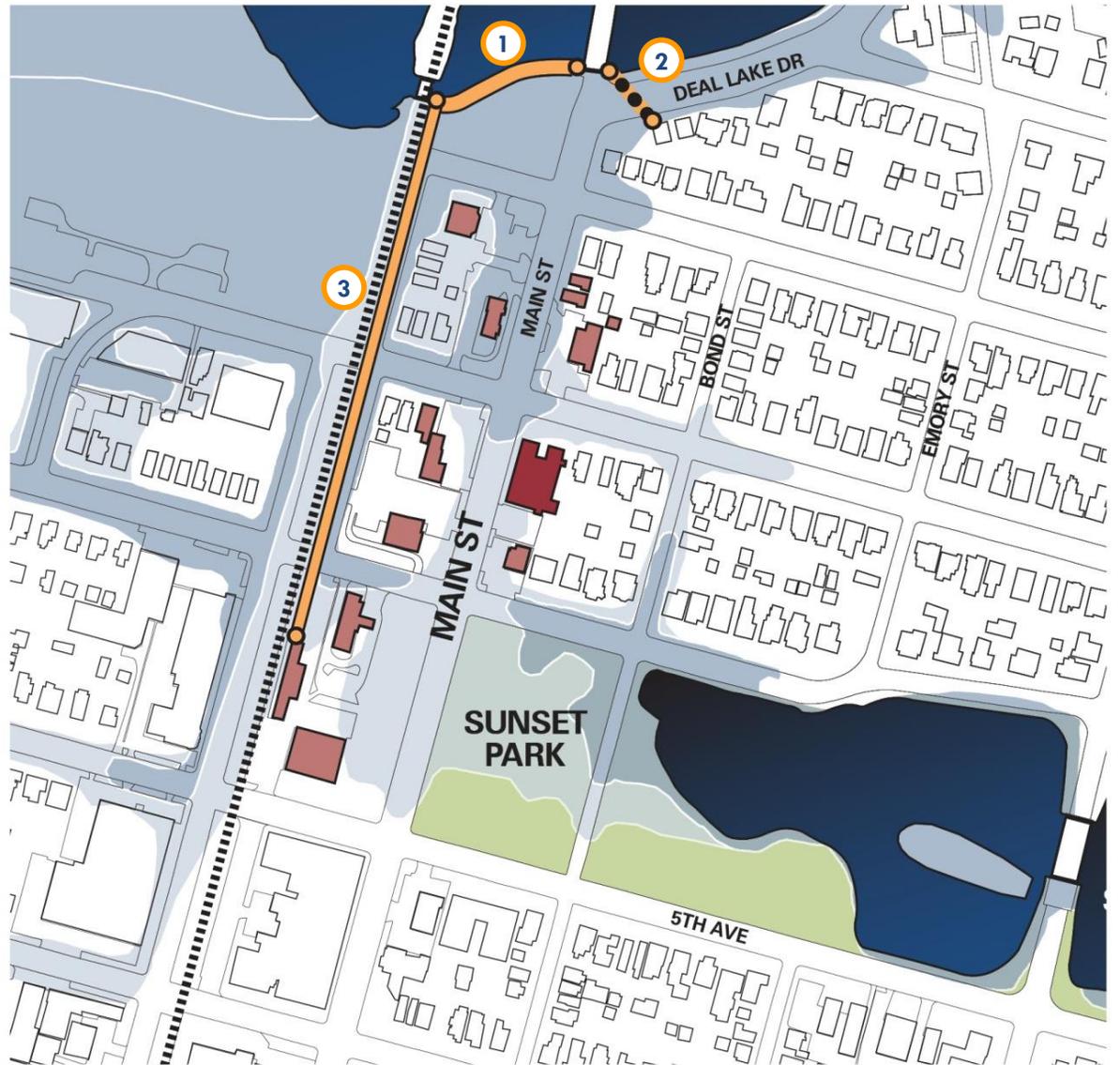
Corridor Strategy

- ① Landscape protection on the park
- ② Protective wall along the rail track



Corridor Strategy

- ① Edge protection on deal lake park
- ② Deployable protection into high ground
- ③ Protection for 500-year flooding on the edge of NJ Transit rail line



District Strategies



District Strategies

Asbury Park has suffered from years of disinvestment, the seasonal ebb and flow of its population and economy, and the continued social decay that peaked with the riots of 1970. To address long-term disinvestment in Asbury Park, we created three additional initiatives focused on urban planning improvements to strengthen the community and bind the district together, where there are currently boundaries between Asbury Park's communities.



District Strategy

Protect & Promote Sunset Park

This initiative creates a more resilient western end of Sunset Park. This end of the park is the melting pot of Asbury Park. It is the site of Jazz Fest and a growing farmers' market, and is seen as the most democratic space in the city. Investment in an altered landscape that is subtly elevated to protect the lake from flooding from the northwest has been designed to support a series of permanent multi-purpose structures. A band shell that backs onto Main Street and faces east is much-needed infrastructure for summer concerts and Jazz Fest and a series of canopies are proposed to help protect the weekly farmer's market. In times of emergency, a park that is safely situated above the floodplain can serve as home base for recovery and aid programs once the area is safe for return.



District Strategy

Sunset Park

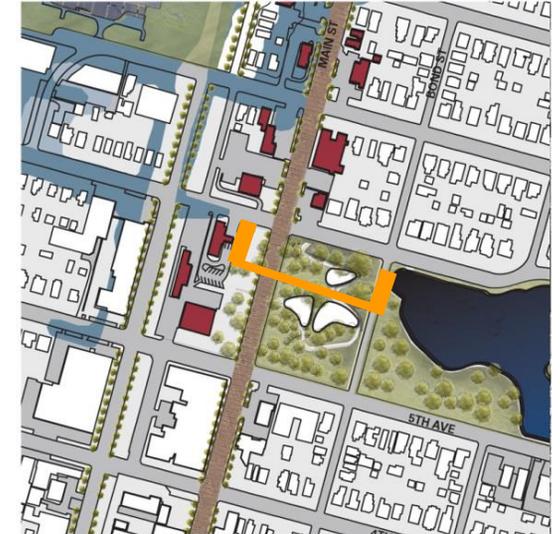


District Strategy

- 1 Proposed Sunset Park to promote social activity
- 2 Program to support Jazz festival

Goals:

- Reconnect North Station (NJT) at Fireman's Monument
- Streetscape flood protection



District Strategy

East of Lake Avenue Development Plan

Our proposal for Lake Avenue resilience ties directly into integrated flood protection strategies at the historic structures on the Boardwalk. There are three approaches to that connection. The first connects building and open space protection measures on the western edge of the Boardwalk through the space between the Power Station and the Carousel to a new Lake Avenue promenade. The second connects outer edge building and site strategies around a newly renovated and resilient Casino structure and around the Power Station protecting the assets in Asbury Park. The third connects around the Casino again and integrates a resilient boardwalk edge in Ocean Grove with a crossing that ties into high ground on the Ocean Grove side of Wesley Lake, protecting the entirety of Wesley Lake from tidal waters and debris.



District Strategy

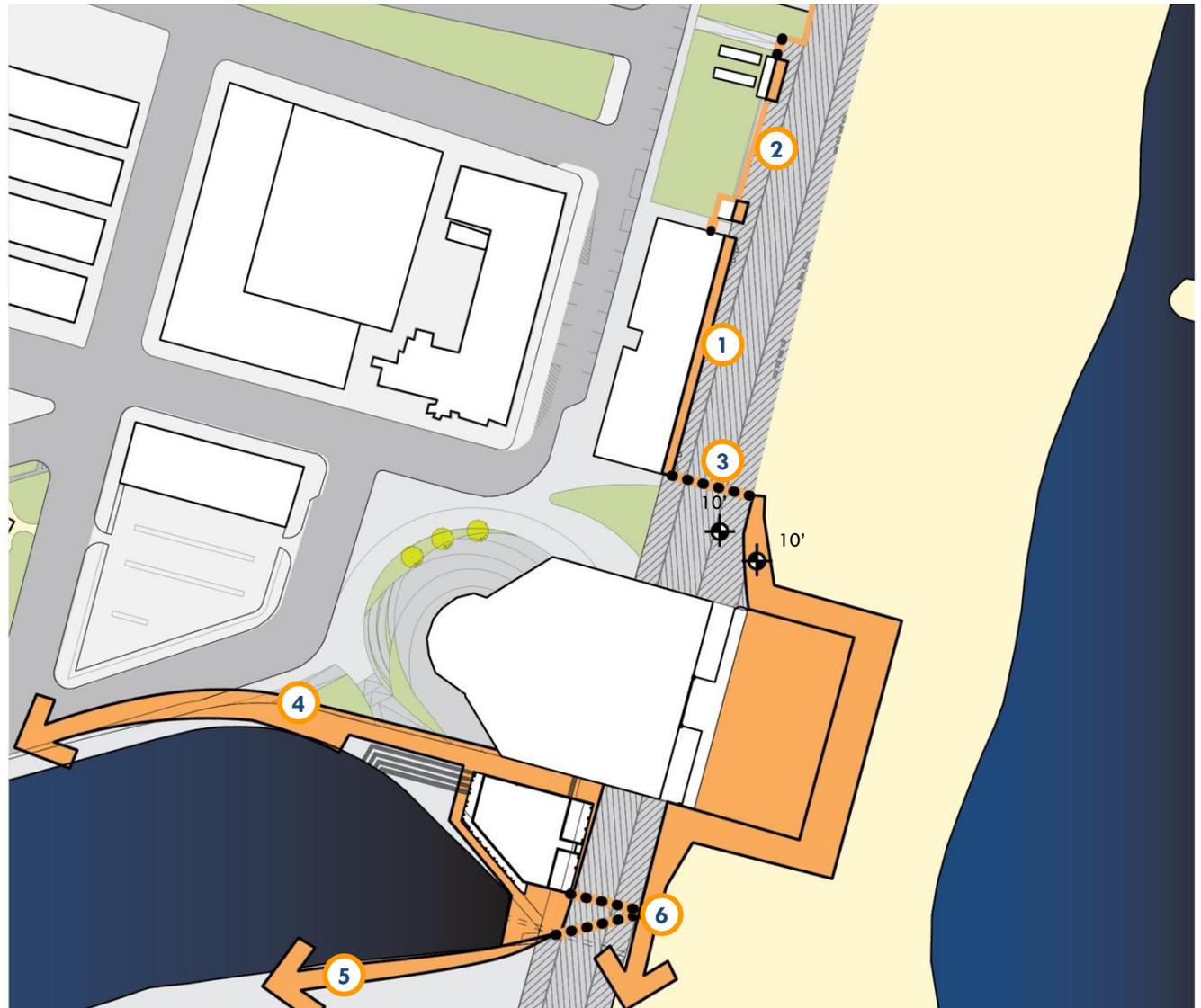
- ① Hardened pavilion / container wall
- ② Landscape protection at open space program
- ③ Deployable protection at entry points
- ④ Lake Avenue landscaped berm



Interventions occurring at the connection of the boardwalk and Lake Avenue can restore and reduce hazards around the historic Casino, Carousel, and Power Station sites. This concept is designed to integrate building, landscape, and flood protection to make the south and east borders of the city resistant to flooding and more resilient at times of extreme weather events.

District Strategy

- Option 1:**
- ① Hardened pavilion / container wall
 - ② Landscape protection at open space program
 - ③ Deployable protection at entry points
 - ④ Lake Avenue landscaped berm
 - ⑤ Highland Avenue (Ocean Grove) landscaped berm
 - ⑥ Ocean Grove Boardwalk



District Strategy

- Option 2:**
- ① Edge Protection on Boardwalk
 - ② Deployable protection at entry points
 - ③ Lake Avenue landscaped berm
 - ④ Highland Avenue (Ocean Grove) landscaped berm
 - ⑤ Ocean Grove Boardwalk



District Strategy

- ① Casino & power plant restoration project
- ② New development, and parking area
- ③ Lake Avenue landscaped berm
- ④ Proposed Street Connection Casino Ave
- ⑤ Elevated Platform



District Strategy

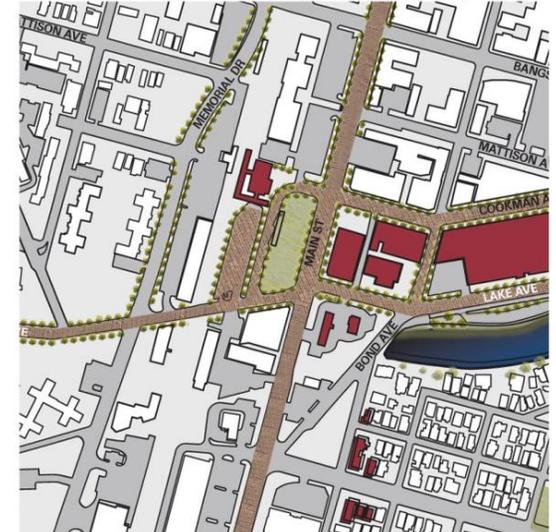
Springwood & Cookman Ave Connection.

The first project extends investment in flood protection and a new pedestrian path from Lake Avenue through a difficult intersection at Main Street and the Transit Hub to connect to Springwood Avenue. A safer and more inviting streetscape is expected to help encourage a stronger relationship between the east and west sides of Asbury Park.

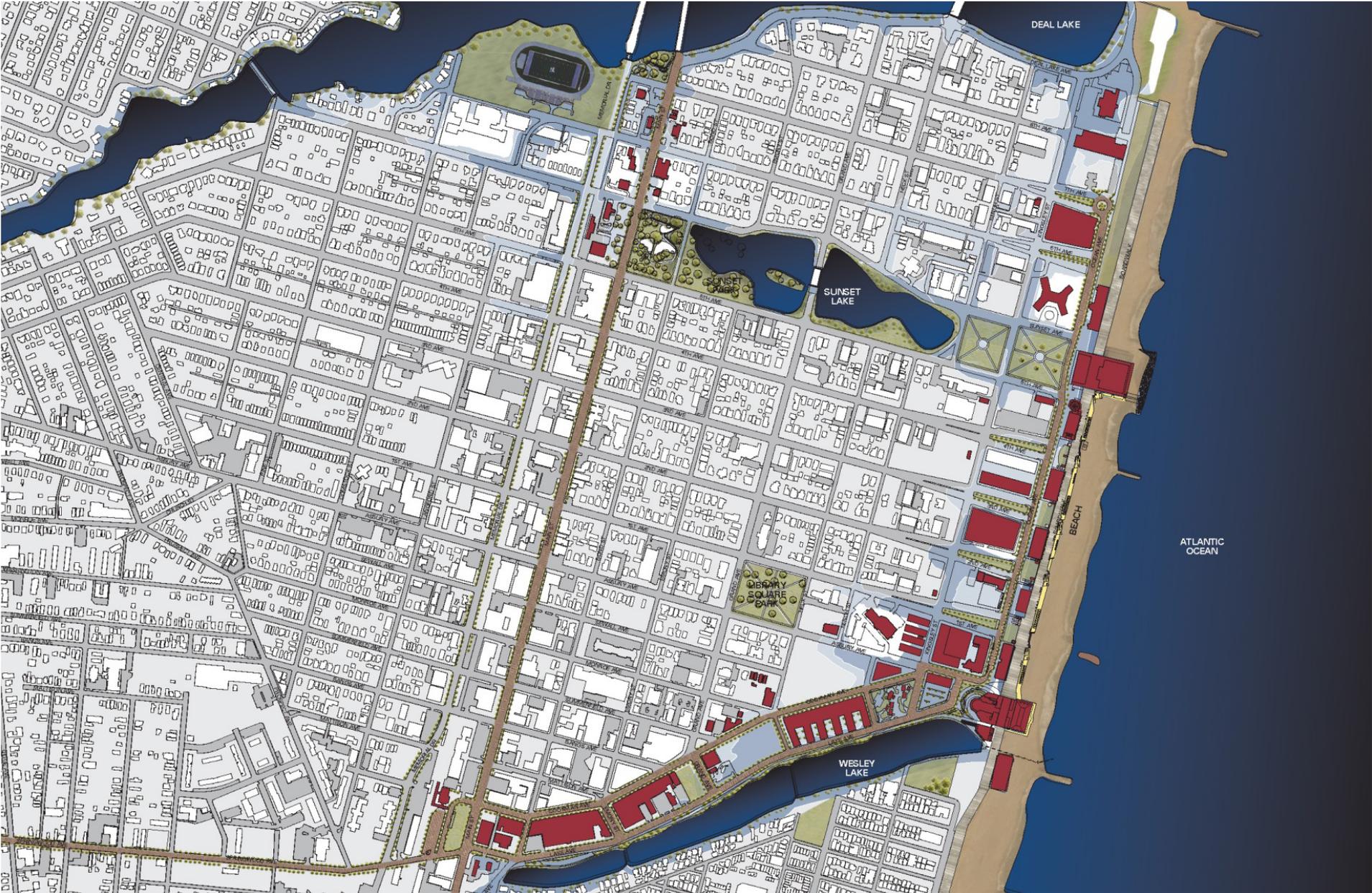


District Strategy

- 1 Parking lot creates break in the street wall
- 2 Free standing program turns away from the street
- 3 Hard and uninviting façade
- 4 Many cuts and conflicts between pedestrians and vehicles
- 5 Railroad tracks
- 6 Vacant land on Springwood Ave



Current Flood Risk



Reduced Risk with Implementation



IV. Implementation Strategy

Commercial Corridor Resiliency

Challenges to Implementing Commercial Resiliency

Challenges



Difficulty Accessing Capital



Lack of Knowledge & Organization



Lack of Density & Coordination

Solutions

A multi-scaled and multi-pronged approach focused on both physical design and implementation and financing of resiliency improvements. The implementation strategy for commercial resiliency necessarily combines interventions at each physical scale, a combination of public and private support and investment, and both program and design components. Without taking a comprehensive approach, commercial corridors are left vulnerable and lacking the tools they need to become more resilient. Solutions that boost economic vitality earn their value in future investment, and both local technical assistance and organization and larger-scale infrastructure and planning efforts are required. Our implementation strategies for each study area and the region are focused on providing a foundation for a practical financing strategy, proposals for corridor-wide capital improvements, and investment in capacity-building of organizations to support implementation.

Commercial resiliency financing must address the challenges faced by small, coastal businesses and utilize innovative mechanisms for providing low-cost financing and funding for implementation, tied to incentives for business and property owners.

Investment in corridor interventions through public capital allocations can both significantly reduce risk from storm hazards and support commercial vibrancy, creating an environment for future growth and stability.

Expanded capacity of merchants' associations, business improvement districts and local development corporations supports individual business mitigation and preparedness programs, corridor planning and development of large-scale interventions, and broader economic development goals.

Challenges to Implementing Commercial Resiliency

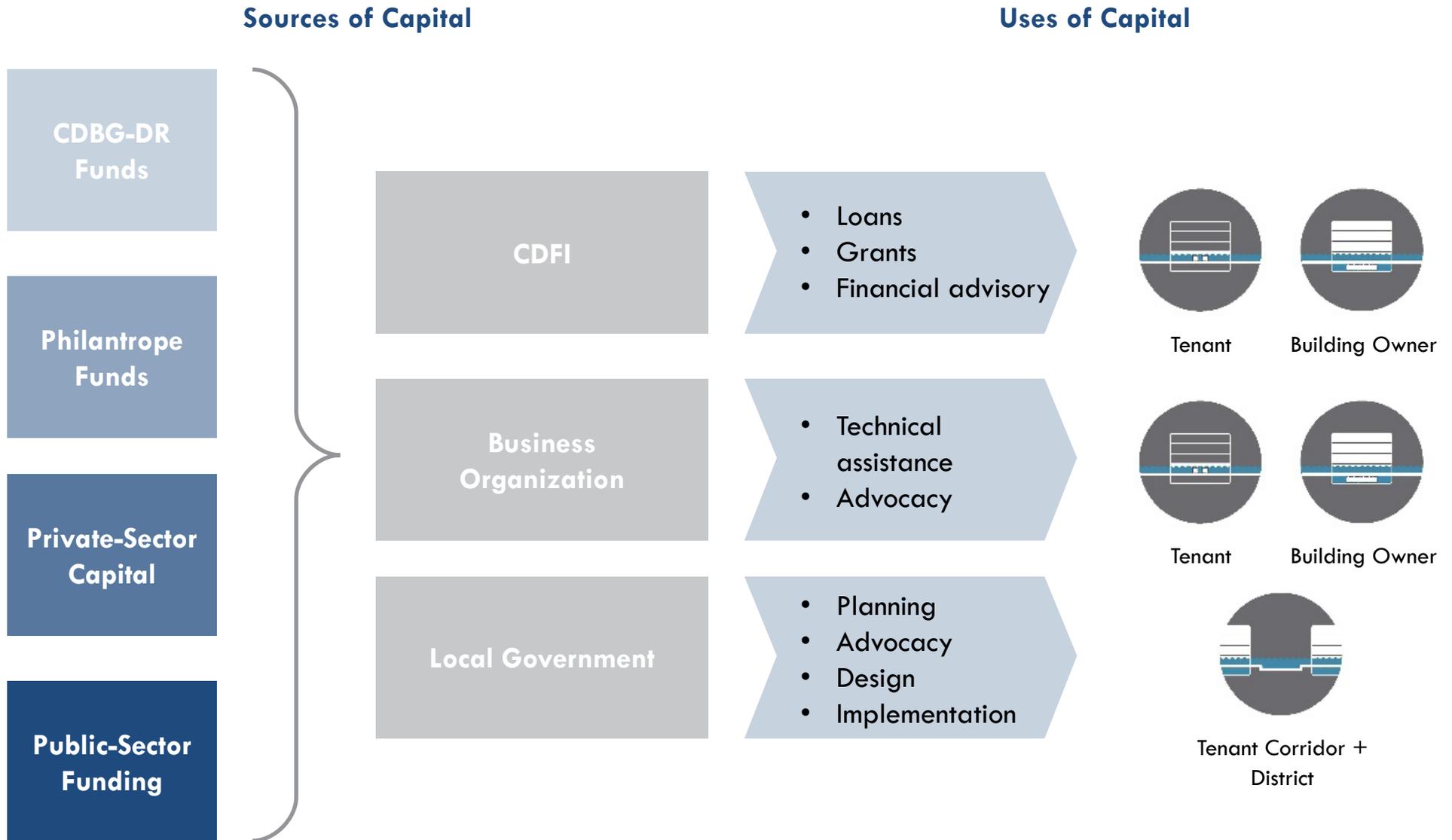
Based on the challenges described above, we created a framework for providing sustainable funding sources, technical assistance, and expanding the capacity of business advocacy organizations. This framework is tied to priority initiatives for each study area, and are central to the proposals for New York City and the Jersey Shore. This approach could include the following components:

- **A small business resiliency fund** composed of (1) federal Community Development Block Grant – Disaster Recovery (CDBG-DR) funds to guarantee loans and provide grants; (2) Community Reinvestment Act-motivated investment capital; and (3) philanthropic project-related investments to reduce interest rates. The fund would offer below-market capital and incentive grants to small businesses and property owners undertaking resiliency improvements.
- **An intermediary to administer the fund and provide technical support.** Numerous CDFIs have experience with targeted lending programs in the region and can provide vital technical assistance needed to encourage program participation, as well as serving as a conduit for loans where government agency capacity is insufficient for underwriting.
- **A network of community-level organizations,** including merchants' associations, business improvement districts, and local development corporations. These entities would receive grants to provide organizational support for behavioral changes by small businesses and provide technical assistance to fund applicants. Some entities may have strong enough balance sheets to provide guarantees for loans for corridor-wide improvements.

A crucial concept in this framework is the blend of funding sources to create a sustainable funding stream for resiliency improvements. Recognizing that larger-scale interventions will take longer to plan, design, and construct, this framework allows for near-term disbursement of funding to assist small businesses in creating a first line of defense, while building capacity of merchants' associations to provide technical assistance, and considers funding for longer-term strategies, like corridor and district-level interventions, which will require additional study and be implemented over time. The diagram on the following page illustrates the sources of capital that we understand may be available to fund resiliency projects, the intended flow of funds, and end utilization.

Commercial Resiliency Financing

Per the previous page, the graphic below communicates the sources of capital that could be leveraged to create a sustainable resiliency funding program for interventions at each scale studied, and which could be disbursed along the appropriate timeline for a wide variety of projects.



Implementation Recommendations Summary

Pilot Area	Priority Projects	Primary Implementing Entity	Recommended RBD Project Funding (\$ millions)
New York Citywide	Expanded Business Resiliency Investment Program	NYC Economic Development Corporation	\$50
	Merchants' Association Support Program	NYC Department of Small Business Services	\$10
Red Hook	Integrated Flood Protection System*	City and State of New York	\$140
	Community Planning Process	Red Hook Residents, Workers, Business Owners	\$5
	Local Resiliency Corporation	Local Community-Based Organizations	\$2
Beach 116th Street	MTA Rail Yard Flood Protection Intervention	Metropolitan Transit Authority and City of New York	\$13
	Beach 116th Street Partnership Resiliency Programming	NYC Department of Small Business Services	\$0.6
	Community Planning Process for Corridor Interventions	City of New York with Rockaway Residents, Workers, Business Owners	\$2
New Jersey Shore-wide	Business Resiliency Investment Program	NJ Economic Development Authority	\$30
	Merchants' Association Support Program	NJ Economic Development Authority	\$6
Asbury Park	Beachfront Integrated Flood Protection System & Community Planning Process	NJ Governor's Office of Recovery & Rebuilding and City of Asbury Park	\$22
	Coastal Lake Protections	NJ Governor's Office of Recovery & Rebuilding and City of Asbury Park	\$4
Total Recommended RBD Project Funding			\$284.6

* Assumes project funding leverages \$100M in funding commitments from the City and State of New York combined and approximately \$70M in private investments on private property to future improvement.

New York Citywide: Commercial Business Resiliency Programming

Priority Projects

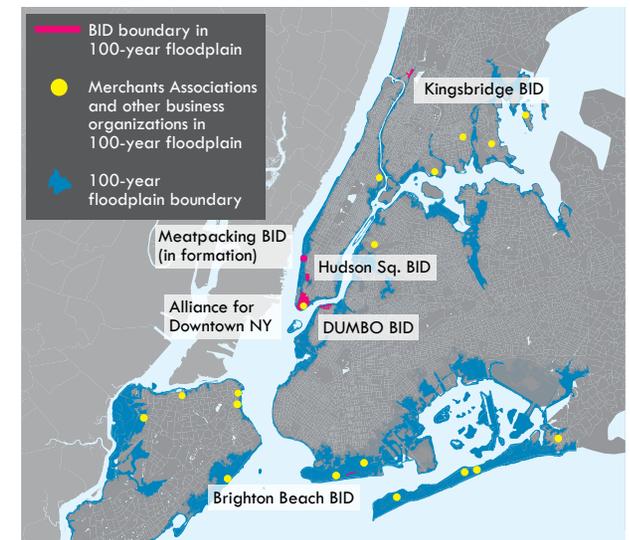
New York City has allocated \$110 million to a Business Resiliency Investment Program (BRIP) and expects to provide grants to approximately 600 recipients (businesses or buildings) under this program. However, there are as many as 22,000 small businesses within the Sandy-affected area of the City, indicating a remaining need to incentivize business resiliency in at-risk areas. We propose to amend the City of New York's planned BRIP and its small business support programs to include the following:

- **Provide additional funding through Rebuild By Design.** Create a loan component that leverages CRA-motivated bank capital and project related investments (PRI) by philanthropic institutions. Additional private sources of capital can create a sustainable loan fund guaranteed by federal funds and accessible to struggling business owners, incorporated into the BRIP. This structure can be replicated in other areas of the Sandy-affected region, and potentially throughout the country.
- **Provide enhanced support for behavioral changes and collective action in addition to physical mitigation.** While adoption of physical improvements will take time and financial support, there are straightforward, inexpensive behavioral strategies that can be employed with appropriate knowledge and organization, such as through merchants' associations. New funding would be provided for merchants' associations, business improvement districts (BIDs), Local Development Corporations (LDCs), and other entities in at-risk areas to provide technical assistance and organize merchants for collective action, as well as for general economic development efforts, which will enhance the economic resiliency of businesses in at-risk coastal areas.

Implementation

We understand that the NYC Economic Development Corporation (NYCEDC) is currently establishing a project management office for this project and expects the program to launch in June of this year. If this proposal moves forward, the City of New York would be able to expand this program and seek to incorporate leveraged funding through engagement with assistance from financial institutions and Community Development Financial Institutions (CDFIs).

To support capacity-building activities, new funding should be allocated to NYC Small Business Services (SBS) to support the five BIDs, 18 merchants' associations, and numerous other business advocacy groups (including nascent business associations like Restore Red Hook) in the 100-year floodplain. This funding would be used to implement resiliency programming and capacity-building activities in these communities.



Mapping of New York City merchants associations, BIDs, and business advocacy groups serving businesses in the floodplain.

New York Citywide: Commercial Business Resiliency Programming

Investment Rationale

Based on our earlier business- and building-level case studies and analyses, we found that many mitigation strategies produce a robust benefit-cost ratio. In addition, the largest obstacles to implementation may not always be cost, but rather a lack of knowledge about the appropriate strategies, as well as a deficit of assistance to help business owners access funding to support these improvements. Successful expansion of the Business Resiliency Investment Program (BRIP) hinges on the ability of the program to deliver comprehensive, accessible technical assistance, which may encourage higher rates of adoption and adherence to the program.

Based on the average costs associated with the BRIP plan and anticipated participants, we believe that an additional \$50 million could reach as many as 5,000 additional businesses, assuming many small businesses participate. This assumes that 50% of the fund is leveraged with alternative sources of capital, and relies on technical assistance programming accompanying physical mitigation costs.

At the individual building scale, mitigation costs are highly efficient investments. We utilized the FEMA Cost-Benefit Model to analyze building interventions for Red Hook case studies as an example for Citywide building interventions, producing cost benefit ratios above 5.0, well above the 1.0 threshold.

To illustrate the efficiency of this investment, we added technical assistance costs of \$2,000 for site visit and concept sketches to building mitigation costs. Even with additional funding support, this investment produces cost-benefit ratios of 1.44 and higher for the three buildings tested in Red Hook. With up to \$10,000 in technical assistance, producing drawings and technical specifications for mitigation, the cost-benefit ratios remain above 1.25.

Red Hook: Integrated Flood Protection & Commercial Revitalization

Priority Projects

A multi-pronged approach will be needed to enhance flood protection in Red Hook. In addition to business- and building-level interventions in Red Hook, we recommend that new funding be allocated to:

- **Fund an innovative integrated flood protection system that also supports revitalization.** After assumed funding commitments by the City and State of New York and investments by private property owners that could be captured around the Red Hook waterfront, additional funding of \$140 million would be required. Additional measures would leverage the value of this investment and incorporate community input and aspirations.
- **Launch a planning process in which components of the flood protection system are designed to include commercial or mixed use preservation and/or expansion,** such as revitalization along Atlantic Basin; catalytic new building construction or modification along the west bank of the Gowanus to serve as both flood protection and new commercial or mixed use expansion; decking of the Hugh L. Carey Tunnel entrance to protect the tunnel from flooding and provide new development opportunities; and connecting Columbia Street in Red Hook to the Columbia Waterfront District. The planning process should culminate in regulatory changes and planned infrastructure projects by the City to support these initiatives.
- **Support a new local entity to plan for corridor level protections and support building mitigation.** A Local Development Corporation (LDC) or comparable entity would perform an array of functions, including: serve as a community-based planning entity for the integrated flood protection system; undertake business organization efforts (through a merchants' association or business improvement district (BID)); serve as a Community Development Financial Institution (CDFI) to channel funding to local businesses for mitigation; and promote local job creation through workforce development and training.

Implementation

Should funding be allocated to plan for, design, and construct an integrated flood protection system in Red Hook, the City and State could begin a planning process promptly.

To establish an LDC focused on resiliency, the City could utilize new funding to kick off consensus-building outreach and provide funding support for an existing or new entity or entities to serve as the local planning and assistance lead.

Red Hook: Integrated Flood Protection & Commercial Revitalization

Investment Rationale

Throughout Stage III, we considered three planning concepts for an integrated flood protection system in Red Hook. While each concept addresses specific urban design considerations, each also varies by level of public investment required and total protection afforded. Our preferred option utilizes various strategies that work together to provide comprehensive protection. In comparison to the other strategies, this option was found to provide the greatest amount of protection for the total investment.

The table below indicates the level of public investment required for each concept, the total property protected, and the ratio of investment to the value of avoided damages from a 100-year flood in today's dollars. While not a full cost-benefit analysis based on a loss-damage frequency curve, this comparative analysis indicates the relative benefit compared to investment for the three flood protection options studied, and is the basis for the recommendation for a preferred approach that provides protection at the waters' edge rather than primarily on upland streets or in the water.

These calculations assume that property along the integrated flood protection route that is privately redeveloped becomes part of the protection, incorporating an elevated promenade or reinforced walls and deployable flood gates, and that large existing property owners retrofit buildings to provide protection for their properties, and in some cases other properties behind them. Total investment costs are net of these costs incurred by private developers (approximately \$70 million for integrated flood protection on private sites), which we believe is supportable as economic activity continues to grow in Red Hook as a result of resiliency and other efforts and as the community's land uses continue to evolve.

IFPS Concept	Total Investment (\$ millions)	Total Property Protected	Investment to Benefit Ratio
Inland Route	\$222	8.2 million square feet	1.84
Waters Edge Concept (Preferred)	\$240	10.3 million square feet	2.13
In-Water Concept	\$409	10.5 million square feet	1.28

Beach 116th Street: Infrastructure Resiliency & Commercial Vibrancy Planning

Priority Projects

The implementation strategy for Beach 116th Street begins with a significant commitment to improving the resiliency of the corridor's critical transportation, then builds on this anchoring step through business resiliency measures at each physical scale studied.

- ***Provide flood protection for the MTA subway station and rail yard through an innovative commercial redevelopment strategy and bayside wall enhancement.***
- ***Introduce a pilot of the City's Business Resiliency Investment Program (BRIP), accompanied by capacity-building for the Beach 116th Street Partnership.***

Implementation

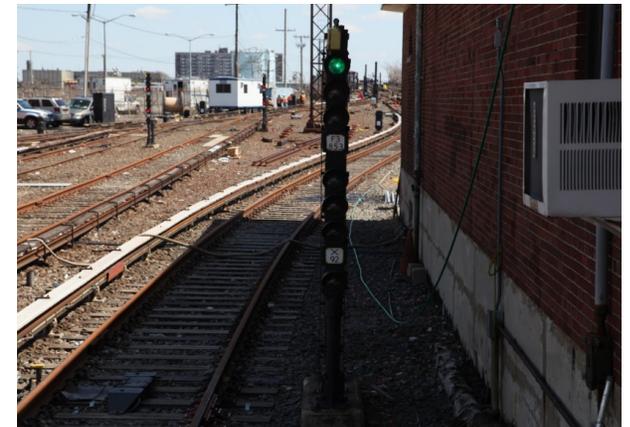
The MTA has expressed interest in exploring innovative measures for resiliency improvements at the Beach 116th Street rail yard. Pending Federal Transit Administration (FTA) funding and the potential for other new funds through the Rebuild By Design process, the agency is prepared to begin mitigation at the site. The infusion of approximately \$13 million in new mitigation funds will allow the MTA to create a resilient facility that supports the community's economic health and creates a destination along the corridor.

The Partnership is committed to assisting business and property owners in making resiliency improvements, as well as supporting a longer-term strategy for the corridor's commercial vibrancy and overall resiliency. Piloting the City's commercial resiliency program will deliver much-needed mitigation to local businesses and strengthen the corridor for the near-term.

Additional Initiatives

We also developed a long-term vision for the corridor, including redevelopment of the Jamaica Bay edge adjacent to the 9/11 Memorial; new development along the rail yard; and resilient streetscape improvements. Should the community and City choose to pursue these initiatives, we recommend:

- Launching a community planning process to build consensus around flood protection concepts and longer-term strategies for the corridor.
- Developing an economic development plan for flood protection improvements that would include the potential for new retail and parking garage development around the MTA station; a new bayside park; and corridor protection strategies.



Beach 116th Street: Infrastructure Resiliency & Commercial Vibrancy Planning

Investment Rationale

Investing in urban infrastructure is a critical part of creating a more resilient corridor at Beach 116th Street and for barrier islands throughout the region. Maintaining these connections to the mainland, through bridges, trains, and waterborne transportation is a crucial element to preserving residents' ability to get safely to supplies and assistance as they recover from disaster and rebuild their homes and businesses once it is safe to return to the area. Reducing the risk of flooding to the MTA's equipment and rail yard will help to preserve this essential form of connectivity for the corridor.

Supporting the Beach 116th Street Partnership to expand capacity and promote resiliency programming and education provides a powerful tool for individual business owners and the collective corridor. The Partnership is interested in continuing to provide support for businesses owners to create an economically and physically resilient corridor, and requires public support to do this effectively.



New Jersey: Business Resiliency Programming & Capacity-Building

Priority Projects

As we discovered, many Shore businesses are independently owned, and some are outposts of established businesses further inland. Business owners are hard-working and often capital-strapped. They may view loan programs as burdensome, which would be a major obstacle to resiliency improvements. To incentivize adoption, we propose:

Creating a Business Resiliency Program and Coastal Protection Plan for the Jersey Shore that:

- **Provide federal funding through Rebuild By Design.** Funds should be deployed to businesses across the Shore in the form of grants and loans to support mitigation at the building level.
- **Create a loan component that leverages Community Reinvestment Act (CRA) motivated bank capital and program related investments (PRI) by philanthropic institutions.** The need to assist businesses in future resiliency will exceed available federal funds and will need to be part of a sustainable funding program. Leveraging alternative sources of capital will bring down interest rates and create a long-term strategy for financing business resiliency that can be deployed throughout New Jersey.
- **Provide enhanced support for behavioral changes in addition to physical mitigation.** While adoption of physical improvements will take time and financial support, there are straightforward, inexpensive behavioral strategies that can be employed with appropriate knowledge and organization, and which could be developed in a Shore-wide entity. Funding would be provided for these activities along with capital improvements.

Implementation

Creation of this Shore-wide program would be supported by the New Jersey Economic Development Authority (NJ EDA), which does not currently have a program aimed at mitigation, but which has experienced success with ongoing business recovery programs. Upon allocation of funding, this program could be integrated into NJ EDA's existing resiliency programming with support from the New Jersey Governor's Office of Resiliency and Rebuilding (NJ GORR) to market the program and advise on technical assistance.

Similarly, funding for capacity-building and expansion of resiliency-focused programming could be rolled into new mitigation programming to serve business advocacy organizations along the Shore.



New Jersey: Shore-Based Public Private Partnership

Additional Initiatives

To support larger-scale interventions along the Shore, create a Shore-based public-private partnership to promote resiliency and revitalization, and serve as the funding conduit. Along the Shore, public interventions may be required as a first line of defense against flooding, with a secondary line of improvements required for adjacent commercial properties and corridors to support commercial vibrancy after an extreme weather event. The partnership entity would plan for, fund, and implement these improvements.

Investment Rationale

Per our findings for New York sites, we believe that investment in business- and building-level resiliency is highly cost-effective and provides a crucial first line of defense against flooding and extreme weather impacts. Across the Jersey Shore, we believe that this program would require investment of \$30 million, coupled with \$6 million in programming costs to support capacity-building for resiliency programs within merchants' associations and other business advocacy groups. The rationale tested for New York City building mitigation and technical assistance funding holds true for these businesses and properties along the Shore and provides a strong rationale for public investment in this program.



Asbury Park: Beachfront Flood Protection System & Coastal Lake Mitigation

Priority Projects

Flood risks for Asbury Park are severe, largely due to the damage associated with storm surge carrying debris and wave action on the beachfront. To protect Asbury Park's vital boardwalk businesses, we propose that Rebuild by Design funding be allocated to:

- **Fund an integrated beachfront flood protection system** utilizing boardwalk reinforcement; deployable flood barriers across building facades and entrances; and resilient landscaping (bermed or otherwise protected) on open space parcels, along the length of the boardwalk. Together, these interventions will serve as protection for not only the boardwalk, but also buildings on Ocean Avenue.
- **Protect against flooding along the edges of Asbury Park's coastal lakes.** Wesley, Sunset, and Deal Lakes suffer from regular flooding and drainage issues. Improved drainage systems and soft and hard interventions to prevent flooding will protect adjacent properties and enhance perception and utilization of the lakes.

Implementation

Implementation for large-scale resiliency measures in Asbury Park should be carried out by NJ GORR, with support and planning by the City of Asbury Park. Should these agencies choose to pursue this strategy, a planning process should be initiated between the two with the support of a full technical team.

Additional Initiatives

Initiatives for enhancing commercial vibrancy, connectivity, and flood protection in Asbury Park to be considered in the future include:

- Funding and planning for a large-scale protection, such as a flood wall or reinforced dune, at the beachfront intersection of Lake Avenue and Ocean Avenue. Interventions could provide protection for a portion of both corridors and the historic Casino structure that is central to Asbury Park's beachfront identity.
- Introduction of resiliency protections and potentially extended NJ Transit service at Sunset Park between Main Street and Memorial Drive. Currently home to few businesses, this area is a common ground for both sides of the community and could be a node of activity and connection in the future with the proper resiliency investments and strategic investments for reactivation.
- Enhanced connectivity between Lake and Springwood Avenues, joining Asbury's east and west communities. The dividing line between Lake and Springwood Avenues, at Main Street and Memorial Drive, is perceived as the dividing line between communities in Asbury. Strengthening this corridor could help to soften this divide and begin to reinvigorate the City.

Asbury Park: Beachfront Flood Protection System

Investment Rationale

In Asbury Park, we focused on providing an effective, comprehensive solution for flood protection, and at the same time aimed to preserve the City's urban beach and access from the waterfront to nearby retail, open space, and residential communities. This concept is best manifested as an integrated flood protection system along the boardwalk and adjacent properties. Such a large-scale intervention is multi-faceted and will require significant planning and technical analysis, along with a strong commitment from local government agencies to maintain and deploy systems when necessary. However, we believe that it is crucial to protecting Asbury Park from future extreme weather events. The total investment required for this system is estimated to be \$22 million.

Interventions at the coastal lakes is crucial to preserving a unique part of Asbury Park's ecology and a historically significant cultural asset. Mitigation is estimated to cost \$4 million for the three lakes. The lakes could provide new opportunities for economic activity around tourism and recreation, and improvement will enhance utilization of adjacent corridors.



Conceptual Cost Summary

Pilot Area	Priority Projects	Total Cost (\$ millions)	Existing Sources of Funding	Recommended RBD Project Funding (\$ millions)
New York Citywide	Expanded Business Resiliency Investment Program	\$50	n/a	\$50
	Merchants' Association Support Program	\$10	n/a	\$10
Red Hook	Integrated Flood Protection System	\$310	\$100 million NYS/NYC + \$70 million private sites	\$140
	Community Planning Process	\$5	n/a	\$5
	Local Resiliency Corporation	\$2	n/a	\$2
Beach 116th Street	MTA Rail Yard Flood Protection Intervention	\$13	Pending FTA grant funding	\$13
	Beach 116th Street Partnership Resiliency Programming	\$0.6	n/a	\$0.6
	Community Planning Process for Corridor Interventions	\$2	n/a	\$2
New Jersey Shore-wide	Business Resiliency Investment Program	\$30	n/a	\$30
	Merchants' Association Support Program	\$6	n/a	\$6
Asbury Park	Beachfront Integrated Flood Protection System & Community Planning Process	\$22	n/a	\$22
	Coastal Lake Protections	\$4	n/a	\$4
Total		\$454.6		\$284.6

Implementation Strategy Summary: New York City & Site Initiatives

Pilot Area	Priority Projects	Action Steps
New York Citywide	Expanded Business Resiliency Investment Program (BRIP)	<ul style="list-style-type: none"> • Approve new funds for program expansion • Identify additional funders • Expand scope to include substantial technical assistance
	Merchants' Association Support Program	<ul style="list-style-type: none"> • Approve new funds for programming specifically geared toward resiliency planning • Perform outreach to build consensus around resiliency programming
Red Hook	Integrated Flood Protection System & Community Planning Process	<ul style="list-style-type: none"> • Fund remaining cost of the system with new federal funds • Fund and launch a community planning process to determine the appropriate path for the IFPS, and other key objectives for resiliency
	Local Resiliency Corporation	<ul style="list-style-type: none"> • Fund a new or rebranded Local Development Corporation (LDC) to focus on resiliency • Staff the organization to lead the above-referenced community planning process
Beach 116th Street	MTA Rail Yard Flood Protection Intervention	<ul style="list-style-type: none"> • Fund additional protection necessary to connect the rail yard to the corridor and protect from threat of flood • Create schematic designs for MTA rail yard protection
	Partnership Resiliency Programming	<ul style="list-style-type: none"> • Fund programming specifically geared toward resiliency planning and expansion of the Partnership
	Community Planning Process for Corridor Intervention	<ul style="list-style-type: none"> • Fund and launch a community planning process focused on long-term strategies for the Beach 116th Street corridor

Implementation Strategy Summary: New Jersey & Site Initiatives

Pilot Area	Priority Projects	Action Steps
New Jersey Shore-wide	Business Resiliency Investment Program (BRIP)	<ul style="list-style-type: none"> • Build consensus between NJ GORR and NJ EDA to adopt project • Approve new federal funds to launch a new mitigation-focused program • Identify additional funders and local CDFIs to provide traditional technical assistance to small businesses • Provide adequate funding and programming to provide technical assistance for building and business-level improvements
	Merchants' Association Support Program	<ul style="list-style-type: none"> • Build consensus between NJ GORR and NJ EDA to adopt project • Fund programming specifically geared toward resiliency planning
Asbury Park	Beachfront Integrated Flood Protection System	<ul style="list-style-type: none"> • Build consensus between NJ GORR and NJ EDA to adopt project, with support from the City of Asbury Park • Fund a study to plan for and design integrated flood protection along the boardwalk and beachfront • Engage in planning and permitting for implementation of the components of the protection system • Create schematic designs for MTA rail yard protection • Fund programming specifically geared toward resiliency planning and expansion of the Partnership • Fund and launch a community planning process focused on long-term strategies for the Beach 116th Street corridor

Implementation Summary

In total, these proposals rely on \$284.6 million in federal mitigation funding through the Rebuild By Design initiative – using primarily Rebuild by Design funding but also potential FTA funding, FEMA Disaster Mitigation funding, and other sources. These projects represent innovative thinking at the crossroads of commercial vibrancy and physical resiliency. They are developed as models to be applied throughout the Sandy-affected region and elsewhere.

The Commercial Corridor Resiliency Project is based on our belief that commercial corridors and clusters are integral to their surrounding communities and that commercial resiliency will be the strongest when it is tied to larger-scale interventions that provide protection for entire communities. Commercial vitality, in the form of an active streetscape, job creation, or economic activity, is key to sustaining vibrant places throughout the region. Protection of these assets in the face of extreme weather events and storms like Hurricane Sandy is vital to the broader region they serve.



Photo Credits

Key: Bottom (B); Bottom Left (BL); Bottom Right (BR); Center (C); Center Left (CL); Center Right (CR); Left (L); Right (R); Top (T); Top Left (TL); Top Right (TR)

Slide 1: TL: Consultant Team C: Consultant Team

TR: Consultant Team

Slide 6: TL: Consultant Team; TR: [Iron State Development BL: Flickr user pauls95blazer; BR: The New York Times/Michael Nagle

Slide 7: FEMA / Jocelyn Augustino

Slide 8: All: Consultant Team

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Slide 59: Consultant Team

Slide 60: All: Consultant Team; flyer produced by NY Rising Red Hook Planning Committee

Slide 61: L: Consultant Team; R: Station Liquors

Slide 62: All: Consultant Team; flyer produced by Beach 116th Street Partnership

Slide 63: All: Consultant Team

Slide 64: Consultant Team

Slide 74: All: Consultant Team

Slide 78-80: All: Consultant Team

Slide 84: All: Consultant Team

Slide 86: All: Consultant Team

Slide 90-2: All: Consultant Team

Slide 94: All: Consultant Team

Slide 96: Consultant Team

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Slide 109: Consultant Team

Slide 126: All: Consultant Team

Slide 130-4: All: Consultant Team

Slide 142: Consultant Team

Slide 154-5: All: Consultant Team

Slide 161: All: Consultant Team

Slide 163: Consultant Team

Slide 165-7: Consultant Team

Slides 174: Consultant Team

Slide 176: Consultant Team

Slide 175: Consultant Team

Slide 178: Consultant Team

Slide 180: Consultant Team

Slide 186: Consultant Team

Slide 197: All: Consultant Team

Slide 205-8: Consultant Team

Slide 210: Consultant Team

Slide 214: Lucas Jackson

V. Letters of Support

Commercial Corridor Resiliency

CHARLES E. SCHUMER
NEW YORK

United States Senate
WASHINGTON, DC 20510

COMMITTEES:
BANKING
FINANCE
JUDICIARY
RULES

The Honorable Shaun Donovan
Secretary
U.S. Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410

Dear Secretary Donovan,

I am writing to express my support for the design proposals advanced by HR&A Advisors and Cooper Robertson through the Rebuild By Design process for New York City. I am pleased to support this team's efforts to create innovative strategies that will protect and enhance New York's critical commercial corridors at risk of flooding associated with events like Sandy. As they have made clear through their submission, resilient businesses make strong communities, and these proposals will foster resiliency.

These proposals are practical, implementable solutions to enhance commercial vibrancy and resiliency, including:

- Planning and construction of an innovative integrated flood protection system to protect Red Hook, a vibrant waterfront community, accompanied by community capacity-building and revitalization efforts;
- Support for combined commercial revitalization and flood protection efforts around the Beach 116th Street corridor in Rockaway Park as well as protection of the MTA terminus at in such a way that integrates the elevated, protected rail yard with the surrounding corridor through new resilient commercial development.
- Expansion of New York City's Business Resiliency Investment Program, tied to capacity-building activities to support resiliency programming within local business improvement districts, merchants associations, and other business advocacy organizations.

I am confident that this proposal aligns with goals to enhance resiliency in our region. Thank you for your consideration.

Sincerely,



Charles E. Schumer
United States Senate



www.restoreredhook.org

Tax ID#: 13-2612524

Secretary Shaun Donovan
United States Department of Housing and Urban Development
451 7th Street S.W.
Washington, DC 20410

March 25, 2014

Re: Expression of Support for Rebuild by Design Projects Proposed by HR&A Advisors with
Cooper, Robertson & Partners
To the Honorable Secretary Shaun Donovan and members of the Rebuild by Design jury:

On behalf of ReStore Red Hook, a membership organization of small businesses in Red Hook formed to rebuild our small business community after the devastation of Superstorm Sandy, I am writing to express our support for the design and planning proposals by the team led by HR&A Advisors through the Rebuild By Design process. We have met with the HR&A Team and reviewed their proposals. We strongly agree that resilient businesses make strong communities and that these proposals will foster resiliency and revitalization of our waterfront community.

As small business owners, we are excited about the prospect of a long-term, integrated flood protection infrastructure solution to protect our neighborhood against flooding from storm surge. The damage and disruption from Sandy was a clear demonstration of the compelling need for this infrastructure.

Recognizing that this protection will take a long period to realize and that in the face of climate change, no single solution will be adequate to protect our community, we also support HR&A's proposals for interim efforts to foster small business resiliency through support for capital improvements and technical assistance and capacity building for an organization or organizations within the community to serve as the local planning liaison and the source of technical assistance and potential financing for small business and building mitigation efforts.

We are confident that this proposal meets the objectives of Rebuild by Design and aligns with goals to enhance resiliency in our neighborhood and our region.

Thank you for your consideration.

Sincerely,

Monica Byrne
Founder, ReStore Red Hook



Secretary Shaun Donovan
United States Department of Housing and Urban Development
451 7th Street S.W.
Washington, DC 20410

March 25, 2014

Re: Expression of Support for Rebuild by Design Projects Proposed by HR&A Advisors with Cooper, Robertson & Partners

To the Honorable Secretary Shaun Donovan and members of the Rebuild by Design jury:

On behalf of the Beach 116th Street Partnership, a newly formed merchants' association focused on promoting the vitality and resiliency of this Rockaway Park business community after the devastation of Superstorm Sandy, I am writing to express our support for the design and planning proposals by the team led by HR&A Advisors through the Rebuild By Design process. Our association has met with the HR&A Team on more than one occasion. We strongly agree that resilient businesses make strong communities and that these proposals will foster resiliency and revitalization for our commercial corridor.

The small businesses of Beach 116th Street suffered physical damage and significant business disruption from Sandy. Were these businesses able to remain in continuous operation, it is clear that they would have been able to play an important role in the recovery of the peninsula. Efforts to promote business and building mitigation through technical assistance, financing and direct funding as well as support for the Partnership's activities would serve as welcome resources to ensure Beach 116th is better prepared for the next storm. In addition, plans for revitalization and rebuilding advanced by HR&A, including around the Beach 116th Street A train station, would support economic vitality for the small business community in this area.

We are confident that this proposal meets the objectives of Rebuild by Design and aligns with goals to enhance resiliency in our neighborhood and our region.

Thank you for your consideration.

Sincerely,

Krzysztof Sadlej
Executive Director
Beach 116th Street Partnership

MYRA CAMPBELL, MAYOR
SUE HENDERSON, DEPUTY MAYOR
JACK KELLY, CITY MANAGER



COUNCIL
JOHN M. LOFFREDO
JOHN B. MOOR
AMY QUINN

**CITY OF ASBURY PARK
OFFICE OF THE CITY MANAGER**

MUNICIPAL BUILDING • ONE MUNICIPAL PLAZA
ASBURY PARK, NEW JERSEY 07712-7000
TEL: (732) 775-2100
FAX: (732) 775-1483

Secretary Shaun Donovan
United States Department of Housing and Urban Development
451 7th Street S.W.
Washington, DC 20410

March 24, 2014

**Re: Expression of Support for Rebuild by Design Projects Proposed by HR&A Advisors
with Cooper, Robertson & Partners**

To the Honorable Secretary Shaun Donovan and members of the Rebuild by Design jury:

Please accept this letter to express our strong support for the design proposals advanced by HR&A Advisors and Cooper Robertson through the Rebuild by Design process for Asbury Park and New Jersey. I am pleased to support this team's efforts to create innovative strategies that will protect and enhance New Jersey's critical commercial corridors at risk of flooding associated with events like Sandy. As they have made clear through their submission, resilient businesses make strong communities, and these proposals will foster resiliency.

These proposals are practical, implementable solutions to enhance commercial vibrancy and resiliency, including:

- Establishing a Shore-wide business resiliency investment program, including providing technical assistance and financing for capital improvements and behavioral strategies for mitigation, and supporting funding and programming to build capacity of business advocacy organizations to assist in resiliency measures;
- Funding to restore and mitigate Asbury's coastal lakes, enhancing resiliency, providing recreational access to the water, and restoring lake ecologies.
- Funding for planning and construction of an innovative integrated flood protection system at the Asbury Park boardwalk and adjacent upland areas, a pilot for future Shore resiliency projects; I am confident that this proposal meets the objectives of Rebuild by Design and aligns with goals to enhance resiliency in our region.

It is our recommendation that HR&A Advisors and Cooper Robertson's proposals be given strong consideration for funding. Thank you

Sincerely,

Thomas J. Gilmour
Director of Economic Development

Greetings From Asbury Park

VI. Technical Appendix

Commercial Corridor Resiliency

Project Costs

HR&A + Cooper Robertson Team
 Rebuild By Design
 Project Cost Worksheet
 3/25/2014

Hard costs provided by Parsons Brinckerhoff
 Soft costs provided by HR&A

PROJECT	USES Cost	SOURCES			
		FTA	City/State CDBG-DR	Private Development	RBD CDBG-DR Funds
CITYWIDE					
Leveraged BRIP Program Allocation	\$50,000,000	\$ -	\$ -	\$ -	\$50,000,000
Local Merchant Association/BID Support Program	\$10,000,000	\$ -	\$ -	\$ -	\$10,000,000
Total Citywide Initiatives	\$ 60,000,000	\$ -	\$ -	\$ -	\$ 60,000,000
RED HOOK					
<i>Integrated Flood Protection System</i>					
Deployable system along streets/paths	\$ 3,213,840				
Elevated Roadway	\$ 1,124,400				
Levee wall (edge protection)	\$ 89,909,512				
Floodgate (potentially at Thor site)	\$ 75,000,000				
<i>Subtotal</i>	<i>\$ 169,247,752</i>				
Total Hard Costs	\$ 169,247,752				
<i>Soft Costs</i>					
10% GC OH & Profit	\$ 186,172,527				
25% Design Contingency	\$ 232,715,659				
8% Escalation	\$ 251,332,912				
25% Soft Cost	\$ 314,166,140				
<i>Total IFPS Cost</i>	<i>\$ 314,166,140</i>		\$ 100,000,000	\$ 72,283,900	\$ 141,882,240
Neighborhood Planning Process	\$5,000,000				\$ 5,000,000
Local Resiliency Corporation	\$2,000,000				\$ 2,000,000
Red Hook Total	\$ 321,166,140	\$ -	\$ 100,000,000	\$ 72,283,900	\$ 148,882,240
BEACH 116th					
<i>MTA Railyard Flood Protection</i>					
Raised platform	\$6,000,000				
South reinforced flood wall	\$516,300				
North reinforced flood wall	\$442,800				
Total Hard Costs	\$ 6,959,100				
<i>Soft Costs</i>					
10% GC OH & Profit	\$ 7,655,010				
25% Design Contingency	\$ 9,568,763				
8% Escalation	\$ 10,142,888				
25% Soft Cost	\$ 12,678,610				
<i>MTA Railyard Flood Protection</i>	<i>\$ 12,678,610</i>	TBD (per FTA Application)	\$ -	\$ -	\$ 12,678,610
Local Merchant Association/BID Support Program	\$600,000	\$ -	\$ -	\$ -	\$600,000
Neighborhood Planning Process	\$2,000,000	\$ -	\$ -	\$ -	\$2,000,000
B116th Total	\$ 15,278,610	\$ -	\$ -	\$ -	\$ 15,278,610

HR&A + Cooper Robertson Team

Rebuild By Design
 Project Cost Worksheet
 3/25/2014

Hard costs provided by Parsons Brinckerhoff
 Soft costs provided by HR&A

PROJECT	USES Cost	SOURCES			
		FTA	City/State CDBG-DR	Private Development	RBD CDBG-DR Funds
SHOREWIDE					
Shorewide Business Resiliency Program	\$30,000,000	\$ -	\$ -	\$ -	\$30,000,000
Shorewide Merchants Association Support Program	\$6,000,000	\$ -	\$ -	\$ -	\$6,000,000
Total Shore-wide Initiatives	\$ 36,000,000				\$ 36,000,000
ASBURY PARK					
<i>Beachfront Flood Protection System</i>					
Boardwalk reinforcement	\$ 7,740,485				
Building buffers (debris prevention)	\$ 3,468,800				
Deployable protection	\$ 279,160				
Landscape protection at parks (dune)	\$ 384,214				
Total Hard Costs	\$ 11,872,658				
<i>Soft Costs</i>					
10% GC OH & Profit	\$ 13,059,924				
25% Design Contingency	\$ 16,324,905				
8% Escalation	\$ 17,304,399				
25% Soft Cost	\$ 21,630,499				
Total IFPS Cost	\$ 21,630,499	\$ -	\$ -	\$ -	\$ 21,630,499
<i>Wesley Lake Protection</i>					
Bermed lake edge	\$ 3,553,183	\$ -	\$ -	\$ -	\$ 3,553,183
<i>North Main Street Protection</i>					
Bermed lake edge @ Deal Lake	\$ 254,026	\$ -	\$ -	\$ -	\$ 254,026
<i>Sunset Park Protection</i>					
Bermed lake edge @ Sunset Lake	\$ 523,928	\$ -	\$ -	\$ -	\$ 523,928
Neighborhood Planning Process	\$2,000,000	\$ -	\$ -	\$ -	\$ 2,000,000
Asbury Park Total	\$ 27,961,636		\$ -	\$ -	\$ 27,961,636
Projects Total					\$ 288,122,486

Costing Worksheet

HR&A + Cooper Robertson Team

Rebuild By Design

Project Cost Worksheet

3/25/2014

Hard costs provided by Parsons Brinckerhoff

Soft costs provided by HR&A

PROJECT	USES						Cost	
	Design Length (LF)	Design Height (LF)	Quantity	Unit	Cost per unit	Unit		
RED HOOK								
<i>Integrated Flood Protection System</i>								
Deployable system along streets/paths								
Deployable unit	2619	3	7,857 SF		\$320 SF	\$	2,514,240	
Wall foundation (2' x 2' x L)	-	-	388 CY		\$900 CY	\$	349,200	
Post foundation (2' x 3' x 4' x # of posts)	-	-	292 CY		\$1,200 CY	\$	350,400	
Elevated Roadway								
Backfill with structural fill			12186 CY		\$50 CY	\$	609,300	
Mobilization of pavement equipment			1 LS		\$10,000 LS	\$	10,000	
Pave access road (1" top, 2" base)	3215	3	112525 SF		\$4 SF	\$	450,100	
Pavement striping			1 LS		\$5,000 LS	\$	5,000	
MPT Allowance			1 LS		\$50,000 LS	\$	50,000	
Levee berm (edge protection)	15818	10	15,818 LF		\$5,684 LF	\$	89,909,512	
Floodgate	240	10	3 Ea.		\$25,000,000 Ea.	\$	75,000,000	
Pile Wall and Foundation								
Total Hard Costs							\$	169,247,752
<i>Soft Costs</i>								
10% General Requirements							\$	-
10% GC OH & Profit							\$	186,172,527
25% Design Contingency							\$	232,715,659
8% Escalation (2 years at 3% assumed)							\$	251,332,912
25% Soft Costs							\$	314,166,140
IFPS Loaded Total							\$	314,166,140
Breakwaters (if needed)			LF		\$45,000			

HR&A + Cooper Robertson Team

Rebuild By Design

Project Cost Worksheet

3/25/2014

Hard costs provided by Parsons Brinckerhoff

Soft costs provided by HR&A

PROJECT	USES						Cost
	Design Length (LF)	Design Height (LF)	Quantity	Unit	Cost per unit	Unit	
BEACH 116th							
<i>MTA Railyard Flood Protection</i>							
Raised platform	45000SF	6	10,000	CY	\$600	CY	\$6,000,000
South reinforced flood wall							
Wall foundation (2 x 2 x L)	1290	6	191	CY	\$900	CY	\$171,900
Retaining wall (1 x L x H)			287	CY	\$1,200	CY	\$344,400
North reinforced flood wall							
Wall foundation (2 x 2 x L)	1108	6	164	CY	\$900	CY	\$147,600
Retaining wall (1 x L x H)			246	CY	\$1,200	CY	\$295,200
Total Hard Costs							\$ 6,959,100
<i>Soft Costs</i>							
10% General Requirements							\$ 7,655,010
21% GC OH & Profit							\$ 9,262,562
25% Design Contingency							\$ 11,578,203
6% Escalation (2 years at 3% assumed)							\$ 12,272,895
30% Soft Costs							\$ 15,954,763
MTA Station Loaded Total							\$ 15,954,763
BEACH 116th							
<i>Corridor Protection Program (Public interventions only)</i>							
<i>Deployables @ Street</i>							
Deployable unit			840	SF	\$320	SF	\$268,800
Wall foundation (2' x 2' x L)	140	6	560	CY	\$900	CY	\$504,000
Post foundation (2' x 3' x 4' x # of posts)			456	CY	\$1,200	CY	\$547,200
<i>Deployables @ Sidewalk</i>							
Deployable unit			401.5	SF	\$320	SF	\$128,480
Wall foundation (2' x 2' x L)	73	6	292	CY	\$900	CY	\$262,800
Post foundation (2' x 3' x 4' x # of posts)			264	CY	\$1,200	CY	\$316,800
Total Hard Costs							\$ 2,028,080
<i>Soft Costs</i>							
10% General Requirements							\$ 2,230,888
21% GC OH & Profit							\$ 2,699,374
25% Design Contingency							\$ 3,374,218
6% Escalation (2 years at 3% assumed)							\$ 3,576,671
30% Soft Costs							\$ 4,649,673
Corridor Protection Loaded Total							\$ 4,649,673

HR&A + Cooper Robertson Team

Rebuild By Design

Project Cost Worksheet

3/25/2014

Hard costs provided by Parsons Brinckerhoff

Soft costs provided by HR&A

PROJECT	USES						Cost
	Design Length (LF)	Design Height (LF)	Quantity	Unit	Cost per unit	Unit	
BEACH 116th							
<i>Bay Edge</i>							
Park	90000SF		90,000 SF		\$50 PSF		\$4,500,000
Reinforced Baywall	1230	10	1230 LF		\$6,000 LF		\$7,380,000
Total Hard Costs						\$	11,880,000
<i>Soft Costs</i>							
10% General Requirements						\$	13,068,000
21% GC OH & Profit						\$	15,812,280
25% Design Contingency						\$	19,765,350
6% Escalation (2 years at 3% assumed)						\$	20,951,271
30% Soft Costs						\$	27,236,652
Protected Bay Edge Loaded Total						\$	27,236,652

ASBURY PARK							
<i>Beachfront Flood Protection System</i>							
Boardwalk reinforcement (armored berm with impervious core)	2803	6	2,803 LF		\$2,762 LF	\$	7,740,485
Building buffers (deployable unit)	1084	10	10840 SF		\$320 SF	\$	3,468,800
<i>Deployable protection</i>							
Deployable unit			1892 SF		\$320 SF	\$	151,360
Wall foundation (2' x 2' x L)	473	4	70 CY		\$900 CY	\$	63,000
Post foundation (2' x 3' x 4' x # of posts)			54 CY		\$1,200 CY	\$	64,800
Landscape protection at parks (berm)	363	4	363 LF		\$1,058 LF	\$	384,214
Total Hard Costs						\$	11,872,658
<i>Soft Costs</i>							
10% General Requirements						\$	13,059,924
21% GC OH & Profit						\$	15,802,508
25% Design Contingency						\$	19,753,135
6% Escalation (2 years at 3% assumed)						\$	20,938,323
30% Soft Costs						\$	27,219,820
Beachfront Flood Protection System Loaded Total						\$	27,219,820

HR&A + Cooper Robertson Team

Rebuild By Design

Project Cost Worksheet

3/25/2014

Hard costs provided by Parsons Brinckerhoff

Soft costs provided by HR&A

PROJECT	USES						Cost
	Design Length (LF)	Design Height (LF)	Quantity	Unit	Cost per unit	Unit	
ASBURY PARK							
<i>Ocean Avenue Road Renovation</i>							
<i>Excavation and Removal of Existing Road</i>							
Remove sidewalk			30064 SF		\$2 SF	\$	60,128
Remove asphalt			30064 SF		\$2 SF	\$	60,128
Remove curb			1879 SF		\$5 SF	\$	9,395
Relocate utility and pole streetlight			4 Ea.		\$1,500 Ea.	\$	6,000
<i>Creation of New Roadway</i>							
Pave asphalt travel lanes	1879	-	30064 SF		\$5 SF	\$	150,320
Stripe travel lanes			1,879 LF		\$4 LF	\$	7,516
Install curb			1,879 LF		\$45 LF	\$	84,555
Install permeable sidewalk			6,013 SF		\$25 SF	\$	150,320
Install trees in sidewalk			38 Ea.		\$1,000 Ea.	\$	38,000
Total Hard Costs							\$ 566,362
<i>Soft Costs</i>							
10% General Requirements						\$	622,998
21% GC OH & Profit						\$	753,828
25% Design Contingency						\$	942,285
6% Escalation (2 years at 3% assumed)						\$	998,822
30% Soft Costs						\$	1,298,468
Ocean Avenue Loaded Total							\$ 1,298,468
<i>Wesley Lake Protection</i>							
Bermed lake edge	3357	4	3,357 LF		\$1,058 LF	\$	3,553,183
<i>Deal Lake Protection</i>							
Bermed lake edge @ Deal Lake	240	4	240 LF		\$1,058 LF	\$	254,026
<i>Sunset Park Protection</i>							
Bermed lake edge @ Sunset Lake	495	4	495 LF		\$1,058 LF	\$	523,928
Lake Mitigation Total							\$ 4,331,136

BCA Framework Red Hook

REBUILD BY DESIGN

HR&A Advisors with Cooper, Robertson & Partners

RBD BCA Framework

Red Hook

Step	Question	Describe
<p>Step 1 - Problem Analysis</p> <p><i>Key Question:</i></p> <p><i>What is the problem we are trying to solve in our project?</i></p>	<p>What are the existing flood risks (e.g. coastal flooding, fluvial/pluvial flooding, groundwater flooding) in your area (hazard, vulnerability, probability)?</p>	<p>Existing flood risk (hazard, vulnerability) in our area:</p> <ul style="list-style-type: none"> • Red Hook experiences stormwater backup during heavy rains and was severely flooded during Sandy, with businesses taking on from 1' to 4' of water. • Saltwater flooding during Sandy caused corrosion of business equipment and infrastructure. • The area also experiences regular stormwater flooding, and lacks the necessary infrastructure to provide adequate drainage. • The entire neighborhood is in the FEMA flood zone. The majority is an A-zone, susceptible to flooding in a 100-year storm, with portions at the water's edge in a V-zone, susceptible to wave action during storm surge. Small portions of the community are in the 500-year floodplain, providing higher ground on partial blocks.
	<p>What are the existing social conditions (e.g., lack of housing, mobility) in your area?</p>	<p>Social conditions (e.g., lack of housing, mobility) in our area:</p> <ul style="list-style-type: none"> • 6,000 residents in NYCHA public housing (Red Hook Houses – East and West); lack of socioeconomic mobility for low-income population. • Unemployment is 9%+ within the zip code area. • Businesses are often small, cash-strapped, and do not own the buildings they inhabit, limiting their ability to prepare for disaster.
	<p>What are the environmental conditions in your area?</p>	<p>Environmental conditions in our area:</p> <ul style="list-style-type: none"> • Historically an industrial waterfront, portions of the waterfront may require remediation. • Local drainage remains an issue for the business community, and storm water systems back up frequently during less severe storms. • Industrial uses and materials may create contamination hazards throughout the neighborhood.
	<p>What are the existing values of the community? How is spatial quality defined? What are the trends in spatial development (rising demand for housing or agriculture; urbanization)?</p>	<p>Existing values in our area:</p> <ul style="list-style-type: none"> • Red Hook is home to approximately 8 million square feet of commercial property, composed of neighborhood retail, light manufacturing, and traditional industrial properties. This unique mix gives the neighborhood a distinctly industrial feel, preserving much of the area's history.

Step	Question	Describe
		<ul style="list-style-type: none"> • New development is on the rise, however. Private developers have purchased properties on the waterfront with the intention of developing new commercial and residential projects. Residential buildings are predominantly mid to high-rise, while older structures along side streets preserve local context. • Though not directly within the scope of our work, housing, and preservation of affordable housing is a major concern within the community.
<p>Step 2 - Project Definition</p> <p><i>Key Question:</i></p> <p><i>What is our project about?</i></p>	<p>What are the key objectives?</p>	<p>Our key objectives:</p> <ul style="list-style-type: none"> • <i>Fund an innovative integrated flood protection system that also supports revitalization.</i> After assumed funding commitments by the City and State of New York and investments by private property owners that could be captured around the Red Hook waterfront, additional funding will be required to protect the community. Additional measures would leverage the value of this investment and incorporate community input and aspirations. • <i>Launch a planning process in which components of the flood protection system are designed to include commercial or mixed use preservation and/or expansion,</i> such as revitalization along Atlantic Basin; catalytic new building construction or modification along the west bank of the Gowanus to serve as both flood protection and new commercial or mixed use expansion; decking of the Hugh L. Carey Tunnel entrance to protect the tunnel from flooding and provide new development opportunities; and connecting Columbia Street in Red Hook to the Columbia Waterfront District. The planning process should culminate in regulatory changes and planned infrastructure projects by the City to support these initiatives. • <i>Support a new local entity to plan for corridor level protections and support building mitigation.</i> A Local Development Corporation (LDC) or comparable entity would perform an array of functions, including: serve as a community-based planning entity for the integrated flood protection system; undertake business organization efforts (through a merchants' association or

Step	Question	Describe
		business improvement district (BID)); serve as a Community Development Financial Institution (CDFI) to channel funding to local businesses for mitigation; and promote local job creation through workforce development and training.
	What are the geographical boundaries?	Our geographical boundaries: <ul style="list-style-type: none"> • Van Brunt Street south of Hamilton Avenue • Coffey Street west and south from Van Brunt Street • Van Dyke Street east to Otsego Street and south from Van Brunt Street; extending from Otsego Street east to Columbia Street and south.
	What is the design philosophy?	Our design philosophy: <ul style="list-style-type: none"> • Small businesses are vulnerable to climate change and extreme weather events by nature. They thrive when they are accessible from the street and are seen as part of the urban fabric, opening directly onto corridors. • Many typical resiliency measures, such as elevation and barriers, are not plausible long-term solutions for businesses, as they disrupt their operations. • Design solutions are geared toward providing flood protection and enhancing commercial vibrancy. This employs both temporary and deployable interventions at the business and building level, and corridor-level interventions that use innovative building strategies as protection for a number of properties in close proximity. • In addition, in Red Hook and other historically industrial waterfront communities, protecting the industrial property at or near the water's edge is key to the community's vitality, and revitalizing or diversifying these uses can also be achieved in tandem with flood protection efforts.
	What are the main components of the plan? How do the components interact (synergies, reinforcement, conflicting etc.)?	<i>Our main components:</i> Our main components: <ul style="list-style-type: none"> • Design and construct an innovative integrated flood protection system, incorporating retrofit of existing properties, resilient strategies for new development, and a combination of deployable

Step	Question	Describe
		<p>and permanent interventions in the public realm, providing protection for the maximum number of businesses, buildings, and housing units.</p> <ul style="list-style-type: none"> • Launch a neighborhood planning process in which flood protection components are designed to include commercial or mixed use preservation or expansion, such as new vitality in Red Hook Houses, connectivity along key corridors like Columbia Street, and an elevated Brooklyn Greenway. • Create a new or adapted Local Resiliency Corporation to serve as a planning partner and support or finance commercial and community revitalization, incorporating existing merchants groups and additional community objectives. • Provide enhanced resources to support resiliency improvements by individual businesses and buildings in the short-term, including technical assistance, direct funding and loans. <p><i>Interaction of our main components:</i></p> <ul style="list-style-type: none"> • Addressing resiliency at multiple scales, the business and building, corridor, and neighborhood or district, provides the maximum amount of protection in the event of a Sandy-like storm. • All components are designed to foster commercial vibrancy while providing flood protection and enhancing resiliency, including both economic and physical resiliency.
	<p>What is the development of the project in 5 years, in 20 years and in 50 years from now?</p>	<p><i>Development of the project in 5 years, in 20 years and in 50 years from now:</i></p> <ul style="list-style-type: none"> • 5 years: Continued growth of a pilot funding program to become self-sustaining in providing loans and grants to businesses in need in preparation of and following future storms. • Potential for additional local stakeholders to sign on as cooperating entities in supporting administration of the program. • 20 years: Planning, design and construction of an integrated flood protection system, affording a high level of protection around Red Hook • 50 years: Maintenance of IFPS components

Step	Question	Describe
<p>Step 3 - Reference situation</p> <p><i>Key Question:</i> What will happen without our project?</p> <p><i>See Appendix I for further guidance.</i></p>	<p>What realistically would happen now, in 5 years, in 20 and in 50 years if this specific project would not be implemented?</p> <p>What would individuals, communities, (local/federal) governments do? Is “do-nothing and nothing changes” a realistic development?</p>	<p><i>Description of the reference situation:</i></p> <p>5 years:</p> <ul style="list-style-type: none"> • Additional businesses that were affected by Sandy and now struggle to completely rebuild and resume operations will likely continue to close, either due to burden of debt or inability to operate at full capacity. • Lack of organization could inhibit businesses from making further individual gains and from growing as a community. • Businesses will continue to strive for recovery, but may not move to mitigation <p>20 years:</p> <ul style="list-style-type: none"> • Design and construction of an integrated flood protection system may proceed, likely along an inland route, providing less protection than the preferred concept and potentially without community planning and consensus-building. <p>50 years:</p> <ul style="list-style-type: none"> • Economic instability will persist and the neighborhood will continue to be home to only small businesses, without significant growth, within a fractured social environment.
<p>Step 4 - Identify Stakeholders</p> <p><i>Key Question:</i> Who are the key stakeholders relevant to our project?</p>	<p>Who are the key stakeholders in our area and what are their interests in our project?*</p> <p>(*The interests of the stakeholders may either be related to the positive or negative impacts (scores) of the project)</p>	<p><i>Communities:</i></p> <ul style="list-style-type: none"> • Restore Red Hook (merchants): organizational capacity, funding, and long-term planning • Red Hook Houses tenants: economic opportunity and mobility <p><i>Municipalities:</i></p> <ul style="list-style-type: none"> • New York City: significant flood protection commitment and economic development interest in the neighborhood through EDC, and potentially SBS in business interests <p><i>County:</i></p> <ul style="list-style-type: none"> • Kings County: overall economic and environmental health

Step	Question	Describe
		<p><i>PANYNJ:</i></p> <ul style="list-style-type: none"> • Interest in preserving waterfront edge and working waterfront, as well as potential to preserve ship channels through New York Harbor and Buttermilk Channel <hr/> <p><i>State:</i></p> <ul style="list-style-type: none"> • New York: significant commitment to flood protection commitment as a comprehensive protection strategy for the neighborhood • MTA/TBTA: Interest in protecting Hugh L. Carey Tunnel from flooding and improving safety conditions in the area surrounding the tunnel <hr/> <p><i>NGO:</i></p> <ul style="list-style-type: none"> • Restore Red Hook: transitioning to become a merchants association • Red Hook Coalition: coalition of local nonprofits, including Good Shepherd, RH Initiative, and others, focused on Red Hook's underserved and vulnerable populations and serving neighborhood youth <hr/> <p><i>Private sector:</i></p> <ul style="list-style-type: none"> • Institutional capital in the form of grants and Program Related Investments to support Sandy recovery and future resiliency • Local property owners and real estate developers with an interest in the area's long-term opportunities to attract businesses and residents • Merchants' associations and businesses in the process of organizing and expanding capacity
	Score the effect of your project on the basis of the criteria list:	

<p>Step 5 - Project Scoring</p> <p><i>Key Question:</i></p> <p><i>What are the positive and negative effects of our project, as compared to the reference situation?</i></p>		<p>1. <u>Monetize</u> <i>life-cycle costs</i> and the effect on <i>flood protection</i>, to the extent you can.</p> <p>2. <u>Quantify</u> all effects with the most advanced quantitative information possible, to the extent you can. In case no quantitative information is available, use a semi-quantitative scale, such as:</p> <p>-- Expected strong negative impact - Expected negative impact 0 Neutral + Expected positive impact ++ Expected strong positive impact ? Impact unknown / cannot be assessed</p> <p>Notes on scoring:</p> <ul style="list-style-type: none"> • Use expert judgments to score. • Scoring of the project is relative to the reference situation (see step 3). • Use the criteria list in Appendix II to quantify the effects. • Provide a qualitative clarification for each score. • Identify required extra information needed for (improving) the judgment. <p>3. <u>Qualitatively</u> describe the effects.</p> <p>4. Assess the <u>certainty of the effect</u> on a scale from 1 (very certain) to 5 (very uncertain)</p>			
Criteria List	Sub-criteria	Monetized effect	Quantitative assessment	Qualitative description	Uncertainty
Life cycle costs	Investment costs (including preparation and project management)	<ul style="list-style-type: none"> • IFPS: Preferred concept: \$140 million, net of \$100 million commitment from New York City and State, and \$70 million anticipated to be accomplished through new development of private property. • Neighborhood planning process for planning & design: \$5 million • Capacity – building/LDC startup: \$2 million (first year costs) 		Strong impact for immediate business programs as well as integrated flood protection development, with the former coming at relatively low cost and the latter requiring large public investment.	

	Operation and maintenance cost	Estimated to be \$500,000 annually		Estimate covers routine maintenance and testing of deployable systems.	This amount will vary greatly depending on the portion of the system that is deployable and level of materials utilized.
	Re-investment after ... years	Up to 50 years			Reinvestment will vary for system components, with 50 years serving as an estimated average.
	...				
Flood protection (coastal, pluvial, fluvial, groundwater)	Reduction of expected property damages due to flooding	The preferred concept of an integrated flood protection system could protect up to 10.3 million square feet of property, equivalent to \$515 million in estimated avoided damage costs.		Protecting commercial property will allow businesses to reopen more quickly after an event and	Additionally, the project is intended to reduce business interruption, loss of inventory, and length of displacement.
	Reduction of expected casualties due to flooding	0		No reported deaths from direct outreach. Probability may be reduced.	
Environmental value	Ecosystem and biodiversity effects		?		For integrated flood protection system, this will require a separate study that specifically addresses these issues where interventions interact with the water's edge, dependent on the specific intervention.
	Energy efficiency		+	Efficiencies in building operating systems will likely improve energy utilization, especially after a disaster.	
	Ambient (urban) environment / spatial quality		+	Enhanced streetscape and neighborhood quality will provide an overall improvement to the	

				neighborhood and commercial vibrancy.	
	Noise levels		-	Construction of an integrated flood protection system is likely to create construction noise impacts, which will be studied as part of project planning and environmental studies.	
	Greenhouse gas emissions		0	No direct impact likely	
	Air quality		0	No direct impact likely	
	<i>Add other effects</i>				
Social value	Identity & Social cohesion		++	Expanded capacity for business associations and owners, as well as strengthening connections between different portions of Red Hook, both through flood protection strategies and commercial vibrancy, will enhance the area's identity and cohesion within a currently fractured social fabric.	
	Crime and vandalism		+	Enhanced retail vibrancy and street activity may deter street-level crime and vandalism.	
	Affordable housing		+	Project will not create new affordable housing, but will seek to improve expanded opportunities for residents living in public and affordable housing now, and enhance flood protection for those residents.	

	Recreational value for inhabitants		+	Potential to increase access to greenspace and recreation through use of an elevated greenway as flood protection	
	Cultural, historic, archaeological sites and landscapes		+	Flood protection can protect Red Hook's historical working waterfront and industrial access, while building on these uses and introducing modern industry.	The ability to preserve historic buildings within an integrated flood protection system may hinge on property owners' willingness to adapt buildings with modern, innovative interventions.
	Human capital and education		+	Job training and skills-based education, provided through a LDC or other governance entity could have meaningful impacts for the community, especially around Red Hook Houses.	
Economic value	Direct effects on local or regional economy (e.g. tourism, agriculture/fishery, logistics, energy)		+	Provides an enhanced environment for commercial vibrancy.	
	Synergies or spin-off effects to other sectors' revenues (e.g. transportation)		+	Will not be studied, but inferred to be a positive impact to affected sectors, based on economic health within the area, though may be realized locally.	
	Economic competitiveness (through specialization; agglomeration)		+	Will not be quantified, but assumed that the project will enhance competitiveness with other former industrial waterfront, especially within Brooklyn, barring the negative	

				impacts of distance from transit.	
	Local / regional employment		+	Local business resiliency and strengthening neighborhood identity and cohesion, as well as protecting critical industrial, manufacturing and entrepreneurship opportunities should provide employment opportunities to	
	Local / regional employment in construction		+	Construction of an integrated flood protection system is likely to produce a large number of construction jobs.	The community also expressed interest in job training programs for construction and skilled labor jobs, potentially tied to creation of flood protection systems.
	Value of property other than through enhanced flood protection		++	Commercial vibrancy is likely to support future market growth.	
	Mobility / Transportation		+	As an additional initiative, the team suggests planning and action be taken as part of an enhanced transportation system to Red Hook, as well as proposing urban planning interventions for enhancing perceived connectivity.	
	<i>Add other effects</i>				

Step	Question	Describe
<p>Step 6 Robustness and flexibility</p> <p><i>Key question:</i> <i>How future-proof is our project?</i></p>	<p>What are the key risks and uncertainties that may affect our project and how do these affect the scores in step 5?</p> <p>How well can the project be adapted in case any of the risks materialize? (e.g. through upscaling/ downscaling/ delaying/ speeding up)</p>	<p><i>What are possible changes in governmental / federal subsidies and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> • Changes in available CDBG-DR funds will impact any financing mechanism and funding tool if the entity organizing and administering these programs is not yet self-sufficient. • In particular, obstacles to delivering funding to local businesses due to federal regulations on “small businesses” and administrative recording requirements may prevent funds from being efficiently disbursed to applicants to a program like New York City’s Business Resiliency Investment Program. • Shifts in the state or city’s commitment to creating integrated flood protection will threaten project completion <p><i>How can the project adapt to this risk?</i></p> <ul style="list-style-type: none"> • Shifts in the state or city’s commitment to creating integrated flood protection will threaten project completion
		<p><i>What are possible changes in the fiscal situation for specific public stakeholders and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> • Incentivizing property owners to incorporate resilient standards in rebuilding may require incentives such as property tax abatements, though not defined <p><i>How can the project adapt to this risk?</i></p> <ul style="list-style-type: none"> • Dedicated technical assistance and organization for business owners looking to make resilient improvements could accelerate adoption and is a necessary component to implementation
		<p><i>How do climate change scenarios influence the project?</i></p>

Step	Question	Describe
		<ul style="list-style-type: none"> • If significantly greater than projected, could undermine investment of public capital in integrated flood protection (data does not suggest that this is the case) <p><i>How can the project be adapted with regard to climate change scenarios?</i></p> <ul style="list-style-type: none"> • The scales of work the team proposes here are appropriate to both enhancing commercial vibrancy and providing flood protection. Portions of this project, including resilient investments for small businesses, expanding organizational capacity, and storm preparedness planning, will be effective strategies for businesses in current and immediate future conditions, regardless of climate change. <hr/> <p><i>How do demographic and socio-economic trends influence the project?</i></p> <ul style="list-style-type: none"> • Rapid changes in local demographics as a product of private development could shift stakeholder priorities, though not only toward the negative <p><i>How can the project be adapted with regard to these scenarios?</i></p> <hr/> <p><i>How can developments in the real estate market influence the project?</i></p> <ul style="list-style-type: none"> • Same as above, while increasing property values will provide greater value for property within protection area <p><i>How can the project be adapted with regard to these developments?</i></p> <hr/> <p><i>Describe any other risks and uncertainties and how the project can be adapted in order to cope with these risks.</i></p>

<p>Step 7 - Implementation</p> <p><i>Key question: How difficult is the implementation of our project?</i></p>	<p>What are the implementation challenges and opportunities of our project?</p>	<p><i>What are the technical risks?</i></p> <ul style="list-style-type: none"> • Extensive environmental review and engineering will need to be carried out to ensure that plans are technically viable
		<p><i>What are procedural (legal) and process (political, societal) risks?</i></p> <ul style="list-style-type: none"> • Financial feasibility and sustainability of a leveraged business resiliency funding program to be determined; might require long-term investments from seed funders; establishing financial relationships has yet to be determined. • Feasibility of ongoing public capital investments for fund has yet to be determined.
		<p><i>What are synergies / conflicts with ongoing, planned national/regional developments?</i></p> <ul style="list-style-type: none"> • Integrated flood protection concepts are meant to be integrated with ongoing work, rather than at odds with
		<p><i>Are there any political and stakeholder issues?</i></p> <ul style="list-style-type: none"> • Expansion of capacity of a LDC of similar entity will need to be sensitive to various groups within the local business community, and rifts exist within the local business community that may need to be resolved for full program adoption • Sensitivity to local socioeconomically challenged communities is key

APPENDIX I

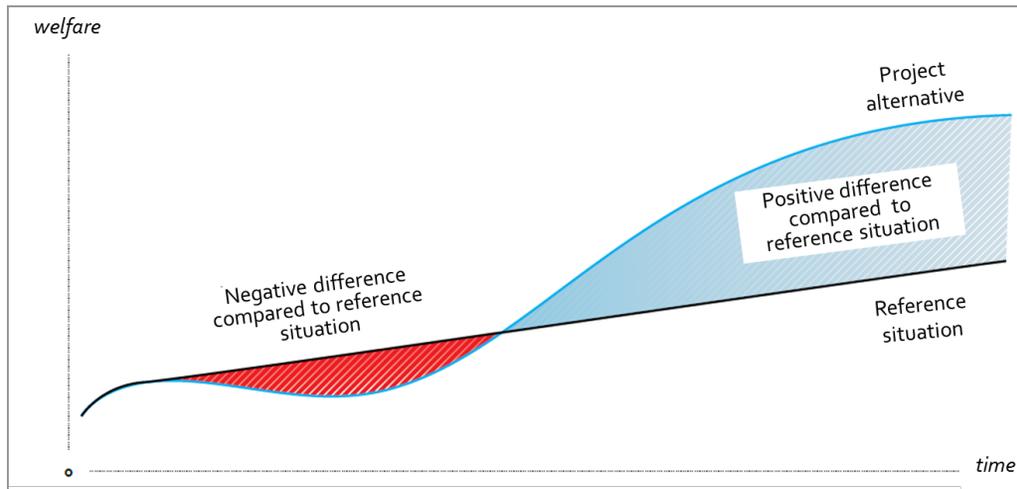
Reference situation

The reference situation describes the development that would happen if the project would not be implemented.

Why do we need a reference situation?

In order to assess the impact of the project, or the added value, it is important to understand what “difference it makes” compared to the natural development of the situation. In the graph below, the black line shows the development in the reference situation and the blue line the development of the project alternative. The difference between the two (for example, negative difference at the start of the project because of *extra* costs, and positive difference in the later phase of the project because of *extra* benefit) is the effect, or impact, the project has.

Not only does the reference situation help to assess the impact of the project, it also gives an indication on the willingness to pay for a certain measure. For example, if individuals, businesses or authorities are willing to invest a certain amount of money in the reference situation, they might be willing to spend at least this same money on the project alternative.



Supportive questions to help describe the reference situation:

- What would the county/government do without this project?
- What would individuals and community groups do without the project?
- Would “nothing” happen?

APPENDIX II

List of indicators

Criteria	Sub criteria	Examples of indicators
Life cycle costs	Investment costs	Dollar
	Operation and maintenance cost	Dollar/year or % of initial investment per year
	Re-investment after ... years	Years
Flood protection	(Reduction) of expected property damages due to flooding	Dollar/year Or Probability x number of assets Or Probability x number of persons at risk Or Length of (artificially) defended coastline (miles);
	Reduction of expected casualties due to flooding	Same as above. People at risk; length of (artificially) defended coastline;
Environmental value	Ecosystem and biodiversity effects	Change of condition of habitats and species that have been identified as priorities for conservation;
	Energy efficiency	Share of renewable energies;
	Ambient (urban) environment / spatial quality	Green buildings; collection of rain water / rain water harvesting for urban supply ;
	Noise levels	Human exposure to harmful noise levels;
	Greenhouse gas emissions	Share of biofuels in transport; energy consumption;
	Air quality	Air pollution; green areas;
Social value	Identity & Social cohesion	Attendance to festivals and public events, organized to strengthen the area's local identity; local products;
	Crime and vandalism	Crime; perception of safety; safety provision; poverty;
	Affordable housing	Provision of affordable housing;
	Recreational value for inhabitants	Green land area; tourism intensity;
	Cultural, historic, archaeological sites and landscapes	Visits to cultural and natural sites;
	Human capital / Education	Hours taught; number of people educated

BCA Framework Beach 116th Street

REBUILD BY DESIGN

HR&A Advisors with Cooper, Robertson & Partners

RBD BCA Framework

Beach 116th Street Corridor

Step	Question	Describe
<p>Step 1 - Problem Analysis</p> <p><i>Key Question:</i></p> <p><i>What is the problem we are trying to solve in our project?</i></p>	<p>What are the existing flood risks (e.g. coastal flooding, fluvial/pluvial flooding, groundwater flooding) in your area (hazard, vulnerability, probability)?</p>	<p><i>Existing flood risk (hazard, vulnerability) in our area:</i></p> <ul style="list-style-type: none"> • B. 116th Street experienced severe flooding from both sides of the peninsula, resulting in extensive property damage. Waters from the Atlantic entered basements in the 200 block while the Jamaica Bay end of Beach 116th and Beach Channel Drive were impacted by Jamaica Bay storm surge. • Flooding along Beach 116th Street caused an electrical fire that damaged a row of commercial spaces on Rockaway Beach Boulevard and created a hole in the corridor’s commercial fabric. • Commercial property owners have been encountering major obstacles in successfully submitting insurance claims • Both beach and bayfront sides of the corridor are in VE flood zones according to the latest FEMA FIRM maps, subject to intense flooding from 100-year storms and potentially more frequently, with intense wave action.
	<p>What are the existing social conditions (e.g., lack of housing, mobility) in your area?</p>	<p><i>Social conditions (e.g., lack of housing, mobility) in our area:</i></p> <ul style="list-style-type: none"> • Businesses are often small, with limited financial capacity to independently protect themselves from flood risk. • The surrounding area is largely residential and middle-class, however the immediate area is perceived to be unsafe and rundown, resulting in lower sales per square foot relative to other neighborhood commercial corridors in the City. • Beach 116th Street may experience some seasonal dips, as a portion of businesses operate only during the summer months, when beach traffic is at a high. Strengthening the corridor will help attract consumers year-round and support economic resiliency.
	<p>What are the environmental conditions in your area?</p>	<p><i>Environmental conditions in our area:</i></p> <ul style="list-style-type: none"> • The seawall along the bay breaks directly north of Beach 116th street at the edge of private retailers, compounding the area’s vulnerability.

Step	Question	Describe
		<ul style="list-style-type: none"> Higher elevation on the ocean side of the corridor provides some protection for businesses and buildings Several gas stations along Beach Channel Drive may have underground gas tanks that would need to be removed and remediated if the edge is turned into a protected, soft edge on the bay. A large sewage treatment plant at Beach 108th Street, the Rockaway Wastewater Treatment Plant, also presents a need for additional consideration and potential future remediation to enhance the area's environmental safety. During Sandy, the plant was inundated and sewage overflow mixed with storm water, spreading pollution throughout the area.
	<p>What are the existing values of the community? How is spatial quality defined? What are the trends in spatial development (rising demand for housing or agriculture; urbanization)?</p>	<p><i>Existing values in our area:</i></p> <ul style="list-style-type: none"> 140,000 SF of commercial property (New York City PLUTO data) Property values are based on assumed replacement costs of \$200 psf, totaling \$28 million. Property values and subsequently, real estate taxes, could increase with increases in sales revenue if the corridor is revitalized. Trend in development is toward single family residential surrounding Beach 116th Street. The corridor itself is a mix of building typologies, though buildings on the beach block are in notable disrepair, and perceived as a threat to the community's future growth and safety.
<p>Step 2 - Project Definition</p> <p><i>Key Question:</i></p> <p><i>What is our project about?</i></p>	<p>What are the key objectives?</p>	<p><i>Our key objectives:</i></p> <ul style="list-style-type: none"> Provide a framework for behavioral and physical strategies for mitigation. Building owners and tenants should be encouraged to (1) create storm preparedness plans; (2) install or implement deployable flood barriers and other protection systems; and (3) alter space use, storage and tenant build-out to protect critical equipment, building systems and merchandise. Protect critical infrastructure that connects the community to other parts of the City by constructing flood protection around the MTA terminus and linking this intervention to an elevated datum for

Step	Question	Describe
		<p>retail and open space, a portion of which will take place on the lots destroyed by fire after Sandy.</p> <ul style="list-style-type: none"> • Pilot a program for public-private financing and technical assistance program for businesses to promote resiliency and protection against future flooding and other storm-related hazards, as part of the City’s Business Resiliency Improvement Program (BRIP). • Continue community engagement and support to develop a plan for longer-term strategies for economic development and larger-scale flood protection.
	What are the geographical boundaries?	<p><i>Our geographical boundaries:</i></p> <ul style="list-style-type: none"> • B. 116th corridor, stretching from Jamaica Bay to the beach: north of B. 117th Street to south of B. 110th Street, across peninsula from Beach Channel Drive to Rockaway Beach Boulevard; also extending from Rockaway Beach Boulevard to Ocean Promenade Walkway between B. 115th St. and B. 117th St.
	What is the design philosophy?	<p><i>Our design philosophy:</i></p> <ul style="list-style-type: none"> • By their design, small businesses are vulnerable to climate change and extreme weather events. They thrive when they are accessible from the street and are seen as part of the urban fabric, opening directly onto corridors. Therefore, many typical resiliency measures, such as elevation and barriers, are not plausible long-term solutions for businesses, as they disrupt their operations. • Design solutions are geared toward providing individual and integrated flood protection, and enhancing commercial vibrancy. This employs both temporary and deployable interventions at the business and building level, and corridor-level interventions that use innovative building strategies as protection for a number of properties in close proximity. • In the Rockaways and other established coastal neighborhoods, protection of neighborhood retail can promote growth and vibrancy through building-scale mitigation and merchant organization.

Step	Question	Describe
		<ul style="list-style-type: none"> In a highly flood-prone area like Beach 116th Street, we also seek to leverage infrastructure by creating an elevated datum around the train station and relocating buildings from the Jamaica Bay edge to protected areas that are currently used for surface parking. New development on vacant lots adjacent to the rail yard can be elevated to the height of the existing train platform, and the railhead area can be expanded to provide an elevated open space for circulation, leading to a new elevated parking structure in the place of the Municipal Lot and Waldbaum’s parking lot.
	<p>What are the main components of the plan? How do the components interact (synergies, reinforcement, conflicting etc.)?</p>	<p><i>Our main components:</i></p> <ul style="list-style-type: none"> Design and construct flood protection for the MTA subway station and rail yard through an elevated commercial redevelopment strategy, and enhancement of adjacent development parcels. Support capacity-building for the Beach 116th Street Partnership to support local business resiliency. Create an economic development plan focused on corridor and neighborhood-scale flood protection improvements including potential new retail around the MTA station, a new bayside park, corridor protection strategies, and potential ferry landing. Provide enhanced resources to support resiliency improvements by individual businesses and buildings in the short-term, including technical assistance, direct funding and loans. <p><i>Interaction of our main components:</i></p> <ul style="list-style-type: none"> Elevated datum at train station will act as a part of the flood protection system or individual improvements along the Beach 116th Street corridor, as the train station faces the east side of the roadway. An enhanced Beach 116th Street, through individual protections and corridor-wide planning will tie together flood protection and commercial revitalization, creating a corridor that is economically and physically more resilient.

Step	Question	Describe
	<p>What is the development of the project in 5 years, in 20 years and in 50 years from now?</p>	<p><i>Development of the project in 5 years, in 20 years and in 50 years from now:</i></p> <p>5 years:</p> <ul style="list-style-type: none"> Continued growth of a public-private fund, as well as technical resources to assist commercial property owners to implement individual improvements or a flood protection system. <p>20 years:</p> <ul style="list-style-type: none"> Planning, design and construction of individual improvements or an integrated flood protection system, affording a high level of protection along the commercial storefronts on Beach 116th Street. <p>50 years:</p> <ul style="list-style-type: none"> Maintenance of flood protection system around storefronts along Beach 116th street.
	<p>What realistically would happen now, in 5 years, in 20 and in 50 years if this specific project would not be implemented?</p> <p>What would individuals, communities, (local/federal) governments do? Is “do-nothing and nothing changes” a realistic development?</p>	<p><i>Description of the reference situation:</i></p> <p>5 years:</p> <ul style="list-style-type: none"> Additional businesses that were affected by Sandy and now struggle to completely rebuild will likely continue to close, either due to burden of debt or inability to operate at full capacity. Lack of support for business partnerships could inhibit businesses from making further individual gains and from growing as a community. Businesses may continue to rely on insurance to recover after a storm, without a framework for implementing improvements. The City’s seawall reconstruction project will not protect much of Beach 116th Street, where the seawall ends at the edge of private property. <p>20 years:</p> <ul style="list-style-type: none"> Businesses are damaged by future storms and routine flooding, causing more damage and business closure, exacerbating the area’s unsteady economic health. <p>50 years:</p> <ul style="list-style-type: none"> Negative perception of Beach 116th commercial district will persist, driving down retail sales, property values and property tax revenues.
		<p><i>Communities:</i></p>

Step	Question	Describe
<p>Step 4 - Identify Stakeholders</p> <p><i>Key Question:</i> Who are the key stakeholders relevant to our project?</p>	<p>Who are the key stakeholders in our area and what are their interests in our project?*</p> <p>(*The interests of the stakeholders may either be related to the positive or negative impacts (scores) of the project)</p>	<ul style="list-style-type: none"> • Residents: interest in improving the quality of retail options and public space along Beach 116th Street • Commercial property owners: interested in improving the public perception of the commercial corridor to drive increased sales revenue <p><i>Municipalities:</i></p> <ul style="list-style-type: none"> • New York City: Interest in expanding BRIP program through NYCEDC; potential interest in expanding capacity of neighborhood merchants’ associations and business advocacy organization at SBS; and increased property tax revenue <p><i>County:</i></p> <ul style="list-style-type: none"> • Queens County: improved economic and environmental health, as well as increased property tax revenue <p><i>PANYNJ:</i></p> <ul style="list-style-type: none"> • N/A <p><i>State:</i></p> <ul style="list-style-type: none"> • MTA: Protecting the MTA stop at Beach 116th Street, a terminus of the S and A trains, and home to valuable signal equipment <p><i>NGO:</i></p> <ul style="list-style-type: none"> • B. 116th Street Partnership: increased organizational capacity, funding, and long-term planning; improved commercial flood protection and economic development • A Greater Rockaway: improved ecological health of the beachfront • Rockaway Waterfront Alliance: improved economic and environmental health <p><i>Private sector:</i></p> <ul style="list-style-type: none"> • Institutional capital in the form of grants and Program Related Investments: support Sandy recovery and future resiliency • Local property owners and real estate developers: improved economic and social vibrancy in the area’s long-term opportunities to attract businesses and residents

Step 5 - Project Scoring

Key Question:

What are the positive and negative effects of our project, as compared to the reference situation?

Score the effect of your project on the basis of the criteria list:

1. Monetize *life-cycle costs* and the effect on *flood protection*, to the extent you can.
2. Quantify all effects with the most advanced quantitative information possible, to the extent you can. In case no quantitative information is available, use a semi-quantitative scale, such as:

- Expected strong negative impact
- Expected negative impact
- 0 Neutral
- + Expected positive impact
- ++ Expected strong positive impact
- ? Impact unknown / cannot be assessed

Notes on scoring:

- Use expert judgments to score.
- Scoring of the project is relative to the reference situation (see step 3).
- Use the criteria list in Appendix II to quantify the effects.
- Provide a qualitative clarification for each score.
- Identify required extra information needed for (improving) the judgment.

3. Qualitatively describe the effects.
4. Assess the certainty of the effect on a scale from 1 (very certain) to 5 (very uncertain)

Criteria List	Sub-criteria	Monetized effect	Quantitative assessment	Qualitative description	Uncertainty
Life cycle costs	Investment costs (including preparation and project management)	<ul style="list-style-type: none"> • MTA Rail Yard Flood Protection: \$13 million • Beach 116th Street Partnership Resiliency Programming: \$0.6 million • Community Planning Process: \$2 million 		Strong impact for immediate business programs	
	Operation and maintenance cost	Based on comparable flood protections, maintenance costs of approximately 1.5%, or \$200,000 may apply to the MTA protections.			Portions of this protection system are to be integrated into new development on adjacent lots, potentially offsetting portions of this cost.

					Programming for the Partnership will require ongoing capital funding that will depend heavily on future mission and programs.
	Re-investment after ... years	50+ years			Some reinvestment will be required for private development adjacent to the MTA protections, and likely will occur along the corridor before reinvestment of flood protection measures may be necessary.
Flood protection (coastal, pluvial, fluvial, groundwater)	Reduction of expected property damages due to flooding	\$280,000/year		Prevention of damage to property worth ~\$28 million.	
	Reduction of expected casualties due to flooding	0 Persons/year		No reported deaths from direct outreach. Probability may be reduced, but this will not be studied.	If flood hazards become more severe or populations do not prepare adequately for disaster, this risk could increase, in which case protection may need to be increased.
	<i>Add other effects</i>				
Environmental value	Ecosystem and biodiversity effects		?		Jamaica Bay ecology may be affected by bay-side interventions, which will be considered within the community planning process. Certain interventions, such as creating a soft edge, will foster ecological health, while others, such as flood gates or seawalls, may do little to alter current conditions.
	Energy efficiency		+	Efficiencies in building operating systems will	

				likely improve energy utilization, especially during disaster	
	Ambient (urban) environment / spatial quality		+	Enhanced streetscape and neighborhood quality	
	Noise levels		0	No direct impact likely	Construction around the MTA terminus may create short-term noise impacts, but the area is mainly commercial, and not heavily populated in directly adjacent areas.
	Greenhouse gas emissions		0	No direct impact likely	
	Air quality		0	No direct impact likely	
	<i>Add other effects</i>				
Social value	Identity & Social cohesion		++	Expanded capacity for business associations and owners, as well as strengthening connections between different portions of Beach 116 th Street, both through flood protection strategies and commercial vibrancy, will enhance the area's identity and cohesion within a currently fractured social fabric	
	Crime and vandalism		+	Although not directly impacted, crime and vandalism should decrease through increased retail traffic and improved economic and social vitality.	
	Affordable housing		0	No direct impact likely	

	Recreational value for inhabitants		+	Increased access to beachfront	Enhanced value to residents will be moderated by enhanced attraction to tourists. This will be desirable for businesses, though may prove a concern for some residents.
	Cultural, historic, archaeological sites and landscapes		+	A flood protection strategy is specifically geared toward protecting the Beach 116 th Street commercial corridor, as well as improving the environmental health of the waterfront on the bay and beach sides, a cultural and environmental destination.	
	Human capital and education		+	Increased economic activity can increase employment opportunities.	
	<i>Add other effects</i>				
Economic value	Direct effects on local or regional economy (e.g. tourism, agriculture/fishery, logistics, energy)		+	Increases tourism along the waterfront through commercial protection.	
	Synergies or spin-off effects to other sectors' revenues (e.g. transportation)		+	Railhead project should drive retail traffic, and therefore increase transportation usage.	
	Economic competitiveness (through specialization; agglomeration)		+	The project should enhance competitiveness within the tourism industry.	

	Local / regional employment		+	Improved commercial corridor should increase retail traffic, and therefore increase employment opportunities for local residents.	
	Local / regional employment in construction		+	Construction of protection around the MTA facility may provide construction jobs for a number of individuals.	
	Value of property other than through enhanced flood protection		0	Rising property values may be a long-term outcome of an enhanced Beach 116 th Street, but these effects are likely to only come to fruition after implementation of initiatives identified in the community planning process.	See left
	Mobility / Transportation		+	Ferry service expansion to Beach 116 th Street, which should be considered as part of the planning process, would enhance connectivity to other parts of the city.	
	<i>Add other effects</i>				

Step	Question	Describe
<p>Step 6 Robustness and flexibility</p> <p><i>Key question:</i> How future-proof is our project?</p>	<p>What are the key risks and uncertainties that may affect our project and how do these affect the scores in step 5?</p>	<p><i>What are possible changes in governmental / federal subsidies and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> • Changes in available CDBG-DR funds will impact any financing mechanism and funding tool if the entity organizing and administering these programs is not yet self-sufficient. <p><i>How can the project adapt to this risk?</i></p> <ul style="list-style-type: none"> • If there is insufficient funding available for the project, proposed programs will need to seek outside public and/or private funding.
	<p>How well can the project be adapted in case any of the risks materialize? (e.g. through upscaling/ downscaling/ delaying/ speeding up)</p>	<p><i>What are possible changes in the fiscal situation for specific public stakeholders and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> • Incentivizing property owners to incorporate resilient standards in rebuilding may require incentives such as property tax abatements, though not defined at this time. <p><i>How can the project adapt to this risk?</i></p> <ul style="list-style-type: none"> • If incentives are inadequate, the project will need to seek additional CDBG-DR, other public or private funds to finance the proposed flood protection improvements.
		<p><i>How do climate change scenarios influence the project?</i></p> <ul style="list-style-type: none"> • If significantly greater than projected, could undermine investment of public capital in integrated flood protection. This is not likely. <p><i>How can the project be adapted with regard to climate change scenarios?</i></p> <ul style="list-style-type: none"> • Resiliency standards should be sufficient to protect commercial corridor against a significant increase in flood risk and risk of damage caused by extreme weather events.
		<p><i>How do demographic and socio-economic trends influence the project?</i></p> <ul style="list-style-type: none"> • Demographic and socio-economic trends should not influence the project, however the project could help improve the perception of the retail corridor along Beach 116th Street.

Step	Question	Describe
		<p><i>How can the project be adapted with regard to these scenarios?</i></p> <ul style="list-style-type: none"> • N/A <p><i>How can developments in the real estate market influence the project?</i></p> <ul style="list-style-type: none"> • Increased real estate development, particularly around the railhead should increase property values in the surrounding area, which will provide greater value for property within protection area. <p><i>How can the project be adapted with regard to these developments?</i></p> <ul style="list-style-type: none"> • The project should receive more support from property owners given the increased value of their properties warrant stronger flood protection. <p><i>Describe any other risks and uncertainties and how the project can be adapted in order to cope with these risks.</i></p> <ul style="list-style-type: none"> • An increase in the interest rate market will make private investment more expensive, necessitating more public funds and/or grant funding.
<p>Step 7 - Implementation</p> <p><i>Key question:</i></p> <p><i>How difficult is the implementation of our project?</i></p>	<p>What are the implementation challenges and opportunities of our project?</p>	<p><i>What are the technical risks?</i></p> <ul style="list-style-type: none"> • Individual improvements or flood mitigation system implemented are insufficient to protect against flood risk <p><i>What are procedural (legal) and process (political, societal) risks?</i></p> <ul style="list-style-type: none"> • Constructing an elevated datum will necessitate MTA approval, and will likely require political support/public resources. • Financial feasibility and sustainability of endeavor to be determined; might require long-term investments from seed funders; establishing financial relationships has yet to be determined.

Step	Question	Describe
		<ul style="list-style-type: none"> Feasibility of ongoing public capital investments for fund may require political support in order to ensure private investors are eligible for CRA credit.
		<p><i>What are synergies / conflicts with ongoing, planned national/regional developments?</i></p> <ul style="list-style-type: none"> Integrated flood protection concepts are meant to be integrated with ongoing work, rather than at odds with other planned developments.
		<p><i>Are there any political and stakeholder issues?</i></p> <ul style="list-style-type: none"> Expansion of capacity within B. 116th Street Partnership may be challenging, and rifts exist within the local business community that may need to be resolved for full program adoption

APPENDIX I

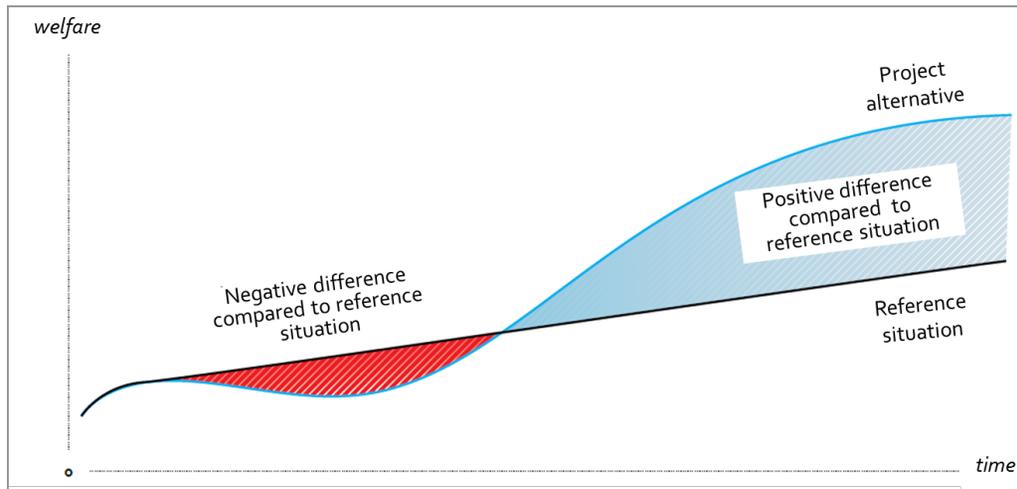
Reference situation

The reference situation describes the development that would happen if the project would not be implemented.

Why do we need a reference situation?

In order to assess the impact of the project, or the added value, it is important to understand what “difference it makes” compared to the natural development of the situation. In the graph below, the black line shows the development in the reference situation and the blue line the development of the project alternative. The difference between the two (for example, negative difference at the start of the project because of *extra* costs, and positive difference in the later phase of the project because of *extra* benefit) is the effect, or impact, the project has.

Not only does the reference situation help to assess the impact of the project, it also gives an indication on the willingness to pay for a certain measure. For example, if individuals, businesses or authorities are willing to invest a certain amount of money in the reference situation, they might be willing to spend at least this same money on the project alternative.



Supportive questions to help describe the reference situation:

- What would the county/government do without this project?
- What would individuals and community groups do without the project?
- Would “nothing” happen?

APPENDIX II

List of indicators

Criteria	Sub criteria	Examples of indicators
Life cycle costs	Investment costs	Dollar
	Operation and maintenance cost	Dollar/year or % of initial investment per year
	Re-investment after ... years	Years
Flood protection	(Reduction) of expected property damages due to flooding	Dollar/year Or Probability x number of assets Or Probability x number of persons at risk Or Length of (artificially) defended coastline (miles);
	Reduction of expected casualties due to flooding	Same as above. People at risk; length of (artificially) defended coastline;
Environmental value	Ecosystem and biodiversity effects	Change of condition of habitats and species that have been identified as priorities for conservation;
	Energy efficiency	Share of renewable energies;
	Ambient (urban) environment / spatial quality	Green buildings; collection of rain water / rain water harvesting for urban supply ;
	Noise levels	Human exposure to harmful noise levels;
	Greenhouse gas emissions	Share of biofuels in transport; energy consumption;
Social value	Air quality	Air pollution; green areas;
	Identity & Social cohesion	Attendance to festivals and public events, organized to strengthen the area's local identity; local products;
	Crime and vandalism	Crime; perception of safety; safety provision; poverty;
	Affordable housing	Provision of affordable housing;
	Recreational value for inhabitants	Green land area; tourism intensity;
	Cultural, historic, archaeological sites and landscapes	Visits to cultural and natural sites;

Criteria	Sub criteria	Examples of indicators
	Human capital / Education	Hours taught; number of people educated
Economic value	Directly effects local or regional economy (e.g. tourism, agriculture/fishery, logistics, energy)	Gross Value Added (per sector of economy, explicitly focusing on activities like fishing, aquaculture, tourism, port activities);
	Synergies or spin-off effects to other sectors' revenues (e.g. transportation)	Transport of goods; foods industry
	Economic competitiveness	Enhanced competitiveness through specialization, agglomeration
	Local / regional employment	Additional employment by sector;
	Local / regional employment in construction	Additional employment in construction;
	Value of property other than flood protection	Re-use of urban and derelict areas;
	Mobility / Transportation	Travel time improvement; vehicle ownership

BCA Framework Asbury Park

REBUILD BY DESIGN

HR&A Advisors with Cooper, Robertson & Partners

RBD BCA Framework

Asbury Park, New Jersey

Step	Question	Describe
<p data-bbox="201 399 470 480">Step 1 - Problem Analysis</p> <p data-bbox="201 513 365 542"><i>Key Question:</i></p> <p data-bbox="201 561 543 626"><i>What is the problem we are trying to solve in our project?</i></p>	<p data-bbox="611 354 1037 461">What are the existing flood risks (e.g. coastal flooding, fluvial/pluvial flooding, groundwater flooding) in your area (hazard, vulnerability, probability)?</p>	<p data-bbox="1062 329 1583 354"><i>Existing flood risk (hazard, vulnerability) in our area:</i></p> <ul data-bbox="1110 358 1860 630" style="list-style-type: none"> <li data-bbox="1110 358 1860 412">• Asbury Park is a shore town which experienced flooding from the ocean during Sandy. <li data-bbox="1110 417 1860 470">• Asbury Park’s historic casino building and boardwalk were severely damaged by Sandy. <li data-bbox="1110 475 1860 565">• The community is also challenged by some stalled development projects and “missing teeth” in the urban fabric leading upland from the beach. <li data-bbox="1110 570 1860 630">• The boardwalk and corridors leading inland along coastal lakes is in VE or AE flood zones, and subject to significant flood hazards.
	<p data-bbox="611 662 993 740">What are the existing social conditions (e.g., lack of housing, mobility) in your area?</p>	<p data-bbox="1062 638 1656 662"><i>Social conditions (e.g., lack of housing, mobility) in our area:</i></p> <ul data-bbox="1110 667 1860 1027" style="list-style-type: none"> <li data-bbox="1110 667 1860 784">• The community relies heavily on tourism to sustain the beachfront economy, with the City recouping fees for beach taxes and private business owners often surviving the entire year on summer season sales. <li data-bbox="1110 789 1860 849">• Businesses are often small, cash-strapped, and do not own the buildings they inhabit, limiting their ability to prepare for disaster. <li data-bbox="1110 854 1860 1027">• There is a dramatic divide between east and west Asbury Park. East Asbury is perceived as dangerous, unkempt, lower income, and not connected to the beach and waterfront. East Asbury residents feel that development in west Asbury is not meant to benefit their community and do not partake in improvements or activities at the beach.
	<p data-bbox="611 1063 1010 1117">What are the environmental conditions in your area?</p>	<p data-bbox="1062 1039 1434 1063"><i>Environmental conditions in our area:</i></p> <ul data-bbox="1110 1068 1871 1369" style="list-style-type: none"> <li data-bbox="1110 1068 1871 1247">• Coastal lakes in Asbury Park, like much of the Jersey Shore, suffer from poor water quality with pathogen contamination, algae blooms, aquatic weed overgrowth and eutrophication. The cause is primarily the storm water flowing from the surrounding watersheds directly into the lake, bringing oil and grease, sediments and other pollutants without any treatment. <li data-bbox="1110 1252 1871 1369">• The beach is a key physical feature of Asbury Park, and adjacent open spaces provide views to the ocean and pathways for ocean air to flow into the town. A commercial beach, it is integral to the ecology and economy of Asbury Park.

Step	Question	Describe
	<p>What are the existing values of the community? How is spatial quality defined? What are the trends in spatial development (rising demand for housing or agriculture; urbanization)?</p>	<p><i>Existing values in our area:</i></p> <ul style="list-style-type: none"> • Property values are based on assumed replacement costs of \$200 psf, for \$200,000 SF of commercial property, totaling \$40 million. • Multifamily development has been on the rise in redeveloped lofts turned apartments, and some new construction near the beach. This rise in development marks a return to the beach and follows the trend of revitalizing west Asbury Park. • In east Asbury, homes are mainly single-family, with a higher instance of disinvestment.
<p>Step 2 - Project Definition</p> <p><i>Key Question:</i></p> <p><i>What is our project about?</i></p>	<p>What are the key objectives?</p>	<p><i>Our key objectives:</i></p> <ul style="list-style-type: none"> • Create an integrated flood protection system utilizing boardwalk reinforcement, deployable flood barriers across building facades and entrances, and resilient landscaping (bermed or otherwise protected) on open space parcels, along the length of the boardwalk. Together, these interventions will serve as protection for not only the boardwalk, but also buildings on Ocean Avenue. • Protect the edges of Asbury Park’s coastal lakes, including enhanced drainage and berms to protect adjacent commercial corridors from flooding. • Plan for a large-scale protection, such as a flood wall or reinforced dune, at the beachfront intersection of Lake Avenue and Ocean Avenue. Interventions could provide protection for a portion of both corridors and the historic Casino structure that is central to Asbury Park’s beachfront identity. • Introduce resiliency protections and potentially extended NJ Transit service at Sunset Park between Main Street and Memorial Drive. Currently home to few businesses, this area is a common ground for both sides of the community and could be a node of activity and connection in the future with the proper resiliency investments and strategic investments for reactivation. • Enhanced connectivity between Lake and Springwood Avenues, joining Asbury’s east and west communities. The dividing line between Springwood and Lake, at Main Street and Memorial

Step	Question	Describe
		<p>Drive, is perceived as the dividing line between communities in Asbury. Strengthening this corridor could help to soften this divide and begin to reinvigorate the City.</p>
	<p>What are the geographical boundaries?</p>	<p><i>Our geographical boundaries:</i></p> <ul style="list-style-type: none"> The boundaries of the study area follow a sideways “U” shape along Cookman and Lake Avenues to Ocean and the Boardwalk, extending North to Sunset Avenue and turning eastward to Main and Memorial Streets. These Avenues provide a double-loaded boundary, throughout which commercial activity varies, but connectivity is key to long-term growth.
	<p>What is the design philosophy?</p>	<p><i>Our design philosophy:</i></p> <ul style="list-style-type: none"> In Asbury Park and other destination shore towns, protecting the boardwalk and creating conditions for expansion of adjacent uses is critical to future economic resiliency. Protecting seasonal beachfront commercial community and downtown from lake inundation and providing building-level mitigation is necessary for economic stability.
	<p>What are the main components of the plan? How do the components interact (synergies, reinforcement, conflicting etc.)?</p>	<p><i>Our main components:</i></p> <ul style="list-style-type: none"> Beachfront integrated flood protection at one of the following locations: Boardwalk, Property Line, or Ocean Avenue Lake Avenue protection along Wesley Lake, using a bermed edge to protect businesses along Lake and Cookman Protection of commercial cluster at Main Street & Sunset Park, encouraging connection between Main Street to the south and north, and connection of community from East and West Asbury Park. <p><i>Interaction of our main components:</i></p> <ul style="list-style-type: none"> Beachfront protection should reduce water flowing into Wesley and Sunset Lake, thereby reducing flood risk to the commercial corridors along Lake Avenue, Main Street and Sunset Park.

Step	Question	Describe
	<p>What is the development of the project in 5 years, in 20 years and in 50 years from now?</p>	<p><i>Development of the project in 5 years, in 20 years and in 50 years from now:</i></p> <p>5 years:</p> <ul style="list-style-type: none"> Continued development of an integrated flood protection system and renewal of the lake edges <p>20 years:</p> <ul style="list-style-type: none"> Planning, design, and construction of additional residential and commercial product throughout Asbury Park, especially on Ocean Avenue, with a newly elevated datum for commercial activity, protected from the floodplain Increased tourism resulting from additional recreational uses, and enhanced access to coastal lakes. With improved water quality and drainage, lakes that currently suffer from algae blooms and pathogen contamination could be revitalized, both in terms of health of the lake’s ecosystem and as a recreational asset. <p>50 years:</p> <ul style="list-style-type: none"> Maintenance of IFPS components and lake protection systems
<p>Step 3 - Reference situation</p> <p><i>Key Question:</i></p> <p><i>What will happen without our project?</i></p> <p><i>See Appendix I for further guidance.</i></p>	<p>What realistically would happen now, in 5 years, in 20 and in 50 years if this specific project would not be implemented?</p> <p>What would individuals, communities, (local/federal) governments do? Is “do-nothing and nothing changes” a realistic development?</p>	<p><i>Description of the reference situation:</i></p> <p>5 years:</p> <ul style="list-style-type: none"> Businesses that were affected by Sandy and now struggle to completely rebuild will likely continue to close due to reduction in tourism spending. <p>20 years:</p> <ul style="list-style-type: none"> Businesses are damaged by future storms and routine flooding, causing more damage and business closure, having negative impact on the health of the community’s tourism industry. <p>50 years:</p> <ul style="list-style-type: none"> Tourism industry will likely decline and local businesses will not be able to survive a shrinking economy. A growing residential population on the west side of Asbury Park may stagnate or shrink, pushing the City back toward disinvestment and high vacancy, including empty buildings, potentially causing a nuisance or becoming a hazard in the midst of the City’s downtown.

<p>Step 4 - Identify Stakeholders</p> <p><i>Key Question:</i> Who are the key stakeholders relevant to our project?</p>	<p>Who are the key stakeholders in our area and what are their interests in our project?*</p> <p>(*The interests of the stakeholders may either be related to the positive or negative impacts (scores) of the project)</p>	<p><i>Communities:</i></p> <ul style="list-style-type: none"> • Residents: improved economic and environmental health • Commercial business owners: improved economic health and increased property values • Tourists: improved recreational activities and environmental health <p><i>Municipalities:</i></p> <ul style="list-style-type: none"> • Asbury Park, NJ: significant flood protection commitment and economic development interest in the neighborhood through the New Jersey Economic Development Authority <p><i>County:</i></p> <ul style="list-style-type: none"> • Monmouth County: improved economic and environmental health <p><i>PANYNJ:</i></p> <ul style="list-style-type: none"> • N/A <p><i>State:</i></p> <ul style="list-style-type: none"> • New Jersey: significant commitment to flood protection commitment as a comprehensive protection strategy for the community, as well as increased tourism <p><i>NGO:</i></p> <ul style="list-style-type: none"> • Asbury Park Chamber of Commerce/other group? (merchants): organizational capacity, funding, and long-term planning <p><i>Private sector:</i></p> <ul style="list-style-type: none"> • Institutional capital in the form of grants and Program Related Investments: support Sandy recovery and future resiliency • Local property owners and real estate developers: increased tourism and economic vibrancy • Madison Marquette and iStar, who jointly own and manage much of Asbury Park’s boardwalk retail and adjacent development): increased tourism and economic vibrancy
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Step 5 - Project Scoring

Key Question:

What are the positive and negative effects of our project, as compared to the reference situation?

Score the effect of your project on the basis of the criteria list:

1. Monetize *life-cycle costs* and the effect on *flood protection*, to the extent you can.
2. Quantify all effects with the most advanced quantitative information possible, to the extent you can. In case no quantitative information is available, use a semi-quantitative scale, such as:

- Expected strong negative impact
- Expected negative impact
- 0 Neutral
- + Expected positive impact
- ++ Expected strong positive impact
- ? Impact unknown / cannot be assessed

Notes on scoring:

- Use expert judgments to score.
- Scoring of the project is relative to the reference situation (see step 3).
- Use the criteria list in Appendix II to quantify the effects.
- Provide a qualitative clarification for each score.
- Identify required extra information needed for (improving) the judgment.

3. Qualitatively describe the effects.
4. Assess the certainty of the effect on a scale from 1 (very certain) to 5 (very uncertain)

Criteria List	Sub-criteria	Monetized effect	Quantitative assessment	Qualitative description	Uncertainty
Life cycle costs	Investment costs (including preparation and project management)	<ul style="list-style-type: none"> • Integrated flood protection at boardwalk: \$27.2 million • Coastal Lake protections: \$5.8 million 		Strong impact for businesses along the boardwalk, as well as those along Wesley Lake and Sunset Park, where property will now be protected. Restoration of coastal lakes will also enhance utilization.	Coastal lake protection relies on berms and landscaping as suitable interventions for each lake edge. If not suitable, a harder intervention may have to be created, potentially increasing costs.
	Operation and maintenance cost	<ul style="list-style-type: none"> • Integrated flood protection at boardwalk: \$0.2 million/year 		Maintenance for comparable interventions is 1% annually, to cover basic testing and maintenance, including drills to ensure operations	

		<ul style="list-style-type: none"> Coastal Lake protections: \$0.06 million/year 		are in working order and components have not become compromised.	
	Re-investment after ... years	TBD			
Flood protection (coastal, pluvial, fluvial, groundwater)	Reduction of expected property damages due to flooding	\$400,000/year (over 100 years)		Prevention of damage to property worth ~\$40 million.	Additional development will add new property to be protected.
	Reduction of expected casualties due to flooding	0 Persons/year		No reported deaths from direct outreach. Probability may be reduced, but this will not be studied.	
Environmental value	Ecosystem and biodiversity effects		+	Likely to improve the overall ecology of the coastal lakes, freeing them from algae overgrowth, polluted waters, and struggling species’.	Highly dependent on the existing ecological conditions specific to each lake and the chosen maintenance system, such as prevalence of algaecide, biomanipulation, or other strategies for enhancing local ecology.
	Energy efficiency		0	No direct impact likely	
	Ambient (urban) environment / spatial quality		+	Enhanced streetscape and neighborhood quality along all corridor interventions	
	Noise levels		0	No direct impact likely	
	Greenhouse gas emissions		0	No direct impact likely	
	Air quality		0	No direct impact likely	
Social value	Identity & Social cohesion		++	Improved social resiliency and increased tourism should improve community identity and social cohesion	
	Crime and vandalism		0	Will not be studied and no direct impact likely	If any impact, will be in east Asbury, outside of our study area, but home to individuals affected by our project.

	Affordable housing		0	No direct impact likely	
	Recreational value for inhabitants		+	Increase in recreational activities is a goal of the project.	
	Cultural, historic, archaeological sites and landscapes		0	No direct impact likely	
	Human capital and education		+	Increased economic activity can increase employment opportunities and connect east and west communities	
Economic value	Direct effects on local or regional economy (e.g. tourism, agriculture/fishery, logistics, energy)		+	Increased beach and lake front resilience should improve tourism economy.	
	Synergies or spin-off effects to other sectors' revenues (e.g. transportation)		+	Will not be studied, but inferred to be a positive impact to affected sectors, based on economic health within the area, though may be realized locally.	
	Economic competitiveness (through specialization; agglomeration)		+	The project should enhance competitiveness within the tourism industry.	
	Local / regional employment		+	The project should increase jobs within the tourism industry.	
	Local / regional employment in construction		0	In the short term, local construction employment will increase through resiliency construction efforts, but the effects will not be studied.	
	Value of property other than through enhanced flood protection		+	Property values at Ocean Avenue are historically low, and have stunted development feasibility. Creating flood protection and enhancing	

				vibrancy of the boardwalk corridor may drive property values.	
	Mobility / Transportation		+	Enhanced urban design along Cookman and Springwood is geared toward enhancing mobility of members of the east Asbury community to connect to the west and north, bringing two parts of a disjointed local community together.	

Step	Question	Describe
<p>Step 6 Robustness and flexibility</p> <p><i>Key question:</i> How future-proof is our project?</p>	<p>What are the key risks and uncertainties that may affect our project and how do these affect the scores in step 5?</p> <p>How well can the project be adapted in case any of the risks materialize? (e.g. through upscaling/ downscaling/ delaying/ speeding up)</p>	<p><i>What are possible changes in governmental / federal subsidies and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> Changes in available CDBG-DR funds will impact any financing mechanism and funding tool if the entity organizing and administering these programs is not yet self-sufficient. <p><i>How can the project adapt to this risk?</i> If there is insufficient funding available for the project, proposed programs will need to seek outside public and/or private funding.</p>
		<p><i>What are possible changes in the fiscal situation for specific public stakeholders and how do these post a risk to the project?</i></p> <ul style="list-style-type: none"> Incentivizing property owners to incorporate resilient standards in rebuilding may require incentives such as property tax abatements, though not defined <p><i>How can the project adapt to this risk?</i></p> <ul style="list-style-type: none"> If incentives are inadequate, the project will need to seek additional CDBG-DR, other public or private funds to finance the proposed flood protection improvements.
		<p><i>How do climate change scenarios influence the project?</i></p>

Step	Question	Describe
		<ul style="list-style-type: none"> • If significantly greater than projected, could undermine investment of public capital in integrated flood protection <p><i>How can the project be adapted with regard to climate change scenarios?</i></p> <ul style="list-style-type: none"> • Resiliency standards should be set that are sufficient to protect commercial corridor against a significant increase in flood risk. <hr/> <p><i>How do demographic and socio-economic trends influence the project?</i></p> <ul style="list-style-type: none"> • Demographic and socio-economic trends should not influence the project. <p><i>How can the project be adapted with regard to these scenarios?</i></p> <ul style="list-style-type: none"> • N/A <hr/> <p><i>How can developments in the real estate market influence the project?</i></p> <ul style="list-style-type: none"> • Increased real estate development, particularly around the railhead should increase property values in the surrounding area, which will provide greater value for property within protection area. <p><i>How can the project be adapted with regard to these developments?</i></p> <ul style="list-style-type: none"> • The project should receive more support from property owners given the increased value of their properties warrant stronger flood protection. <hr/> <p><i>Describe any other risks and uncertainties and how the project can be adapted in order to cope with these risks.</i></p> <ul style="list-style-type: none"> • Other threats to the tourism economy, such as slow economic growth in the NY-NJ area might decrease tourism, and would therefor increase the need to protect local businesses from additional economic losses.

<p>Step 7 - Implementation</p> <p><i>Key question:</i></p> <p><i>How difficult is the implementation of our project?</i></p>	<p>What are the implementation challenges and opportunities of our project?</p>	<p><i>What are the technical risks?</i></p> <ul style="list-style-type: none"> • Extensive environmental review and engineering will need to be carried out to ensure that plans are technically viable, given that the beachfront is in a VE zone, with significant risks from severe wave action. • Flood protection along the boardwalk may not be viable from a tourism standpoint.
		<p><i>What are procedural (legal) and process (political, societal) risks?</i></p> <ul style="list-style-type: none"> • Implementing a flood mitigation system will require significant community support • Financial feasibility and sustainability of endeavor to be determined; might require long-term investments from seed funders; establishing financial relationships has yet to be determined. • Feasibility of ongoing public capital investments for fund may require political support in order to ensure private investors are eligible for CRA credit.
		<p><i>What are synergies / conflicts with ongoing, planned national/regional developments?</i></p> <ul style="list-style-type: none"> • Integrated flood protection concepts are meant to be integrated with ongoing work, rather than at odds with other planned developments.
		<p><i>Are there any political and stakeholder issues?</i></p> <ul style="list-style-type: none"> • Increased property values may increase the cost of residential rental properties, having a negative impact on local tourism.

APPENDIX I

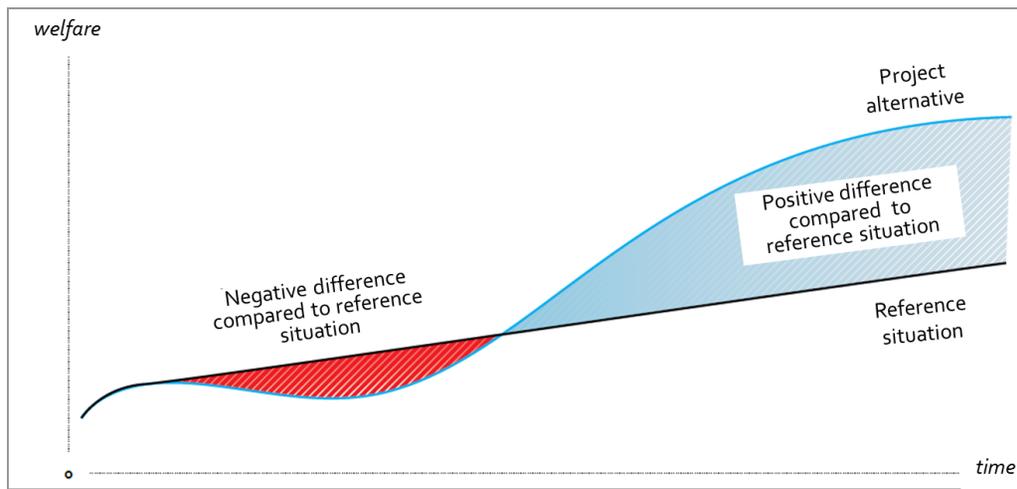
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	Energy efficiency	Share of renewable energies;
	Ambient (urban) environment / spatial quality	Green buildings; collection of rain water / rain water harvesting for urban supply ;
	Noise levels	Human exposure to harmful noise levels;
	Greenhouse gas emissions	Share of biofuels in transport; energy consumption;
	Air quality	Air pollution; green areas;
Social value	Identity & Social cohesion	Attendance to festivals and public events, organized to strengthen the area's local identity; local products;
	Crime and vandalism	Crime; perception of safety; safety provision; poverty;
	Affordable housing	Provision of affordable housing;
	Recreational value for inhabitants	Green land area; tourism intensity;
	Cultural, historic, archaeological sites and landscapes	Visits to cultural and natural sites;
	Human capital / Education	Hours taught; number of people educated

Criteria	Sub criteria	Examples of indicators
Economic value	Directly effects local or regional economy (e.g. tourism, agriculture/fishery, logistics, energy)	Gross Value Added (per sector of economy, explicitly focusing on activities like fishing, aquaculture, tourism, port activities);
	Synergies or spin-off effects to other sectors' revenues (e.g. transportation)	Transport of goods; foods industry
	Economic competitiveness	Enhanced competitiveness through specialization, agglomeration
	Local / regional employment	Additional employment by sector;
	Local / regional employment in construction	Additional employment in construction;
	Value of property other than flood protection	Re-use of urban and derelict areas;
	Mobility / Transportation	Travel time improvement; vehicle ownership