Waterfront Resilience
Miami, Florida

A ULI Advisory Services Panel Report

June 2–7, 2019

Urban Land Institute
Advisory Services

Waterfront Resilience
Miami, Florida

The Riverfront, the Bayfront, and the Ridge: A Holistic Approach to Waterfront Resilience

A ULI Advisory Services Panel Report

June 2–7, 2019

Urban Land Institute
2001 L Street, NW
Suite 200
Washington, DC 20036-4948
uli.org

About the Urban Land Institute

THE URBAN LAND INSTITUTE is a global, member-driven organization comprising more than 45,000 real estate and urban development professionals dedicated to advancing the Institute's mission of providing leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific region, with members in 80 countries.

ULI's extraordinary impact on land use decision-making is based on its members' sharing expertise on a variety of factors affecting the built environment, including urbanization, demographic and population changes, new economic drivers, technology advancements, and environmental concerns.

Peer-to-peer learning is achieved through the knowledge shared by members at thousands of convenings each year that reinforce ULI's position as a global authority on land use and real estate. In 2018 alone, more than 2,200 events were held in about 330 cities around the world.

Drawing on the work of its members, the Institute recognizes and shares best practices in urban design and development for the benefit of communities around the globe.

More information is available at uli.org. Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

COVER PHOTO: ULI

2001 L Street, NW | Suite 200 | Washington, DC 20036-4948

About ULI Advisory Services

THE GOAL OF THE ULI ADVISORY SERVICES program is to bring the finest expertise in the real estate field to bear on complex land use planning and development projects, programs, and policies.

Since 1947, this program has assembled well over 700 ULI-member teams to help sponsors find creative, practical solutions for issues such as downtown redevelopment, land management strategies, evaluation of development potential, growth management, community revitalization, brownfield redevelopment, military base reuse, provision of low-cost and affordable housing, and asset management strategies, among other matters. A wide variety of public, private, and nonprofit organizations have contracted for ULI's advisory services.

Each panel team is composed of highly qualified professionals who volunteer their time to ULI. They are chosen for their knowledge of the panel topic and are screened to ensure their objectivity. ULI's interdisciplinary panel teams provide a holistic look at development problems. A respected ULI member who has previous panel experience chairs each panel.

The agenda for a five-day panel assignment is intensive. It includes an in-depth briefing day composed of a tour of the site and meetings with sponsor representatives, a day of hour-long interviews of typically 50 to 100 key community representatives, and two days of formulating recommendations. Long nights of discussion precede the panel's conclusions. On the final day on site, the panel makes an oral presentation of its findings and conclusions to the sponsor. A written report is prepared and published.

Because the sponsoring entities are responsible for significant preparation before the panel's visit, including sending extensive briefing materials to each member and arranging for the panel to meet with key local community members and stakeholders in the project under consideration, participants in ULI's five-day panel assignments are able to make accurate assessments of a sponsor's issues and to provide recommendations in a compressed amount of time.

A major strength of the program is ULI's unique ability to draw on the knowledge and expertise of its members, including land developers and owners, public officials, academics, representatives of financial institutions, and others. In fulfillment of the mission of the Urban Land Institute, this Advisory Services panel report is intended to provide objective advice that will promote the responsible use of land to enhance the environment.

ULI Program Staff

Paul Bernard
Executive Vice President, Advisory Services

Thomas W. Eitler
Senior Vice President, Advisory Services

Deborah Kerson Bilek
Vice President, Advisory Services

Paul Angelone
Director, Advisory Services

Lauren McKim Callaghan
Director, Advisory Services

Jaqueline Canales
Director, Advisory Services

Cali Slepin
Senior Associate, Advisory Services

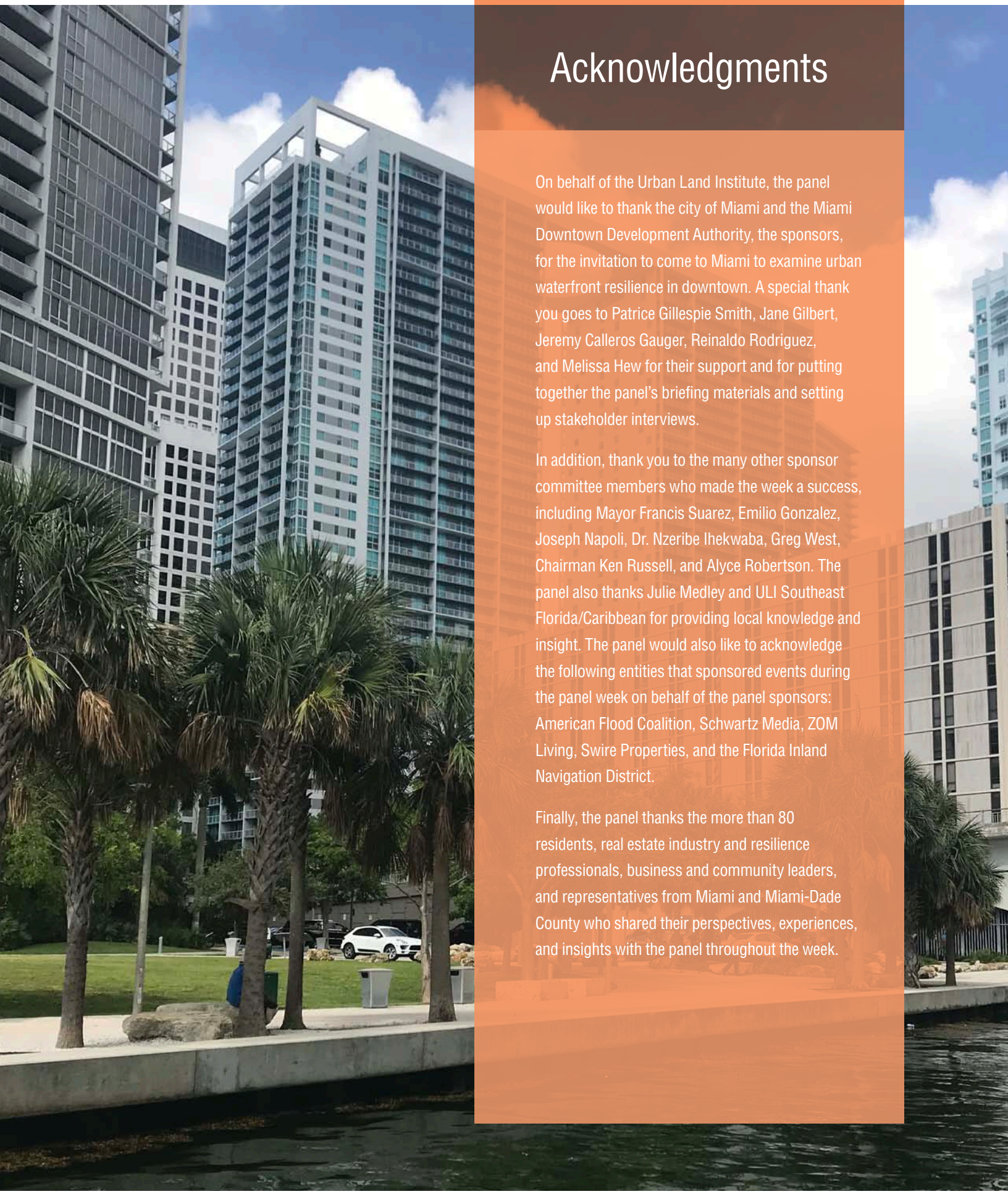
James A. Mulligan
Senior Editor

Laura Glassman, Publications Professionals LLC
Manuscript Editor

Brandon Weil
Art Director

Deanna Pineda, Muse Advertising Design
Graphic Designer

Craig Chapman
Senior Director, Publishing Operations



Acknowledgments

On behalf of the Urban Land Institute, the panel would like to thank the city of Miami and the Miami Downtown Development Authority, the sponsors, for the invitation to come to Miami to examine urban waterfront resilience in downtown. A special thank you goes to Patrice Gillespie Smith, Jane Gilbert, Jeremy Calleros Gauger, Reinaldo Rodriguez, and Melissa Hew for their support and for putting together the panel's briefing materials and setting up stakeholder interviews.

In addition, thank you to the many other sponsor committee members who made the week a success, including Mayor Francis Suarez, Emilio Gonzalez, Joseph Napoli, Dr. Nzeribe Ihekwaba, Greg West, Chairman Ken Russell, and Alyce Robertson. The panel also thanks Julie Medley and ULI Southeast Florida/Caribbean for providing local knowledge and insight. The panel would also like to acknowledge the following entities that sponsored events during the panel week on behalf of the panel sponsors: American Flood Coalition, Schwartz Media, ZOM Living, Swire Properties, and the Florida Inland Navigation District.

Finally, the panel thanks the more than 80 residents, real estate industry and resilience professionals, business and community leaders, and representatives from Miami and Miami-Dade County who shared their perspectives, experiences, and insights with the panel throughout the week.

Contents

ULI Panel and Project Staff

Panel Chair

Ladd Keith
Chair, Sustainable Built Environments Program
University of Arizona, College of Architecture, Planning, and Landscape Architecture
Tucson, Arizona

Panel Vice Chair

Michelle Beaman Chang
Founder and Chief Executive Officer
Imby Community Inc.
Washington, D.C.

Panel Members

Jason Bonnet
Vice President, Development
Brookfield Properties
San Francisco, California

Samia Byrd
Deputy County Manager
County of Arlington, Virginia
Springfield, Virginia

John Macomber
Senior Lecturer, Harvard Business School
Harvard University
Cambridge, Massachusetts

Michael Rodriguez
Leader, Market Research and Insight
CBRE Mid-Atlantic
Washington, D.C.

Susannah Ross
Consultant
Landscape Architecture
Boston, Massachusetts

Matt Steenhoek
Vice President, Development
PN Hoffman
Washington, D.C.

Byron Stigge
Founder
Level Infrastructure
New York, New York

Jay Valgora
Founder and Principal
Studio V Architecture
New York, New York

Panel Adviser

Kevin Rogan
Managing Director, Global Real Estate and Hospitality Practice
Marsh & McLennan
Miami, Florida

ULI Project Staff

Lauren McKim Callaghan
Director, Advisory Services

Gretchen Sweeney
Senior Director, Awards

Leah Sheppard
Senior Associate, Urban Resilience

Rebecca Hill
Associate, Events and Logistics

The Panel's Assignment

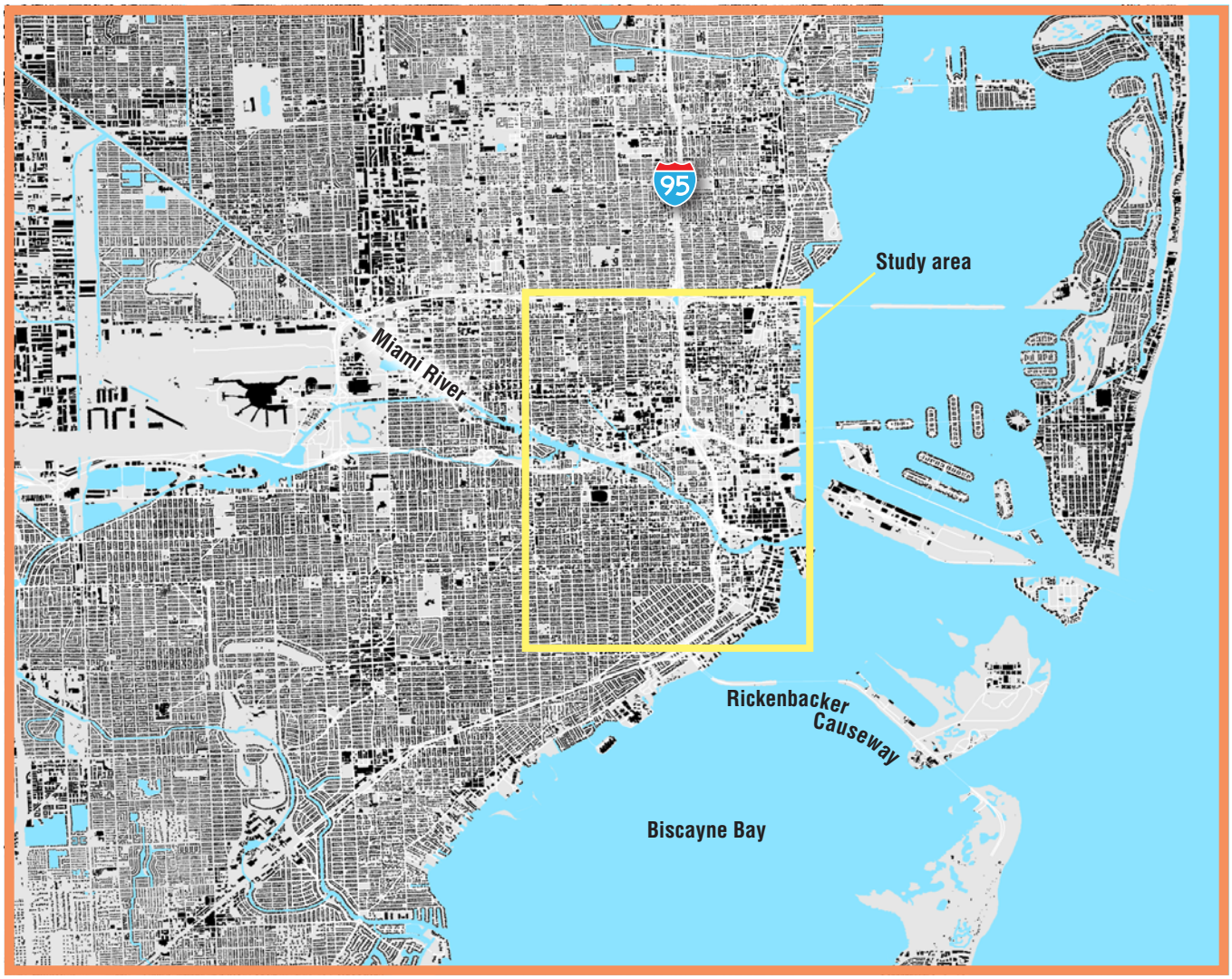
MIAMI'S WATERFRONTS AND WATERWAYS have played a prominent role in its history. In its earliest days, the Miami River was a source of food. Much later, the waterfront along the Bay of Biscayne helped attract tourists, many of whom came by Henry Flagler's railroad extension along the ridge to the west of the bay. This ushered in a real estate boom in the late 1800s and helped shape the development of today's Magic City.

The study area for the panel, in downtown Miami, encompasses Miami's urban waterfronts along both the Miami River and Biscayne Bay. Specifically, the study area extends from SE 26th Road (southern boundary) to NE 36th Street (northern boundary) and NW 27th Avenue (western boundary) along the Miami River.

Today the study area has an estimated population of about 250,000, based on information provided by the city. The population is projected to continue to grow by 4 percent annually and reach 304,000 by 2024. The median household income is an estimated $40,846, with about 20 percent of households earning $100,000 or more. An estimated 79 percent of the population in the study area identifies as being of Hispanic origin, up from 77 percent based on the 2010 census. Current estimates indicate that 14 percent of housing units in the study area are vacant and the majority (61 percent) of occupied units are renter occupied, compared to 26 percent that are owner occupied.

The Assignment

As a part of Miami's efforts to be at the forefront of resilience planning, the city of Miami and the Miami Downtown Development Authority (DDA) (the sponsors) asked the Urban Land Institute to conduct an Advisory Services panel to provide strategic recommendations on design guidelines, funding opportunities, policy approaches, and an implementation plan



The study area focuses on the downtown bayfront and riverfront of the Miami River.

to bolster the resilience of Miami's waterfront, which the city considers its first line of defense against the impacts of sea-level rise and climate change. Specifically, the sponsors asked the panel to focus on the following:

- Concentrate on economic resilience, update waterfront design guidelines that incorporate the city's resilience goals, align with the city's form-based code, and bolster the Baywalk and Riverwalk. These design alternatives should address the increasing flood risks to the physical and economic viability of the waterfront, including insurance rates, real estate investment, financing, and enhanced livability.
- Define public and private-sector roles and recommend financing strategies for green and gray infrastructure improvements along the waterfront (especially the Baywalk and Riverwalk).
- Develop a policy direction that informs both private and public property modifications to enhance flooding and storm surge resiliency, with a specific focus on high rises and historic buildings that cannot be elevated and that are not likely to be demolished. In addition, identify steps the most forward-thinking cities are taking to ensure protection of their waterfront assets (such as waterfront promenades) and apply these to Miami.

- Integrate these recommendations into an action plan that outlines short-, medium-, and long-term steps. This action plan should be integrated with and leverage other resilience planning work underway, such as Resilient Greater Miami and the Beaches Strategy; the U.S. Army Corps of Engineers (USACE)'s Back Bay study; the Miami Baywalk and Riverwalk Design Guidelines, the city of Miami's Stormwater Master Plan, and its overall strategic plan.

The Panel's Key Recommendations

After briefings from the sponsor, a tour of the urban bayfront and riverfront, and more than 80 interviews with a variety of stakeholders, the panel prepared the following key takeaways and recommendations:

- Embrace the legacy of the waterfront through design to protect from water, live with water, and create value from water.
- Adopt the draft Miami Baywalk and Riverwalk Design Guidelines with a few modifications.
- Design and implement a Living Shoreline Demonstration Project along the bayfront that helps build partnership across agencies and the community and allows exploration of long-term resilience strategies not currently in use both out into the bay and further inland.
- Extend and apply these guidelines to the Riverwalk, the Baywalk, and riverfront with a few additional resilience-focused measures.
- Track and actively engage in the USACE Back Bay Study and support the installation of an iconic tidal gate for the river.
- Return to Miami's history and embrace sensitive transit-oriented development (TOD) on the ridge for future growth.
- Update the Downtown Miami Master Plan to bring existing plans and visions together. Act on these strategies and evaluate outcomes on a regular basis to address updates in relevant forecasts and data and progress made in resilience-related measures.
- Pursue a portfolio of financial strategies to become the world leader in resilient finance, investment, and construction.
- Use an expanded transfer of development density (TDD) policy to encourage sensitive development in less flood-prone areas and provide capital for existing buildings to make investments in flood-proofing measures when elevating or demolishing a building is untenable.
- Reduce uncertainty for the community and private market through predictability, transparency, and accountability. Pursue proactive community engagement strategies and support networks to foster communication throughout the city.
- Use incremental actions to lead to transformational changes. Further refine the outlined action plan to implement panel recommendations and take initial steps that can lead to larger efforts and benefits in the years to come.


WIKIMEDIA COMMONS

Background

AFTER HURRICANE ANDREW, HURRICANE KATRINA, SUPERSTORM SANDY, and other storms, communities like Miami are increasingly focused on becoming more resilient, or *how to prepare and plan for, absorb, recover from, and more successfully adapt to the adverse events*. The region is expected to experience an increase in rainy season months and more frequent storm events. These issues will be compounded by a forecast two-foot increase (over the next 40 years) in sea-level rise and associated flood risks like king tides and tidal flooding. On the basis of these projections, a proactive approach that addresses these issues and challenges is necessary. In 2016, Miami became part of the Rockefeller Foundation's 100 Resilient Cities initiative and added a chief resilience officer to its city staff to focus on these issues. In addition, a number of studies, plans, and strategies have been recently completed or are currently underway, including Resilient305, Miami Forever: Climate Ready strategy, the USACE Back Bay study, the Miami Baywalk and Riverwalk Design Guidelines, and the city's pending update to the stormwater master plan.

From sea-level rise to heat waves, from storm surge to drought, the many impacts of climate change threaten the built environment in ways that have serious consequences for the health, viability, and economic vitality of our cities.

Flooding

Sunny-day flooding, which refers to above-normal tide events, has increased in recent years, forcing water into stormwater outfalls and above walls onto streets, leading to corrosion of cars and infrastructure, according to the Southeast Florida Regional Climate Compact. This type of flooding is intensified when it occurs during storms and surge conditions.

With urban development comes an increase in impervious surfaces, such as roads, sidewalks, parking lots, and roofs. Replacing the natural landscape with these surfaces leaves fewer opportunities for water infiltration, which can prompt more frequent flooding. Private-sector developers and designers are playing a growing role in meeting cities' water management–related goals. Local regulators are seeking increased participation from the private sector, requiring or

incentivizing the real estate community to incorporate enhanced water management mechanisms in new development projects.

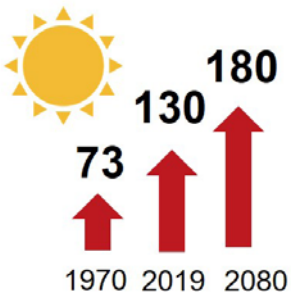
In low-lying Miami with its porous ground composition, sea-level rise and groundwater absorption are and will continue to be issues that will affect the city's resilience. These physical and environmental factors do and will exacerbate existing challenges in addressing heavy rainfall, seasonal tidal flooding ("king tides"), and major storm events like Hurricane Irma, which had an associated storm surge of three to six feet, based on information provided by the National Oceanic and Atmospheric Administration (NOAA). Flood mitigation and water management have become of interest to the sponsors because of the flood risk in the greater downtown area that is affected by two water sources—the bay and the river.

Heat

Urban areas are the most heat-at-risk locations in the United States. Heat has the potential for devastating public health consequences—as seen in the Chicago Heat Wave of 1995, the European heat wave of 2003, and more recently, the near-global summer heat wave of 2018. Miami had a record-setting summer in 2019—71 days with temperatures at or above 92 degrees.

Extreme heat also has the potential for long-term impacts on local economies and even consumer market preferences. The built environment is ultimately both a contributor to and solution for extreme heat, especially in cities, and presents numerous opportunities for mitigation and adaptation at the building and neighborhood levels. Although designing for heat is an emerging issue that is not yet mainstream in many U.S. markets, it is likely to become more prevalent as extreme heat increases and is acknowledged by both consumers and local regulators.

According to information provided to the panel by the sponsors, extreme heat has become a more prevalent issue in Miami. An article in the *New York Times* points out that between 1970 and 2015, Miami has experienced an increase of approximately 73 days annually of temperatures above 90 degrees. Locally, these extremely hot days can be particularly difficult on the elderly, the young, and low-income individuals. Furthermore, these days foster an environment conducive to an increase in the existing population of mosquitos, which present their own public health challenges. Heat in Miami is particularly challenging along the waterfronts and downtown because of the lack of an existing tree canopy to provide shade throughout the day.



Miami has experienced an increase of about 73 days annually with temperatures above 90 degrees. Locally, these extremely hot days can be particularly difficult on the elderly, the young, and low-income individuals.

Broader Panel Considerations

As the panel deliberated on its findings from the sponsor briefing, study area tour, and stakeholder interviews, it also took into account broader considerations when developing the recommendations. One notable consideration was a holistic definition of resilience that includes not only the waterfront, but also Miami more broadly, including economic resilience. The panel also acknowledged that the city has a responsibility to continue to mitigate greenhouse gas emissions and reduce Miami's contribution to climate change. In addition, the panel wanted to focus on ensuring that solutions are not maladaptive—either unintentionally contributing more greenhouse gas emissions or inadvertently causing new problems—such as installing water pumps to keep downtown dry that might also increase pollution in the bay and harm the natural environment, inadvertently adding to the impact of storm surge.

The panel also learned about a number of areas in which Miami has been successful at furthering resilience efforts—and on which the panel builds its recommendations. Current successes that the panel applauds include the following:

- Participation in 100 Resilient Cities and continued support of the chief resilience officer and Office of Resilience and Sustainability;
- Creating and sustaining an active Sea Level Rise Committee within the city of Miami;
- Release of Resilient305, a strategy to address resilience challenges through collaboration within the community and across several city and county jurisdictions;
- Development of a city-specific Climate Ready strategy
- Support of the Southeast Florida Regional Climate Change Compact;
- Amendment to Miami21 to allow new structures to be elevated up to five feet (freeboard) above base flood elevation;
- Current and ongoing update of the Stormwater Master Plan (SWMP); and
- Being a leader in wind and storm-related building codes.

Downtown Market Context

MIAMI IS A THRIVING GLOBAL ECONOMY AND A TOP DESTINATION as a national and global real estate market. Among major global cities, Miami ranks fifth in U.S. yields (income returned on an investment) for retail and industrial real estate. Between 16 and 20 percent of investment comes from other countries every year, according to information provided by CBRE. An important point, the panel learned that the waterfront is a key part of the economy, with 75 percent of the city's jobs located within a half mile of the water.

Residential Market

Home prices have trended upward, with homes selling at $416 per square foot in 2018, up 36 percent since 2012. By comparison, rents in greater downtown have increased 16 percent to $2,627 over the same period. This suggests that homeownership is becoming more expensive than rental units according to current data from CBRE and CoStar. The information also speaks to issues of housing affordability that were conveyed to the panel during the panel week.

Commercial Market

Recent commercial trends also suggest a healthy downtown market. Current office rents, retail rents, and multifamily rents have all increased in the greater downtown. Importantly, research indicates that the city of Miami is changing its economy toward more professional and office-using jobs that have pushed office vacancies in the Miami market (Brickell) to levels under 12 percent. Downtown Miami office vacancy is slightly higher, at around 15 percent as of the second quarter of 2019.

Important Commercial Market Indicators

Global investor market returns	Fifth in U.S.
Fastest-growing markets	Second in U.S.
Amount of investment in past 10 years	$13.1 billion
Commercial real estate investment from abroad	20%

Sources: CBRE Inc.; Wallethub; Real Capital Analytics.

Commercial properties (offices, retail establishments, and large apartment buildings) are an incredibly important segment of the downtown economy. By the panel's estimate, these properties comprise $21.1 billion in taxable commercial property value (excluding owner-occupied space) in greater downtown Miami. Of that, $5 billion exists within a quarter mile from the waterfronts of Biscayne Bay or the Miami River.

The waterfront outperforms greater downtown in the retail and multifamily segments although office rents close to the water are lower ($37.95 per square foot versus $40.23 per square foot). This is likely because the core office market is upland toward the Metrorail where most of the key office inventory is located.

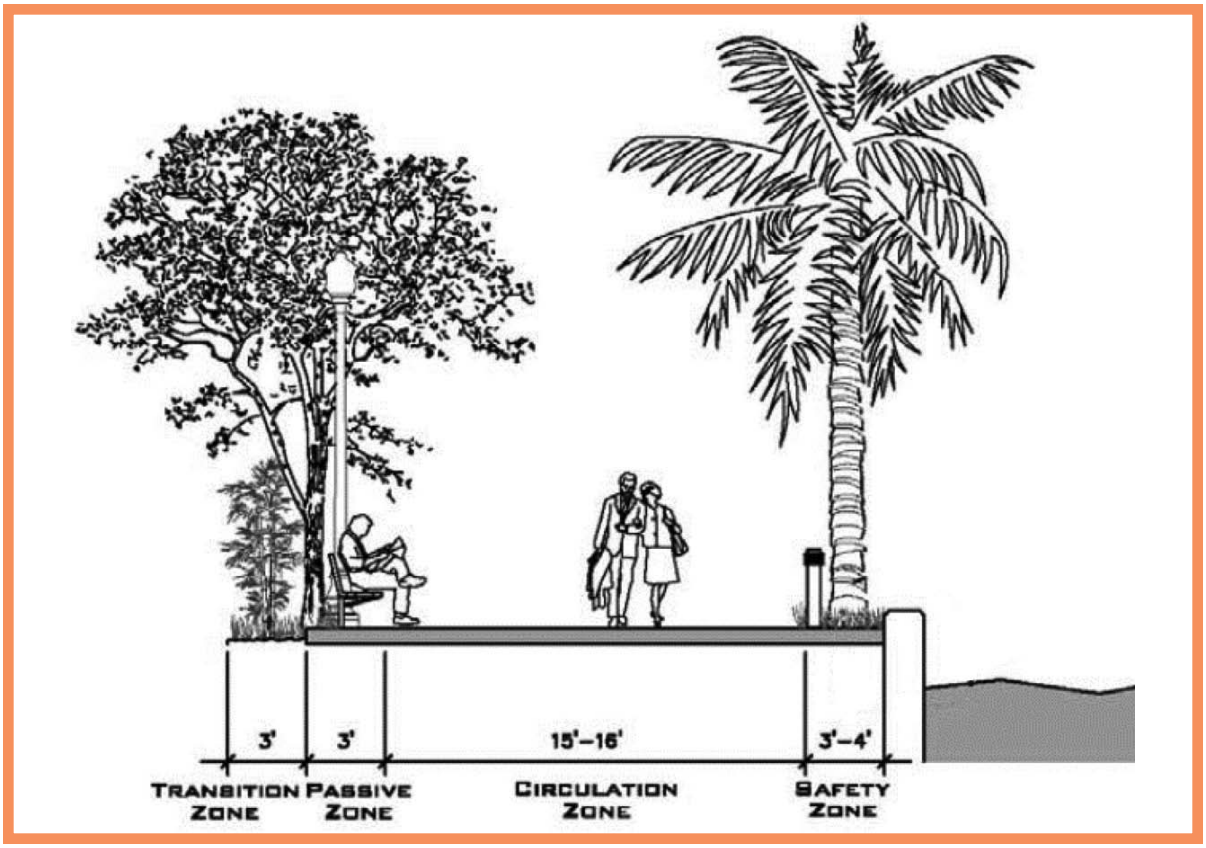
Finally, since 2009 a total of $13.1 billion was invested in commercial property in the Miami central business district, indicating an active market. Although transaction volumes have slowed to $1.2 billion in 2018, total volumes still remain significant, especially with an active foreign investment market that totals 23 percent in 2018 based on current data from CBRE and Real Capital Analytics.

Waterfront Design Concepts

RESILIENT DESIGN IS A MULTIFACETED CONCEPT, and resilient design solutions are highly specific to place and time. A strong resilient design strategy may include multiple and changing interventions and will need to evolve over time. The panel recommends that the sponsors play a leadership role in designing Miami's waterfront and be ready to repeat and continue to build from the work that has already been done. The panel anticipates that it will be necessary to continually adjust the waterfront design standards, with specific checkpoints to account for current and future sea-level rise and storm projections as well as the evolving land use and demographic contexts. Given the urgency of addressing sea-level rise, a single revision to current design standards will not suffice for the long term. Accordingly, the panel's design approach begins with recommendations for incremental improvements that have the potential to evolve and build a more resilient city over time and pave the way for larger-scale interventions in the future.

Resilient design knows no boundaries. Even in a city that revolves around the ocean and waterways, the waterfront is not the only place where design matters for a resilient city. In Miami, the inland areas—and the ridge in particular—play a critical role. Here the ridge refers to elevated areas of the city of Miami that are less susceptible to climate risks such as sea-level rise and storm surge. The panel focused on three areas when constructing the following recommendations for a unified approach to resilience: the bay, the river, and the ridge.

The panel's goal was to develop a cohesive strategy for the Baywalk and Riverwalk that unites these two distinct stretches of waterfront while recognizing and responding to their unique needs. The neighborhood character and physical condition of each pedestrian route differ significantly, as do the adjacent land uses. If the city can succeed in knitting them together into a continuous route, they will form an invaluable economic, recreational, and ecological asset. The panel recommends extending the Baywalk guidelines to the Riverwalk. Doing



CITY OF MIAMI

Current waterfront design section.

so would bring a strong visual style to the whole Miami waterfront and provide one form of continuity across different parts of the city.

To create a comprehensive and cohesive strategy, the panel has three sets of recommendations: one for the bay, one for the river, and one for the ridge.

The Bay

The Baywalk and Riverwalk Design Guidelines currently being prepared would introduce many improvements to the current Waterfront Design Guidelines in Appendix B of the Miami21 Zoning Code (2009). The panel largely agreed with the sponsor's analysis of the shortcomings of the current Waterfront Design Guidelines—that they lack overall flexibility, have some problematic design requirements, and do not allow for elements, such as terracing, that could address storm surge.

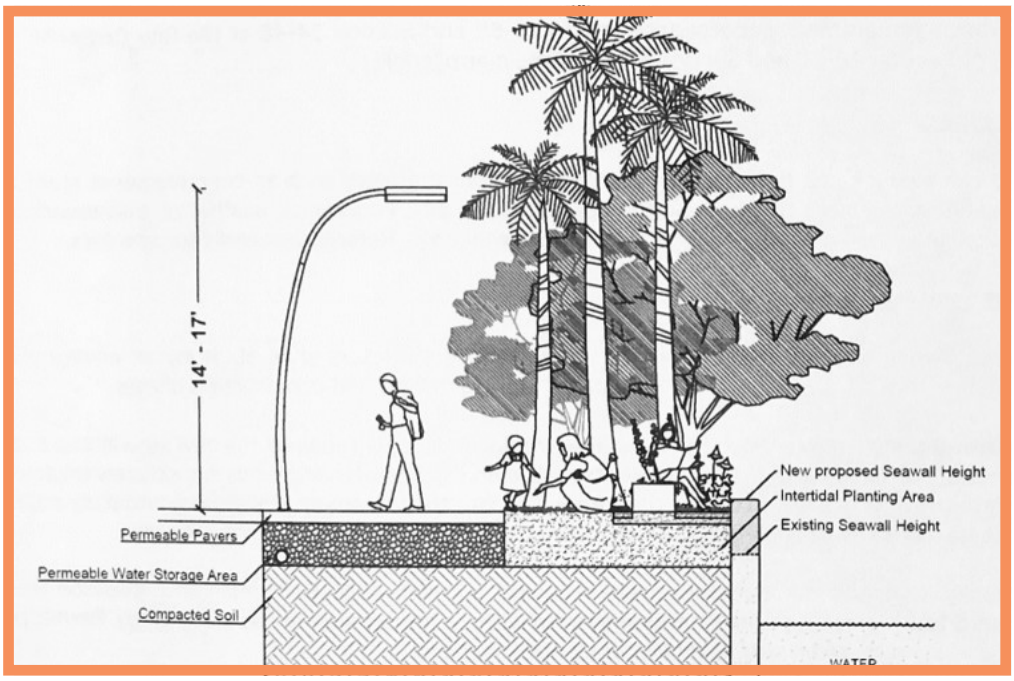
The panel also supports the design approach and standards proposed in the draft Baywalk and Riverwalk Design Guidelines—under the brand "Miami Baywalk"—because they address most of these shortcomings. These proposed guidelines include living shorelines, increased flexibility for pedestrians to engage with the water, a slightly raised seawall, wider planting zones, permeable pavement, and removing the mandate for coconut palms.

Some components of the draft design guidelines face significant regulatory obstacles, in particular, Miami-Dade County Environmental Resources Management has concerns about allowing living shorelines to extend into Biscayne Bay.

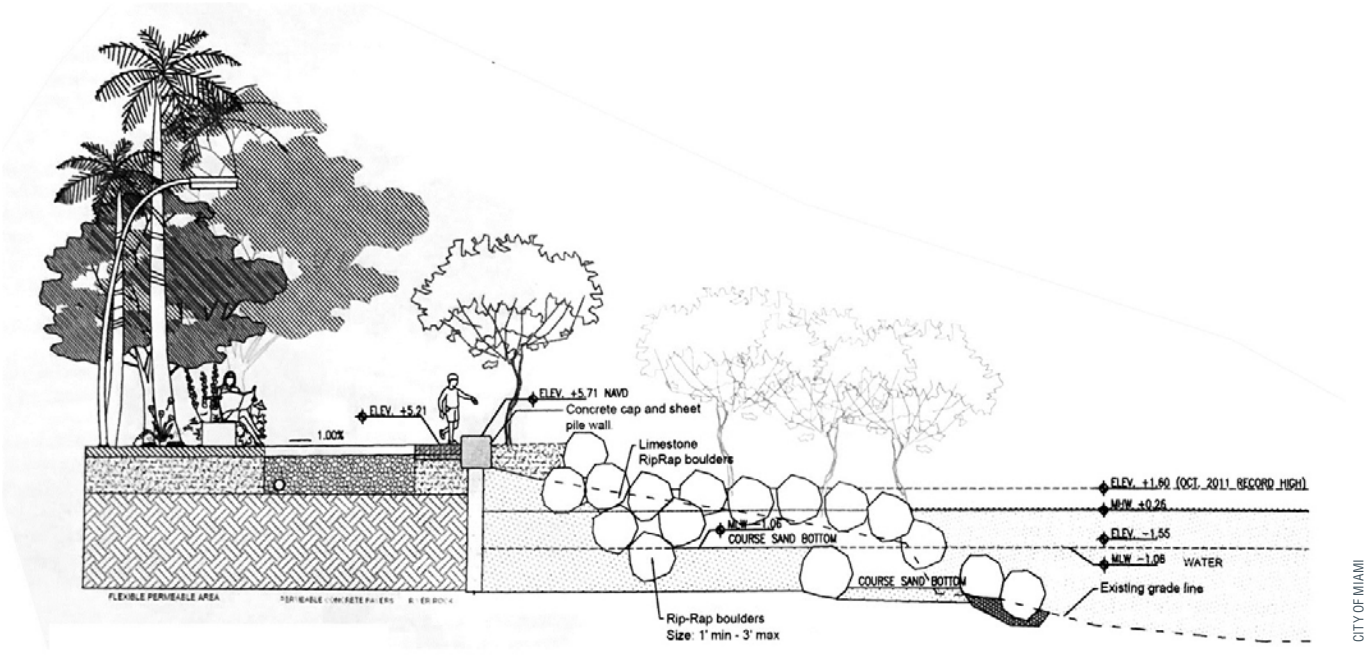
Design Recommendations

The panel notes that the sponsors must look for ways to address these concerns and recommends the following:

- Adopt the proposed Baywalk and Riverwalk Design Guidelines with their existing minimum top elevation for bulkheads of +5.71 feet NAVD (North American Vertical Datum, a system used by surveyors and engineers as the basis for elevation measurements, www.fema.gov). This elevation provides enough current protection while ensuring the bay is accessible to the community; 5.71 feet NAVD correlated to existing bulkhead elevations plus 2.5 feet sea-level rise. The panel did not recommend raising



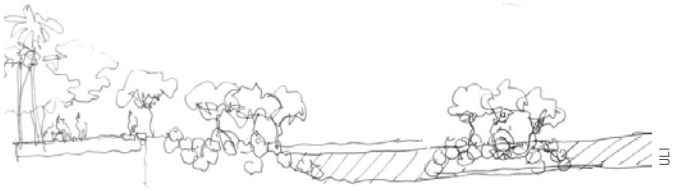
Proposed waterfront design section.



Proposed living shoreline.

the bulkhead all the way up to FEMA map 1 percent flood elevations of AE 10/11 plus sea-level rise plus freeboard (about +12 to 13 feet NAVD) because that would have required a seawall eight to 10 feet higher than the existing seawall, which would not be feasible from an urban-edge-condition point of view.

- Engage and address relevant regulatory agencies to advance a more expansive framework that allows for softer edges that extend into the bay. A dialogue and commitment at the highest levels of city and county government are necessary to address the conflicting needs of the shoreline and the bay.



ULI

One approach can include a living shoreline of the Barrier Islands and mangroves.

- Consider future alternatives for building to a higher elevation and building farther into the bay. Establish a process to review and update the design guidelines on a regular basis, at least every 10 years. Changes to elevation and the bay edge may need to be made based on updated data and successful testing. Over time, more intensive living shoreline solutions may become feasible.
- Create a demonstration project and test certain shoreline typologies to foster collaboration and exploration for a range of waterfront resilience design options.
- Reserve three feet (horizontally) of the 25-foot right-of-way as a potential corridor for seawall in the future. This length refers to the approximate width required to retrofit a high seawall in the future, if feasible. The panel considered recommending a higher minimum top elevation, for example +10 feet; however, given the wide variance in landownership, land use types, and opportunities for new construction along the bay and river, achieving a continuous and effective stretch of bulkhead at +10 feet would be extremely challenging. The panel recognizes that the bayfront will flood in an extreme storm event. However, many buildings along the bay have already elevated their lower levels and protected them from such an event, and other buildings will need to take such measures.

  The best approach for the bayfront now is acknowledging and preparing for extreme storm event flooding. The city may need to evaluate whether public or other assets are at greater risk to determine if they need greater levels of protection than these general recommendations provide.

Typology Discussion

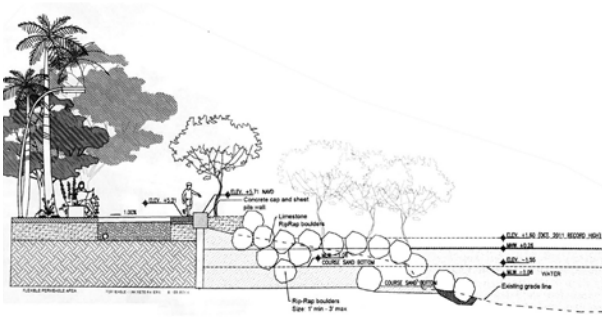
The panel reviewed a few building typologies specific to the downtown Miami area to formulate recommendations.

Bayfront large commercial building. The panel recommends the adoption of the proposed Baywalk guidelines as they pertain to the existing commercial building stock. This includes less intensive ground-floor uses and taking measures to wet

WHAT IS A LIVING SHORELINE?

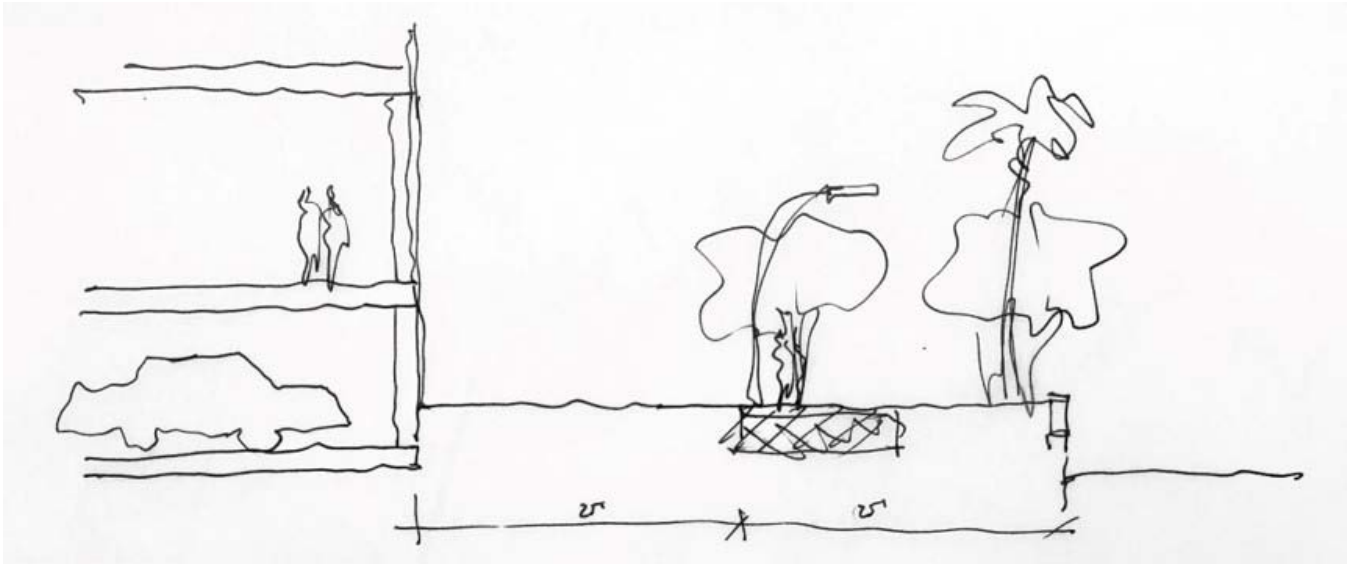
Living shorelines are a green infrastructure technique that uses native aquatic vegetation alone or in combination with offshore sills to stabilize the shoreline. Here in South Florida, they are composed primarily of natural lime rock riprap boulders, sand infill, mangroves, cordgrasses, and oyster bags. Living shorelines provide a natural buffer that can bolster gray infrastructure, attenuate storm surge and wave energy, enhance wetland habitat, sequester carbon, and provide protection from costal inundation. According to NOAA, about 15 feet of terrain can absorb 50 percent of incoming wave energy. Although living shorelines are not suitable for protecting against a powerful storm event, they are an appropriate technique for mitigating the effects of tidal events, sea-level rise, and some coastal events.

In New York, Brooklyn Bridge Park implemented salt marshes along the edges of its design not only to filter the water of pollutants but also to help protect the park and upland area during a storm surge.



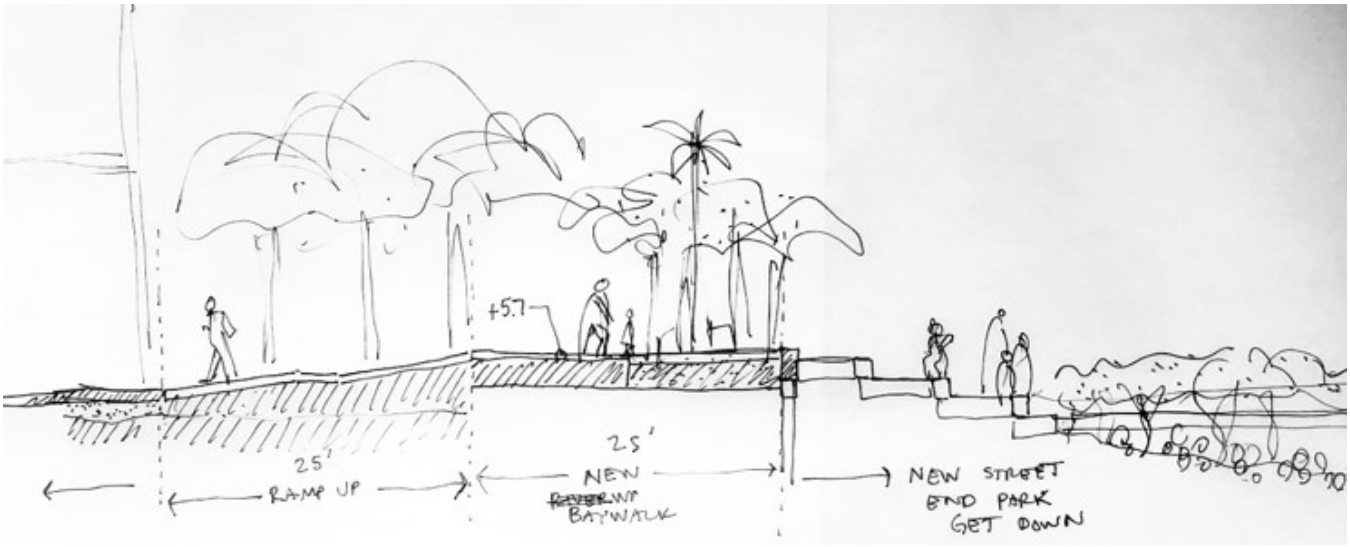
CITY OF MIAMI AND PALM BEACH COUNTY

CITY OF MIAMI AND PALM BEACH COUNTY



ULI

A concept of shoreline treatment for Bayfront commercial space with in-depth protection elements such as a bulkhead, wet floodproofing, and parking on the first floor.



ULI

A suggested approach to Bayfront public end-of-road locations includes terraced steps extending into the bay with riprap below the steps.

floodproof the ground floor, allowing the water to come in and go back out.

Bayfront public end of road. This typology recommends a 25-foot ramp of the existing road up to the seawall elevation of +5.7 NAVD that the draft Baywalk and Riverwalk Design Guidelines propose. On the bayside of the seawall, the typology would have terraced steps—known as a "get down"—into the water, with riprap below the steps.

The River

The panel believes consistent guidelines for both the Baywalk and Riverwalk will introduce a continuous pedestrian experience and help establish a shared sense of community among diverse waterfront neighborhoods. However, the flooding conditions for the Miami River are quite different from those along the bay and thus require different design elements. The river edge and the surrounding communities experience more regular flooding events from rain and king tides relative to bayfront communities. Storm surge flooding along the Miami River is lower than for Biscayne Bay—mostly +7.7 feet NAVD—which is only two feet above the seawall elevation of +5.7 feet NAVD in the design guidelines.

Whereas bayfront development consists primarily of large commercial and multifamily residential uses, the Miami River is a working waterfront over five miles long, and therefore

CITY OF NEW YORK

An example of terraced steps with riprap in Brooklyn Bridge Park.

a continuous flood wall is not a practical solution. In fact, stretches of the Riverwalk will run parallel to the river on nearby streets rather than right along the water's edge. Boats need to access businesses, restaurants, and other uses at the typical tidal water levels of +0 feet to +2 feet NAVD. Because of these requirements, as well as the limited width of the river, creating soft edges and ecological solutions within the river corridor is much less feasible—although unique opportunities may exist.

Communities surrounding the Miami River, such as Little Havana and Allapattah, are vibrant neighborhoods characterized by single-family homes and smaller-scale multifamily apartments in contrast to elevated condominium towers along the bay. The flood zone below +7.7 feet NAVD on both sides of the river is wide, leaving miles of streets and large swaths of neighborhoods with limited resources exposed to flood risk. Thus, even a moderate hurricane—like Irma was when it reached Miami—has damaging effects in these communities. The panel heard stories of power lines being down for over a week and homes destroyed, which was a much different story than was heard about residents in Edgewater, downtown, or Brickell. Imagine what a Category 3 or higher storm would do to these communities. The riverfront requires a different approach to flood protection from the bay.

Infrastructure investment and coastal and stormwater design standards resulting from the city's update to the Stormwater Master Plan have the potential to dramatically reduce flooding in the neighborhoods adjacent to the Miami River. The update will evaluate opportunities for expanding green infrastructure, such as permeable and planted surfaces, as well as gray infrastructure, such as larger drainage pipes, flood control backflow prevention valves, and many other strategies. Although the scope of this plan update does not primarily

ULI

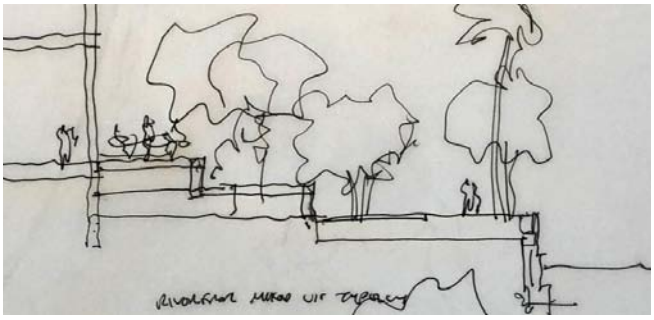
The riverfront area has different typology from the bayfront. Flood zones (shown in pale yellow) extend anywhere from five to 20 blocks into the neighborhoods.

focus on addressing long-term storm surge risk, the city and its consultants have identified the update as an opportunity to coordinate stormwater and coastal resilient infrastructure. The panel recommends a continued emphasis on green infrastructure in neighborhoods along the Miami River to reduce flooding from sea-level rise and storm surge. Such infrastructure has multiple public benefits, including reducing surface and air temperatures and connecting communities to nature and open space.

Design Recommendations

The panel identified the following recommendations specific to the waterfront design guidelines:

- Clarify that the Miami Baywalk and Riverwalk Design Guidelines cover the river and ensure they address the unique characteristics of the river where few, if any, opportunities exist for a living shoreline.



ULI

A suggested section through the riverfront bulkhead.

LESSONS FROM THE GOWANUS CANAL

The Gowanus Canal is a 1.8-mile-long canal that runs through Brooklyn, New York, and empties into the New York Harbor. Built in the mid-1800s, the canal was a heavily used working waterway for industrial and transportation uses, including chemical plants, paper mills, and gas plants, making it one of the most contaminated bodies of water and eventually labeled as a Superfund site in 2010. The city also initiated the Billion Oyster Project to help improve water quality. Running parallel to the canal cleanup projects, the city proposed a neighborhood rezoning initiative that could mitigate the effects of climate change, encourage economic development, and remediate industrial pollution in this neighborhood that prides itself on a growing creative arts scene and large number of locally owned breweries and other businesses, amongst a previously industrial backdrop. In recent years, the neighborhood has already begun experiencing a residential housing boom.

The plan, that would generate more than 8,000 new apartments by 2035, is currently in a public hearing period. The Department of City Planning is using this plan to encourage more affordable housing units, create green space, and spur economic development in the area, as well as a vehicle to spur long-term resilience to rising sea levels, flooding, and impacts of urban heat island effect, promote pedestrian- and bicyclist-friendly routes along the canal, and attract investment into the neighborhood, all while maintaining the working character of the waterfront.

WIKIMEDIA COMMONS

ANDREW J. DELGADO

Gowanus Canal as it is now (above), and future plans (below).

WIKIMEDIA COMMONS

WIKIMEDIA COMMONS

The London Thames Barrier (top) and the Singapore Marina Bay Barrage (above) are large-scale examples of tidal gateways. A smaller-scale tidal barrier at the mouth of the Miami River could eliminate the significant impacts of surge flood for the residential communities along the river.

- Use a bulkhead height of +4 feet NAVD to allow boat access and to permit pedestrians to be close to the water. This is a lower elevation than the requirements along the Baywalk because of the amount of direct water-to-land interaction with commercial and leisure boat traffic along the river's edge. Raising the seawall too far from the existing edge elevation would make boat traffic and the pedestrian experience disjointed.
- Grade up to +8 NAVD before meeting building edges.
- Use vertical ecological solutions for the bulkhead to encourage habitat formation, including eco concrete and living shelves.
- Plant shade trees rather than coconut palms along pedestrian paths.

Typology Discussion

The panel examined a site at 451 South Miami Avenue as a place to apply its recommendations for a riverfront mixed-use typology. This typology continues the graphic design and landscape palette of the draft Baywalk and Riverwalk Design Guidelines to ensure a continuity of experience for the pedestrian. It comprises the following elements:

- Safety zone and bulkhead at +4 feet;
- Circulation zone width: eight feet to 12 feet with structured seating up to +6 feet;
- Planting zone width: six feet;
- Transition zone width: six inches minimum; and
- A series of landscape design features to bring ground elevation up to base flood elevation to +8 feet NAVD between river edges and building edges.

Using the Waterfront to Its Fullest

The panel identified several recommendations that would not only enhance the resilience of the study area to coastal-related issues but could also boost economic well-being.

Create a tidal gateway. The panel saw great promise for the USACE Back Bay study (the Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study) to dramatically reduce coastal storm risk for most of the flood zone along the Miami River while also providing the opportunity for an inspiring and iconic architectural gesture, such as the London Thames Barrier or Singapore Marina Bay Barrage. A tidal barrier at the mouth of the river would nearly eliminate storm surge flood risk to vast swaths of low-wealth communities with a singular project.

Unfortunately, strict constraints on design, engineering, and cost/benefit analysis as part of the federal process require that USACE consider a purely functional set of solutions. Rather than letting the process flow through its natural course, the panel recommends finding a way for the widest possible public outreach and engagement in the process to weigh in on design. Imagine how an iconic architectural gesture could change the image of Miami from "underwater" to a beautiful inspiration for how a city overcomes the seemingly impossible task of holding back a hurricane. Investing in an infrastructural feat right in the heart of Miami's waterfront to protect a diverse set of neighbors and businesses downstream could singularly change the narrative of Miami's relationship to water.

The Back Bay study—still in its feasibility stage—may possibly not conclude with a project that meets the needs of those living and working in downtown, Brickell, or upstream communities. If that happens, the city should look for other routes to implement a bold and essential component of the Miami waterfront.

Encourage mixed-use working waterfront. The city should encourage a rich mixed-use community that preserves the working waterfront character. That means preserving existing uses, while encouraging new residential uses that complement the existing ones. Developments along the Gowanus Canal and Vancouver waterfront can serve as examples of how to preserve industrial and commercial waterfront uses and character while adding a greater mix of uses.

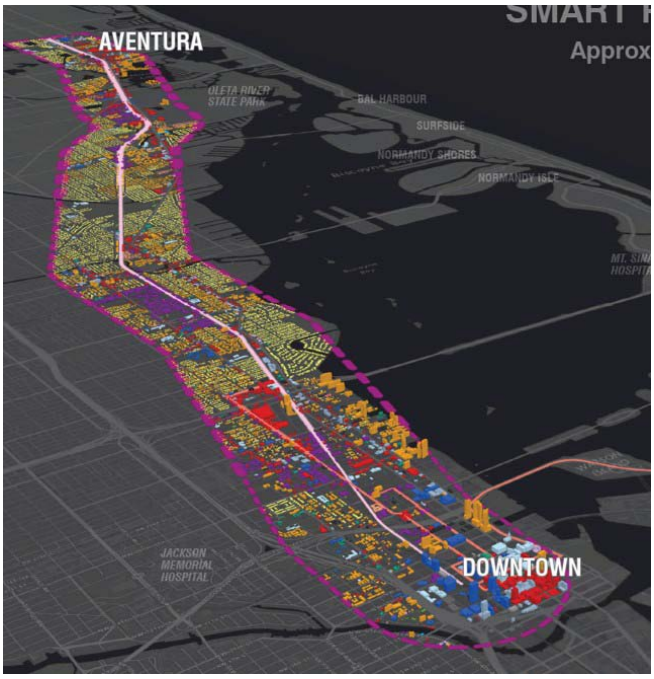
Ensure preparedness plus social and economic resilience. Whether or not the tidal gateway is built, the panel recommends ensuring neighborhoods along the Miami River prepare for flood events by focusing on other forms of resilience. That might mean strengthening local social networks and the Neighborhood Enhancement Team program to encourage a resilient communal response to events, which is discussed later in this report. It likely also will include asset-level enhancement strategies, such as dry floodproofing and storm shutters,

ADVISORY SERVICES PANEL IMPACT: ARCH CREEK BASIN, MIAMI–DADE COUNTY, FLORIDA

In 2016, Miami–Dade County invited ULI to study the Arch Creek Basin, a multijurisdictional area that comprises about 2,838 acres and four municipalities, as well as unincorporated county land. The area is economically diverse and includes sites that have experienced repetitive losses caused by routine flooding, where households had unsuccessfully applied for FEMA buyouts. The area is also likely to experience development and change, because a future commuter-rail station will provide an opportunity for transit-oriented development. The panel sought to address the question of how long-term development and land use patterns in Arch Creek could pivot to enhance resilience, thus reversing the effects of decades of past development that advanced regardless of flood vulnerability.

A key recommendation from the panel was to concentrate development in transit-ready sites along the coastal ridge, such as a new station proposed for NE 125th Street, described as the Transit Opportunity Area. This promising opportunity area offers relatively high ground, future transit connectivity, and the opportunity for a considered mixed-income development approach including dedicated relocation housing for flood-vulnerable households.

In December 2018, the city of North Miami adopted a TOD Mobility Study to establish a blueprint for implementing the panelists' recommendation for TOD on higher ground. In 2019, the North Miami City Council adopted an ordinance to amend the city's Comprehensive Plan and Zoning Code to establish the North Miami Transit Station Area Overlay District, a new mixed-use district with residential, office, and retail uses as well as spaces identified for parks and green trails.



SOUTH FLORIDA REGIONAL TRANSPORTATION AUTHORITY

Aventura is building a Brightline rail line to connect to downtown.

ULI

Higher densities along the transit ridge are encouraged (shown in red). This will support transit planning with increased density within a half mile of stations and mixed uses and commercial activity in areas less vulnerable to surge and storm events.

and neighborhood-level strategies such as distributed energy generation and storage, and emergency management solutions.

The Ridge

Higher ground within a half mile of the waterfront offers an opportunity for climate-resilient development. The city of Miami has existing and incoming transit assets and vibrant urban fabric along the ridge. As one example, rail lines run along the ridge between the neighborhoods of Wynwood and Edgewater, following the original path of the railway that Henry Flagler built. The panel heard that significant and growing development pressure exists in lower-density neighborhoods west of the rail line, such as Wynwood, and this momentum may continue into adjacent neighborhoods such as Overtown. The city has a unique opportunity that requires some urgency.

Transit-Oriented Development

The panel recommends that the city encourage transit-supportive development that benefits both the neighborhoods and the region and avoids widespread displacement of current residents. A TOD strategy for this area serves multiple purposes: it expands mobility options, potentially shifts transportation mode share out of single-occupancy vehicles and improves air quality, provides active transportation to improve the health of communities, and enables multiple solutions for safety and emergency planning and services during storm events.

Recommendations

The panel had the following recommendations related to the ridge:

- Support visioning and planning for the Northeast Corridor rail line. The Miami-Dade Transportation Planning Organization has engaged in land use scenario and visioning planning to better understand the relationship between transit and land development along the Northeast Corridor. Brightline express trains, which connect to Fort Lauderdale and West Palm Beach, currently run along this corridor, and the South Florida Regional Transportation Authority's Tri-Rail commuter trains are set to run along it as well, to serve downtown Miami at the new MiamiCentral station.
- Cultivate additional mixed-use transit nodes along the corridor within a half mile of incoming and existing stations.
- Explore changes in existing zoning to allow more density and transit-oriented strategies to encourage more population to live in elevated areas.
- Link land use and planning along the Northeast Corridor rail line to the Underline effort (a planned 10-mile trail and park) south of the Miami River, which is also studying transit-oriented development options. Ultimately build a physical connection between these transit nodes north and south of the river.

Proposed living shoreline demonstration project at Maurice A. Ferré Park.

- Use incentives for preserving current and developing new affordable and workforce housing within a half mile of train stations. Focus limited funds on preserving existing affordable housing. Also introduce new options around these transit nodes to create potential for an integrated strategy addressing housing affordability within the greater metropolitan area.

Living Shoreline Demonstration Project

Existing development conditions along the bayfront preclude large-scale reintroduction of natural conditions due to the prohibitive cost. However, over time, the city has an opportunity to demonstrate and build consensus for a new relationship with the shoreline and the bay that may eventually become feasible or even a necessity. The panel recognizes that state regulations currently do not allow building certain conditions, such as living shoreline out into the bay. However, the panel recommends demonstration projects going both inward and outward from the existing shoreline that may give the sponsors the leeway to test, document, and build trust in such solutions. In particular, the panel recommends a high-profile demonstration project of a living shoreline, with the goal of creating a productive conversation among stakeholders, including the sponsors, regulatory agencies, and the public.

The panel notes that Maurice A. Ferré Park (formerly Museum Park) offers a unique opportunity for a demonstration site, because it brings together scale, partnerships, and adjacency to missing links in the Baywalk. On this site, the partners can test different resilient shoreline options within similar conditions and discuss the opportunities and challenges. The Phillip and Patricia Frost Museum of Science may be a potential partner to engage on issues of resilience on this site and can bring together educators to communicate the lessons of the demonstration site to a wider range of audiences. The panel also recommends engaging with the university scientific and research community to test before-and-after conditions for softer edges. The panel recommends the sponsors consider Margaret Pace Park for additional demonstration projects or a similar nearby location for a high-profile project.

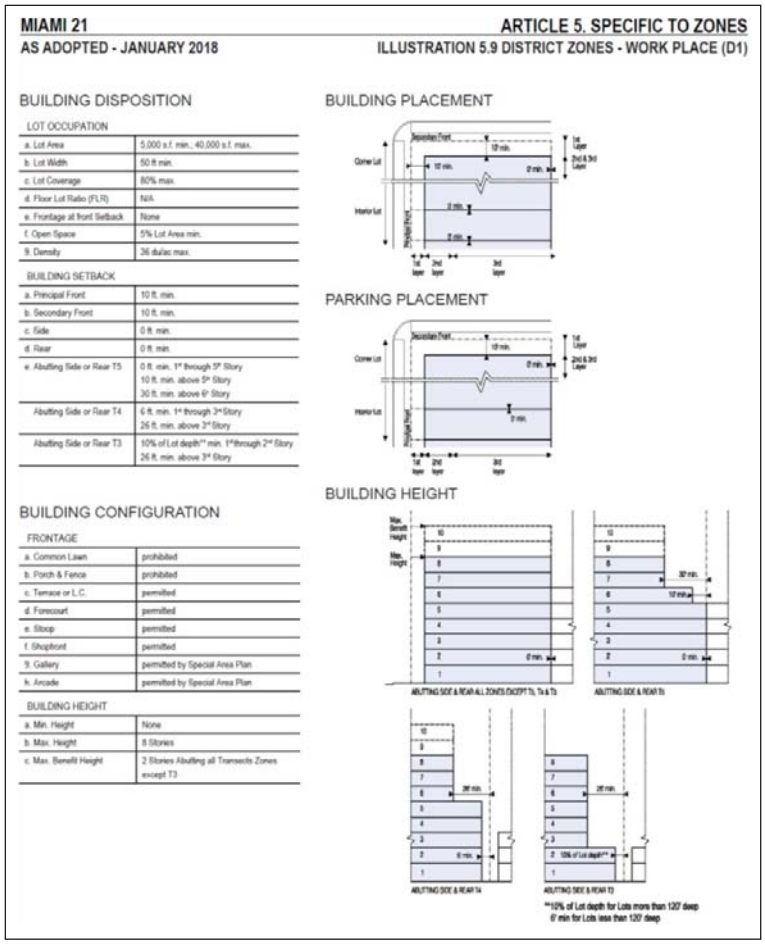

LEAH SHEPPARD/ULI

Preparing Policy for Action

AS A FOUNDATION FOR GROUNDING POLICY DECISIONS, a comprehensive land use plan or strategy that is updated and refined over time is key to informing zoning, transportation, open space, housing, sustainability, public facilities, and decisions on other critical areas regarding the city's growth and development. Developing the specific master plans or sector or area plans is a useful practice to further define a policy direction that is more than general principles and objectives but can inform details about how specific properties should be planned, envisioned, and developed.

Building on Existing Plans

Existing plans and policies to guide development of the downtown waterfront area include the Miami21 Code form-based zoning ordinance and the Miami River Greenway Action Plan. Over time Miami has adopted pioneering waterfront standards and regulations. Now the city has indicated a goal and intent of developing new standards for the Miami waterfront that are performance based and allow flexibility in design. As presented to the panel, the city's overarching intent in updating these standards is to both allow and require the Miami waterfront to perform well under current and projected storm surges and king tides while also improving public access. To understand the policy framework for design guidelines and applicable regulatory requirements, a foundational element is needed that can serve as a document unifying these plans while refining or updating them as required. To address the prescriptive nature, lack of flexibility, and outdated and detailed design requirements that do not focus on resilience, the panel recommends an update to the Downtown Miami Master Plan. A key component that the panel believes should be added to the plan is a focus on the areas of resilience and equity. These are both evolving principles in planning that have not been


MIAMI 21
AS ADOPTED - JANUARY 2018

ARTICLE 5. SPECIFIC TO ZONES
ILLUSTRATION 5.9 DISTRICT ZONES - WORK PLACE (D1)

BUILDING DISPOSITION

LOT OCCUPATION	
a. Lot Area	5,000 s.f. min., 40,000 s.f. max.
b. Lot Width	50 ft min.
c. Lot Coverage	80% max.
d. Floor Lot Ratio (FLR)	N/A
e. Frontage at front Setback	None
f. Open Space	5% Lot Area min.
9. Density	36 du/ac max.
BUILDING SETBACK	
a. Principal Front	10 ft. min.
b. Secondary Front	10 ft. min.
c. Side	0 ft. min.
d. Rear	0 ft. min.
e. Abutting Side or Rear T5	0 ft. min. 1st through 5th Story 10 ft. min. above 5th Story 30 ft. min. above 6th Story
Abutting Side or Rear T4	6 ft. min. 1st through 3rd Story 26 ft. min. above 3rd Story
Abutting Side or Rear T3	10% of Lot depth** min. 1st through 2nd Story 26 ft. min. above 3rd Story

BUILDING CONFIGURATION

FRONTAGE	
a. Common Lawn	prohibited
b. Porch & Fence	prohibited
c. Terrace or L.C.	permitted
d. Forecourt	permitted
e. Stoop	permitted
f. Shopfront	permitted
9. Gallery	permitted by Special Area Plan
h. Arcade	permitted by Special Area Plan
BUILDING HEIGHT	
a. Min. Height	None
b. Max. Height	8 Stories
c. Max. Benefit Height	2 Stories Abutting all Transects Zones except T3

BUILDING PLACEMENT

PARKING PLACEMENT

BUILDING HEIGHT

CITY OF MIAMI

CITY OF MIAMI

The Miami21 Code and the Downtown Miami Master Plan, among other documents, provide guidance to the community on how sites should be developed and what the downtown wants to be in the future. The panel suggests that the two documents evolve to include key components that focus on urban resilience and equity.

comprehensively considered in the context of existing land use planning by the city.

A Downtown Miami Master Plan

Miami's Downtown Miami Neighborhood Comprehensive Plan was adopted in 1989. As an element of this plan, in the same year the city adopted the Downtown Miami Master Plan. The latter appears not to have been revised or revisited to consider waterfront resilience since its adoption. In 2009, the DDA completed the 2025 Downtown Miami Master Plan. The goal as stated in the plan is "to connect and maximize the potential of the Central Business District (CBD), the Arts & Entertainment (A+E) District, Brickell and Miami's celebrated waterfront. Building upon previous plans and studies, this Master Plan provides specific action-oriented implementation items that will increase the livability of downtown, encourage private sector investment and ensure the proper investment of public dollars."

From 2005 to 2009, the Miami DDA engaged with its board and then with the public in a series of workshops and stakeholder meetings focused on increasing understanding of existing conditions, to gain input on how to go about revitalizing downtown. The plan references a list of numerous plans, studies, and guidelines developed between 2003 and 2009. However, it is not a plan formally adopted by the city of Miami nor does it include details that make the objectives tangible based on specific properties or land use and zoning tools with respect to resilience for downtown and the waterfront. The broad goals and objectives and key areas recommended for short-term action by 2025 do not provide a comprehensive long-range vision for such key planning elements as sustainability, equity, land use, housing, public and open space, transportation, sustainability, building form, height and urban design, historic preservation and cultural resources, economic vitality, and public facilities.

The panel recommends reconsidering the Downtown Miami Master Plan in the context of the work completed by the DDA and others as a valuable next step. Previous plans and studies are all pieces of a larger puzzle that seem to have been developed separately from the city's existing Downtown Miami Master Plan. Further, the plans were completed by different entities with varying focus, intent, and purpose. Missing from

existing planning is a comprehensive master plan for the downtown and the waterfront that incorporates resilience.

The panel acknowledges that a great deal of work has been done with respect to resilience in Miami. The next step is to make this planning work with checklists and tool kits applicable to downtown and waterfront plans such that the sponsors can develop an updated master plan for the area that charts the goals, objectives, and action items for resilience in downtown long term. It should be comprehensive and consolidate all efforts while still being considered iterative.

The panel recommends that with all the tools in place and a significant amount of work already done, the city of Miami, in coordination with the Miami DDA, should do the following to address this:

- Evaluate comprehensively the inventory of work on waterfront and downtown development, specifically with a focus on resilience;
- Develop guiding principles based on an overall updated vision and goals for the downtown and waterfront; and
- Build in benchmarks and goals to allow continuous evaluation, feedback, and master plan evolution.

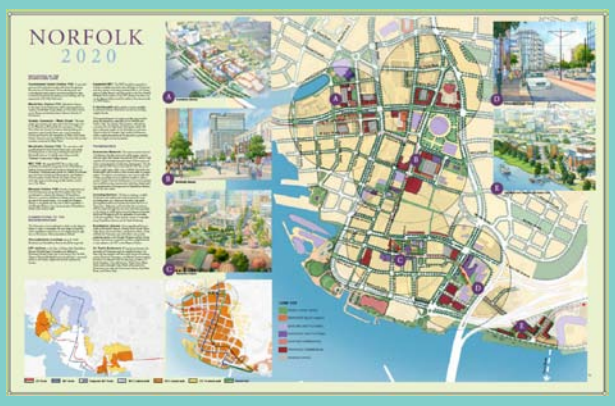
The ultimate goal in reevaluating and updating the Downtown Miami Master Plan is that it will serve as a tool used to guide development of properties to fulfill the city's vision as it relates to resilience and equity for the downtown waterfront. A city-owned and updated plan can establish a high-level framework with a vision, goals, objectives for the downtown, fundamental recommendations for key planning elements, a range of short- to long-term strategies to support the vision and goals, a list of preliminary future implementation tools (zoning ordinance amendment, land use changes), and issues that may require future analysis for further study. Moreover, the process of updating the master plan should incorporate an engagement strategy that involves all stakeholders.

Further, the panel recommends that the sponsors evaluate each of the previous studies and planning efforts that were undertaken but have not been updated in the past 10 to 20 years. In doing so, the sponsors should consider whether pieces of these plans and data can be collected into a new comprehensive plan element focused specifically on resilience or whether resilience needs to be incorporated into these existing documents. Tailoring portions of these documents to just the waterfront areas may be necessary. The American Planning Association and other similar professional organizations have tools and scorecards whereby localities can evaluate their existing plans, policies, and regulations with respect to resilience that the city may find useful in this effort.

The panel recommends that policies regarding resilience should be shaped by a comprehensive or master plan. Missing from the existing Downtown Miami Master Plan and all other efforts is a comprehensive and unified approach. Too many plans that are not coordinated and connected lead to fragmented and disjointed policy decisions. With its current work and efforts and a great foundation of previous efforts, the city is well primed to take the final step of consolidating all efforts into a unified vision with goals, objectives and clear recommendations that provide sufficient detail to inform policy on waterfront resilience: one direction, one road map, one narrative, unified in one key document. This approach will provide predictability and can bring certainty to the residents, the business community, and others that the city has a direction and vision and understands what it needs and what it wants to be.

NORFOLK'S DOWNTOWN 2020 PLAN

The city of Norfolk, Virginia's approach to downtown planning is to engage in a planning process with stakeholders every 10 years, which allows for regular updates and refinements and careful consideration of the appropriate context and strategies to be able to set policy priorities that are achievable and tangible. Norfolk uses the opportunity for 10-year planning reviews to build on the previous plan iterations and set the framework for the next 10 years. This work is undertaken by the city's planning department, which works with consultants and the community to complete the update. The sponsors may consider an approach similar to that of Norfolk in pursuing an update to the Downtown Miami Master Plan.



CITY OF NORFOLK

City of Norfolk, Virginia, 2020 plan.

Infrastructure Finance Approaches

FINANCING SOLUTIONS FOR INFRASTRUCTURE that supports waterfront resilience in downtown Miami should have several key features. Solutions should be diversified so they remain viable through varying market conditions, flexible so they are nimble and can evolve with time and changing needs, and focused to reflect that they are grounded in mandate and not associated with political influences. These solutions should also be positioned to respond to the future, not just the present, and be renewable to provide long-range sources of funding for long-range challenges.

The Importance of Investing in Resilience

Broadly speaking, a city or private entity might take three basic approaches to investing in strategies that promote resilience with the knowledge that a weather, fire, or earthquake event might occur.

A. Business as usual, no investment in resilience, no event occurs.

B. Business as usual, no investment in resilience, an event occurs (losses are notable).

C. Make an investment in resilience, an event occurs (losses are minimal, it was worth making the investment).

The panel acknowledges the chance that investment may be made and no weather event occurs: thus the investment could be considered wasted. However, as the panel learned during its visit, the Miami area is at risk for projected sea-level rise of about two feet by 2060, future storm events like Hurricane Irma, and consistent seasonal king tides—so the exposures are very real.

Miami Perspective on the Importance of Investing in Resilience

In this simplified conceptual illustration, Miami is assumed to have three main courses of action with respect to investing in resilience: (a) do nothing; (b) invest in the magnitude of $50

Investment in Resilience Scenarios (Millions)

Scenario A: No resilience investment, no bad event

Year	0	1	2	3	4	Total
Baseline investment	$20					–$20
Additional resilience investment	0					0
Cash flow from operations		$20	$20	$20	$20	$80
Stress event: cost		0	0	0	0	0
Net cash flow						**$60**

Scenario B: No resilience investment, a bad event

Baseline investment	$20					–$20
Additional resilience investment	0					0
Cash flow from operations		$20	$20	$10	$10	$60
Stress event: cost		0	0	$30	0	–$30
Net cash flow						**$10**

Scenario C: Investment upfront in resilience/adaptation, a bad event

Baseline investment	$20					–$20
Additional resilience investment	$10					–$10
Cash flow from operations		$20	$20	$20	$20	$80
Stress event: cost		0	0	$10	0	–$10
Net cash flow						**$40**

Source: ULI.

million to $100 million for the level of protection indicated in the Baywalk design discussed earlier in this report; and (c) invest in the magnitude of $500 million to $1 billion in robust defenses such as a tidal gate at the river and high wing walls. All of these investments would rely on multiple sources of funds, ranging from USACE to city to private landowners to philanthropy, many of which are discussed later in this section.

To perform a basic analysis of infrastructure investment for the Miami waterfront, the panel assumed three basic weather scenarios could unfold over the next 25 years:

- No important weather events;
- A series of king tides, rain bombs, or low-grade hurricanes; and
- A big hurricane during a king tide.

For illustrative purposes, each of these scenarios has a different annual probability of occurrence. There is a 94 percent chance of no event occurring, a 5 percent chance of high tides or a Category 1 storm, and a 1 percent chance of a Category 5 storm during a king tide event.

Over the course of a 25-year period, the probability of each these events occurring in at least one of the years increases to 100 percent, 72.3 percent, and 22.2 percent, respectively. These probabilities are approximations for the discussion; next steps for the city would include learning the real probabilities from NOAA, FEMA, and private modeling sources like 427, Jupiter, AIR, and RMS.

The panel analyzed each scenario from the perspective of the economic costs from uninsured losses. Examples of these losses could include direct costs of rebuilding, indirect

Expected Investment Scenarios

Protection choice	Investment (millions)	Event size	Long-run probability	Losses (millions)	Weighted probability (millions)	Expected value cost (millions)
1. Do nothing	$0	Big	22.2%	$5,000	$1,111	
		Medium	72.3%	$500	$361	$1,472
		Small	100.0%	$0	$0	
2. Midrange	$50	Big	22.2%	$4,000	$889	
		Medium	72.3%	$250	$181	$1,219
		Small	100.0%	$100	$100	
3. Robust	$500	Big	22.2%	$500	$111	
		Medium	72.3%	$100	$72	$683
		Small	100.0%	$0	$0	

Source: ULI.

costs of being out of business or displaced from home, and human costs such as job loss and public health problems. The vulnerability is largely inland along the Miami River. Although these costs are hard to gauge except for a big hurricane during a king tide, history shows that uninsured losses could be in these ranges:

- Investment scenario A (do nothing): Losses would be huge—probably on the order of $5 billion to $7 billion in the study area. Considering the market values and economic values discussed above, this scenario represents the potential for a crippling loss, and the exposure is real.
- Investment scenario B (infrastructure consistent with the Baywalk and Riverwalk Design Guidelines): Uninsured losses would still be notable but less crippling than in scenario A.
- Investment scenario C (robust resilience infrastructure): This scenario provides a high level of protection, and uninsured losses would be much lower than in the other two scenarios.

Therefore, the expected value of each resilience investment, less the value of uninsured losses, is illustrated in the table above and reflects the conclusions outlined. Of course, if one believes that over time the probability of incidence is increasing, then that would have an additional impact on the investment justification.

Ultimately, the flood risk figures are known, if arguable. The costs of uninsured damages are not known at this time. Also, the panel's cost figures are only directional. Therefore, the panel recommends that the city should further research the actual possible losses and refine the design, engineering, and costs for the various resilience interventions. Then sources of funds can be rallied, the spending can be allocated, and the city can invest accordingly.

Use of Funds Analysis

The benefits of both a more attractive and dynamic Baywalk and Riverwalk are clear. The threat of inundation is also well publicized with respect to, for example, 100-year flood lines. So what are the costs that complete the equation?

The combined Riverwalk and Baywalk are about 15 miles in length, including five miles on the bay and 10 miles including both sides of the Miami River to a distance of about five miles. The eventual end condition anticipates the current 50 feet of clear space from seawall to building face, of which the 25 feet nearest the water is usable for recreation and water access. During interviews with stakeholders, panelists heard that about 80 percent of the Baywalk is complete to some level of quality. About 20 percent of the Riverwalk is said to be complete. The quality level is highly variable. Those who have contributed to covering the costs for the walkways include private property owners, public property owners, and the city of Miami.

To put an order of magnitude on the discussion, the panel assumed that on a unit price basis, installation of seawalls in the region costs $1,500 to $2,000 per running foot for a seawall that will have about four feet of exposed height. The interior fill and a simple asphalt cover are assumed to cost about $20 per square foot for a 25-foot width, or $500 per running foot. This combination equates to about $2,500 per linear foot. If 20 percent of 15 miles remains to complete, the cost works out to about $40 million. Funds of this magnitude would need to be sourced from developers, grants, city budget, and philanthropy or sponsorship. As stated previously, these figures are based on what panelists heard from stakeholders during the panel week and briefing materials, but the panel believes that a crucial next step is for the city to obtain comparable quotes from local engineering firms.

An aggregate budget for annual operations and maintenance including repairs, aesthetics, plantings, benches, access points, wayfinding, and other design amenities is an important cost consideration. A rule of thumb for maintaining a capital asset like this could be 10 percent of the original cost per year. Assuming $2,500 of value per running foot across the entire 15 miles, the cost basis could be ballparked (in aggregate for all holders) at just under $200 million. Much of this original cost was already paid by property owners. However, for the entire combined Baywalk and Riverwalk to be maintained and programmed in an attractive, brand-building, value-enhancing, all-city-welcoming manner, funds on the order of about $20 million per year would be required. The shortfall might come from city budget, from new sources of revenue, or from grants, philanthropy, and sponsorships.

If the Miami Baywalk design adds two feet to the top of an already fully completed seawall, at a running cost of $500 per foot, that would be an incremental capital expenditure across 15 miles of just over $39 million, which would have to be raised from multiple sources. This plan might not add substantial flood protection, particularly upriver.

As a thought experiment, if the bayfront barrage were to cost about $200 million and adjacent wing walls to 14 feet above NAVD at five miles times $10,000 per running foot, that would total about $264 million. Although this plan might provide a high level of confidence around protection of the waterfront and upriver for an extended period of time, this money would have to be raised from multiple sources. The operations and maintenance budget for this design would be similar to the prior illustration, if the scope of amenities and water access was also envisioned to be similar.

Return on Investment

Who are the investors in Miami? And who might benefit from investing in resilience infrastructure? During the panel's time in the city, the panel members talked to or interviewed more than 80 people. Each had his or her own story and investment of time or money into Miami. From the visiting tourist, to waterfront condominium owners visiting for the weather and amenities, to millennials moving from other urban cities looking for better work/life balance and improved cost of living, to a family of third-generation Miamians whose matriarch originally moved to the city for the opportunity to achieve a better life for future generations, each has his or her own investment and hopes for a return on investment from the time spent in Miami. Their expected return on investment is a better quality of life. These individuals are all financing today's Miami.

Another type of investor is the more traditional developer, equity investor, pension fund, and bank—institutional-grade investors that bring dollars into the Miami market through asset purchases, bond financing, or other investments issued or backed by the local municipalities. This type of investor is already sophisticated and practiced in the methods of risk-based analysis. They are grouping assets in risk-based tiers and applying higher discounting to these investments, driven by the risk quantification of climate change and extreme weather. This is the current reality of the investment market in Miami. Mother Nature is driving buy-and-sell decisions. Any resistance or slowdown of movement to future-proof against increasing inclement weather can be reflected in higher discount rates bid by these sophisticated investors, which would manifest at local municipalities through the downgrading of ratings and the negative investment outlooks within those jurisdictions. This can lead to a slowing of investment dollars into the local market, or in the case of a major natural disaster, an immediate reaction such as a large sell-off of assets.

In Miami, government agencies are also investors and the facilitators and managers of investments back into the city that originate from individuals and businesses through taxes. All investors coming to Miami expect that the government agencies will protect and continue to improve infrastructure as well as regulations and laws about the built environment to establish a resilient Miami. Investors are looking for predictability and risk mitigation against rising waters, rising cap rates, and discounts to land and property values. From what the panel learned during its visit, the question is not if the next natural disaster will occur, but when the next destructive storm will hit and cause damage.

The panel believes everyone can participate in financing Miami's future, today, with the tools outlined in this report.

The impact and costs to infrastructure and the built environment can be quantified, but no value can be placed on the loss of life caused by poor preparation or by missing the opportunity to invest and be proactive in embracing resilient measures for Miami. As illustrated in the financial models at the beginning of this chapter, the panel believes that the smart investor will spend $1 today to be prepared and fortify assets in the face of severe weather, rather than pay $100 tomorrow for the high costs of repair and rebuilding roads, buildings, utilities, and the like in reaction to storm damage and flooding. One example of the costs of being unprepared is presented by the now-bankrupt PG&E electric utility in California. PG&E evidently failed to invest in resilience measures such as more robust switchgear, transformers, poles, and wires or the clearing of trees and brush from around its assets. As a result, wildfires were much more destructive than expected, resulting in dozens of lost lives and excess billions of dollars in damages to infrastructure and homes.

Seeing a Return on Investment

Two major considerations when analyzing return on investment are how much is one spending and what is the benefit. Many investments in real estate add to top-line revenue, such as adding a swimming pool. Others reduce operating costs, like installing an efficient air-conditioning system. Investments in resilience tend to show benefits by significantly reducing the future cost of dealing with potential flood and weather events and associated damages. The panel believes making the investment in real estate results in a cash flow advantage. Examples of the benefits of investing in resilience follow.

Insurance Premiums

The ability to insure property against acts of nature is a major factor in maintaining asset values and protecting equity in an investment, be it shopping centers, condominiums, or single-family homes. On the basis of information provided to the panel, insurance is held at "affordable" levels by the federal government subsidizing rates and keeping them at these artificially low levels. Unfortunately, the panel learned during its visit that, moving forward, rates will only continue to increase and never decrease. Will homeowners or investors be willing or even able to pay for insurance to cover costs to repair and rebuild after damages incurred from weather events such as hurricanes, storm surge, and flooding? The panel recommends that a larger economic resilience discussion needs to occur that includes all parties while time still remains to be proactive instead of reactive in the face of climate change and the rising probability of inclement weather events.

Feedback from stakeholders informed the panel that many of Miami's property owners have already taken steps to increase preparedness and have pursued proactive solutions on their own. Incentivized by the opportunity to achieve discounted insurance rates compared to the market-rate costs of flood insurance, developers and owners are going beyond the minimal building code by taking fortifying measures in their design and construction of condominium buildings and office towers to be ready for the next flood or storm event. The panel observed that developers are already building with resilience in mind. Therefore, the panel recommends that the city update the building code to correspond with minimum investments already seen in resilient designs undertaken by the real estate market to minimize flood-related risks. Approaches by local real estate industry leaders include raising the first floor of buildings to provide extra "freeboard," making basements and lower levels easy to clean and get back into service after inundations, locating sensitive mechanical equipment on higher floors, building flood doors or seawalls, installing pumping systems, investing in floodwater holding cisterns, and incorporating "green infrastructure" elements like permeable hardscape, saltwater-friendly plants, and earthen berms to direct water flow. Although the city has guidelines and regulations encouraging these design strategies, more could be done to incentivize private-sector participation.

Impacts on Value

Two major cost components are related to property: the cost to build and the ongoing cost to maintain the building. Insurance is an ongoing cost. As these cost increase, they can affect the valuation of a property. If the property owner is unable to afford insurance costs, or even elects to waive insurance coverage, then the owner will bear the costs of repair and maintenance after every event.

Property values are a major economic driver in downtown Miami, particularly commercial buildings such as offices, hotels, and shopping centers. At the investor level, property values are based on annualized income and expenses on a consistent basis. Loss of income is a major valuation issue for a commercial property such as a hotel, which can result from power outages, flooded lobbies, or the inability to reach the hotel because of downed trees or inaccessible roads. Forecast climate and weather issues take a toll on the asset's balance sheet, particularly the need to increase the owner's capital

reserve bucket. Repairing or replacing building systems and components more often than the expected manufacturer's life span has a direct correlation to the value's asset in the salable marketplace. As annual expenses increase, values can decrease. When commercial property values drop, it translates into property tax losses.

One of the real estate product types most vulnerable to rising water levels and major storm events is single-family homes. Constructed of framed wood and usually built on lower ground, houses are susceptible to a multitude of issues and costs from the impact of a storm and its aftermath. Damage to homes is not only an exposure that burdens the private sector and the residents of these homes, but also a public burden to social infrastructure such as health care and emergency support systems.

Sources of Funding

By its nature, climate resilience or adaptation is a long-term, ever-evolving challenge. It is one that Miami will continue to grapple with and on which it must take serious proactive measures. It is also a challenge that involves many related assets and multiple sources of funding. Accordingly, the financing sources that can help support this effort and mobilization must be

- Diversified to remain viable through varying market conditions;
- Flexible to evolve with time and changing needs;
- Focused and grounded in a long-view objective and decoupled from short-term politics;
- Forward-oriented to respond to future risks and issues, not just the present situations; and
- Renewable or scalable to provide continuous long-range sources of funding for long-range challenges.

Project selection choices need to be compiled from evidence-based solutions. The city must be able to recognize and incorporate new solutions and data as they become available. Further, these projects must consider both the initial capital expenditures and the ongoing operational expenditures and, crucially, the follow-up on benefits that will be created as a result of forward-looking investment.

With the market value of properties in the urban waterfront area exceeding $39 billion, the city of Miami relies on the downtown and waterfront areas as its economic engine. The success and vibrancy of the study area is vital to the solvency of the city's overall budget and to ensuring that Miami remains a key cultural and tourism draw for South Florida. The sponsors are intimately familiar with many of the potential funding sources available, including the landmark $400 Miami Forever bond, other general obligation and revenue bond sources, and grants at the state, county, and federal levels. The panel recommends that these opportunities continue to be leveraged and maximized. The city should also explore several taxing, zoning, and budgeting authorities as potential mechanisms for generating dedicated and renewable streams of funding for climate-resilient projects or other policy goals.

Organization and Administration

The panel identified organizational updates to implement recommendations.

Resilient investment leader. The funding sources and tools described in the following sections should be depoliticized and able to be controlled in an open and transparent environment. Therefore, the panel recommends that a nonpartisan and independent resilient investment leader (RIL) oversee private-sector funding of citywide strategies so the various funding streams can be mutually supportive to leverage the various millions into the productive billions the effort will require in the years to come. The RIL role would fulfill a climate and resilience mandate and should have the freedom to direct investment with an objective perspective. Dedicated and reliable funding streams that are of a magnitude commensurate with the scale of the issue to be addressed should be identified and controlled by the RIL. Finally, the RIL role must be carried out with transparency and able to conduct business while also sharing information with residents and local stakeholders at important decision-making points. One method to enhance the transparency of the process that the panel suggests is for the sponsors to consider having the RIL publish an annual scorecard and investment summary for the public. This first-of-its-kind position would set a new precedent nationally and could help Miami continue its leadership in embedding resilience into municipal government.

Conservancy and commercialization. The panel recommends that a conservancy model also be considered to fund moderate-scale capital improvement campaigns, support operational expenses, and manage events and programing for the Baywalk and Riverwalk. These investments could include the creation of shade structures or tree plantings to help mitigate heat. In addition, both a conservancy and a place-based organization (PBO) can play a significant role as advocates in raising and directing philanthropic funding streams or other creative "value

add" investments. The Brooklyn Bridge Park Conservancy (www.brooklynbridgepark.org/pages/aboutbbpc) is one example of this model. According to its 2019 annual report, this conservancy operates on a $2.7 million annual budget, roughly 38 percent of which comes from contributions and grants, 42 percent from events, and the remaining 20 percent from a mix of other sources.

The panel believes opportunities for commercialization along the Baywalk and Riverwalk areas, such as limited food and beverage retailing, can help generate ongoing funding for maintenance and programming while creating a community amenity for all. Further, considerations for revenues from advertising or sponsorships and private/public commercial events should be considered as value-add investments that support ongoing maintenance, operations, and programming. The Riverwalk in particular offers significant opportunities to leverage its existing working-waterfront character to create a vibrant urban waterfront with a community character that is distinct from the Baywalk experience. The city should ensure that the regulatory framework would allow for the commercialization of these waterfront spaces so long as the revenue generated can be reinvested in the ongoing programming and maintenance of said spaces.

VISIT PHILADELPHIA

Spruce Street Harbor Park in Philadelphia.

WIKIMEDIA COMMONS

The Yards Park in Washington, D.C.

Spruce Street Harbor Park in Philadelphia and the District Wharf or Yards Park in Washington, D.C., offer compelling examples of how sponsorship and commercialization of public spaces can be leveraged to create truly unique and beloved community environments that are safe, vibrant, and self-supporting.

Place-based organization. The Miami DDA provides a vital service to the downtown Miami neighborhoods. It supports an area with 92,000 residents and a daytime population of more than 250,000. The DDA's scope and responsibilities are expansive. Accordingly, to focus on the unique resilience needs of the geographically discrete area adjacent to the bayfront, the panel recommends considering a PBO such as a community improvement district or special improvement district to work alongside the DDA. This entity should be structured to ensure a framework of transparency, predictability, and accountability. Possibly this PBO could remain within the framework of the DDA if enabling regulations allow it and this approach is the most effective means of implementation.

The PBO would be formed through the support of the property owners within its boundaries and primarily funded by a voluntary additional levy placed on those properties. Although the exact boundaries would need to be refined, the area could include the collective downtown properties that are between the river and the higher elevated ridgeline that would experience an immediate benefit from resilient infrastructure enhancements reducing the risk of flooding and storm surge.

The panel recommends that the sponsors take actions to build consensus and support from property owners within this area by highlighting the collective benefits of insurance and operational saving that property owners will see from enhanced flood mitigation such as private bulkhead resilience investments. A detailed cost/benefit analysis demonstrating insurance and operational cost savings opportunities should be commissioned to help frame the financial upside for property owners from the formation of a PBO.

The formative purpose of the PBO would be to serve as the convening and coordinating body for a group of property owners who will self-fund appropriate infrastructure improvements to undergo a FEMA Conditional Letter of Map Revision/Letter of Map Revision process to have areas remapped to positively amend flood inundation designations

(current VE Zone designation to an AE Zone) of many waterfront properties. As described to the panel, this remapping has the potential to provide significant insurance cost savings to individual owners and can be completed more effectively in a coordinated rather than piecemeal approach. The PBO can also serve as the implementing body for infrastructure improvements that are necessary along public portions of the Baywalk, such as parks and street ends, or for private property owners with unique circumstances (religious institutions, nonprofits, etc.). The panel believes that the city must ensure that the regulatory, zoning, and building code framework exists to minimize the entitlement friction for the PBO and individual property owners to complete these improvements.

A PBO can also act as the coordinating entity to maximize the productive value and output of grants or other potential revenue streams as well as the ongoing operations of shared public or quasi-public resources such as the Baywalk/Riverwalk and parks within the PBO boundaries. This helps reduce the city's cost of maintenance and administration of the spaces while ensuring for adjacent property owners that these public or quasi-public spaces are maintained and programmed at a level that provides a community benefit and enhances property values.

A PBO or similar type of organization should also be considered as the coordinating entity to support the goals of the Riverwalk. For the Riverwalk, the focus of the PBO would likely center around completing broken links in the walk, providing clean-and-safe programs, and making investments in shade and comfort.

Non-Tax Revenue and Funding Strategies

The panel believes that significant opportunities exist for the city of Miami to be thoughtful about where growth is focused; the city should seize the opportunity to think about density and planning and how it considers the transportation network.

Transit-oriented development. Creative and deliberate changes to the zoning code to allow increased density in the respective TOD supportive areas or corridor, focusing on locations that are naturally resilient and have the potential to encourage sustainable transit use, is a sound planning policy that the panel believes should be promoted.

Leveraging enhanced zoning in these corridors will not only generate value for the city through investment and increased property values, but can also create tools to build affordable and workforce housing that enables the cocreation of wealth. These investments can create jobs and opportunities for local business participation in the construction and ongoing operations for the developed corridors. The city needs to be sure to capture value from these rezonings through transfer of development rights (TDR), tax increment financing (TIF), reasonable impact or infrastructure fees, or other monetization of development density mechanisms available to the city. If the proper mechanisms do not exist, a change in the laws may be necessary. In addition, a large portion of the areas that have potential for strong TOD investment are currently defined as an Opportunity Zone. This designation may open up additional strategies for maximizing value and should be explored by the city.

Tax increment financing. Opportunities for the use of TIF mechanisms can be created through the process of rezoning properties along the transit corridors previously discussed. These funding mechanisms may already have a track record in the city of Miami, so existing expertise and familiarity can be leveraged. The process of enlarging the zoning envelope along the transit corridor will create properties with enhanced values that generate taxes beyond what the properties were able to create before the rezoning. The revenues from this incremental tax can support the debt service on public bonds that are issued to support identified investments. These investments, which are made possible by the increased values of the newly zoned properties, can support projects that improve resilience.

The panel believes that efforts should be made to structure the bonds to ensure that the resulting infrastructure investments can be delivered both inside and outside the redevelopment area, as necessary to most effectively create resilient infrastructure. Moreover, the enabling legislation should be clear and transparent about precisely what types of infrastructure investment can be funded using TIF funds. Demonstrating the broader public benefit associated with the investments will help increase public understanding and acceptance of this valuable financial tool.

The panel acknowledges that TIF capacity will depend on the additional levels of development and value that are unlocked, but this mechanism can create the opportunity for significant bonding capacity. As an example, the 3 million-square-foot District Wharf project in Washington, D.C., is able to support about $200 million in TIF/PILOT bonds through the roughly $70 million in annual tax increment that it is anticipated to produce upon stabilization.

Transfer of development density. Numerous historic or existing properties in areas vulnerable to flood or storm surge have been developed below their maximum density and would

require significant investment to enhance their resilience because they are not likely candidates for demolition, nor can they be elevated. The panel recommends that an expanded TDD program, beyond including only historic properties, is one strategy that can help property owners generate income by capitalizing on the otherwise unachievable density contained within their site. This program will create a source of funds that landowners would be able to use for the necessary resilience capital investments.

The panel recommends expanding TDD to include all properties in the floodplain with excess density. Creating a receiving zone along the higher elevated ridge TOD corridor discussed previously and a structure to allow further enhanced density would help ensure a viable market for the TDD transfers to generate meaningful income. Further, additional applications for the TDD program may exist in other areas of the city when diverting or enhancing density and investment is desirable to achieve the city's policy, planning, or resilience goals.

City-owned parcel land value capture. If the city is able to identify key development parcels to sell, enter into a long-term ground lease, or otherwise enter into transactions, the panel recommends that proceeds from these property dispositions can be used as another source to support resilience investments. These transactions can take a number of forms, such as a one-time arm's-length property sale or a public/private partnership with ongoing revenue sharing. The city has a track record of using this tool in general, but it should be considered to explicitly support investment in resilient infrastructure.

If used, the city must be open and transparent about its intended goals for each transaction so the public can understand the associated public benefit. For example, if the goal of the land value capture is leveraging the highest and best use to create the greatest amount of money to support resilience efforts, this should be transparent and explicit because these transactions will largely be a zero-sum game if the addition of proffers with financial implications in these situations may dilute the city's ability to maximize value capture.

When pursuing these transactions, the panel recommends clearly establishing the goals and reasoning up front for a particular disposition to ensure the city's residents understand and can support the city in its disposition of public assets. This is particularly important because these goals may change from project to project. For example, some dispositions may focus on revenue generation, while others may focus on affordable housing, green building, and sustainable development. The city may also be able to leverage its own TDD opportunities, as discussed earlier, if the circumstances and goals allow.

EXPLORING TDR AS A POSSIBLE CLIMATE ADAPTATION STRATEGY

This report, led by ULI Southeast Florida and Caribbean, summarizes the recommendations of a focus group convened to explore the use of transfer of development rights (TDR), sometimes referred to as transfer of development density, as a climate adaptation strategy in South Florida. Convened by Miami-Dade County, this focus-group project was a follow-up to the ULI Arch Creek Basin Advisory Services panel hosted by the county in 2016 and responds to the central question of whether TDRs could be used as a mechanism to divert development from low-lying, flood-prone areas. The major recommendations are as follows:

- Adopt a new TDR program.
- Carefully manage supply and demand of TDR credits.
- Study future capital outlay needs in pilot areas to help determine TDR values.
- Consider forming a TDR bank.

Read the full report, *Exploring Transfer of Development Rights as a Possible Adaptation Strategy*, at americas.uli.org/research/centers-initiatives/urban-resilience-program/reports.

Tax-Based Revenue and Funding Strategies

The panel acknowledges that any increase in taxes can be a contentious issue for some municipalities. However, the panel recommends that the sponsors seriously consider the following tools as one of the more direct ways to generate revenue that can be used to pay for infrastructure needed for resilience measures.

Enhanced homestead exemption/vacancy fee. Homeownership is critical for building wealth among Miami residents, but in Miami-Dade County homeownership rates have declined from 61 percent in 2010 to 55 percent by 2017. The panel believes that a larger homestead exemption coupled with property tax increases would favor resident-homeowners

VANCOUVER'S EMPTY HOMES TAX

In 2016, the city of Vancouver, British Columbia, passed a tax regulation, called the Vacancy Tax By-Law No. 11674 and also known as the Empty Homes Tax, to decrease the number of uninhabited homes in the city and slow quickly escalating home prices. The Empty Homes Tax was designed to help encourage fuller use and occupancy of existing housing stock, with an eye toward mitigating foreign real estate investment. Having empty homes occupied improves the quality of a neighborhood, and a larger presence of "eyes on the street" ultimately creates safer neighborhoods and increases vibrancy.

This levy is designed to target foreign home investors who leave the property empty for more than six months of the year. If the property is deemed vacant for longer than six months, the owner will be charged a 1 percent vacancy tax on taxable assessed value of the parcel.

Each year, owners of residential property are required to submit a property status declaration to determine whether their home is subject to the tax at the end of the year. Many homes are exempt from the tax, including principal residences or homes rented for more than six months of the year.

According to a CBC News posting on February 6, 2019, the Canadian Press reported that the number of vacant properties fell 15 percent in 2018, and a little more than half of those homes shifted into the rental market.

Net revenue from the Empty Homes Tax is reinvested in affordable housing initiatives that support creating more homes with prices in reach for people who live and work in Vancouver.

Read the full Vacancy Tax By-law at https://src.bna.com/J3A.

and can serve to address economic resilience issues while funding physical resilience programs.

The panel acknowledges that Miami already has a homestead exemption. However, the panel recommends that if residential property taxes are increased by 1 percent ($1 per $100 of assessed value), and resident homeowners receive a full 1 percent homestead exemption, this would provide a technical mechanism to implement a form of vacancy tax, or enhanced homestead exemption. For example, in 2016 Vancouver successfully instituted a similar tax on foreign buyers of real estate to generate revenue for the city. Further research on the need for state enabling authority may be required to pursue this recommendation.

Such a tax reform can provide a source of revenue for physical resilience while mitigating the housing unaffordability effects of absentee property owners. The *Connect Capital Miami* report (City of Miami, 2019) showed about 31,000 vacant properties in Miami-Dade County. The same study estimated that a 1 percent property tax on vacant residences in the city of Miami alone could yield $98 million per year based on 2017 assessed values. This is similar to existing taxes on empty houses such as the vacancy tax in Vancouver, British Columbia, and a recently proposed vacancy tax in New York City.

In addition to funding resilience efforts, an enhanced homestead exemption such as the one described above advances housing affordability by discouraging real estate speculation among owners whose units will remain vacant and will not contribute to the local economy during significant parts of the year. Thus, market prices of homes become more affordable to potential homeowners who want to live in Miami. The economy benefits from year-round homeowners who work locally, invest in local business, spend in the local economy, and participate in their communities and civic associations.

Waterfront area commercial property tax. Commercial property owners along the waterfront in Miami benefit from resilience mitigation measures most by not suffering from disruptions to their office workers or retail sales. Therefore, the panel recommends that a progressive way to fund resilience efforts is to increases the millage (property tax) rate on commercial properties (office, retail, and large apartment buildings) within an area in and around the waterfront.

By the panel's estimate, a 1 percent annual property tax rate on these properties within a quarter mile of the waterfronts could yield $80 million in revenue per year, an amount that is likely to increase significantly as property values grow. If this tax were to be extended to include industrial, flex, and other types of commercial uses, tax revenues would be even higher.

Citywide general property tax. Property taxes are the largest part of the city's budget, totaling $396.4 million in revenues, or about 35 percent of the city's general fund revenues. Ongoing maintenance of resilience improvements along the Baywalk and Riverwalk will likely be paid, in part, by these revenues. The current millage rate in Miami is 21.2 cents per $100 of assessed value, distributed among the city, county, and several

jurisdictions. Of that, 7.57 cents accrue to the DDA and the city of Miami. Because Miami millage rates are low, bringing property taxes to levels commensurate with other global cities and large U.S. cities can go a long way to fund resilience efforts. By comparison to Miami's 0.21 percent rate (a percentage of total assessed property value), the total local property tax rate is higher in cities like Houston (0.61 percent), Atlanta (0.41 percent), New York (12.6 percent), and Los Angeles (1.77 percent), according to information from municipal and county tax assessor's offices. Even just a 0.01 percent (one cent per $100 assessed value) increase in the citywide general property tax could generate approximately $45 million in additional revenue annually.

Earlier in this report, the panel estimated that greater downtown Miami has approximately $2.96 billion in commercial real estate value at existing market prices and capitalization rates. The cost of climate risk is severe by this measure: a 1 percent increase to market capitalization rates could depress market values by 14 percent, or $424 billion in taxable real estate. This includes only office, retail, and apartments and could represent a loss of $32 million per year to the city—and increase each year as risk increases.

The panel believes that the threat from sea-level rise and climate change also threatens property values and therefore taxes. If property owners increasingly internalize the risk of making these resilience investments, this can lead to increases in capitalization rates in the commercial real estate market (a capitalization rate is similar to expected yield). The result would be lower market values for properties and therefore decreased revenues for the city. By this logic, resilience improvements have a return on investment simply by preserving property values in the commercial real estate market and therefore preserving tax revenues for the city.


CITY OF MIAMI

Implementation

THE CITY OF MIAMI AND MIAMI DDA HAVE PRODUCED A COMMENDABLE NUMBER of studies, reports, and plans that have been completed over time, and many more are underway. However, there is such a thing as overplanning to the point where it paralyzes a community from implementing those plans. The following set of recommendations provide specific strategies to guide the city toward implementation of the ideals already presented in these planning efforts, focusing on gaining legitimate community input and approaches that can be executed immediately to incrementally enhance the resilience of Miami's downtown and greater waterfront area.

From Vision to Implementation

Although implementation hinges upon a variety of factors, including resources, ownership, finances, and politics, enough study and recommendation have been outlined in the currently available reports, plans, and studies to be able to move forward. The panel recommends that the city avoid seeking validation through studies, reports, and plans. The panel recommends conducting a comprehensive review of the various plans to better understand whether gaps and redundancies exist. During this exercise, the city should take note of recommendations and considerations outlined in each of the studies, reports, and plans, and what hindrances or challenges to implementation have occurred and determine how these can be overcome.

The panel acknowledges that the city has a good toolbox for execution in current plans and regulations, including Miami21, the Baywalk and Riverwalk Draft Design Guidelines, and current building codes. These are the framework for implementation, and the panel recommends that those not yet adopted be finalized for use by developers and others who can convert plan to action. Adoption of plans and implementation does not mean that evolution, updates, or changes do not occur, but it facilitates the opportunity to take steps toward meeting

consensus-based goals and objectives. For example, building codes should be clear and consistent—and coupled with a public design review checklist that ensures proactive and timely solutions to design troubles instead of wasting time and money relitigating issues project by project.

These policies can be adapted and refined over time based on the outcomes of implementation.

Success through Stakeholder Engagement

Miami's influx of residents from diverse cultures at times reflects a divergent set of values that when viewed optimistically is dynamic and lively but can break down into community factions. Without a comprehensive vision and set of values, it will be difficult for the city to move forward and meet the challenge of climate change and water resilience as one.

Once a destination for immigrants in search of the American middle-class dream, Miami struggled in the 1980s like many U.S. cities with inner-city challenges. The city has experienced explosive growth in the past 15 years and a boom of jobs in tourism, finance, and tech that brought an economic vibrancy and swagger to Miami's art, food, and cultural center. This growth has occurred nearly nonstop and today manifests itself in inequality and an affordable housing crisis that affects many lifelong Miami families. Low-paid service workers struggle to support their families while they balance multiple jobs and spend a disproportionate amount of income on rent.

Wealthy South American buyers flee unstable countries to invest in Miami's million-dollar waterfront condominiums. An influx of millennials in search of job opportunities quickly drive up rents in a region bounded by water, protected swampland, and multiple jurisdictions in competition for limited resources. Concern and preparation for an unknown future of hurricanes and superstorms drops on the priority list for anyone who has mold today, a rent check due, jobs across town in rush hour, children's education to pay for, and food to get on the table. That is a lot to advocate for, so climate-related issues do not always make it onto the list.

"We Dodged a Bullet"

Hurricane Irma should have been a wake-up call to Miami residents. Roads turned into rivers; some neighborhoods were cut off from electricity for nearly a week. Life essentially shut down for some. Gone are the days of setting your watch to light afternoon rainstorms; high-intensity weather patterns are increasingly likely to become the norm.

WIKIMEDIA COMMONS

Hurricane Irma should have been a wake-up call for Miami residents.

Adaptation to unknown environmental conditions can be intimidating and overwhelming, especially in the absence of information. Progress can start now; solutions to resilience are by definition incremental, and prevention of loss of life and property can start today. To build more resilient communities in the face of unknown and likely intense climate challenges, the panel recommends the city of Miami create an engagement strategy that includes all segments of the population equitably.

People Support What They Are Invested In

Public participation can seem like a hindrance at times, especially in today's modern era of soundbite everything. Today, practitioners expect information to be easily digestible, surveys to be entertaining, and public attendance to be a media event that triggers jealousy from our peers for not attending. However, that is not how democracy works at the local level—or ever should—local governments can inform and engage their citizens in ways that can lead to more immediate impacts on their lives than they could expect on a state or federal level.

The panel believes that the city of Miami needs to be clear on its definition of resilience—how it affects different communities in the same city—and understand what actionable protection measures the community can take starting today. The panel sees enhanced education as a critical approach to economic and social resilience before a major weather event occurrence, as noted in the Resilient305 strategy.

The flow of information cannot occur in one direction. Information needs to flow between citizens, government staff and officials, local organizations, advocacy groups, and businesses. The panel recommends establishing a facilitator framework between city and residents that is further supported with partner organizations, institutions, and corporations to inform, educate, and be prepared when

LESSONS FROM ARLINGTON COUNTY, VIRGINIA: COMMUNITY ENGAGEMENT BEST PRACTICES

Like many municipalities, Arlington County, Virginia, prioritizes gathering and engaging with the greater community to provide perspectives and ideas on community development projects. The PLACE initiative, which stands for Participation Leadership and Civic Engagement, is the county's approach to expand and better its ways of engaging with residents.

PLACE's approach focuses on doing the following:

- Offering regular engagement training sessions for residents, commissioners, and staff;
- Constantly finding new ways to encourage thoughtful and constructive residents to engage in a persistent way;
- Creating and updating a community map that captures the county's groups, leagues, organizations, and other entities;
- Having ongoing community-wide conversations to energize civic decision-making processes;
- Understanding and clearly sharing each sector's roles and how they are related to civic well-being; and
- Aligning staff work streams with building effective civic engagement.

To learn more about PLACE and Arlington County's engagement strategies, visit the Engage Arlington website at https://topics.arlingtonva.us/engage.

a disaster strikes. A communication system that bridges conversations between community and government, like the Neighborhood Enhancement Team (NET), meets people where they are and can link the many organizations already doing great work. NET's physical presence in neighborhoods makes it ideal to act as a resilience hub for community-driven solutions, actions, and leadership to coordinate resources before, during, and after a storm. Community resources can intertwine efforts that already exist among Miami's organizations and could include the following, among others:

- Catalyst Miami, a nonprofit organization focused on improving health and economic opportunity in low-wealth communities in Miami-Dade County, pioneered the Clear Program, a 12-week training program on climate resilience that provides graduates with grounding to become community leaders and organizers.
- The Frost Science Museum's Volunteers for the Environment partnered with the county's Department of Environmental Resource Management to educate community members about the many benefits of living shorelines and inspires volunteers to help restore natural habitats along their waterfronts.
- Local organizations such as the American Institute of Architects (AIA) provide certification programs for volunteers to serve in disaster areas to assess damage and recommend ways for residents to rebuild.

In addition, local universities, like Florida International University (FIU), are partnering with climate change–focused institutions like the CLEO Institute and FIU's Sea Level Solutions Center to host events, such as the annual Empowering Capable Climate Communicators Symposium, that further prepare the community on the impacts of climate change through targeted trainings and facilitated sessions.

This list is not exhaustive. Numerous advocates and organizations are ready, willing, and able to share with and serve their neighbors. Proactive preparation and visioning efforts with these groups will go a long way.

People Are More Important Than Real Estate

Resilience to climate change impacts comes in many forms. Miami's priority should remain its people. A government resilience framework needs to prepare its citizens before, during, and after a storm with conversations that address issues of public health.

Sadly, the storm-preparedness and resilience of a residential building often relies on the wealth of its residents. Poor mechanical, electrical, and plumbing systems break down during storm events in lower-wealth neighborhoods and the impacts last longer, threatening public health.

The panel recommends the chief resilience officer develop a cohesive resident resilience strategy that is built both bottom up and top down to ensure the needs of people are met in ways effective to them and in conjunction with this panel's recommended government facilitation network. The recently published Resilient305 strategy is a step in this direction. The panel also recommends that the government facilitation team work directly with resilience hubs to provide resources to

residents before, during, and after a weather event, with year-round access.

The panel further recommends equipping and procuring emergency services that are able to access neighborhoods vulnerable to high floods and winds during a weather event. Hospitals and neighborhood resilience hubs, as mentioned in the Resilient305 strategy, need to be prepared for worst-case disaster and in an equitable way so all residents in all of Miami's structures can stay warm, safe, and dry. Building systems in vulnerable neighborhoods that do not meet Miami's future top-notch code should be identified and prioritized for storm protection using some of the finance methods laid out earlier by this panel. Not all solutions cost money; often knowledge sharing is the best first step. For instance, property management best practices can be shared and distributed regardless of resident income.

Civic Engagement and Advocacy

The panel recognizes that needs like affordable housing, job attainment and opportunity, and food access are of the utmost importance because many residents will choose to advocate for solutions to daily needs rather than for resilient infrastructure development necessary for when natural disaster strikes. That is why the panel worked to make recommendations that tie climate change to these pressing concerns, similar to the way the new Resilient305 strategy does.

The panel recognizes that the downtown district is the front line of storm defense but that inland neighborhoods usually suffer limited access to electricity, sanitary water, and transportation longer. The government facilitation network prioritizes and ensures equitable access to information and resources involving not only environmental resilience but also social and economic resilience. By tying immediate needs to the needs when a disaster strikes, engaging a broader community in the conversation becomes easier, as does bringing Miami together for the future. Communities with stronger social networks have higher rates of resilience and wealth.

Transparency, Predictability, and Accountability Are Key Leadership Traits

Greater Miami should adopt a holistic resilience strategy, specific to Miami's downtown, that takes into account the intertwined social, economic, and environmental impacts.

A systems-focused way of thinking will be the most effective model for shared leadership between community advocates and local officials to ensure impacts are made where they are needed most. Trust among stakeholders will be critical, and it is important to remember that trust is difficult to build but easy to break. A government framework that builds trust with organizations will be better positioned through already existing familiarity. Implementing an effective and ongoing resilience strategy will require the city of Miami to build and maintain public trust, which will require in equal measure transparency, predictability, and accountability.

The digital revolution has brought a level of broader transparency than ever available before. Although not everyone has access to a personal device, digital access can be provided by community-based organizations, including the neighborhood Resilience Hubs. Information shared online and in person travels faster than ever before—this is true for both accurate and inaccurate information. To avoid the spread of misinformation that occurs when a communication vacuum exists, the sponsor will need to prioritize the dissemination of fact-based communication and marry it with community events and storytelling to ensure the message is heard and understood. NET's system of connecting community ideas and opinions to city staff and officials to effect change can be expanded through the use of software like New York City's 311 service request map. (For more information, visit www.ny.gov/agencies/nyc-311.)

The panel also recommends that the sponsor explore crowdfunding/crowdsourcing platforms for organizations in need of time, money, and materials that can be used for community greening and resilience projects. Regular attendance at local meetings of neighborhood associations and a specific resilience newsletter, like one identified in the Resilient305 strategy, that is available to all of Miami will help fill in communication gaps.

The trust required to meet Miami's resilience challenge will also require predictability. Knowing when a conversation will occur makes participation easier for a person or an organization. Being part of the conversation and seeing one's ideas implemented will bring the personal investment necessary to support an effort as large as this, which is only as strong as its weakest link. Being resilient requires adaptability. Predictability of process will ensure a fairness that Miami is working together. The panel recommends a government facilitation team—both online and offline—as an excellent resource to notify residents, organizations, and businesses of the next requests for information, events to connect ideas and people, and opportunities to build on existing resources to meet

the challenge. Building predictable events within communities will ensure a broader representation and understanding that will equate to more equitable sharing of resources to meet and recover from natural disaster when it strikes.

Establishing Implementation Metrics

A resilient Miami cannot happen or evolve without accountability among so many different organizations, agencies, and stakeholders. Collaboration in all aspects is crucial to meeting and adapting to climate change impacts, and keeping multiple stakeholders accountable will require a transparent and predictable road map that clearly states roles, responsibilities, and time frames available to every person in Miami. The panel recommends metrics be set and measured and remeasured to ensure the effectiveness of the solutions proposed today for all Miamians, because what gets measured gets made.

The Recommendation Road Map

The panel strongly believes that the city of Miami has an opportunity to take steps toward enhancing the resilience of its waterfront through the Baywalk and the Riverwalk, and greater downtown area, now. To take full advantage of the momentum created by the various initiatives and programs dedicated to enhancing Miami's resilience, the panel recommends following the action plan set forth in the table to ensure all residents have a profitable and increased quality of life for many years to come.

Recommended Next Steps of Larger Action Plan

	Policy	Design	Finance
Short range/immediate	Begin update of the Miami Downtown Master Plan and conduct a plan audit to ensure comprehensiveness. *Key players:* Miami DDA, city of Miami	Update zoning and building codes to incorporate resilience principles and meet minimums that the real estate market has already set as a baseline. *Key player:* City of Miami	Create a place-based organization or conservancy to facilitate private investment and management for the urban waterfronts.
	Strengthen community preparedness in vulnerable locations with emergency management and other community partners. *Key players:* City of Miami, Miami Emergency Management, Resilience Hubs, local stakeholders and residents	Refine and adopt the Miami Baywalk and Riverwalk Draft Design Guidelines with resilience concepts. *Key players:* Miami DDA, city of Miami	Designate a resilient investment leader.
	Draft an evolving list of preparedness resources on the city website, including NET locations and contact information, and formalize informative sessions to enhance public education before an event occurs. *Key players:* Resilience Hubs, city of Miami, Miami DDA, NETs	Revise design guidelines for the riverfront to allow boat access, incorporate an ecological wall along the bulkhead, and grade up to BFE. *Key players:* Miami DDA, city of Miami	Identify funding uses for executing a holistic resilience vision and create a transparent checklist and communications. *Key players:* City of Miami, Miami DDA, resilient investment leader
	Support transit planning with land use policy in terms of increased density within transit stations and mixed-use and commercial activity. *Key player:* City of Miami	Engage with key agencies to build the case for living shorelines. *Key players:* Miami DDA, city of Miami, Miami-Dade County, Department of Environmental Resources Management (DERM) and other related agencies, nonprofits	Explore resilience finance tools that leverage the real estate market like TOD rezoning, TIFs, and TDD. *Key players:* City of Miami, Miami DDA, resilient investment leader
		Extend Baywalk guidelines from back of seawall to Riverwalk, but consider solutions on the seawall that encourage habitat formation like eco-concrete and living shelves. *Key player:* Miami DDA	Select a specific source, or sources, of dedicated long-term funding beyond the Miami Forever bond. *Key players:* City of Miami, Miami DDA, resilient investment leader

Source: ULI.

Recommended Next Steps of Larger Action Plan

	Policy	Design	Finance
Short range/immediate		Install green infrastructure throughout vulnerable neighborhoods adjacent to the Miami River. *Key player:* City of Miami	
		Actively engage with the USACE Back Bay Study and search for ways to enhance functional design so it represents the iconic Miami style. *Key players:* City of Miami, Miami DDA, residents and stakeholders	
		Reach out to potential partners and design demonstration projects such as the Living Shoreline Demonstration Project. *Key players:* Miami DDA, city of Miami, DERM and other related agencies, Frost Science Museum	
Medium range	Adopt master plan document that incorporates resilience as a key element to guide land use planning for downtown and the waterfront. *Key players:* City of Miami, Miami DDA	Test typologies and implement demonstration project. *Key players:* Miami DDA, city of Miami, Miami-Dade County, DERM and other related agencies, nonprofits	Approve a diversified financing tool set and start to collect funds to pay for recommendations. *Key players:* City of Miami, DDA, resilient investment leader
	Preserve existing affordable housing and create incentives for new affordable housing in identified TOD zones. *Key player:* City of Miami	Depending on the results of the Back Bay Study, harness and begin promoting the tidal gate plan as a highly visible, beautiful icon and working with USACE to prioritize its iconic status. *Key player:* City of Miami	Use identified tools to facilitate residential and commercial development in designated TOD areas along the ridge. *Key players:* City of Miami, Miami DDA, private development community
	Approve incoming TOD and affordable housing development project along the ridge. *Key player:* City of Miami		
Long range	Continue to develop higher-density mixed-use and commercial projects along the ridge. *Key players:* City of Miami, private development community	Implement USACE tidal gate project with feedback from community. *Key players:* USACE, city of Miami	Focus on continued success in the capital markets to attract dollars and retain talent. *Key players:* City of Miami, resilient investment leader
	Reevaluate and update plans and design guidelines according to status of resilience efforts and updated forecasts and projections for sea-level rise and associated data. *Key players:* City of Miami, Miami DDA		

Source: ULI.


CITY OF MIAMI

Conclusion

MIAMI HAS THE OPPORTUNITY TO LEAD the national conversation about building resilient communities. By working together, the city stakeholders can make Miami a leader in this area. As the sponsors noted, Miami's waterfronts are the city's first line of defense from the impacts of sea-level rise, storm surge, and other water-related issues. To address the resilience of Miami's waterfronts, including human and built assets, the panel recommends a holistic approach that includes similar design guidelines for the bayfront and riverfront as well as planning that promotes transit-oriented development along the city's ridge. The panel also identified a need to update and expand the Downtown Miami Master Plan, making it a framework document that can incorporate past plans and studies and provide a broader vision for downtown with a resilience focus.

Converting plans to action, however, often requires funding. The panel believes a strong case exists for a range of investors to engage in building the resilience of Miami's waterfronts, given existing challenges and climate forecasts that indicate continued and growing risks. Several funding mechanisms and tools support and incentivize infrastructure improvements, and the panel sees this as an opportunity for Miami to set an example for other cities around the country.

Many people, businesses, and families for whom waterfront resilience is critical have invested in Miami as their place of business or home. As the sponsors begin to take real action toward a more resilient Miami waterfront, they must keep in mind that proactive stakeholder engagement, transparency, and predictability of process are necessary in implementing the panel's recommendations. Change may be incremental, but it has the potential to be lasting and transformational for Miamians. Miami cannot afford to wait to take action. The panel's recommendations offer a holistic approach to enhancing resilience in the downtown and greater Miami area to encourage continued economic growth and vibrancy in the Magic City.

About the Panel

Ladd Keith

Panel Chair
Tuscon, Arizona

Keith is chair of the Sustainable Built Environments Program and will transition from lecturer to assistant professor in planning at the University of Arizona in 2019. He researches policy innovation in urban planning practice, including the use of climate science in the planning and design of cities. He is a research affiliate of CLIMAS (Climate Assessment for the Southwest) and on the advisory team of CCASS (Center for Climate Adaptation Science and Solutions).

He is currently the principal investigator of a NOAA-funded research project evaluating the use of urban heat maps in urban planning and is co-investigator on a project creating community climate profiles tailored to community needs. He also leads the Sustainable Built Environments degree program and teaches Public Participation and Dispute Resolution and Planning for Urban Resilience.

Keith has led the development and analysis of planning policies at the local level, including land use and development regulations, comprehensive plans, hazard mitigation plans, and climate action plans. He recently completed a full eight-year term on the city of Tucson's Planning Commission and as chair led the commission's public participation process for Plan Tucson: General and Sustainability Plan, which guides the city's long-range planning.

An active member of the Urban Land Institute, he has served on the Sustainable Development Council and was a founding member of the Center for Sustainability and Economic Performance Advisory Board. In 2016, he was recognized as one of the ULI's 40 under 40, which represent the best young land use professionals from around the globe, as selected by members of ULI. He is also an active member of the American Planning Association and serves as an academic liaison for the Arizona Chapter.

Michelle Beaman Chang

Panel Vice Chair
Washington, D.C.

After 15 years in real estate development, Chang is founder and chief executive officer of Imby Community, a hybrid grassroots/digital platform that bridges conversations between community members and real estate developers.

Originally from Kansas City, she moved to Philadelphia where she joined a boutique real estate development firm and worked on projects like a Robert Venturi–designed condominium and the Curtis Institute of Music's Lenfest Hall. Her passion for social justice intersected with global forces to land a role developing affordable housing in New York City for Catholic Charities in 2008. She later moved to Washington, D.C., where she developed affordable, mixed-income, and historic preservation projects for AHC Inc., spent a "gap year" at home with two kids under three, and then joined Vornado/Charles E. Smith to develop on their multifamily team. It was while at Vornado that she became frustrated with the lack of engagement tools that could genuinely and effectively reach a larger audience of people who are busy but civically inclined and want to participate in real estate development conversations in their communities.

As a result, Chang founded Imby Community to focus on early, nonconfrontational communication from a neighborhood perspective that flips the paradigm to make it easier for real estate developers to understand and manage predevelopment risk while accessing ideas and opinions they can implement in their building design and program to build support and meet hyperlocal demand. The platform just wrapped its beta in four D.C. neighborhoods and is gearing up for a fall 2019 full-scale launch.

Jason Bonnet

San Francisco, California

In his current role as vice president of development at Brookfield Properties' San Francisco office (previously vice president of development for Forest City Realty Trust), Bonnet

oversees the 5M project in the SoMa neighborhood—$1 billion-plus mixed-use development over four acres—and leads all vertical residential development for the over $3 billion Pier 70 waterfront district, entitled for 2,000 residential units. He was previously in the Washington, D.C., office where he led multiple projects in the phase 1 development of the Yards, about 1,000 multifamily units and over 150,000 square feet of retail space, as well as hotel and condominium uses. At completion, the Yards will be a $2 billion vibrant waterfront district located over 48 acres.

Bonnet relocated back to Washington, D.C., to join the then Forest City after obtaining a master's in real estate development at the University of Southern California. Before USC, he founded a real estate development firm to pursue opportunities in revitalization projects that supported and promoted urban renewal within D.C. communities. During his career, Bonnet has directed development projects from inception to completion with responsibilities spanning entitlements, financing, design, construction management, marketing, and sales and leasing for numerous projects. He obtained his bachelor's degree from the University of North Carolina at Chapel Hill.

Samia Byrd

Springfield, Virginia

A native of Hampton, Virginia, Byrd has been a resident of Fairfax County since 1995. She has more than 20 years of experience in urban planning, housing, and community economic development in the public, private, and nonprofit sectors. She is a deputy county manager for Arlington County where her portfolio includes the Department of Community Planning Housing and Development, which comprises the county's Planning, Housing, Neighborhood Services, Historic Preservation, Zoning, and Inspection Services divisions. She is also liaison to the County Board on behalf of the County Manager.

Before this position she served as a principal planner in Arlington County's Planning Division. She has managed and facilitated the review of several notable complex, multifaceted, development proposals and, having served as both site plan and use permit coordinator, she was instrumental in providing oversight of and managing the county's special exception land use and development review processes. Her work as a planner for Arlington County builds upon her career providing consulting expertise, research, and information to state and local practitioners on housing and community economic development policy, practices, and programs. Before joining the county, Byrd served for more than eight years as a manager with affordable housing management consulting firm Quadel Consulting. She also was director of state fiscal analysis and policy for the National Council of Nonprofit Associations and as a research associate with the Urban Land Institute.

Byrd holds both a bachelor's degree and master of city planning from the University of Virginia and Georgia Institute of Technology, respectively. She is an alumna of the ULI Regional Land Use Leadership Institute and received her Certification of Public Management from the George Washington University/ Metropolitan Washington Council of Governments. She is an active member of the Urban Land Institute and the Martin Luther King Jr. Memorial Planning Committee in the city of Alexandria, Virginia.

John Macomber

Cambridge, Massachusetts

Macomber is a senior lecturer in the Finance unit at Harvard Business School (HBS). His professional background includes leadership of real estate, construction, and information technology businesses. At HBS, his work focuses on the urban impacts of private finance and delivery of public infrastructure projects in both the developed and emerging worlds. These include transportation, energy, water/sanitation, and real estate investments that speed economic development, reduce environmental impacts (notably air and water pollution), and facilitate individual opportunity. His teaching combines infrastructure finance (including public/private partnerships), economic development, and urban planning as well as the impact of new technologies.

Macomber is engaged in the Business and Environment Initiative and Social Enterprise Initiatives at HBS and is a member of the Executive Committee of the Harvard University

Center for African Studies. He teaches finance, real estate, urbanization, and entrepreneurship courses in the elective curriculum and in Executive Education. He is the former chairman and chief executive officer of the George BH Macomber Company, a large regional general contractor, and remains a principal in several real estate partnerships. He serves or has served on the boards of Young Presidents Organization International, Boston Private Bank, Mount Auburn Hospital, and the WGBH Educational Foundation.

Michael Rodriguez

Washington, D.C.

Rodriguez is the leader for market research and insights for the Mid-Atlantic Region of CBRE Inc. As the region's thought leader on market trends, economics, and data, he works closely with CBRE's research and marketing teams across all real estate asset types.

He has experience and expertise in the field of urban research, specializing in real estate, land use, and transportation economics and analysis. His broad professional background in real estate and infrastructure includes being a consultant to the World Bank's transport group; advising dozens of cities throughout the United States on real estate, housing, and transportation issues; and leading major reports for regional agencies like the Washington Area Metropolitan Transit Authority and the Regional Plan Association. He is also co-author of nationally recognized publications on walkability and real estate, including *Foot Traffic Ahead 2016* and *WalkUP, Wake-Up Call: New York*.

In addition, Rodriguez serves as visiting director of research at Smart Growth America and led the development of a nationally leading fiscal impact of development model for state and local governments. He is a member of the Urban Land Institute and previously served on an Advisory Services panel for Commerce City, Colorado, in 2018. He is a PhD dissertator in urban policy at the George Washington University Trachtenberg School and holds a joint MPA and an MS in urban and regional planning from the University of Wisconsin–Madison La Follette School.

Susannah Ross

Boston, Massachusetts

Ross is an independent licensed landscape architect who recently practiced for 16 years at Sasaki. There she managed projects from master planning through construction administration, including transformational urban projects such as Schenley Plaza, the Ithaca Commons Redesign, and the Council Bluffs, Iowa, riverfront. She was also the coordinator for the landscape architecture discipline, overseeing staff recruitment, hiring, and development, and a member of the Technical Quality Control Committee, playing an active role in ensuring that Sasaki's work met the highest standards of landscape design and documentation.

Ross is currently working as the project manager for the team led by Agency Landscape + Planning and Sasaki that is designing the 53-acre Sarasota Bayfront Park in Florida. The project client, the Bay Park Conservancy, is working to create a legacy, iconic, and aspirational park for all citizens and visitors to Sarasota and the west coast of Florida, one that will serve as a model for environmental sustainability and flood resilience.

Passionate about the design of public open spaces in urban settings, Ross enjoys exploring the potential of landscape design to enrich the daily life, health, and well-being of both city dwellers and urban ecology, as well as to shape the core identity of a city. She welcomes the challenge of designing to meet the needs of a diverse set of interests in a complex physical context.

She received a master of landscape architecture and a BA in anthropology from Harvard University. She is currently on the board of directors for the Cultural Landscape Foundation and previously served on the board of directors for the Salt Center for Documentary Studies.

Matt Steenhoek

Washington, D.C.

Steenhoek joined PN Hoffman & Associates in 2005 and is currently a vice president of development for PN Hoffman and the project director for phase 2 of the Wharf, a 3.2 million-

square-foot redevelopment in Southwest Washington, D.C. His primary responsibilities include the management of the building design, transportation, sustainability, urban design, public financing, and local entitlement components of the Wharf.

Before his involvement on the Wharf, Steenhoek was PN Hoffman's development manager for Constitution Square, a 1.6 million-square-foot LEED-ND Gold certified mixed-use project in NoMa, seeing the project from master planning through to construction completion. He has also completed developments in Alexandria, Virginia, and the Kalorama neighborhood of Washington, D.C.

Steenhoek received his BS in architecture from the University of Maryland, is a graduate of the 2012 Urban Land Institute Regional Leadership Institute, and holds a master of urban and regional planning degree from Virginia Polytechnic Institute. He is a LEED Accredited Professional and member of the Anacostia Watershed Steering Committee.

Byron Stigge

New York, New York

Stigge is the founder of Level Infrastructure, an engineering and sustainability consulting firm based in New York City. Level's specialism is sustainable urban infrastructure design planning and its work ranges from master plans to new city plans to legislation and policy. Recently Level has worked in New York, Boston, Portland, Kabul, Manila, and Jakarta to develop resilience strategies for waterfront districts. The firm's collaborative approach seeks technical solutions that achieve the social, environmental, and financial goals of its clients.

Stigge has lectured and taught at Harvard, Columbia, MIT, Yale, Washington University in St. Louis, and Cornell. He has engineering degrees from Washington University in St. Louis and MIT and a planning degree from Harvard Graduate School of Design. He is the coauthor of *Infrastructural Ecologies* published by MIT Press in 2016.

Jay Valgora

New York, New York

Valgora's Manhattan-based practice, STUDIO V Architecture, is dedicated to the reinvention of the contemporary city. The studio addresses multiple themes in its designs, including transforming waterfronts, creating radical adaptive use, and experimenting in innovative structures through fabrication. STUDIO V has designed an extraordinary range of work advancing these issues.

Valgora has 30 years of experience in multiple disciplines including architecture, urban design, and industrial design. He earned a master of architecture from Harvard and a bachelor of architecture from Cornell University and was a Fulbright Fellow to the United Kingdom where he began his studies of reinventing former industrial waterfronts for London's Canary Wharf. He is expanding his work on the waterfront with his recent appointment by the NYC mayor to the Waterfront Management Advisory Board, which is tasked with rewriting the city's next comprehensive waterfront plan for 2020–2030.

Along with this appointment, Valgora is launching and leading the Waterfront Initiative at the AIA New York Chapter, which will bridge the gap between the design community and the city. He has recently been appointed as an Urban Design Fellow for the Urban Design Forum. Finally, Valgora is heavily involved with the Urban Land Institute, serving on ULI New York's Advisory Board as well as its Infrastructure Council.

Valgora's work has received numerous awards, including national, state, and local AIA awards, International Design Award, Architizer A+ Awards, among many others. His work has been featured in numerous publications including the *New York Times*, *Fast Company*, *Architectural Record*, *Dwell*, the *Wall Street Journal*, and *New York* magazine. He is currently completing a book on the contemporary transformation of cities titled *Last Utopia*.

Urban Land Institute
2001 L Street, NW
Suite 200
Washington, DC 20036-4948
uli.org