MIAMIBEACH

Sustainability Resiliency Committee Meeting
Commission Chamber
June 20, 2018 - 1:00 PM
Commissioner Micky Steinberg, Chair
Commissioner John Elizabeth Aleman, Vice-Chair
Commissioner Ricky Arriola, Member
Commissioner Mark Samuelian, Alternate
Elizabeth Wheaton, Liaison

COMMISSION REFERRALS

1. DISCUSSION ON THE HISTORY OF STORMWATER PLANS
   Public Works
   Roy Coley, Public Works Director
   Item C4I - June 06, 2018 Commission Meeting
2. REVIEW OF THE NEIGHBORHOOD IMPROVEMENT PROJECT SEQUENCING
   Commissioner Mark Samuelian
   Roy Coley, Public Works Director
   Item C4L - June 06, 2018 Commission Meeting
3. DISCUSSION REGARDING CITY OF MIAMI BEACH STREET RAISING RESILIENCY POLICY AND POTENTIAL ALTERNATIVES
   Commissioner Mark Samuelian
   Roy Coley, Public Works Director
   Item R9L - June 06, 2018 Commission Meeting
4. DISCUSSION TO EXPLORE NEW FEDERAL FUNDING FROM FEMA FOR SEA LEVEL RISE MITIGATION
   Commissioner Mark Samuelian
   Judy Hoanshelt, Grants Management Division Director
   Item C4H - June 06, 2018 Commission Meeting
5. DISCUSSION ON REPURPOSING OUR GOLF COURSES FOR THE FUTURE
   Commissioner Ricky Arriola
   John Rebar, Parks and Recreation Director
   Item C4 AB - May 16, 2018 Commission Meeting

URBAN LAND INSITUTE

6. DISCUSSION ON URBAN LAND INSTITUTE (ULI) REPORT RECOMMENDATIONS
   Office of the City Manager
   Susanne Torriente, Assistant City Manager

HARVARD GRADUATE SCHOOL OF DESIGN

7. DISCUSSION ON RECOMMENDATIONS FROM THE HARVARD GRADUATE SCHOOL OF DESIGN STUDY
   Office of the City Manager
   Susanne Torriente, Assistant City Manager

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION ON THE HISTORY OF STORMWATER PLANS**

RESPONSIBLE DEPARTMENT:
Roy Coley, Public Works Director

LEGISLATIVE TRACKING:
Item C4I - June 06, 2018 Commission Meeting

SPONSORED:
Public Works

Analysis
Presentation at Committee Meeting

ATTACHMENTS:

	Description	Type
🗋	Attachment A: Commission Referral	Other

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Jimmy L. Morales, City Manager
DATE: June 6, 2018

SUBJECT: REFERRAL TO THE JUNE 20, 2018 SUSTAINABILITY AND RESILIENCY COMMITTEE TO DISCUSS THE HISTORY OF STORMWATER PLANS.

ANALYSIS

The City has an extensive history of mitigating flooding. A 30 year history will be presented of the efforts to coexist and adapt to the challenges of living in close proximity to sea level. This in-depth historical record dates back to 1992 detailing the activity related to the City's flooding mitigation strategies and stormwater improvement efforts which have recently included the effects of sea level rise.

Legislative Tracking
Public Works

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **REVIEW OF THE NEIGHBORHOOD IMPROVEMENT PROJECT SEQUENCING**

RESPONSIBLE DEPARTMENT:
Roy Coley, Public Works Director

LEGISLATIVE TRACKING:
Item C4L - June 06, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

Analysis
Presentation at Committee Meeting

UPDATE:
Supplemental Material Updated on 06/19/18.

ATTACHMENTS:

	Description	Type
🗋	Attachment A: Commission Referral	Other
🗋	Attachment B: Project Sequencing Gantt Chart	Other

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Commissioner Mark Samuelian
DATE: June 6, 2018

SUBJECT: REFERRAL TO THE SUSTAINABILITY AND RESILIENCY COMMITTEE TO REVIEW THE NEIGHBORHOOD IMPROVEMENT PROJECT SEQUENCING.

ANALYSIS

During the May 16th Commission Meeting discussion on item R7 O (see relevant section in the minutes attached), the Commission asked the administration to take steps to bring forward the next planned Neighborhood Resiliency Project as per the Master Plan. The current Commission has not reviewed the Master Project Plan and so the Committee should discuss priorities, decision criteria (eg. current flooding, community receptiveness, etc) and next steps.

Legislative Tracking
Commissioner Mark Samuelian

ATTACHMENTS:

Description

- After Action Report on May Commission Item R7 O

11:42:56 a.m.

R7 O ~~A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, ACCEPTING THE RECOMMENDATION OF THE CITY MANAGER, PURSUANT TO REQUEST FOR PROPOSALS (RFP) NO. 2016-166-KB, FOR DESIGN/BUILD SERVICES FOR RIGHT-OF-WAY INFRASTRUCTURE IMPROVEMENT PROGRAM FOR NEIGHBORHOOD NO. 5 LA GORCE, AWARDING THE GROUP 3 - NORTH AREA, TO DAVID MANCINI AND SONS INC., WITH THE TOTAL CONTRACT PRICE IN THE AMOUNT OF $24,002,128; AND AUTHORIZING A TEN PERCENT (10%) OWNER'S CONTINGENCY FOR THE GROUP 3 - NORTH AREA WORK IN THE AMOUNT OF $2,400,213; AND FURTHER AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE A DESIGN BUILD AGREEMENT.~~

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, REJECTING ALL BIDS RECEIVED, PURSUANT TO REQUEST FOR PROPOSALS (RFP) NO. 2016-166-KB FOR DESIGN/BUILD SERVICES FOR RIGHT-OF-WAY INFRASTRUCTURE IMPROVEMENT PROGRAM FOR NEIGHBORHOOD NO. 5 LA GORCE; AND DIRECTING THE ADMINISTRATION TO REISSUE A NEW REQUEST FOR PROPOSALS FOR THE PROJECT.

Public Works/Procurement

ACTION: Resolution 2018-30312 adopted. Item separated by Mayor Gelber and heard in conjunction with C4 O. Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Alemán and Arriola. See motions below and direction. **Roy Coley and Alex Denis to handle.**

MOTION 1:
Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Arriola and Alemán.

MOTION 2:
Motion made by Commissioner Alemán to refer the Resolution regarding the undergrounding for North Bay Road and Alton Road to the Neighborhood/Community Affairs Committee; seconded by Commissioner Rosen Gonzalez. Voice vote: 7-0. **Kathie G. Brooks to place on Committee agenda. Roy Coley and Alex Denis to handle.**

MOTION ON NEW ITEM:
Motion made by Commissioner Alemán to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Vice-Mayor Steinberg. Voice vote: 4-3. Opposed: Commissioners Góngora, Rosen Gonzalez, and Samuelian. **Roy Coley and Alex Denis to handle.**

City Clerk's Note: On May 20, 2018, Commissioner Góngora requested via email that the after-action reflect that he did not vote as he intended on the motion on the "new item." Commissioner Góngora stated that he was away from the dais when the initial discussion on this item occurred, and as a result voted incorrectly.

REFERRAL:
Neighborhood/Community Affairs Committee to discuss undergrounding for North Bay and Alton Road.

Commissioner Samuelian expressed his desire for some thoughtful discussion on this item.

Mayor Gelber explained that there is a motion to discuss this item at the Finance and Citywide Projects Committee and simultaneously there is an award to the RFP that the City Commission must choose, as it cannot do both. He asked Mr. Coley to introduce the issue to inform the public better on the matter.

Roy Coley, Public Works Director, explained that this is an award of a comprehensive neighborhood improvement project, which is part of the La Gorce Neighborhood Project from 59th Street to 63rd Street on upper North Bay Road. The project includes the replacement of the drinking water system, the waste water system, installing new storm water systems for rainfall, elevating the roads to mitigate against sea level rise, and installing new lighting systems. The reason for the time sensitivity is that the Florida Department of Transportation has a project scheduled that will range from Michigan Avenue to 63rd Street on Alton Road taking place between 2021 and 2023. It is his opinion that the City should not have this area under construction during that time because North Bay Road will be an alternate means to traverse traffic. Time is of the essence. He is asking the City Commission to consider enhancing the blue and green infrastructure in all the City's projects as indicated in the Urban Land Institute (ULI) and Harvard studies.

Mayor Gelber asked Mr. Coley to explain the meaning of blue and green infrastructure.

Mr. Coley explained that there are typically three types of infrastructure: gray, blue, and green. Gray is considered engineered structures such as pipes, pumps, and roads. Green is considered vegetation such as grass areas, trees, and things of that nature. Blue are holding ponds, reservoirs, and possibly wet lands. The two studies suggested the City add more of the green and blue areas, yet the contractors were asked to respond to a design criteria that did not include these enhancements. Currently, the City is in a cone of silence with this process. They do not have the ability to go to the potential awardee and ask them for proposals and pricing and how they would enhance blue and green infrastructure hence why they recommend the City approve an award to allow the contractors to be notified to proceed with only the design. After that, the City can then request the contractor with the enhancement costs of blue and green infrastructure enhancements. The City Commission would give the final approval on the designs.

City Attorney Aguila asked Mr. Coley whether his statement was consistent with the City Manager's recommendation in the package to award Group 3.

Mr. Coley stated that awarding Group 3 is an amendment to the City Manager's recommendation to authorize only notice to proceed for design only, and then return to the City Commission for approval.

City Attorney Aguila asked Mr. Coley whether he was amending the City Manager's recommendation on the floor during this meeting.

Mr. Coley answered in the affirmative that he is in fact amending the City Manager's recommendation. He explained that without the amendment, the City could not engage with the contractor due to the cone of silence. The addition of blue and green infrastructure will affect the overall design of the project, it is important that they discuss this with the contractor.

Commissioner Rosen Gonzalez asked whether it would be better to get the blue and green infrastructure design and then award the contract.

Mr. Coley explained that if the City were to take that approach, the project would have to be restarted from the beginning. A great deal of time would be lost.

Commissioner Rosen Gonzalez stated that this is very stressful for Commissioners. Several residents have shared photos with her of streets and businesses being completely flooded. Many residents believe they are worse off now than before. Some are even threatening to sue the City. She is now seeing the Administration rushing ahead with this project when it should pause. She addressed Mayor Gelber and asked him to lead and get a red team to fix this problem. Not all neighborhoods are in bad shape, Sunset Islands I, II, III, and IV are doing fine after the City did its resiliency project, and that is because the City did not raise the roads. She asked the Mayor and City Manager to put a six-month pause on this project.

City Manager Morales expressed his hope that the Administration receives clear direction from the City Commission on this matter. This item was deferred from last month. In fact, The City Commission could have been issuing an RFP for the entire three areas. The City is now focusing on the lowest area, which has the most need for flood protection. There needs to be a decision made today, he believes the City's commitment to move forward on this project is important.

Commissioner Samuelian stated that the red team and ULI had a lengthy discussion about undergrounding in this neighborhood. He asked how the undergrounding would affect the RFP.

Mr. Coley replied that in his opinion, if the undergrounding were to begin today the undergrounding project would take approximately seven to eight years.

Commissioner Samuelian asked whether the RFP included any undergrounding provisions.

Mr. Coley stated that undergrounding utilities is not part of this project.

Commissioner Góngora stated that it is unusual to have a City Manager recommendation modified and amended on the floor during a meeting. He is having serious concerns about the increase in road heights. Residents do not seem to have confidence in this project. He is also concerned about pausing this project, because it will not get them to a final destination. The City Commission needs to decide as to what it is going to do. He would like significant undergrounding work to take place, improve pipes, and avoid future flooding.

Mayor Gelber stated that this RFP only implicates North Bay Road. He asked members of the public who want to speak on the subject to approach the podium.

Alex Heckler, on behalf of David Mancini, spoke in favor of supporting the recommendation of this item. Group 3 is at the lowest level of elevation and in the most need of drainage, water, and wastewater. There has been much misinformation going around and designs are not modeled on modern designs. Both the ULI and Harvard studies recommended that the City not stop.

Sid Feltenstein read the Harvard study and attended the ULI session. He believes both studies were critical of the City, as they believe Miami Beach does not have a plan to live with water. The City needs a plan to know what enhanced green space will do. A model needs to be created and then financed. He cannot imagine going forward without this information. He shared a maxim he uses in his line of work: “If you don’t know where you are going, any road will get you there.”

Jaime Robinson, lifelong Miami Beach resident, highlighted the deficiencies in planning the Hibiscus project. This project taking place on North Bay Road is now experiencing the same problem. She wants the money earmarked for this neighborhood to be provided to this neighborhood.

Jane Kahn Jacobs, lifelong Miami Beach resident, stated that she expects the elected officials to listen to experts in the field. This is not the time to vote on awarding contracts. She wants a review of the storm water and other corroded pipes. She urged the City Commission to study the Harvard report.

Joy Malakoff stated that she served four years on the City blue ribbon panel ex-officio on sea level rise. She believes she is knowledgeable on the subject. She lives north of 59th Street, and asked the City Commission to listen to the people who live in the area. She believes the City should go forward with this part of the project. She agrees that the blue and green projects will help in the future. The City is on the right path, and should not continue putting off the project.

Nancy Bernstein stated that her street does not flood. Her street used to flood a decade ago, but since the gutters and drainage system were cleaned up there has not been any flooding. She wants the City to rethink the green and blue projects. She concluded by saying that her trust in her elected officials is changing.

Glenna Norton disagreed with the project taking place on half the street. If it is to be done, it needs to be done on the entire street. The City needs experts with training, knowledge, and goals.

Bruce Bender stated that he lives on 59th Street and Alton Road and has had four floods since moving in. He has done everything humanly possible to stop the flooding, but it is still happening. He has time stamped photos of a foot of water everywhere on and around his property. He is desperate and does not know what else to do.

David Mancini addressed Commissioner Rosen Gonzalez and stated that Sunset Harbour Islands I and II are failing because the roads were not elevated. He clarified that all the undergrounding projects have been stopped by residents; this is because of the

necessary easements that residents continually refuse. When this City Commission allows residents to dictate its projects that is when the trouble begins.

City Attorney Aguila restated that the recommendation has been amended to award the RFP for Group 3 north area to David Mancini and Sons with a contractor price of $24 million and contingency further authorizing the Administration to issue a notice to proceed for design only with the final project design subject to and contingent upon prior City Commission approval authorizing the awards of Groups 1 and 2 at a later date.

Commissioner Alemán stated that before the City Commission starts talking about options and what they will do, she believes this conversation warrants a much lengthier discussion.

Mayor Gelber stated that he wants everyone present to know the options; the City needs to get this right.

Discussion held.

Commissioner Alemán stated that this is the most important issue the City is currently facing. It is the City's future. She shares everyone's concerns that we all want to protect our property values and have our City thrive. We need to remind ourselves of that. There is nothing wrong with the current system, only that the times have changed. This City relies enormously on its pumps. Without the pumps, North Bay Road would be in a great deal of trouble. Nature has gotten stronger, and as such, we need to be better prepared. Some people have stated that the City does not have a plan when it comes to sea level rise, and that is not true; the City does have a strategy, which is incremental.

Mayor Gelber stated that the RFP is trying to catch up with the green and blue requirements from the ULI study.

Commissioner Alemán would like to award Group 3 today and include funding for above and below ground improvements. There are funds for the above ground portion, but the undergrounding portion is another issue.

City Attorney Aguila stated that undergrounding takes much longer to complete as Mr. Coley stated previously. To do an undergrounding project, they must first determine the special assessment district and they would additionally need an estimate from FPL.

Commissioner Alemán stated that the undergrounding that took place in other neighborhoods was approximately $20,000 per house. Any other undergrounding project should be around the same price.

Discussion continued.

Commissioner Góngora asked whether the City Commission has ever used this mechanism when there is an RFP for vote to provide funds, but instead the City Commission gives the Administration notice to proceed and go with an RFP and do enhancements and design changes.

City Attorney Aguila stated that he does not recall any instance when this has happened.

Commissioner Góngora stated that if the RFP comes before the City Commission and it needs enhancement and design changes, the proper legal vote is to reject the RFP and start over with something entirely new. He wants to move forward with this project, but he finds it incredibly imperfect. The Administration stated that the Group 3 project would cost $24 million, but now that it needs enhancements and design changes, it will not be $24 million, and it will be much more. He believes the contractors do not want to redo a proper RFP and incorporate the comments addressed so far. He does not want to gamble $24 million, he wants to move forward with this project, but it must be done correctly. He does not want the neighbors to have to come back to the City Commission to complain further. He has no problem, however, in beginning the process of a special taxing district so long as the neighbors want it.

Commissioner Rosen Gonzalez stated that the pause she is requesting is not specifically for this project. Her worry is that the City is arbitrarily picking neighborhoods to do these resiliency projects. The current plan does not include blue and green areas; it is now incomplete. One cannot simply agree to add blue and green infrastructure to the swales and claim it is done. A study needs to be done. She asked how much money has been spent on the project so far.

Eric Carpenter, Assistant City Manager, replied that minimal time has been spent on this project so far, so the costs are minimal.

Commissioner Rosen Gonzalez stated that she would be in favor of rejecting this RFP today. She wants to set a meeting and incorporate blue and green areas. The City needs vision and a complete reevaluation to start over.

Commissioner Góngora agreed and stated that he is afraid that this project is not going in the right direction.

Commissioner Rosen Gonzalez stated that the City Commission needs to give direction of where this project should go.

Commissioner Samuelian stated that there is no doubt the City is in need for a flooding and sea level rise program. It needs to be done right. The mistakes that are made along the way can cause terrible problems in the long run. Doing nothing is not an option, but going about the problem the wrong way is even worse. He believes the City needs to rethink the street raising policy. He is not advocating to stop completely, but to say it must be 3.7 NAVD across the board has been the single most controversial policy that has been causing problems. He wishes people would be excited for this project, but that is not what is happening. People are complaining throughout the City, because residents are not seeing the value of what the City is doing.

Commissioner Arriola stated that he generally leans towards undergrounding utilities. The City has some magnificent homes and it looks very odd to have that in contrast with outdated utility poles. Unfortunately, the City is at the mercy of FPL in terms of undergrounding utilities. FPL does not have undergrounding as a priority. He is unsure why people are pushing for undergrounding at the moment, when it is an impossibility during the next 18 to 24 months, and even after that wait time, the project will still take at least six years. He agrees to issue another RFP to be looked into the Administration during the next 90 days and work with the Florida Department of Transportation to incorporate blue and green infrastructure.

City Attorney Aguila asked whether the procurement process could be expedited to 30 days.

Assistant City Manager Carpenter stated that would not be possible. He explained that a typical RFP, where there is a clearly defined scope, would take from 90 days to six months, even when expedited. An RFP of this magnitude with changing scope will take every bit of six months.

City Attorney Aguila stated that the scope is already there, and they are simply adding blue and green infrastructure.

Vice-Mayor Steinberg asked what the difference is between design-build and design-bid-build projects.

Assistant City Manager Carpenter explained that in the design-bid-build delivery method, the City has full design package and a direct consultant with the City to put out a bid procurement and go with the lowest responsive and responsible bidder. Design-build process hires a design builder that is a team of contract and design consultants that will put the design package together and ultimately give the City a price for the completed project. As an engineer, he prefers the design-bid-build method, but Miami Beach favors the design-build option. The problem with the design-build method is that if the City Commission wants to change the scope of the design, the designer needs to be contacted to amend the design and have a contractor again price the design changes and bring it back to the City Commission.

Discussion continued.

Commissioner Alemán asked that if the City goes forward, how the City would work with the design-build method, and getting public input into the design.

Assistant City Manager Carpenter replied that the first things they would ask the contractor when they sit down and negotiate the final contractual mechanism is for them to provide the City a copy of the public engagement and contractual requirement. There are very few things the City seems to be at odds with the residents, but they can be worked out.

Commissioner Alemán stated that some people are calling this project an experiment. She asked Assistant City Manager Carpenter whether that statement is true.

Assistant City Manager Carpenter stated that water and sewer projects are things the City has done hundreds of times. These projects take place here and throughout the country. Water and sewer repair is what it is; it is not an experiment. The Administration has implemented pipes and pumps in multiple neighborhoods in Miami Beach. The neighborhoods where the new pumps have been installed have been happy with the results. There have been a few challenges with the early projects they have implemented and multiple iterations have gone through even during the 90s. Exfiltration trenches, gravity wells, injection wells, pumped outfalls, and raised streets have all been tried out, and they are building on the lessons learned in the past to make it better. He restated that this project is not experimental as it is using tried-and-true technology.

Mayor Gelber stated that this is very difficult choice, and the truth is that every expert has stated that the City must do something to raise the streets and put in pumps. While the City is busy doing this, it needs to take care of the water needs. These are not easy things to talk about and the City's staff is trying to learn from what has been done in the past. Very few cities are as low lined as Miami Beach, and experts have stated that what Miami Beach is doing will protect the community's assets. If nothing is done, no bank or mortgage lender will provide funds, and property values will tumble in South Florida. He added that currently the only City that has not had a decrease in property values in South Florida has been Miami Beach.

Commissioner Alemán stated that if the City Commission awards Group 3 it already has the mechanisms by which the green and blue infrastructure could be introduced appropriately. She disagreed with the Mayor's statement and highlighted that Miami Beach single-family homes have in fact declined 2% in value during the last two years. She believes the City should continue its current path. This is not only her opinion, but also the opinion of bonding agents she has spoken to.

Commissioner Góngora stated that everyone has ideas on what strategy Miami Beach should take. The discussion of undergrounding utilities is nothing new to this City Commission. He does have some concerns with some of his colleagues who want to move forward at all costs. No City Commission has ever chosen to have an RFP come before the City Commission only to have it amended to ask the City Commission to trust the Administration in redrafting the RFP after the fact. He cautioned the City Commission again that the $24 million cost is not actual given that the project needs to undergo enhancements and design changes.

MOTION 1:
Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Arriola and Alemán.

MOTION 2:
Motion made by Commissioner Alemán to refer the Resolution regarding the undergrounding for North Bay Road and Alton Road to the Neighborhood/Community Affairs Committee; seconded by Commissioner Rosen Gonzalez. Voice vote: 7-0.

1:32:05 p.m.
NEW ITEM:
Commissioner Alemán motioned to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Vice-Mayor Steinberg. **Roy Coley and Alex Denis to handle.**

Mayor Gelber called for a vote.

Some members of the Commission voted in the affirmative, but there was confusion by some members of the Commission that a vote was being taken.

Commissioner Rosen Gonzalez asked Commissioner Góngora whether he heard the motion.

Commissioner Alemán restated the motion.

Commissioner Góngora stated that he is unclear as to what the Commissioner is asking for.

Vice-Mayor Steinberg explained that the City Commission does not want to pause, but move forward with the best process and have all the information on whether to proceed with a design-build or design-bid-build in incorporating green and blue infrastructure.

City Clerk Granado stated that although the vote took place, Commissioners Góngora and Samuelian had not yet voted.

Commissioner Rosen Gonzalez objected to the vote as it was unclear what was going on at the time. There is still confusion on the green and blue infrastructure, and whether there is green impermeable infrastructure underneath the raised roads. She does not believe David Mancini is the expert authority on this. Someone like Rem Koolhaas should be overseeing this, not Lanzo Construction. Do not bring C quality to an A quality City. We cannot continue starting projects in neighborhoods without clear vision.

Commissioner Alemán asked whether there would be a new vote.

Mayor Gelber stated that the vote should be redone as it went by fast, and people were unclear as to what was going on.

Mayor Gelber stated that this item would queue up the next project, which is what the City Commission had been talking about previously.

Commissioner Samuelian stated that he has not seen the Master Plan with the project priorities. The priorities have not been discussed by this Body and he would like that discussion to take place.

Commissioner Alemán addressed Commissioner Samuelian and stated that if he has not looked at the Master Plan in the six months since being elected – shame on him. This is the most important plan this City has ever seen. The motion she made is to go forward with the plan.

Commissioner Samuelian replied to Commissioner Alemán, with all due respect, that he has dedicated a great deal of time to the Master Plan, and even so, he is not clear as to what the priorities are. Before agreeing on the next project, he would like the City Commission to go over the Master Plan.

Mayor Gelber explained that this item is simply queueing up the next project. There will be ample time to weigh in on it. The world needs to know that we are not stopping what we are doing. He will support the Commissioner's motion.

Commissioner Samuelian offered an amendment that he would like to proceed with the next project, and have the City Commission simultaneously discuss the Master Plan and its priorities so that everyone on the City Commission has a context of the big picture.

Commissioner Alemán rejected the amendment, but invited Commissioner Samuelian to make a separate motion. The City Commission needs to send a clear message to the world that Miami Beach is committed to resiliency.

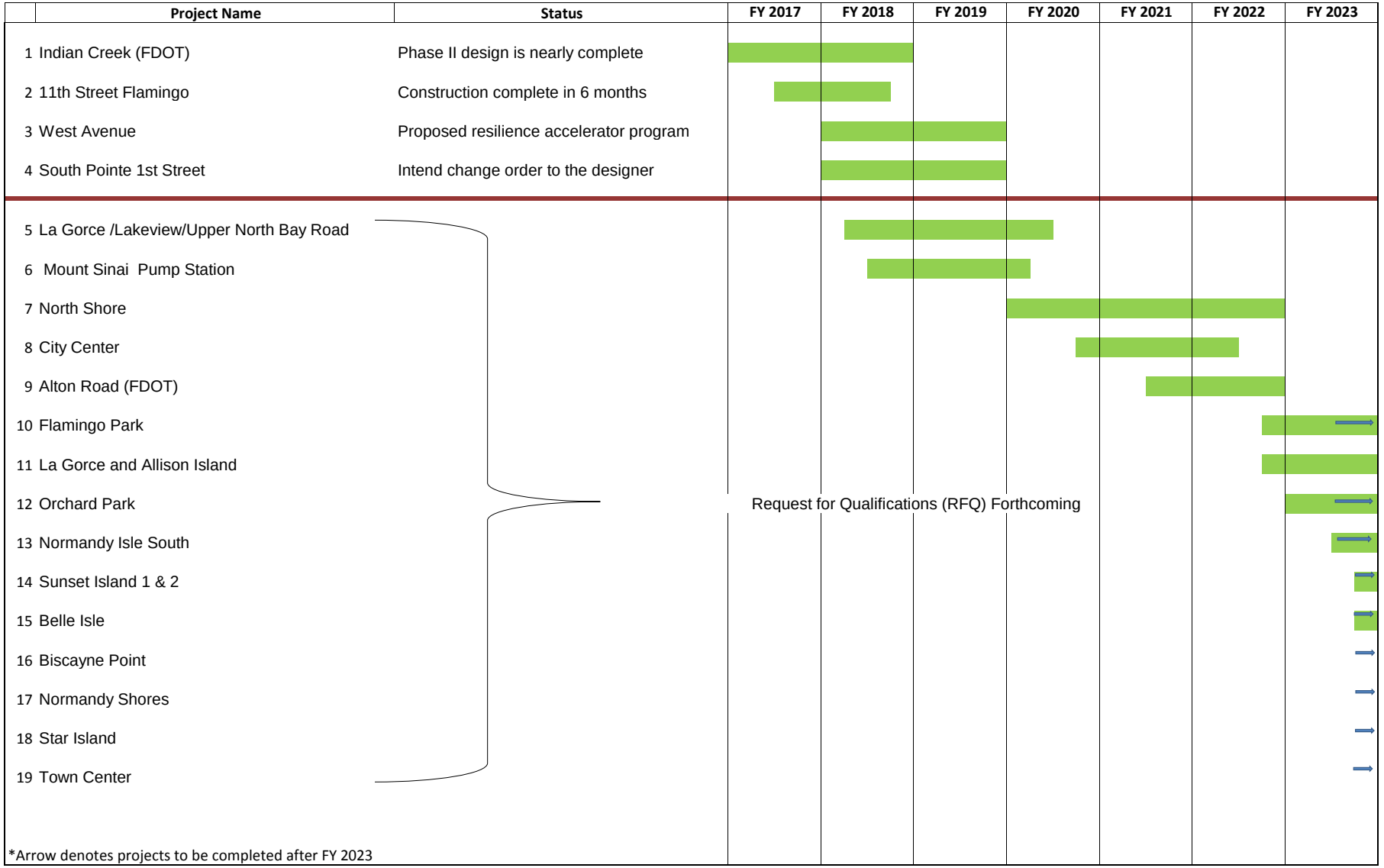
Commissioner Arriola stated that the City is doing a pause by another name. It can be called requesting a study or issuing a new RFP.

MOTION ON NEW ITEM:
Motion made by Commissioner Alemán to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Commissioner Steinberg. Voice vote: 4-3. Opposed: Commissioners Góngora, Rosen Gonzalez, and Samuelian.

City Clerk's Note: On May 20, 2018, Commissioner Góngora requested via email that the after-action reflect that he did not vote as he intended on the motion on the "new item." Commissioner Góngora stated that he was away from the dais when the initial discussion on this item occurred, and as a result voted incorrectly.

Handouts and Reference Materials:
1. Resolution drafted by Commissioner Rosen Gonzalez
2. Email from Commissioner Góngora, dated May 21, 2018, entitled "Question."
3. Email from Raul Aguila dated May 21, 2018 to Commissioner Michael Góngora, Diana Fontani and Debora Turner RE: Question regarding correcting a vote.

NEIGHBORHOOD IMPROVEMENT PROJECT TIMELINE



MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION REGARDING CITY OF MIAMI BEACH STREET RAISING RESILIENCY POLICY AND POTENTIAL ALTERNATIVES**

RESPONSIBLE DEPARTMENT:
Roy Coley, Public Works Director

LEGISLATIVE TRACKING:
Item R9L - June 06, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

Analysis
Presentation at Committee Meeting.

ATTACHMENTS:

	Description	Type
🗋	Attachment A: Commission Referral	Other

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Commissioner Mark Samuelian
DATE: June 6, 2018

SUBJECT: DISCUSSION REGARDING CITY OF MIAMI BEACH STREET RAISING RESILIENCY POLICY AND POTENTIAL ALTERNATIVES.

ANALYSIS

Our current policy is to raise all streets to 3.7 NAVD as part of neighborhood improvement projects and the City's resiliency strategy. This "one size fits all" approach does not appreciate the uniqueness of our neighborhoods. This policy has many downsides and risks for private property owners. Our residents want the City to address flooding; however, they have major concerns about this specific policy (see attached). We should discuss this policy and potential alternatives.

Legislative Tracking

Commissioner Mark Samuelian

ATTACHMENTS:

Description

- Bayshore Homeowners Association Position
- Palm and Hibiscus Resident Email
- RE Miami Article on Sunset Harbor
- West Avenue Neighborhood Association Position
- Ordinance Setting NAVD Policy
- Ordinance Setting Majority Vote for Modification of Stormwater Master Plan
- After Action Report on May Commission Item R7 O
- MBU Resolution on Flood Plan

Bayshore Homeowners Association

Miami Beach, Florida

Communication Regarding Central Bayshore South Project

Dear Neighbors,

Tuesday night there was an "informational" meeting at Miami Beach Senior High School where the City attempted to inform the Bayshore Neighborhood about their approach regarding the Streetscape/Drainage/Water Main Improvement project. Based on what we heard, it is paramount for the BHOA to take an immediate position in moving forward as follows:

We agree that the City must take adaptive measures to reduce flood risk. But we believe that the current project is **extreme and unwarranted**, and will perversely **endanger** our properties. We hope to address our concerns to the City – the Mayor, Commissioners, City Manager, etc. – so that they can move forward with an adaptive project that accords with our neighborhood's need and character and best benefits us, the owners and residents.

Per the Commission's recommendation, this issue will be discussed at Neighborhood's Committee April 21, 2017 (City Hall Commission Chamber) and at the Commission on April 26th, 2017. Please try to attend both of these meetings or sign letter and send back if you agree with the following points if you have not already signed the previous petition.

The following list states the positions we will address to the City:

- Adaptive projects should **proceed first** in areas of the City either or both part of an **evacuation or sheltering route** and/or most-prone to high-tide and rain-event flooding. Central Bayshore South is neither.
- The City must complete and present **100% of the project planning** – so that those affected can understand it – before proceeding further. Currently, they have only presented what the City said was 60% of the project, though much of the project's crucial impacts and information was not presented, and still are not available, i.e. finish floor elevations of all residences, which impacts criteria and decisions in how much to raise streets, property values, and insurance rates.
- Road crown elevations in Central Bayshore South should be **raised to a benchmark elevation of 2.70' NAVD**, which meets or exceeds the built elevations of other road projects in other parts of the City (e.g., North Bay Road, Central Bayshore North, Flamingo Road, Lake Pancoast area), according to the following criteria:
    1. Existing streets below the centerline elevation of 2.20' NAVD shall be raised 6" maximum.
    2. Existing streets now between the centerline elevation of 2.20' and 2.70' NAVD shall be raised to 2.70' NAVD, with minimum allowances for slope/drainage requirements.
    3. Existing streets now above 2.70' NAVD, shall be raised to 3.00' to 3.20' NAVD to allow for slope/drainage requirements.
- City should use **passive and green measures** in stormwater design and retention – possibly in conjunction with the City's redevelopment of the Former Par 3 Park, and through intensive planting of large canopy street trees.

- Streets in Central Bayshore South should be **reduced in width to the minimum width allowable with a posted 25 mph speed limit (9' per County standards)**, or at a minimum, remain at their current width with no net widening of streets, inclusive of valley gutters.

- Any reconstruction in Central Bayshore South must include **City guarantees that any drainage onto private property resulting from re-grading of the existing swales and driveways to harmonize with the raised street elevations will be the responsibility of the City to implement and pay for.**

- The City must account for the **G.O. Bond and ad valorem tax funds** dedicated to street improvements in Central Bayshore South which were approved by referendum. The bonds were issues, taxes were collected, but the original project – approved through the required public review process – never even broke ground.

- The City must explain how the current project **specifically benefits** the property owners specially assessed in connection with the City's 2015 stormwater revenue bond (and the hike in our water bills). A special assessment which does not specially benefit the project funded by the assessment is invalid.

We hope all of you will consider **taking two steps**:

1. All of you should have received a **petition** to the mayor and Commissioners, which has garnered over 170 signatures (in an area with roughly 250 homes). If you agree with it but have not yet signed it, please do and return it to us at this email address:

   BayshoreHA@gmail.com

2. Please **call and email** your Commissioners, the Mayor's office and the City Manager's office **ASAP,** and call and email again, to express your disapproval of the current project and state our bulleted positions.

Micky Steinberg	tathianetrofino@miamibeachfl.gov	305.673.7030 Ext 6087
Michael Grieco	danilabonini@miamibeachfl.gov	305.673.7030 Ext 6457
Joy Malakoff	bonniestewart@miamibeachfl.gov	305.673.7030 Ext 6142
Kristen Rosen Gonzalez	kristen@miamibeachfl.gov	305.673.7030
Ricky Arriola	erickchiroles@miamibeachfl.gov	305.673.7030 Ext 6274
John Elizabeth Alemán	cmruiz-paz@miamibeachfl.gov	305.673.7030 Ext 6437
Philip Levine	philiplevine@miamibeachfl.gov	305.673.7035
Jimmy Morales	jimmymorales@miamibeachfl.gov	305.673.7010

Of course, every property will be affected differently by this project, and all of us are entitled to our individual opinions. But we can best serve our collective interests by acting together.

Bayshore Homeowners Association

On Apr 16, 2018, at 12:50 PM, [redacted]

< >> wrote:

Good afternoon,

I am writing to you in behalf of my family and many of my neighbors who are extremely concerned with the work that has taken place on Palm Island. I received an email from the Mr. David Martinez Director of the Office of Capital Improvement projects stating that we will not have permanent generators to run the new storm water pumps.

I applaud the previous administrations efforts to address climate change however the execution is not something to be grateful for. On my street (North Coconut lane) the street has been raised approximately 2 feet. While the street did flood a few times a year, it also held a large amount of rain water that eventually went away causing no real harm. I do believe that the new system will help reduce the flooding on the street however we lose power (almost weekly lately) and without power this new system will do more harm than good as all of the water that used to flow and accumulate into the street will now flow into our homes.

I have a list of concerned neighbors; in fact, the vast majority of our homes are now below the street which does not make any sense. If the city is trying to help the residents by raising the streets they should do so when more than 51% of residents in a specific area will benefit. In our case 90% of my neighbors and I are worse off than we were, we all prefer a flooded street occasionally than a flooded home.

I understand that for the city it might not be feasible to place generators in every neighborhood and I have also heard that this issue is now being revisited and such projects placed on hold. I urge you as elected officials to do anything you can do provide us with PERMANENT generators as we know that moving/installing and fueling temporary generators in a heavy downpour does not make sense and by the time it is deployed and functional our homes will be flooded.

I have seen that Sunset Harbour area has benefited from the permanent generators and I ask that we be provided with such. I also urge you to stop raising the streets in other neighborhoods unless such work will benefit the majority, unlike what is happening to us.

Please advise when there will be a meeting that we can attend where this issue will be discussed and I will coordinate for my neighbors and I to attend.

Thank you in advance for anything you can do to help us. The rainy season is right around the corner and it will be catastrophic for us if what has happened in Sunset Harbour happens to our homes.

Regards,

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

parts of sunset harbour stormwater system not performing as expected

resiliency , sunset harbour
May 15, 2018

susan askew

parts of sunset harbour stormwater system not performing as expected:

lanzo construction to submit plans for improvements

Parts of the new stormwater system in Sunset Harbour are not working to their intended capacity. City Manager Jimmy Morales notified Commissioners that during a heavy rain event on Sunday "some localized flooding was observed at various locations throughout the City" but the rain should not have been enough to cause flooding in Sunset Harbour.

Morales wrote in a Letter to Commission that in the 24-hour period ending at midnight Sunday, 4.09 inches of rain fell at City Hall. Between the hours of 6 and 7 pm Sunday evening, 1.88 inches of rain fell with a peak intensity of 8.11 inches per hour.

"In Sunset Harbour on Sunday evening, some properties that are located below the flood plain elevation reported minor flooding for a brief period of time," Morales wrote.

Built by Lanzo Construction Company, the new system "was expected to prevent sunny day flooding due to sea level rise and manage six (6) inches of rain in 24 hours with a peak hourly capacity of 2.4 inches," according to Morales. "The improvements have proven to work very well against sea level rise as we have not seen any sunny day flooding in the area which had been frequently the case during higher tidal events."

But, as Morales explained, the system is not performing to that expected capacity during rain events. "[T]he system, in at least some locations, reaches capacity at 1.8 inches in one hour."

Local businesses and Commissioner Kristen Rosen Gonzalez have expressed frustration at the flooding that still occurs in some areas of Sunset Harbour during rain storms. According to Morales,

“City staff, consultant engineers from AECOM, and Lanzo Construction Company with their engineers from Wade Trim, have been engaged for months making this determination.”

“Lanzo Construction Company owner, Joe D’Alessandro Sr., has provided his commitment to the City of Miami Beach to make improvements in the system to be sure expectations are met,” Morales said. The company is expected to submit plans for system improvements soon and, “Work is expected to commence very shortly."

In the meantime, “If the City experiences rainfall events that exceed 1.8 inches per hour, exceeding the system capacity, properties that are below the flood plain elevation may experience standing water for a short amount of time,” Morales said.

Sunset Harbour was the first project in the City's $400 million resiliency program. It included a new stormwater system, pumps, and elevated roads.

From: WAvNA - West Avenue Neighborhood Association <wavna305@gmail.com>
Date: March 22, 2018 at 06:27:18 EDT
To: Commissioner Steinberg <MickySteinberg@miamibeachfl.gov>, Ricky Arriola <RickyArriola@miamibeachfl.gov>, Commissioner Mark Sameulian <MarkSamuelian@miamibeachfl.gov>, John Elizabeth Aleman <JohnAleman@miamibeachfl.gov>
Cc: [redacted]
Subject: WAvNA Comments at March 14 SRC Meeting

Dear Commissioner,

The purpose of this letter is to document the comments made by representatives of the West Avenue Neighborhood Association (WAvNA) at the Sustainability & Resiliency Committee meeting on Wednesday, March 14th, 2018, about how the City is addressing Climate Change issues and the West Avenue Phase II Project. Comments are as follows:

- **Proposed Increase to Street Elevation**: The current plan, which is under review, will put the elevation of private property below the level of the street for many of the businesses and residences in the West Avenue Neighborhood. While this might protect the streets, it will increase the probability of private property flooding, especially during storm events that exceed the design capacity of the new stormwater system or failure of the stormwater pumps. The Neighborhood is concerned that this increased risk decreases the likelihood of obtaining property insurance, resulting in diminished property values.
- **Improved Stormwater system**: Since the West Avenue Phase I project installed new stormwater pumps at 10th and 14th Streets, residents have no longer witnessed flooding or standing water on streets of stormwater drains connected to the City's stormwater system. This questions the need for increasing the street's elevation.
- **Bay Water Pollution**: Some residents have expressed concerns with the visual quality of the water being discharged into Biscayne Bay, and feel the City should do more to improve the quality of the discharged water.
- **Seawalls along Biscayne Bay**: The seawalls along Biscayne Bay have significantly reduced flooding during King Tide events in the West Avenue Neighborhood. Residents have expressed concerns about the City's plan to address private seawalls, which have not been raised, and feel the city should develop solutions to address this problem. This would further reinforce the neighborhood's protection from King Tide events.
- **Ground Water**: Some residents feel that potential increases in the groundwater elevation pose the most significant risk to the West Avenue Neighborhood. Although there have not been any reported instances of groundwater rising to the surface, it is a concern.
- **Electrical and Communication Infrastructure**: Residents are concerned about the resiliency of the electrical and communication infrastructure during storm events, from

both wind and flooding. Addressing this concern is critical to the neighborhood's resiliency.

As Miami Beach moves forward we need to think strategically and comprehensively about climate change and how we will live with the anticipated increases in water levels, the frequency of storms and increasing temperatures. It also must develop policies that address greenhouse gas emissions to be part of turning climate change around. Developing well designed sustainable solutions will be key to the future of Miami Beach.

Regards,

West Avenue Neighborhood Association (WAvNA)

West Avenue Board of Directors:
Gayle Durham - President
Shawn Patrick Bryant - Vice President
Brian Keene - Secretary/Treasurer
Travis Copeland
Corinne Kirkland
Gregg Chislett
Tim Carr

RESOLUTION NO. 2016-29454

A RESOLUTION AMENDING THE CITY'S 2011 CDM-SMITH STORMWATER (MANAGEMENT) MASTER PLAN (2011 SWMP) TO INCORPORATE THE CITY'S CONSULTANT, AECOM'S, RECOMMENDATIONS RELATING TO DEFINING "FUTURE GRADE," AND "FUTURE CROWN OF THE ROAD;" FURTHER MODIFYING SECTIONS 2.5.3, ENTITLED "PROPOSED LEVEL OF SERVICE (LOS), AND 9.2.5 ENTITLED "SEAWALL HEIGHTS," OF THE 2011 SWMP, TO INCLUDE MODIFICATIONS TO THE LEVEL OF SERVICE FOR CONSTRUCTION OF ROADS, STORMWATER SYSTEMS, AND DEVELOPMENT TO REDUCE THE RISK OF FLOODING; A COPY OF WHICH IS ATTACHED HERETO AS EXHIBIT 1.

WHEREAS, the City's Stormwater (Management) Master Plan (2011 SWMP) is intended to be a guide for improving the City's stormwater management system performance for the next 20 years, with considerations of potential sea level rise over 20-years of stormwater infrastructure and a 50-year planning horizon for seawall heights; and

WHEREAS, the City adopted Resolution 2012-28068 on November 14, 2012, adopting the 2011 SWMP; and

WHEREAS, the City adopted Resolution 2014-28499 on February 12, 2014, which approved the recommendation of The Flooding Mitigation Committee to amend the 2011 SWMP by modifying the design criteria for the tailwater elevation from 0.5 Ft-NAVD to 2.7 Ft-NAVD for all tidal boundary conditions; and

WHEREAS, the City adopted Resolution 2014-28684 on July 23, 2014 which accepted the recommendation of the Flooding Mitigation Committee to amend the 2011 SWMP for minimum seawall elevation from 3.2 feet NAVD to 5.7 feet NAVD, however the 5.7 NAVD elevation for seawalls shall not apply to minor seawall repairs less than $300 per linear foot at "2014 Consumer Price Index (CPI)"; and

WHEREAS, on December 17, 2014, the City Commission approved the revised standard seawall height at 3.2 NAVD with a caveat of an additional cap of 2 feet; and

WHEREAS, on July 21, 2015, the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise recommend that the seawall cap on all new private construction and all public seawall construction be changed from 3.2 feet NAVD to 5.7 feet NAVD throughout the City; however, on existing private seawalls that are being replaced/repaired not associated with new building construction, a minimum 4.0 NAVD elevation shall apply with the structural design to accommodate a seawall height extension to a minimum 5.7 NAVD; and

WHEREAS, on May 11, 2016, the City Commission adopted Ordinance 2016-

4009 which amended Chapter 54 – "Floods", by establishing a minimum and maximum freeboard (minimum one foot / maximum five feet) above base flood elevation (FIRM BFE = not less than 6.44 NAVD) for all properties and amend the Land Development regulations pertaining to the calculation of building height, and establish minimum elevations of required yards in single family districts; and

WHEREAS, on May 11, 2016, the City Commission adopted Ordinance 2016-4010, amended Chapter 118, of the Land Development Regulations relating to defining "future grade" and "future crown of the road;" and

WHEREAS, the modifications to Chapter 54 and Chapter 118 were provided an effective date of June 8, 2016, so that these terms would be provided a definition and criteria in the 2011 SWMP, and the attached Addendum 1 to the 2011 SWMP, incorporates the definitions and changes to the 2011 SWMP to effectuate the new definitions for "future crown of the road" and "future grade."

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, that the Mayor and City Commission amend the City's 2011 CDM-Smith Stormwater (Management) Master Plan (2011 SWMP) to incorporate the City's consultant, AECOM's, recommendations relating to defining "future grade," and "future crown of the road;" further modifying sections 2.5.3, entitled "Proposed Level Of Service (LOS), and 9.2.5 entitled "Seawall Heights," of the 2011 SWMP, to include modifications to the level of service for construction of roads, stormwater systems, and development to reduce the risk of flooding; a copy of which is attached hereto as Exhibit 1.

PASSED and **ADOPTED this** 8 day of June, 2016.

ATTEST:

6/13/16

Rafael E. Granado, City Clerk

Philip Levine, Mayor

MIAMI BEACH INCORPORATED MARCH 26TH 1915

APPROVED AS TO FORM & LANGUAGE & FOR EXECUTION

City Attorney 6/1/16 Date

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Condensed Title:

A Resolution Amending The City's 2011 Stormwater Management Master Plan To Incorporate Modifications To The Standards For The Construction Of New Roads, Stormwater Systems, And Developments; Which Standards Would Incorporate Higher Elevations In Order To Reduce The Risk Of Flooding; And Defining "Future Grade" And Minimum Required Seawall Heights; And Which Documents Are Attached Hereto As Composite Exhibit A.

Key Intended Outcome Supported:

Ensure reliable stormwater management and resiliency against flooding by implementing select short and long-term solutions including addressing sea-level rise.

Item Summary/Recommendation:

The City adopted the 2011 Stormwater Management Master Plan (SWMMP) by Resolution 2012-28068. This plan is intended to be a guide for improving the City's stormwater management system performance for a 20 year planning horizon, with considerations of potential sea level rise over 20 years for stormwater infrastructure and 50 years for seawall heights.

Periodically, due to updated climate projections, it is important to update the SWMMP to stay current and viable. The modifications proposed include provisions for new development to include roadway elevation, levels of service for roads, precipitation design rates and distribution, seawall elevations, and minimum future grade elevations.

These items have been presented to the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise on several occasions.

The SWMMP needs to be amended to incorporate modifications to the standards for the construction of new roads, stormwater systems, and developments; which standards would incorporate higher elevations in order to reduce the risk of flooding; redefine the level of service and design storm; and define minimum "future grade" and seawall heights; and which documents are attached hereto as Exhibit A. The Public Works Manual will also be amended to provide construction details referencing the SWMMP.

THE ADMINISTRATION RECOMMENDS ADOPTING THE RESOLUTION.

Advisory Board Recommendation:

Financial Information:

Source of Funds:		Amount	Account	Approved
	1			
	2			
	3			
OBPI	Total			

Financial Impact Summary:

City Clerk's Office Legislative Tracking:

Eric Carpenter, Public Works X6012

Sign-Offs:

Asst. Department Director	Assistant City Manager/DPW	City Manager
JJF	ETC	JLM

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MIAMIBEACH

City of Miami Beach, 1700 Convention Center Drive, Miami Beach, Florida 33139, www.miamibeachfl.gov

COMMISSION MEMORANDUM

TO: Mayor Philip Levine and Members of the City Commission

FROM: Jimmy L. Morales, City Manager

DATE: June 8, 2016

SUBJECT: **A RESOLUTION AMENDING THE CITY'S 2011 STORMWATER MANAGEMENT MASTER PLAN TO INCORPORATE MODIFICATIONS TO THE STANDARDS FOR THE CONSTRUCTION OF NEW ROADS, STORMWATER SYSTEMS, AND DEVELOPMENTS; WHICH STANDARDS WOULD INCORPORATE HIGHER ELEVATIONS IN ORDER TO REDUCE THE RISK OF FLOODING; AND DEFINING "FUTURE GRADE" AND MINIMUM REQUIRED SEAWALL HEIGHTS; AND WHICH DOCUMENTS ARE ATTACHED HERETO AS COMPOSITE EXHIBIT A.**

BACKGROUND

The City adopted the 2011 Stormwater Management Master Plan (SWMMP) by Resolution 2012-28068. This plan is intended to be a guide for improving the City's stormwater management system performance for a 20 year planning horizon, with considerations of potential sea level rise over 20 years for stormwater infrastructure and 50 years for seawall heights.

Periodically, due to updated climate projections, it is important to update the SWMMP to stay current and viable. The modifications proposed include provisions for new development to include roadway elevation, levels of service for roads, precipitation design rates and distribution, seawall elevations, and minimum future grade elevations.

These items have been presented to the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise on several occasions.

On February 12, 2014, the City adopted Resolution 2014-28499, which approved the recommendation of The Flooding Mitigation Committee to amend the SWMMP so as to modify the design criteria for a "tailwater elevation" be increased from 0.5 Ft-NAVD to 2.7 Ft-NAVD for all tidal boundary conditions;

On July 21, 2015, the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise recommend that the seawall cap on all new private construction and all public seawall construction be changed from 3.2 feet NAVD to 5.7 feet NAVD throughout the City; provided, however, that for properties with existing private seawalls that are being replaced/repaired not associated with new building construction, the Panel recommended applying a minimum 4.0 NAVD elevation, as

long as the structural design to accommodate a seawall height extension to a minimum 5.7 NAVD

On May 11, 2016, the Mayor and City Commission adopted Ordinances 2016-4009, relating to amending Chapter 54 of the City Code entitled "Floods" to define City of Miami Beach Freeboard, and modify how grade elevation and height are defined due to flooding and climate change.

Also on May 11, 2016, the Mayor and City Commission adopted Ordinance 2016-4010, relating to amending Chapter 118, of the Land Development Code, to incorporate the same Freeboard definitions, and procedures for how to determine grade elevation and height as a result of flooding and climate change.

The SWMMP needs to be amended to incorporate modifications to the standards for the construction of new roads, stormwater systems, and developments; which standards would incorporate higher elevations in order to reduce the risk of flooding; redefine the level of service and design storm; and define minimum "future grade" and seawall heights; and which documents are attached hereto as Exhibit A. The Public Works Manual will also be amended to provide construction details referencing the SWMMP.

CONCLUSION

The Administration recommends that the Mayor and City Commission of the City of Miami Beach, Florida accept the recommendation of the City Manager to amend the 2011 Stormwater Management Master Plan.

Attachment – Exhibit A

JLM/ETC/JRF/BAM/WRB

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EXHIBIT A

AECOM recommended changes to the 2011 CDM-Smith Stormwater Master Plan (2011 SWMP)

- Modify Section 2.5.3 Proposed Level of Service to include, *"Future crown of road and back of sidewalk elevations shall be 3.7 feet, NAVD, unless exempt due to hardship as determined by the Director of Public Works."*

- Modify Section 2.5.3 Proposed Level of Service to include, *"For land development purposes, the future grade shall be 3.7 feet NAVD minimum."*

- Modify Section 2.5.3 Proposed Level of Service to state, *"The stormwater level of service for roadways such that the crown of road is not overtopped during the 5 year / 24 hour design storm event with the following parameters:*
    - *South Florida Water Management District nomograph with 1.25 safety factor.*
    - *The rainfall distribution shall be the SCS Type III.*
    - *The Unit Hydrograph peaking factor shall be 150."*

- Modify Section 2.5.3 Proposed Level of Service to state, *"New construction or substantial reconstruction on private property shall retain stormwater runoff from the 5 year / 24 hour design storm of 7.5 inches of rainfall."*

- Modify Section 9.2.5 Seawall Heights to state, *"All new seawalls on private construction and all seawalls constructed on public projects shall have a minimum elevation of 5.7 feet, NAVD, however, on existing private seawalls that are being replaced/repaired not associated with new building construction, a minimum 4.0 NAVD elevation shall apply with the structural design to accommodate a seawall height extension to a minimum 5.7 NAVD."*

EXHIBIT A

ADDENDUM 1 TO THE CITY OF MIAMI BEACH STORMWATER (MANAGEMENT) MASTER PLAN FINAL REPORT

The City of Miami Beach's consultant, AECOM, has recommended modifications to the 2011 CDM Smith Stormwater (Management) Master Plan Final Report (2011 SWMP) in order to ensure the resiliency of the City, which recommendations are incorporated into the 2011 SWMP, as Addendum 1.

The following amendments to the following sections of the 2011 SWMP are hereby amended and incorporated by reference into the 2011 SWMP, as follows:

* * *

2.5.3 Proposed Level of Service (LOS)

As shown, CDM evaluated design storm events and joint tidal event periods to evaluate stormwater system performance and the project needs and costs to achieve various levels of service. The various evaluations for LOS indicated a point of diminishing returns at the 2 to 3 year storm event level.

Therefore, the City and CDM formulated options to best protect public safety and property with available funding. The 5-year, 24-hour ~~(5.9 inches of rainfall)~~ design storm of 7.5 inches of rainfall was also investigated due to current LOS standards. As an example, a 5 year LOS in the Flamingo Park Lummus Avenue project area would cost approximately $80 million, and the City available budget for this project area is approximately $35 million.

Based on the supplied information herein, the City should determine whether an adjustment in the design storm is prudent as it relates to the future evaluation of LOS.

"*Future crown of road*" and "*future back of sidewalk elevations*" shall be 3.7 feet, NAVD, unless exempt due to hardship as determined by the Director of Public Works.

For land development purposes, "*future grade*" shall be a minimum of 3.7 feet NAVD.

The stormwater level of service for roadways such that the "*future crown of road*" is not overtopped (flooded) during the 5 year / 24 hour design storm event shall be constructed utilizing the the following parameters:

- South Florida Water Management District nomograph with 1.25 safety factor.
- The rainfall distribution shall be the SCS Type III.
- The Unit Hydrograph peaking factor shall be 150.

New construction or substantial reconstruction on private property shall retain stormwater runoff from the 5 year / 24 hour design storm of 7.5 inches of rainfall.

* * *

9.2.5 Seawall Heights

This section provides recommendations regarding the influence of sea-level on seawall elevations. Condition assessment and solutions for rehabilitating the City's extensive network of seawalls was not included as part of the scope of the SWMP. In 2003, a preliminary inspection report on seawalls was produced by another consultant. This investigation identified the structural integrity of approximately 99 seawall sites throughout the City. That study did not include any recommendation of modifications to the seawalls to address sea-level rise considerations. The following are additional considerations related to seawall heights.

Seawall Height Consideration No. 1

As part of the City's consideration of long-term sea-level rise, a comprehensive inventory of City and private seawalls within the City of Miami Beach should be performed. The inventory should include survey of top (i.e., cap) of the seawall and condition assessment of its structural integrity.

Seawall Height Consideration No. 2

Seawall height design standards should be consulted with coastal engineers and planners in accordance with procedures normally utilized in this specialty discipline (i.e., coastal storm surge estimation). ~~A preliminary consideration is the establishment of a minimum seawall elevation. Based on FEMA and USACE guidance and discussions with USGS and CSI during the development of the SWMP, the establishment of a minimum seawall height of 1foot above the 1-year tidal stillwater (1.0 + 2.2 ft NAVO = 3.2 ft NAVO) elevation is recommended. This level should be evaluated in coordination sea-level rise projections.~~ All new seawalls for private construction and all seawalls constructed on public projects (after June 8, 2016) shall have a minimum elevation of 5.7 feet, NAVD, provided, however, for existing private seawalls that are being replaced/repaired not associated with new building construction, a minimum 4.0 NAVD elevation shall apply with the structural design to accommodate a seawall height extension to a minimum of 5.7 NAVD.

* * *

FREEBOARD

ORDINANCE NO. 2017-4150

AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, AMENDING SUBPART A – GENERAL ORDINANCES, OF THE CITY CODE, BY AMENDING CHAPTER 54 "FLOODS" AT SECTIONS 54-39, ENTITLED "ESTABLISHMENT OF DEVELOPMENT PERMIT;" IN ORDER TO SPECIFICALLY ADOPT THE CITY'S STORMWATER MASTER PLAN, AS MAY BE AMENDED, AND TO REQUIRING 5/7 VOTE OF FULL CITY COMMISSION TO LESSEN ANY OF THE STORMWATER REQUIREMENTS CONTAINED IN CHAPTER 54; TO AMEND SECTION 54-45, "PERMIT PROCEDURES," TO CORRECT THE TITLE OF THE CITY'S STORMWATER MASTER PLAN; AND BY AMENDING SUBPART B – "LAND DEVELOPMENT REGULATIONS," BY AMENDING SECTION 114-1, ENTITLED "DEFINITIONS," IN ORDER TO CORRECT THE NAME OF THE CITY'S STORMWATER MASTER PLAN; PROVIDING CODIFICATION; REPEALER; SEVERABILITY; AND AN EFFECTIVE DATE.

WHEREAS, sea level rise and flooding is an ongoing concern of the City; and

WHEREAS, low lying infrastructure including buildings must also retrofit and adapt to increased water levels or elevate in order to reduce risk or maintain low risk from potential flood damage; and

WHEREAS, it is appropriate to ensure that the Stormwater Master Plan, as may be amended, is incorporated into Chapter 54, entitled "Flooding" of the City's Code; and

WHEREAS, the City's Stormwater Master Plan provides guidance and regulations to ensure minimum flood-proofing requirements to protect residential and commercial structures, and to provide additional levels of protection to maintain consistency with U.S. Federal and State guidance, and

WHEREAS, the City desires to require a 5/7th vote of the City Commission in order to reduce, relax, diminish, or repeal the requirements of Chapter 54, and of the Stormwater Master Plan, incorporated by reference therein.

WHEREAS, these regulations will accomplish these goals and ensure that the public health, safety and welfare will be preserved.

NOW THEREFORE BE IT ORDAINED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA:

SECTION 1. Chapter 54, "Floods," at Section 54-45, "Permit Procedures," is amended as follows:

CHAPTER 54
FLOODS

* * *

Sec. 54-39. - Establishment of development permit; adoption of the city's stormwater master plan; and requiring 5/7 vote of the full city commission to lessen any of the stormwater requirements contained in this Chapter 54. Repeal or modification of this 5/7 voting requirement shall require a 5/7 vote of the full city commission.

A development permit shall be required in conformance with the provisions of this article prior to the commencement of any development activities. All developments or applications for development permits shall comply with the city's stormwater master plan, as may be amended. The adoption of any ordinance that would reduce, relax, diminish, or repeal the requirements of this Chapter 54, shall require a 5/7 vote of the city commission.

* * *

Sec. 54-45 Permit Procedures

Application for a development permit shall be made to the building director or his/her designee on forms furnished by him or her prior to any development activities, and may include, but not be limited to, the following plans in duplicate drawn to scale showing the nature, location, dimension, and elevations of the area in questions, existing and proposed structures, earthen fill, storage of materials or equipment, drainage facilities, and the location of the foregoing. Specifically, the following information is required:

(1) Application stage:

* * *

(f) A stormwater management plan and site drainage calculations, for new constructions and substantial improvement, shall be prepared by a Florida licensed engineer in accordance with the ~~CDM Smith 2011~~ City's Stormwater Master Plan, as may be amended, to demonstrate that adequate surface drainage shall be provided and surface run-off water shall be diverted to a storm conveyance or other approved point of collection, in accordance with Florida Building Code Sections 1804 and R401.3. The site shall be graded in manner to drain surface water away from foundation walls in accordance with Florida Building Code Sections 1804 and R401.3. All site drainage for new construction shall be designed and constructed in such a manner as to provide runoff rates, volume and

pollutant loads not exceeding predevelopment conditions and prevent flooding adjacent properties.

* * *

SECTION 2. Chapter 114, "General Provisions," of the Land Development Regulations, at Section 114-1, "Definitions," is hereby amended as follows:

CHAPTER 114
GENERAL PROVISIONS

Sec. 114-1. Definitions.

* * *

Grade, adjusted means the midpoint elevation between grade and the minimum required flood elevation for a lot or lots.

Grade, average existing means the average grade elevation calculated by averaging spot elevations of the existing topography taken at 10-foot intervals along the property lines.

Grade, future adjusted means the midpoint elevation between the future crown of the road as defined in the ~~CDM *Smith*~~ City's Stormwater Master Plan, as may be amended, and the base flood elevation plus minimum freeboard for a lot or lots.

Green infrastructure shall be as defined in Section 54-35.

* * *

SECTION 3. CODIFICATION.
It is the intention of the Mayor and City Commission of the City of Miami Beach, and it is hereby ordained that the provisions of this ordinance shall become and be made part of the Code of the City of Miami Beach, Florida. The sections of this ordinance may be renumbered or relettered to accomplish such intention, and the word "ordinance" may be changed to "section", "article", or other appropriate word.

SECTION 4. REPEALER.
All ordinances or parts of ordinances in conflict herewith be and the same are hereby repealed.

SECTION 5. SEVERABILITY.
If any section, subsection, clause or provision of this Ordinance is held invalid, the remainder shall not be affected by such invalidity.

SECTION 6. EFFECTIVE DATE.
This Ordinance shall take effect 10 days after enactment.

PASSED AND ADOPTED this 31 day of October, 2017.

ATTEST:

Philip Levine, Mayor

11/3/17
Rafael E. Granado, City Clerk

First Reading: October 18, 2017

Second Reading: October 31, 2017

APPROVED AS TO
FORM & LANGUAGE
& FOR EXECUTION

City Attorney

10/24/17
Date

Underline = new language
~~Strikethrough~~ = deleted language

[Sponsored by Commissioner John Aleman and Co-sponsored by Commissioner Joy Malakoff]

MIAMI BEACH INCORPORATED MARCH 26TH 1915

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission

FROM: Jimmy L. Morales, City Manager

DATE: October 31, 2017

9:35 a.m. Second Reading Public Hearing

SUBJECT: AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, AMENDING SUBPART A - GENERAL ORDINANCES, OF THE CITY CODE, BY AMENDING CHAPTER 54 "FLOODS" AT SECTIONS 54-39, ENTITLED "ESTABLISHMENT OF DEVELOPMENT PERMIT;" IN ORDER TO SPECIFICALLY ADOPT THE CITY'S STORMWATER MASTER PLAN, AS MAY BE AMENDED, AND TO REQUIRING 5/7 VOTE OF FULL CITY COMMISSION TO LESSEN ANY OF THE STORMWATER REQUIREMENTS CONTAINED IN CHAPTER 54; TO AMEND SECTION 54-45, "PERMIT PROCEDURES," TO CORRECT THE TITLE OF THE CITY'S STORMWATER MASTER PLAN; AND BY AMENDING SUBPART B - "LAND DEVELOPMENT REGULATIONS," BY AMENDING SECTION 114-1, ENTITLED "DEFINITIONS," IN ORDER TO CORRECT THE NAME OF THE CITY'S STORMWATER MASTER PLAN; PROVIDING CODIFICATION; REPEALER; SEVERABILITY; AND AN EFFECTIVE DATE.

RECOMMENDATION

The Administration recommends approving the Resolution.

ANALYSIS

The City adopted the 2011 Stormwater Management Master Plan (SWMMP) by Resolution 2012-28068. This plan is intended to be a guide for improving the City's stormwater management system performance for a 20 year planning horizon, with considerations of potential sea level rise over 20 years for stormwater infrastructure and 50 years for seawall heights. Periodically, due to updated climate projections, it is important to update the SWMMP to stay current and viable.

Items such as roadway elevation, levels of service for roads, precipitation design rates and distribution, seawall elevations, and minimum future grade elevations have been presented to the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise on several occasions.

On February 12, 2014, the City adopted Resolution 2014-28499, which approved the recommendation of The Flooding Mitigation Committee to amend the SWMMP so as to modify the design criteria for the water level in Biscayne Bay be increased from 0.5 Ft-NAVD to 2.7 Ft-NAVD for all tidal boundary conditions.

On July 21, 2015, the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise recommend that the seawall cap on all new private construction and all public seawall construction be changed from 3.2 feet NAVD to 5.7 feet NAVD throughout the City; provided, however, that for properties with

existing private seawalls that are being replaced/repaired not associated with new building construction, the Panel recommended applying a minimum 4.0 NAVD elevation, as long as the structural design to accommodate a seawall height extension to a minimum 5.7 NAVD.

On May 11, 2016, the Mayor and City Commission adopted Ordinances 2016-4009, relating to amending Chapter 54 of the City Code entitled "Floods" to define City of Miami Beach Freeboard, and modify how grade elevation and height are defined due to flooding and climate change.

Also on May 11, 2016, the Mayor and City Commission adopted Ordinance 2016-4010, relating to amending Chapter 118, of the Land Development Code, to incorporate the same Freeboard definitions, and procedures for how to determine grade elevation and height as a result of flooding and climate change.

The SWMMP needs to be amended to incorporate modifications to the standards for the construction of new roads, stormwater systems, and developments; which standards would incorporate higher elevations in order to reduce the risk of flooding; redefine the level of service and design storm; and define minimum "future grade" and seawall heights.

At the Mayor's Blue Ribbon Panel on Flooding and Sea Level Rise on July 18, 2017, the members discussed and recommended that the SWMMP be codified and require a super majority of the Commission to reduce the resiliency standards incorporated therein. Sea level rise and flooding is an ongoing concern of the City. Low lying infrastructure including buildings must either retrofit and adapt to increased water levels or elevate in order to reduce risk or maintain low risk from potential flood damage. It is appropriate to ensure that the SWMMP, as may be amended, gets incorporated into Chapter 54, of the City of Miami Beach's City Code, entitled "Flooding".

The proposed Ordinance specifically adopts the SWMMP as may be amended in the future. All developments or applications for development permits shall comply with the SWMMP. In addition, the adoption of any ordinance that would reduce, relax, diminish, or repeal the requirements of Chapter 54, shall require a 5/7 vote of the City Commission.

The City's SWMMP provides guidance and regulations to ensure minimum flood-proofing requirements to protect residential and commercial structures, and to provide additional levels of protection to maintain consistency with U.S. Federal and State guidance.

Following discussion at the City Commission meeting of October 18, 2017, additional language was added to the Ordinance amendment on the dais, requiring a 5/7 vote of the City Commission in order to repeal or modify the voting mandate.

CONCLUSION

The Administration recommends approving the Resolution.

Legislative Tracking

Public Works

Sponsor

Commissioner John Elizabeth Aleman & Co-sponsored by Commissioner Joy Malakoff

ATTACHMENTS:

Description

- FINAL ORDINANCE

11:42:56 a.m.

R7 O ~~A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, ACCEPTING THE RECOMMENDATION OF THE CITY MANAGER, PURSUANT TO REQUEST FOR PROPOSALS (RFP) NO. 2016-166-KB, FOR DESIGN/BUILD SERVICES FOR RIGHT-OF-WAY INFRASTRUCTURE IMPROVEMENT PROGRAM FOR NEIGHBORHOOD NO. 5 LA GORCE, AWARDING THE GROUP 3 - NORTH AREA, TO DAVID MANCINI AND SONS INC., WITH THE TOTAL CONTRACT PRICE IN THE AMOUNT OF $24,002,128; AND AUTHORIZING A TEN PERCENT (10%) OWNER'S CONTINGENCY FOR THE GROUP 3 - NORTH AREA WORK IN THE AMOUNT OF $2,400,213; AND FURTHER AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE A DESIGN BUILD AGREEMENT.~~

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, REJECTING ALL BIDS RECEIVED, PURSUANT TO REQUEST FOR PROPOSALS (RFP) NO. 2016-166-KB FOR DESIGN/BUILD SERVICES FOR RIGHT-OF-WAY INFRASTRUCTURE IMPROVEMENT PROGRAM FOR NEIGHBORHOOD NO. 5 LA GORCE; AND DIRECTING THE ADMINISTRATION TO REISSUE A NEW REQUEST FOR PROPOSALS FOR THE PROJECT.

Public Works/Procurement

ACTION: Resolution 2018-30312 adopted. Item separated by Mayor Gelber and heard in conjunction with C4 O. Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Alemán and Arriola. See motions below and direction. **Roy Coley and Alex Denis to handle.**

MOTION 1:
Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Arriola and Alemán.

MOTION 2:
Motion made by Commissioner Alemán to refer the Resolution regarding the undergrounding for North Bay Road and Alton Road to the Neighborhood/Community Affairs Committee; seconded by Commissioner Rosen Gonzalez. Voice vote: 7-0. **Kathie G. Brooks to place on Committee agenda. Roy Coley and Alex Denis to handle.**

MOTION ON NEW ITEM:
Motion made by Commissioner Alemán to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Vice-Mayor Steinberg. Voice vote: 4-3. Opposed: Commissioners Góngora, Rosen Gonzalez, and Samuelian. **Roy Coley and Alex Denis to handle.**

City Clerk's Note: On May 20, 2018, Commissioner Góngora requested via email that the after-action reflect that he did not vote as he intended on the motion on the "new item." Commissioner Góngora stated that he was away from the dais when the initial discussion on this item occurred, and as a result voted incorrectly.

REFERRAL:
Neighborhood/Community Affairs Committee to discuss undergrounding for North Bay and Alton Road.

Commissioner Samuelian expressed his desire for some thoughtful discussion on this item.

Mayor Gelber explained that there is a motion to discuss this item at the Finance and Citywide Projects Committee and simultaneously there is an award to the RFP that the City Commission must choose, as it cannot do both. He asked Mr. Coley to introduce the issue to inform the public better on the matter.

Roy Coley, Public Works Director, explained that this is an award of a comprehensive neighborhood improvement project, which is part of the La Gorce Neighborhood Project from 59th Street to 63rd Street on upper North Bay Road. The project includes the replacement of the drinking water system, the waste water system, installing new storm water systems for rainfall, elevating the roads to mitigate against sea level rise, and installing new lighting systems. The reason for the time sensitivity is that the Florida Department of Transportation has a project scheduled that will range from Michigan Avenue to 63rd Street on Alton Road taking place between 2021 and 2023. It is his opinion that the City should not have this area under construction during that time because North Bay Road will be an alternate means to traverse traffic. Time is of the essence. He is asking the City Commission to consider enhancing the blue and green infrastructure in all the City's projects as indicated in the Urban Land Institute (ULI) and Harvard studies.

Mayor Gelber asked Mr. Coley to explain the meaning of blue and green infrastructure.

Mr. Coley explained that there are typically three types of infrastructure: gray, blue, and green. Gray is considered engineered structures such as pipes, pumps, and roads. Green is considered vegetation such as grass areas, trees, and things of that nature. Blue are holding ponds, reservoirs, and possibly wet lands. The two studies suggested the City add more of the green and blue areas, yet the contractors were asked to respond to a design criteria that did not include these enhancements. Currently, the City is in a cone of silence with this process. They do not have the ability to go to the potential awardee and ask them for proposals and pricing and how they would enhance blue and green infrastructure hence why they recommend the City approve an award to allow the contractors to be notified to proceed with only the design. After that, the City can then request the contractor with the enhancement costs of blue and green infrastructure enhancements. The City Commission would give the final approval on the designs.

City Attorney Aguila asked Mr. Coley whether his statement was consistent with the City Manager's recommendation in the package to award Group 3.

Mr. Coley stated that awarding Group 3 is an amendment to the City Manager's recommendation to authorize only notice to proceed for design only, and then return to the City Commission for approval.

City Attorney Aguila asked Mr. Coley whether he was amending the City Manager's recommendation on the floor during this meeting.

Mr. Coley answered in the affirmative that he is in fact amending the City Manager's recommendation. He explained that without the amendment, the City could not engage with the contractor due to the cone of silence. The addition of blue and green infrastructure will affect the overall design of the project, it is important that they discuss this with the contractor.

Commissioner Rosen Gonzalez asked whether it would be better to get the blue and green infrastructure design and then award the contract.

Mr. Coley explained that if the City were to take that approach, the project would have to be restarted from the beginning. A great deal of time would be lost.

Commissioner Rosen Gonzalez stated that this is very stressful for Commissioners. Several residents have shared photos with her of streets and businesses being completely flooded. Many residents believe they are worse off now than before. Some are even threatening to sue the City. She is now seeing the Administration rushing ahead with this project when it should pause. She addressed Mayor Gelber and asked him to lead and get a red team to fix this problem. Not all neighborhoods are in bad shape, Sunset Islands I, II, III, and IV are doing fine after the City did its resiliency project, and that is because the City did not raise the roads. She asked the Mayor and City Manager to put a six-month pause on this project.

City Manager Morales expressed his hope that the Administration receives clear direction from the City Commission on this matter. This item was deferred from last month. In fact, The City Commission could have been issuing an RFP for the entire three areas. The City is now focusing on the lowest area, which has the most need for flood protection. There needs to be a decision made today, he believes the City's commitment to move forward on this project is important.

Commissioner Samuelian stated that the red team and ULI had a lengthy discussion about undergrounding in this neighborhood. He asked how the undergrounding would affect the RFP.

Mr. Coley replied that in his opinion, if the undergrounding were to begin today the undergrounding project would take approximately seven to eight years.

Commissioner Samuelian asked whether the RFP included any undergrounding provisions.

Mr. Coley stated that undergrounding utilities is not part of this project.

Commissioner Góngora stated that it is unusual to have a City Manager recommendation modified and amended on the floor during a meeting. He is having serious concerns about the increase in road heights. Residents do not seem to have confidence in this project. He is also concerned about pausing this project, because it will not get them to a final destination. The City Commission needs to decide as to what it is going to do. He would like significant undergrounding work to take place, improve pipes, and avoid future flooding.

Mayor Gelber stated that this RFP only implicates North Bay Road. He asked members of the public who want to speak on the subject to approach the podium.

Alex Heckler, on behalf of David Mancini, spoke in favor of supporting the recommendation of this item. Group 3 is at the lowest level of elevation and in the most need of drainage, water, and wastewater. There has been much misinformation going around and designs are not modeled on modern designs. Both the ULI and Harvard studies recommended that the City not stop.

Sid Feltenstein read the Harvard study and attended the ULI session. He believes both studies were critical of the City, as they believe Miami Beach does not have a plan to live with water. The City needs a plan to know what enhanced green space will do. A model needs to be created and then financed. He cannot imagine going forward without this information. He shared a maxim he uses in his line of work: “If you don’t know where you are going, any road will get you there.”

Jaime Robinson, lifelong Miami Beach resident, highlighted the deficiencies in planning the Hibiscus project. This project taking place on North Bay Road is now experiencing the same problem. She wants the money earmarked for this neighborhood to be provided to this neighborhood.

Jane Kahn Jacobs, lifelong Miami Beach resident, stated that she expects the elected officials to listen to experts in the field. This is not the time to vote on awarding contracts. She wants a review of the storm water and other corroded pipes. She urged the City Commission to study the Harvard report.

Joy Malakoff stated that she served four years on the City blue ribbon panel ex-officio on sea level rise. She believes she is knowledgeable on the subject. She lives north of 59th Street, and asked the City Commission to listen to the people who live in the area. She believes the City should go forward with this part of the project. She agrees that the blue and green projects will help in the future. The City is on the right path, and should not continue putting off the project.

Nancy Bernstein stated that her street does not flood. Her street used to flood a decade ago, but since the gutters and drainage system were cleaned up there has not been any flooding. She wants the City to rethink the green and blue projects. She concluded by saying that her trust in her elected officials is changing.

Glenna Norton disagreed with the project taking place on half the street. If it is to be done, it needs to be done on the entire street. The City needs experts with training, knowledge, and goals.

Bruce Bender stated that he lives on 59th Street and Alton Road and has had four floods since moving in. He has done everything humanly possible to stop the flooding, but it is still happening. He has time stamped photos of a foot of water everywhere on and around his property. He is desperate and does not know what else to do.

David Mancini addressed Commissioner Rosen Gonzalez and stated that Sunset Harbour Islands I and II are failing because the roads were not elevated. He clarified that all the undergrounding projects have been stopped by residents; this is because of the

necessary easements that residents continually refuse. When this City Commission allows residents to dictate its projects that is when the trouble begins.

City Attorney Aguila restated that the recommendation has been amended to award the RFP for Group 3 north area to David Mancini and Sons with a contractor price of $24 million and contingency further authorizing the Administration to issue a notice to proceed for design only with the final project design subject to and contingent upon prior City Commission approval authorizing the awards of Groups 1 and 2 at a later date.

Commissioner Alemán stated that before the City Commission starts talking about options and what they will do, she believes this conversation warrants a much lengthier discussion.

Mayor Gelber stated that he wants everyone present to know the options; the City needs to get this right.

Discussion held.

Commissioner Alemán stated that this is the most important issue the City is currently facing. It is the City's future. She shares everyone's concerns that we all want to protect our property values and have our City thrive. We need to remind ourselves of that. There is nothing wrong with the current system, only that the times have changed. This City relies enormously on its pumps. Without the pumps, North Bay Road would be in a great deal of trouble. Nature has gotten stronger, and as such, we need to be better prepared. Some people have stated that the City does not have a plan when it comes to sea level rise, and that is not true; the City does have a strategy, which is incremental.

Mayor Gelber stated that the RFP is trying to catch up with the green and blue requirements from the ULI study.

Commissioner Alemán would like to award Group 3 today and include funding for above and below ground improvements. There are funds for the above ground portion, but the undergrounding portion is another issue.

City Attorney Aguila stated that undergrounding takes much longer to complete as Mr. Coley stated previously. To do an undergrounding project, they must first determine the special assessment district and they would additionally need an estimate from FPL.

Commissioner Alemán stated that the undergrounding that took place in other neighborhoods was approximately $20,000 per house. Any other undergrounding project should be around the same price.

Discussion continued.

Commissioner Góngora asked whether the City Commission has ever used this mechanism when there is an RFP for vote to provide funds, but instead the City Commission gives the Administration notice to proceed and go with an RFP and do enhancements and design changes.

City Attorney Aguila stated that he does not recall any instance when this has happened.

Commissioner Góngora stated that if the RFP comes before the City Commission and it needs enhancement and design changes, the proper legal vote is to reject the RFP and start over with something entirely new. He wants to move forward with this project, but he finds it incredibly imperfect. The Administration stated that the Group 3 project would cost $24 million, but now that it needs enhancements and design changes, it will not be $24 million, and it will be much more. He believes the contractors do not want to redo a proper RFP and incorporate the comments addressed so far. He does not want to gamble $24 million, he wants to move forward with this project, but it must be done correctly. He does not want the neighbors to have to come back to the City Commission to complain further. He has no problem, however, in beginning the process of a special taxing district so long as the neighbors want it.

Commissioner Rosen Gonzalez stated that the pause she is requesting is not specifically for this project. Her worry is that the City is arbitrarily picking neighborhoods to do these resiliency projects. The current plan does not include blue and green areas; it is now incomplete. One cannot simply agree to add blue and green infrastructure to the swales and claim it is done. A study needs to be done. She asked how much money has been spent on the project so far.

Eric Carpenter, Assistant City Manager, replied that minimal time has been spent on this project so far, so the costs are minimal.

Commissioner Rosen Gonzalez stated that she would be in favor of rejecting this RFP today. She wants to set a meeting and incorporate blue and green areas. The City needs vision and a complete reevaluation to start over.

Commissioner Góngora agreed and stated that he is afraid that this project is not going in the right direction.

Commissioner Rosen Gonzalez stated that the City Commission needs to give direction of where this project should go.

Commissioner Samuelian stated that there is no doubt the City is in need for a flooding and sea level rise program. It needs to be done right. The mistakes that are made along the way can cause terrible problems in the long run. Doing nothing is not an option, but going about the problem the wrong way is even worse. He believes the City needs to rethink the street raising policy. He is not advocating to stop completely, but to say it must be 3.7 NAVD across the board has been the single most controversial policy that has been causing problems. He wishes people would be excited for this project, but that is not what is happening. People are complaining throughout the City, because residents are not seeing the value of what the City is doing.

Commissioner Arriola stated that he generally leans towards undergrounding utilities. The City has some magnificent homes and it looks very odd to have that in contrast with outdated utility poles. Unfortunately, the City is at the mercy of FPL in terms of undergrounding utilities. FPL does not have undergrounding as a priority. He is unsure why people are pushing for undergrounding at the moment, when it is an impossibility during the next 18 to 24 months, and even after that wait time, the project will still take at least six years. He agrees to issue another RFP to be looked into the Administration during the next 90 days and work with the Florida Department of Transportation to incorporate blue and green infrastructure.

City Attorney Aguila asked whether the procurement process could be expedited to 30 days.

Assistant City Manager Carpenter stated that would not be possible. He explained that a typical RFP, where there is a clearly defined scope, would take from 90 days to six months, even when expedited. An RFP of this magnitude with changing scope will take every bit of six months.

City Attorney Aguila stated that the scope is already there, and they are simply adding blue and green infrastructure.

Vice-Mayor Steinberg asked what the difference is between design-build and design-bid-build projects.

Assistant City Manager Carpenter explained that in the design-bid-build delivery method, the City has full design package and a direct consultant with the City to put out a bid procurement and go with the lowest responsive and responsible bidder. Design-build process hires a design builder that is a team of contract and design consultants that will put the design package together and ultimately give the City a price for the completed project. As an engineer, he prefers the design-bid-build method, but Miami Beach favors the design-build option. The problem with the design-build method is that if the City Commission wants to change the scope of the design, the designer needs to be contacted to amend the design and have a contractor again price the design changes and bring it back to the City Commission.

Discussion continued.

Commissioner Alemán asked that if the City goes forward, how the City would work with the design-build method, and getting public input into the design.

Assistant City Manager Carpenter replied that the first things they would ask the contractor when they sit down and negotiate the final contractual mechanism is for them to provide the City a copy of the public engagement and contractual requirement. There are very few things the City seems to be at odds with the residents, but they can be worked out.

Commissioner Alemán stated that some people are calling this project an experiment. She asked Assistant City Manager Carpenter whether that statement is true.

Assistant City Manager Carpenter stated that water and sewer projects are things the City has done hundreds of times. These projects take place here and throughout the country. Water and sewer repair is what it is; it is not an experiment. The Administration has implemented pipes and pumps in multiple neighborhoods in Miami Beach. The neighborhoods where the new pumps have been installed have been happy with the results. There have been a few challenges with the early projects they have implemented and multiple iterations have gone through even during the 90s. Exfiltration trenches, gravity wells, injection wells, pumped outfalls, and raised streets have all been tried out, and they are building on the lessons learned in the past to make it better. He restated that this project is not experimental as it is using tried-and-true technology.

Mayor Gelber stated that this is very difficult choice, and the truth is that every expert has stated that the City must do something to raise the streets and put in pumps. While the City is busy doing this, it needs to take care of the water needs. These are not easy things to talk about and the City's staff is trying to learn from what has been done in the past. Very few cities are as low lined as Miami Beach, and experts have stated that what Miami Beach is doing will protect the community's assets. If nothing is done, no bank or mortgage lender will provide funds, and property values will tumble in South Florida. He added that currently the only City that has not had a decrease in property values in South Florida has been Miami Beach.

Commissioner Alemán stated that if the City Commission awards Group 3 it already has the mechanisms by which the green and blue infrastructure could be introduced appropriately. She disagreed with the Mayor's statement and highlighted that Miami Beach single-family homes have in fact declined 2% in value during the last two years. She believes the City should continue its current path. This is not only her opinion, but also the opinion of bonding agents she has spoken to.

Commissioner Góngora stated that everyone has ideas on what strategy Miami Beach should take. The discussion of undergrounding utilities is nothing new to this City Commission. He does have some concerns with some of his colleagues who want to move forward at all costs. No City Commission has ever chosen to have an RFP come before the City Commission only to have it amended to ask the City Commission to trust the Administration in redrafting the RFP after the fact. He cautioned the City Commission again that the $24 million cost is not actual given that the project needs to undergo enhancements and design changes.

MOTION 1:
Motion made by Commissioner Góngora to reject the current RFP and issue a new RFP; seconded by Commissioner Rosen Gonzalez. Voice vote: 5-2. Opposed: Commissioners Arriola and Alemán.

MOTION 2:
Motion made by Commissioner Alemán to refer the Resolution regarding the undergrounding for North Bay Road and Alton Road to the Neighborhood/Community Affairs Committee; seconded by Commissioner Rosen Gonzalez. Voice vote: 7-0.

1:32:05 p.m.
NEW ITEM:
Commissioner Alemán motioned to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Vice-Mayor Steinberg. **Roy Coley and Alex Denis to handle.**

Mayor Gelber called for a vote.

Some members of the Commission voted in the affirmative, but there was confusion by some members of the Commission that a vote was being taken.

Commissioner Rosen Gonzalez asked Commissioner Góngora whether he heard the motion.

Commissioner Alemán restated the motion.

Commissioner Góngora stated that he is unclear as to what the Commissioner is asking for.

Vice-Mayor Steinberg explained that the City Commission does not want to pause, but move forward with the best process and have all the information on whether to proceed with a design-build or design-bid-build in incorporating green and blue infrastructure.

City Clerk Granado stated that although the vote took place, Commissioners Góngora and Samuelian had not yet voted.

Commissioner Rosen Gonzalez objected to the vote as it was unclear what was going on at the time. There is still confusion on the green and blue infrastructure, and whether there is green impermeable infrastructure underneath the raised roads. She does not believe David Mancini is the expert authority on this. Someone like Rem Koolhaas should be overseeing this, not Lanzo Construction. Do not bring C quality to an A quality City. We cannot continue starting projects in neighborhoods without clear vision.

Commissioner Alemán asked whether there would be a new vote.

Mayor Gelber stated that the vote should be redone as it went by fast, and people were unclear as to what was going on.

Mayor Gelber stated that this item would queue up the next project, which is what the City Commission had been talking about previously.

Commissioner Samuelian stated that he has not seen the Master Plan with the project priorities. The priorities have not been discussed by this Body and he would like that discussion to take place.

Commissioner Alemán addressed Commissioner Samuelian and stated that if he has not looked at the Master Plan in the six months since being elected – shame on him. This is the most important plan this City has ever seen. The motion she made is to go forward with the plan.

Commissioner Samuelian replied to Commissioner Alemán, with all due respect, that he has dedicated a great deal of time to the Master Plan, and even so, he is not clear as to what the priorities are. Before agreeing on the next project, he would like the City Commission to go over the Master Plan.

Mayor Gelber explained that this item is simply queueing up the next project. There will be ample time to weigh in on it. The world needs to know that we are not stopping what we are doing. He will support the Commissioner's motion.

Commissioner Samuelian offered an amendment that he would like to proceed with the next project, and have the City Commission simultaneously discuss the Master Plan and its priorities so that everyone on the City Commission has a context of the big picture.

Commissioner Alemán rejected the amendment, but invited Commissioner Samuelian to make a separate motion. The City Commission needs to send a clear message to the world that Miami Beach is committed to resiliency.

Commissioner Arriola stated that the City is doing a pause by another name. It can be called requesting a study or issuing a new RFP.

MOTION ON NEW ITEM:
Motion made by Commissioner Alemán to direct the Administration to immediately prepare the next procurement package according to the City's current roll out schedule and consider whether to have it as a design-build or design-bid-build; seconded by Commissioner Steinberg. Voice vote: 4-3. Opposed: Commissioners Góngora, Rosen Gonzalez, and Samuelian.

City Clerk's Note: On May 20, 2018, Commissioner Góngora requested via email that the after-action reflect that he did not vote as he intended on the motion on the "new item." Commissioner Góngora stated that he was away from the dais when the initial discussion on this item occurred, and as a result voted incorrectly.

Handouts and Reference Materials:
1. Resolution drafted by Commissioner Rosen Gonzalez
2. Email from Commissioner Góngora, dated May 21, 2018, entitled "Question."
3. Email from Raul Aguila dated May 21, 2018 to Commissioner Michael Góngora, Diana Fontani and Debora Turner RE: Question regarding correcting a vote.

Miami Beach United
Flooding / Sea Rise Planning Resolution
August 3, 2017

Whereas, Miami Beach United supports efforts to ensure against flooding and the effects of sea rise, and

Whereas, the current pace and method of trying to protect the City against the threat of sea rise has caused the disruption of life for Miami Beach residents, tourists and businesses, and

Whereas, Miami Beach has completed work on the city's most vulnerable streets, and the City is planning to extend the timeline of its previous flood protection plan by approximately 3 years, and

Whereas, the City is in the midst of investing hundreds of millions of residents' and tourists tax dollars, and new technologies and techniques are evolving quickly and may allow for more effective solutions in the future than those that were planned several years ago, and

Whereas, neighborhoods are subject in different ways to risk from sea-level rise, with specific local challenges that merit consideration of specific solutions rather than a uniform, one-size-fits-all approach;

THEREFORE, Miami Beach United urges the City to improve planning and implementation for future storm water/flooding projects, including both public works and related legislation, by taking the following steps:

1. Determine the urgency of public works necessary in each neighborhood and prioritize City actions and time lines in conjunction with neighborhood input.

2. Engage and work together with affected neighborhood associations to address specific local needs and conditions, and fully respond to those questions or concerns before finalizing public works plans. Attention should be given to the implications of raised streets, sidewalks, or alleys upon private property owners.

3. The same transparent, community-inclusive approach process should be followed before enacting changes in zoning, redevelopment incentives, or other guidelines for new private development based on long-term sea-level rise.

4. Special attention should be given to guidelines that protect and enhance historic buildings and neighborhoods, developed with formal community input at the Historic Preservation Board, specific to each affected historic district.

5. Provide full disclosure of a plan's impact upon the removal of parking or landscaping in residential neighborhoods, as parking is limited and landscaping is a key element to protect urban spaces from flooding.

6. Add emergency generators to flood pumps to reduce flooding when power outages occur.

7. Research new solutions and technology for water retention and protection against flooding, and provide independent review from unbiased experts to assess learnings to-date and future plans.

8. Use every effort to abate traffic congestion while roads are being raised.

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION TO EXPLORE NEW FEDERAL FUNDING FROM FEMA FOR SEA LEVEL RISE MITIGATION.**

RESPONSIBLE DEPARTMENT:
Judy Hoanshelt, Grants Management Division Director

LEGISLATIVE TRACKING:
Item C4H - June 06, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

Analysis
Presentation at Committee Meeting.

ATTACHMENTS:

	Description	Type
🗋	Attachment A: Commission Referral	Other

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Commissioner Mark Samuelian
DATE: June 6, 2018

SUBJECT: REFERRAL TO THE SUSTAINABILITY AND RESILIENCY COMMITTEE TO EXPLORE NEW FEDERAL FUNDING FROM FEMA FOR SEA LEVEL RISE MITIGATION.

ANALYSIS

As the Urban Land Institute Panel accurately identified during their presentation on April 19th, funding is critical for an effective adaptation strategy. While the City of Miami Beach continues to explore various venues, one stakeholder that cannot be forgotten is the federal government. In fact, some of the City's adaptation needs may fall under categorization for Federal Emergency Management Agency (FEMA) mitigation funding, and that should be pursued. The city already has relationships with the agency--for instance, On April 7th Commissioner Mark Samuelian gave a certificate of recognition to FEMA Assistant Administrator Nick Shufro. These relationships make FEMA a natural stakeholder (please see attached document especially pgs. 3, 4, 8, 10, and 11).

Legislative Tracking
Commissioner Mark Samuelian

ATTACHMENTS:

Description

- FEMA - Mitigation Presentation

Mitigation in a Changing Environment: Preserving our Heritage while Investing in Mitigation for a More Resilient Nation

Miami Design Preservation League –

2nd Annual Resiliency Workshop April 7, 2018

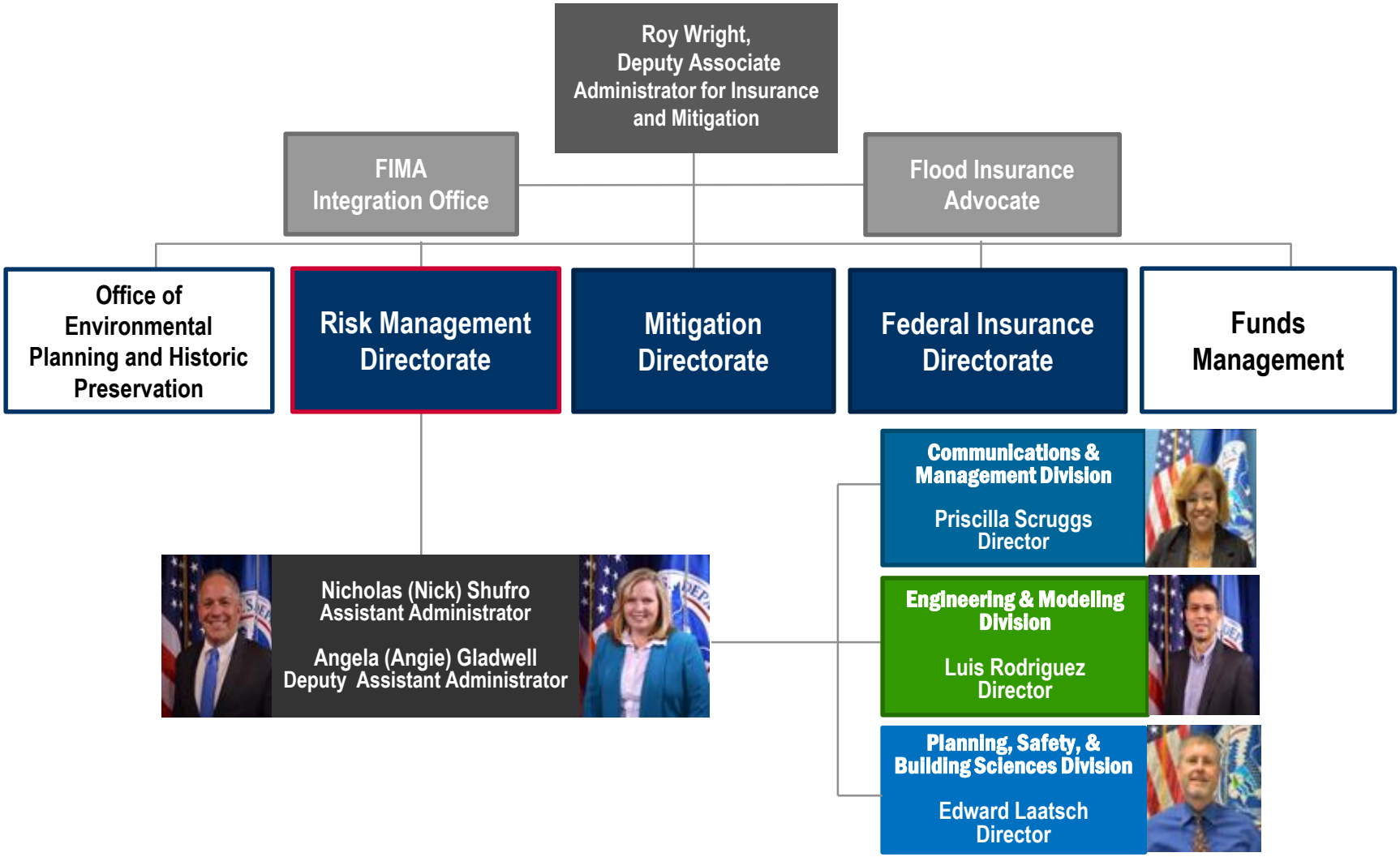
***Nick Shufro**, Assistant Administrator, Risk Management Directorate,*
Federal Insurance and Mitigation Administration

FEMA

Risks and impacts are evolving

FEMA by the numbers

Federal Insurance and Mitigation Administration



Risk Management Directorate's Divisions and capabilities

Communications & Management Division

- ✓ Drives agile and predictable business excellence
- ✓ Manages customer experience
- ✓ Oversees data and IT systems
- ✓ Aligns and ensures engagement with regional partners

Engineering & Modeling Division

- ✓ Serves as the technical authority on national flood hazard mapping program
- ✓ Manages the policy, technical development, and production of flood hazard maps
- ✓ Provides predictive risk and loss analytics to support disaster operations and multi-hazards risk assessment

Planning, Safety & Building Science Division

- ✓ Serves as subject matter authority on multiple program include: Earthquake Hazard Reduction, Mitigation Planning, and National Dam Safety,
- ✓ Supports development and adoption of building codes and standards.

Mapping Miami

- Miami Beach coastal study dates from 1993-1994
- Effective study for Miami-Dade County (includes Miami Beach) dated 9/11/2009; study updated to include inland areas that flood due to rainfall
- The coastal study is presently being redone. The Flood Risk Review (FFR) Meeting is projected to take place in Spring 2019 and the Preliminary Maps are anticipated to be issued Fall 2019
- Miami Beach has asked FEMA to include sea level rise (SLR) in the new study. The only SLR data will be the flood risk products that include 1, 2, and 3 feet increases – this has been discussed with the community

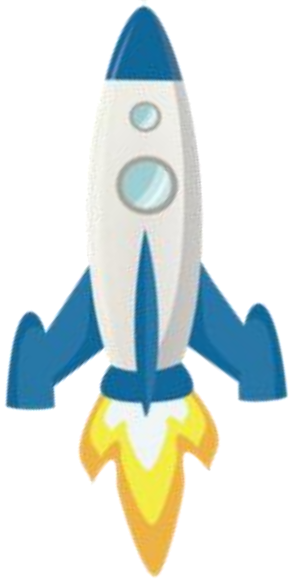
FEMA Strategic Plan 2018-2022 summary infographic

FIMA Moonshots aligning to FEMA's Strategic Objectives

FEMA Strategic Objective 1: Build a Culture of Preparedness

Alignment through Mitigation Moonshot

Strategic Objective 1.1: Incentivize investments that Reduce Risk, including pre-Disaster mitigation and reduce disaster costs at all levels

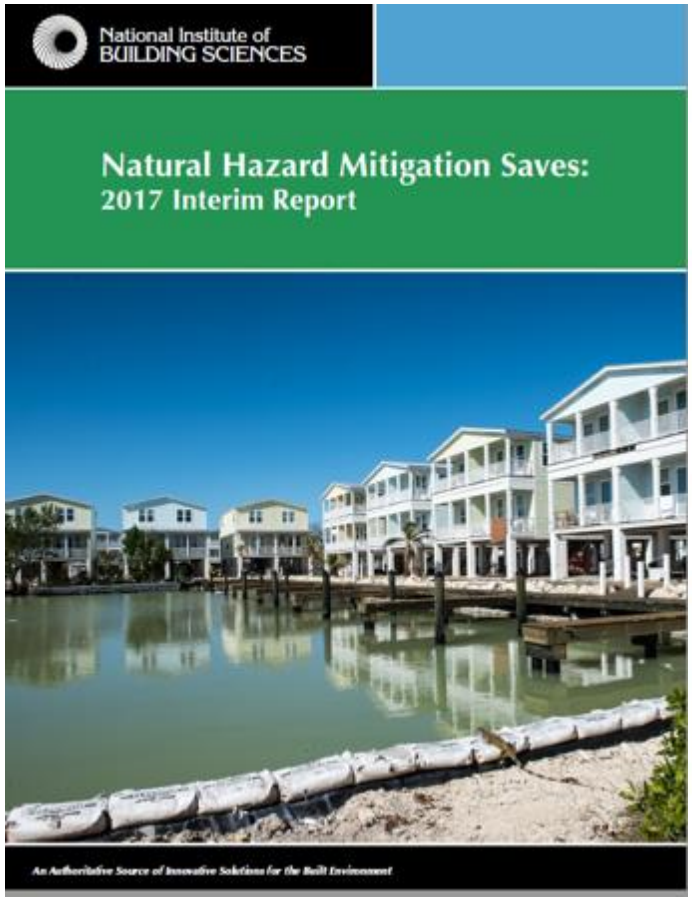


Alignment through Insurance Moonshot

Strategic Objective 1.2: Close the insurance gap

Anywhere it can rain, it can flood

Mitigation's return on investment



National Benefit-Cost Ratio (BCR) Per Peril *BCR numbers in this study have been rounded	Beyond Code Requirements	Federally Funded
Overall Hazard Benefit-Cost Ratio	$4:1	$6:1
Riverine Flood	$5:1	$7:1
Hurricane Surge	$7:1	Too few grants
Wind	$5:1	$5:1
Earthquake	$4:1	$3:1
Wildland-Urban Interface Fire	$4:1	$3:1

National Mitigation Investment Strategy: Proposed Outcomes

Coordination of risk mitigation and management improves between and among federal, public, and private and non-profit sector entities

Private and non-profit sector entities increase their investments in and innovations related to resilience and mitigation.

State, local, tribal, territorial entities increasingly share responsibility and accountability for risk reduction with the federal government.

Public, private and non-profit sector entities develop and share more of the data and tools needed to make risk-informed mitigation investments.

Public, private, and non-profit sector entities improve risk communication, leading to more risk-informed mitigation investments by individuals and communities.

The built environment – whether gray or nature-based infrastructure, and including lifeline infrastructure, buildings, and homes – becomes more resilient and promotes community resilience.

What does this mean…?

National Historic Preservation Act
- ❖ Does not guarantee specific outcomes
- ❖ Federal agency actions = triggers compliance requirements

FIMA's Mitigation Role
- ❑ Pre-disaster Mitigation Assistance
- ❑ Hazard Mitigation Assistance….

FIMA's Mandates:
- ✓ Insurance
- ✓ Mitigation
- ✓ Mapping
- ✓ E&HP Compliance
- ✓ Building Science
- ✓ Risk Management

Pathways
- Sufficient scale may be achieved via any number of defined paths

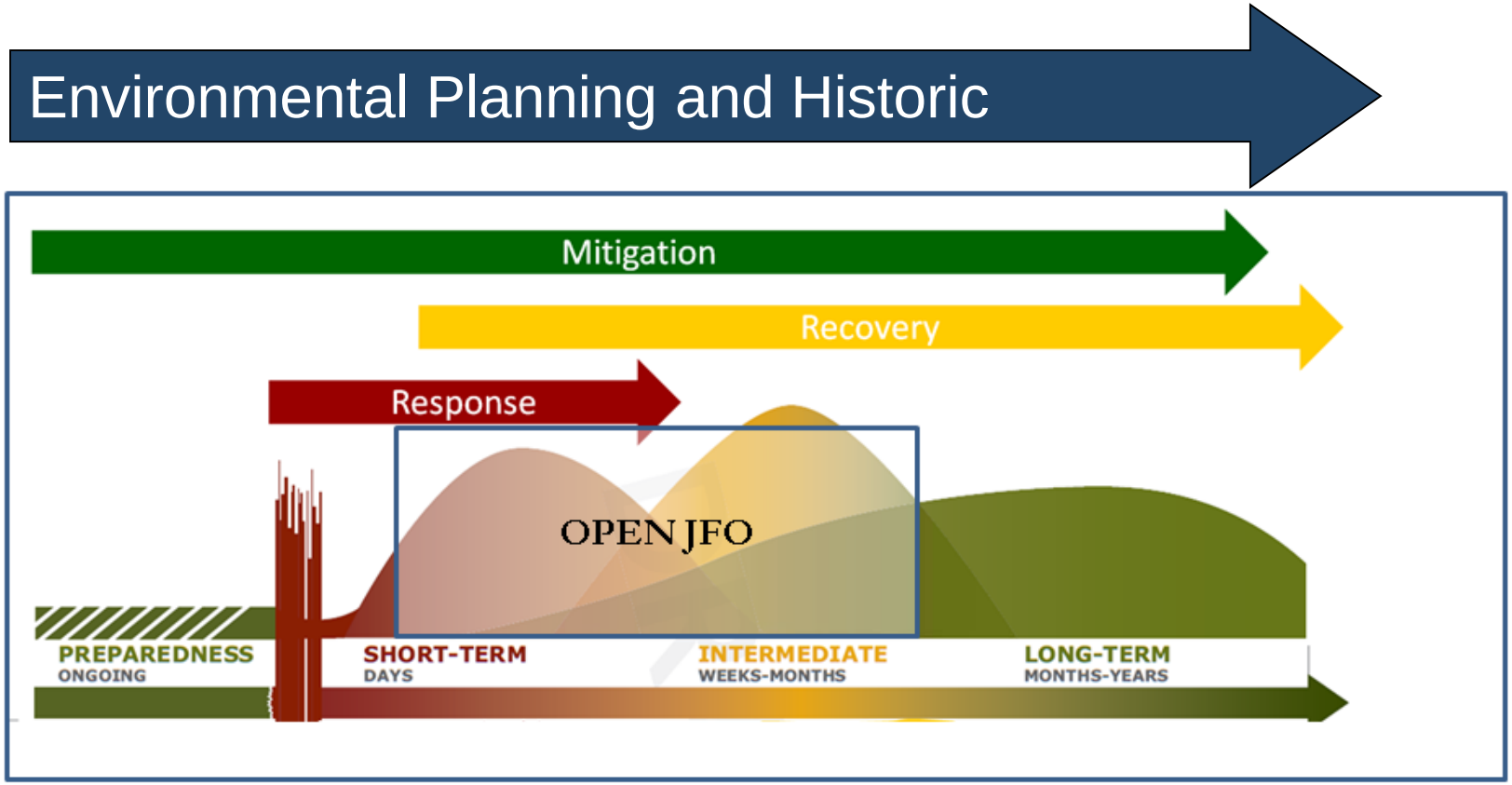
EHP Engagement
- FEMA grant programs identified
- NHPA Compliance evaluates how project can avoid, minimize and/or compensate

Building Codes
- ➢ Developed/implemented at state, and local, not federal level
- ➢ Tied into floodplain management
- ➢ FIMA supports consensus-based and strongly enforced standards

Community's Role
- ○ Asks the questions / determines what it wants
- ○ Develops actionable and achievable goals (grant programs, etc.)
- ○ Initiates the journey

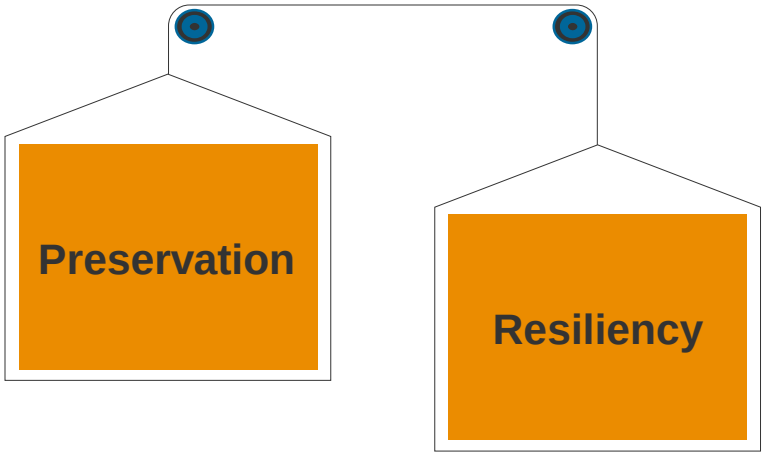
FEMA EHP Mission

Help communities reduce the impact that disasters and emergency management decisions and operations have on the nation's natural and cultural resources

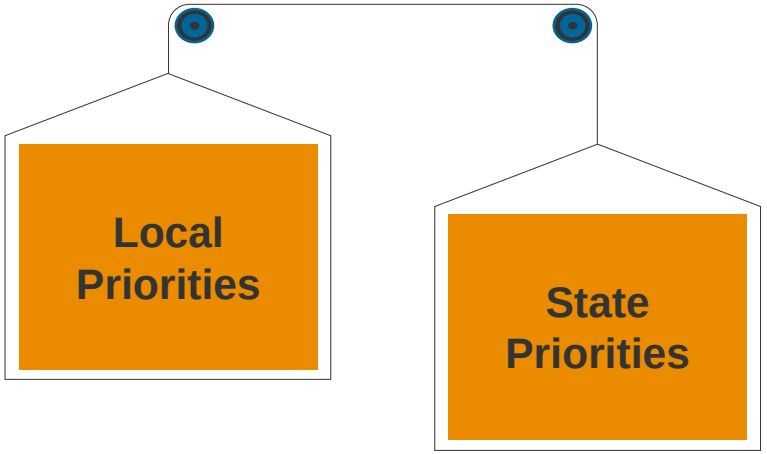


EHP is part of the Whole Emergency Management Lifecycle

Inherent Tensions Exist – Driving Critical Dialogue and Planning



What are we willing to sacrifice and what matters as we look at the real issues of future risk?

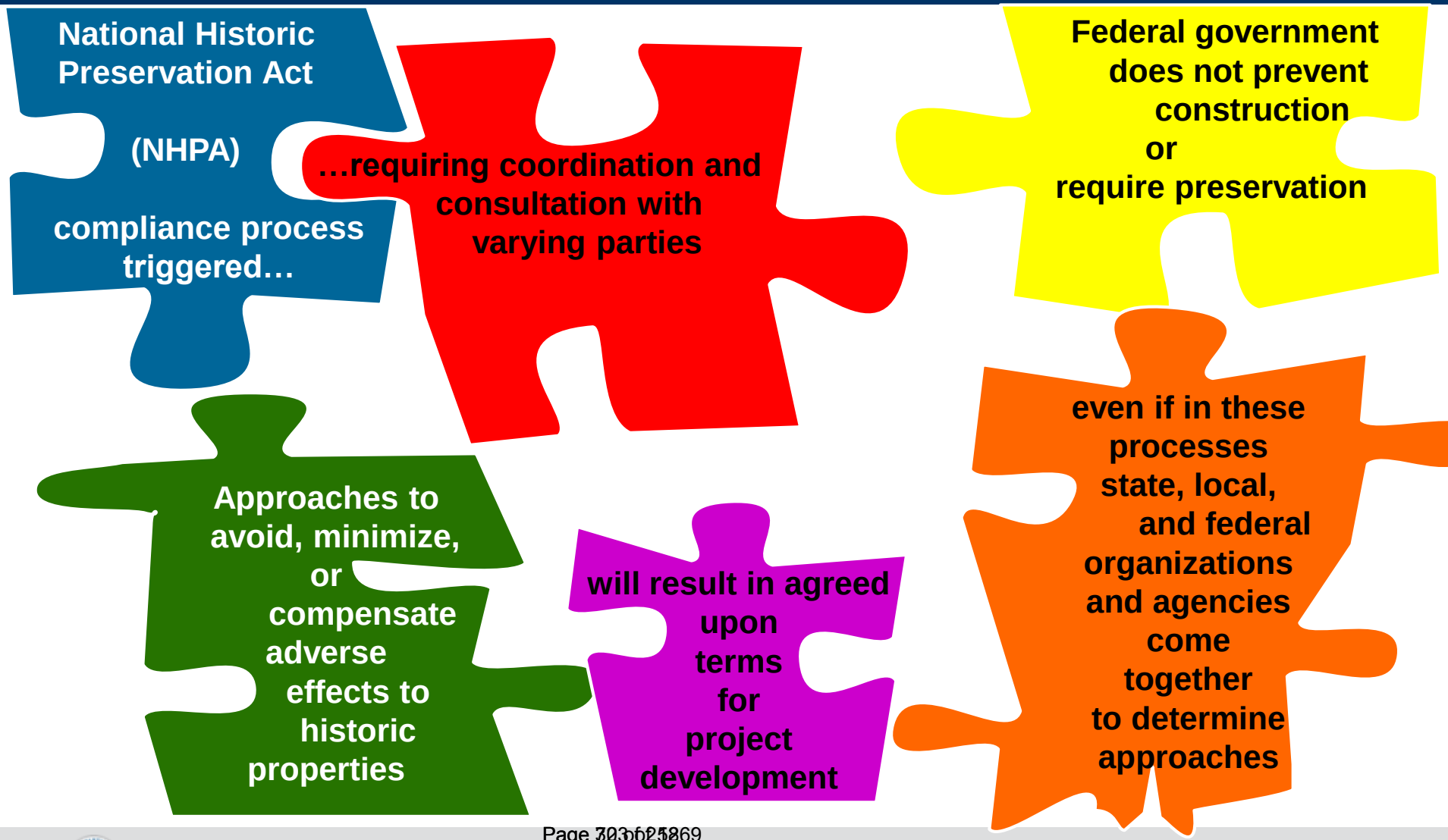


Are the priorities leaning in one direction or another? How do the different perspectives become part of the dialogue?

EHP Compliance Review

- Triggered by FEMA funding of eligible hazard mitigation projects proposed by States and Tribes
- Typically process-driven requirements with no guarantee that natural or historic resources will be protected
- Section 106 of NHPA requires consultation to avoid, minimize, or compensate for adverse effects to historic properties
- In 2017, EHP reviewed over 15,000 grant projects for environmental and historic preservation considerations

Pieces of the puzzle….
when Federal engagement occurs,



MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION ON REPURPOSING OUR GOLF COURSES FOR THE FUTURE**

RESPONSIBLE DEPARTMENT:
John Rebar, Parks and Recreation Director

LEGISLATIVE TRACKING:
Item C4 AB - May 16, 2018 Commission Meeting

SPONSORED:
Commissioner Ricky Arriola

Analysis
Presentation at Committee Meeting

ATTACHMENTS:

	Description	Type
🗋	Attachment A: Commission Referral	Other

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Commissioner Ricky Arriola
DATE: May 16, 2018

SUBJECT: REFERRAL TO THE SUSTAINABILITY AND RESILIENCY COMMITTEE AND TO THE FINANCE AND CITYWIDE PROJECTS COMMITTEE TO DISCUSS REPURPOSING OUR GOLF COURSES FOR THE FUTURE.

ANALYSIS

The City of Miami Beach has 523.96 acres of public green space. Of those 275 acres, over half are reserved for our municipal golf courses.

I ask for the Sustainability and Resiliency Committee to explore the environmental impact of the City's golf courses and how they can be repurposed to optimize our citywide resiliency plan in light of the Urban Land Institute's recommendations and the Harvard University Graduate School of Design's study. I also ask for the Finance and Citywide Projects Committee to examine the financial outlook of our golf courses as new competitors like TopGolf are emerging.

Legislative Tracking
Commissioner Ricky Arriola

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION ON RECOMMENDATIONS FROM THE URBAN LAND INSTITUTE (ULI) REPORT.**

RESPONSIBLE DEPARTMENT:
Susanne Torriente, Assistant City Manager

SPONSORED:
Office of the City Manager

Analysis

1. Infrastructure advancement

- Blue/green infrastructure
- Enhanced, integrated and multi-risk modeling
- Living with water pilot projects
- Level of service
- Income generating solar power
- Blue corridor

2. Design typologies

3. Creative placemaking

- Arts, culture
- Branding

4. Governance (identify, redirect or reorganize staff)

- Delivery Office
- Community Adaptation Program
- Risk Transfer Department

5. Finance/Risk (CRO, CFO)

- Business case analysis

6. Regulation – revamp land use boards (Planning)

7. Integrated Communications, proactive vs. reactive (READY Team, Communications, PW, CIP)

ATTACHMENTS:

Description	Type
Attachment A: LTC 209-2018 ULI Presentation	Other
Attachment B: ULI Presentation	Other

MIAMIBEACH

OFFICE OF THE CITY MANAGER

NO. LTC # **209-2018**

LETTER TO COMMISSION

TO: Mayor Dan Gelber and Members of the City Commission

FROM: Jimmy L. Morales, City Manager

DATE: April 20, 2018

SUBJECT: Urban Land Institute Presentation

I am pleased with the positive, innovative, and comprehensive presentation from the Urban Land Institute's expert panel yesterday. It was well-received by my team and the Greater Miami and the Beaches team. The 100 Resilient Cities initiative, pioneered by the Rockefeller Foundation, fully funded this effort for Miami Beach.

We are looking forward to further reviewing the recommendations and enhancements as we develop both the Greater Miami and the Beaches Resiliency Strategy and the Miami Beach Rising Above Resilience Strategy. The full detailed Urban Land Institute report is anticipated by June 30th, 2018. As discussed at the last Sustainability and Resiliency Committee on April 18th, the recommendations will be holistically examined through the Committee. The presentation and video can be accessed at: www.mbrisingabove.com/ULI

I'd like to thank the staff and the community for their time, insight, and dedication. I specifically acknowledge the preparation by Susanne Torriente, Assistant City Manager & Chief Resilience Officer, Amy Knowles, Deputy Resilience Officer, and Kayla Martinez, Office Associate V. They made sure this was a seamless and productive week for the ULI panel. In addition, Eric Carpenter, Assistant City Manager, Roy Coley, Public Works Director, Maria Hernandez, Convention Center Project Director, David Martinez, Capital Improvement Director, Thomas Mooney, Planning and Zoning Director, and Elizabeth Wheaton, Environment and Sustainability Director shared their expertise and commitment to Miami Beach through presentations and a guided tour. The community came to share their perspectives at the public meeting and many interviews.

I am proud of the resilience team, our city, and I look forward to the next steps of Miami Beach Rising Above.

JLM/SMT/ALK

Urban Land Institute

Miami Beach Stormwater Management & Climate Adaptation

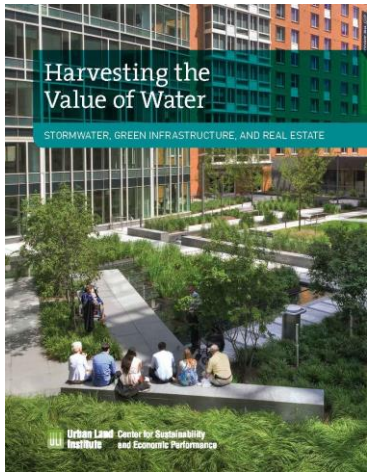
Advisory Services Panel

Miami Beach City Commission Chamber

April 19th 2018

Urban Land Institute

- 40,000+ global real estate and built environment members
- Mission – Responsible use of land, creating and sustaining thriving communities
- ULI Advisory Services Program – Strategic advice to cities on complex land use challenges
- Panel supported by the Rockefeller Foundation's 100 Resilient Cities



Miami Beach Panel

Panelists:

- **Joyce Coffee**, President, Climate Resilience Consulting & Panel Chair
- **Juanita Hardy**, Senior Visiting Fellow, ULI Center for Creative Placemaking
- **Jeff Hebert**, Vice President for Adaptation and Resilience, The Water Institute of the Gulf
- **Phillip Kash**, Principal, HR&A Advisors
- **Greg Lowe**, Global Head of Resilience and Sustainability, Aon
- **Walter Meyer**, Founding Principal, Local Office Landscape Architecture
- **Christian Nyerup Nielsen**, Global Service Line Leader, Climate Adaptation and Flood Management, Ramboll Water
- **Mark Osler**, National Practice Leader, Coastal Science & Engineering, Michael Baker International
- **Greg West**, President & CEO, ZOM Living & Chair, ULI Southeast Florida/Caribbean

ULI Staff:

- **Katharine Burgess**, Senior Director, Urban Resilience, ULI
- **Julie Medley**, Executive Director, ULI Southeast Florida and Caribbean
- **Mallory Barker**, Associate, ULI Southeast Florida and Caribbean

Acted with Courage to Fix Sunny Day & Stormwater Flooding

- Applied good practice for initial pump rollout – Engineering and prioritization
- Initiated street elevations
- Designed for mid-level climate change risk estimates
- Raised funds through fees
- Crafted thoughtful communications materials & vehicles
- Collaborated both interagency and within regional partnerships
- Implemented multiple levers including policy changes
- Examining Cost/Benefit of Current Program

Comprehensive Vision for Living with Water

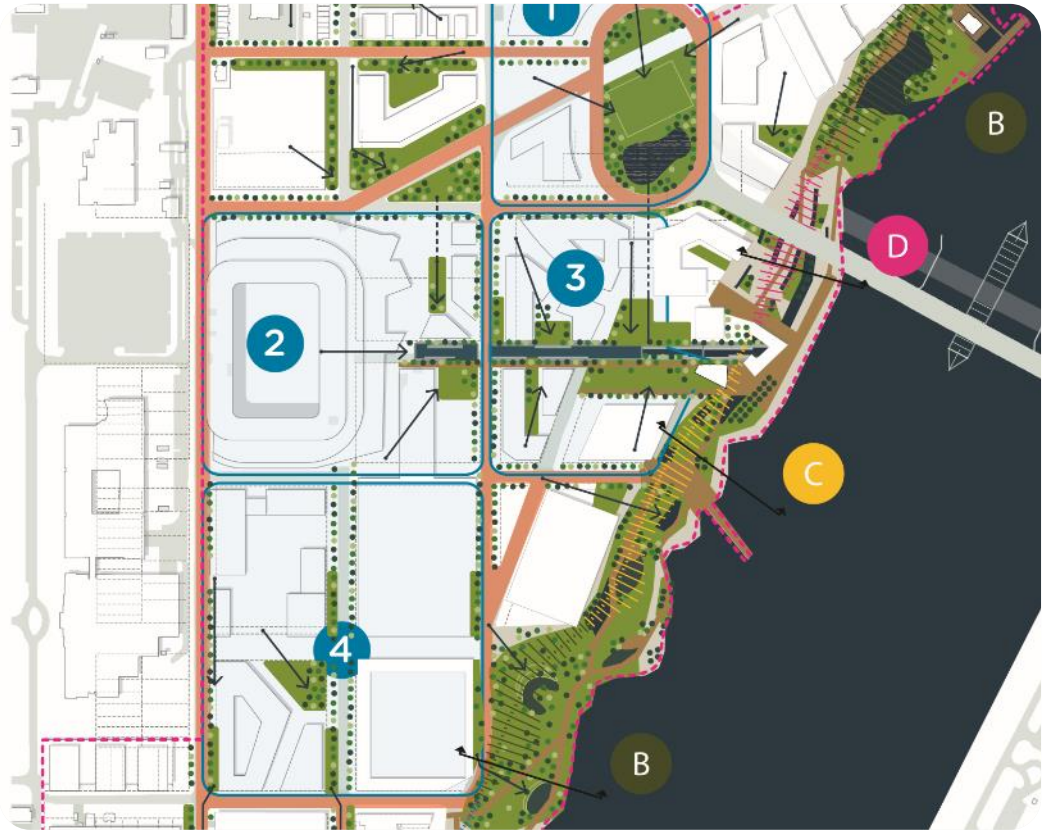
- Integrate stormwater management with larger resilience strategy
- Enhance public trust, trust the public, increase transparency
- Elevate aesthetics and function to perpetuate city's cultural relevance
- Actively use green and open space for sponge function
- Amplify aesthetics and function to perpetuate cultural relevance
- Increase long-term financial and comprehensive protection

- Go big on the resilience brand – distinguish yourself from your coastal competitors

Recommended Solutions - Overview

- Infrastructure advancements
- Design typologies
- Creative placemaking
- Governance
- Finance
- Regulation
- Integrated Communications plan

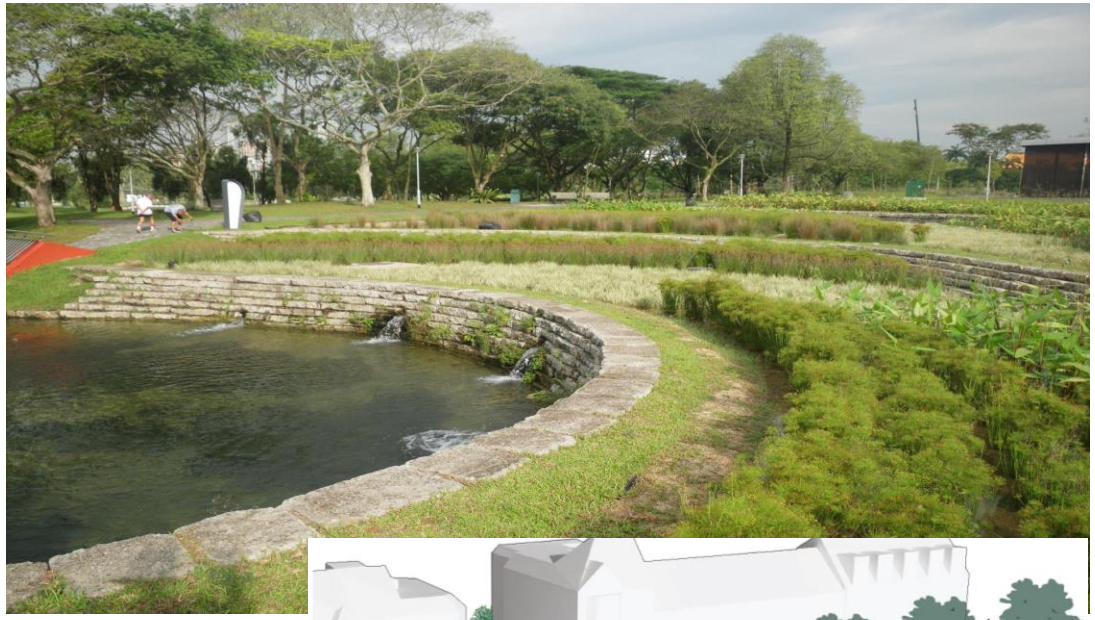
Improve Flexibility and Robustness of Pump Systems



IMPLEMENT CITY-WIDE BLUE-GREEN INFRASTRUCTURE

- Miami Beach's pump system is well-tested and the City has implemented appropriate design and management strategies.
- Going forward, the City should introduce blue-green infrastructure developed with a detailed modelling approach that guarantees buy-in and co-benefits. The City should also implement electrical and infrastructure enhancements to mitigate extreme weather.

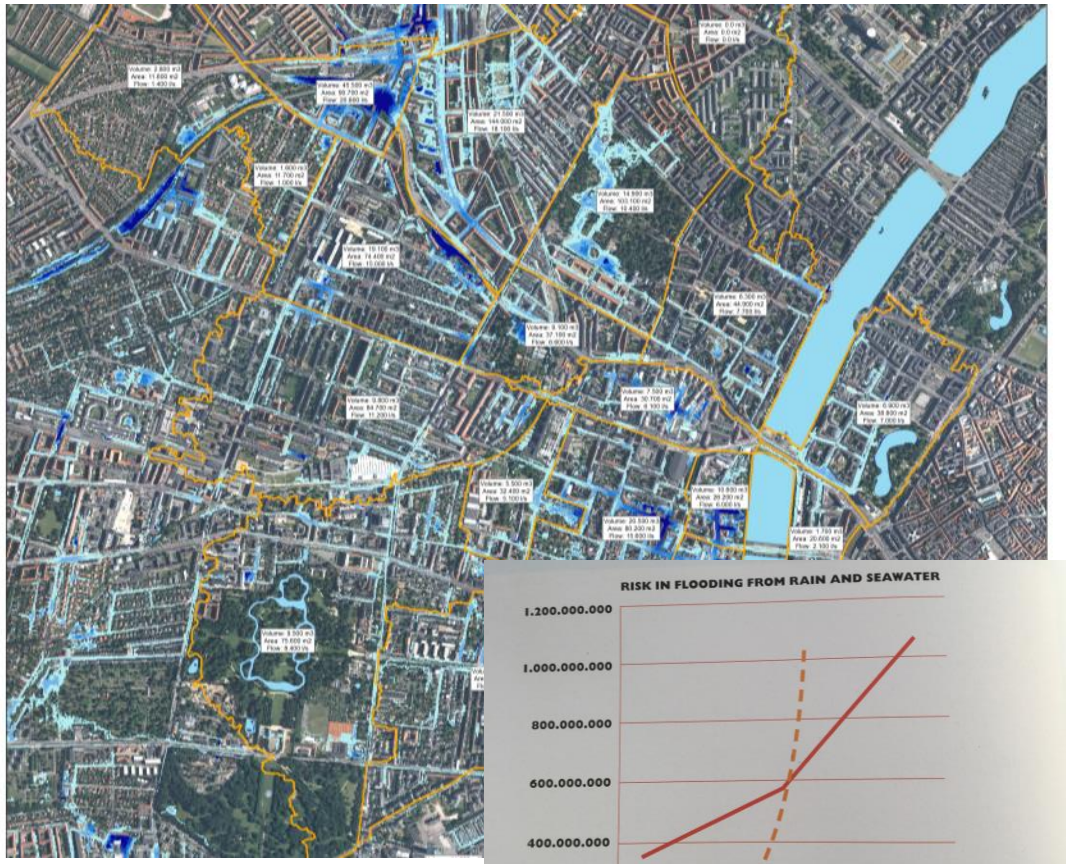
Blue-Green Infrastructure Also Aids Water Quality

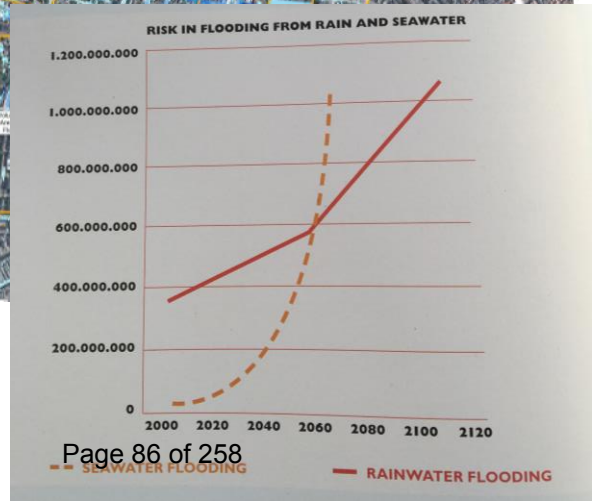


WATER QUALITY AT THE OUTLETS WILL ALSO BE ENHANCED

- The City's water quality solution is well-tested and easy to maintain.
- However, improvements are needed to enhance performance – this can be accomplished through an implementation of blue-green infrastructure, which will absorb pollutants, increase flexibility and offer co-benefits.

Informed Decision-Making through Enhanced Modelling



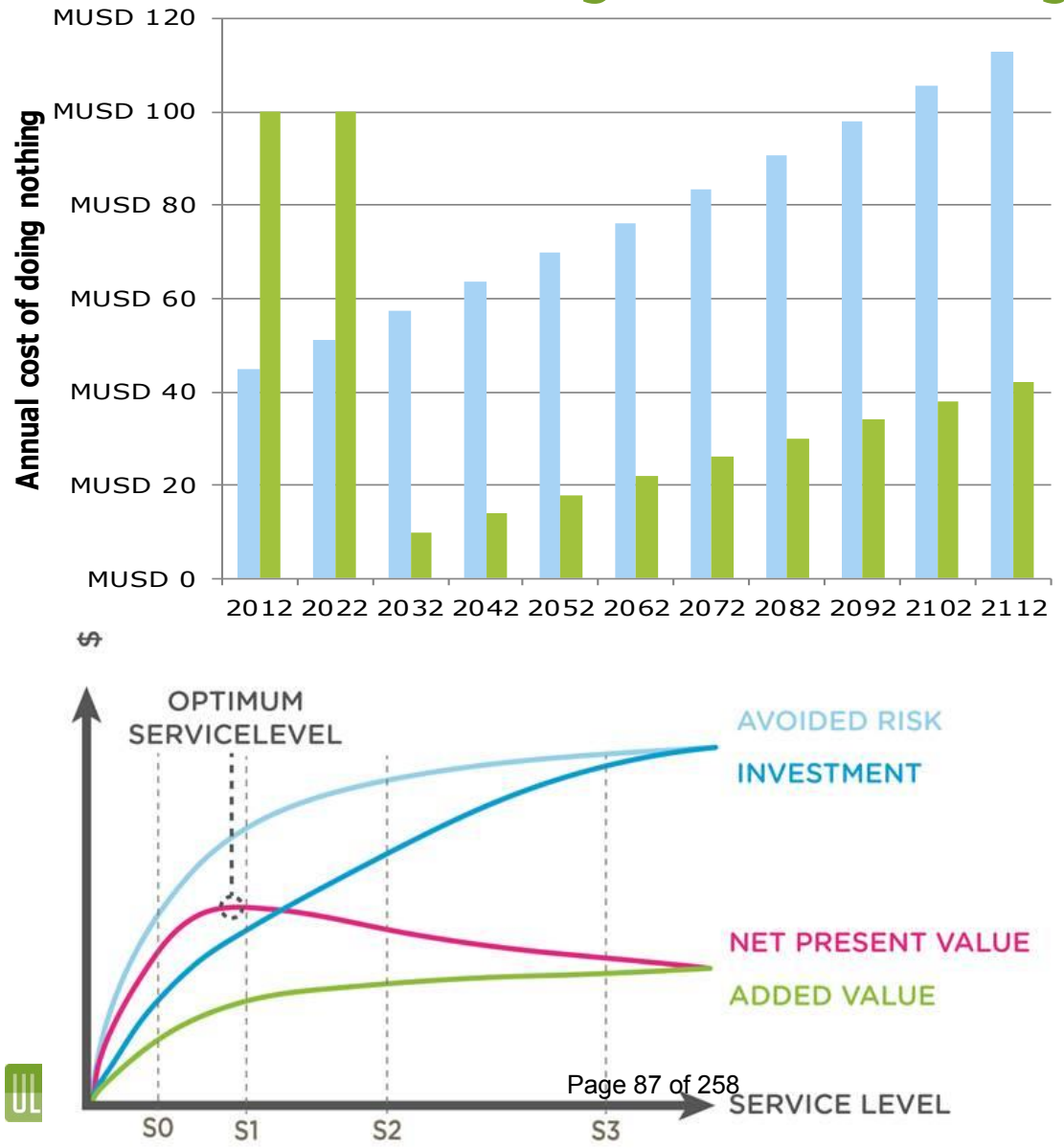


RE-EXAMINE DECISION SUPPORT TOOLS

- The city has an existing pipe-network model and logs water levels and geology.
- Integrated Water Model - Coupling the pipe-network model with a digital elevation and groundwater model will allow the City to make better decisions regarding increased flood risks. This model would also measure the impact of their solutions.

Urban Land Institute

Risk Based Management Through an Enhanced Modelling System



RISK BASED MANAGEMENT WILL BE EASIER TO PREDICT

- The current modelling system anticipates sea level rise and precipitation and initiates a cost-benefit analysis.

- A more comprehensive model would calculate risk for various impacts, help formulate optimal socio-economic protections, and create safer guidelines for densification, climate change, system data and rain statistics.

Learning to Live with Water – Through Pilot Projects

MIAMI BEACH IS THE ICON

- The City of Miami is taking a forward-thinking approach to climate adaptation.

- The City should implement “Living with Water” pilot projects that involves the City and its residents to suggest that resiliency strategies are a common cause. This will create enthusiasm for the plan.

Bishan Park – Singapore
Living with water

Bishan Park – Singapore
Living with water

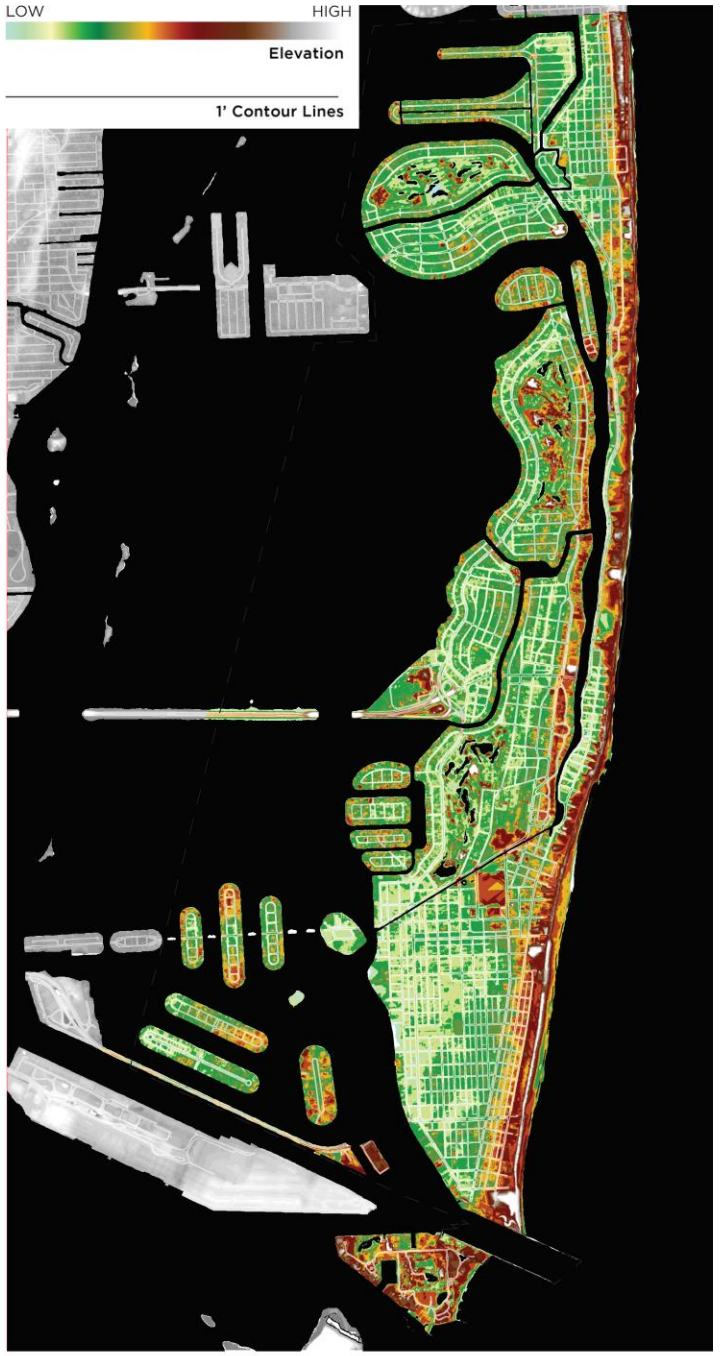

Bishan Park – Singapore
living with water

Infrastructural Enhancements

Asked to ‘test the logic for project prioritization and sequencing…’

- Consider a ‘level of service’ concept to guide future phasing
- Integrated water model to aid decision-making

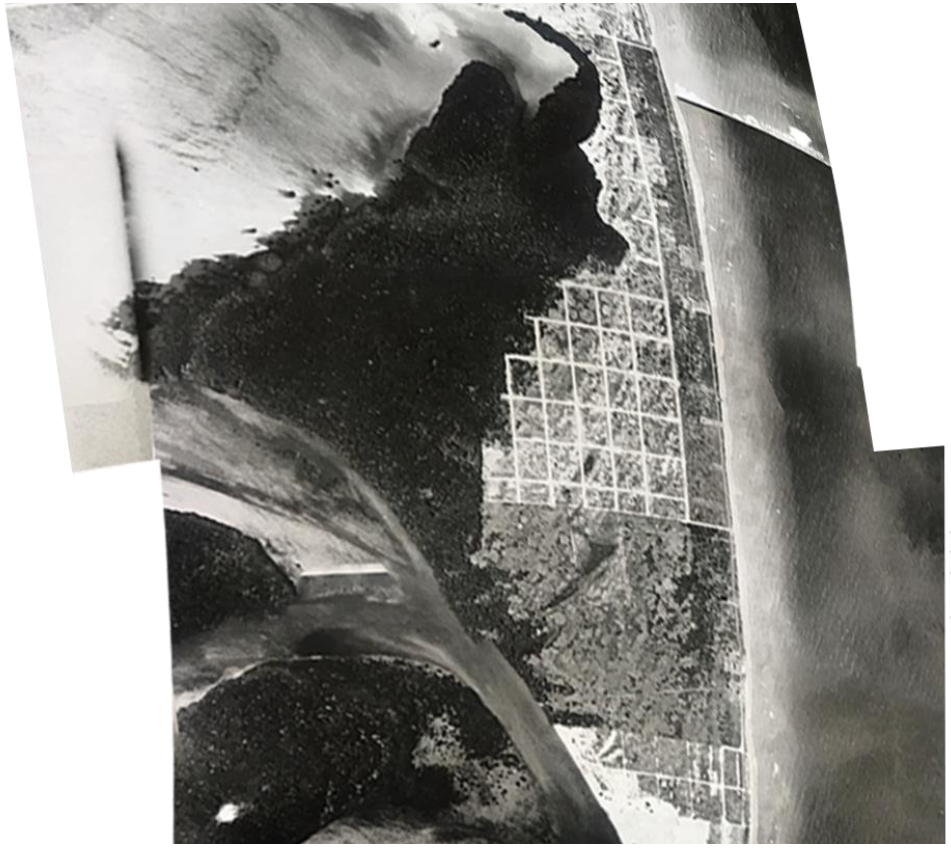
The Long-Now

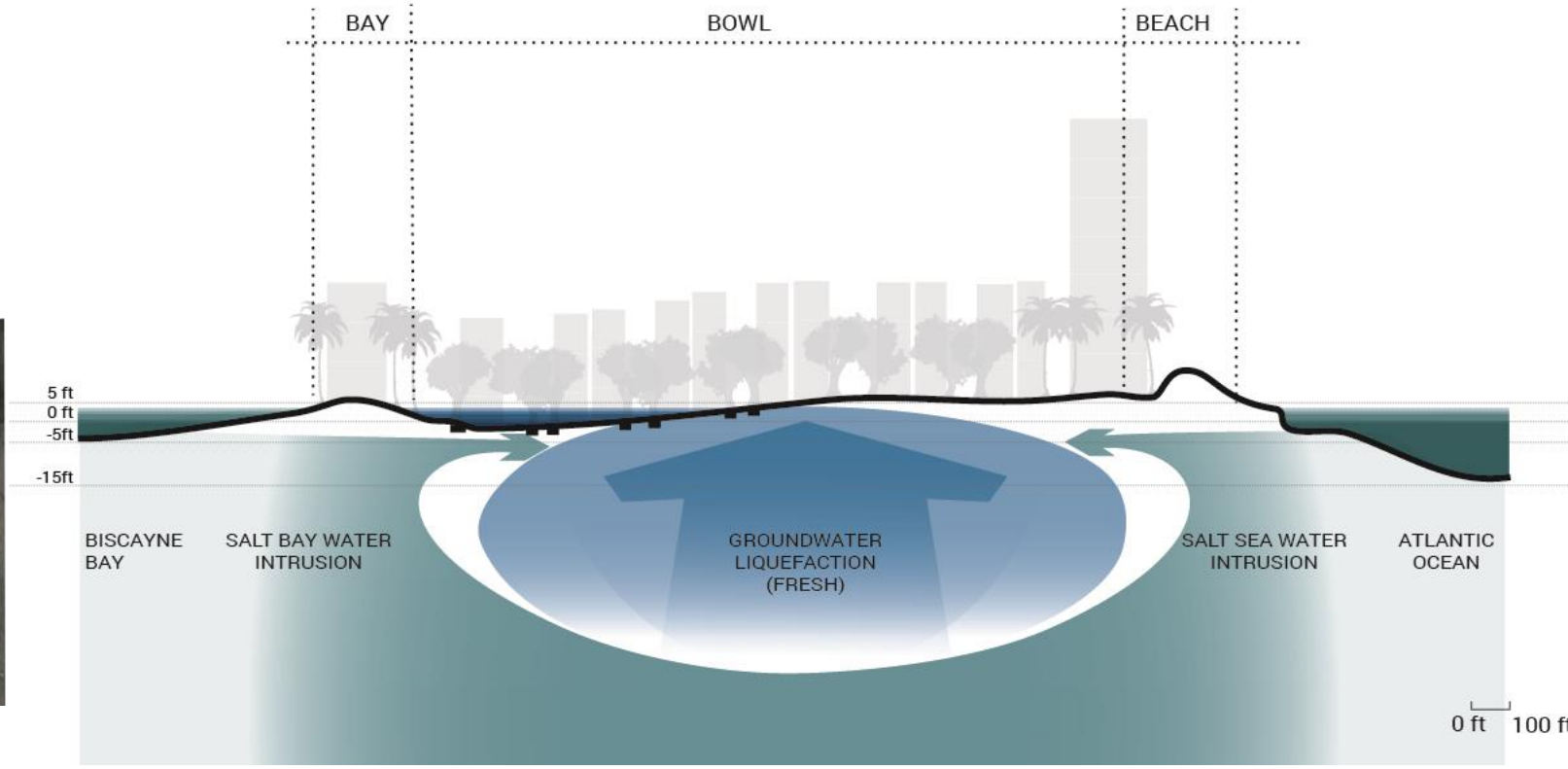


ELEVATION
Miami Beach

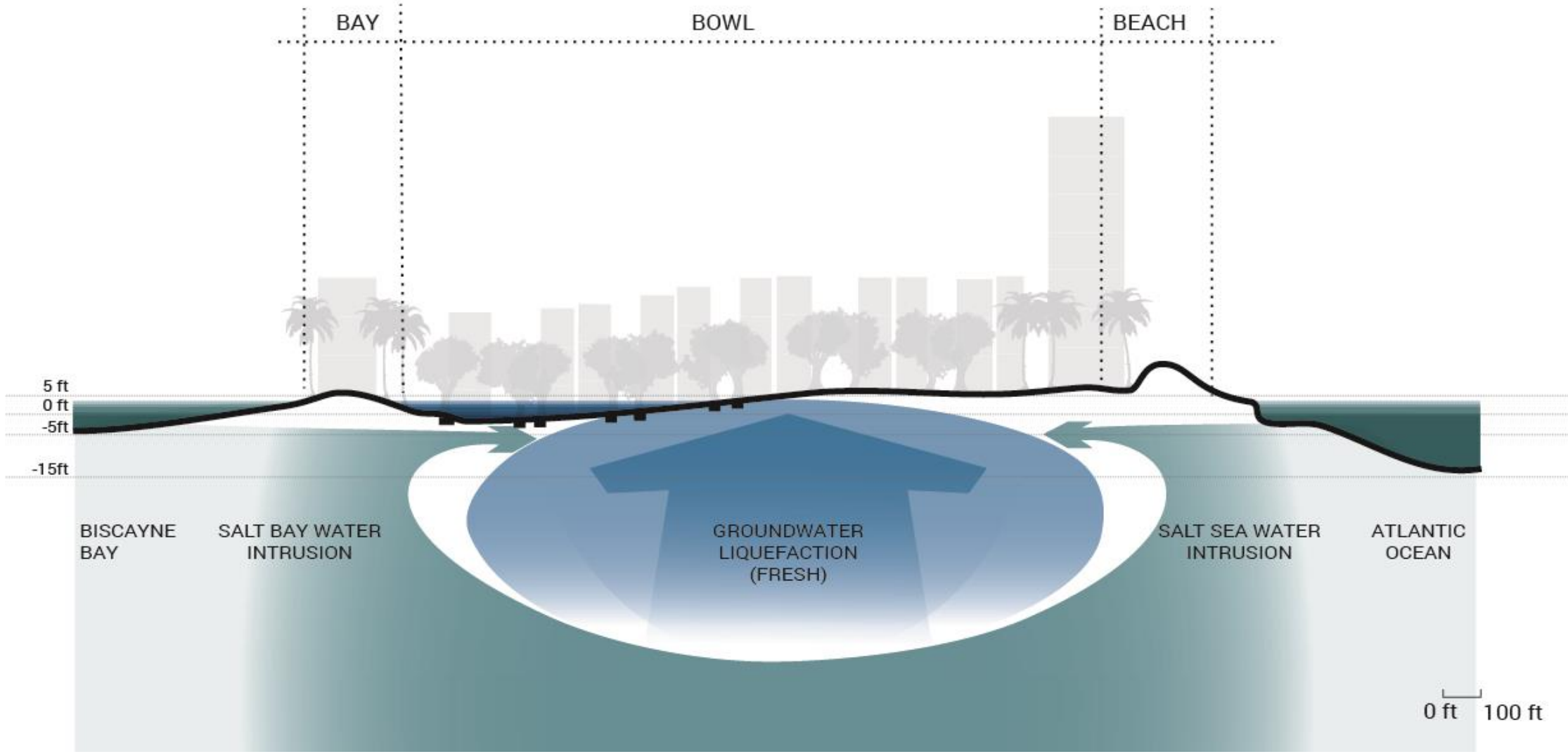
HYDROLOGY
Miami Beach

Water Movement

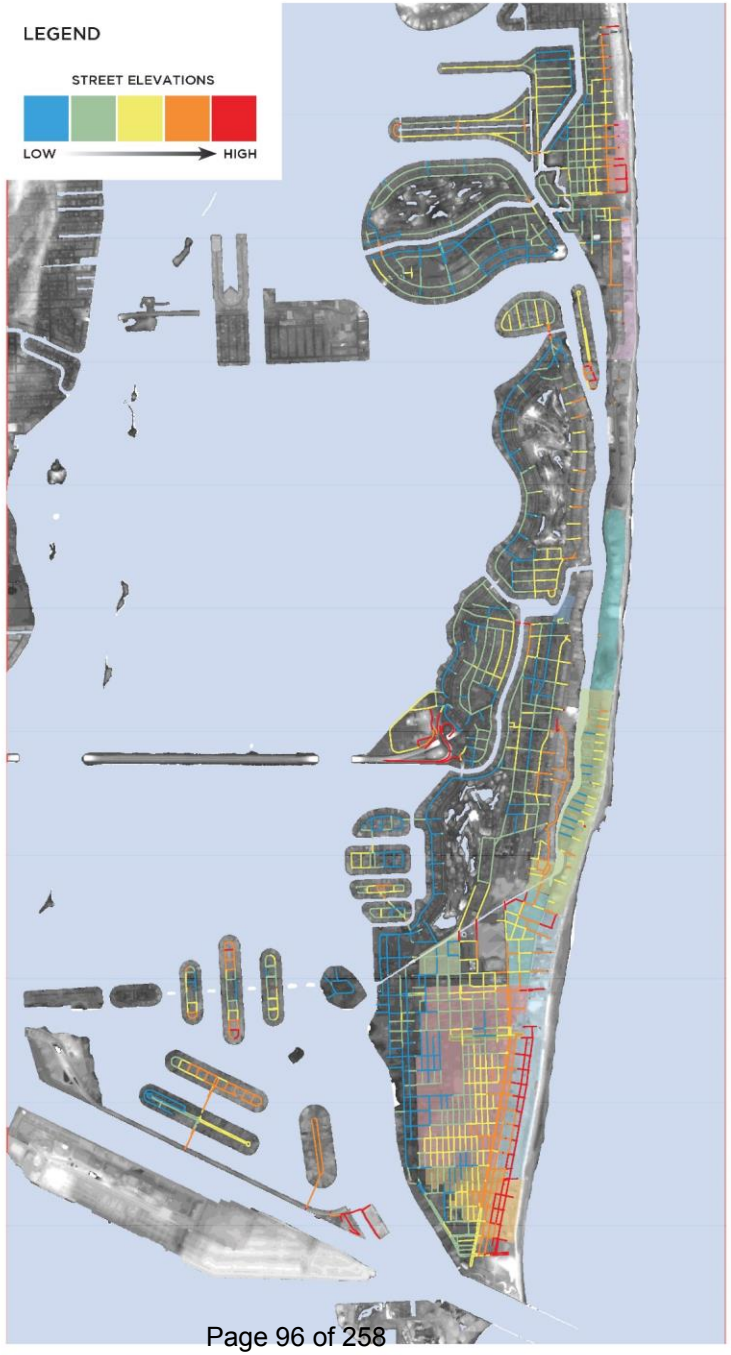




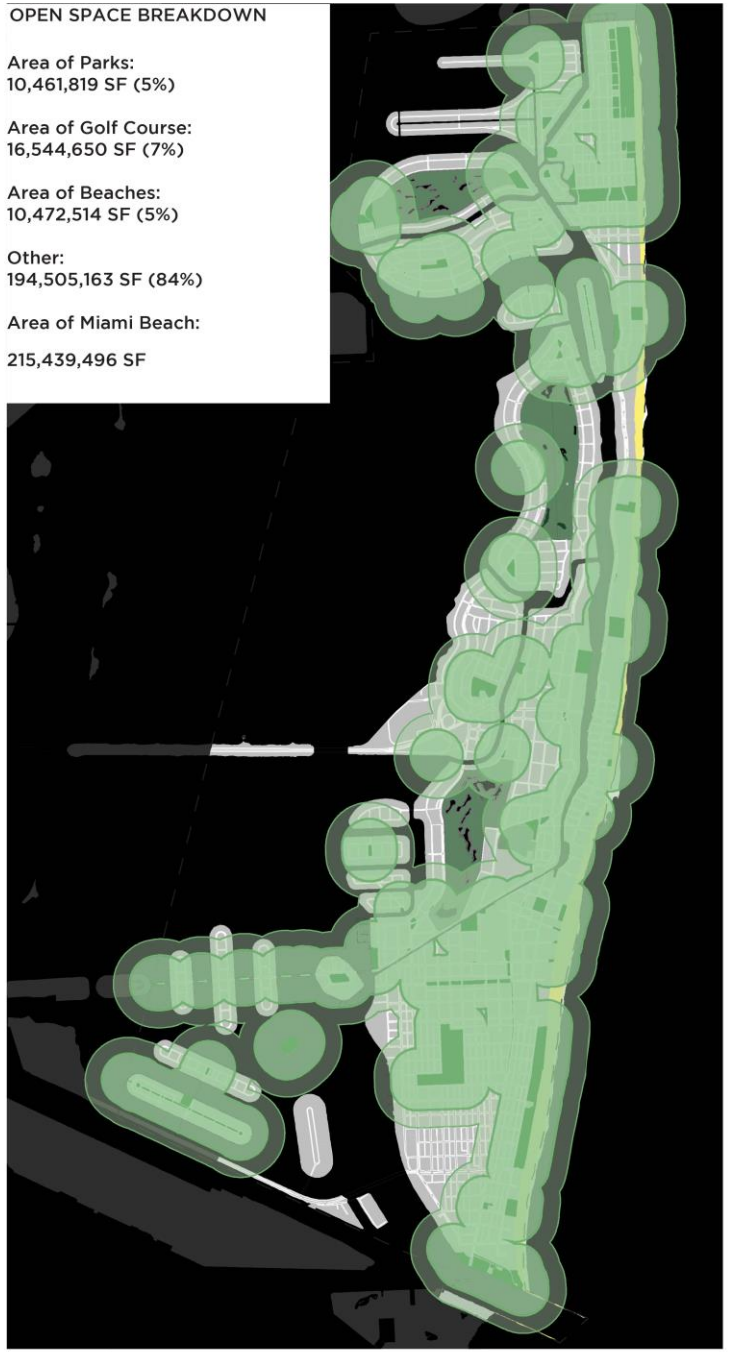
Beach, Bowl, Bay



Amenities, Access & Elevation



ROAD ELEVATIONS IN HISTORIC DISTRICTS
Miami Beach



5 MINUTE (1/4 MILE) & 3 MINUTE (800ft) PARK BUFFER

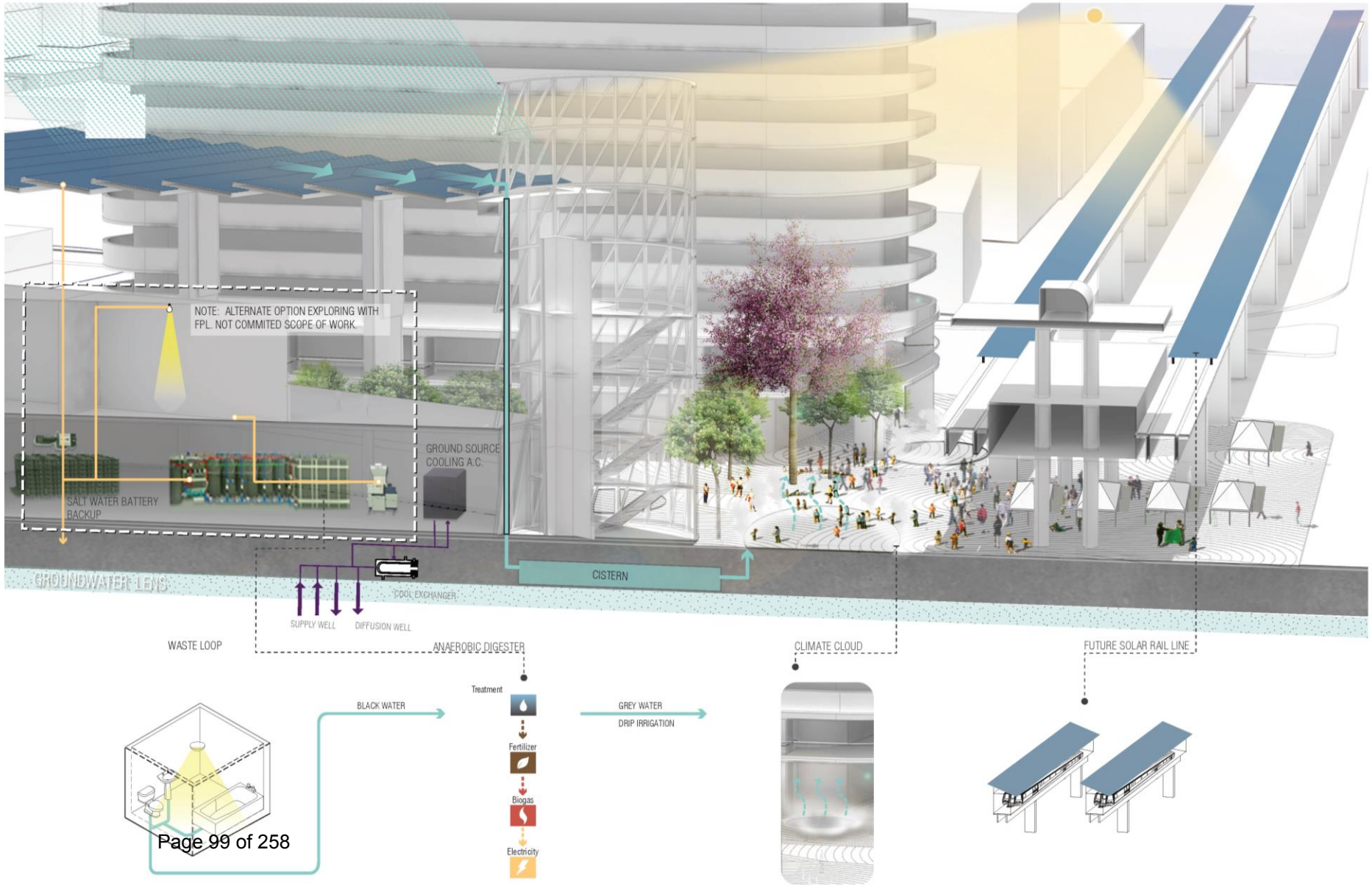
Golf Courses as Storage

SPACE ALLOCATED TO GOLF COURSES
Miami Beach

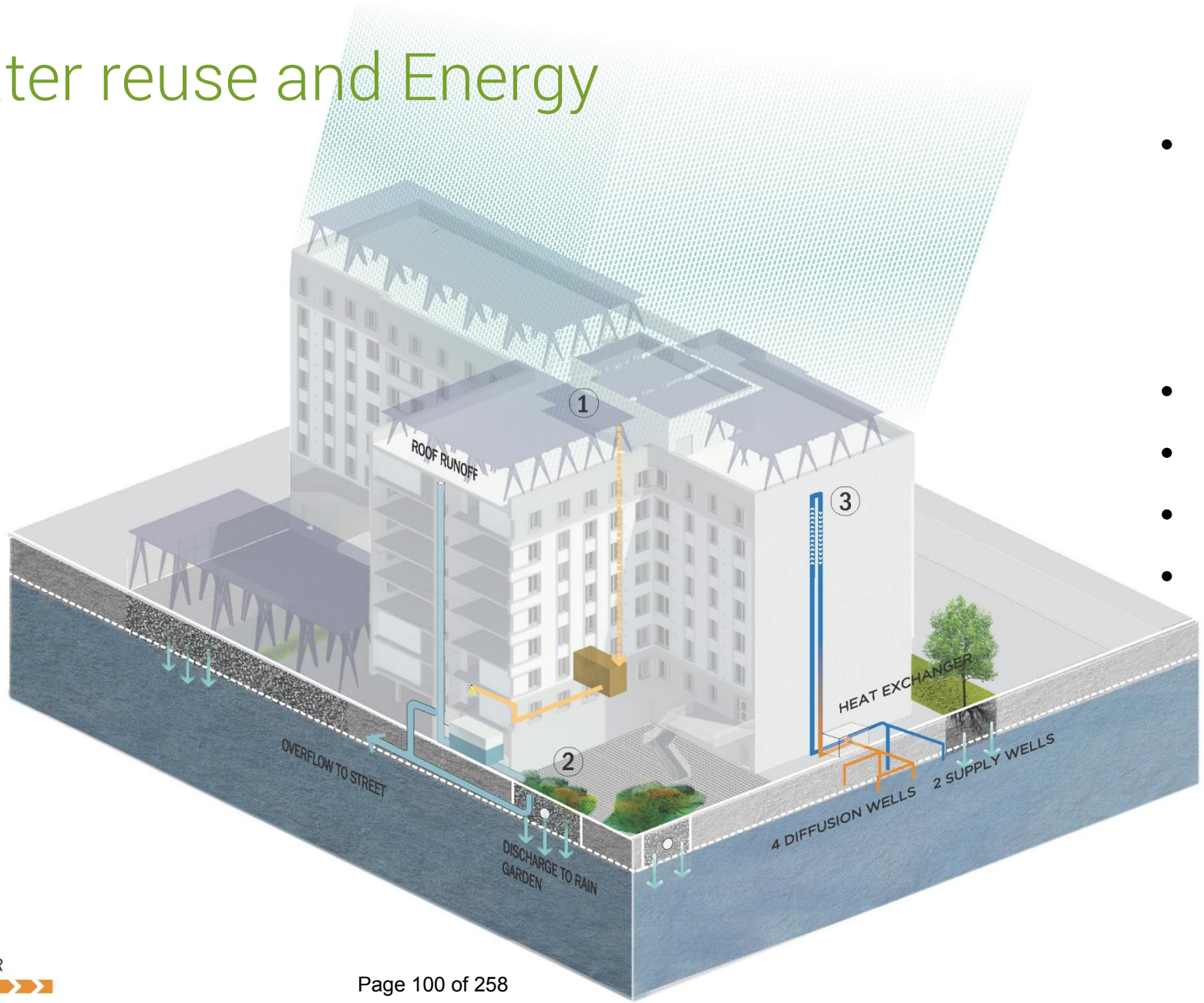
Income Generating Solar Energy for Backup Power

- San Juan, PR 10th story rooftop 517 KW solar trellis
- Designed for 185mph winds
- 98% intact after hurricane Maria
- Primary cabling, inverters and superstructure fully operational

Energy


NOTE: ALTERNATE OPTION EXPLORING WITH FPL. NOT COMMITED SCOPE OF WORK.
GROUND SOURCE COOLING A.C.
SALT WATER BATTERY BACKUP
GROUNDWATER LENS
COOL EXCHANGER
SUPPLY WELL
DIFFUSION WELL
CISTERN
WASTE LOOP
ANAEROBIC DIGESTER
CLIMATE CLOUD
FUTURE SOLAR RAIL LINE
BLACK WATER
Treatment
Fertilizer
Biogas
Electricity
GREY WATER
DRIP IRRIGATION

Water reuse and Energy



- Couple building infrastructure to natural infrastructure to capture overlooked revenue streams
- Energy from sun and wind
- Cooling from the Earth
- Water from rain and waste
- Flood reduction from habitats

WARM WATER

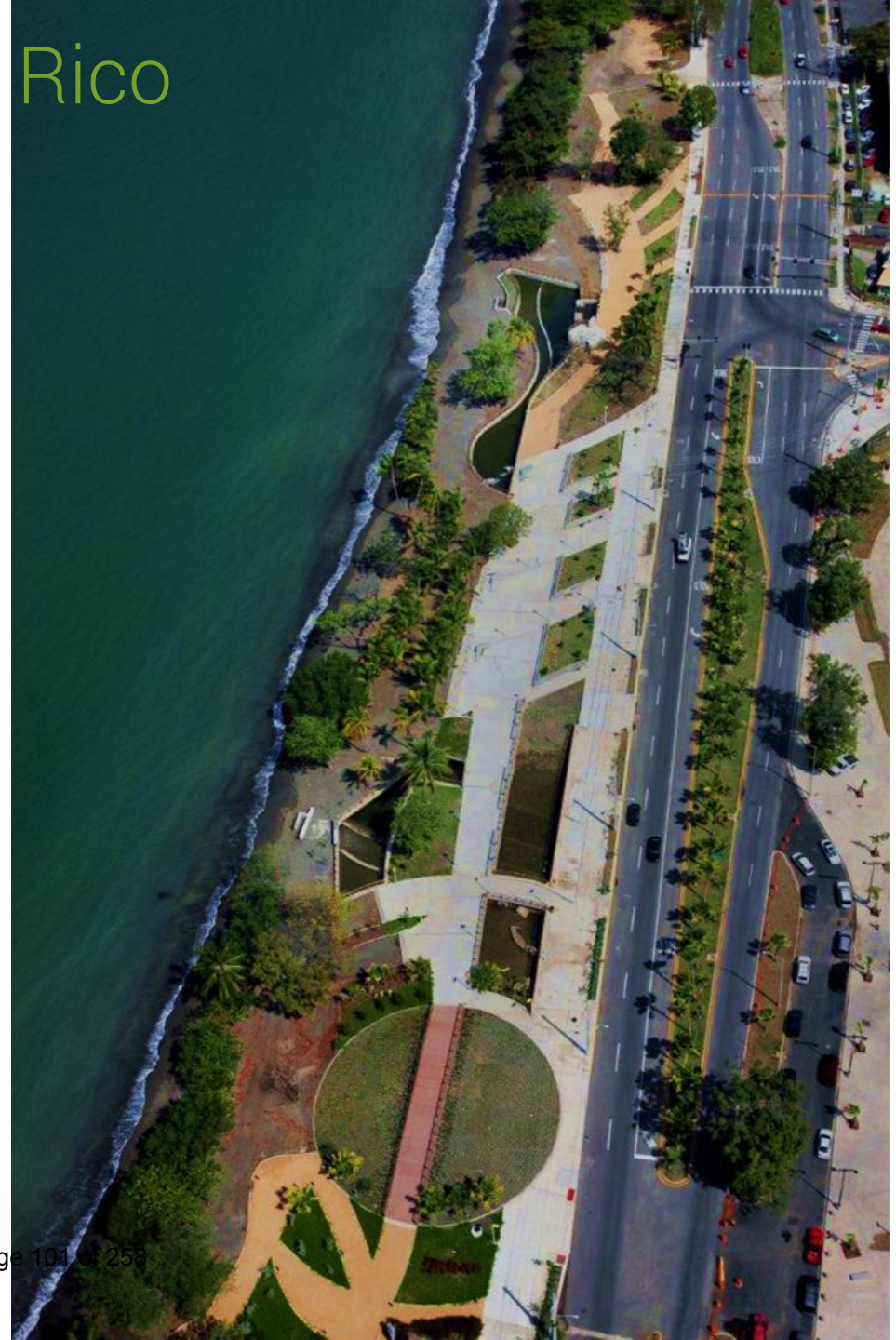
COOL WATER

Mayaguez, Puerto Rico
Parque Litoral

9/18/17, Hurricane Maria, Category 4
10 foot waves over 4 foot surge

Performance:

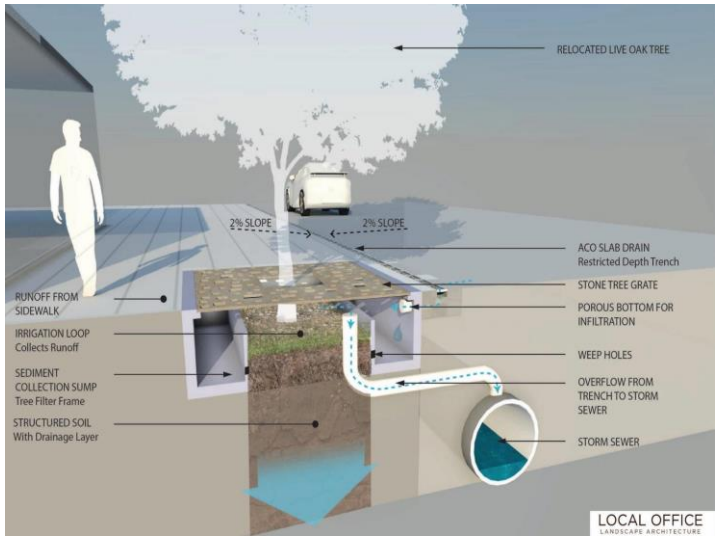
- Coastal forest 91% intact
- Minor damage to railing and lighting
- No loss of drainage through phytoremediation wetland
- Park operational after 2 weeks of debris cleanup
- Grand reopening festival one month after storm
- Adjacent businesses had dry ground floors and opened a week after Maria



Urban Land Institute

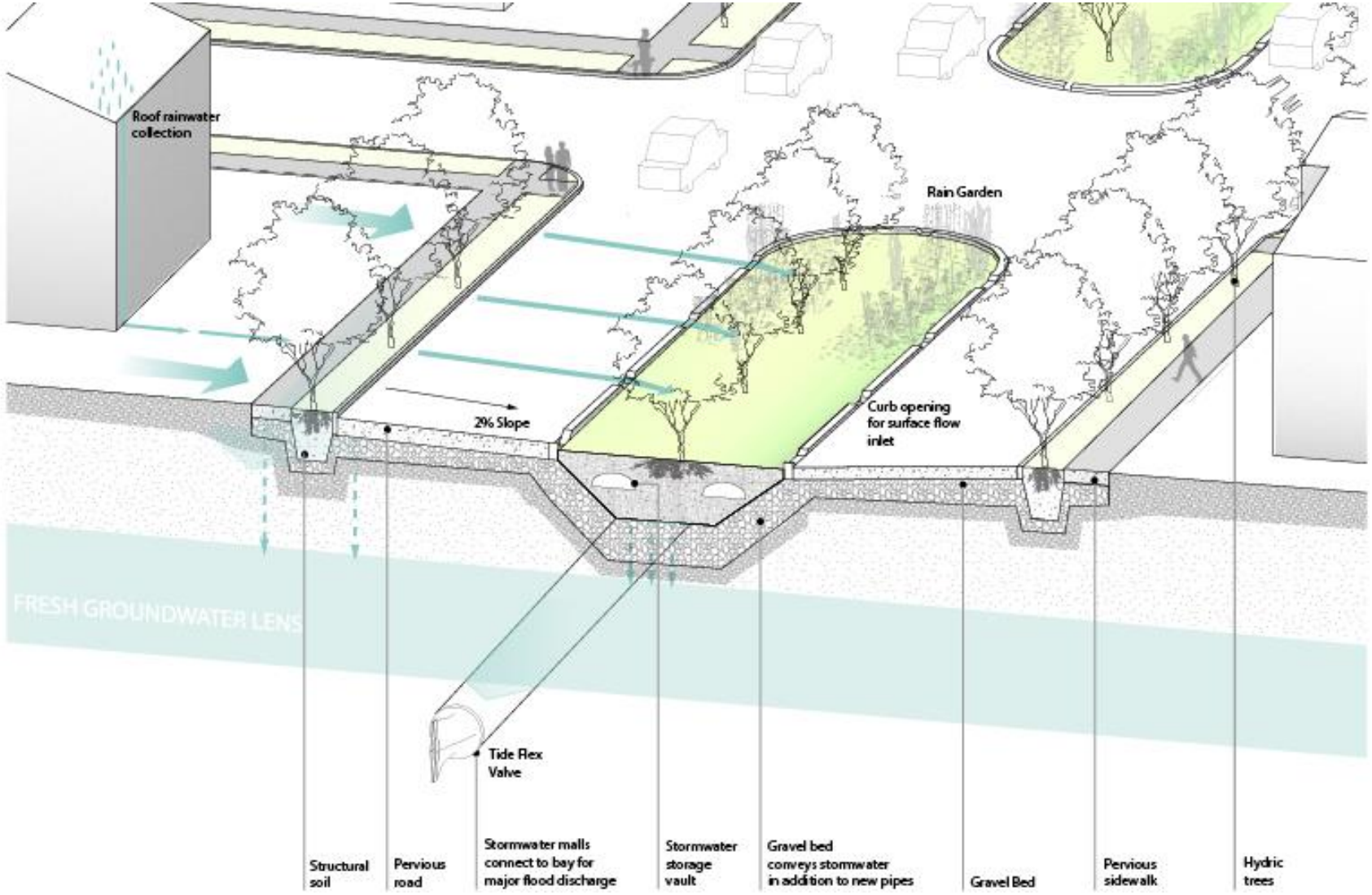
Stormwater Management

Coral Gables, Miracle Mile and Giralda Ave designed for some the most intense urban rains on the planet, at 7.5” per hour. Hurricane wind resistant planting to accelerate business recovery. Porous paving, structural soil, and decentralized line drains.



Tested by hurricane Irma August 2017, no flooding or tree loss after the highest winds and most intense rains in 25 years, adjacent streets flooded.

Ocean to Bay – Blue Street Corridor



Long Beach, NY

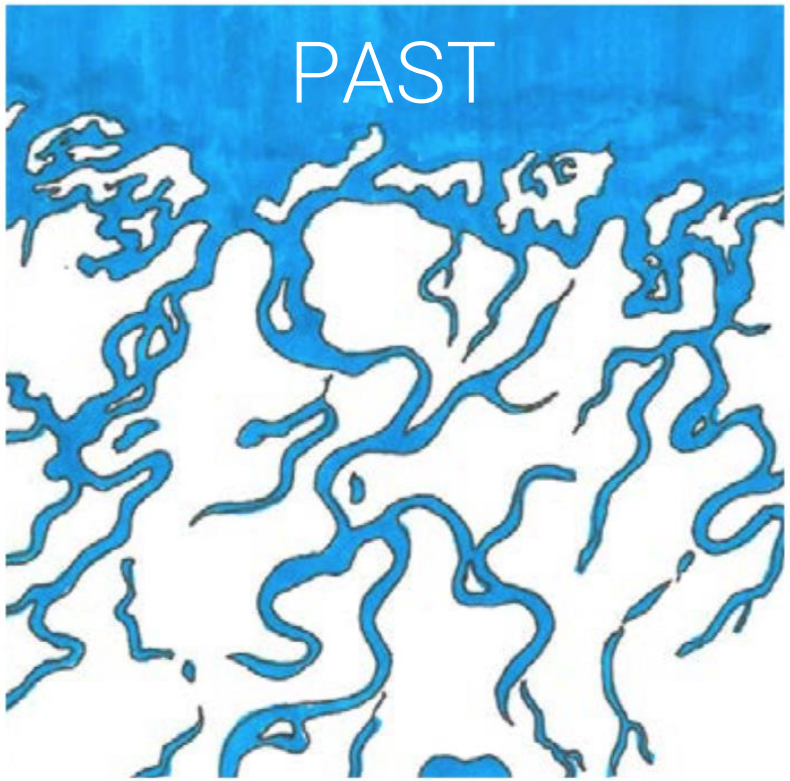
- Comprehensive Resiliency Plan
- Blue Streets move water from beach to bay
- Surface and subsurface conveyance of storm water through a porous gravel bed
- supplements existing underground storm pipes when saturated in groundwater
- 30% cost increase doubles the life of street, and reduces flooding when pipes and pumps are compromised.

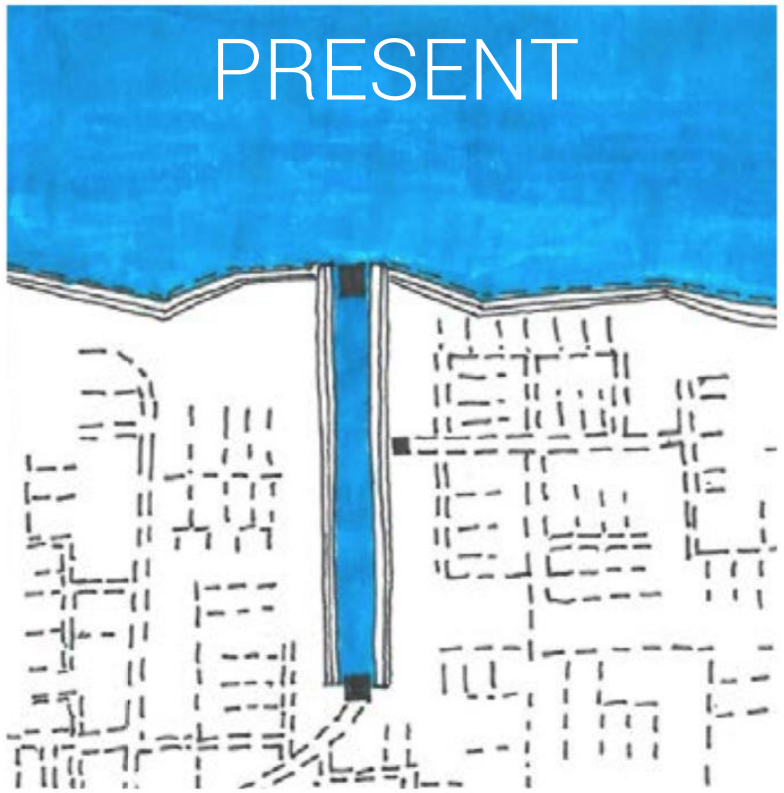
Living Shoreline

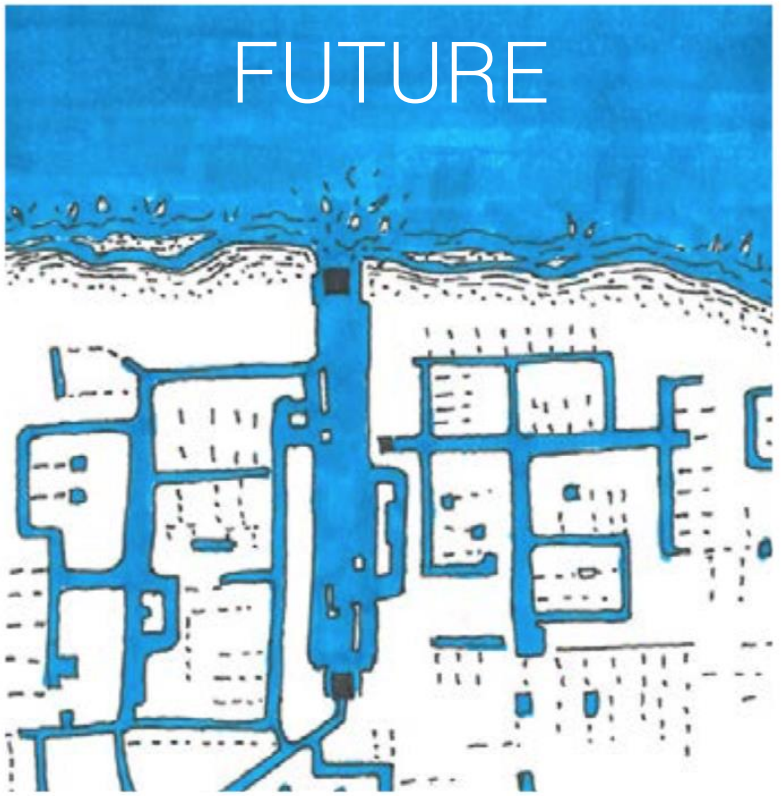
Long Beach, NY

Existing building flooding is alleviated with new development coordination.

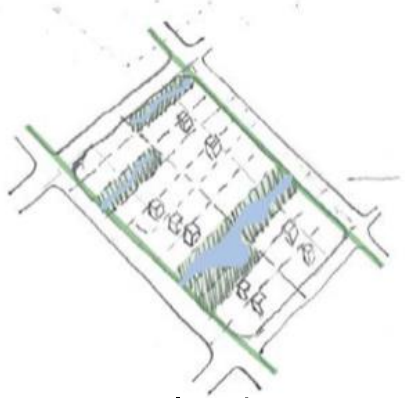
Government built Seawall supplemented with new elevated open space, living shore, and roads.



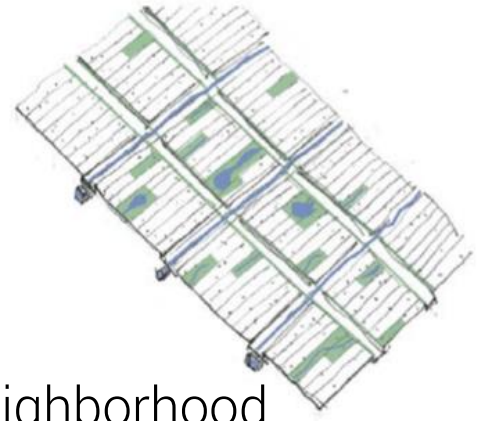




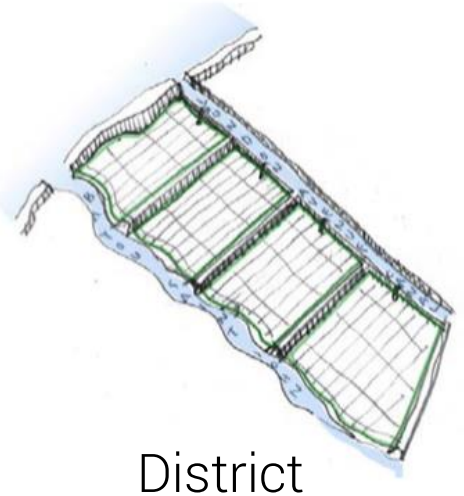
House



Block



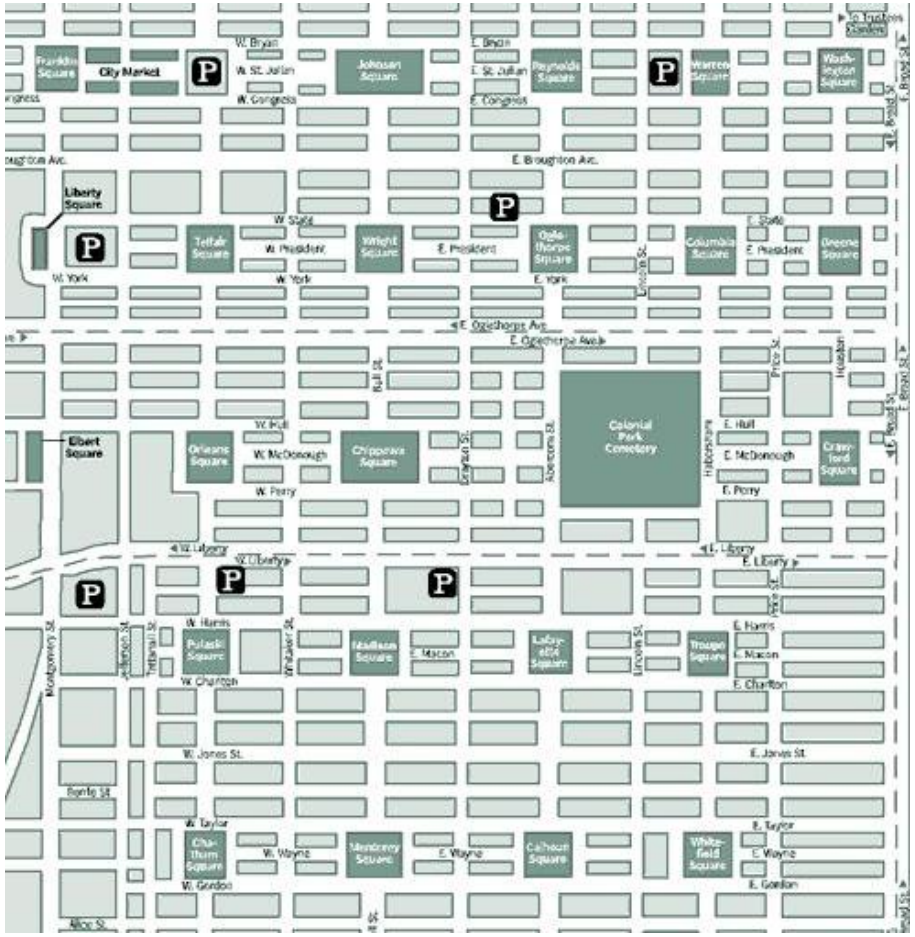
Neighborhood



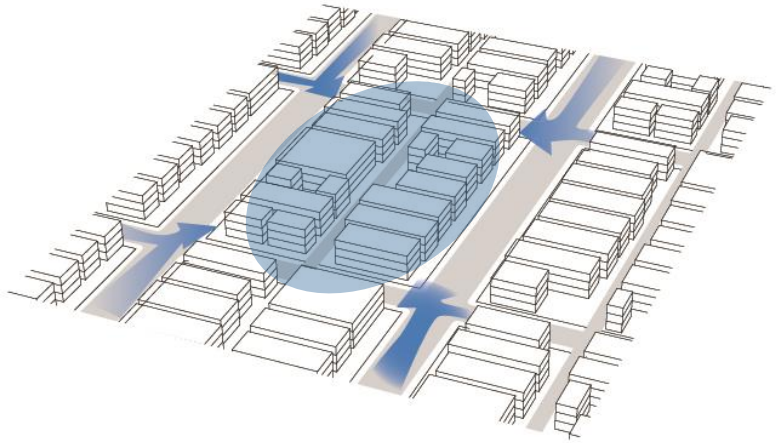
District

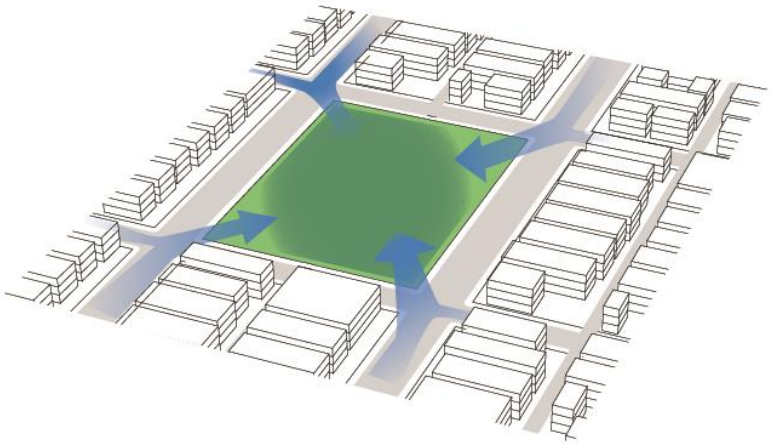
Source: City of New Orleans

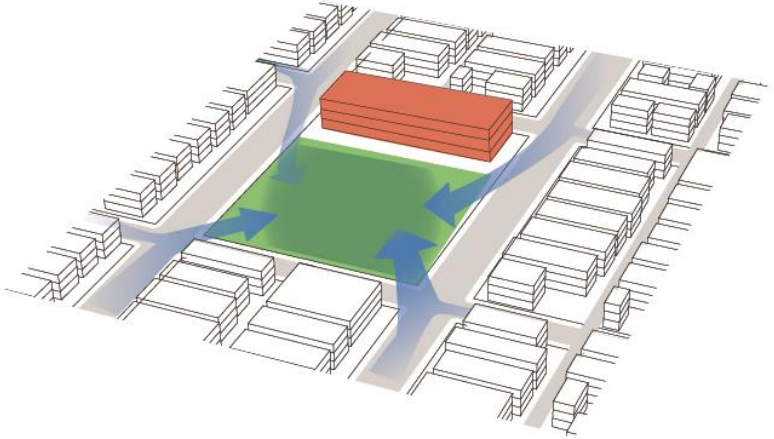
Savannah, GA – Distributed Park System



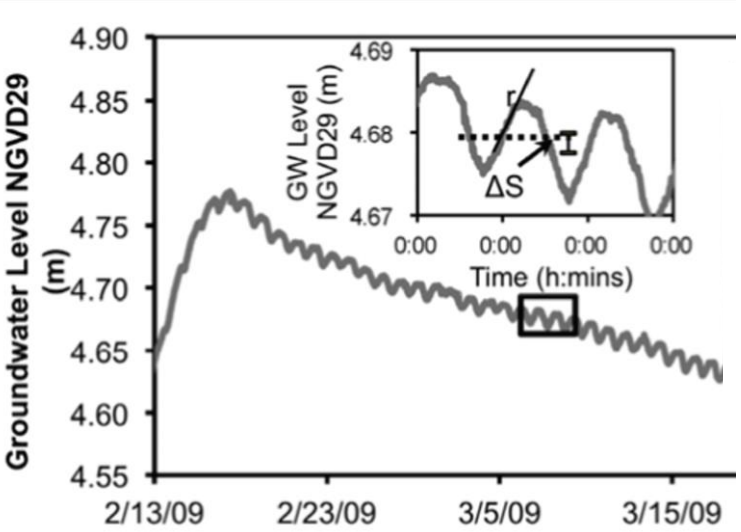
Flood Park







Habitat Metrics for The City



Groundwater-Surface Water Interactions On Tree Islands In The Everglades, South Florida (Sullivan, Pamela, FIU, 2011)

A mature tree can transpire as much as 109 gallons/day (USGS)

Tree Islands of the Everglades (South Florida Ecosystem Restoration Task Force)

Miami Beach: A Vibrant, Historic Tropical Community

Placemaking & Creative Placemaking

Country Club Plaza, Kansas City, MO

Confluence Park

San Antonio, Texas

Photos courtesy the San Antonio River Foundation

Vine Street Beckoning Cistern

Seattle, Washington

Buffalo Bayou Park Houston, Texas

Tanner Springs Park

Portland, Oregon

Approach to integrating creative placemaking into resilience program

- Develop vision for the city's art and resilience program
- Build relationships with public and private partners; strengthen existing partnerships with universities
- Engage citizens in the artist selection and procurement process
- Empower the design team – engineers, artists
- Communicate and promote the program

All stakeholder benefit from integrated art and resilience

Governance for water management & climate adaptation

- **Establish a Miami Beach Rising Above Delivery Office** for greater transparency and to monitor and communicate the effectiveness of such a large, dynamic program.
- **Establish (or retool) an agency or district to capture increased real estate value for** public investment and green/blue infrastructure and the administration of a Community Adaptation Program
- **Establish a robust City of Miami Beach Risk Transfer Department** that can facilitate the development of risk transfer solutions

Courtesy City of New Orleans

NEW ORLEANS REDEVELOPMENT AUTHORITY

New Orleans Redevelopment Authority (NORA)
Request for Proposals
Community Adaptation Program (CAP)
Issue Date: September 22, 2017
Due Date: October 27, 2017

Governance and strategy for historic preservation

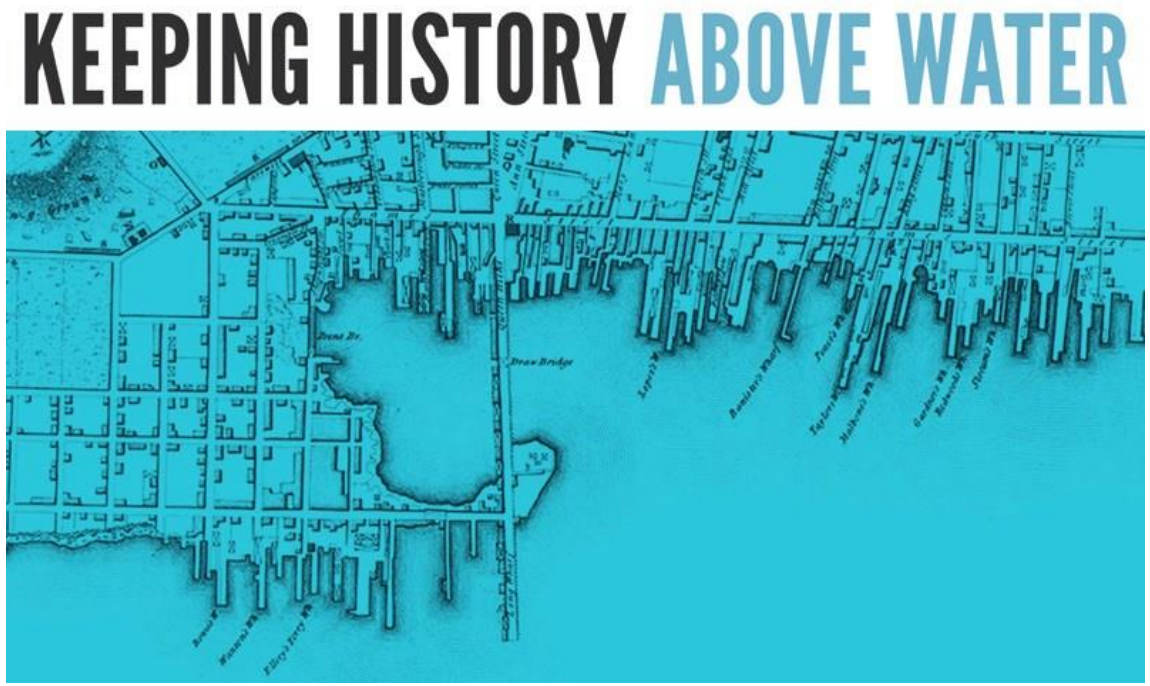
- "New adaptation and mitigation tools are needed to support communities as they respond to the new normal."

– The National Trust for Historic Preservation

- "Climate change and rising sea levels mandate a new type of assessment of the vulnerability of historic resources, requiring stakeholders to look at adaptation options and to decide what will be saved for future generations."

– John Englander, Preservation Leadership Forum Journal

- This is currently an international conversation that Miami Beach could lead.



Courtesy City of New Orleans

Finance is critical for an effective adaptation strategy

- Finance includes three key sources of funding
  - Public capital
  - Private capital
  - Insurance (contingent capital)
- A risk financing strategy will protect homeowners, businesses, and ratepayers
- A holistic approach that recognizes the link between insurance and the cost of capital is needed

Public finance has a strong local base

- State and Federal funds are limited
- Most public capital comes from the City's real estate tax-base
- There are a number of tools to realize new sources of revenue associated with the benefits of stormwater management and climate adaptation
  - Assessment districts, such as a business improvement district and homeowners associations
  - Incremental finance districts, such as community reinvestment areas

Innovative insurance solutions should be explored

- Insurance and risk transfer can de-risk the public balance sheet
- Infrastructure can be insured, reducing the burden of debt servicing during disaster recovery
- The long-term viability of NFIP is not certain: insurance pools provide access to affordable insurance
- Innovations in insurance can offer financial protection for chronic weather risks, such as sunny-day flooding.

A risk finance focus on costs and benefits

- Build on the recently commissioned stormwater business case analysis

- Risk management function should be driven by a total cost of risk approach (TCOR)
  - Look at underlying exposure and expected losses
  - Evaluate risk engineering, insurance, and accepting the risk based on an agreed risk appetitie
  - Most efficient use of capital protects taxpayers

Engage private financial stakeholders

- Credit ratings agencies
- Investors interested in climate risk disclosure: don't be afraid to talk about it. They know.
- Insurers as sounding-boards for stormwater management and climate adaptation solutions

Regulate Private Development

- Regulation of private development will be an important component of Miami Beach's water management strategy.
- Parcel and building level water management will reduce the burden on pumps and other water infrastructure.
- Regulation is a tool to direct capital from the private market toward Miami Beach's water management goals.

Leverage Regulatory Boards

- The City should use its existing regulatory infrastructure to incentivize and require increased storm water management at the parcel and building level.

Design Review Board

Historic Preservation Board

Board of Adjustment

Planning Review Board

Reform Regulatory Boards

- Expand the mission to give equal priority to water management.
- Add board members with backgrounds in water management and development.
- Provide training and technical support to the board members.
- Establish specific measurable water management goals at the district level.
- Add staff or external experts to support the evaluation of proposed projects.

Design Review Board

Historic Preservation Board

Board of Adjustment

Planning Review Board

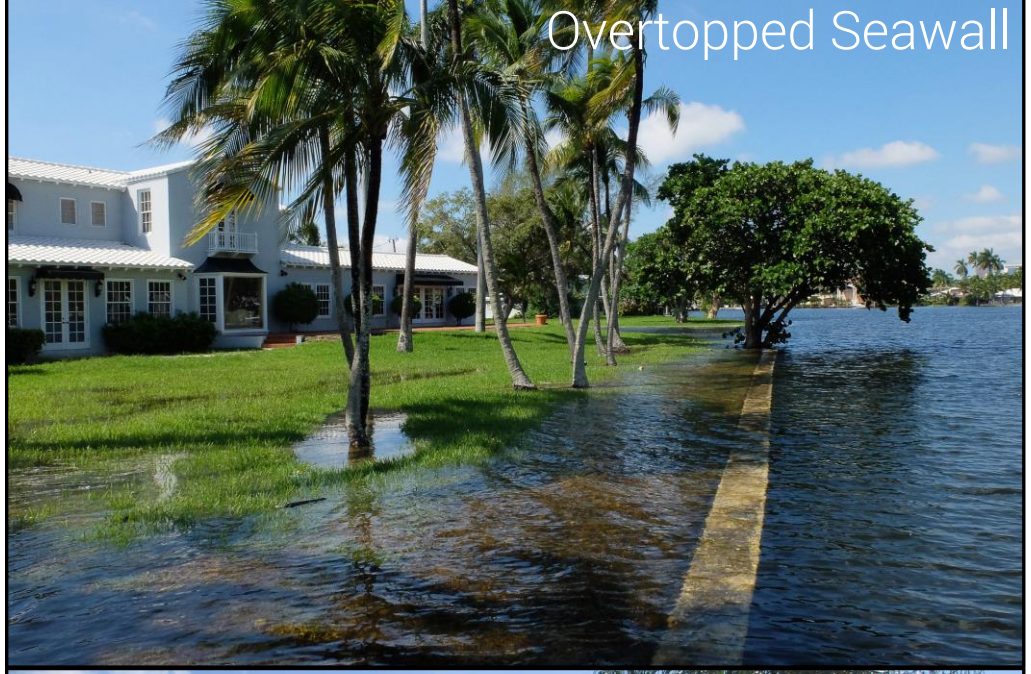
Adjust Stormwater Fees

- The City should revise its current stormwater fee structure to be based on stormwater runoff.
- A runoff based stormwater fee will reward property owners that manage water on their property and decrease the burden on pumps.

Create Island-wide Sea-barrier

- The City should adopt an integrated island-wide approach to creating a sea-barrier and not leave this to individual property owners.

- To undertake an island-wide approach the City will need to dedicate public funds which could come from an assessment district for affected properties, a user fee, or other funding mechanisms.


Overtopped Seawall

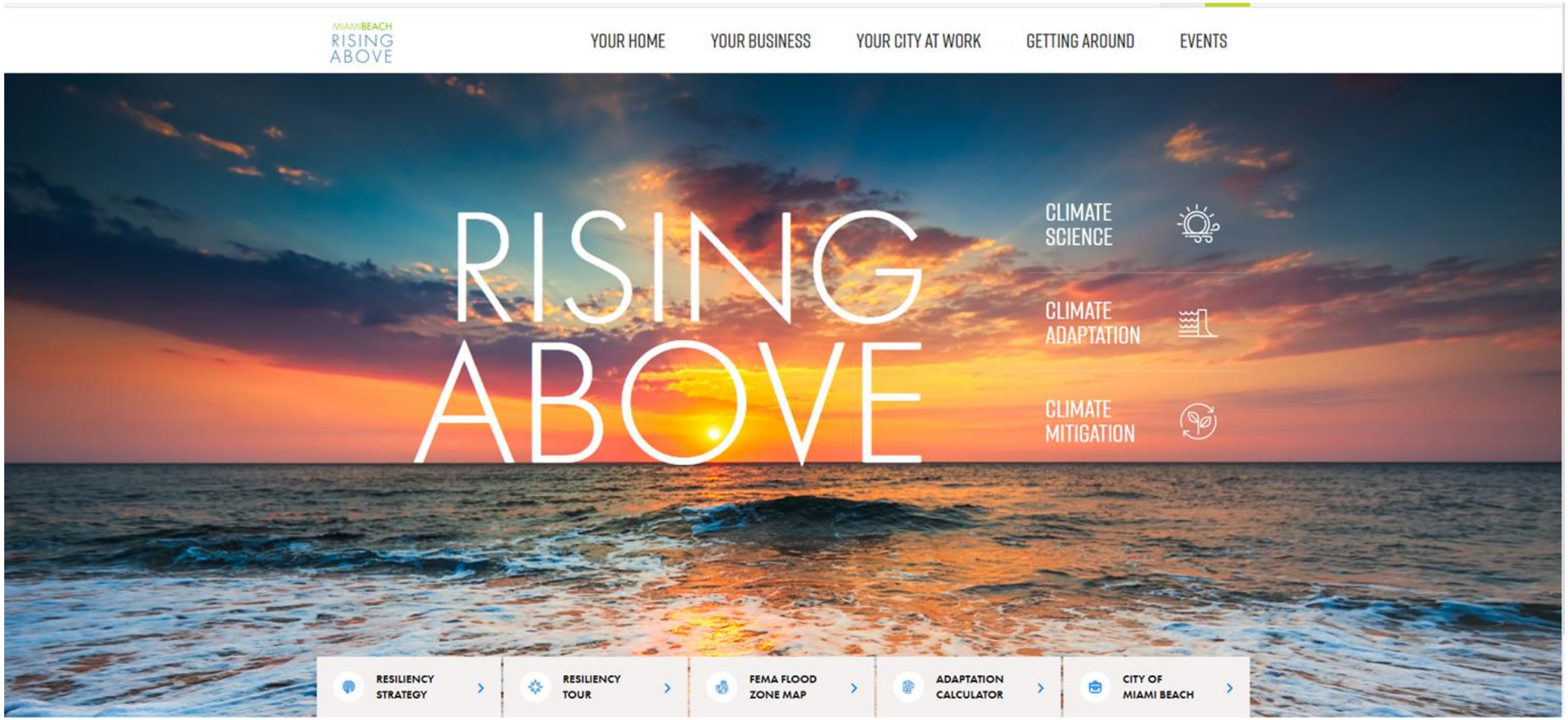

Seawall Installation

Allow Elevated Buildings

- The City should continue to allow greater height and density to offset the future loss of useable space as water levels rise.

- To mitigate the impact of taller buildings, a review of appropriate design and use constraints should be undertaken.

A Tool for Spreading Awareness

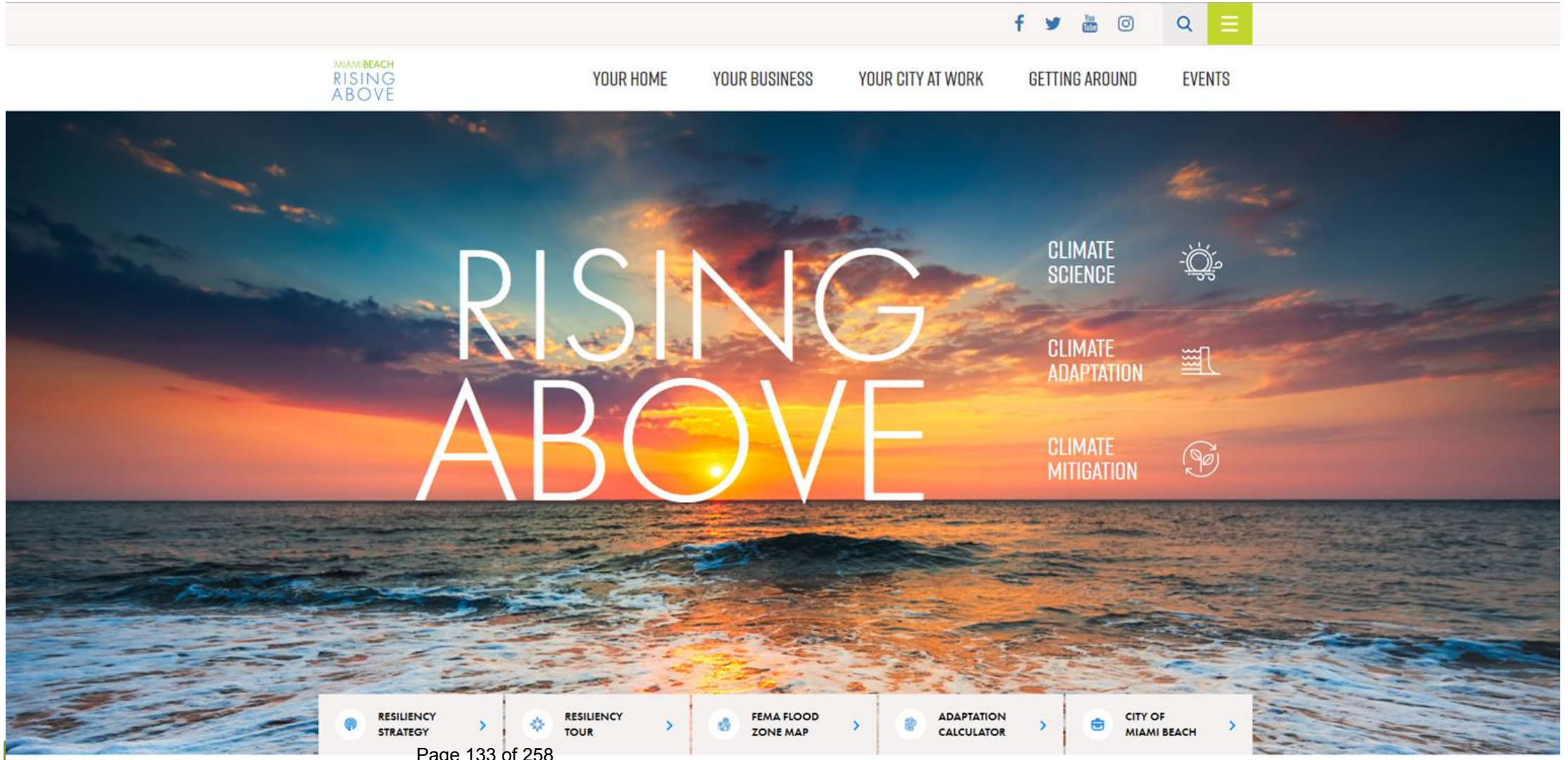


Proactive vs. Reactive Communications

Proactive vs. Reactive Communications

MIAMIBEACH
RISING
ABOVE

Integrate all facets of resilience communications



Stormwater and Climate Adaptation Principles

- Maintained Urgency
- Incrementalism & Evaluation
- Transparency
- Ecological Health
- Financial Pragmaticism
- Co-benefits
- Social Equity
- Cultural Identity
- Living with Water

One more thing…

Questions & Discussion

Thank you for attending today's presentation.

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COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: June 20, 2018

SUBJECT: **DISCUSSION ON RECOMMENDATIONS FROM THE HARVARD GRADUATE SCHOOL OF DESIGN STUDY**

RESPONSIBLE DEPARTMENT:
Susanne Torriente, Assistant City Manager

SPONSORED:
Office of the City Manager

Analysis
1. Create a comprehensive and flexible medium-term plan for urban adaptation

2. Expand flood mitigation projects from a single purpose engineering solution to multifunctional green infrastructure

3. Reconceive elevated streets and avenues to maximize infrastructural and public co-benefits and to contribute to multi-adaptive infrastructure

4. Transform main public right of ways into green infrastructure and exemplify innovative urban adaptation.

ATTACHMENTS:

Description	Type
Attachment A: LTC 147-2017 Harvard GSD	Other
Attachment B: Harvard GSD Letter to Mayor	Other
Attachment C: Harvard Study Presentation	Other

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City of Miami Beach, 1700 Convention Center Drive, Miami Beach, Florida 33139, www.miamibeachfl.gov

Jimmy L. Morales, City Manager
Tel: 305-673-7010 , Fax: 305-673-7782

NO. LTC # **147-2017**

LETTER TO COMMISSION

TO: Mayor Philip Levine and Members of the City Commission

FROM: Jimmy L. Morales, City Manager

DATE: March 17, 2017

SUBJECT: Harvard University's Graduate School of Design, Office for Urbanization Partnership

I am pleased to provide an update on the City's partnership with the Harvard University's Graduate School of Design, Office for Urbanization (GSD) and the milestones this collaboration has achieved to date.

In May 2015, the City of Miami Beach entered into a two-year partnership with the Harvard GSD for a series of sponsored design studios to study the impacts of and potential responses to sea level rise in coastal communities like Miami Beach. The multi-year research project, aims to examine the implications of rising sea levels and increased storm events on our city's economy, ecology, infrastructure, and community identity. The studios have engaged Harvard faculty members and researchers, as well as other leading academics and professionals in architecture, landscape architecture, urban design, planning, engineering, ecology, law and other related disciplines toward developing planning strategies that anticipate potential future scenarios and mitigate present threats.

Above: Harvard faculty members and researchers with City staff during a studio presentation.

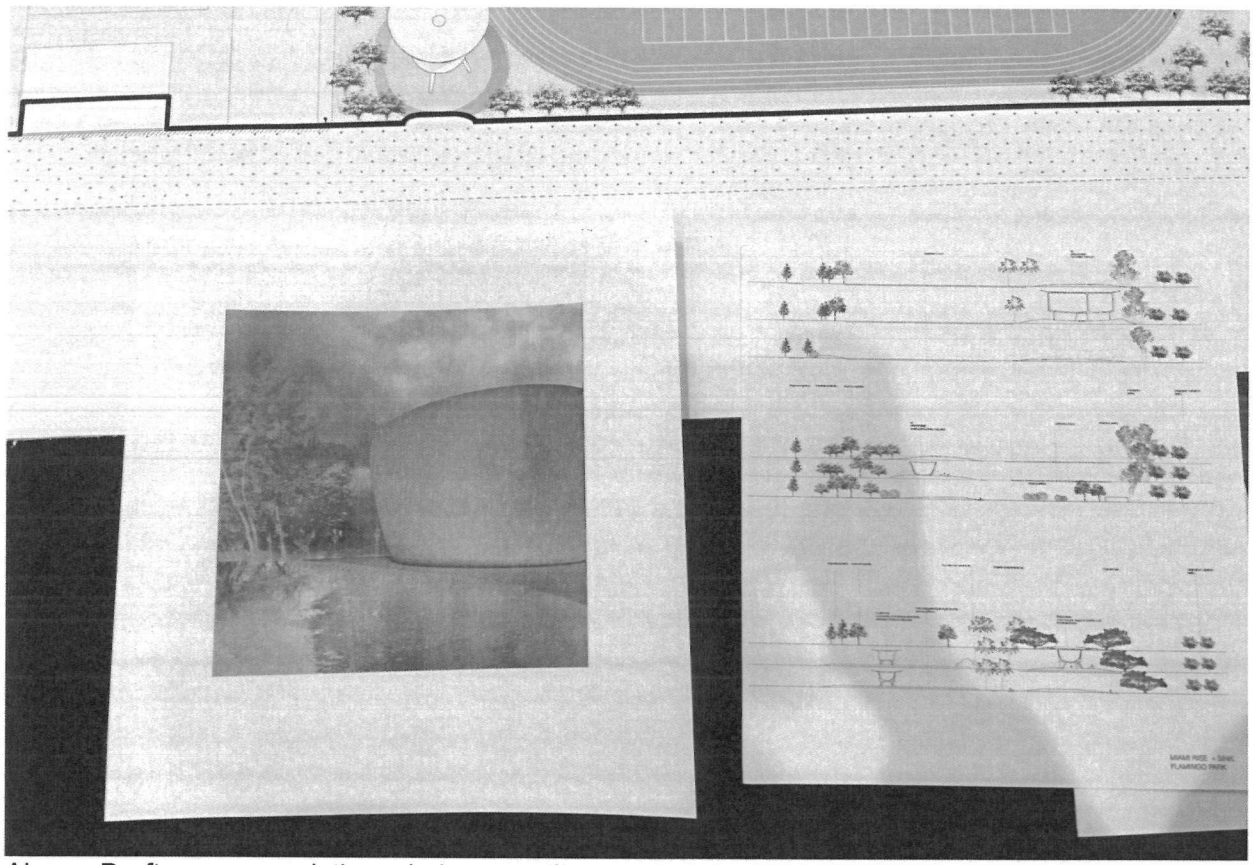
Key highlights to date include:

2015-2016 Academic Year

- A research seminar on resource interconnections and a graduate design studio focusing on innovative solutions for adaptation options within the next 30 years.
- A day-long conference hosted by Harvard GSD at the Wolfsonian attended by academics from Harvard, the University of Miami, Florida Atlantic University and Florida International University.

2015-2017 Academic Year

- Design and research course work focused on three related sub-themes:
    - The legal and policy framework for adaptation (Harvard Law School);
    - The context of real estate development in relation to adaptation (Harvard Real Estate Field Study); and,
    - The role of architectural preservation in the context of adaptation (Harvard GSD Critical Conservation Program).
    - Architectural and urban innovations design



Above: Draft recommendations during a studio presentation included above-ground water storage.

All the coursework and research materials developed as part of this research project will be synthesized in the summer of 2017 into a set of recommendations. The larger research findings, and associated research products will be combined in a research report that will be published by

Harvard GSD in the fall of 2017 and presented in a public event in Miami Beach before the end of October 2017.

JLM/SMT/MKW/FCT

MIAMIBEACH

City of Miami Beach, 1700 Convention Center Drive, Miami Beach, Florida 33139, www.miamibeachfl.gov

Jimmy L. Morales, City Manager
Tel: 305-673-7010 , Fax: 305-673-7782

April 9, 2018

Dear Mayor Dan Gelber,

I am pleased to present to you Harvard Graduate School of Design's Office for Urbanization's final research report *South Florida and Sea Level: The Case of Miami Beach*. Over the course of the last two years, the Harvard Graduate School of Design completed a series of sponsored design studios to study the impacts of and the potential response to sea level rise in Miami Beach. The multi-year research project, examined the implications of rising sea levels and increased storm events on our city's economy, ecology, infrastructure, and community identity.

I am pleased to report that Harvard's findings are in line with the direction our resiliency program is moving. Many of the suggestions build upon programs and initiatives that the city has been engaged. The following four recommendations are timely and could take us to the next level. I recommend these for your consideration as we move to the next stages of our Resiliency Strategy development and following the recommendations of the Urban Land Institutes Technical Advisory Panel.

> Recommendation 3: The city should **create a comprehensive and flexible medium-term plan for urban adaption**. This plan should project a shared, future cultural identity. This aspiration should draw upon the history of Miami Beach's natural endowment and synthetic construction to inform a future imaginary that simultaneously respects and transcends nostalgia and heritage. This medium-term plan should be comprised of short-term, multi-scalar efforts that multiple stakeholder can cumulatively and sequentially complete. Within these short-term projects, the challenge is to respond to shifting environmental and economic conditions that preserve the economic and cultural value of prior investments.
>
> Recommendation 4: The city should **expand flood mitigation projects from a single-purpose engineering solutions to multi-functional green infrastructure**. The city should commission a study of the resilience metrics for local species and ecologies to inform ongoing and future flood mitigation projects. Beyond studying the hydrological and ecological advantages of native mangroves and rhizomatic grasses, the city should promote their public perception and work with the private sector to mandate their deployment, particularly along jurisdictionally discontinuous coastlines. Finally, the city should differentiate between plants used for ecological versus aesthetic purposes and deploy them accordingly to environmental, public, and educational ends.

Recommendation 6: The city should **reconceive elevated streets and avenues to maximize infrastructural and public co-benefits and to contribute to multi-adaptive infrastructure**. The city should commission a study or conduct a pilot program on using elevated roads for the conveyance, absorption, and storage of stormwater as well as for public benefits (e.g., recreation amenities). Furthermore, the city should commission a study on the use of interstitial block alleys for hydrological, environmental, and public functions. In the medium term, the city should develop sectional strategies for the gradual one-story elevation of streets and avenues and integrate them with ingress/egress requirements, sidewalks, storefronts, and other public right-of-ways.

Recommendation 8: The city should commission studies that **transform its main public right-of-ways into green infrastructure and exemplify innovative urban adaptation**. One of the studies should reconceive Collins Canal as stormwater infrastructure that also provides new a waterside development, a public promenade, and coastal vegetation. Another study should reconceive the Biscayne Bay coastline as a living seawall that also connects a system of elevated street-end plazas over pump stations with a continuous public baywalk. A third study should reconceive Flamingo Park as a hydrological and ecological resource that also maintains its public landscape.

At the next commission meeting on April 11, Charles Waldheim, John E. Irving Professor of Landscape Architecture at Harvard University's Graduate School of Design and Director of the School's Office for Urbanization will be presenting the final report for your consideration. Please do not hesitate to reach out to me prior to the meeting with any questions or concerns.

Thank you,

Jimmy L. Morales

City Manager

SMT/ESW

OFFICE

South Florida and Sea Level: The Case of Miami Beach

OFFICE FOR URBANIZATION

RESEARCH REPORT

South Florida and Sea Level: The Case of Miami Beach

EDITION

2017

Harvard University
Graduate School of Design

SOUTH FLORIDA AND SEA LEVEL

The Case of Miami Beach

South Florida and Sea Level: The Case of Miami Beach

Principal Investigator
Charles Waldheim

Lead Researchers
Aziz Barbar, Rosetta Elkin, Helen Kongsgaard, Jessy Yang.

Project Team
Javier Ors-Ausin, Matthew Coogan, Francesca Romana Forlini, Christian Lavista, Mariano Gomez-Luque, Chris Merritt, Richard Peiser, Lindsay Woodson.

Scenario Contributors
Myrna Ayoub, Mikela De Tchaves, Kent Hipp, Geunhwan Jeong, Andrew Madl, Chris Merritt, Izgi Uygur, Boxia Wang, Daniel Widis, Sonny Xu, Jessy Yang, Ziwei Zhang.

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This research report documents the work of an investigation sponsored by the City of Miami Beach and Harvard University Graduate School of Design. Additional support for the investigation was generously provided by the Harvard GSD Irving Innovation Fund.

Harvard University Graduate School of Design
Office for Urbanization

Mohsen Mostafavi, Dean
Charles Waldheim, Director

The Harvard University Graduate School of Design is dedicated to the education and development of design professionals in architecture, landscape architecture, urban planning, and urban design. With a commitment to design excellence that demands the skillful manipulation of form and technology and draws inspiration from a broad range of social, environmental, and cultural issues, the Harvard GSD provides leadership for shaping the built environment of the twenty-first century.

The Harvard GSD Office for Urbanization draws upon the School's history of design innovation to address societal and cultural conditions associated with contemporary urbanization. It develops speculative and projective urban scenarios through design research projects. The Office imagines alternative and better urban futures through applied design research. The Office aspires to reduce the distance between design innovation and societal impact.

Harvard University Graduate School of Design
48 Quincy Street
Cambridge, MA 02138

www.gsd.harvard.edu
www.officeforurbanization.org

ISBN: 978-0-9991618-5-2

Harvard University
Graduate School of Design

OFFICE FOR URBANIZATION

SOUTH FLORIDA AND SEA LEVEL

The Case of Miami Beach

“The infrastructure we have is built for a world that doesn’t exist anymore.”[1]

Nicole Hernandez Hammer, 2015
Environmental Studies Researcher, Union of Concerned Scientists

Fig. 1. Aerial view of South Beach looking south.

Contents

Acknowledgments

This report documents the work of an investigation conducted at the Harvard University Graduate School of Design's Office for Urbanization from 2015 to 2017. The research and this report would not have been possible without the generous contributions of many people and institutions.

We must begin by thanking the City of Miami Beach, Mayor Philip Levine, and City Manager Jimmy Morales as well as city representatives who served on the Blue Ribbon Panel on Flood Mitigation and Sea Level Rise: Scott Robins, Special Advisor to the Mayor and Chairman; Michael DeFilipe, community activist; and Wyn Bradley, architect and faculty at the University of Miami and member of the City Planning Board. We are deeply grateful to the committed public servants who were generous and insightful consultants, including Eric Carpenter, Public Works Director; Amy Knowles, Deputy Resiliency Officer; Rogelio Madan, Chief of Community Planning and Sustainability; Bruce Mowry, City Engineer; Susanne Torriente, Chief Resilience Officer and Assistant City Manager; Margarita Wells, Environmental Resources Manager; and Elizabeth Wheaton, Director of Environment and Sustainability. We also acknowledge the contributions of those from Miami-Dade County, in particular Maria Nardi, Director of Miami-Dade County Parks, Recreation, and Open Spaces Department. This report would not have been possible without all of their support.

We must also thank our academic collaborators in Miami for offering their generous assistance, intellectual rigor, and educational facilities: Florida International University, University of Miami, and Florida Atlantic University. First, we thank Director of The Wolfsonian-FIU Timothy Rodgers for opening his beautiful venue to host our spring 2016 *South Florida and Sea Level* colloquium. Additionally, we thank Roberto Rovira, Associate Professor of Landscape Architecture and Chair of Landscape Architecture + Environmental and Urban Design at FIU, for his collegiality, leadership, and support with our on-site programs and field visits. We are grateful to others at the University of Miami, including Sonia Chao, Associate Professor and Director of the Center for Urban and Community Design; Benjamin Kirtman, Professor of Meteorology and Physical Oceanography; Joanna Lombard, Professor of Architecture; and Harold Wanless, Professor of Geology. Thanks equally to Marta Canaves, Instructor of Landscape Architecture at the Florida International University. Lastly, we acknowledge members of nonprofit and journalism organizations that shared their unique insights, including Alistair Gordon, Contributing Editor of Architecture and Design, *Wall Street Journal*; Greg Guannel, Urban Programs Director, The Nature Conservancy; and Rachel Silverstein, Executive Director and Waterkeeper of the Biscayne Bay Waterkeeper.

We are indebted to our professional contributors in Miami for offering their multi-disciplinary expertise on urban adaptation. From participating in our colloquium, to hosting our field trip visits, to attending our design reviews; these individuals deserve our sincere appreciation, including Reinaldo Borges, Principal of Borges Architects and Associates; Jeremy Gauger, Vice President of ArquitectonicaGEO; Rene Gonzalez, Principal of RGA; Chad Oppenheim, Principal of Oppenheim Architecture; Eric Rodenbeck, Founder and Creative Director of Stamen; Eric Rothstein, Managing Partner and Engineer of eDesign Dynamics; Laurinda Spear, Principal of ArquitectonicaGEO; Marcia Tobin, Principal and Vice President of AECOM; Justine Velez, Principal of Urban Robot; and JJ Wood, Principal of Urban Robot. Their perspectives and inquiries challenged us to think more holistically and critically about designing for urban adaptation.

We thank our academic contributors at the Harvard University Graduate School of Design as well as the University at large for their time, perspectives, and productive criticism, including Anita Berrizbeitia, Professor and Chair of Landscape Architecture; Neil Brenner, Professor of Urban Theory and Director of Urban Theory Lab; Brad Cantrell, Associate Professor of Landscape Architectural Technology; Felipe Correa, Associate Professor of Urban Design; Scott Cohen, Professor of Architecture; Diane Davis, Chair of the Urban Design and Planning Department; Ana Gelabert-Sanchez, Design Critic of Urban Planning and Design; Jerold Kayden, Professor of Urban Planning and Design; Jesse M. Keenan, Lecturer in Architecture; Sergio Lopez-Pineiro, Lecturer in Landscape Architecture; Nicholas Nelson, Lecturer in Landscape Architecture; Richard Peiser, Michael D. Spear Professor of Real Estate Development; and Andrew Witt, Assistant Professor in Practice of Architecture. In addition, we would like to extend our gratitude to Gerald E. Frug, Louis D. Brandeis Professor of Law at the Harvard Law School and Dr. Alan Blumberg, Oceanographer and Director of the Center for Maritime Systems at the Stevens Institute of Technology. Lastly, we also acknowledge the valuable design feedback provided by those visiting from other universities and institutions, including Mitesh Dixit, Assistant Professor of Architecture and Urbanism at Syracuse University; Martin Felsen, Director of the Master of Architecture Program at the Illinois Institute of Technology; Paul Lewis, Associate Professor of Architecture at Princeton University and Principal of LTL Architects; Ashley Schafer, Professor and Graduate Chair of Architecture at Ohio State University; and Mason White, Associate Professor of Architecture at the University of Toronto. We could not have developed our projects as deeply and richly without all of their contributions.

We also want to highlight all of the students who participated in the seminar and studios and thank them for their dedication, imagination, and hard work: Myrna Ayoub, Adria Boynton, Jenna Chaplin, Dave Hampton, Justin Henceroth, Shanika Hettige, Kent Hipp, Geunhwan Jeong, Elizabeth Langer, Rebecca Liggins, Andrew Madl, Patrick Mayfield, Chris Merritt, Tyler Mohr, Thomas Nideroest, Althea Northcross, Emma Schnur, Brodrick Spencer, Andrew Taylor, Mikela de Tchaves, Izgi Uygur, Foad Vahidi, Boxia Wang, Yifan Wang, Daniel Widis, Lindsay Woodson, Han Xu, Mengze Xu, Sonny Xu, Jessy Yang, and Ziwei Zhang. The projects presented in this report capture only a small fraction of their remarkable efforts and contributions.

Finally, we owe a debt of gratitude to the four committed lead researchers of the Harvard University Graduate School of Design's Office for Urbanization on this project: Aziz Barbar, Research Associate; Rosetta Elkin, Professor of Landscape Architecture at the Harvard University Graduate School of Design; Helen Kongsgaard, Research Associate; and Jessy Yang, Research Associate. Last but not least, the eight team members of the Office who contributed their talents in different ways deserve recognition: Javier Ors-Ausin, Matthew Coogan, Francesca Romana Forlini, Christian Lavista, Mariano Gomez-Luque, Chris Merritt, Richard Peiser, and Lindsay Woodson.

“Ultimately, you can’t beat nature, but you can learn to live with it. Human ingenuity is incredible, but do we have the political will? Holland sets aside $1 billion a year for flood mitigation, and we have a lot more coastline than they do.”[2]

Jimmy Morales, 2013
City Manager of Miami Beach

Fig. 2. Sunny Isles Beach.

Introduction

Project on South Florida and Sea Level

The Harvard University Graduate School of Design's Office for Urbanization draws upon the School's history of design innovation to address societal and cultural conditions associated with contemporary urbanization. It develops speculative and projective urban scenarios through sponsored design research projects. The Office imagines alternative and better urban futures through applied design research. The Office aspires to reduce the distance between design innovation and societal impact.

The challenges of contemporary urbanization rarely correspond to discrete professional or disciplinary boundaries. The Office is committed to enabling and accelerating societal impact through collaborative, multidisciplinary design projects. This work aspires to construct alternatives to present conditions and predictable outcomes with a relevant array of future options. These scenarios are selected in order to insulate individuals and their communities from the most adverse social and ecological impacts associated with ongoing processes of urbanization. They are also identified for their potential to contribute to urban life

and culture as well as our knowledge of urban sites and subjects. The work of the Office centers on design as an activity of collective imagination.

The work of the Office can be described under the general rubric of design research. The Graduate School of Design has a longstanding tradition of pursuing research through a diverse array of methods and media. Faculty members pursue research agendas closely associated with the humanities on the one hand, or with the natural, social, or political sciences on the other. In addition to those forms of research, faculty at the School pursue design research as its own unique form of knowing in and about the world.

Over the past two years since July of 2015, the Graduate School of Design and the City of Miami Beach have partnered on *South Florida and Sea Level*, a study of the impacts of and potential responses to sea level rise for coastal communities in South Florida. This research project examines the implications of rising sea levels and increased storm events on the economy, ecology, infrastructure, and identity of Miami Beach in relation to its metropolitan and regional contexts. This report synthesizes and presents strategies to anticipate future events and to mitigate present threats. As Miami's coastal barrier islands form one of the most recognizable and singularly valuable cultural landscapes in the world, the study of Miami Beach reveals the potential for ecological and infrastructural strategies as alternatives to large, single-purpose engineering solutions.

The emergent topic of urban adaptation to the effects of climate change is among the more pressing areas of research for those engaged in the built environment. While it was not entirely clear how the mitigation of climate change implicated the disciplines of architecture, urban design, or planning; the recent focus on adaptation to ongoing human impact on the environment and climate change puts those fields at the center of the conversation.

Over the past several years, the North American discourse on the subject has sensibly focused on the significant case studies of New Orleans post Katrina and New York post Sandy. Both of these cases have engendered a range of public discourse, planning proposals, and design strategies for living with the ongoing reality of increased storm events, rising sea levels, and a host of secondary and tertiary effects associated with this new reality. In each of these cases, the design disciplines have been central to projecting alternative futures for these vulnerable major metropolitan centers.

While these cases have provided unique contexts for advancing disciplinary knowledge, professional practices, and societal engagement with the subject of urban adaptation to sea level rise, they have also reinforced the defense of relatively densely concentrated urban agglomerations through the deployment of large hydrological engineering systems. By contrast, much of the North American coastline, and its associated urbanization, resist such approaches due to their geography, hydrology, and patterns of urbanization. Among the more extreme cases in this regard is the present status and uncertain future of South Florida's coastal communities.

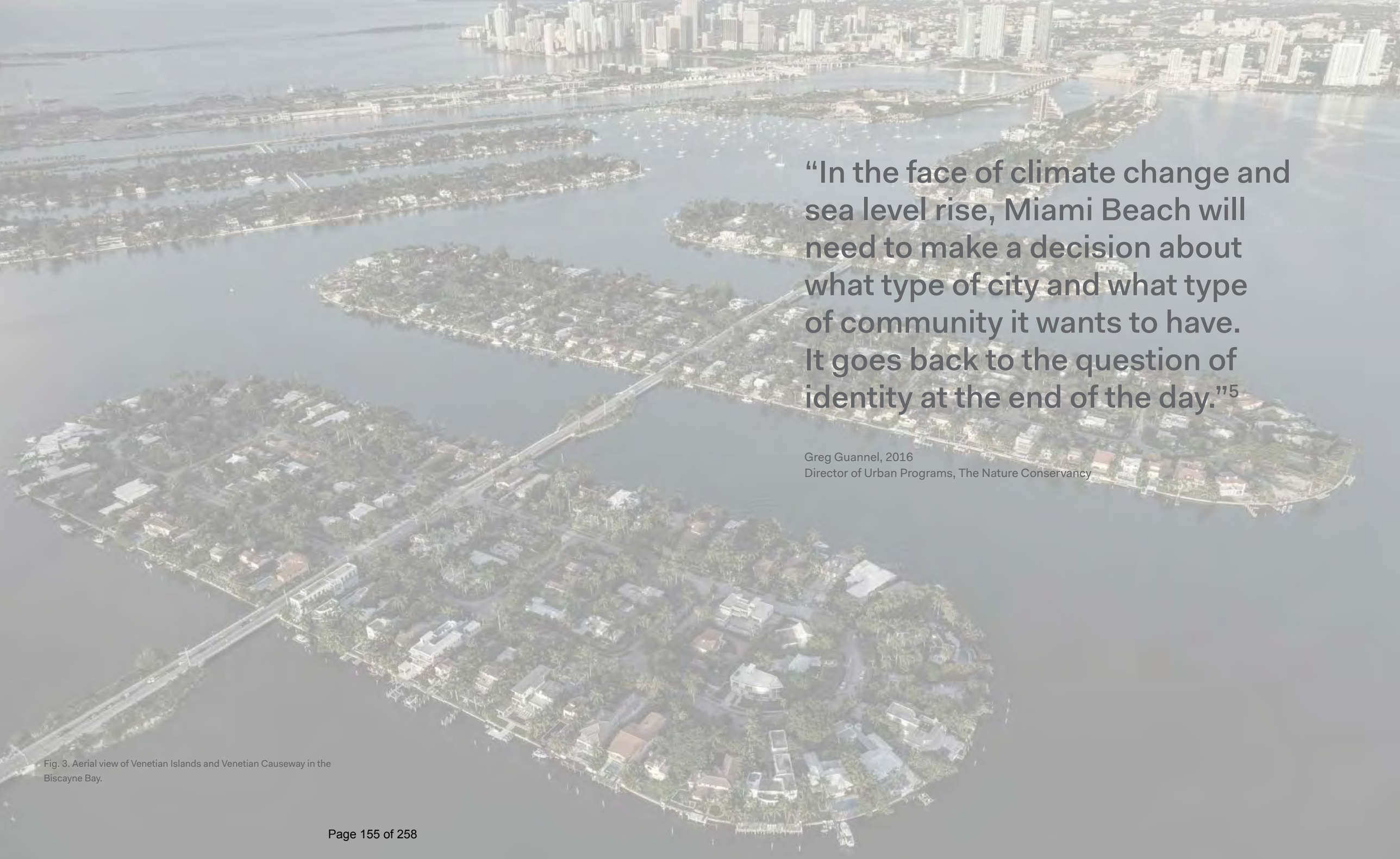
Using Miami Beach as a case in point, the GSD and its partners have examined the implications of sea level rise and increased storm events on the sprawling urbanism of metropolitan Miami and its numerous municipalities and communities. Among those communities, Miami Beach presently experiences multiple occurrences of so-called "sunny day" flooding (i.e., flooding in the absence of a storm event).[3] From 2014 to 2015, the City of Miami Beach convened a Blue Ribbon Panel on Flood Mitigation[4] to advise the Mayor's Office on this issue. The City is also in the midst of a multi-million dollar upgrade to its drainage infrastructure, which is designed to mitigate the most immediate impacts of seasonal flooding. Ultimately, this work can do little to apprehend the larger impacts of sea level rise. The low-lying coastal conditions and singular cultural heritage of Miami Beach resist the types of massive civil engineering projects that have recently been proposed for London, Venice, or other major international cities. Given that South Florida's economy and identity rely upon the specific landscape conditions of Miami Beach, this research project uses the frameworks of green infrastructure, landscape ecology, and cultural heritage as potential responses to looming threats associated with sea level rise.

This research project is led by Principal Investigator Charles Waldheim, John E. Irving Professor of Landscape Architecture, who is joined by Assistant Professor of Landscape Architecture Rosetta Elkin as well as research associates, graduate research assistants, and students from across the GSD. The project launched in July of 2015 and has since gathered expertise from across the GSD and the University through research seminars, design workshops, design studios, and scholarly meetings. In addition, the studios and their related site visits, colloquium and studio reports convened leading experts from various disciplines and professions in South Florida with participants for dialogue. This report synthesizes the best practices and compelling cases and proposes strategies and solutions for mitigating the impacts of sea level rise in the context of Miami Beach. Divided into two time scales, short-term (approximately 10 years out) and medium-term (50 years out), recommendations presented here should be understood not as design projects but as principles conveyed through design scenarios.

The report was made possible with the support the City of Miami Beach. It is informed by the collaboration of committed public servants and citizens from Miami Beach who have been appointed by their Mayor to represent the city on the Blue Ribbon Panel on Flood Mitigation, including Special Advisor to the Mayor and Chairman Scott Robins, retired engineer Dr. Dwight Kraai, and Professor Emeritus from the University of Miami Dr. Michael Phang, with help and guidance from Mayor Philip Levine and his City Manager Jimmy Morales. Additional contributions were provided by thought leaders at Florida International University, Florida Atlantic University, the University of Miami as well as local non-governmental and professional offices.

RECOMMENDATIONS

Summary
Prospects
Scenarios



"In the face of climate change and sea level rise, Miami Beach will need to make a decision about what type of city and what type of community it wants to have. It goes back to the question of identity at the end of the day."[5]

Greg Guannel, 2016
Director of Urban Programs, The Nature Conservancy

Fig. 3. Aerial view of Venetian Islands and Venetian Causeway in the Biscayne Bay.

Summary

Miami Beach

1

The City of Miami Beach should mainstream climate adaptation in all infrastructural, environmental, economic, and social undertakings because climate issues have now become common to each sector. The city should continue to initiate experimental research, reports, and projects as well as engage with all relevant stakeholders and agencies to coordinate ongoing and future adaptation efforts. Additionally, the city should continue to engage with local civic and research institutions and professionals to solicit imaginative adaptation strategies. Through prototypes of projects and policies, the city has the opportunity to develop the appropriate pathways through trial and error.

2

The City of Miami Beach should continue to engage national, state, regional, and local actors through the Southeast Florida Regional Climate Change Compact in order to translate scientific consensus into support tools, guidelines, and design standards for managing infrastructure systems and the built environment. A uniform application of standards based on a range of direct and indirect climate change impacts can help local municipalities serve as leaders that other jurisdictions can learn from.

3

The City of Miami Beach should create a comprehensive and flexible medium-term plan for urban adaptation. This plan should project a shared, future cultural identity. This aspiration should draw upon the history of Miami Beach's natural endowment and synthetic construction to inform a future imaginary that simultaneously respects and transcends nostalgia and heritage. This medium-term plan should be comprised of short-term, multi-scalar efforts that multiple stakeholders can cumulatively and sequentially complete. Within these short-term projects, the challenge is to respond to shifting environmental and economic conditions that preserve the economic and cultural value of prior investments.

4

The City of Miami Beach should expand flood mitigation projects from single-purpose engineering solutions to multi-functional green infrastructure. The city should commission a study that examines, among others, strategies to replace hard seawalls with living seawalls, increase permeable surfaces, maximize on-site stormwater capacity, and leverage different water types (e.g., saltwater, freshwater, greywater) according to their utility. In the medium term, the city should design urban environments around current and future hydrological performance. As jurisdictional oversight and permitting inertia pose the primary challenges, the city should seek joint cooperative agreements with cross-sectorial and cross-jurisdictional partners.

5

The City of Miami Beach should incorporate landscape ecology into the evaluation and design of all infrastructural projects. The city should commission a study of the resilience metrics for local species and ecologies to inform ongoing and future flood mitigation projects. Beyond studying the hydrological and ecological advantages of native mangroves and rhizomatic grasses, the city should promote their public perception and work with the private sector to mandate their deployment, particularly along jurisdictionally discontinuous coastlines. Finally, the city should differentiate between plants used for ecological versus aesthetic purposes and deploy them accordingly to environmental, public, and educational ends.

6

The City of Miami Beach should reconceive elevated streets and avenues to maximize infrastructural and public co-benefits and to contribute to multi-adaptive infrastructure. The city should commission a study or conduct a pilot program on using elevated roads for the conveyance, absorption, and storage of stormwater as well as for public benefits (e.g., recreation amenities). Furthermore, the city should commission a study on the use of interstitial block alleys for hydrological, environmental, and public functions. In the medium term, the city should develop sectional strategies for the gradual one-story elevation of streets and avenues and integrate them with ingress/egress requirements, sidewalks, storefronts, and other public right-of-ways.

7

The City of Miami Beach should reconceive the historic district as a stormwater sink. The city should commission a study on specific typological and morphological strategies to elevate the historic district over time without sacrificing cultural identity. This study should develop codes and massing strategies to rewrite existing regulations, maximize permeable ground, increase on-site stormwater retention, and incentivize development interest. In the medium term, the city should consider prioritizing typological preservation over strict architectural or material preservation.

8

The City of Miami Beach should commission studies that transform its main public right-of-ways into green infrastructure and exemplify innovative urban adaptation. One of the studies should reconceive Collins Canal as stormwater infrastructure that also provides new waterside development, a public promenade, and coastal vegetation. Another study should reconceive the Biscayne Bay coastline as a living seawall that also connects a system of elevated street-end plazas over pump stations with a continuous public bay walk. A third study should reconceive Flamingo Park as a hydrological and ecological resource that also maintains its public landscape.

9

The City of Miami Beach should include the public realm as a metric of evaluation in all adaptation efforts. The city should commission a study on strategies to incorporate public space and programming into all hydrological, ecological, and infrastructural landscapes by integrating promenades, open spaces, public amenities, and educational opportunities. This study should also examine maintaining and increasing public access around large luxury developments along the waterfront. In the medium term, the city should continue to enhance public transit options along major corridors (e.g., Alton Road, Washington Avenue) by prioritizing buses, pedestrians, and bicycles over vehicles.

10

The City of Miami Beach should commission a transportation study on fortifying connections with mainland Miami in terms of mass transit and transportation resilience. This study should explore designs that expand transit options on existing causeways by widening and/or decking in order to accommodate bike paths, light rails, and rapid bus lanes. The city should coordinate with the Miami-Dade Transportation Planning Organization (TPO) and Miami-Dade Transit (MDT) to streamline intercity and multi-modal commuting.

11

The City of Miami Beach should incentivize, guide, and coordinate future adaptation efforts. The city should revise its zoning regulations and land use practices to reflect regional and local policy initiatives. The city should create a finer-grained regulatory system, beyond the catch-all Adaptation Action Areas designation, for areas vulnerable to flooding and prioritize or restrict funding accordingly. Finally, the city should: 1) standardize Base Flood Elevations by location, use, and program; 2) negotiate Flood Insurance Rate Maps that incorporate current probabilities for sea level rise and frequency of storm events; and 3) explore strategies that qualify for credits under the pending FEMA rule for Public Assistance Deductibles.

12

The City of Miami Beach should channel its real estate market toward uses and co-benefits that inure to public and private realms. The city should commission an economic study on maximizing development contributions without diminishing the inherent values in retail, commercial, and housing sub-markets. This study should examine policies that incentivize or require new developments to not only incorporate engineered resilience but also contribute to the resilience of the contextual public realm. Additionally, the city should require transparency in real estate transactions by requiring brokers to disclose current and projected risks to properties based on current data from the Southeast Florida Regional Climate Change Compact.

“South Florida…has been called ‘ground zero when it comes to sea-level rise.’ It has also been described as ‘the poster child for the impacts of climate change,’ the ‘epicenter for studying the effects of sea-level rise,’ a ‘disaster scenario,’ and ‘the New Atlantis’.”[6]

Elizabeth Kolbert, 2015
Staff Writer, The New Yorker

Fig. 4. Aerial view new and under-construction condominiums and hotels along Miami Beach's waterfront.

Prospects

Hydrologies

Ecologies

Infrastructures

Identities

Spaces

Publics

Policies

Developments

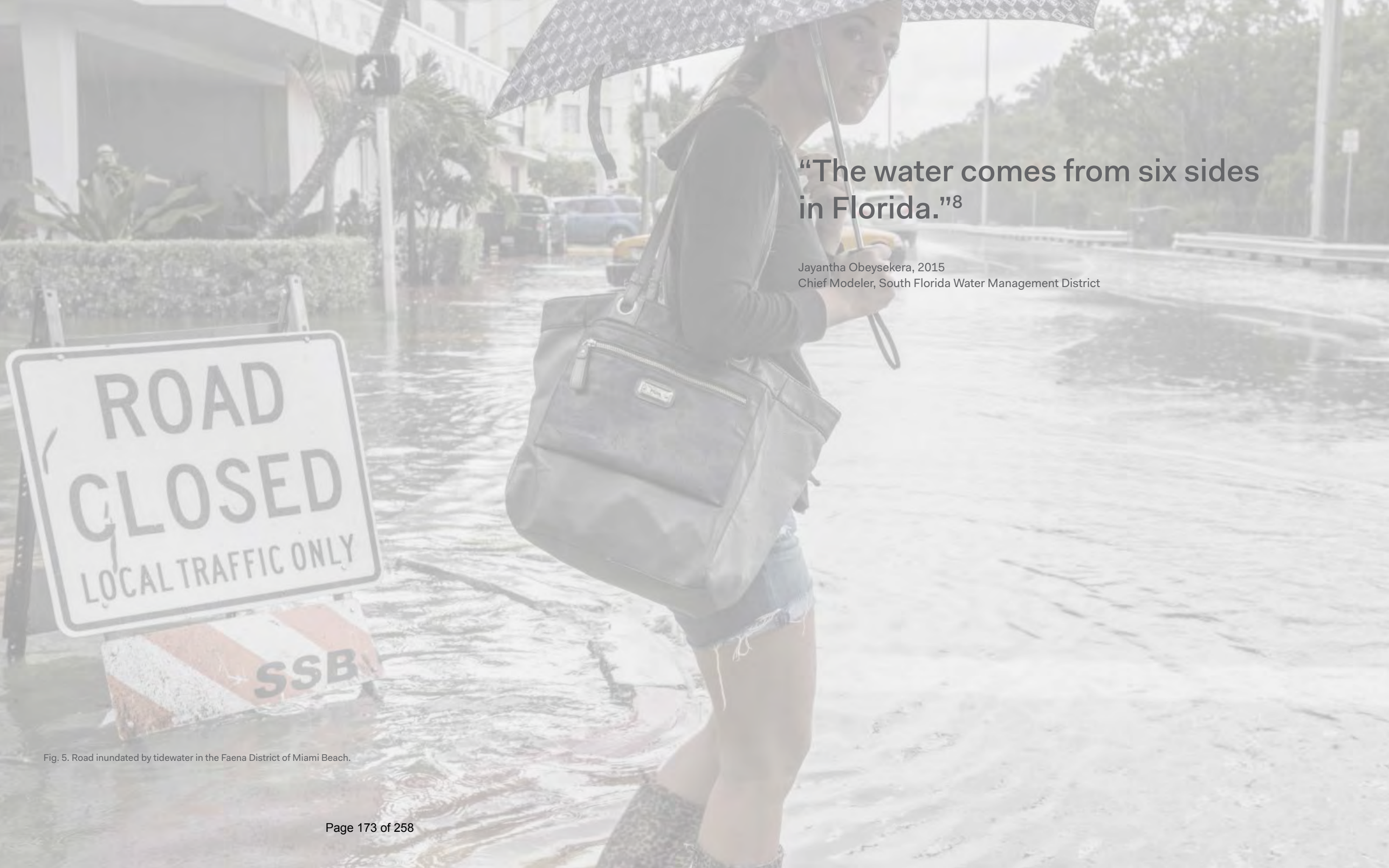
As sea levels rise and storm events intensify, the City of Miami Beach must confront the challenge of urban adaptation, an existential problem that directly implicates the practices and ethics of the design fields. However, current efforts to stem the rising tides employ single-purpose, engineered infrastructure that offers a temporary fix in order to buy time and delay an inevitable future. This infrastructure—manifesting as flood pumps, raised seawalls, elevated roads, and the like—represents a disparate set of defense mechanisms that promises minimal change in planning operations or associated design standards. Furthermore, betting on a miraculous technological fix to save the city[7] is not only dangerous but willfully ignores the capacities of the design disciplines to address the challenge

across a range of sectors, assets, and programs. As every adaptation effort carries environmental, social, and cultural roles and responsibilities, Miami Beach must turn toward alternative strategies that embrace green infrastructure, landscape ecology, livability standards, and a future cultural imaginary worth adapting and aspiring toward.

Absent state and federal leadership, the City must act to develop a comprehensive and simultaneously flexible plan for future adaptation within the context of a municipal government. As a barrier island, Miami Beach enjoys a certain level of autonomy in terms of geological and morphological scale as well as political and legislative agency. This degree of independence gives the City

leeway to act beyond regional coordination when appropriate and necessary. At the same time, while ongoing efforts at a regional scale (i.e., the Southeast Florida Climate Change Compact) are laudable for their spatial coordination, the City must also plan ahead for multi-decade temporal coordination, recognizing that stakeholders have different time cycles: 1-year municipal budgets, 5-year capital plans, 4-year mayoral terms, 10-year real estate developments, 20-year mortgages, and 50-year building cycles. This outlook therefore requires a robust and coherent long-term plan that is comprised of short-term projects and micro-efforts that can be cumulatively completed by public administrations, private developers, and local citizens.

The following recommendations are loosely grouped around eight disciplinary categories: hydrology, ecology, infrastructure, identity (i.e., preservation and cultural image), urban form, public realm, policy, and development. Within each category, recommendations are further grouped into two timescales: short-term (approximately 10 years) and medium-term (approximately 10-50 years out). While most recommendations are synthesized from two and a half years of academic research, others require additional study. Finally, all recommendations draw upon the history of Miami Beach's natural endowment and synthetic construction to inform the city's urban adaptation and future imaginary.



"The water comes from six sides in Florida."[8]

Jayantha Obeysekera, 2015
Chief Modeler, South Florida Water Management District

Fig. 5. Road inundated by tidewater in the Faena District of Miami Beach.

Hydrologies

Given its unique geology and geography, Miami Beach faces threats of water from all sides: heavier precipitation due to increased storm events; higher flood levels due to rising sea levels and storm surges; groundwater intrusion due to rising water tables and a porous limestone foundation; and stronger and more frequent nuisance flooding and king tides.[9] This ongoing reality necessitates a reevaluation of the city's relationship to incoming waters beyond mere engineered defenses. Rather, the narrative of water as a threat must instead be reconceived as an opportunity that signals change, collectivity, and environmental stewardship. Because the city's hydrology is the basis for subsequent urban transformations, we recommend the following:

Short-Term

> Expand from single-purpose grey infrastructure to include multi-purpose green infrastructure. Ongoing efforts to install water pumps and raise streets only stave off water for the immediate future. These strategies cost the city several hundred million dollars and are potentially detrimental to the public realm. Introducing green infrastructure, such as living seawalls and permeable surfaces, provides alternative, sustainable strategies that augment existing engineering efforts.

> Introduce subtle landscape conditions to manage local stormwater drainage and retention to reduce the burden on surrounding pipes and pumps. Introducing

basins and permeable surface areas (e.g., through porous ground cover, elevated decking) increases on-site holding and absorptive capacities. Additionally, the City should encourage new developments to maximize on-site permeable surfaces by reducing building footprints and elevating onto higher planes. (See Scenario 09)

> Use Flamingo Park as both a hydrologic and an ecological resource while maintaining its existing public and vegetated condition. Maximize its ability to hold and filter runoff during storm and tidal events. Because subtropical Florida usually suffers an excess or a deficit of water, Flamingo Park can help balance freshwater availability through seasonal fluctuations by using rainwater collection and distribution strategies. This can be accomplished while at the same time engaging vector borne control and providing additional amenities that are central to Flamingo Park's function for the community. (See Scenario 06)

> Differentiate saltwater (e.g., seawater) from sweetwater (e.g., freshwater, rainwater, groundwater) from greywater (e.g., used water) and consider how each can be retained, reused, or rejected. Rainwater and greywater, for instance, can be stored and reused for local irrigation while saltwater can be retained to stage coastal biodiversity. In particular, use Alton Road as the conceptual and physical divider between these water types so that landscapes and basins on the Flamingo Park side retain and recycle sweetwater while floodable spaces and canals on the Biscayne Bay side host salt-tolerant species. (See Scenario 02)

> Enhance strategies to clean and treat runoff water (e.g., stormwater, groundwater, or otherwise) before it is pumped into the bay. In addition to elevating from water, proper stewardship also needs to improve the water quality of the discharge. Stormwater for instance often picks up pollutants from asphalt before it is drained or pumped into the bay. Maximize biological stormwater filtration systems (e.g., bioswales, planted acequias) as the first layer of treatment before polluted stormwater is treated mechanically within the stormwater system.

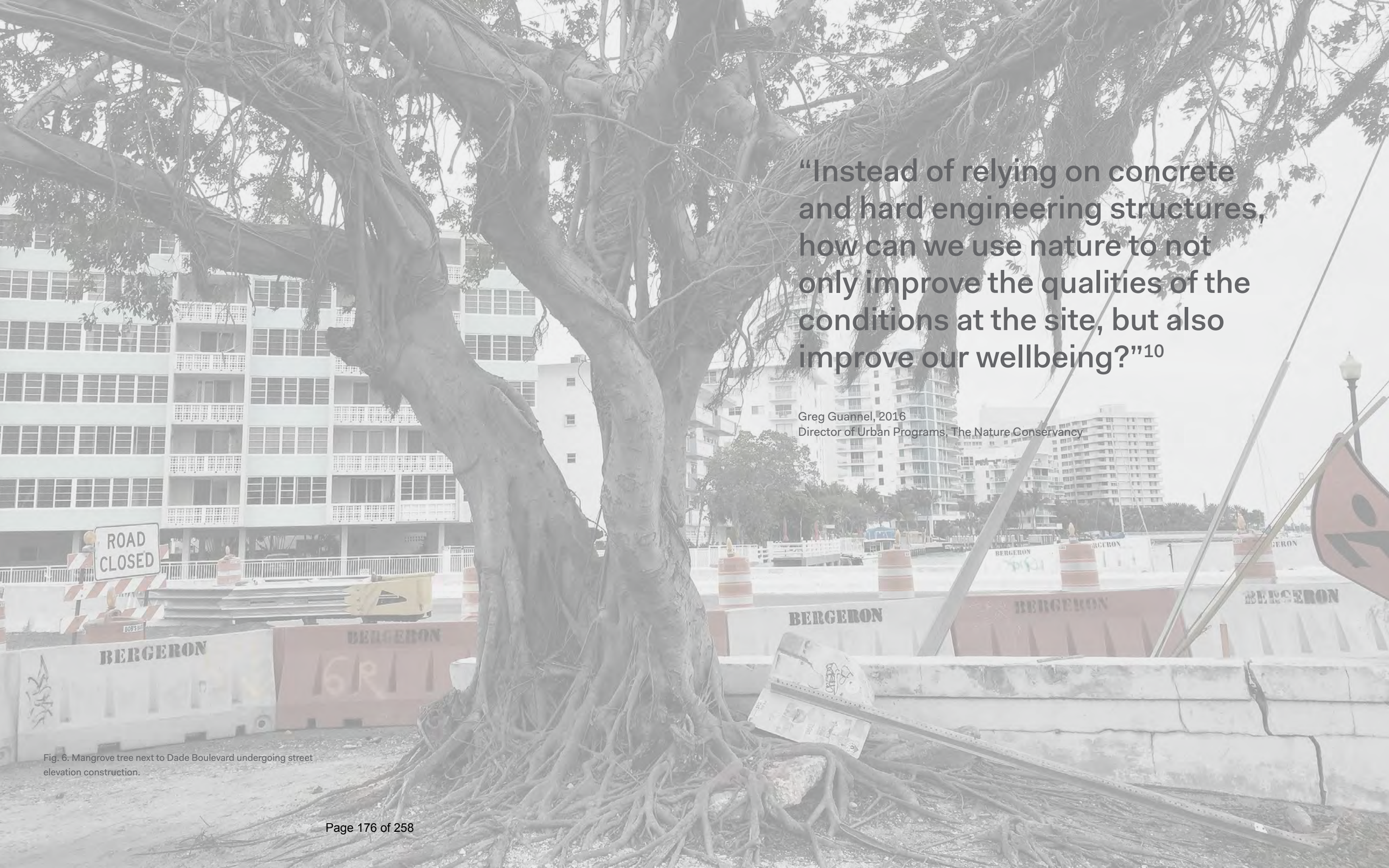
> Reconceive Collins Canal as stormwater storage infrastructure. Originally built as a transportation route for agricultural shipments, Collins Canal today can instead accommodate flood control functions. For instance, a cut-and-fill strategy can expand its capacity to hold water and simultaneously elevate adjacent lands above rising flood projections. Furthermore, new developments and public spaces should be introduced along its banks where the former is channeled to maximize public benefits. (See Scenario 07)

Medium-Term

> Create a networked canalization strategy throughout Miami Beach using different scales of canals for the conveyance and storage of stormwater: local bioswales, linear acequias, and larger channels. Pair with city-wide efforts to reduce cars by gradually trading street medians, edges, and on-street parking lanes for such canals. (See Scenario 04)

> Transform the Biscayne Bay coastal edge from the existing hard seawall into a variegated living seawall using topographic landscapes that mediate hydrological forces. In particular, building out into the bay with choreographed landforms elevates dry land, absorbs tidal impacts, retains seawater and stormwater, and stages ecological habitats. (See Scenario 05)

> Synthesize these hydrological strategies to create a comprehensive, cut-and-fill plan along the principal, public right-of-ways (e.g., Collins Canal, Biscayne Bay, and Flamingo Park) where each offers robust flood mitigation and control capacity. This strategy minimizes dredge that would otherwise disrupt the ecology of the Biscayne Bay.



"Instead of relying on concrete and hard engineering structures, how can we use nature to not only improve the qualities of the conditions at the site, but also improve our wellbeing?"[10]

Greg Guannel, 2016
Director of Urban Programs, The Nature Conservancy

Fig. 6. Mangrove tree next to Dade Boulevard undergoing street elevation construction.

Ecologies

Before Miami Beach was drained, defoliated, and developed, the barrier island was a mangrove swamp in a region whose subtropical climate endowed it with almost gratuitous vegetation and irrigation. As such, Miami Beach has the opportunity to learn from its environmental history and transform its future urban organization with green infrastructure that supports, or altogether replaces, ongoing engineering solutions. The mangrove tree is, in fact, more native than the city's iconic palm tree and has the potential to be a protagonist in the city's hydrological, infrastructural, and cultural adaptation solutions.

While the City has employed the mangrove species to a certain extent, the issue here is one of scale: a mangrove simply does not perform hydrologically or ecologically as a horticultural insert or a decoration around paths and buildings. Rather, for mangroves to comprise meaningful green infrastructure, they must be deployed *en masse* as a thick and deep system such as along the entire length of the bay or creek coastline. To deploy mangroves at this scale, this city must promote the tree's public perception and mandate planting them along privately-owned coastlines.

Short-Term

> Develop and integrate appropriate coastal plant communities using native species that reduce tidal forces, soil erosion, and runoff pollutants. Salt-tolerant and rhizomatic, these species provide a natural and resilient defense system that enhances existing protection.

> Deploy the native and resilient mangrove hammock as a natural coastal infrastructure. Red and black mangroves' rhizomatic roots retain soils, provide nursery habitats, produce rich nutrients, and form pollution sinks. Their tidal positions also create natural breakwater structures and reduce storm surges. White mangroves provide similar advantages on higher intertidal grounds during storm events as well as added aesthetic qualities. (See Scenario 04)

> Deploy salt-tolerant grass species as additional phytohydraulics—plants that absorb, hold, and move water. Like Everglades' sawgrass, certain coastal grasses (e.g., the paspalum) form thick, networked roots that withstand inundation during wet seasons and incidental fires during dry seasons. Inland, they can comprise the primary species in bioswales and daylit acequias, thereby acting as the first layer of the city's stormwater treatment system. (See Scenario 03)

> Differentiate between plants used for ecological and absorptive functions (e.g., saltwater) versus those used for cultural and aesthetic purposes (e.g., sweetwater) and deploy them to appropriate ends. In addition to the aforementioned capacities, native species also reduce the urban heat island effect, freshwater demand, and pollution buildup. On the other hand, aesthetic species, such as the iconic palm, afford a cultural value, such as improving the collective sense of place for local residents.

> Encourage programs that promote environmental education, restoration, and stewardship. Performative vegetation (e.g., rhizomatic grasses, salt-tolerant species) can be a didactic tool to teach lessons about natural sustainability and resiliency. For instance, introduce recreational and community-based programs centered on wildlife protection and awareness both on floodable land and in the bay.

Medium-Term

> Deploy *en masse* mangroves and salt-tolerant grasses as significant defense buffers, particularly along the entire length of the bay and creek coastlines. Promote the public perception and reception of these species so they gradually become just as integrated with the identity of the city as the iconic palm.

> Transition from planting non-native trees to native, salt-tolerant trees, particularly in urban areas covered primarily by asphalt and hardscape. As the city elevates both roads and buildings, the city should develop strategies to incorporate salt-tolerant vegetation to ensure their future growth and resilience.

> Build out into coastal waters and stimulate diverse flora and fauna species using topography to perform hydrologically, ecologically, and aesthetically. These species can add to the cultural image of the city and index its hydrological health and management. Biscayne Bay, for instance, can host a mosaic of heterogeneous species that provide an aesthetic and experiential counterpoint to the typical homogeneity of the eastern beaches. (See Scenario 01)

“Water is not bad; we need to embrace that which is the basis of all life, and we need to look at better ways to utilize it."[11]

Bruce Mowry, 2016
City Engineer, City of Miami Beach

Fig. 7. Workers pump water from the inundated intersection of 18th St. and Bay Rd., located in Sunset Harbour, one of the lowest lying neighborhoods along the western bay coast.

Infrastructures

The immanent and ongoing threats of climate change strain Miami Beach's increasingly vulnerable municipal infrastructure. Pumps and pipes have been installed where gravity-based systems no longer suffice. Yet the recent incapacity to manage sunny day or flash floods highlights the limits of single-purpose engineering solutions and their inability to handle larger storm events.[12] Beyond flood pumps, raised roads, and sacrificial floors, incorporating landscape conditions and hybridized systems offers an opportunity to augment existing flood-resistant infrastructure.

Short-Term

> Use elevated streets and avenues to convey, absorb, and store stormwater. Elevated streets can use limestone-like fill to augment its sponge capacity. Pauses along its cross section can host deeper urban soils for added permeability, storage, and vegetation. Coordinate between jurisdictions to elevate roads in a comprehensive manner, such as for state roads, county roads, and municipal roads. (See Scenarios 08)

> Use rooftop cisterns for water collection and storage in and around Flamingo Park in addition to rain gardens and bioswales. Collected rainwater can help mediate fluctuating irrigation demand in the park. Additionally, underutilized areas in the park can host large rainwater collection tanks that double as public art. Lastly, the city should transform existing hardscapes into permeable surfaces for additional recreation grounds. (See Scenario 06)

> Reconceive block alleys as opportunities to add pervious surfaces and retention basins. Existing alleys adjacent to primary commercial avenues (e.g., Oceans Court, Collins Court) can stage additional public and semi-public spaces as extensions from the public realm. City works can pair these efforts with cut-and-fill strategies to further elevate low-lying lands and structures. (See Scenario 09)

> Coordinate with city-wide efforts to limit on-street parking in order to "trade cars for water" by expanding public transit options. These expansions include extending bike lanes, increasing bus capacity, promoting car-sharing programs, upgrading garage sensors, and ultimately adding mass transit capacity along Alton Road and Collins Avenue as well as rapid bus service to the mainland.

> Use road elevation schemes as opportunities to simultaneously elevate municipal utility infrastructure and avert salt water damage and corrosion. In the private realm, establish new building codes and base flood elevations (BFEs) to elevate critical machinery, utilities, and equipment beyond ASCE 7 and 24 standards to account for relative sea level rise within the useful life of these critical systems.

> Advocate to update the Florida Building Code to account for sea level rise projections. The Southeast Florida Climate Change Compact has standardized the sea level rise projections for the region, however, the next step is to incorporate these into the Florida Building Code. Where different elevation measurement systems (NAVD or NGVD) apply or exist, a consensus standard should use the best available science for protecting the life, safety, and property of citizens. These standards should be updated periodically as scientific certainty dictates.

Medium-Term

> Introduce living sea walls in conjunction with grey infrastructure that can accommodate quick elevational change and host living organisms. To ensure continuity and coordination, require private developments to similarly construct their respective seawalls. Coordinate with engineers to incorporate design solutions that multiply infrastructural capacities. (See Scenario 10)

> Introduce mass transit infrastructure (e.g., light rail) on Alton Road and upzone adjacent blocks for increased density while maintaining historic preservation and affordability. Added density supports transit viability, equitable housing, and much needed tax revenue. Integrate this public transit masterplan with the rest of Miami Beach as well as the City of Miami and Miami-Dade County. (See Scenario 03)

> Create intentional, multi-layered infrastructural redundancies as an added form of defense and resilience. In particular, incentivize decentralized renewable energy production and consumption habits, such as photovoltaic and rainwater capture, and introduce educational programs on resource reuse and waste mitigation. Encourage civil society, private citizens, and other grassroots organizations to invest in more localized solar production and water collection systems to augment post-disaster relief.

> Expand transit options on existing causeways by widening and/or decking in order to accommodate light rails, pedestrian, and bike paths as well as emergency bus lanes. Just as the original Collins Bridge catalyzed Miami Beach's development, fortifying these causeways with resilient infrastructure underpins the future adaptation and viability of the city.

“You can call sea level rise and climate change a ‘blow of destiny,’ but it is really about how we position ourselves to understand what is ahead, how that defines our identity, and how we choose to engage in that process of redefinition.”[13]

Roberto Rovira, 2016
Associate Professor of Landscape Architecture and Chair of Landscape Architecture + Environmental and Urban Design, Florida International University

Fig. 8. View of newly installed flood pump throwing street water into Biscayne Bay.

Identities

Integral to the identity of Miami Beach, Art Deco and MiMo architectures broadcast the city's imaginary of fantasy and escape. Yet, these historic buildings comprise preservation districts that currently sit at low elevations.[14] Pressed between rigid preservation laws and rising sea levels, the future of these districts will rely on aligning the principles of preservation with those of sustainability—and what has successfully sustained Miami Beach (and Miami at large) more than anything else is its economy of images. From postcards of perfect beaches, to billboards of real estate rewards, to television dramas of dystopic seduction, and finally to today's full-resolution renderings of waterfront getaways; Miami's deliberate cultivation of desire through visual media has reciprocally formed and reformed its built environment, not the least of which, its architectures. Therefore, central to its future identity, Miami Beach must ask what aspirational image the city should pursue in order to adapt to climate change and, more importantly, renew its imaginary landscape altogether.

As the public sector cannot single-handedly maintain the city's historic urban fabrics, whose many buildings are in fact of questionable architectural value, the irony in Miami Beach is that preservation depends largely on development. Nevertheless, the good news is that adopting this perspective liberates the city from the price of rigid nostalgia and instead affords it the opportunity of imagination to reshape its built identities in order to propel itself into the future.

Short-Term

> Develop specific typological and morphological strategies for the elevation of historic districts over time while maintaining their cultural identity. Phase this district-wide elevation by prioritizing the most vulnerable, low-lying areas first. Introduce regulations that require constructing higher ground floor ceiling heights so that as sea level rises, this floor can likewise elevate and adapt over time to new Base Floor Elevations (BFEs).

> Pair the elevation of historic districts with incentives for on-site stormwater retention and over-flooding. The necessity to raise these districts affords reconceiving their historic status beyond a one-dimensional label. For instance, elevating also means increased porous groundcover and vegetated gardens. Incentives such as FAR bonuses or transfer of air rights can catalyze adaptation that begins with—instead of ends with—the historic district.

> Prioritize select architectural landmarks for strict preservation or relocation rather than whole neighborhoods. In general, prioritize typological preservation over material and architectonic preservation, recognizing that urban consistency and coherence are more important than specific—and outdated—tectonics and motifs. (See Scenario 03)

> Coordinate with the Historic Preservation Board and the Planning Office to revise preservation restriction codes. Among others, these include: broadening what may be considered “contributing,” such that the term also includes more significant and/or new construction that is contextually sensitive; encouraging new construction that complies with standardized sea level projections within upzoned or upgraded existing land-use categories (e.g., RM-1 to RM-2); issuing appropriateness for demolition and subsequently allowing for increased FAR; allowing the sale of air rights to promote development feasibility for select landmarked buildings and sites; and expanding the historic tax credit to make historic building adaptation and redevelopment efforts more financially viable.

Medium-Term

> Foreground the future imaginary of Miami Beach on its adaptability to climate change and sea level rise by reshaping the city’s urban identity (i.e., urban form, morphology, and typology) according to hydrological and ecological performance. Just as Miami’s climate has yielded a composition of unique typologies (e.g., destination resorts, garden apartments, pleasure gardens), it follows that the imminent and drastic change in climate prompts a corresponding change in built form. (See Scenario 02)

> Reimagine the historic district as a stormwater sink. Begin by developing codes and massing strategies to accommodate “sponge pads” below the sacrificial floors of the historic district. Sponge pads can also hold overflow from rooftop cisterns or gardens. As the city elevates, gradually fill in these sacrificial floors with similar sponge-like (i.e., limestone-like) composites.

> Reconceive the single-family residential district around Flamingo Park (currently RS-4) as a floodable, transitional, upzoned district that channels development toward public ends (e.g., added public space, affordable housing, payment’s earmarked for municipal resiliency efforts). This district should transition from the larger developments by Alton Road to the smaller-scale urban fabric around Flamingo Park. (See Scenario 03)

“There are unique traits about Miami Beach that we like very much, such as its walkability and scale. With the infrastructural projects going on, we must also remember to ask what kind of city are we leaving behind in terms of its urban form.”[15]

Ana Gelabert-Sanchez, 2016
Design Critic in Urban Planning and Design, Harvard GSD

Fig. 9. Aerial view of Lincoln Road looking west toward Biscayne Bay.

Spaces

Miami Beach's existing urban form is largely determined by a street grid laid out near the beginning of the 20th century. In general, from the city's coasts inward, block types transition from irregular to homogenous, from porous and permeable to compact and impermeable, and from high-rise towers and plinths to low-rise bars and courtyards. Adapting to sea level rise means recognizing the economic and political realities of city-making in the 21st century and, by extension, orchestrating these forces to guide urban form. As such, any significant comprehensive plan requires concerted efforts from both the public and private sectors.

Short-Term

> Begin to trade existing height and lot limitations for open space, particularly in the city's interior blocks (e.g., blocks between Alton Road and Washington Avenue). Concentrate density in taller typologies (e.g., mid-rise slabs and towers) in order to create more open, public space for holding water in addition to other hydrological and ecological functions. Where these blocks intersect commercial corridors, eliminate any setbacks.

> Direct the construction and adaptive improvements of private property on the block, rather than parcel, level in order to streamline building elevation, code enforcement, and existing capital improvement efforts. In general, use codes, particularly municipal zoning codes over State-determined building codes, to lead a more proactive transformation of these blocks. Furthermore, allow for the

amalgamation of adjacent properties (e.g., up to 3 continuous lots) to promote higher density developments.

> Distribute density along major avenues and thoroughfares where such corridors can accommodate increased urban scale and traffic. Where these blocks intersect historic districts, establish regulations (e.g., BFE compliance) and incentives (e.g., FAR bonuses) that allow for the elevation of these districts typologically instead of materially. For instance, a historically designated two-story single-loaded residential bar can be completely rebuilt as an elevated three- to four-story bar that occupies a smaller footprint. (See Scenario 03)

> Pair the increase of density with owners' ability to transfer development rights across select districts (e.g., through an overlay zoning district). This transfer right further enables redevelopment feasibility and potentially provides a mechanism to punctuate urban fabric.

Medium-Term

> Develop street cross section types for the gradual one-story (e.g., 3-4 meters) elevation of streets and avenues. Integrate these street sections with sidewalks and building fronts using specific landscape conditions that incorporate on-site drainage, planters, seating surfaces, and other amenities. Formulate programmatic scenarios for the use of floodable ground-floors, such as parking, lobbies, storage, loading docks, and other back-of-house logistics. (See Scenario 08)

> Pair the construction of the bayfront's living seawall with the extension of the public right-of-way to increase public accessibility. Existing blocks at the waterfront span multiple blocks and effectively deny visual and public access to the bay. Additionally, these streets can be designed to prioritize people and water over cars. (See Scenario 10)

> Introduce solar performance as a guiding parameter to shape collective urban form. Zoning envelopes can be calculated to privilege either solar equity (i.e., minimizing shadow on the public right-of-way) or solar energy (i.e., maximizing solar gain on building surfaces). While the former approach ensures optimal daylight on the public realm, the latter approach permits maximal on-site energy exposure and production. (See Scenario 04)

> Research the feasibility of further urbanizing extant islands (e.g., Star Island, Venetian Island, or new islands altogether) through densification and simultaneous decentralization of existing residential nodes on Miami Beach. This reduces the risk of concentrated populations on the city and requires fortifying existing infrastructure that links such islands. (See Scenario 05)

“How can open public space become an adaptation strategy?”[16]

Ana Gelabert-Sanchez, 2016
Design Critic in Urban Planning and Design, Harvard GSD

Fig. 10. Flamingo Park, looking southwest.

Publics

Racing to keep dry, the city is quickly becoming overwhelmed by pumps, seawalls, elevated roads, artificial dunes, and sacrificial floors that increasingly intrude and disrupt the public realm.[17] Building resilience, however, must incorporate metrics of success beyond stemming rising tides; it must also respond to and accommodate new public parameters. Additionally, existing public spaces must also take on additional resilience-oriented responsibilities as well as provide post-disaster shelter, food, and other relief. The following recommendations represent short- and medium-term plans for a more comprehensive open space plan that integrates urban adaptation, cultural identity, and public space.

Short-Term

> Increase public access in certain areas (e.g., via paths, easements, public right-of-ways), particularly along the waterfronts. Current and future luxury developments that line the city's waterfront are significantly larger in scale and often encompass multiple city blocks. These developments de facto privatize the waterfront. As such, ensure public access by preserving public corridors, maximizing sunlight, and enhancing wayfinding.

> Develop a catalog of cross section types that mediate between the changing elevations of roads, sidewalks, and buildings. Study how these urban thresholds shape and augment pedestrian access and experience and build on opportunities to expand the public realm. Additionally, use these sectional changes to incorporate storm and flood water drainage and holding capacities. (See Scenario 08)

> Develop street end plazas over pump stations on the bayside and connect these public spaces with the existing bay walk. Decking over existing pump stations masks their visual and aural noise and recovers much-needed bayfront public space. Additionally, integrate coastal plant communities to increase both hydrological and aesthetic benefits.

> Enhance public transit options along major corridors (e.g., Alton Road, Washington Avenue), prioritizing pedestrians and bicycles over vehicles. Maximize permeable surfaces at medians and sidewalks to host deep soils for vegetation and stormwater storage. As urban density increases, implement mass transit to accommodate transportation demand and intercity connectivity.

> Use public space as a didactic tool to educate residents on the issues of sea level rise and the public infrastructure necessary for future adaptation. Develop strategies to visually express and index the city's infrastructure to the public as a marker of both efficacy and accountability. For instance, the health of performative vegetation in parks, bioswales, and/or acequias is directly linked to the strength of its stormwater management system.

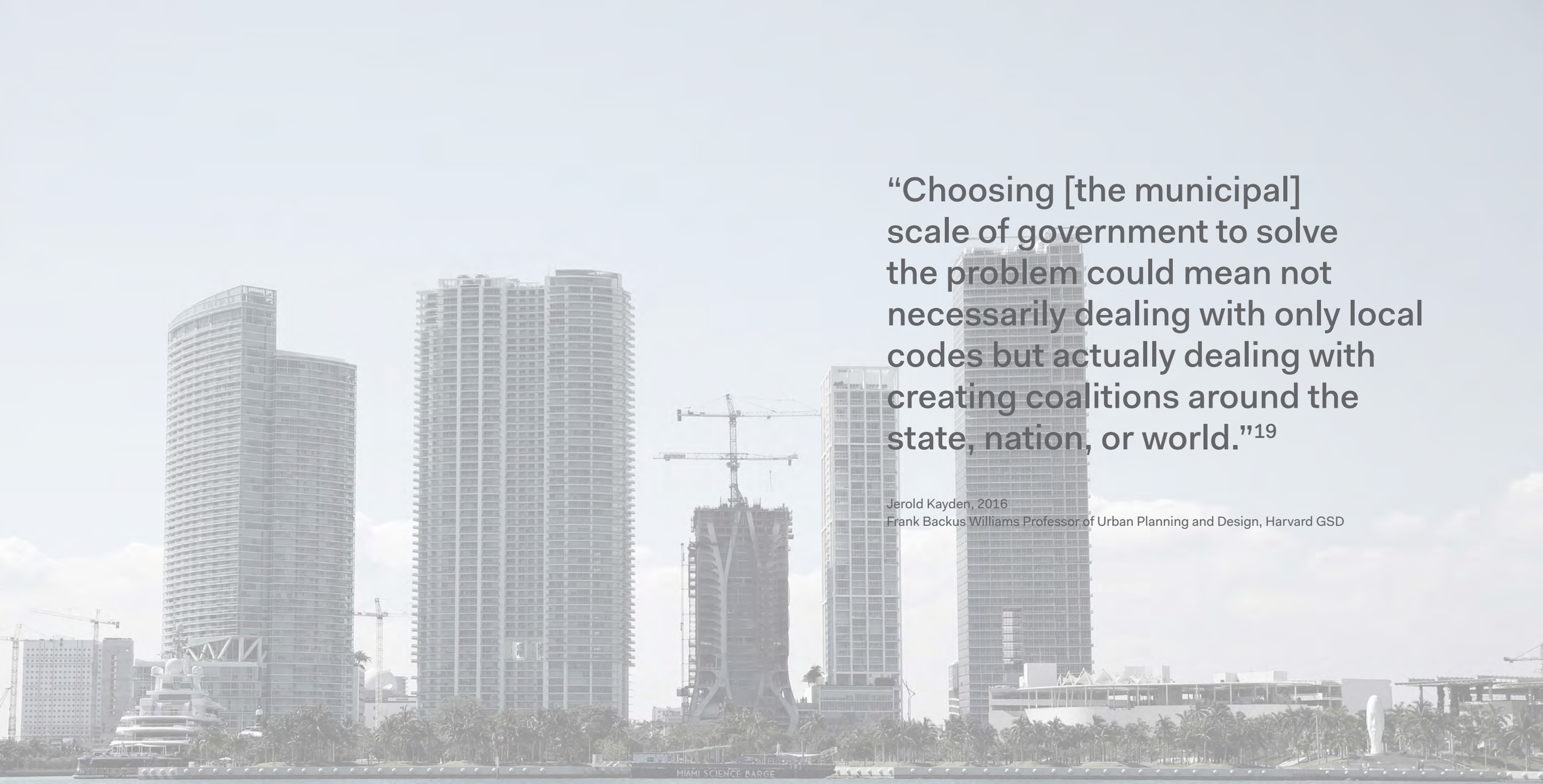
> Create a public ombudsperson who would advocate on behalf of residents, citizens, and tourists. This public voice would review and provide input to measures, interventions, and strategies that are undertaken in the name of resilience and adaptation. In particular, the public ombudsperson should seek to understand the multi-scalar and unintended consequences of action that may lead to undue burdens or may otherwise be regarded as maladaptive. In particular, the public ombudsperson may seek to mitigate the effects of "climate gentrification,"[18] which arise when resilience investments or undue financial burdens lead to localized displacement.

Medium-Term

> Connect aforementioned bayfront street-end plazas with a continuous bay walk to develop a coherent public realm in relation to the city fabric, pump stations, and hydrological infrastructure. Establish zoning codes along the Biscayne Bay shoreline to incentivize new developments to construct their portion of the public bay walk promenade. Where politically necessary, circumvent uncooperative bayfront developments by building out into the bay, making sure to minimize ecological disruption and damage. (See Scenario 10)

> Establish incentives and requirements on new developments to provide and/or maintain additional public spaces and services (e.g., privately-owned public spaces). These requirements can be paired with other flood-mitigating codes as part of a more comprehensive zoning plan. For instance, require new inland developments to provide permeable pocket parks and those along the bay to construct their respective portion of the bayfront living seawall.

> Incorporate public space and programming into all hydrological and ecological landscapes by integrating promenades, open space, public amenities, and educational opportunities. Any investment made in such open spaces should be designed to also accommodate public access and programming. For instance, waterfront landforms can stage public piers, infrastructural canals can host linear parks, and stormwater collection tanks can double as public art. (See Scenario 07)



“Choosing [the municipal] scale of government to solve the problem could mean not necessarily dealing with only local codes but actually dealing with creating coalitions around the state, nation, or world.”[19]

Jerold Kayden, 2016
Frank Backus Williams Professor of Urban Planning and Design, Harvard GSD

Fig. 11. View of Museum Park across Biscayne Bay with One Thousand Museum tower by Zaha Hadid Architects under construction.

Policies

In the absence of state and federal leadership, the onus falls on the municipality of Miami Beach to formulate a comprehensive and flexible adaptation plan. While the viability of adaptation largely hinges on the health of the private sector (e.g., sustaining tax revenues, building investor trust, minimizing actuarial risks), the city must nevertheless take preemptive action toward both incentivizing and guiding adaptation measures. A failure to do so will yield momentum and decision-making to public bond markets which are less disciplined in evaluating the opportunities associated with adaptation plans and strategies. For instance, as a baseline, maintaining dry streets hedges against the potential, if not inevitable, retreat of insurance and mortgage industries long before rising sea levels actually sink the city. Furthermore, while the imminent threats of climate change prompt urgent new policies, the city should remember that it must act with appropriate sensitivity such that the interests of different stakeholders, particularly the most vulnerable, are not overridden in the name of adaptation.

Short-Term

> Establish codes and regulations to incentivize and/or require developments to be constructed or rebuilt with resilience principles and with material and programmatic adaptive capacity. For instance, require developments to meet Base Floor Elevations (BFEs) and encourage them to hold a certain amount of stormwater on-site. Assess fees on new developments to support city-wide green infrastructure through different zoning tools. Additionally, establish new incentives (e.g., density bonuses) that are geared toward adaptation. Currently, federal and state incentives, while helpful, are not specifically related to promoting adaptation

to climate change (e.g., LIHTC, Historic Tax Credit, HOME grants, New Market Tax Credits). The City should provide leadership by aligning its public policy goals with programs such as the New Market Tax Credit in order to advance the resilience of vulnerable populations.

> Create a finer-grained regulatory system, beyond a broad catch-all AAA designation (Adaptation Action Areas), for areas particularly vulnerable to flooding, such as the island's western half. For instance, New York City denotes gradated vulnerability parallel to its Special Flood Hazard Area (SFHA) maps and prioritizes funding accordingly for areas most susceptible to the effects of climate change.[20] In Miami Beach, this more nuanced map can be achieved through a zoning overlay that attracts primary attention and requires stricter building standards.

> Clarify outstanding and future questions around public and private flood insurance costs and availability. First, establish a collective, municipal co-insurance pool to subsidize uninsured risks based on geographic exposure and household vulnerabilities. By one measure, this could be linked to standardized Base Flood Elevation (BFE) metrics and resiliently designed for retrofitted buildings. Additionally, gradate premiums based on elevations above BFEs to encourage elevating higher than projected flood levels. Second, clarify insurance costs and availability for private owners facing elevated streets. In particular, determine whether properties adjacent to elevated streets are entitled to flood insurance and at what grade;[21] whether property owners are entitled to compensation if they are obliged to raise their businesses to the level of the street to maintain commercial viability; and whether property owners with historic homes are entitled to compensation for a taking if the historic board does not allow them to raise said homes.

> Strategize with appropriate committees to continue investigating federal, state, regional, and local funding assistance and grants; prioritizing such funding for green infrastructure; and coordinating capital improvement projects with other resiliency masterplan efforts. The City should develop a restoration and response plan that anticipates future events and develops Community Development Block Grant-Disaster Recovery Action Plans that maximize Public Assistance funds for resilience and adaptation projects.

> Coordinate with the State of Florida and Miami Dade County Division of Environmental Resources Management to make green infrastructure easier to permit. This effort should include an alignment with recent permitting regimes advanced by the US Army Corps of Engineers. Currently, coordinating across jurisdictional lines presents the biggest challenge. This joint agreement, for instance, can be modeled on current road pumping efforts that cross state, county, and municipal lines.

Medium-Term

> Build standardized sea level and nuisance flood projections into all public works decision making related to investment, design, construction, maintenance, and operations.

> Coordinate with county and state actors to plan and develop synergistic mitigation and resilience interventions using the joint-effort on street raising as a potential template. The City should continue to coordinate with the region to build upon the plans of the Southeast Florida Regional Climate Compact and mainstream the scientific consensus data into capital investment decision-making. Additionally, coordinate with the State of Florida to implement expenditures and taxes earmarked for funding stormwater management infrastructure so that Miami Beach is not solely dependent on municipal property tax.

> Research the feasibility of a "hybrid retreat" scenario wherein permanent residences are gradually replaced (via buyouts or otherwise) by tourism-oriented programs (e.g., hotels and condos) and permeable open space (e.g., parks and basins). This medium-term scenario reduces risk for homeowners located on an increasingly vulnerable barrier island, preserves Miami Beach's economic and cultural sustainability, and propels its imaginary as America's definitive subtropical paradise. Nevertheless, this scenario must be choreographed in a manner that supports mixed-income, high-density housing to avoid the worst effects of "climate gentrification."

“Resilience may lead to maladaptation, the paradox being that investment made to protect vulnerable citizens may ultimately drive them away.”[22]

Jesse M. Keenan, 2016
Lecturer in Architecture, Harvard GSD

Fig. 12. Aerial view of residential subdivision under construction at the western edge of the metropolis bordering the Everglades.

Developments

From its inception, Miami Beach has been a product of private and ambitious speculation. Catalyzed by John Collins's wooden footbridge across Biscayne Bay and Carl Fisher's feverish promotion of the barrier island as a real estate gold mine, Miami Beach sustained a building boom that almost weathered the Great Depression. Today, not surprisingly, Miami Beach's adaptive future continues to be tethered to the prospects of its real estate market. While many real estate transactions (e.g., buying, renting, investing) occur with little to no reference to climate change or sea level rise, certain development and investment firms are already accounting for such futures through added line items of risk, shorter hold-periods, sacrificial floors, and elevated mechanical equipment.[23] In its effort to encourage building for resiliency, the city must balance promoting—and harnessing—real estate development with implementing exactions that risk suffocating such investments.

Short-Term

> Clarify and standardize Base Flood Elevations (BFEs) based on sea level rise and other scientific projects from the Southeast Florida Regional Climate Change Compact into flood insurance maps and require developments to construct to or above referenced elevations. Where appropriate (e.g., storefront retail, lobbies), the city should incentivize such developments to construct higher ground floors and ceiling heights so that these floors can adapt to higher BFEs over time. This also includes alternative ingress and egress models as the grade changes. Lastly, site

grading requirements should be decoupled from the requirements associated with street elevations.

> Negotiate with FEMA for revised Flood Insurance Rate Maps (FIRMs) that are inclusive of projections consistent with the Southeast Florida Regional Climate Change Compact. The City should also develop a plan to communicate the advantages of such a negotiated settlement with FEMA.

> Create zoning incentives for new developments to encourage projects designed with flood mitigation and resilience principles. As such, the city should put in place policies that require and/or reward adaptation efforts, including building beach buffers and dunes, ecological habitats, vegetated bioswales, additional on-site flood mitigation measures, and higher density infill developments on less vulnerable grounds. Where developments do not meet such requirements, the city should impose a resilience impact fee that is earmarked for resilience projects.

> Restrict foreign investments to curb empty residences that drive up local housing costs by introducing taxation on unoccupied units. The tax revenue should go into an affordable housing trust fund to retrofit those units and buildings that are currently and will continue to serve cost-burdened households.

> Create brokerage requirements that necessitate real estate brokers to disclose any prior flooding events or flood insurance claims as well as provide the prospective purchaser with a map of the unmitigated inundation projected to happen over 25 years and 75 years. Prior to fully engaging the broker for brokerage services, prospective purchasers must sign an affidavit stating that they have been reviewed these materials with the broker.

Medium-Term

> Require new developments to contribute funding toward major infrastructural improvements whether on-site or off-site, such as living seawalls at the Biscayne Bay coastline. These financial contributions may operate from a range of models such as impact fees, equity contributions, or public-private infrastructure ventures. Additionally, explore public-private partnership opportunities to support major public amenities, such as public parks and waterfront spaces. Lastly, the city should consider selling city parcels to fund risk mitigation projects and simultaneously seed new developments. The city should mandate that new developments on these parcels meet strict flood mitigation standards through a rigorous RFP process.

> Prepare measures to protect against the potential deleterious effects of "climate gentrification,"[24] a scenario whereby the investments put into protecting and adapting communities vulnerable to sea level rise ultimately price them out of their neighborhoods due to increased appeal, amenities, safety, and/or taxation. For instance, the city should require new luxury condominium developments to support inclusionary housing and new luxury hotel developments to pay a fee earmarked toward affordable housing for its service employees.

Scenarios

01: Types in the Park

02: Hydrological Urbanization

03: Paradise in Process

04: Living Landforms

05: Biscayne Barnacles

06: Flamingo Waterpark

07: Collins Reservoir

08: Higher Lanes and Public Planes

09: Ocean Courtyards

10: Biscayne Baywalk

Developed across two studios and one seminar, the following projects represent select scenarios that illustrate particular design principles for Miami Beach's urban adaptation to sea level rise. These scenarios address adaptation in a range of spatial and temporal scales: from small-scale street section interventions to new urban imaginaries for Miami Beach's twenty-second century. Rooted in hydrological performance, each scenario presents adaptation measures that simultaneously address a number of urban parameters, such as infrastructural coordination, public realm improvement, and ecological cultivation, among others. Furthermore, while some scenarios work within disciplinary boundaries and municipal limits, others imagine complete urban environments whose realization is dependent on much broader political agency and coordination. Finally, all scenarios draw upon Miami Beach's history of natural endowment and synthetic construction to inform strategies that anticipate future challenges and opportunities as well as mitigate present threats.

“I think people are underestimating the incredible innovative imagination in the world of adaptive design…I would agree that things can’t continue exactly the way they are today. But what we will evolve to may be better.”[25]

Harvey Ruvin, 2015
Clerk of the Courts of Miami-Dade County
Chairman, Miami-Dade Sea Level Rise Task Force

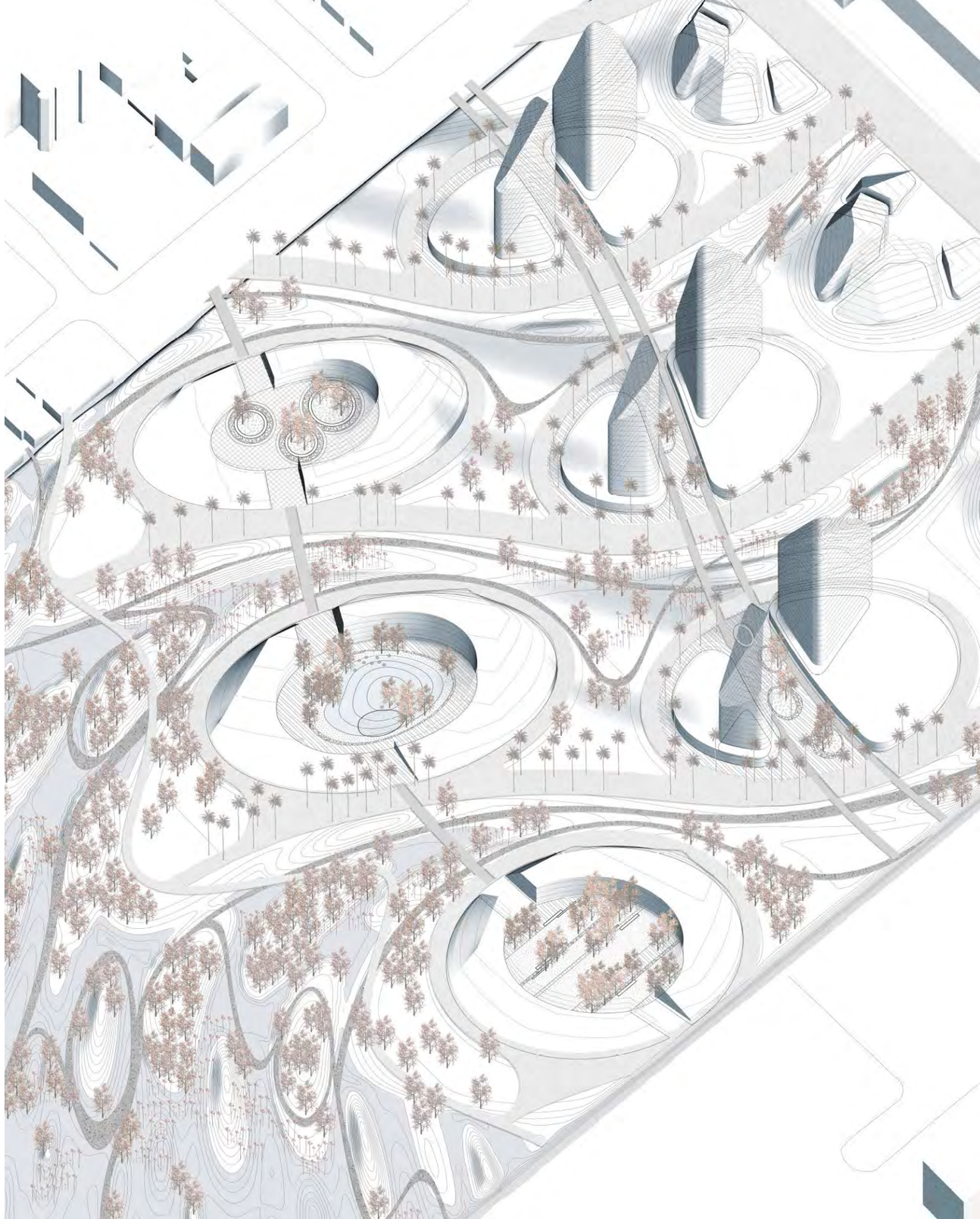
Fig. 13. Four Seasons Hotel under construction in North Beach.

Scenario 01

Types in the Park

Boxia Wang
Advised by Charles Waldheim

Drawing from Miami Beach's history as a mangrove swamp, this project reintroduces this species, and its associated hydrological habitats, as the basis for a new urban adaptation model to sea level rise. The mangrove's four typical habitat conditions inform a gradated, sloped living seawall on the Biscayne Bay coastline which in turn shapes its block structure and urban form. A meandering elevated path weaves the landscape into a public promenade and park.



> Fig. 14. Axonometric view of project proposal showing the integration of novel urban form with hydrologically performative landforms.

Scenario 01: **Types in the Park**

Fig. 15. Site plan from the Biscayne Bay at left to urban blocks adjacent to Alton Road at right.

0 50m

Scenario 01: **Types in the Park**

Hydrologies

The proposed variegated landforms in the bay are informed by the communities of different mangrove species, each of which has a preference for elevation, inundation, water salinity, and moisture level. Freshwater and saltwater systems are separated by a living seawall where these mangroves are curated and concentrated. A riverine system further inland connects to existing outfalls and provides an added layer of stormwater filtration before such water is discharged into the bay.

Ecologies

The geometry of the landforms in the bay are intimately tied to the way they host different communities of mangroves. Each species provides different ecological benefits. From the bay inward, the over-washed mangrove islands host a large, thick system of mangroves that protects against storm surges and soil erosion; the basin zone provides shelter for aquatic wildlife and retains seawater; the fringe mangrove zone stages red mangroves to protect the shoreline; and the highland riverine zone channels water during high tides and storm events.

Infrastructures

This project embraces the ecological and absorptive capacities of the mangrove and functions as a deep, resilient green infrastructure system. While most of the proposed bayfront landscape is floodable, the independent urban blocks are elevated approximately 3-4 meters above the existing ground level. Primary east-west arterial roads align to existing streets and circumvent each block to provide both programmatic and logistical access. Secondary cross-grain roads connect these blocks along a north-south axis.

Identities

Potentially integral to Miami Beach's urban adaptation, this project reconceives the native mangrove as the new icon in the city's future imaginary. In contrast to its found state, the mangroves are deployed systematically and architectonically. As such, they exist not as found nature but as constructed artifice. Lastly, while not shown, the project also proposes the elevation and reorganization of the adjacent historic districts such that they also cede floodable ground to different inland mangrove communities.

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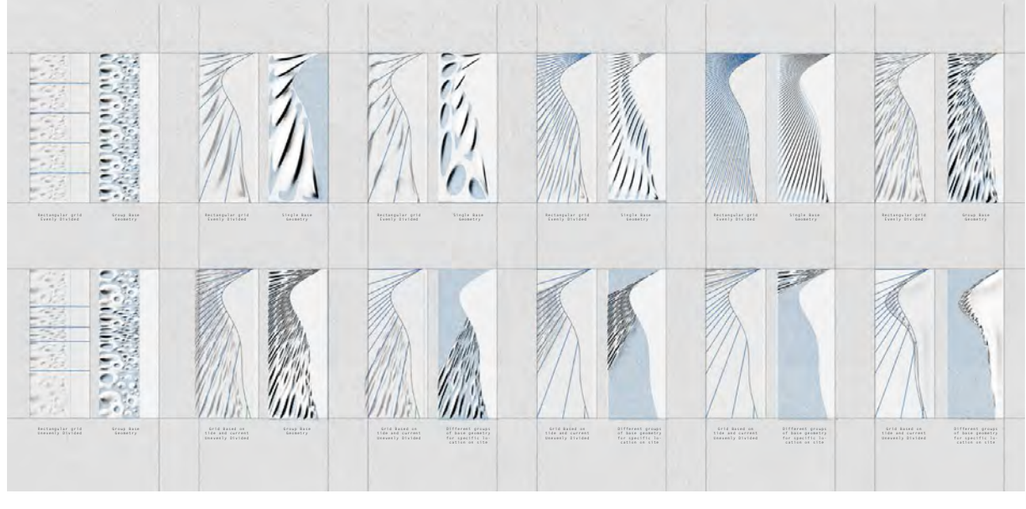

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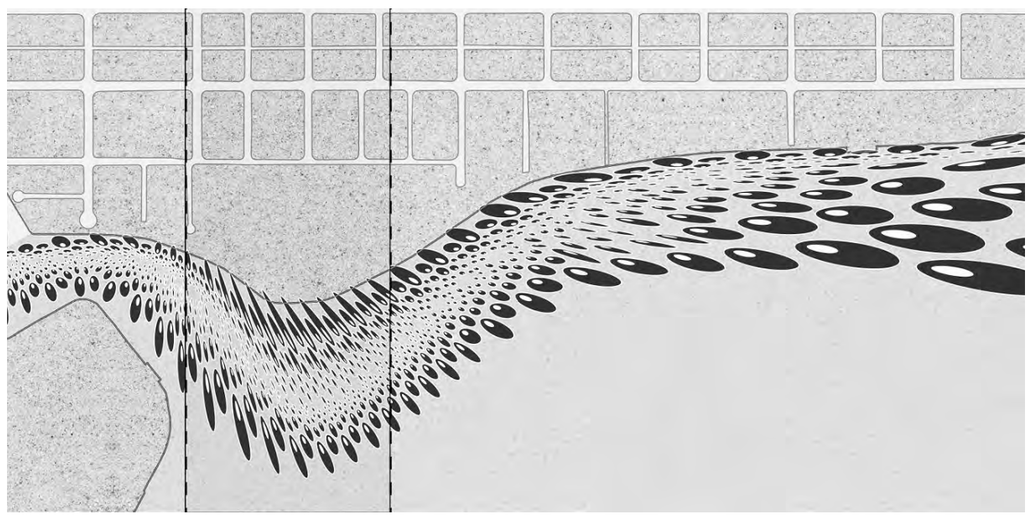

Fig. 16. Matrix of topographic operations at the scale of the Biscayne Bay coastline.

Fig. 17. Site plan showing landform composition and its relationship to the existing coastline and urban fabric. Project fragment is marked in dashed lines.

Scenario 01: **Types in the Park**

Spaces

The elevated urban blocks host several hybridized typologies, all of which stem from the garden courtyard type found throughout Miami Beach. From the bay inward, a set of mid-rise, C-shaped bars host recreational programs such as sports facilities; a series of towers-on-plinths contain luxury hotels atop shopping centers; and adjacent to Alton Road, a row of low-rise linear buildings with local residential communities. Their vertical profiles are shaped to maximize light onto the public park.

Publics

A hierarchy of public roads and paths meander through the entire site. While a trio of arterial roads connect the project back to the city's grid, a lighter and elevated public deck in the form of a "ribbon" ties all components of the project together and offers a new public realm. Visitors have the opportunity to stroll from Alton Road to the over-washed mangrove islands in Biscayne Bay. Lastly, the urban blocks' courtyards provide semi-public spaces for residents and visitors.

Policies

Because the project is predicated on the continuity of its living seawall, the City of Miami Beach must coordinate with adjacent jurisdictions, in particular the County and State, to facilitate permitting and construction. As prime sites for development, the City should promote them through a rigorous RFP process that channels benefits toward public functions and holistic municipal resiliency. Lastly, policies should be put in place to ensure the waterfront promenade and park remain public.

Developments

The project seeks to leverage its attractive waterfront blocks as development opportunities to fund extensive parts of the proposed green infrastructure. For instance, the middle row of urban blocks containing high-rise luxury towers command open views of both the Biscayne Bay and the Atlantic Ocean, and as such, these sites should contribute both impact fees and/or maintenance fees toward the park.

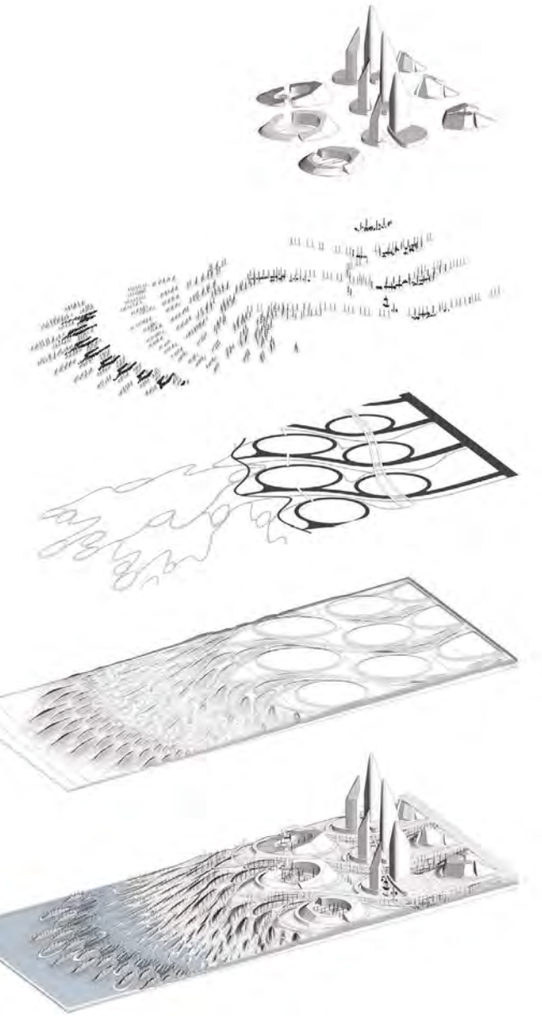

Fig. 18. Exploded Axonometric showing project components.

Scenario 01: **Types in the Park**

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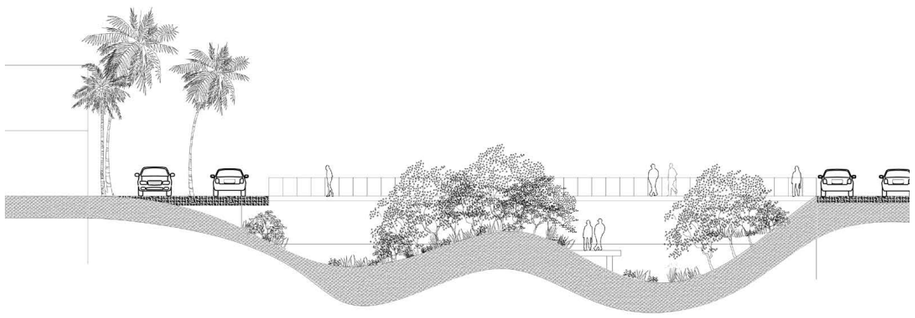

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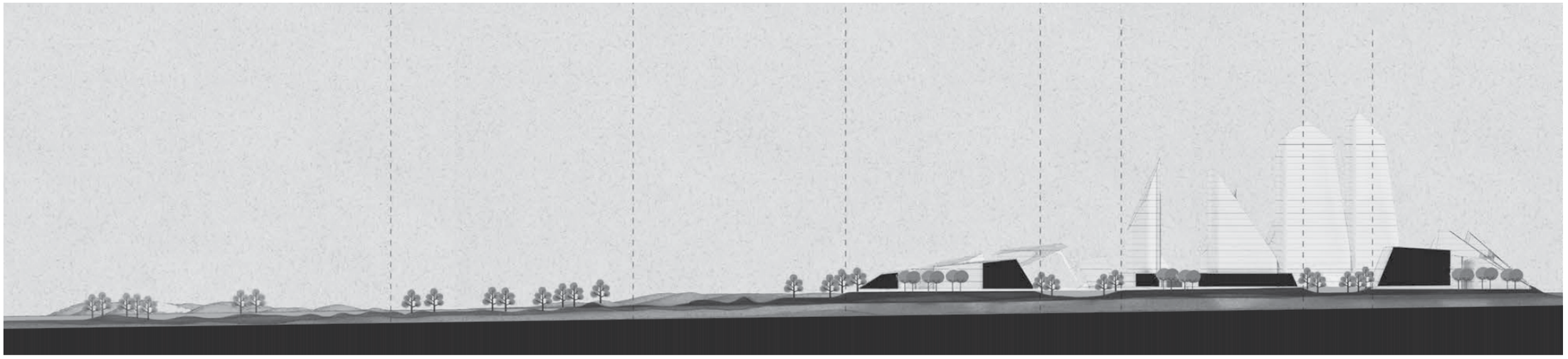

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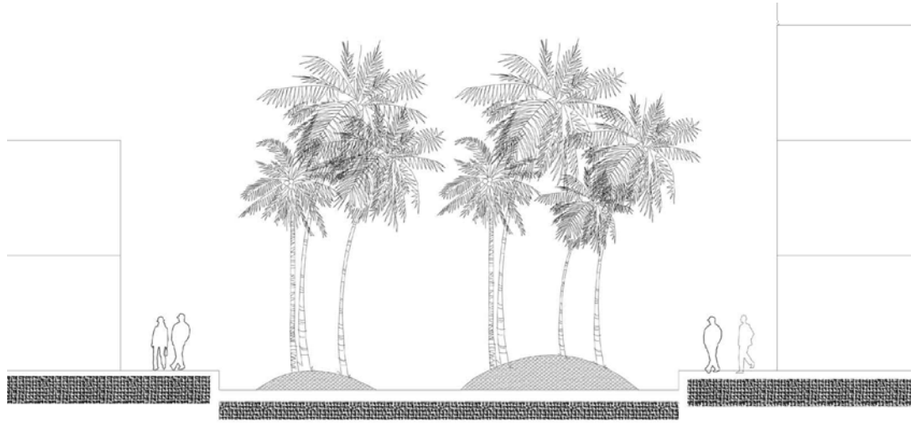

Fig. 19. Street section showing vegetated canal between new blocks.

Fig. 20. Section from Biscayne Bay at left to Alton Road at right.

Fig. 21. Section of courtyard highlighting elevational change.

Fig. 22. Aerial view toward Biscayne Bay showing landforms, public paths, and vegetation.

Scenario 02

Hydrological Urbanization

Andrew Madl
Advised by Charles Waldheim

Rising ocean levels, increasing magnitude of storm events, and the implementation of new stormwater infrastructure necessitate a re-tooling of the current urban paradigm. As such, factors associated with the deconstruction of oceanic systems and ecosystems; such as pH levels, salinity levels/gradients, plant community patterns, and landform typologies should be leveraged to imagine new integrated urban and ecological systems.

> Fig. 23. Aerial perspective showing adaptive urbanization driven by hydrological factors and functions.

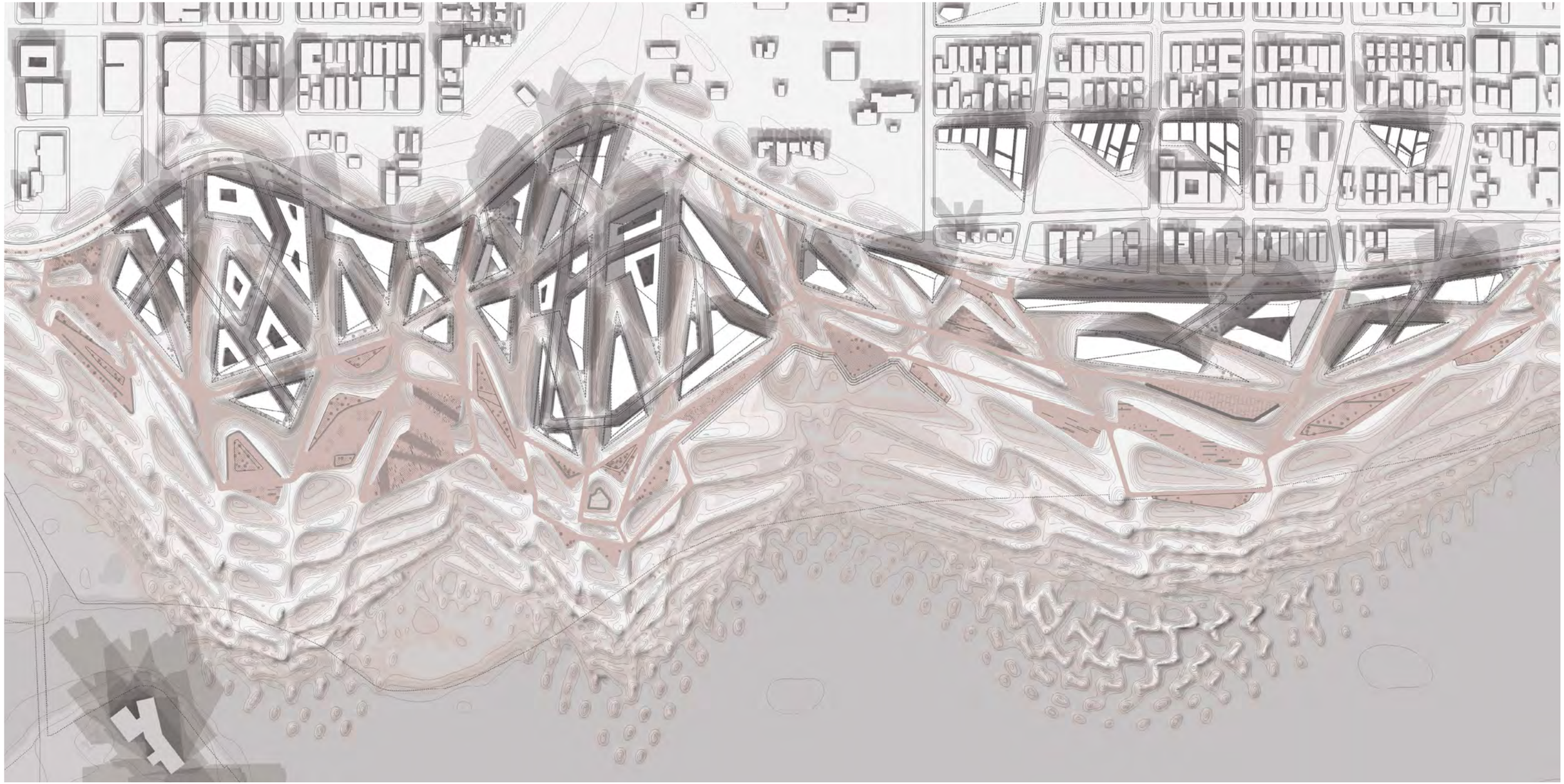

Fig. 24. Site Plan showing landform and urban strategy with planting communities and public space.

0 100m

Scenario 02: **Hydrological Urbanization**

Hydrologies

Various visible and invisible hydrological forces can be exposed and leveraged to underpin a new littoral urbanism for Miami Beach that both maintains existing spatial qualities and projects a future adaptive city. Informed by computational fluid dynamics, intertidal flow rates, salinity levels, among other hydrological parameters, landforms protect the city from future storm surges and stage new urban islands for development.

Infrastructures

Instead of relying on engineered defense against the rising tides, this scenario leverages landform operations as a natural hydrological infrastructure. Alton Road is imagined as the seam and stitch between a new adaptive expansion to the west and an urban transformation to the east. It is also the divide between saltwater in the bay and sweetwater in the park. A network of roads extend from Alton Road and create a sequence on the island to provide both visitor and logistical access.

Identities

This scenario represents a position on sea level rise adaptation where development and policy are not based purely upon economic drivers but rather on the spatialization of various simulated, data-driven natures that also govern the barrier island. Just as Miami Beach's unique built environment has always been intimately tethered to its natural environment, this scenario projects a form of the city in direct dialogue with increasingly intense climatic pressures and environmental drivers.

Spaces

The proposed urban morphology of Miami Beach is driven by the relative calibration of different hydrological forces (e.g., flow dynamics, tidal levels, and salinity). These factors collectively produce a new urban framework that allows for ecological, social, and urban occupation that both respects vernacular architecture and offers a novel urban form. For instance, a combination of hybrid bars, courtyards, and towers prioritize an association with performative landforms over programmatic needs.

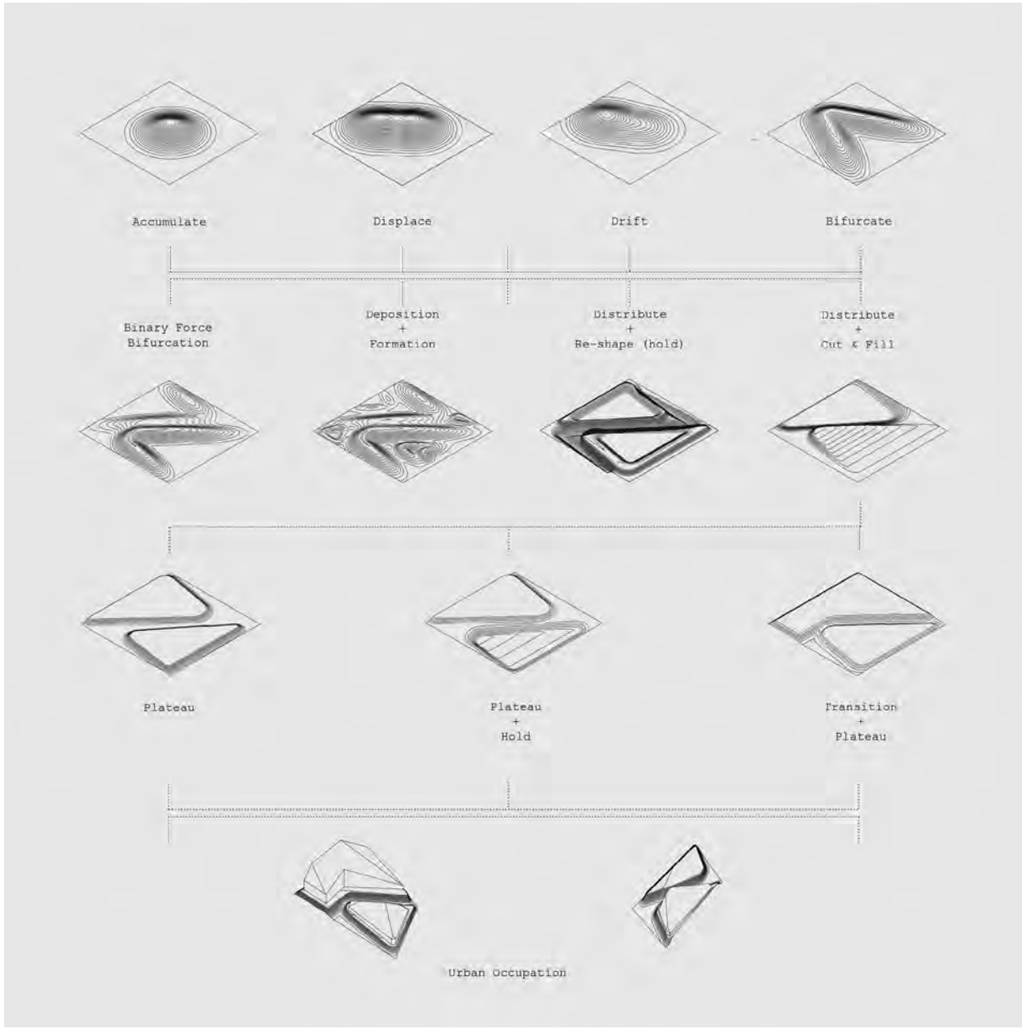

Fig. 25. Landform assemblies based on sand dune geometries.

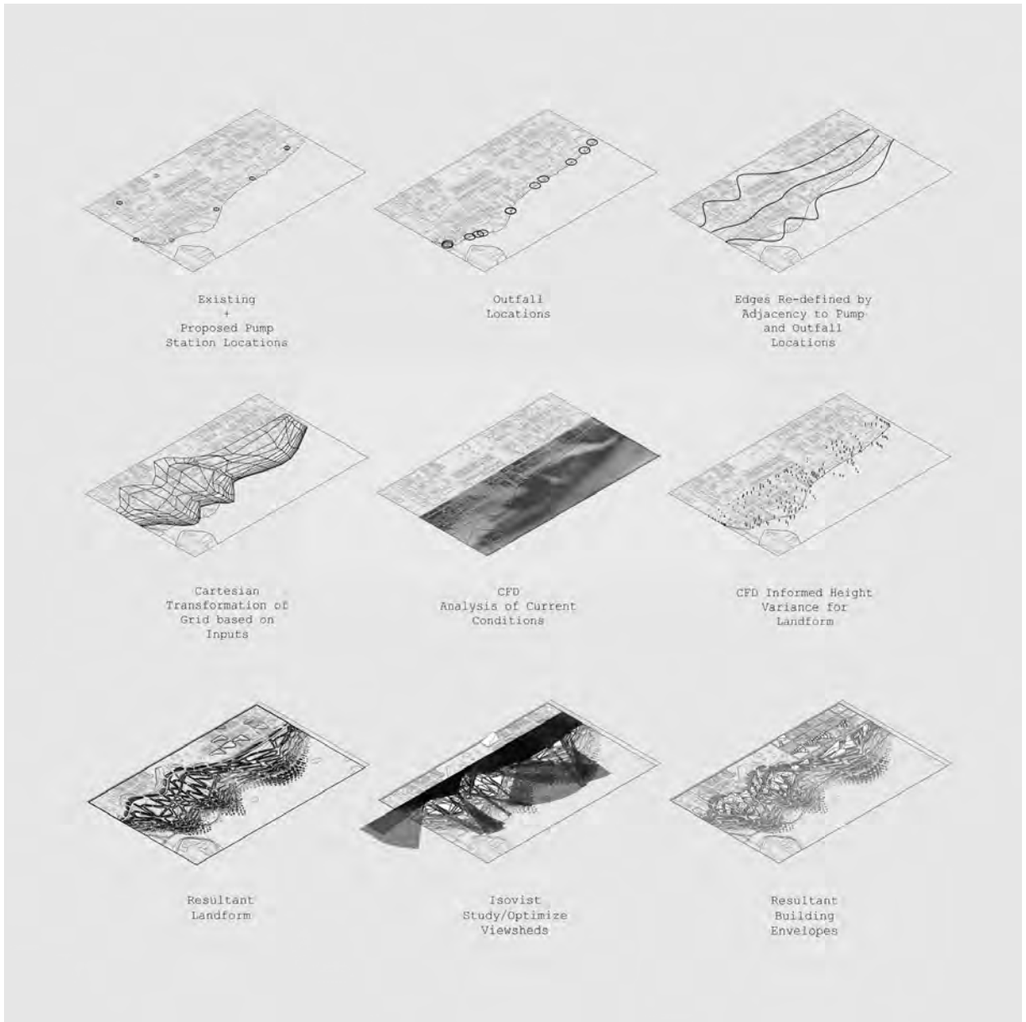

Fig. 26. Site analysis and operation sequence.

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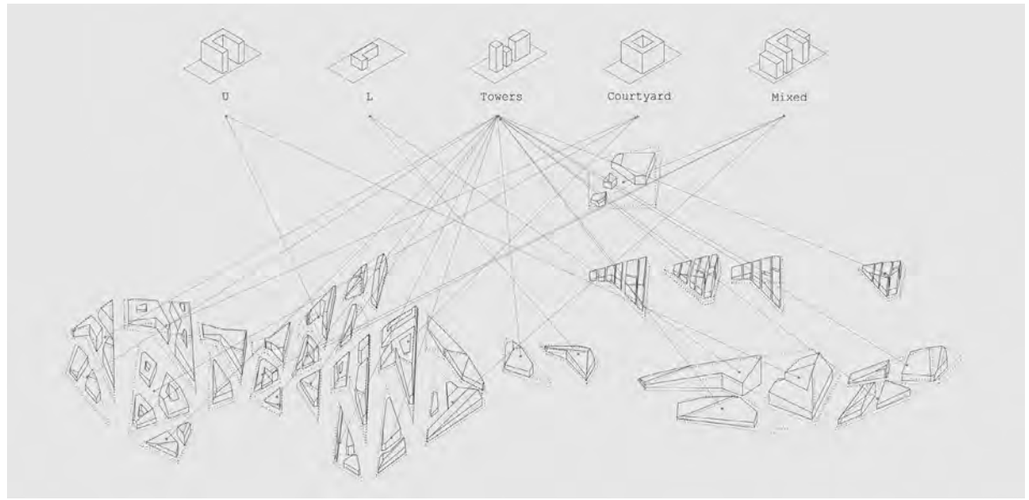

Fig. 27. Genealogical tree and assemblies diagram.

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Fig. 28. Possible programming expressions based on elevation, CFD, view sheds, and salinity/pH levels.

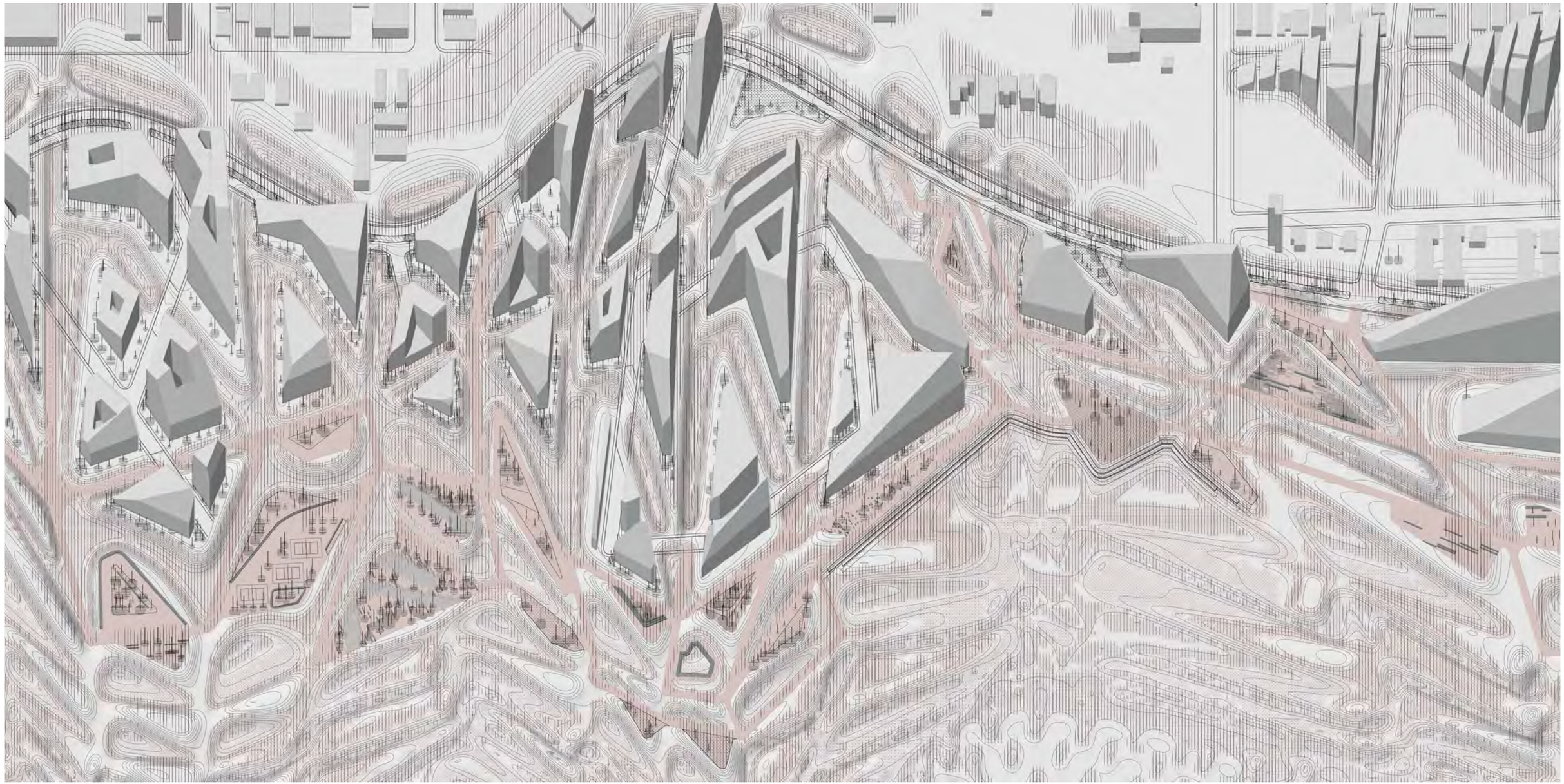


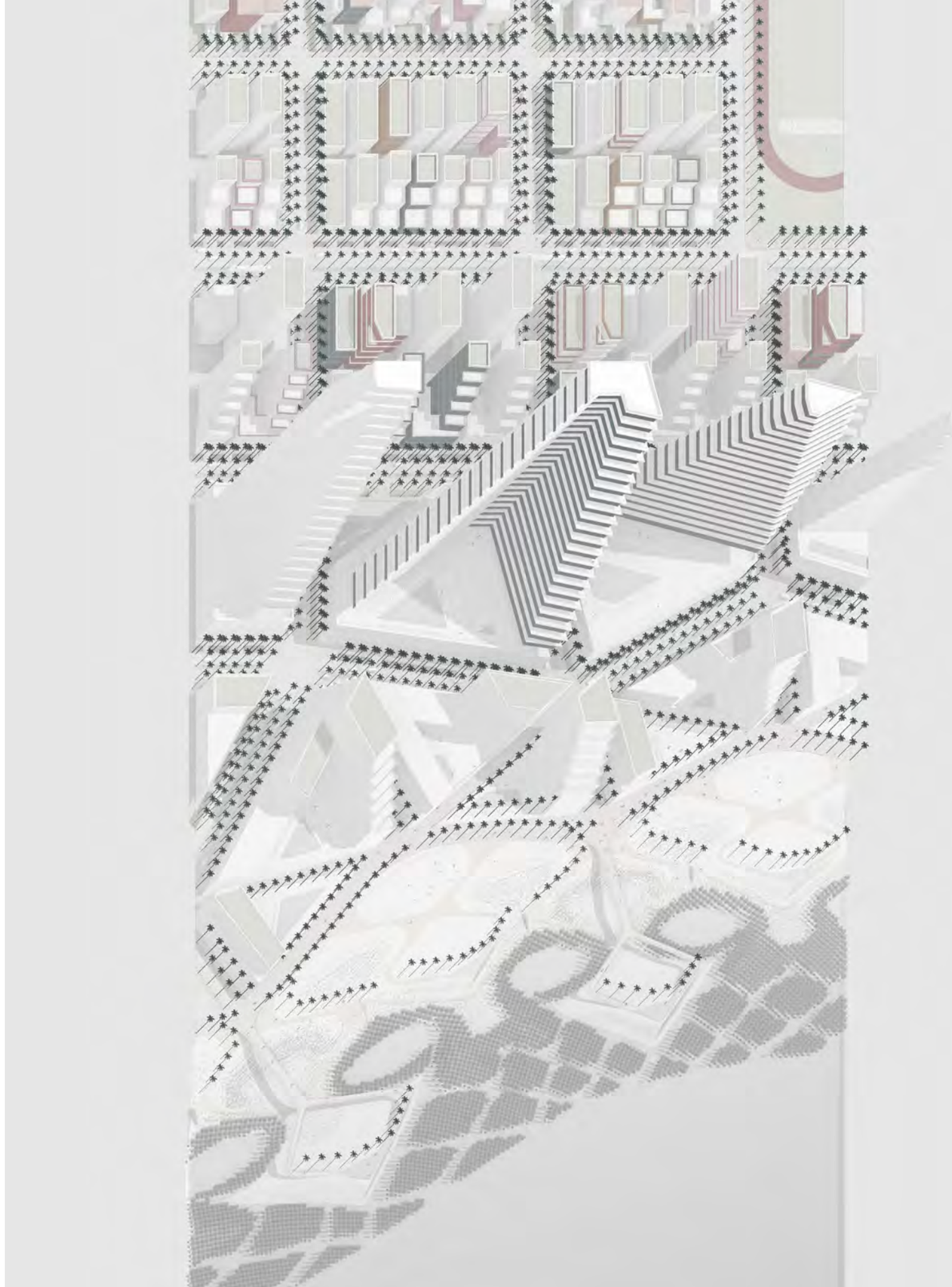
Fig. 29. Oblique plan showing integration of landform, urban form, and vegetation.

Scenario 03

Paradise in Process

Jessy Yang
Advised by Charles Waldheim

This project perceives imminent sea level rise and the ongoing real estate boom in Miami Beach as opportunities to reshape the future collective image of the city. The proposal deploys a new grid framework along the city's Biscayne Bay coastline. This opens up access to the waterfront through existing superblocks, crenellates a resilient living seawall to protect from future storm events, and stages the future developments of the city through a consistent formal language that is informed by sea level rise adaptation and solar performance.



> Fig. 30. Oblique plan showing proposed urban form, waterfront park, and mangrove buffer.

Scenario 03: **Paradise in Process**

Hydrologies

In addition to elevating all streets and buildings, the project proposes a crenellated living seawall that averts new land from rising waters, retains stormwater, and absorbs the impacts from future storm surges and waves. Elevated buildings allow for floodable ground floors and elevated streets contain new pipes that channel stormwater to the bay or the park. Additionally, roof gardens hold stormwater and reduce freshwater consumption for irrigation purposes.

Ecologies

A thick buffer of mangroves along the Biscayne Bay coastline protects against future storm surges and soil erosion. Closer to the coast, a sequence of retention basins provides habitat for salt-tolerant rhizomatic grasses which contribute to stormwater retention and filtration. Further inland, elevated buildings cede additional ground for both native and aesthetic species.

Infrastructures

As a base line, this scenario plans for the one-story elevation of all streets and buildings in the city. These elevated streets accommodate vegetation that provides hydrological and ecological benefits. Additionally, to accommodate increased density and mobility, an added light rail along Alton Road reduces private vehicles and parking spaces and trades “cars for water.” Lastly, elevated streets contain new pipes and utilities to avert future stormwater intrusion and damage.

Identities

The project reimagines its historical district by privileging typological preservation over strictly material or architectural preservation. This strategy retains the urban qualities of the city (e.g., its block dimensions, urban types, and architectural exuberance) and simultaneously allows for its future growth. At the bayfront, a curated set of landscapes based on hydrological and ecological performance creates a different kind of waterfront experience relative to that of the city’s well-known eastern beaches.

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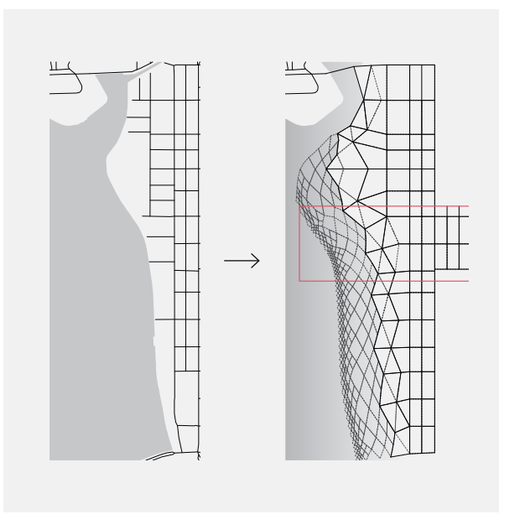

Fig. 31. Everglades' sawgrass fields.

Fig. 32. Detail of sawgrass.

Fig 33. Western half of Miami Beach showing privatized superblocks at bayfront.

Fig. 34. Proposed transformation of bayfront in terms of street network and living seawall framework. Area of study captured in red.

Scenario 03: **Paradise in Process**

Spaces

Recognizing that buildings have an approximately 50-year cycle, this scenario projects a new urban structure and fabric across Miami Beach. At the center of the island, buildings elevate onto columns and trade their footprints for added porous ground cover. Along West Avenue, an underlying grid framework stages a set of high-rise developments whose reduced block dimensions promote public accessibility and walkability. At the waterfront, a new band of mid-rise buildings front a new promenade and park.

Publics

The project deploys an underlying grid framework that is based on the dimensions of the city's typical blocks. This grid subdivides the existing waterfront's superblocks and crenellates the coastline to maximize bay views and inform the geometries of the proposed living seawall. It also manifests in the design of the park's public paths, retention basins, piers, and landforms.

Policies

As the project reimagines a continuous resilient seawall, its success hinges on the abilities of all jurisdictions involved to coordinate planning and construction. This will therefore involve the City of Miami Beach, Miami-Dade County, and the State of Florida. Further inland, existing zoning codes around preservation are revised to allow for both the one-story elevation of the historic district as well as typological preservation (i.e. through new developments) over strict architectural preservation.

Developments

This scheme seeks to harness the strength of the current market to maximize public benefits. Buildings in preservation districts are given FAR bonuses in compensation for elevating and adopting resilience principles. New high-rise developments along Biscayne Bay contribute funding to the construction of the waterfront's green infrastructure. Increased density implicates affordable housing that helps to hedge against the worse effects of climate gentrification.

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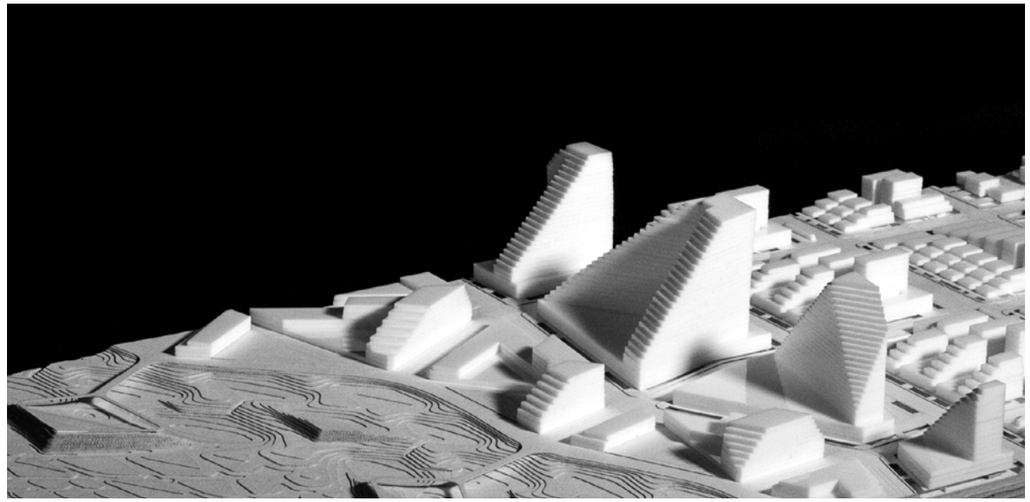

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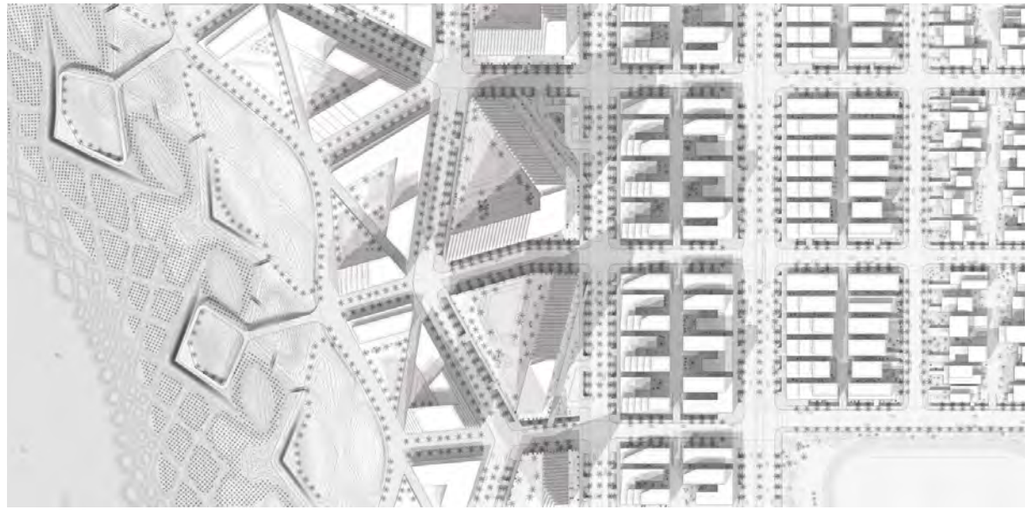

Fig. 35. Proposed urban form and bayside hydrological landform.

Fig. 36. Fragment plan from Biscayne Bay to Flamingo Park showing mangroves at bay and urban form shadows at 3 times during the day on the winter solstice.

Scenario 03: **Paradise in Process**

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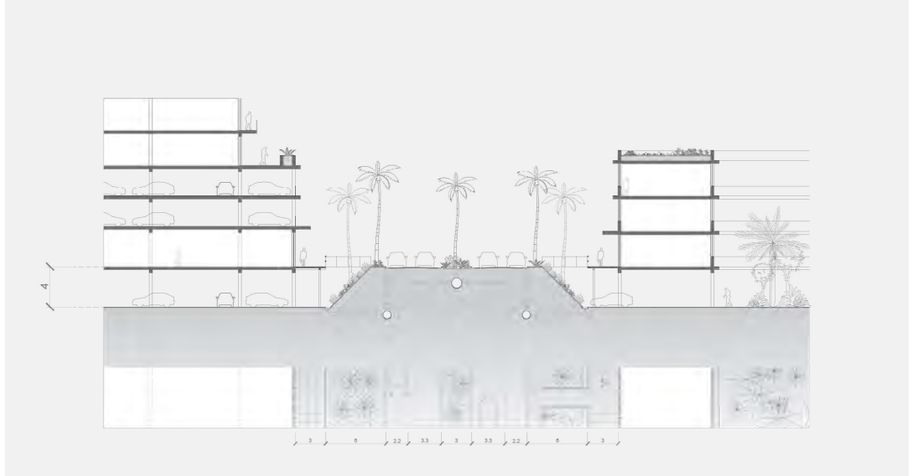

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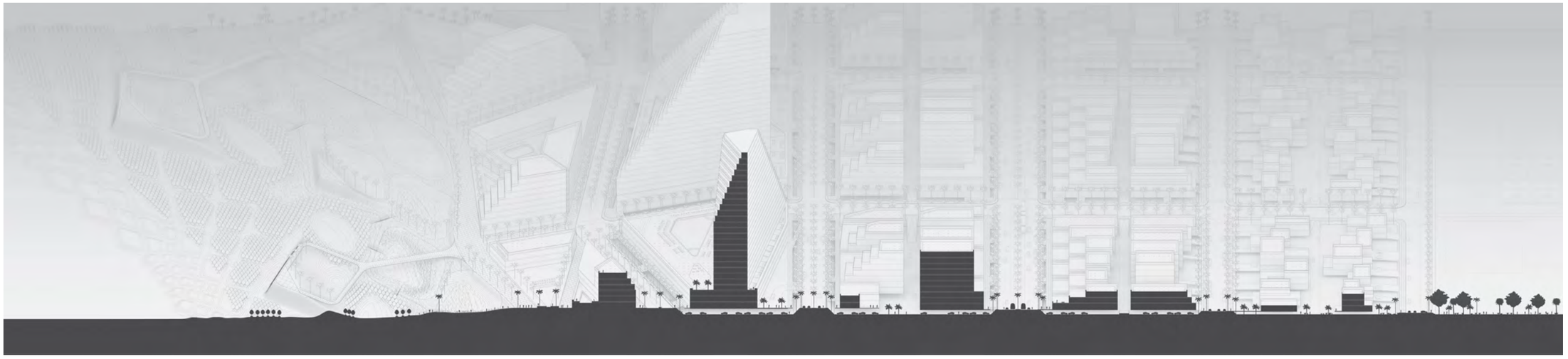

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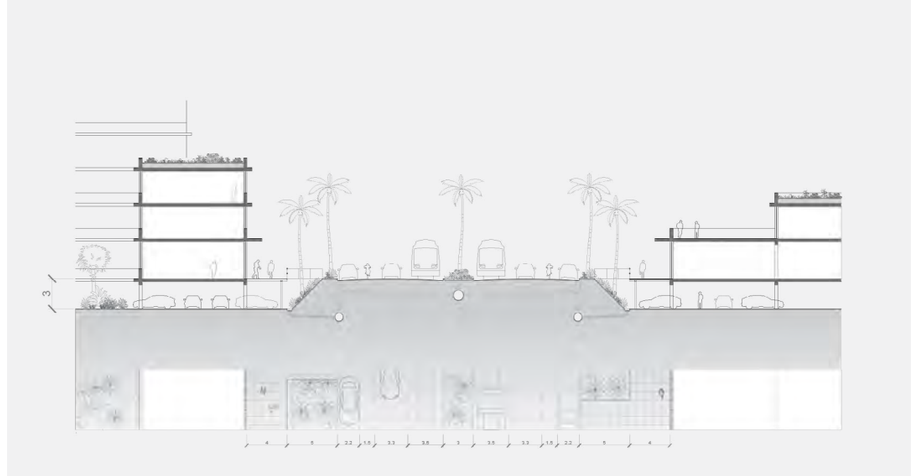


Fig. 37. Proposed street section at West Ave where dashed line represents existing grade.

Fig. 38. Site section from Biscayne Bay at left to Flamingo Park at right.

Fig. 39. Proposed street section at Alton Rd. where dashed line represents existing grade.

Fig. 40. View west toward Biscayne Bay from 13th St. and Alton Rd. showing elevated buildings in foreground, light rail transit in midground, and bayfront developments in background.

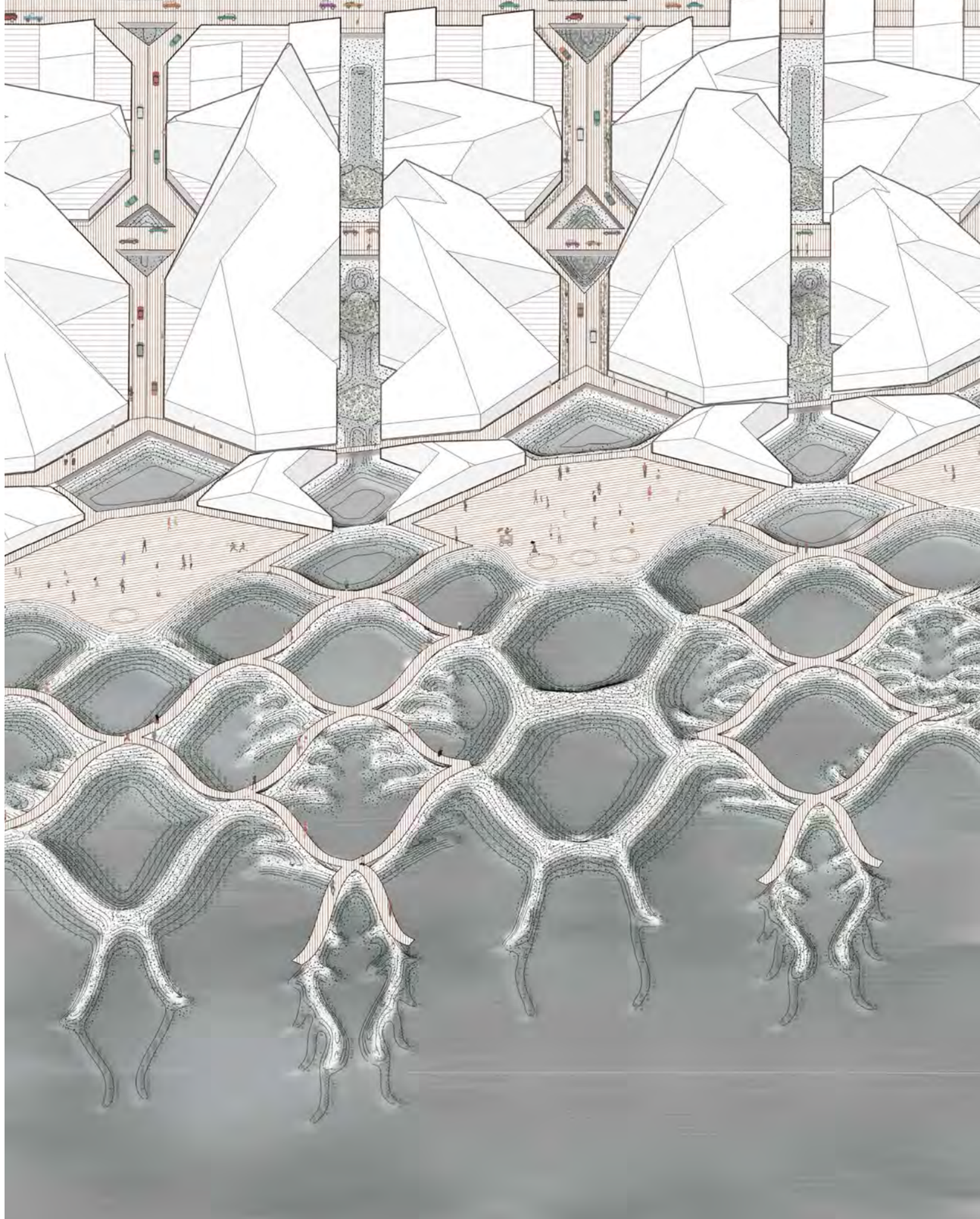
Scenario 04

Living Landforms

Ziwei Zhang
Advised by Charles Waldheim

As sea levels rise, Miami must adopt new urban models that embrace the incoming waters. In the coming decades, new construction of seawalls, breakwaters, and other coastal defense systems must be coupled with green infrastructure to maximize resilience and local ecological assets. This project integrates landform as a new kind of infrastructure that simultaneously informs the city's future urban block structure.

> Fig. 41. Aerial view of waterfront showing proposed landforms staging ecological habitats. Zoning envelopes based on solar performance are rendered in white.



Scenario 04: **Living Landforms**

Hydrologies

New landforms shaped by flow dynamics and habitat formation provide a landscape structure to avert seawater, absorb tidal water, and hold stormwater. Further inland, a combination of sunken inner courtyards, elevated roads, and elevated buildings create a new drainage system that augments existing engineered solutions and streamlines public to private thresholds. This scenario represents only a snapshot moment where roads are elevated roughly half a floor (e.g., 2 meters) while buildings are elevated a full floor (e.g., 3-4 meters).

Ecologies

The deployed species perform a suite of different hydrological and ecological functions. Mangrove communities along the coastal areas of Biscayne Bay stabilize ground sediment and protect shorelines from erosion and storm surge. Rhizomatic, salt-tolerant grasses bind sediment and provide local nutrients for marine life. These two vegetal species occupy different coastal conditions. The landform geometry, developed by repeating and mirroring an S-shape, creates diverse habitats with varying wetness for red, black, and white mangroves as well as grasses.

Spaces

Landform geometry and solar performance shape this scenario's proposed urban form. The block envelope responds to a combination of solar access, equity, and views. For instance, at the bayside, urban form privileges views while within the urban context, it privileges the public realm by casting less shadows, specifically on Alton Road and its adjacent low-rise neighborhoods. Within each block, the southern parts of the building gradually lower to allow more direct sunlight into interior courtyards.

Publics

Currently, the accessibility to the bay front is relatively limited due to a series of privatized superblocks. This scenario creates new public connections and spaces so the new waterfront coheres with the existing city grid. Inner courtyards within each block enhance visual connections to the bay and the regularity of the proposed grid allows for optimal street integration with the rest of the city. Lastly, the ends of the new streets accommodate elevated plazas atop pump stations.

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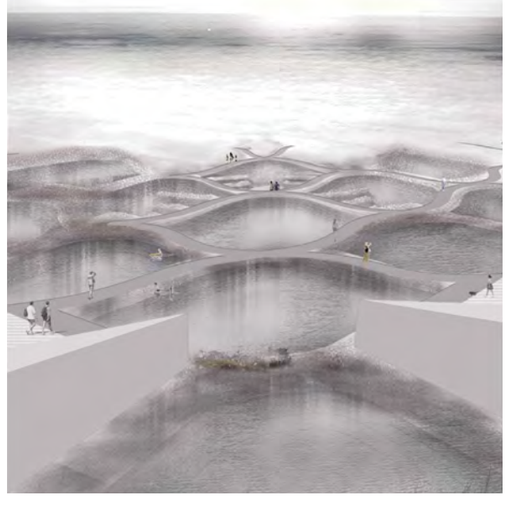

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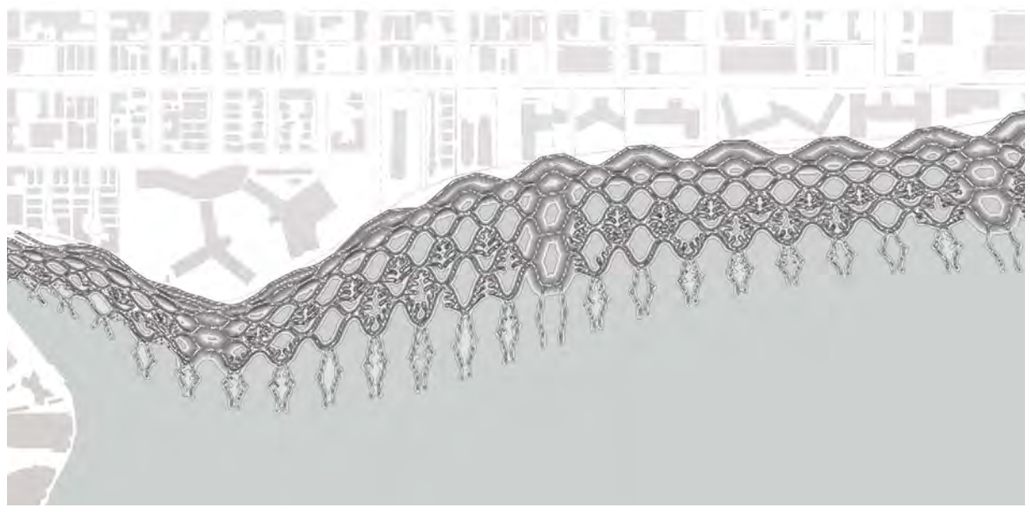

Fig. 42. View west from proposed bayfront across Biscayne Bay.

Fig. 43. View east from the proposed bayfront to Miami Beach.

Fig. 44. Site plan of Biscayne Bay coastline showing proposed networked landforms.

Scenario 04: **Living Landforms**

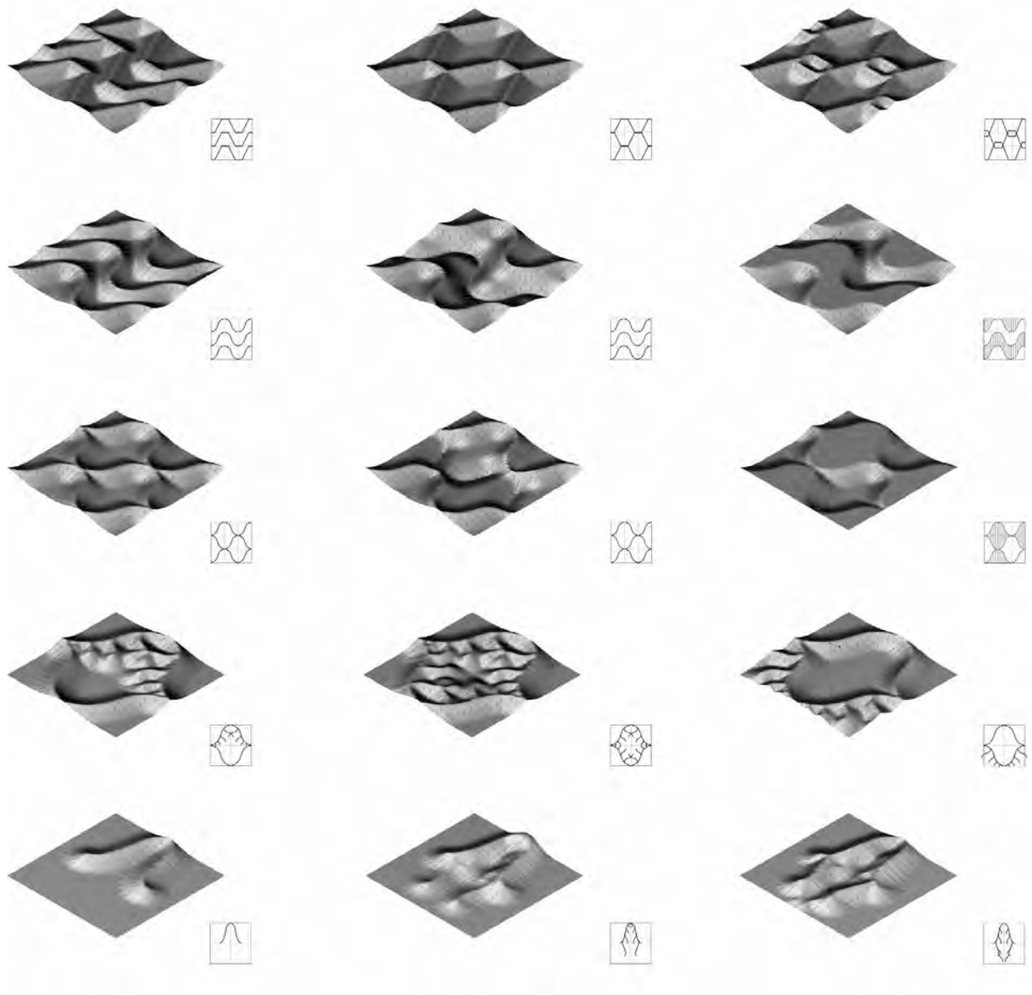

Fig. 45. Matrix of topographic operations and stormwater drainage flows.

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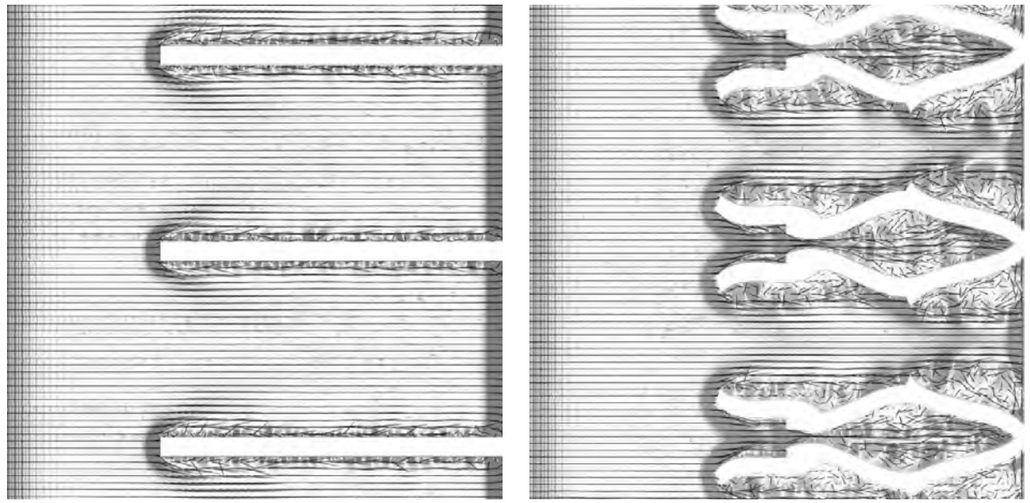

Fig. 46. Computational Flow Dynamic (CFD) simulation of proposed landforms testing for wave dissipation and defense.

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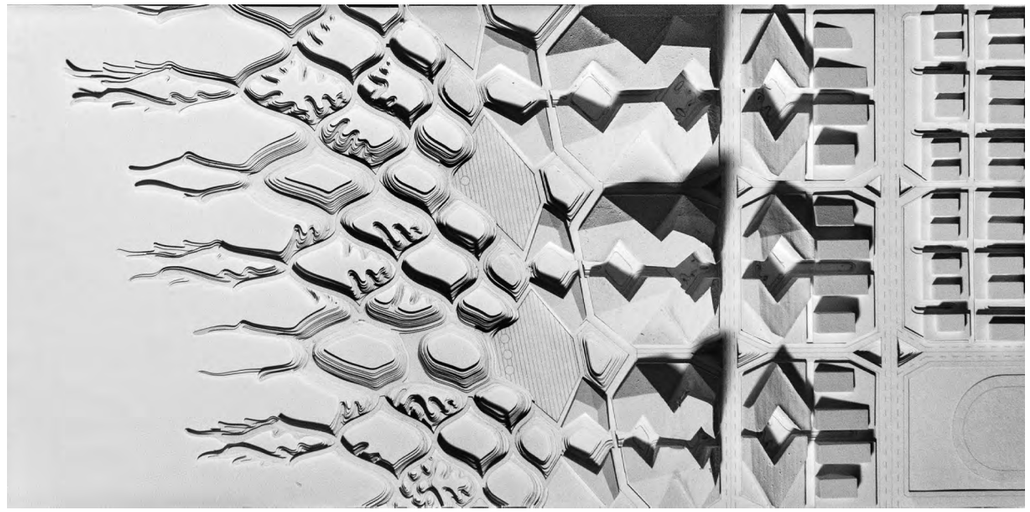

Fig. 47. Plan view of site model showing transition from landforms, building form, and existing built form.

Scenario 04: **Living Landforms**

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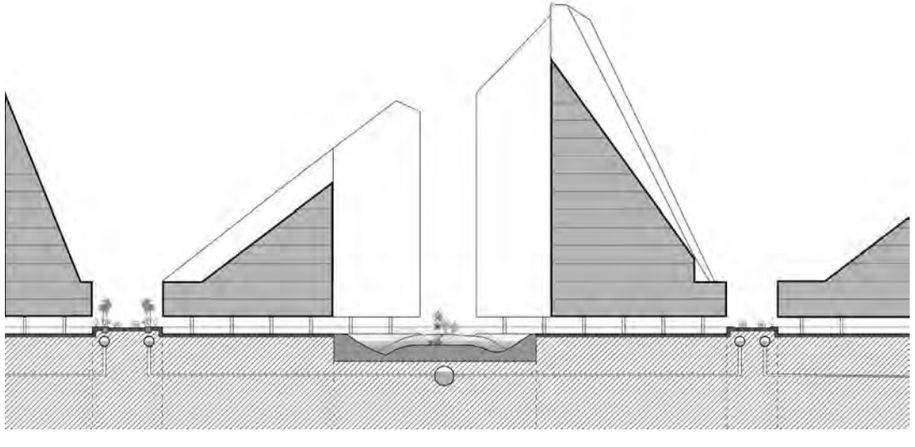

Fig. 48. Urban section showing relationship between elevated buildings, streets, pipes, and courtyards.

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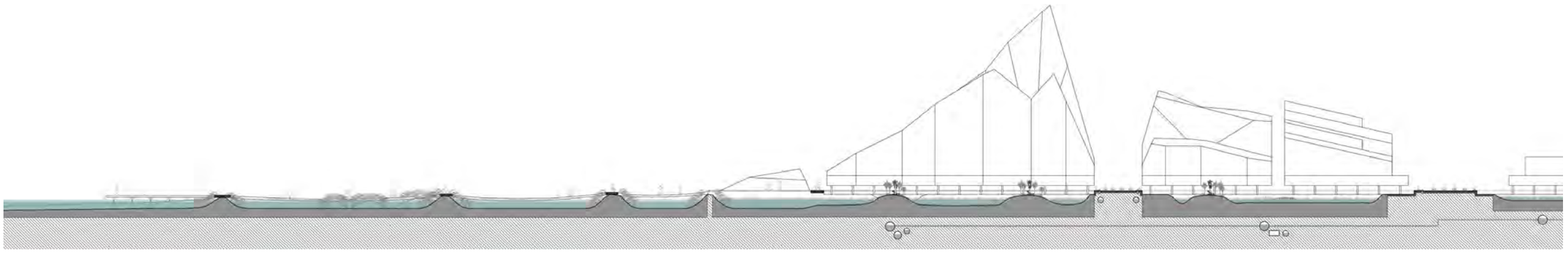

Fig. 49. Site section from Biscayne Bay at left to Flamingo Park at right.

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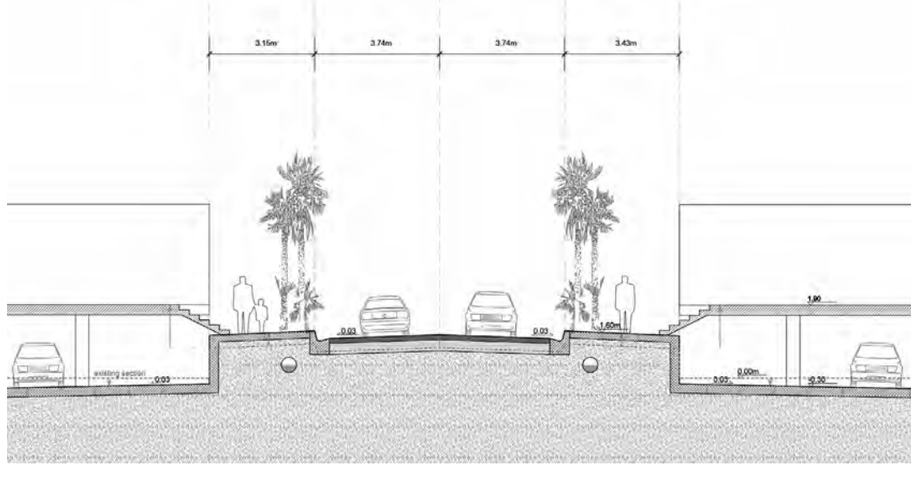

Fig. 50. Street section showing proposed urban threshold between a 2 meter road elevation and a 3-4 meter building elevation. Existing section dashed.

Scenario 05

Biscayne Barnacles

Sonny Xu
Advised by Charles Waldheim

The project aims to build a more resilient and ecologically performative Biscayne Beach shoreline while simultaneously creating a new urban and cultural identity for the city. Through analyzing the form, function, and the aggregation of barnacles; a species commonly found in the bay, the project deploys a comprehensive urban design that holds water, provides habitats, and stages a new littoral urbanism.

> Fig. 51. Axonometric view showing proposed landform and urban form expansions into Biscayne Bay.

Scenario 05: **Biscayne Barnacles**

Hydrologies

The topology of the barnacle species is a donut-like form with a central void or pocket. This geometry serves as the hydrological basis for the projection of landforms, building forms, and public spaces. Landforms aggregate as connected, multi-scaled retention ponds to store water and provide water-based habitats. Building forms elevate above projected sea levels and provide semi-public and semi-private courtyards. The courtyard's public spaces host recreational islands and swimming pools.

Ecologies

While the scenario is based on the geometry and topology of the barnacle, it provides habitats for other species. Seawater ponds, stepped pools, rainwater basins, and other holding wells offer habitats for a variety of marine life: mangroves, salt-tolerant grasses, palms, flamingos, shellfish, oysters, barnacles, corals, etc. Where the Biscayne Bay's ecology is continually stressed, this scenario embraces the native flora and fauna of the bay as an integral component of the future adaptation of the city.

Spaces

Courtyards create a series of multi-scaled typologies for a variety of programs. Smaller courtyards offer a modest residential scale, much like garden apartments often found throughout Miami Beach, whereas larger courtyard bars provide dense multi-family housing that supports additional mass transit on ground and/or water. Lastly, a series of courtyard-shaped zoning envelopes deployed over existing urban blocks aims to guide future adaptive developments for the rest of the city.

Identities

The project revives the history of Miami Beach's land formation and transformation as a future adaptive strategy to sea level rise. West of Alton Road, a new littoral urbanism projects an imaginary that is based on living with and learning from the city's native marine life. As such, the scenario posits that any future adaptation to environmental parameters necessitates a renewed and mutualistic relationship with its contextual ecologies.

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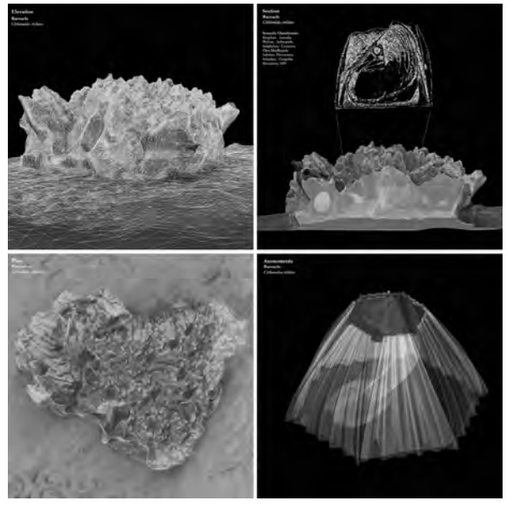

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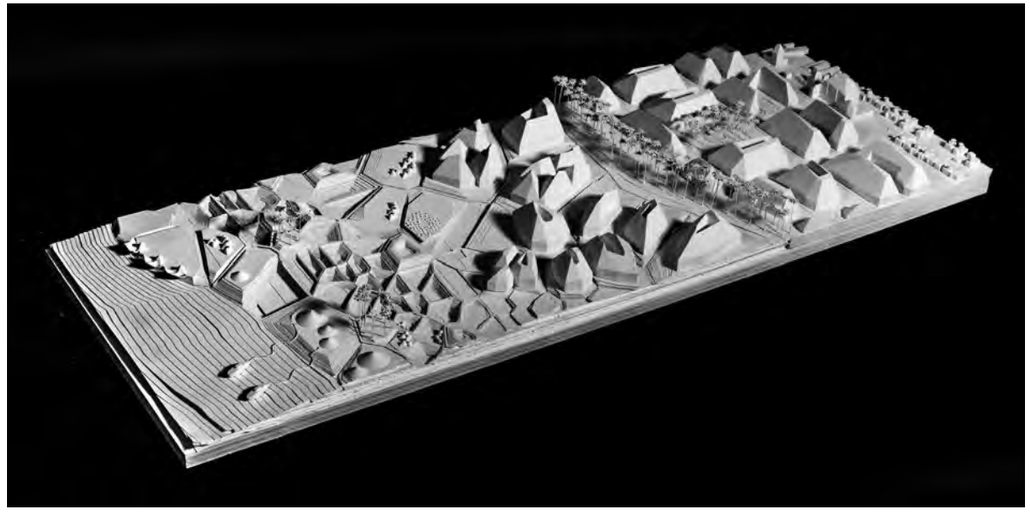

Fig. 52. Study of the Barnacle geometry and topology.

Fig. 53. Plan view of site model showing proposed building typologies based on the barnacle geometry.

Fig. 54. Aerial view of model showing transition from Biscayne Bay at left, to proposed littoral urbanization, and to existing urban fabric transformations.

Scenario 05: **Biscayne Barnacles**

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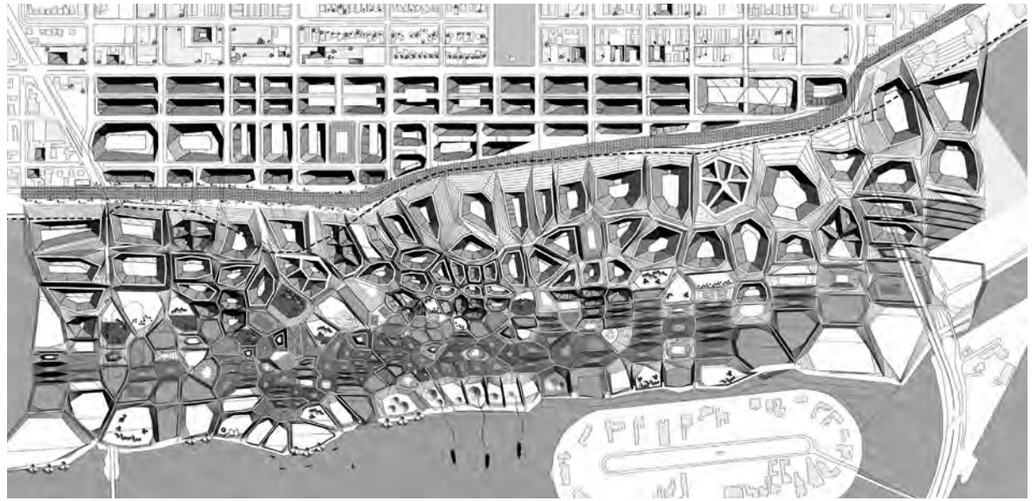

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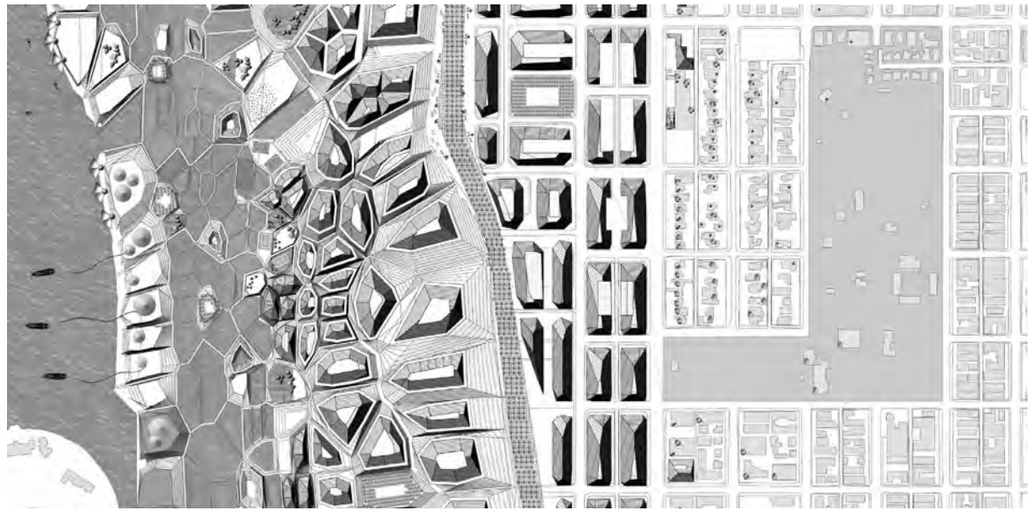


Fig. 55. Site plan of entire Biscayne Bay coastline showing proposed landform and urban form.

Fig. 56. Detail of site plan from Biscayne Bay at left to Flamingo Park at right.

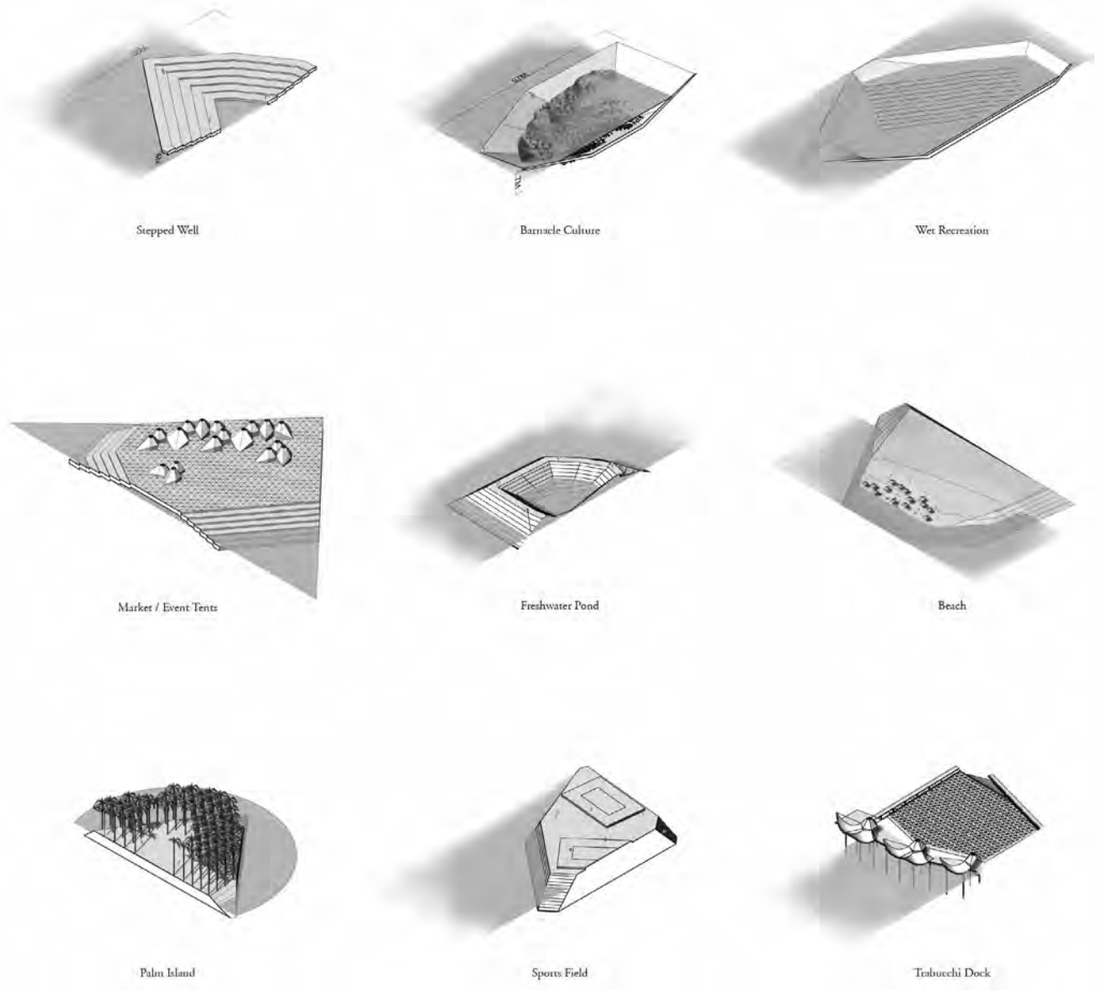


Fig. 57. Matrix of section vignettes showing various built form to hydrology relationships based on the barnacle geometry and topology.

Scenario 06

Flamingo Waterpark

Izgi Uygur
Advised by Rosetta Elkin

Sub-tropical Florida usually suffers an excess or a deficit of water due to highly stochastic weather patterns unique to this region in the United States. By defining the varying merits of increased salination, this project balances freshwater availability through seasonal fluctuations using a series of stormwater retention tanks. In this way, Flamingo Park can become a model for water collection and distribution without drastically modifying its existing character as a critical open and vegetated landscape.

> Fig. 58. View of a proposed water tower on raised ground by the Flamingo Park track field.

Scenario 06: **Flamingo Waterpark**

Hydrologies

As the only large, open landscape in Miami Beach, Flamingo Park offers the opportunity to address two hydrological issues: the fluctuation of freshwater availability and the threat of sea level rise. This scenario proposes a set of stormwater retention tanks to reduce the burden of municipal drainage and to offer consistent freshwater irrigation for the park's native and aesthetic vegetation. A sequence of undulating landforms elevates these tanks above projected flood lines and also offers dry ground for post-storm relief.

Ecologies

Endemic to the area's character is the history of its many botanical gardens (e.g., Vizcaya Museum and Gardens, Miami Beach Botanical Garden). In a similar vein, this project offers the City greater control over freshwater availability to stage a new palette of native and/or aesthetic vegetation species with increased ecological and aesthetic public benefits. While not shown, the project implies that localized water retention capacities (e.g., stormwater cistern at ground level sacrificial floors) across the city on a per lot basis can contribute to individual irrigation and vegetation control.

Infrastructures

Short of elevating the entire Flamingo Park, this project imagines strategic interventions that think of the park as added municipal infrastructure without completely altering its public landscape. Here, the insertion of stormwater retention tanks coupled with select landform maneuvers provide hydrological management capacities and renewed public landscapes. In particular, elevated cisterns irrigate the park through a sub-grade network of interconnected pipes that reinforce each other in case of failure.

Identities

In addition to its role as added infrastructure and public space, the proposed series of elevated cisterns offer a new identity for Flamingo Park beyond mere recreation grounds. The iconicity of the tanks coupled with their new botanical landscapes suggest a new imaginary for the park that fuses the city's history of vegetal exuberance and extravagance with its future of sea level rise adaptation.

Fig. 59. Oblique site plan and section showing proposed topographic intervention and water tower composition.

0 60m

Scenario 06: **Flamingo Waterpark**

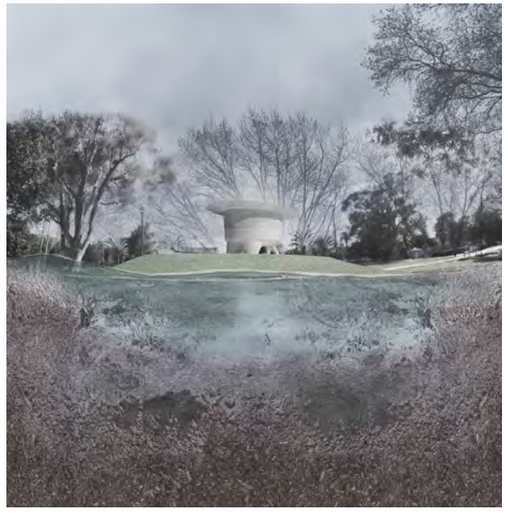
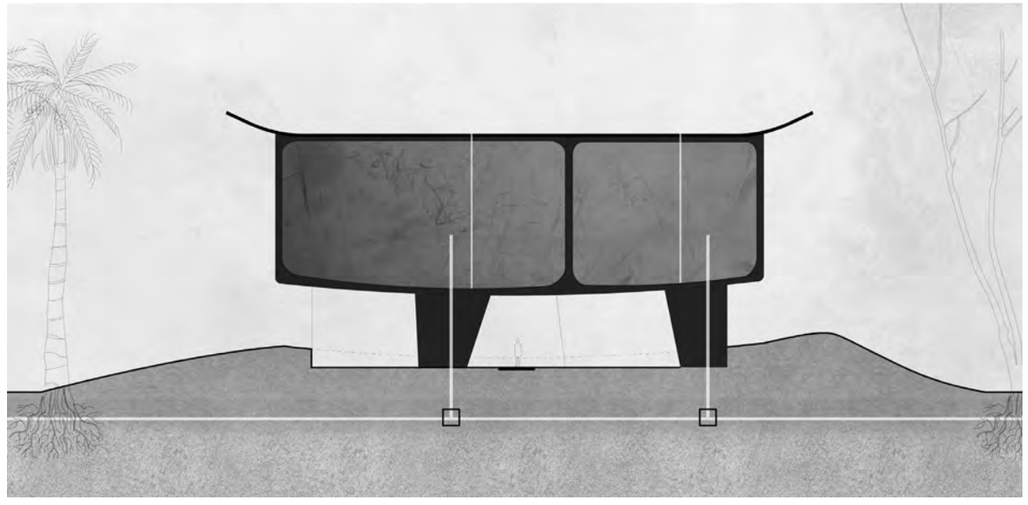


Fig. 60. Views of proposed water towers throughout Flamingo Park, conceived as simultaneously infrastructure and public art.



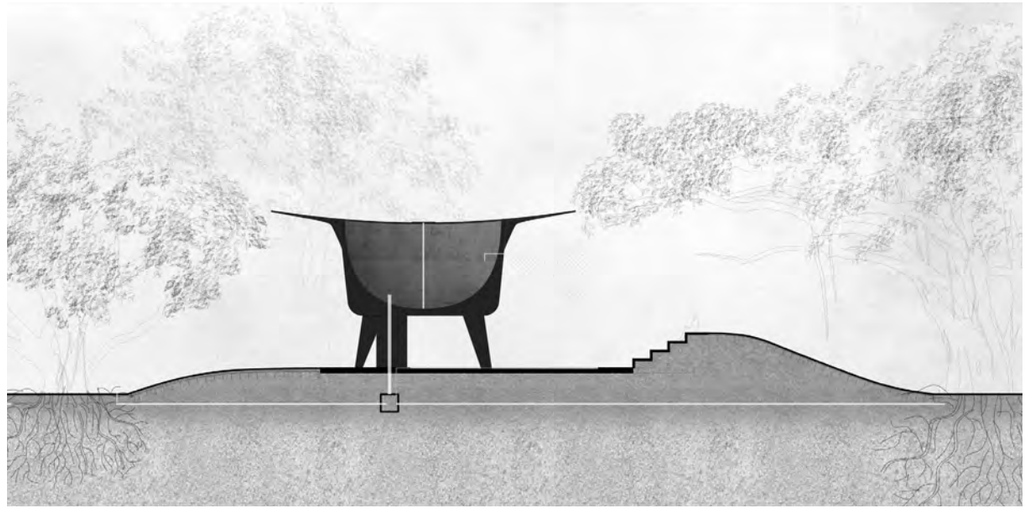


Fig. 61. Sections thru proposed water towers showing how they interface with adjacent topography, vegetation, and public spaces.

Scenario 07

Collins Reservoir

Kent Hipp
Advised by Rosetta Elkin

First cut in 1912 to move produce across the island, Collins Canal is an artifact from the city's past which has received little design attention since its construction. Today, the canal lies adjacent to many publicly owned parcels and a major roadway/ evacuation route; and it remains sparsely developed. This project suggests that the canal should be considered as a test site for a novel, adaptive infrastructure.

Fig. 62. Analytical site plan of Collins Canal showing extent of water shed and proposed pump stations adjacent canal.

Scenario 07: **Collins Reservoir**

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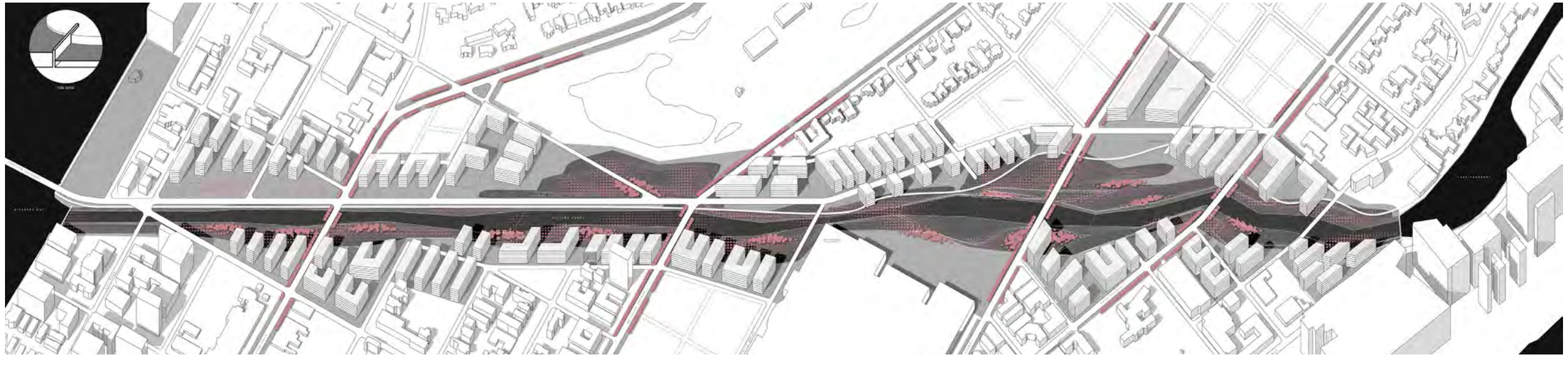

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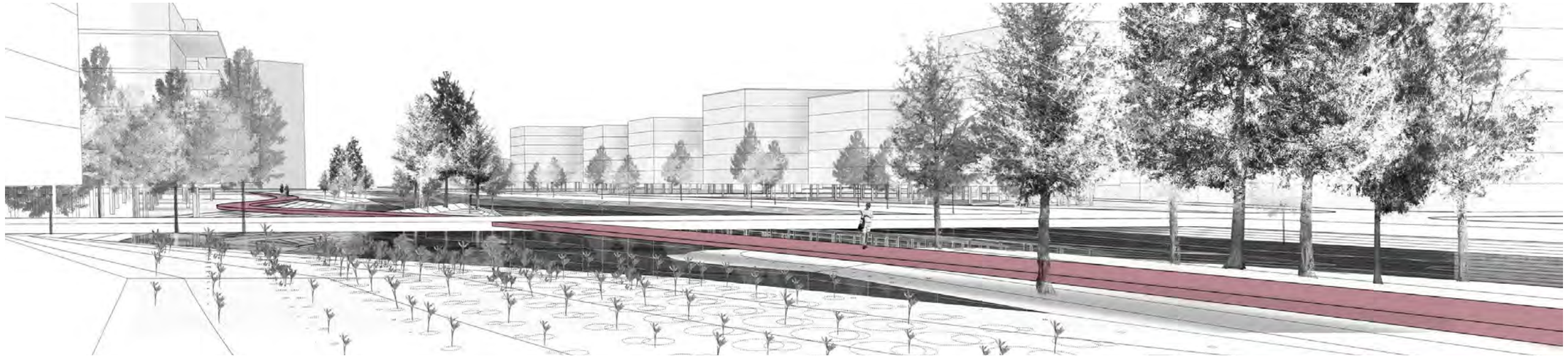


Fig. 63. Axonometric showing proposed hydrological, infrastructural, and typological interventions along Collins Canal. Floodgates are installed at the ends to maximize holding potentials.

Fig. 64. View down proposed Collins Canal highlighting the new riverfront promenade.

Scenario 07: **Collins Reservoir**

Hydrologies

The existing hard edge of the Collins Canal is transformed into a soft, living seawall through a sequence of excavation operations. A pair of gates are placed at either end of the canal basin to regulate tidal flow, thereby creating a reservoir. During low tide, these gates are closed to create a two foot differential as the tide rises. This creates a void space to store water during heavy rain events. Because the basin would receive sea water and large quantities of stormwater, its salinity would vary greatly.

Ecologies

This scenario proposes a planting regime of three specific species. First, a mangrove swamp is established along the water's edge. As a rapidly growing species, it would quickly cover all areas that inundate and can be subsequently trimmed by the city as needed. Second, a number of islands, or cypress heads, would be established to stabilize the fluctuation of the mangrove. Finally, new lines of street trees mark key bridge crossings and stitch the project with its context.

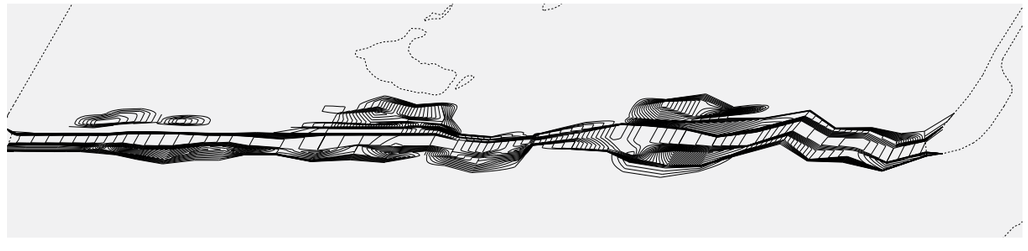
Infrastructures

The main infrastructural operation is the transformation of the canal into a reservoir. The process of excavation produces land mass that is used to elevate adjacent blocks. Additionally, this project shifts a few critical major roadways to streamline city traffic, provide more room for water storage, and articulate new areas of development that link back to the canal. Furthermore, the road network is softened with vegetation and set back from the edge of the canal to create space for public access to the waterfront.

Identities

Once integral to the identity of the city, Miami Beach today generally turns it back on the Collins Canal. This scenario reactivates its urban imaginary from an outdated, transportation artifact to a novel adaptive landscape bordered by vegetated parks and promenades. As such, this transformation posits that the future of Miami Beach needs not tether itself to outdated models of engineering, but instead should draw from its history of imaginative, synthetic landscapes to adapt to rising sea levels.

a.



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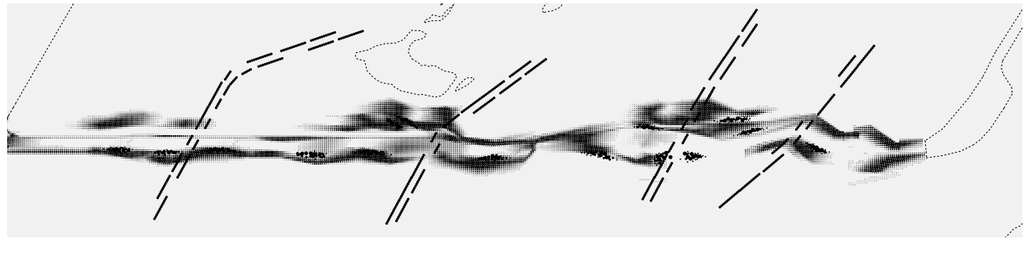

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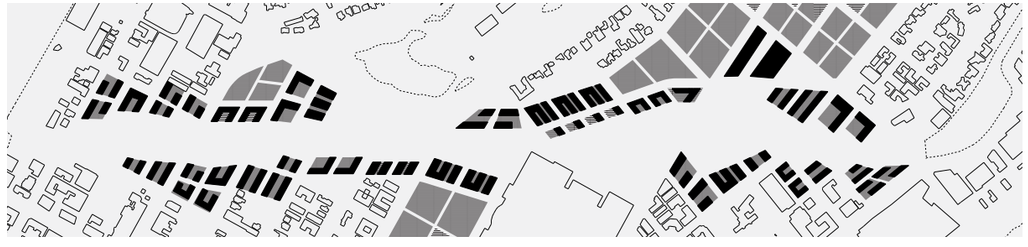

Fig. 65. Sequential concept operations.

a. Topographic subtraction and formation.
b. Planting axis and hierarchy.
c. Grid adjustment and alignment.
d. Typological envelopes and block divisions.

Scenario 07: **Collins Reservoir**

Spaces

The urban form along the two banks of the canal is significantly upzoned and densified in order to fund the new water infrastructure. Using a 40' residential envelope, the project proposes a number of new block and building typologies at the canal edge. Using a consistent grain perpendicular to the water, the urban configuration maximizes visual access between the adjacent neighborhoods and the canal.

Publics

This scenario reclaims the currently underused canal as part of a larger comprehensive strategy to activate this transect into multi-functional public landscape. Because most parcels adjacent this canal are publically owned, the City of Miami Beach should leverage this opportunity to increase development and affordable housing. Lastly, the artificially controlled tidal fluctuations of the reservoir create a sequence of littoral conditions that provides different sectional programming.

Policies

Beyond the level of organizational coordination necessary to carry out this major urban transformation, the City should also implement codes on new adjacent urban blocks to guide their adaptive redevelopment. For instance, zoning regulations and incentives should be established to elevate new edge front developments along the banks. Where these districts intersect historic fabric, priority should be given to typological elevation as opposed to architectural preservation.

Developments

Significant upzoning at the blocks adjacent to the canal provides opportunities for a suite of public benefits: funding infrastructure, providing privately-owned public spaces, elevating resilient-oriented urban fabric, and supplying affordable housing. Because multiple parcels adjacent to the canal are publically-owned, the City should consider redeveloping these through a rigorous RFP process to maximize their adaptive redevelopment. Lastly, the City should hedge against the effects of climate gentrification via inclusionary housing and residential rehabilitation programs.

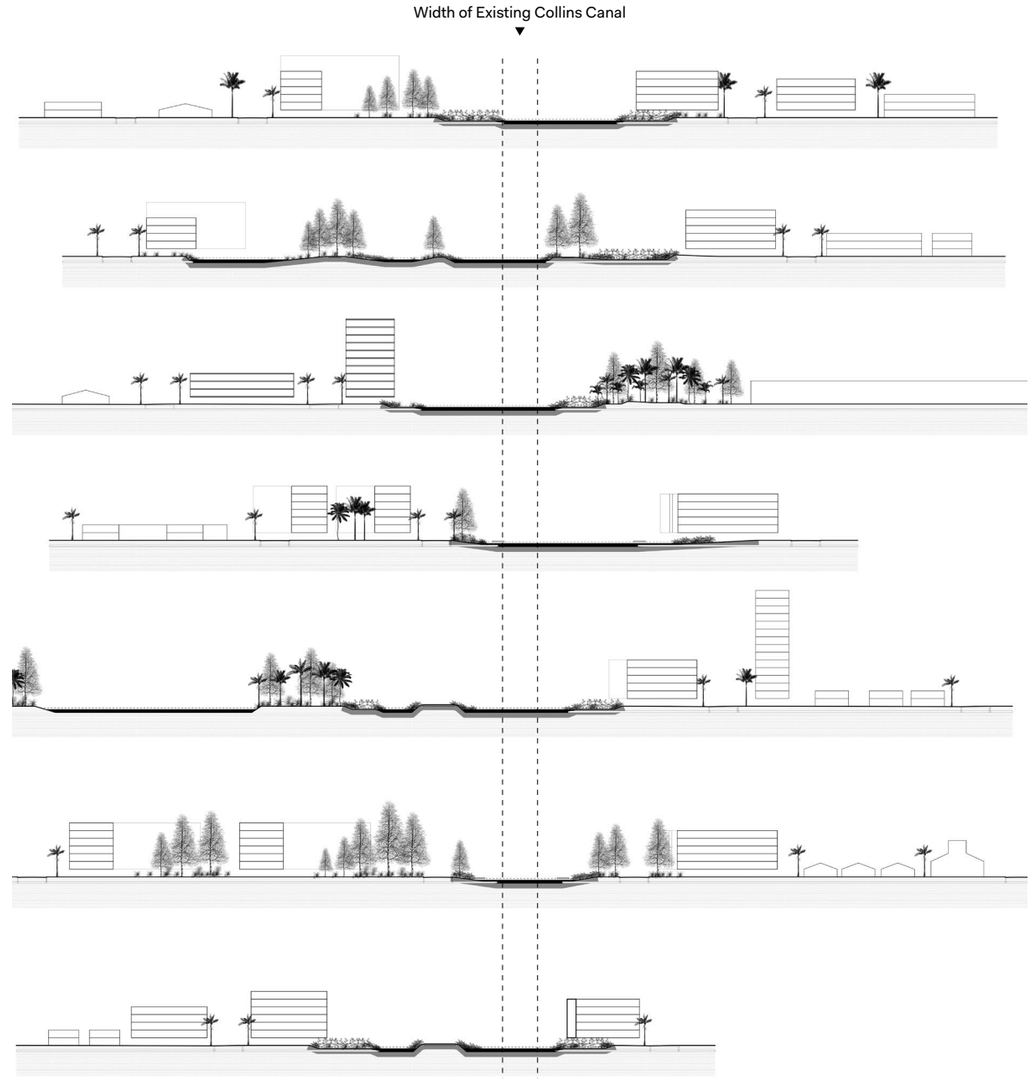

Fig. 66. Cross sections showing the existing canal's relationship (dashed at center) to that of the proposed canal, promenade, and urban form.

Scenario 08

Higher Lanes and Public Planes

Myrna Ayoub
Advised by Rosetta Elkin

The proposed new flood level floors and raised roadways are a deliberate re-articulation of the ground-plane that creates a new urban threshold. By reworking these modifications, water can be absorbed, moved, or retained as opposed to shed, concealed, or pumped. The fluctuation of urban boundaries, manifest in the section in particular, reveals an exploration of levels that augment civic context.

a.

b.

c.

d.

Fig. 67. Street and building elevation scenario.

a. Sea level rise prompts elevating roads, disrupting public realm thresholds.
b. Elevated buildings are economically feasible through floor bonuses.
c. Elevated roads and buildings pose a pedestrian continuity challenge and opportunity.
d. Landscape connections and architectural gestures choreograph a more urban, porous, and continuous "ground plane" experience.

Scenario 08: **Higher Lanes and Public Planes**

Hydrologies

This project explores section operations to maximize municipal stormwater management capacities. In the public realm, streets elevate with limestone-like fill to increase storage. New pervious groundcover materials slow runoff from overburdening existing drainage systems. In the private realm, new ground floors sit atop limestone filled “sponge pads” and elevated buildings cede ground to maximize sheet flow. In both realms, additional vegetation and their deep urban soils add stormwater infrastructure.

Infrastructures

This scenario views ongoing engineered infrastructures as a multi-layered system that provides pubic benefits and a new urban landscape. In addition to elevating the street roughly 5’ above current grade, mass transit is also introduced along 5th Street where it connects directly to the MacArthur Causeway. Pedestrian walkways and bikeways take precedence over vehicular traffic which is reduced in capacity and speed. Lastly, certain parts of the new ground plane are reimagined as extensions of public space.

Spaces

The interior of the site is set aside for ecological performance. Low-maintenance native ecosystems are fostered to regenerate potential habitats and reduce open-space maintenance fees. Concentration of tree planting at the northern and southern tips suggest public parks and possible habitats that could spur from the alluvial channel. Topographical modifications foster the succession of native species. East-west corridors enable street tree planting schemes that organize and orient the block structure.

Policies

Coordination between the public and private realms is paramount to creating seamless urban thresholds and transitions. A finer-grained zoning overlay map would be necessary to integrate suggested common flood elevations and regulate private properties to match such elevations. Where roads cross multiple jurisdictions, additional cooperation is necessary to ensure the successful design, construction, and maintenance of proposed section scenarios. Lastly, FAR incentives on key corner properties would help initiate and accelerate their adaptive redevelopment.

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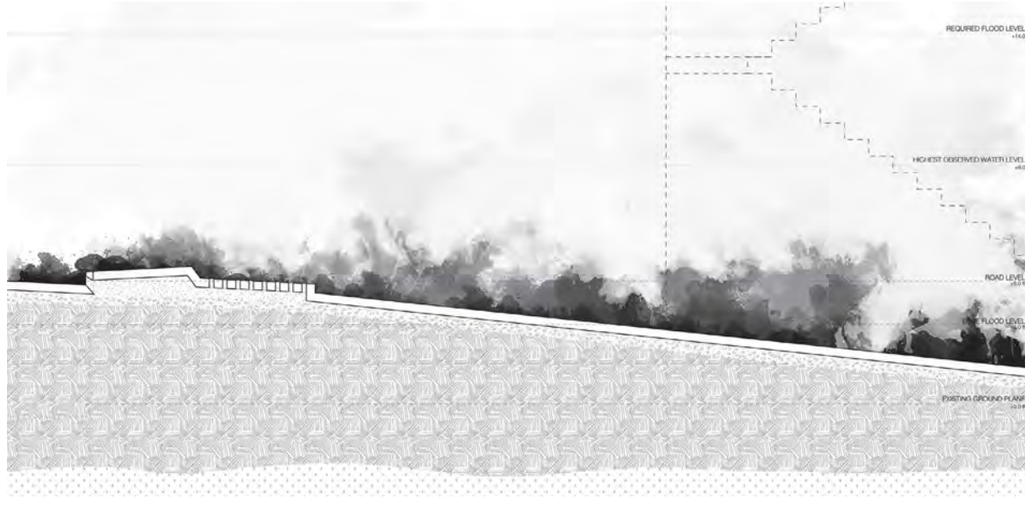

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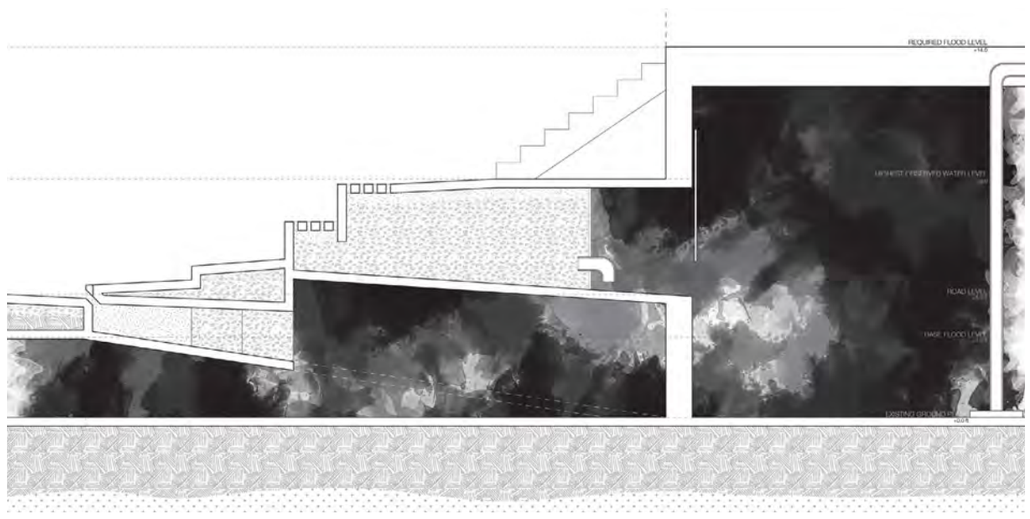

Fig. 68. Section Concept: Move and Flow. Here, elevated streets provide a means to choreograph the flow and filter of water through slopes and absorptive vegetation.

Fig. 69. Section Concept: Retain and Release. Here, shifting street to building thresholds offer water retention capacities through limestone-like fill.

Scenario 08: **Higher Lanes and Public Planes**

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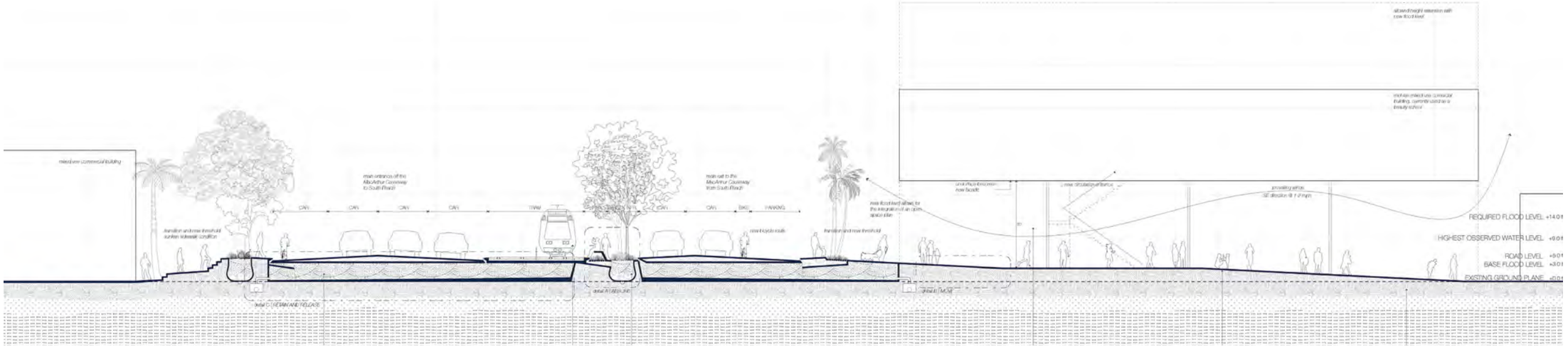


71

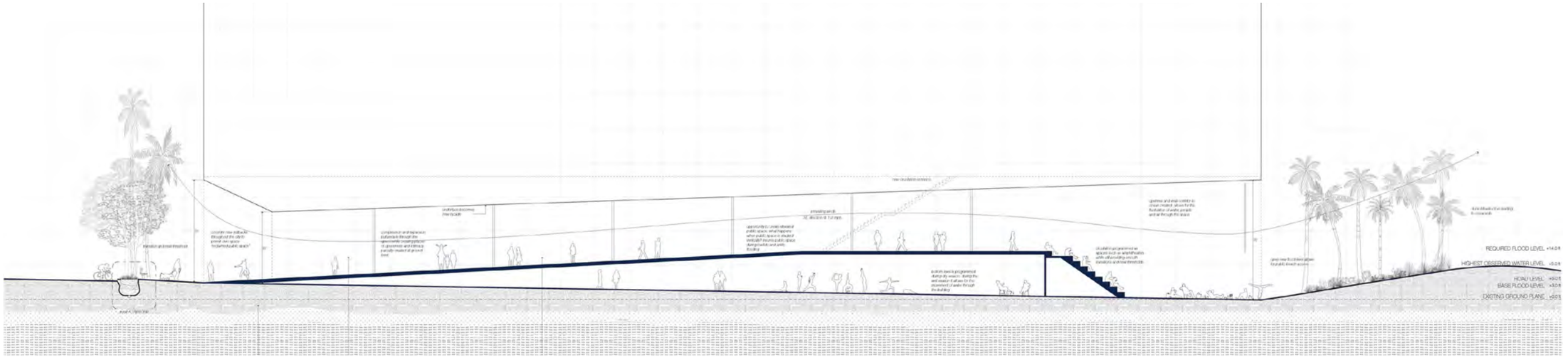


Fig. 70. Section at Alton Road and adjacent mixed-use building.

Fig. 71. Section at the terminus of 5th St and adjacent residential building base.

0 20ft

Scenario 09

Ocean Courtyards

Daniel Widis
Advised by Rosetta Elkin

In a city lacking accessible public space, Ocean Courtyard reclaims and reimagines the interstitial areas behind the iconic Ocean Drive. This project rejects adaptation as a purely functional endeavor and instead argues for the benefits inherent to elevating as a means of reconceiving civic space. By carving new physical and visual connections within adjacent alleys, novel forms of engagement are proposed to a city in need of truly public landscapes.

> Fig. 72. View of Ocean Court transformed from a hardscaped block alley into a public deck over porous ground.

Scenario 09: **Ocean Courtyards**

Hydrologies

The interstitial alleys behind existing streets and avenues present opportunities for added stormwater management. This project reconceives Ocean Court, currently an underused backstreet, as a landscape of elevated public decks which increases porous ground, soil capacity for new vegetation, and semi-public spaces. Because this part of Miami Beach is located on higher elevation, retaining stormwater here critically reduces runoff and over-flooding on lower grounds, particularly toward the city's more vulnerable western half.

Spaces

The introduction of occupiable spaces into existing block alleys implies their reorganization. Existing building footprints step back and shrink to cede ground to added semi-public spaces and transitional porches, arcades, porticos, open lobbies, and courtyards. The combination of these elements would likely result in a welcomed cacophony of novel indoor-outdoor experiences. Additionally, buildings would likely become taller to compensate for reduced floor areas.

Publics

In a city lacking public space, this scenario activates the underused block alleys as potential extensions of adjacent sidewalks and promenades, like the often frequented Ocean Drive. This added public realm will prove critical as the city's existing roads are subject to ongoing infrastructural renovations whose engineered designs often intrude into the public right-of-ways. Furthermore, public and semi-public courtyards offer novel spaces that reconfigure existing perceptions of the city's strict divide between public and private realms.

Developments

The success of the project depends as much on private initiatives and investments as on public incentives and regulations. The City should encourage these hydrological and publicly-oriented spaces through block-scaled (as opposed to lot-scaled), form-based zoning codes and FAR bonuses. It is important to balance these zoning concessions such that the addition of building mass does not overshadow these interstitial spaces and undermine their open atmosphere and potential occupation.

Fig. 73. Site plan showing proposed layout for Ocean Court block alley between 13th and 14th St.

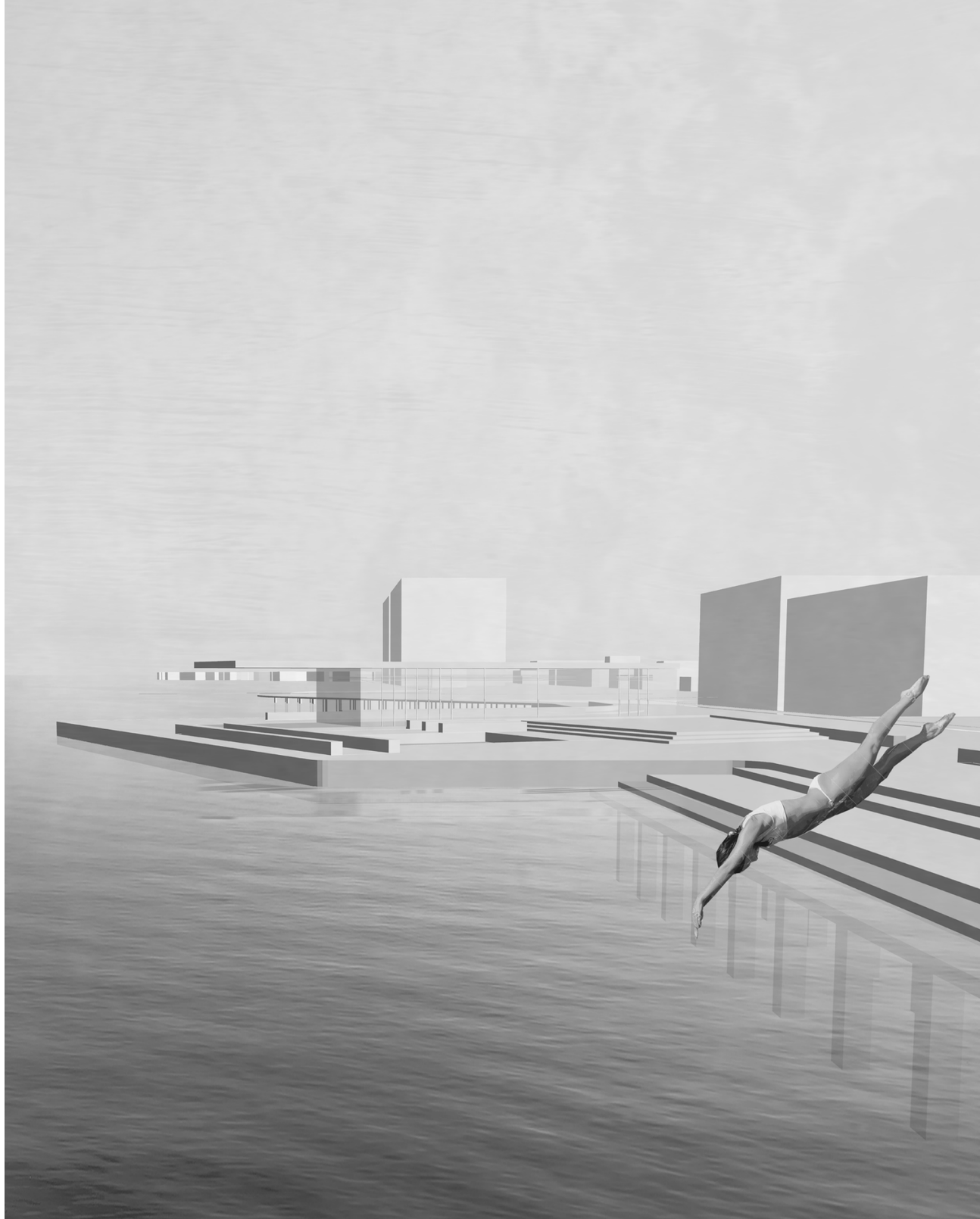
0 15m

Scenario 10

Biscayne Baywalk

Chris Merritt
Advised by Rosetta Elkin

The bayside coastline holds the potential to become infrastructure for storm surge while functioning as an augmented public promenade. Recently, the City of Miami Beach has installed pumps along the Bay to handle the pressures of large volumes of stormwater runoff. The proposed *Biscayne Baywalk* is designed to alleviate stormwater quality issues and enhance the quality of the civic realm, serving as a continuous, connected, and visible system that returns the bayside as a destination.



> Fig. 74. View of a new pubic promenade at the bayfront.

Scenario 10: **Biscayne Baywalk**

Hydrologies

As the bayside of Miami Beach sits at the lowest elevation of the island, this scenario imagines a continuous elevated walkway that protects against storm surges, conceals existing and future water pumps, and integrates with adjacent raised streets and sacrificial floors. To negotiate the elevation difference between the water level and the new promenade, different section scenarios offer a variety of resilient seawall conditions for the absorbing, conveying, and shedding of runoff. Lastly, a system of ground covers augment overall hydrological performance and inform programmatic occupation.

Ecologies

The new Baywalk provides a framework to host a planting regime of different native and aesthetic species, each of which is deployed according to its elevational preference and efficacy along the varying sections of the Baywalk. For instance, mangroves are positioned on deep soils closer to the sea level, grasses are planted at an intermediate level, and aesthetic species such as salt-tolerant palms are deployed closer to the street-end plazas. This curation of plantings therefore becomes the ecological and cultural index of their adjacent spaces.

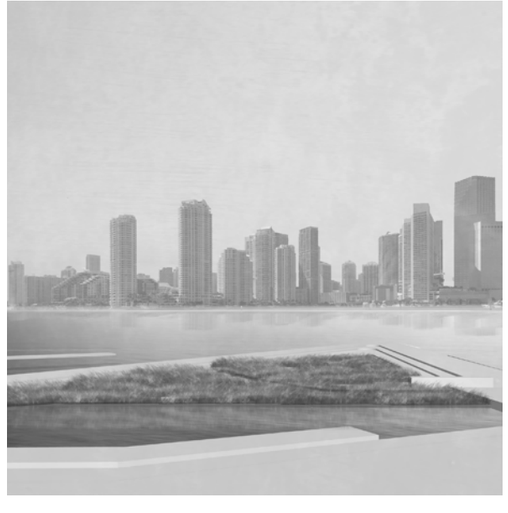
Infrastructures

This scheme works with the ongoing municipal installation of pumps and pipes and incorporates this system into a more comprehensive infrastructural plan that also provides long-term adaptation and novel public spaces. The elevated walkway, for instance, extends raised streets and lifted lobbies, both of which cede their ground levels as sacrificial floors for floodable programs, such as parking and storage. The varying walkway sections toward the bay act as models for different resilient seawall conditions (e.g., living shorelines, dunes, dike, levees).

Identities

This scheme not only transforms the identity and public perception of the Biscayne coastline, but also provides a new model of sea level adaptation that transcends engineered elevation and protection. Here, the Biscayne Baywalk represents a design principle where resilient grey infrastructure can be intermeshed meaningfully with green infrastructure to mutually augment their capacities and accommodate hydrological and public parameters.

75



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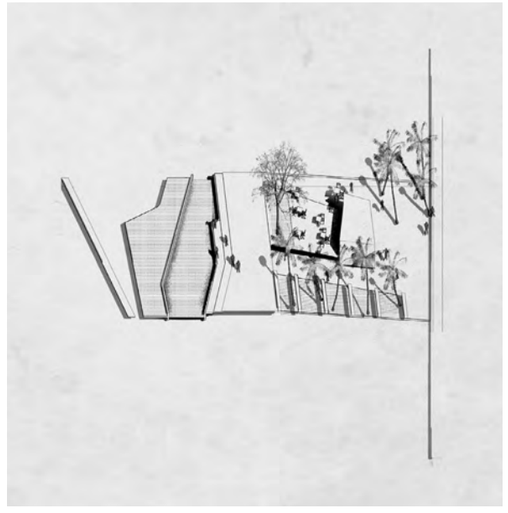


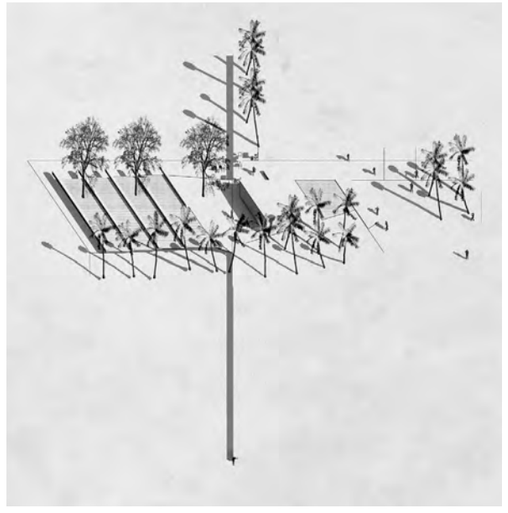


Fig. 75. Views of various bayfront conditions showing the deployment of vegetation and public paths.

Fig. 76. Isometric views of various bayfront conditions showing the integration of the existing pump, landscaped promenade, and vegetation.

Fig. 77. Site plan showing proposed continuous baywalk and its connections to the city fabric.

Scenario 10: **Biscayne Baywalk**

Spaces

As the city elevates its public and private realms, it must contend with a constantly shifting set of public thresholds: road to bikeway, bikeway to sidewalk, and sidewalk to storefront. The Biscayne Baywalk projects this scenario forward and preemptively elevates existing structures, ground lobbies, and public promenades to the second level (i.e., 3-4 meters above existing ground level). It offers a suite of sectional conditions to meet the bay water—through stepped seawalls, terraced amphitheaters, sloped parks, and floating decks.

Publics

Currently a fragmented set of mostly privatized coastlines, the Baywalk reclaims this western edge as a new public space for the city. Public plazas positioned above existing street-end pump stations become civic nodes in a larger network of connected streets and promenades. Additionally, street trees planted along key east-west axes (e.g., Lincoln Road, 15th St, 13th St) tie the project back to the city. The visitors are encouraged to fish, picnic, swim, nap, bike, paddleboard, skateboard, kayak, and dog walk, among other recreational activities.

Policies

Currently, the bayfront coastline is divided under multiple property owners. Only the street-ends are under municipal control. Therefore, to ensure continuity, the Baywalk depends on zoning regulations that require each waterfront property to construct their piece of the promenade. Furthermore, to alleviate municipal maintenance burdens, these spaces can be modeled after privately-owned public spaces. Where certain property owners are uncooperative, the Baywalk can circumvent these private coastlines and become floating decks, thereby ensuring its continuity and feasibility as a public space.

Developments

The Baywalk integrates with the raised ground levels and elevated lobbies of adjacent properties, thereby ensuring a mutually beneficial relationship. The sections here demonstrate a coordinated transition from an elevated drop-off at the entrance, to a public or semi-public deck over floodable parking, to a plaza over existing or future flood pumps, and lastly to a variety of section conditions that ultimately meet the bay water. This scenario would also examine other funding mechanisms from the private sector, such as impact fees, equity contributions, or public-private infrastructure ventures.

a.

b.

c.

d.

Fig. 78. Section scenarios at the bayfront showing how an elevated plaza deck integrates infrastructure, parking, and public space.

a. Stepped Seawall.
b. Sloped Park.
c. Terraced Plaza.
d. Deck and Seawall.

Fig. 79. View of elevated plaza at the bayfront. In this scenario, the pump station is contained within a glass pavilion.

PROCESS

Contexts
Fieldwork

“Resiliency and adaptation are processes, not outcomes. It is a periodical cycle.”[26]

Jesse M. Keenan, 2016
Lecturer in Architecture, Harvard GSD

Fig. 80. Passengers exiting a bus during a "sunny day" flood in Miami Beach.

Contexts: **Overview**

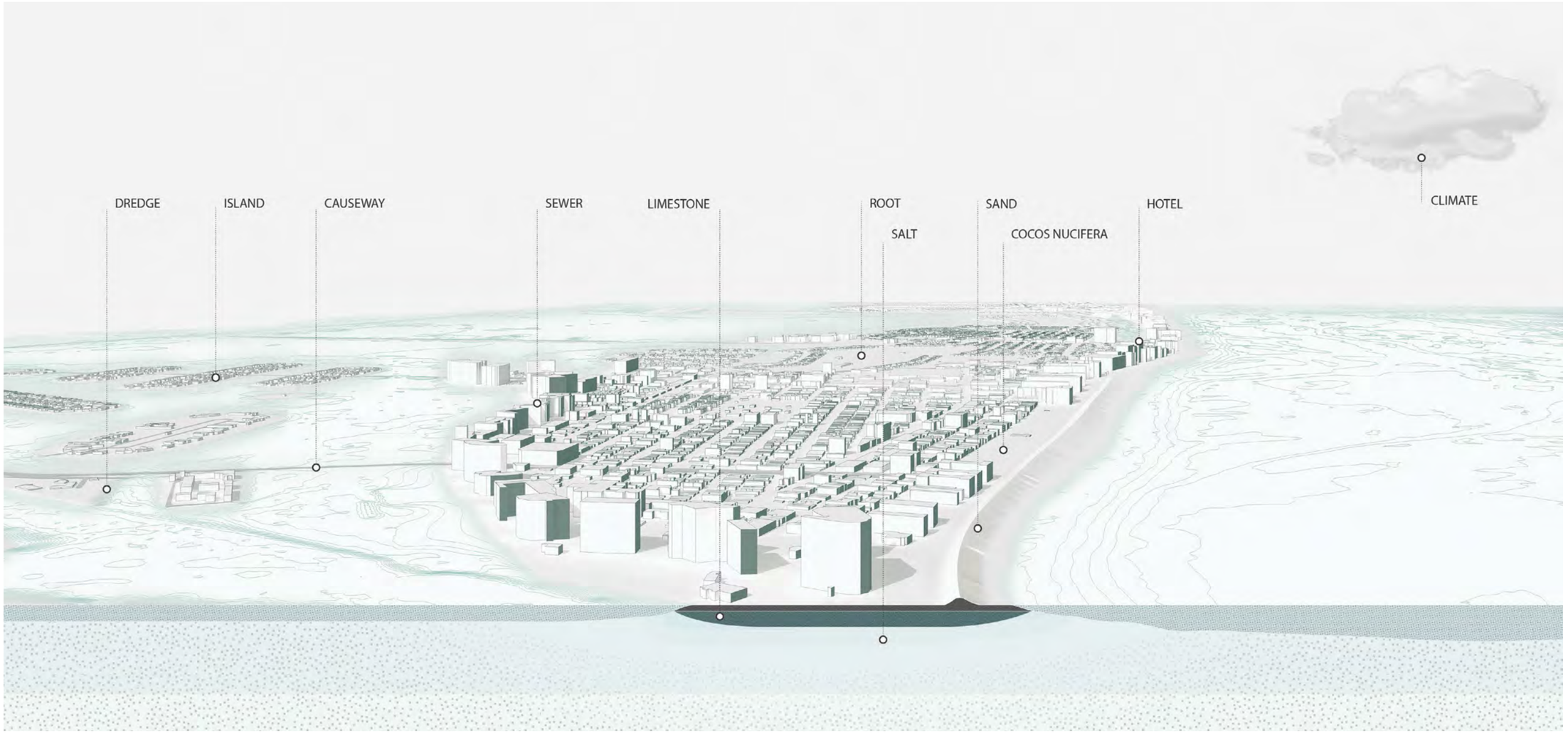


Fig. 81. Section perspective of Miami Beach highlighting different components of research.

Contexts: **Geology and Geography**

Fig. 82. Geological map of Southeast Florida showing bedrock composition. Miami Limestone is the dominant bedrock and the only rock to surface in Miami Beach.

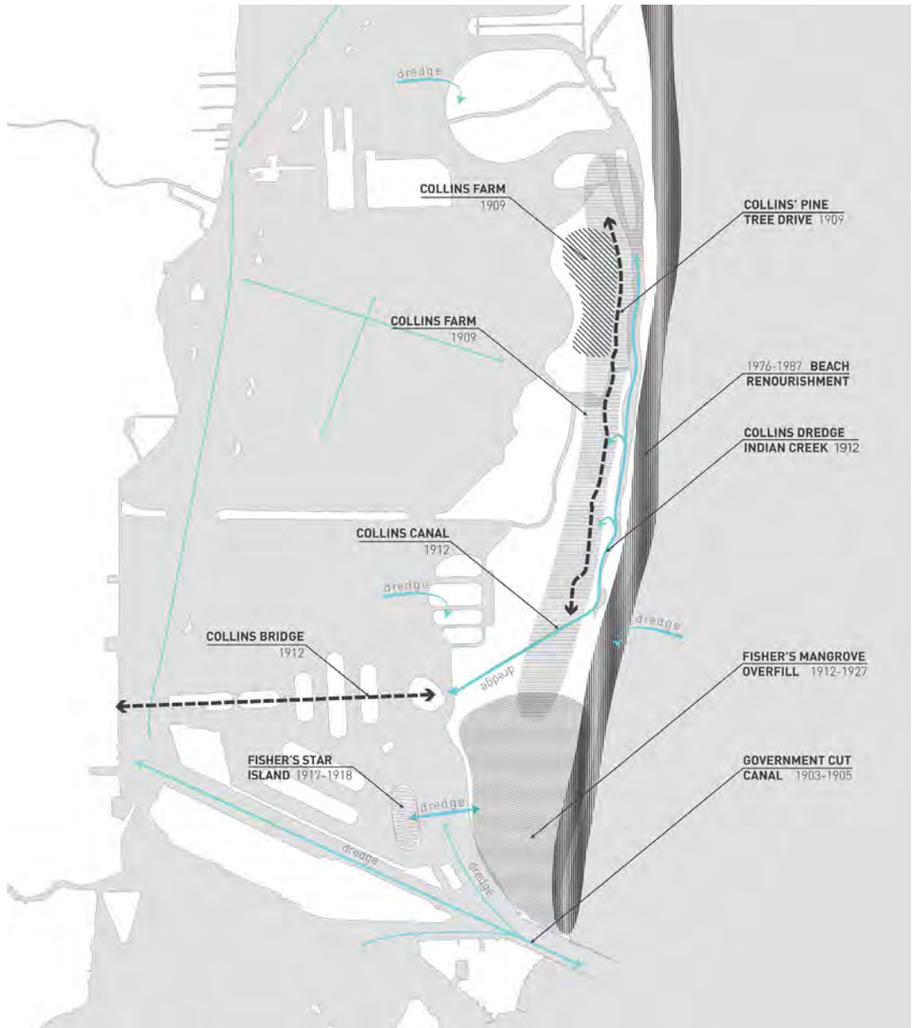


Fig. 83. Dredge Map of Miami Beach showing the historic and synthetic formation of its geography.

Contexts: **Hydrology**

Fig. 84. Hydrological site plan of Miami Beach highlighting pump stations, pipes, and road elevation areas.

0 300m

Fig. 85. Detail of hydrological site plan showing western half of Miami Beach from Biscayne Bay to Flamingo Park.

0 100m

Contexts: **Zoning Envelope and Existing Urban Form**

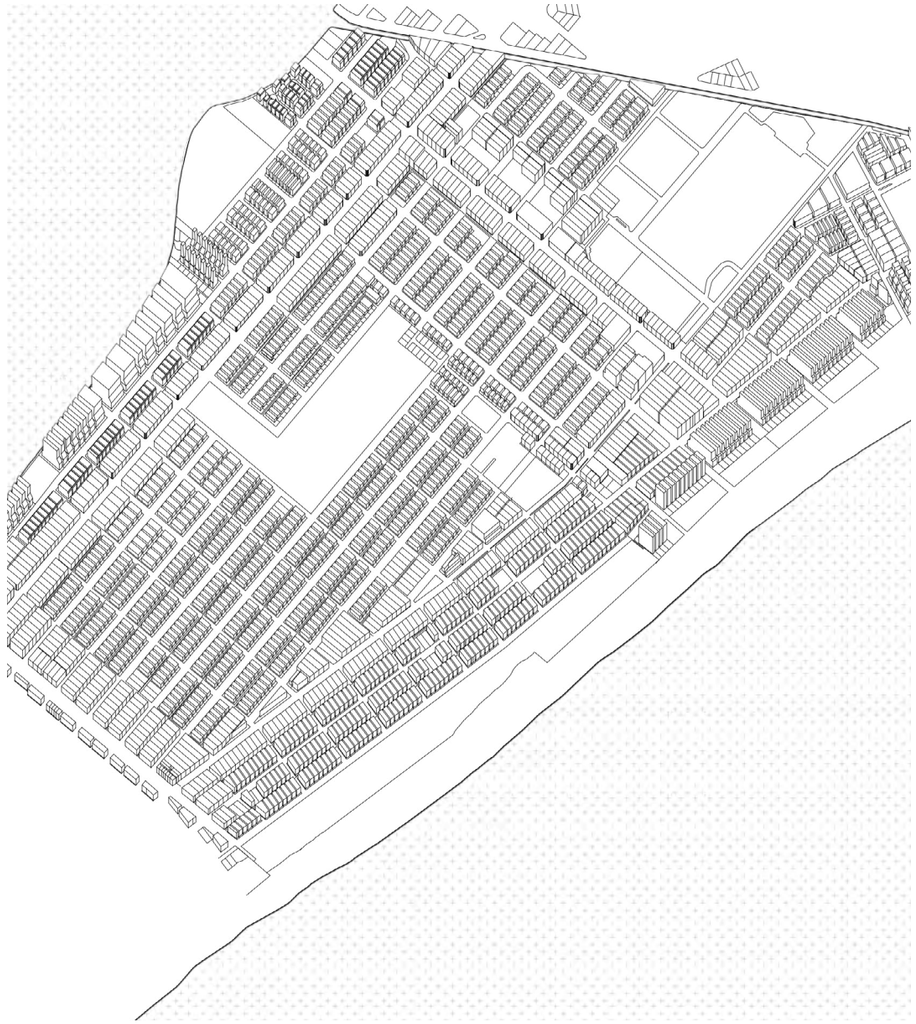


Fig. 86. Axonometric showing the maximum built-out zoning envelopes of Miami Beach between Collins Canal and 5th St.

Fig. 87. Axonometric showing the existing built form of Miami Beach between Collins Canal and 5th St.

Contexts: **Urban Typology**

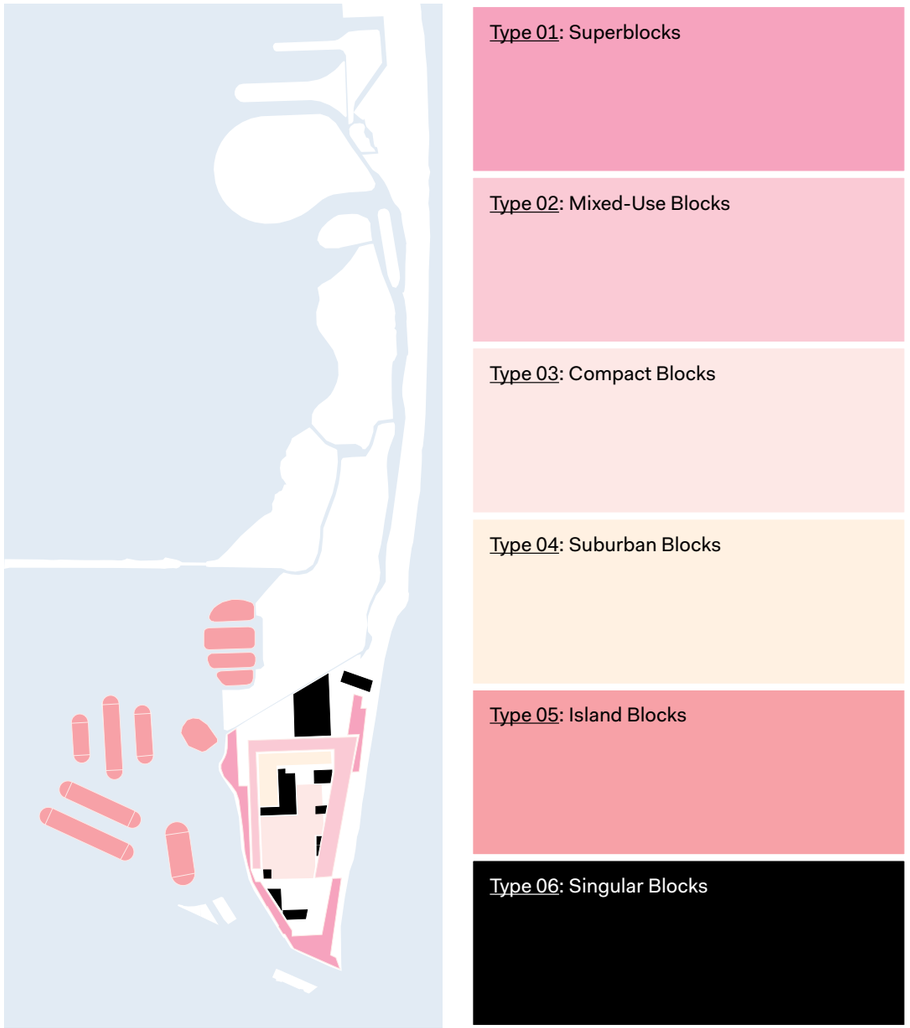


Fig. 88. Map and key showing Miami Beach's 6 dominant urban typologies.

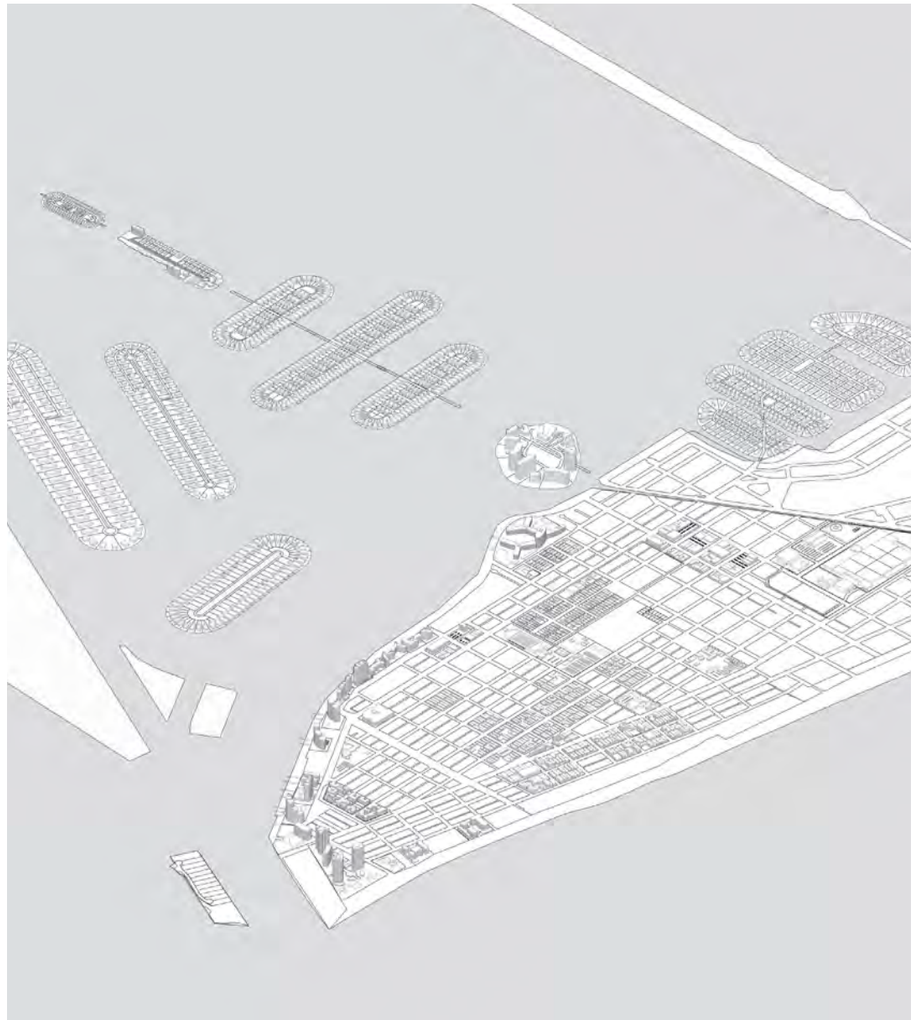
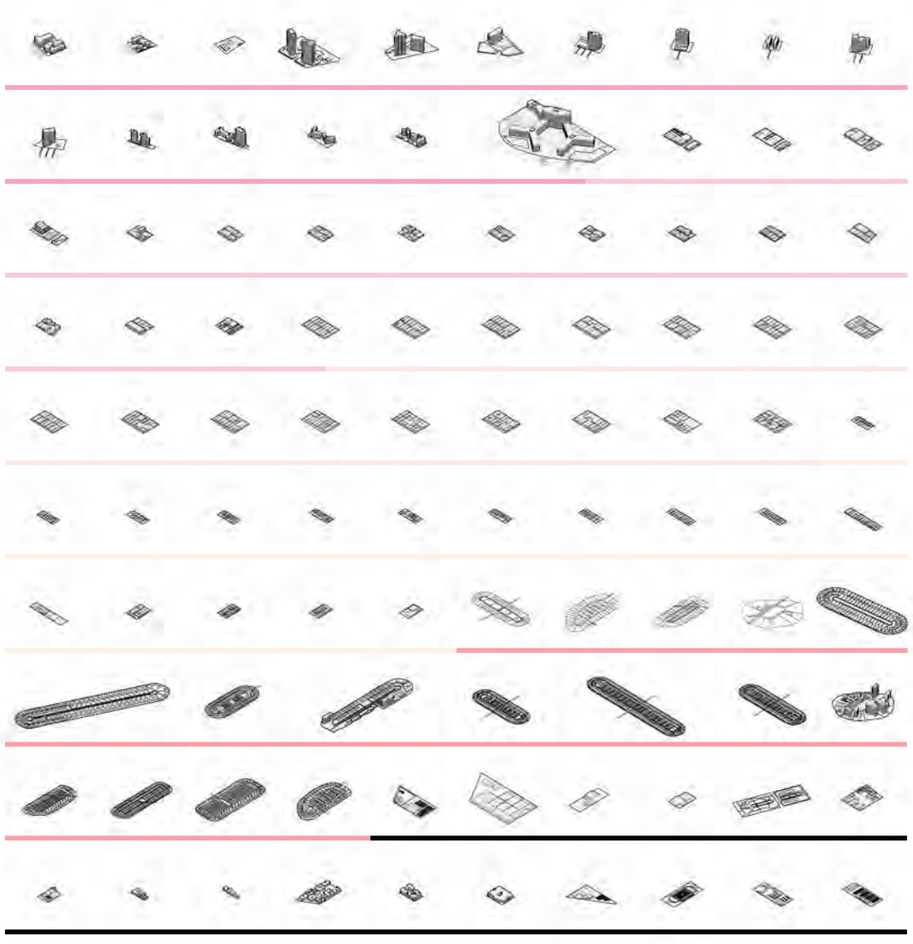


Fig. 89. Isometric view of showing select representative urban types.

Contexts: **Urban Typology**



Superblocks
Mixed-use blocks
Compact blocks
Suburban blocks
Island blocks
Singular blocks

Fig. 90. Typological inventory as axonometric vignettes.

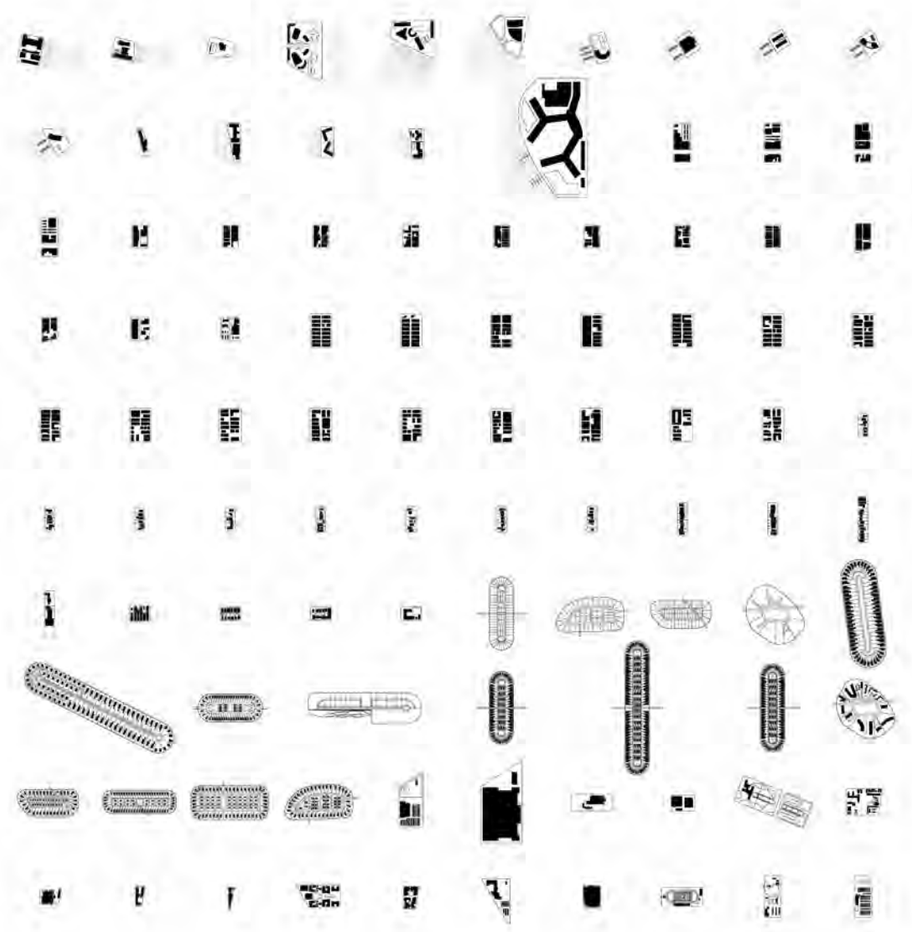


Fig. 91. Typological inventory as figure-ground plans.

Contexts: **Urban Typology**

Type 01: Superblocks | Type 02: Mixed-Use Blocks | Type 03: Compact Blocks | Type 04: Suburban Blocks | Type 05: Island Blocks | Type 05: Singular Blocks

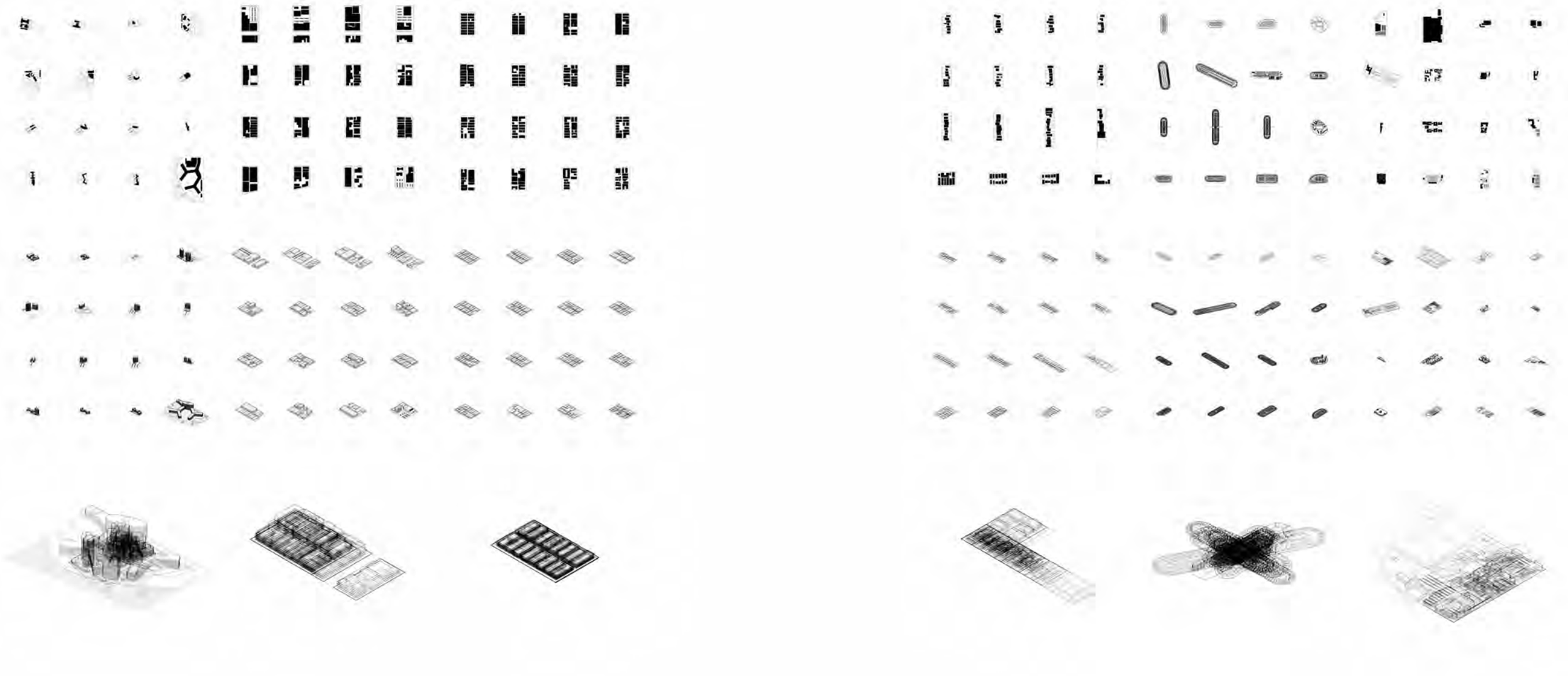


Fig. 92. Comparative catalogue of all 6 types showing, from top row to bottom row, figure-ground plans, axonometric vignettes, and composite models.

“As Miami’s coastal barrier islands form one of the most recognizable and singularly valuable cultural landscapes in the world, the conditions in Miami Beach reveal the potential for ecological and infrastructural strategies to act as alternatives to large single purpose engineering solutions.”[27]

Rosetta Elkin, 2016
Assistant Professor of Landscape Architecture, Harvard GSD

Fig. 93. View of newly raised sea wall along the Collins Canal.

Fieldwork: **South Florida and Sea Level Colloquium**

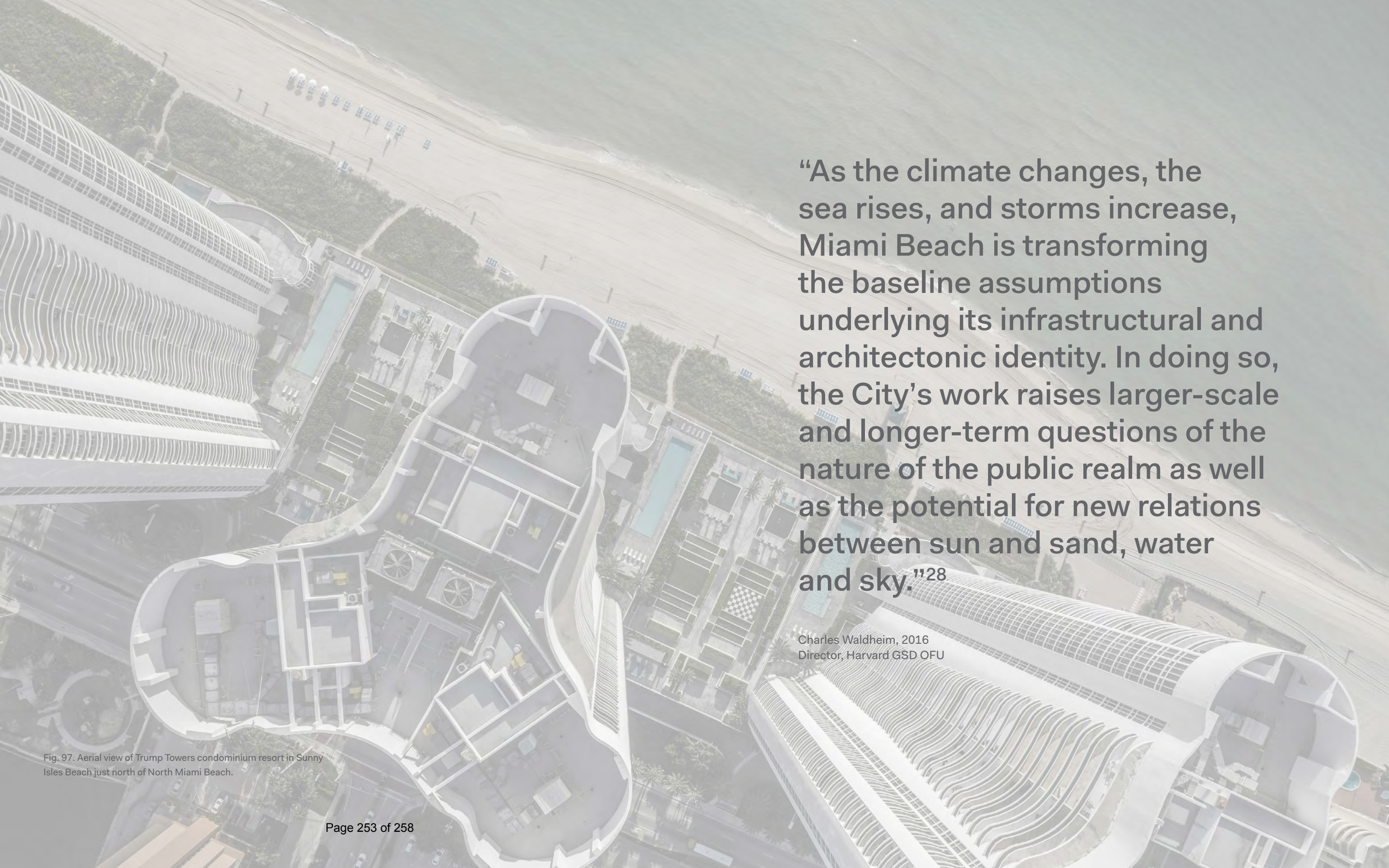
Fig. 94. *South Florida and Sea Level* Colloquium at the Wolfsonian-FIU in Miami Beach. Presenters and speakers include Marta Canaves, Florida International University; Rodolphe el-Khoury, University of Miami; Rosetta Sarah Elkin, Harvard GSD; Jeremy Gauger, ArquitectonicaGEO; Ana Gelabert-Sanchez, Harvard GSD; Alastair Gordon, Miami Herald; Greg Guannel, The Nature Conservancy; Jerold Kayden, Harvard GSD; Jesse M. Keenan, Harvard GSD; Benjamin Kirtman, University of Miami; Bruce Mowry, City of Miami Beach; Maria Nardi, Miami-Dade Parks Department; Eric Rodenbeck, Stamen; Eric Rothstein, eDesign Dynamics; Roberto Rovira, FIU; Rachel Silverstein, Biscayne Bay Waterkeeper; Susanne Torriente, City of Miami Beach; Marcia Tobin, AECOM; Charles Waldheim, Harvard GSD; Harold Wanless, University of Miami; Elizabeth Wheaton, City of Miami Beach; and JJ Wood, Urban Robot.

Fieldwork: **Design Reviews**

Fig. 95. Studio final reviews at the Harvard GSD. Critics include Jeremy Gauger, Arquitectonica; Anita Berrizbeitia, Harvard GSD; Dr. Alan Blumberg, Oceanographer; Neil Brenner, Harvard GSD; Scott Cohen, Harvard GSD Diane Davis, Harvard GSD; Mitesh Dixit, Syracuse University; Rosetta Elkin, Harvard GSD; Martin Felsen, Illinois Institute of Technology; Gerald E. Frug, Harvard Law School; Jesse M. Keenan, Harvard GSD; Mouzayan al Khalil, HMWhite; Amy Knowles, City of Miami Beach; Paul Lewis, LTL Architects; Joanna Lombard, University of Miami; Richard Peiser, Harvard GSD; Eric Rothstein, E-Design Dynamics; Laurinda Spear, Arquitectonica; Ashley Schafer, Ohio State University; Daniel P. Schrag, Harvard Center for the Environment; Marcia Tobin, AECOM; Susy Torriente, City of Miami Beach; Charles Waldheim, Harvard GSD; Elizabeth Wheaton, City of Miami Beach; and Mason White, University of Toronto.

Fieldwork: **Site Visits**

Fig. 96. Student site visit and documentation. Site tours led by Jesse M. Keenan, Harvard GSD; Bruce Mowry, City of Miami Beach; Chad Oppenheim, Oppenheim Architecture; Eric Rothstein, E-Design Dynamics; and Rachel Silverstein, Biscayne Bay Waterkeeper.



“As the climate changes, the sea rises, and storms increase, Miami Beach is transforming the baseline assumptions underlying its infrastructural and architectonic identity. In doing so, the City’s work raises larger-scale and longer-term questions of the nature of the public realm as well as the potential for new relations between sun and sand, water and sky.”[28]

Charles Waldheim, 2016
Director, Harvard GSD OFU

Fig. 97. Aerial view of Trump Towers condominium resort in Sunny Isles Beach just north of North Miami Beach.

Notes

1. Nicole Hernandez Hammer, as cited in Elizabeth Kolbert, “The Siege of Miami,” *The New Yorker*, December 28, 2015.
2. Nick Madigan, “South Florida Faces Ominous Prospects from Rising Waters,” *The New York Times*, November 10, 2013.
3. Jonathan Corum, “A Sharp Increase In ‘Sunny Day’ Flooding,” *The New York Times*, September 3, 2016, https://www.nytimes.com/interactive/2016/09/04/science/global-warming-increases-nuisance-flooding.html.
4. City of Miami Beach, “Mayor’s Blue Ribbon Panel on Flood Mitigation,” Last modified October 10, 2016, http://www.miamibeachfl.gov/cityclerk/default.aspx?id=78270.
5. Greg Guannel, Untitled presentation given at the *South Florida and Sea Level* colloquium conducted at The Wolfsonian-FIU, Miami Beach, FL., February 23, 2016.
6. Elizabeth Kolbert, “The Siege of Miami,” *The New Yorker*, December 28, 2015.
7. David Kamp, “Waterworld,” *Vanity Fair*, December 2015.
8. Jayantha Obeysekera, as cited in Elizabeth Kolbert, “The Siege of Miami,” *The New Yorker*, December 28, 2015.
9. Jeff Goodell, “Miami: How rising sea levels endanger South Florida,” *Rollingstone*, June 20, 2013, http://www.rollingstone.com/politics/news/why-the-city-of-miami-is-doomed-to-drown-20130620.
10. Guannel, Untitled presentation.
11. Bruce Mowry, “Miami Beach Rising above Sea Level,” Presentation given at the *South Florida and Sea Level* colloquium conducted at The Wolfsonian-FIU, Miami Beach, FL., February 23, 2016.
12. Megan Barber, “Miami Beach flooding: what you need to know,” *Curbed Miami*, August 1, 2017, https://miami.curbed.com/2017/8/1/16079896/miami-flood-warning-rain.
13. Rovira, Untitled presentation.
14. Lizette Alvarez, “A fight over historic preservation brews in Art Deco country,” *The New York Times*, January 15, 2013, http://www.nytimes.com/2013/01/16/us/miami-beach-preservationists-push-to-protect-home.html.
15. Ana Gelabert-Sanchez, Moderator at the *South Florida and Sea Level* colloquium conducted at The Wolfsonian-FIU, Miami Beach, FL., February 23, 2016.
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Credits

Fig. 1; Global Aerials.
Fig. 2-5; George Steinmetz Photography.
Fig. 6; Sonny Xu.
Fig. 7; George Steinmetz Photography.
Fig. 8; Rosetta Elkin.
Fig. 9-11; Sonny Xu.
Fig. 12-13; George Steinmetz Photography.
Fig. 14-22; Boxia Wang.
Fig. 23-29; Andrew Madl.
Fig. 30-40; Jessy Yang.
Fig. 41-50; Ziwei Zhang.
Fig. 51-57; Sonny Xu.
Fig. 58-61; Izgi Uygur.
Fig. 62-66; Kent Hipp.
Fig. 67-71; Myrna Ayoub.
Fig. 72-73; Daniel Widis.
Fig. 74-79; Chris Merritt.
Fig. 80; George Steinmetz Photography.
Fig. 81; Harvard GSD Office for Urbanization.
Fig. 82; Justin Henceroth.
Fig. 83; Tyler Mohr.
Fig. 84-92; Harvard GSD Office for Urbanization.
Fig. 93; Sonny Xu.
Fig. 94; Sonny Xu and Harvard GSD Office for Urbanization.
Fig. 95; Justin Knight Photography.
Fig. 96; Rosetta Elkin and studio members.
Fig. 97; George Steinmetz Photography.

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