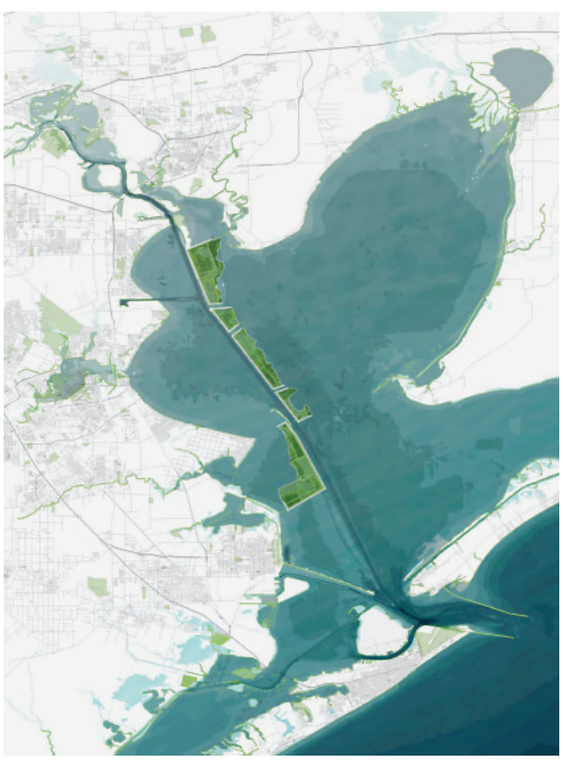
Progress Report: The Galveston Bay Park Plan

Jim Blackburn and Rob Rogers in Conversation with Maria Nicanor

Late last year, Maria Nicanor sat down with environmental lawyer and professor Jim Blackburn and architect Rob Rogers to discuss the Galveston Bay Park Plan, a project initiated by Rice University's SSPEED Center in 2009 that in 2015 proposed the construction of a new string of islands in Galveston Bay to provide both a storm surge barrier and recreational park space. Meant to complement the Texas Coastal Resiliency Master Plan and coastal spine proposed by the Army Corps of Engineers, the ambitious project addresses the urgency with which we must adequately protect the area from the certainty of future storm surges. In this interview, which includes newly created images of the plan's evolution, Blackburn, Rogers, and Nicanor discuss the project's beginnings, its challenges, and the unprecedented collaborative effort needed to take it—quickly—to its next phase.

MN Tell us about Galveston Bay Park Plan (GBPP). How and when did it start?



Site Plan. Courtesy Rogers Partners.

JB The GBPP started with Hurricane Ike and the horrific damage caused by the storm. Ike came up the middle of Galveston Bay and had a much larger surge tide than was expected for a Category 2 storm, so it caused massive inland flooding on the east side of Galveston Bay all the way across to Grand Isle, Louisiana. On the west side of the bay, it had a lot of back circulation that flooded Galveston, Kemah, Seabrook, and some of the areas that jut out into the water and have a northern wind exposure. Bolivar Peninsula was basically destroyed.

Funded by the Houston Endowment, our work at the Severe Storm Prediction, Education, and Evacuation from Disasters Center at Rice (SPSPEED) was to learn from Hurricane Ike. We found that we were unprotected from a large storm that has a surge component that brings the water from the Gulf of Mexico inland, so we set about trying to address that concern. At the same time, the US Army Corp of Engineers was beginning work on what we know today as the coastal spine.

Our focus has always been on the inland impact of storms along the Houston Ship Channel and on the developed west shoreline of Galveston Bay. We figured out how to widen the Houston Ship Channel and use the dredged material to build a levy that runs from the port in Chambers County down the Houston Ship Channel, crosses the channel about mid-bay, and then connects into the Texas City levy system. This barrier would protect against the huge negative effect of all storms up to Category 5 in strength. There's huge potential for damage to the Houston Ship Channel and Bayport industrial complex, as well

as nearly all the way inland to NASA and I-45. It's a huge area. We have about 800,000 people that we think are at risk of from a severe storm event like that, as well as virtually every industry that has frontage on the Ship Channel and Bayport.

RR We got involved after working with Charlie Penland from Walter P Moore on a number of projects around Houston. One day Charlie said, "We have this idea for a strong barrier system. It would be really great if you could take a look at it. We've been trying to communicate this idea; can you help us with images and communication? How do we begin to get this idea across?"

The thing that stood out to us right away was that this piece of infrastructure actually has the potential to do more than just be a barrier. In the office we do a lot of projects that are combine infrastructure and the public realm; we think that is what the 21st-century infrastructure needs to be. A highway is just a highway, and, in fact, a highway often has only negative impacts in addition to being a highway. Infrastructure that deals with climate change and our changing world needs to operate in multiple beneficial ways.

MN Can you talk about the addition that you are proposing, which has the infrastructure component but also space for recreation and other benefits?

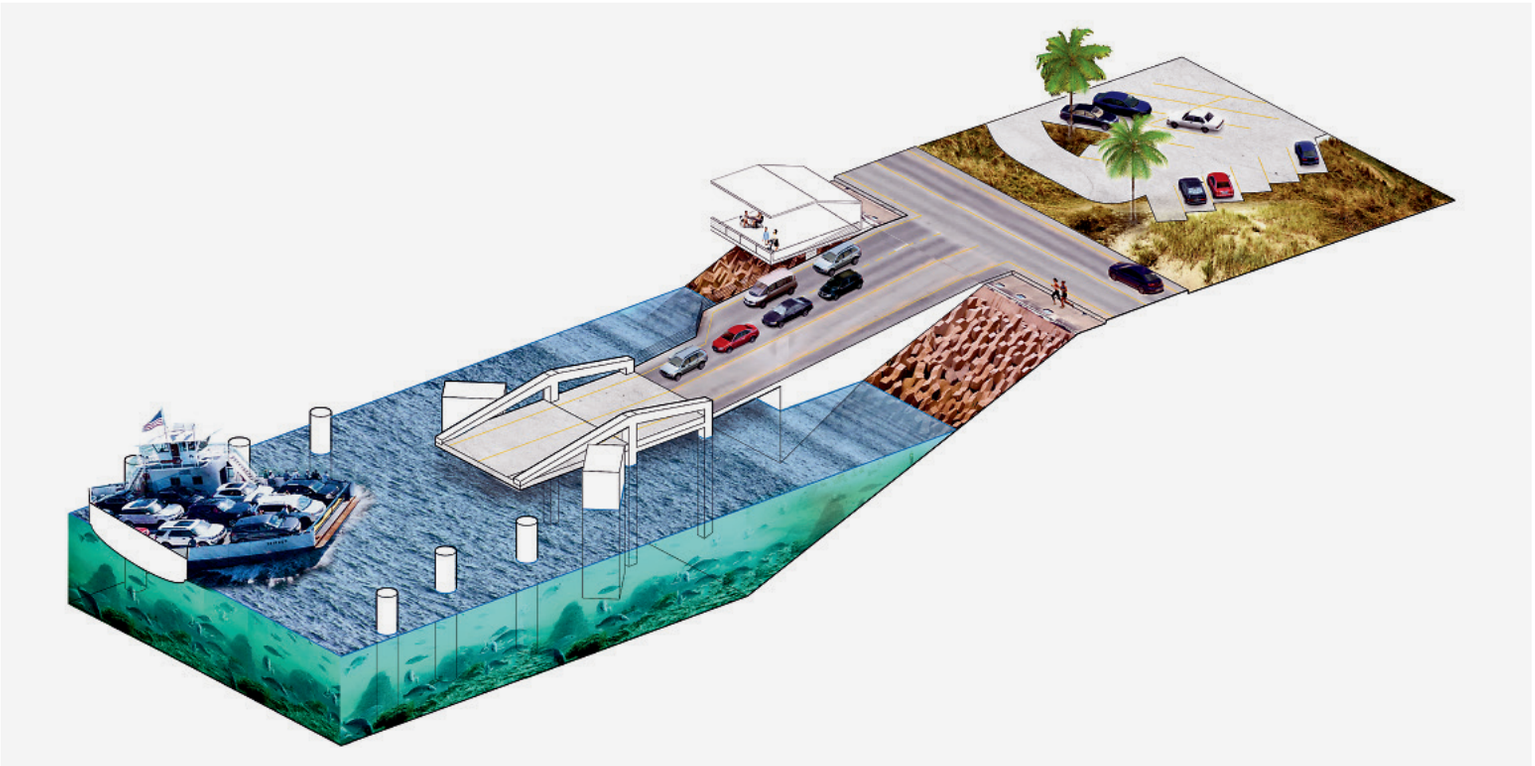
RR It is, essentially, a constructed archipelago. The GBPP proposes a series of islands that are twenty-five feet above sea level, which means they will protect against a storm surge of twenty-five feet. Adjacent to the Ship Channel, there will be a hard edge that will absorb the constant wake of passing ships, but the rest of the islands will include soft edges, beaches, marshes, and wetlands—areas that are designed to be inundated. It can't be permanently habitable, but you can still locate campgrounds and stables, in addition to places to ride bikes, use boats, go to the beach, and go fishing or bird watching. You can put an enormous number of these desirable coastal recreational activities into that space. These soft edges also create opportunities for environmental restoration, recreation, and access. These constructed islands are connected by bridges. There's a big gate at the Ship Channel crossing which is well within the sizes that have been constructed in the Netherlands and elsewhere, so it is a known technology.

Aerial view of proposed storm barrier, dredge spoils, habitats, and programs. Courtesy Rogers Partners.

JB In addition to a large gate, there are several smaller gates between those islands that will be open most of the time for navigation purposes. Hurricanes are going to have a surge component, but they will also have rainfall. In addition to surge inflow, we'll have flow from the bayous. As we get deeper into a storm, we must be able to stop the surge by closing all the gates and then open enough gates to allow the runoff to exit. We will be doing some extensive computer modeling in our next phase of study. We're confident that the timing of the runoff won't coincide with the surge.

The US Army Corps of Engineers has proposed two gates within Galveston Bay in their plan, one on Dickinson Bayou and one on Clear Lake. These are estimated to cost a billion dollars each because of the need for massive pumps that would remove water from those bayou systems. We shouldn't have that problem, but we will be doing extensive modeling to be sure. Those openings in the levees, by the way, are also designed to enhance circulation. We've been asked about how the GBPP will interfere with circulation in the northwest corner of Galveston Bay. Our initial modeling indicates that we have sufficient openings in this system for circulation in order to maintain the health of the bay, but we should be able to verify that in the next round of study.

RR A traditional way of building flood infrastructure is to construct a gate with a massive pumping station. What is that apparatus going to do for 99.9% of its life span? It costs money to maintain, and then it gets used three times every decade. Instead, we're building a basin big enough to handle this amount of water,



At the main gate, the access roads will be linked by a new ferry service with ferry ports integrated on either side of the Ship Channel. Courtesy Rogers Partners.

so we won't need pumps. And we're proposing the creation of a park and a habitat that gives back to Galveston Bay and to the entire region.

During early research, we found that there's only 500 acres of accessible public land along the perimeter of Galveston Bay; the shore is essentially privately owned. So unless you have a boat, you have limited access to Galveston Bay. The GBPP gets people out into the bay while increasing shipping access and safety and providing critical hurricane surge protection. An accessible barrier can be much more than a just a climatic event mitigator; its landmasses can enhance ecological and environmental opportunities in the bay. It can be a public park with so many benefits.

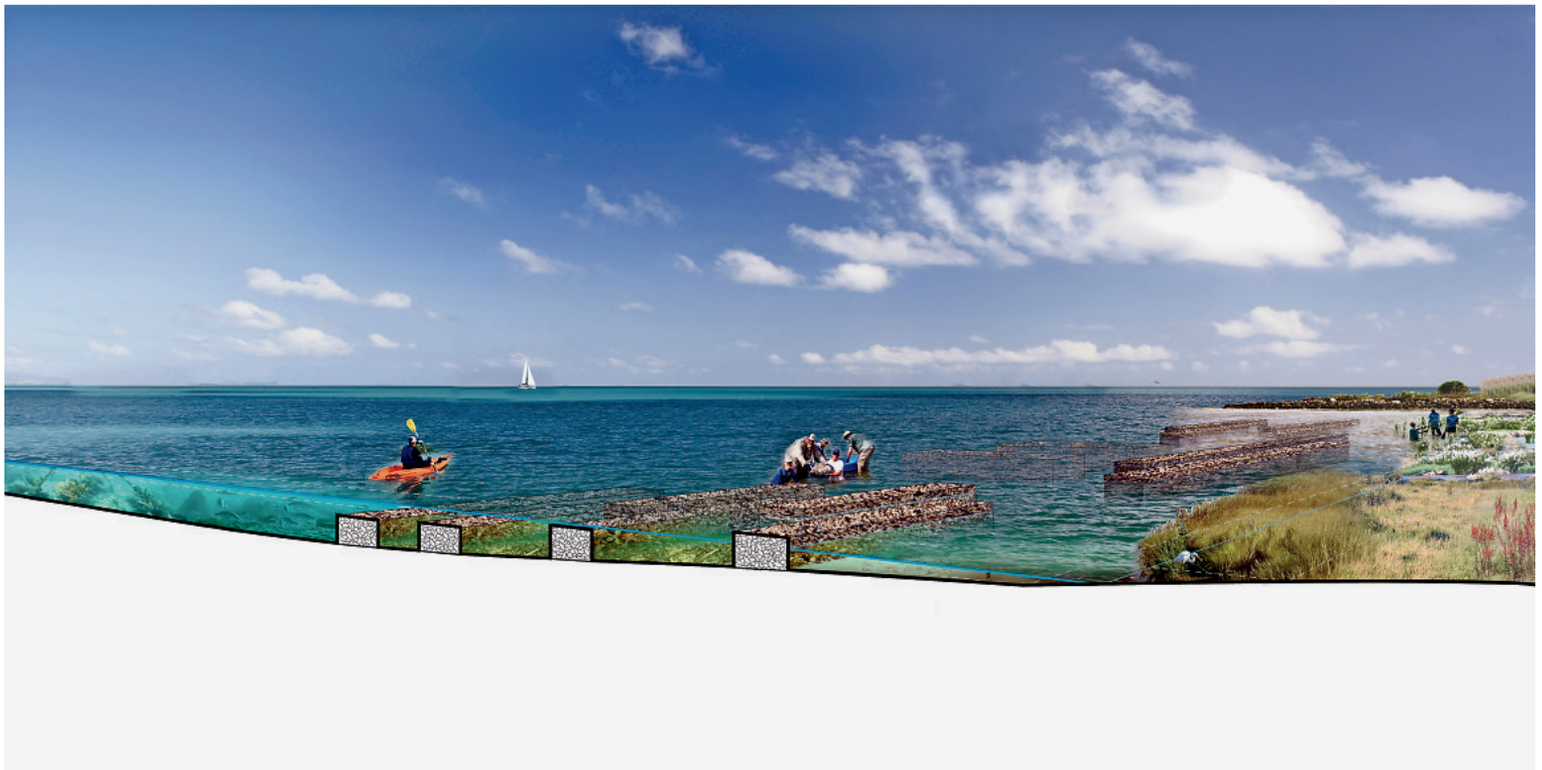
We also learned that almost the entire western shoreline of the bay is either riprap, sheet piling, or seawall. The functioning aspect of an estuary has been mostly removed here, so a softened edge for these islands is an incredible habitat opportunity. These environmental improvements combine the story of Houston as the center of our country's petrochemical economy with the splendor of Galveston Bay.

JB From a design standpoint, it was important to try to maintain both economic and ecological aspects. Industrial areas are vulnerable; if they're damaged, they will destroy Galveston Bay. This hasn't happened in the last 100 years, but it could easily happen soon. Climate change is making hurricanes more powerful, which makes us worried.

MN So much has happened from the initial vision to the involvement of Rogers Partners. Who else is involved as part of your project team?

JB The team has changed over time. Previously we were just working with engineers. Tom Colbert from the University of Houston Gerald D. Hines College of Architecture and Design was with us early on, but he unfortunately passed away; all of a sudden there was this huge void on the project team. Rogers Partners has transformed lines on a map and turned them into a world-class design.

RR Tyler Swanson, architect and landscape architect, is Associate Partner with Rogers Partners and has been critical to our



Constructed oyster beds will replace beds disturbed by changes in salinity. Courtesy Rogers Partners.

thinking about the big picture. Once an idea is possible, then it needs to take a form. The idea of designed coves evolved with the project; it didn't come from pure inspiration. And, almost a third of the GBPP is already in place because existing dredge spoil islands alongside the Ship Channel, produced by a century of dredging, have become incredible habitat opportunities. What needs to happen is already there; it just needs to be scaled up so it can provide these other assets and resources. The existing islands are a byproduct of dredging the Ship Channel; now we can turn that into an intentional action that creates an opportunity for the region.

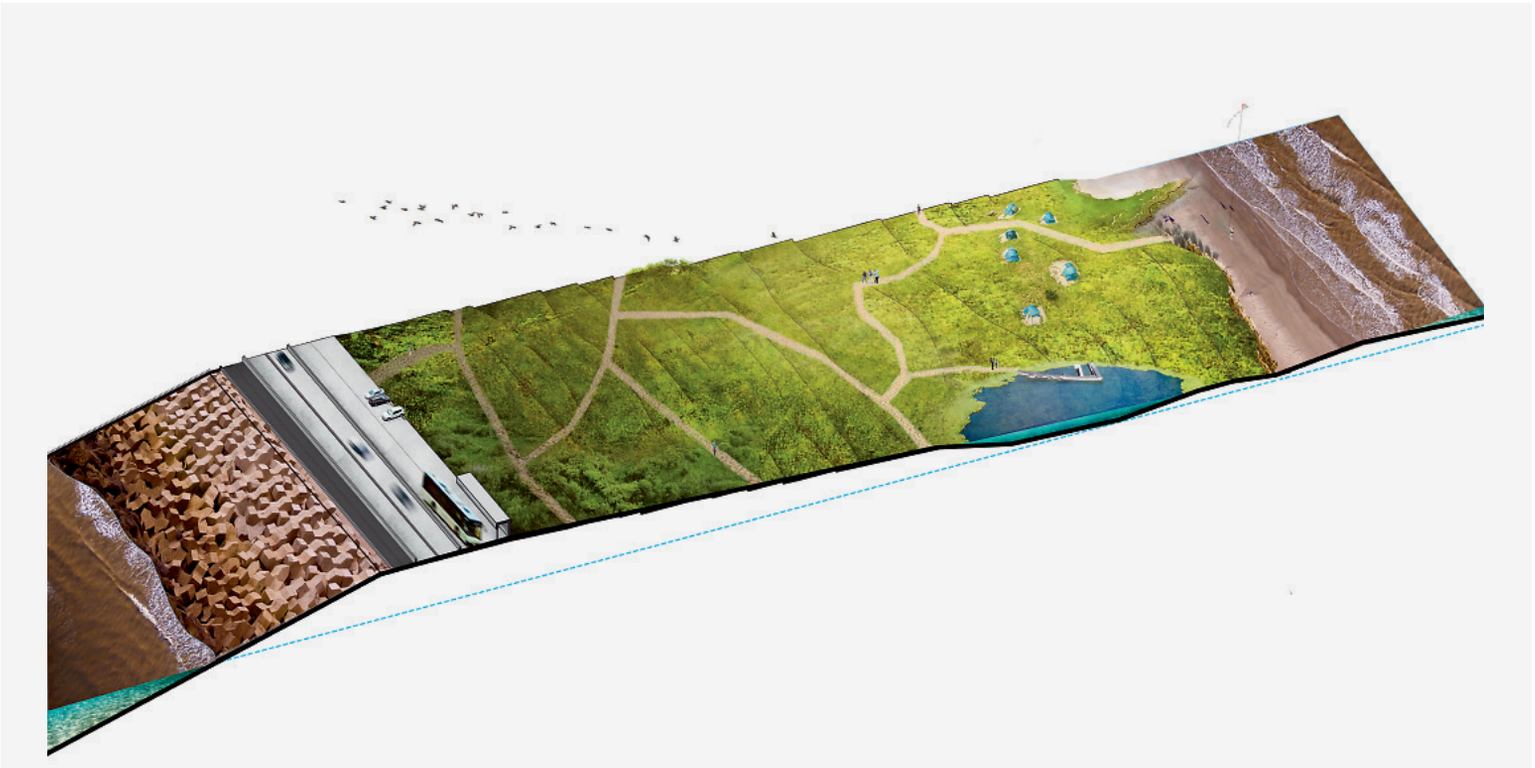
MN What is the state of the project now? Where is the research and funding to make this happen?

JB Right now, the project is being considered for funding for the next phase of engineering and architectural design. We went through a punitive time where there was concern that our project was in competition with the coastal spine advanced by the US Army Corp of Engineers. That is not the case. We are studying an in-bay solution; the US Army Corps of Engineers is advancing a coastal solution. The GBPP complements what the Corps of Engineers is proposing. Historically, the Corp of Engineers doesn't mix a dredging project with a flood protection project. By working outside of governmental cycles, we are able to look at things a little differently. We are also solving for stronger storms. We think these events could generate upwards of $100 billion in damages, even with the coastal spine in place.

Currently, the City of Houston, Harris County, the Port of Houston, and Joe Swinebank have agreed to fund the next phase of this work. We're working with them to secure a contract to provide $1 million in funding, which will lead to a decision regarding how much our design costs and how reasonable it is to implement it. Preliminary estimates for the cost of the coastal spine are $29 billion, and an early estimate for the cost of the GBPP is between $3 and $6 billion.

MN How is Texas's General Land Office (GLO) involved, or not involved? What are the difficulties there?

JB The GLO has been the cosponsor of the coastal spine with the Corps of Engineers, so they have focused on that and are not



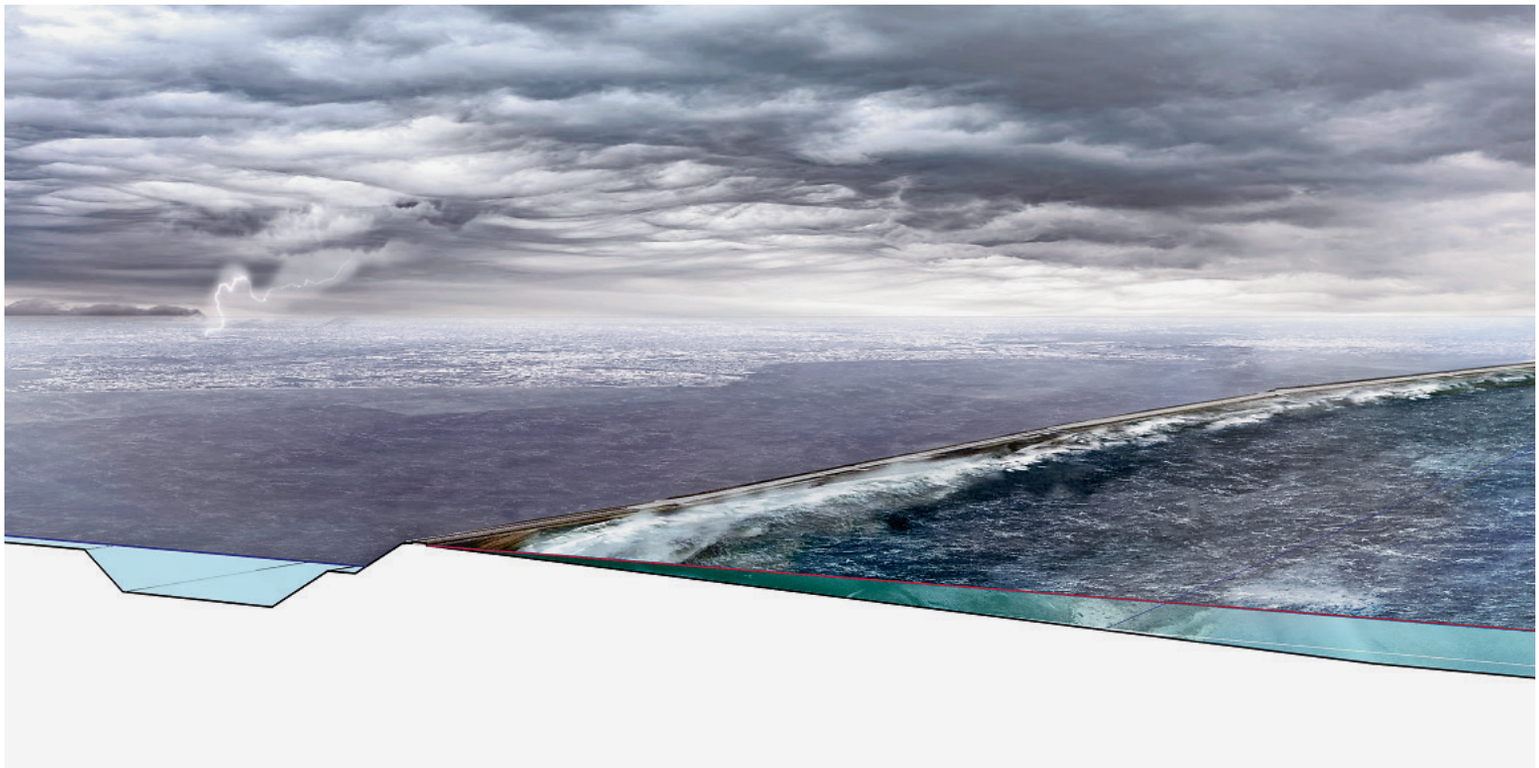
Habitat creation will focus on plant and animal species native to Texas's Gulf Coast, paired with public access for recreational purposes with hiking, biking, and equestrian trails. Courtesy Rogers Partners.

funding our work at this point. We are hopeful that the GBPP will be able to become a part of the Texas Coastal Resiliency Master Plan. The GLO also owns the bay bottoms and would be the permitting entity for the GBPP.

Those of us in the private sector seeking protection from these larger, climate-change-enhanced storms must create our own pathway to implementation, because governmental entities do not have a model to follow. In the case of the Corps of Engineers, their methodologies don't allow them to solve for these larger storms, because they have to work on an average storm from a cost/benefit standpoint. We're in a unique position to put together a coalition of government entities. We have three counties, many cities, and state and federal governments that will all be involved. Getting that group to cooperate has been a difficult part of the process. The politics are not always participatory or inclusive. Things can quickly become partisan, so that is one of the things we have all tried to avoid.

Our proposal exists outside of the normal procedures that are usually followed for this type of project. The Corps of Engineers process could not lead to a solution like the GBPP because they aren't allowed to consider these larger storms. Our premise is that this second line of defense will protect us from Category 4 and 5 storms, which weren't considered in the Corps of Engineers methodology. Still, we approached this as if the GBPP could be included within the Corps of Engineers permitting process and not as its own federal public works project. We anticipate our cost will be sufficiently low that it can be covered by creative bond proposals that can be supported by industries as well by local communities. The recently formed Galveston Bay Protection District has bonding capacity. We will be presenting our results to them when we complete this next phase, assuming we go forward.

One problem that every community in the United States will face is that our current economic and political systems aren't set up to allow proper responses to climate change. One of the results of our collective failure to be honest about climate change in the past twenty or thirty years is that we have not created the methodologies, or the infrastructure design concepts, to address what is happening. We have no tools that anticipate



Designed to withstand twenty-five-foot storm surges resulting from Category 5 storms, Galveston Bay Park will be designed to be inundated. Courtesy Rogers Partners.

where we are going to be in twenty years when these projects will be up and running. We're flying blind. We're reading the best literature we can and are thinking outside of the box, but there isn't an accepted methodology for integrating the current reality of climate change—much less its future—into design. This is a deficiency that is going to haunt the United States for a hundred years.

RR From a design standpoint, this is kind of a grassroots effort. The reason I use the term *grassroots* is that you need to start at the level where people realize the risk and realize that they want to participate in its mitigation. We've been fortunate to work with Houston City Council Member David W. Robinson. Right away he embraced this vision and helped establish relationships with other political entities. One of the challenges we face is the assumption that, if you have a good idea, it will grow its own legs. In this case I think we have an extraordinary collection of ideas, but the GBPP won't just grow its own legs. You have to construct the constituency to be able to make it happen.

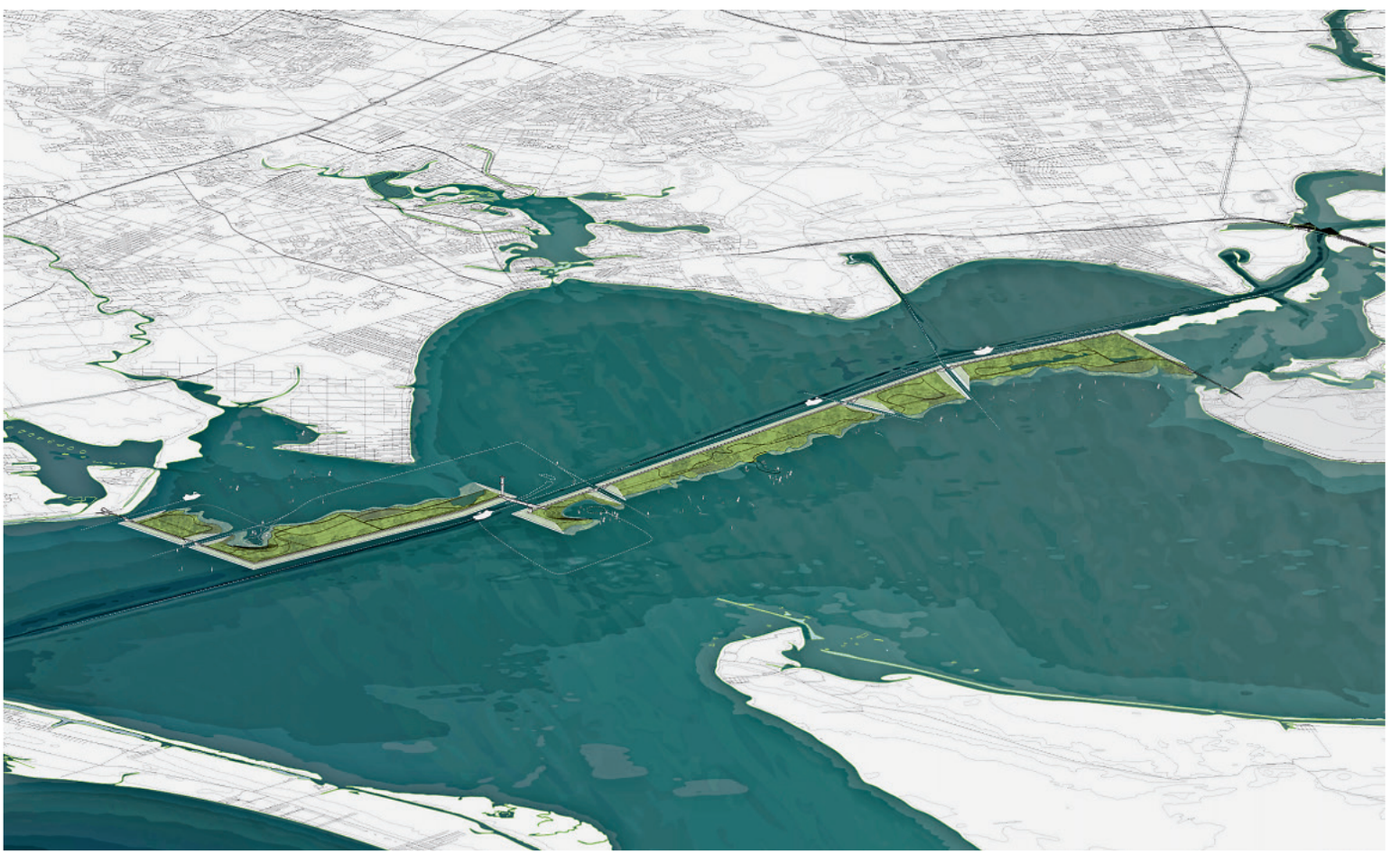
MN People tend to associate these two big ideas—the coastal spine and the GBPP—with the research of two separate universities: Texas A&M and Rice, respectively. But you're saying that they are related efforts that can work together. How so?

RR It's unfortunate that there has been perceived conflict between the coastal spine and the GBPP. In the end, the best collaboration will be realizing the benefits the coastal spine produces—which are many—while expanding the amount of protection and creating robust regional amenities. The two ideas use different methodologies, come to different results, and propose different strategies for different reasons. The coastal spine uses legislative methodologies and cost/benefit analysis. We've seen this method challenged by recent storms. When you do a cost/benefit analysis, a single $2 million house is more important than ten $100,000 houses. This is a challenge. When our team looks at this risk we consider the likely maximum risk, not the average risk. Just as climate change doesn't recognize borders between jurisdictions, it also doesn't recognize the difference between educational institutions or professional organizations or the extents of disciplines. Think-

ing that breaks down boundaries is the only way we are going to be able to confront problems of this scale. So, we're embracing these alternatives.

JB As a society, we don't understand cooperation nearly as well as we understand competition. The evolutionary challenge is for us to learn how to cooperate in ways we never have. In my sustainable design course at Rice, I teach that cooperation is much more difficult than competition. We're all learning that.

It was easy for these two ideas to become juxtaposed. But none of us at the SSPEED Center have worked on something at this scale. We were previously working on watersheds; now all of the sudden we're considering these larger solutions, so it was easy for others to pit our efforts against the research from Texas A&M. We've worked our way to being cooperative and delivering a one-two punch together. We have evolved our thinking and have spent a lot of time and effort to work with the Corps of Engineers, the coastal spine concept, and the politics at play in the region.



Overall axonometric, looking northwest. Courtesy Rogers Partners.

RR Regionally, nationally, and internationally, we must figure this out. This is the starting point where we can ask: "How do you build a cooperative process? What does it take? Where does it go?" We've been experimenting for a couple of years to try to figure it out. It's something that every consequential coastal city in the world will confront. In a functioning democratic society, we need to create this collective behavior that allows us to protect ourselves.

JB Everyone wants everyone to be protected. That is the uniform goal. I think every political leader wants every single house protected. But at some point, we're going to run across some issues that may not be able to be solved from a design standpoint. Retreat might be the solution. That will be the hardest issue along the coast. We can protect most existing develop-

ment in Galveston Bay with these two solutions, but many areas elsewhere won't have those options for various reasons. I don't think any of us have a true understanding of just how destructive and how large the rains, storms, and hurricanes of the future are going to be. We keep looking at history to tell us what to expect instead of looking to statistics and projections to shape our expectations.

MN There are new images of the park included with this interview. What's new? What can people see in these section perspectives?

RR We continue to research, explore, and design. There are four new images to share. One shows the main gate with a ferry. Public access to Galveston Bay is a core aspect of the Galveston Bay Park plan. At the main gate, the access roads will be linked by a new ferry service with ferry ports integrated on either side of the Ship Channel.

Another showcases how Galveston Bay Park will create new oyster beds. Upstream changes to the Trinity and San Jacinto rivers are affecting the salinity of the bay. More water is being diverted from the Trinity River, which has reduced the freshwater outflow at the mouth. Oyster beds are adapted to a specific threshold of salinity, and these changes will shift the locations where oysters can thrive. These new locations will be informed by data about these altered environmental conditions.

A third image shows island habitat and recreation. Habitat creation will focus on plant and animal species native to Texas's Gulf Coast. This effort is paired with public access for recreational purposes with hiking, biking, and equestrian trails.

A final image shows a storm event. Designed to withstand twenty-five-foot storm surges resulting from Category 5 storms, Galveston Bay Park will be designed to be inundated. A combination of engineered and natural systems anticipates severe storm forces.

MN Those are all important updates. Is there anything else about the project that you'd like our readers to know? The urgency of the project is palpable.

JB I've spent almost my whole career trying to protect Galveston Bay. Right now, we're looking at perhaps the biggest challenge we've ever had, which is to predict these huge storms that are coming. It's not something any of us would've anticipated with this degree of dread forty years ago, but this is the modern reality of Texas, the United States, and the world. This type of intervention is going to be a requirement, and especially so where we have massive infrastructure and facilities like in the Galveston Bay and along the Ship Channel. Early on, we saw statistics that Rice Professor Jamie Padgett developed for SSPEED about the risk of spilling oil and other hazardous materials if a big storm hit the Ship Channel. Dr. Padgett projected that a twenty-four-foot surge would cause the release of about 90 million gallons of chemicals, which would all collect in Galveston Bay. Addressing this risk with something like the coastal spine and the Galveston Bay Park is absolutely necessary.

RR The origin story of Houston includes the obliteration of Galveston in a hurricane and the dredging of the Ship Channel to create the Port of Houston, which was one of the first public/private projects in the nation. Jesse Jones had the vision and leadership to step up and say, "This is what we have to do." This, along with Spindletop and the opening of the Panama Canal, created the Houston we know today. What we should be asking is: What should Houston be like tomorrow? It's not about looking backward—it's about a big leap forward. We should be thinking about the storms that will arrive thirty years in the future. We need to act now and in a big way to enable Houston to survive its next hundred years.

JB Because it won't be here if we don't put these protections in place.