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Breaking the Frame: Innovative Galveston Bay Park Offers Comprehensive Storm and Ecological Protection

The Galveston Bay Park Project is a collaborative effort formulated in the aftermath of Hurricane Ike, a Category 2 storm that hit Houston, Texas, in 2008. This near-environmental and economic calamity revealed the latent risk that 25% of the United States' petrochemical activity is extremely vulnerable to destruction. This shocking realization drove key players from different industries to explore solutions that would protect the area from future storms and, moreover, address ecological issues while enhancing community access to public open space through the creation of parks. While most of the industrial area facilities were protected against storm surges up to 14 or 15 feet, Ike's surges reached an alarming height of 12 to 13 feet, which lent increased urgency to find solutions. The multifaceted project has resulted in a comprehensive collaboration that includes the Department of Environmental Sciences, the Civil and Environmental Engineering Department at Rice University, international engineering firm Walter P Moore as well as ROGERS PARTNERS Architects and Urban Designers. Members of the project team spoke with DesignIntelligence about the implications of such a development for both Galveston Bay and the design industry.

DESIGNINTELLIGENCE WITH JIM BLACKBURN, ROB ROGERS, PHIL BEDIENT & CHARLES PENLAND

DesignIntelligence (DI): What was the rationale behind the team you put together?

Jim Blackburn, Civil and Environmental Engineering Department at Rice University (JB): Because of the nature of the work we're doing, our goal from the beginning was to engage an interdisciplinary team. I've been an environmental activist working to protect the Gulf Coast for decades, so I serve as the team's environmentalist and handle the public

outreach side of things, both governmental and private; Phil is the hydrologist modeler; Charlie is the practical engineer; and Rob is the visionary.

Rob Rogers, ROGERS PARTNERS Architects + Urban Designers (RR): The plan evolved from the idea of constructing a levee system along the ship channel itself, crossing it just outside of Texas City where one large gate could be constructed across the channel and connected back into the Texas City

levee. Walter P Moore has been part of the team from the beginning, bringing civil engineering experts to engage with the hydrologic mapping exercises. They discovered we could create 25-foot-high barrier in the bay that protects industry and population alike for that entire area. Charlie Penland, an instructor at Rice, works closely with the Rice University SSPEED Center. They approached us several years ago because they were trying to develop this strategy and envision what this could be. We got involved and started to talk about the programming opportunity and the ecological benefits of building this “string of islands” concept, going well beyond “simply” hurricane protection. We began to consider creating park land and expanding the use beyond storm protection to actually start dealing with ecological issues, environmental improvements, and regional access and equity. The strategy began to evolve from saying, “This is hurricane protection that will save our bacon every 10 or 12 years,” to performing every day in a bigger, broader way for the population. That’s how the early idea for an engineering solution has evolved into a broader concept about regional ecology and access with many different collaborators.

Phil Bedient, Department of Environmental Sciences and Engineering, Rice University (PB): Jim and I met right after Hurricane Ike, and we had ideas about going to the Houston Endowment for two different projects. One was from an engineering perspective in the arena of surge prediction because a lot of new information from that standpoint had just come out of the post-Katrina world. From an ecological standpoint, Jim was very interested in looking at unique, non-structural solutions that might abound. So, we decided to put it all together and go forward with one proposal. We submitted it just after the hurricane, and two months later, we were funded. As we made progress, we gained a better understanding of how to try to mitigate this very complex coastal environment, which is more complicated than many other regions due to the presence of Galveston Bay.

JB: We learned that the potential harm to the natural environment from the Houston industrial complex getting overrun by surge water is something that had not been fully appreciated and, frankly, is not truly indicated, even in current Army

Corps of Engineers studies. We discovered with the escalation of the storms, we were looking at a situation that would probably result in the largest environmental disaster in United States history, so, we decided that we had to do something about it.

DI: What do you consider to be the key features and benefits of this project? What impact do you hope it has on the local community and beyond?

Charlie Penland, Walter P Moore (CP): The initial version of the study was named the Centennial Gate Project, which involved putting a barrier at the mouth of the ship channel at the John Hartman Bridge. We started with the surge protection, which is especially important for the industrial complex along the Houston ship channel. As the concept has expanded, covering Western Harris County and the west side of Galveston Bay, that protection is of paramount importance. A key feature of the project evolution is the developing synergies with other needs, such as widening the ship channel and providing more and better recreational benefits to the area. Features like that set this apart from other projects.

JB: A critical piece is the overlap of navigation improvement with flood protection. I don’t think there has been another project in the United States that has successfully accomplished that overlap — or is even tapped into the dedicated Army Corps’ funding stream for this purpose. I would say it is probably the most important feature of what we’re proposing. One of the issues that has come up in our work is that current methodologies used in storm protections aren’t well-suited for the types of storms we’re going to see in the

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future. With what our team developed, we had the ability to be much more creative and forward-thinking because we had private sector funding through the Houston Endowment, and we weren't constrained by predetermined methodologies dictating how we are supposed to approach the problem. It's difficult to overstate the importance of being "free" in a project like this. Our primary concern focused on a worst-case storm, which we believe to be about 25 feet of surge, and we had the freedom to develop solutions that can be meaningful 50 years from now. In most situations for projects that directly involve natural forces such as climate, we are designing solutions today using current methodologies that are almost obsolete upon arrival. By the time you get this project constructed — we're talking about projects that won't be here until 2030 or 2035 — with the climate change we see now, and we expect to see, it's impossible that what we're designing today is going to be able to function with the climate of the future. That's just a hard reality I don't think anyone has really come to grips with anywhere in the country.



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RR: There's a big need to widen the channel, but we needed to figure out what to do with that leftover material. If we could couple the widening of the channel with the creation of the barrier and the park, these efforts could layer onto each other, making it a more beneficial and efficient concept. Once you tie in the widening of the ship channel, it turns into an economic development project because you're increasing the capacity of the port, which is needed to bring in new super cargo ships. If you follow the news on energy, the U.S. is becoming a primary exporter of energy, and the primary export port is Houston. This is a great confluence of opportunity.

DI: What is the current status of the project?

JB: Various government agencies are reviewing it to determine the extent to which it makes sense and that they feel comfortable with getting involved. The Port of Houston Authority has passed a resolution by the port commission to understand how they can help move this concept forward. We are meeting and talking with the Army Corps of Engineers and the General Land Office about how this project can complement the Coastal Spine Initiative. The Coastal Spine Initiative will be the federal project and we will likely be constructed under permit by one or more local governmental permit applicants. At this stage, the Army Corps of Engineers has concluded that what we are proposing is compatible with that project, so we're not in competition with them.

DI: What do you feel are the potential implications of the ground-up approach on practice more generally? What could professional practices accomplish if they are free from the constraints of fee-for-service client relationships?

RR: Essentially, we don't operate without a client. In this case, the client is the whole region. It's rare to be in a position where you're creating your own project, but I know other practices do that occasionally.

Every firm is different in terms of how they balance work typology and aspirations. While firms could not successfully for the long-term run a practice solely off projects that do not involve a fee-for-service client relationship, we feel it's important to create opportunities that speak to our firm's mission and passion. While this is an opportunity we sought with the rest of the team, it's also not totally "free" from constraints and reality. It is very much rooted in a real-life solution that has life and death implications, and we have a responsibility to those it affects and the passion to make it something that offers several layers of benefits.

I don't think you can run your entire practice that way, but you need to create opportunities in addition to the more standard service work that is the bulk of the profession. It's challenging because you must fund it. We've obtained

some resources along the way through various grants, but we've also delivered an enormous amount of pro bono effort into this, recognizing the importance of this opportunity and believing in the strength of the concept. Our practice has evolved through working on this project. It gives us lessons in both public agency interaction and technical knowledge about water management that informs other work we're doing now and in the future. The real challenge is taking great swaths of the practice into a completely different, vertically-integrated strategy. The place where practices like ours are going to survive is in these areas where you can bring together different kinds of thinking and strategy. That will be where we can provide the greatest value.

CP: The political experience we've gone through with some of our stadium projects has shown us when the stakes are right and the leadership is right, you can accomplish a lot of good things. With the Minute Maid baseball park, we were having weekly meetings with state legislators, city officials and agencies trying to figure out how we were going to put it together. I've seen behind the scenes how the sausage is made, and that has helped guide us into thinking this can really happen. I think we've got a lot of really unique pieces and understandings in here.

DI: How has this project affected the way you might approach your other work (or future work)?

CP: I think there are a lot of firms like Walter P Moore that feel we have an obligation to the communities we serve. Projects like this are part of that responsibility to take these things and try to push them where they need to go. We'll put a lot of extra effort into something we have passion for that we feel has a lot of benefit. I think we would do that again, just driven by the passion that we have for the work we do.

JB: The challenges we're facing today almost make our old way of doing things obsolete across the board. We're talking about a political system in Texas where you're not encouraged to talk about climate change. Yet everything we do as designers is going to be influenced by climate change, and I think it's "malpractice" not to talk about it. At some point you've got to

take a personal stand to decide you're going to talk about it even if you lose the job. That's easy for me to say, but it's very hard for a lot of design and engineering firms to make those statements, particularly when they are financially successful, by saying what needs to be said and not worrying about an obsolete project on the line. The ethical issues that will come to play on this have only just begun to be realized. I think they're huge, but the difficulties of breaking out of this frame are very real.



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DI: How do you feel this model might be employed in other contexts by other firms and organizations?

RR: The origin point of the project was Hurricane Ike underscoring a risk that hadn't been understood before, which is a category of programmatic need. When that started, I don't think anyone had any idea of where a solution might come from. The first thing the SSPEED Center did was start building analytical hydrological models to understand that risk before risk reduction propositions could even start.

Looking into our society and our urbanization for things that are evolving in a way we don't understand and identifying ways they should be addressed need to be a priority. We look for these inflection points in our practice as well, trying to find the scale of a situation where you can operate. I don't know that you could ever apply this approach to the commodity side of practice where expectations are so highly codified.

We're still beginning to look at housing emergencies and things like that, but it hasn't evolved away from existing structures. We need completely different models of understanding how, where and why to build housing. Practice can

evolve into these areas. Again, we've had the liberty of time — it wasn't like somebody said you've got to solve this in six months. As a grassroots effort, it evolves, builds and develops its own momentum.

CP: I think the A/E/C industry is the implementer of ideas, but it takes more than just the A/E/C industry to get these things done. We have a lot of masters to serve, and we have a lot of considerations. When we can collaborate with a broader element of entities and bring the environmental groups to the table, we gain a better understanding of their real base issues and the politics of it. We can see some of the unintended consequences and who it impacts when we start looking at what we're doing. That's what the A/E/C industry can learn from this, along with realizing that many times things worth doing take a lot of effort — we can't give up just because they aren't easy.



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JB: Many people have told us the modeling we have done on hurricane surge is unrealistic. If we had modeled a storm like Hurricane Harvey before it occurred, we would have been derided. Well, Harvey has happened, so I would say the fact that we have been able to pull this together and it at least has some legs is encouraging. I'm not going to tell you it's going to be built yet; we have a lot of work ahead of us before this

project actually gets to an implementation stage. But it's useful that the frame got broken, and now there is a project combining flood protection, navigation, and recreation and environmental enhancement. If we can build it, that will really be the frame-break. We are pleased to have gotten to the point our creative and effective design is getting recognition. Hopefully the message that's transmitted is that you can find a way to do some things that otherwise seem to be impossible.

Dr. Philip Bedient is Chair and Professor of the Department of Environmental Sciences and Engineering, Rice University, Houston, TX. He is author or co-author of more than 100 articles and five textbooks related to surface and groundwater hydrology and containment transport.

Jim Blackburn is an environmental lawyer and Professor in the Practice in the Civil and Environmental Engineering Department at Rice University. He is also a Faculty Scholar at the Baker Institute and co-director of the Severe Storm (SSPEED) Center.

Charles Penland is a Senior Principal at Walter P Moore. Charlie's special interest in low-impact development, hydraulic design, hydrologic analysis, and flood protection has resulted in his being sought after by a variety of professional, industry and educational organizations.

Rob Rogers, FAIA, is the Founding Partner of ROGERS PARTNERS Architects + Urban Designers, a firm known for blurring the boundaries between urbanism, landscape and architecture. Rob has more than 30 years of experience designing major civic and institutional projects and leads the firm's offices in NYC and Texas.

