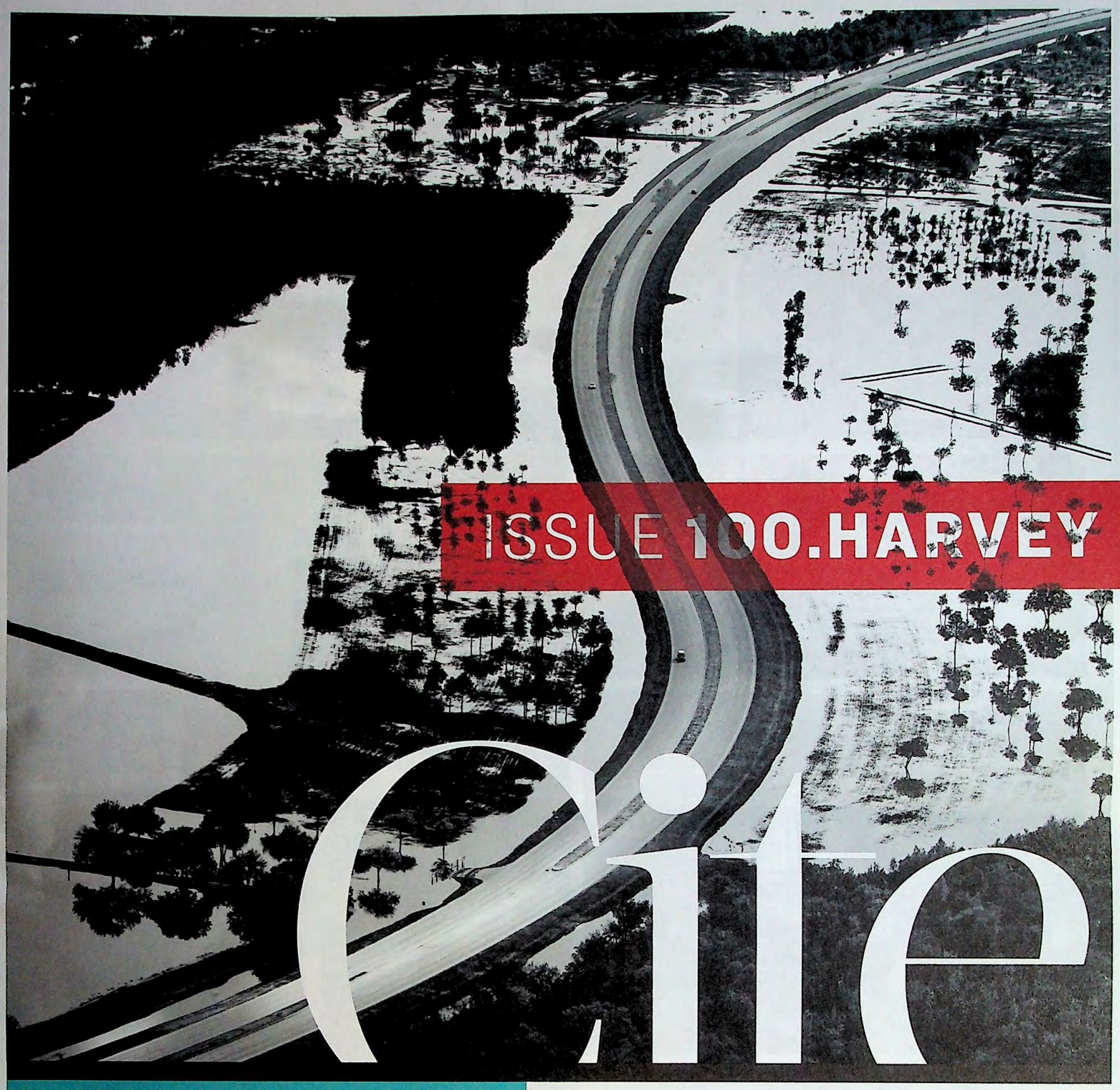


ISSUE 100.HARVEY

Cite

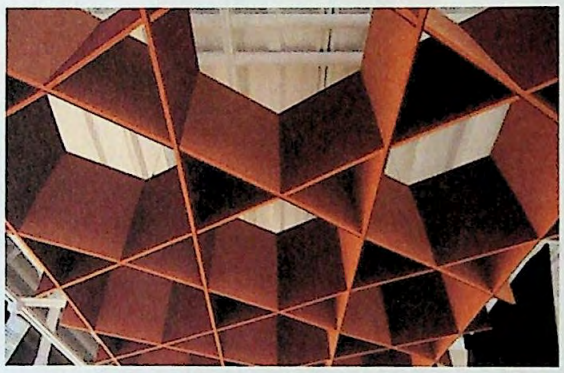
THE ARCHITECTURE AND DESIGN REVIEW OF HOUSTON WINTER 17/18

Rice Design Alliance calls for **an optimistic response to Harvey.** José Solís asks **what "resilience" means.** Falon Mihalic's review of past *Cite* articles provides **a history of Houston flood management.** Florence Tang explains the **Addicks and Barker dams.** Lara Purser writes about **grassroots recovery work** in Kashmere Gardens. Danny Marc Samuels observes that **zoning made no difference but stricter building codes did.** Cheryl Joseph documents **a mid-century house lifted** above the floodplain. Alex MacLean reveals **post-Harvey waste from the sky.** Jack Murphy revisits the H2Ouston tour and finds that **design can save your life.** Geneva Vest explores **suburbs designed with nature.** Alexandra Miller and Andreanecia Morris call for **"equal funds for equal needs."** Raj Mankad talks with city leaders about **equitable transit-oriented development.** José Solís calls for **a local Rebuild by Design initiative.** Sheryl Vasquez on **Visions for Buffalo Bayou.** NuNu Chang reviews Jim Blackburn's **A Texas Plan for the Texas Coast.** Victor Benavides draws Natalye Appel's **rebirth as the Rail Rider.**

"It has always been a principle of our company that function and beauty are inseparable" - Dr. Ferry Porsche













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The Rice Design Alliance, formed within Rice Architecture in 1972, facilitates an actionable understanding of how design influences the built and natural environments.

The Rice Design Alliance empowers academia, architecture, engineering, and construction practitioners, and the broader Houston community to transform our city into a better place to live and a model for twenty-first-century design.

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This is Cite Harvey. This is urgent.

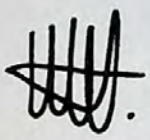
For the past 100 issues *Cite* has relentlessly covered all things architecture and design in the Houston region. It is noteworthy that this issue, a special addendum to *Cite* 100, makes us look anew not at a novel topic, but at an age-old Houston challenge. Water and how this city deals with it is also part of *Cite*'s DNA. Rice Design Alliance, through this publication and its programs, has researched, advocated, and pushed boundaries on Houston's flooding problems for decades. Yet this time, it's different.

As you read through the pages of this special edition of *Cite* devoted to Hurricane Harvey, you will find pieces that look back at lessons learned from the past to provide frameworks; others that analyze specifically what happened with Harvey this past summer; and lastly, some that look forward with recommendations for the future. All are woven with a common thread of collaborative optimism combined with a collective hunger for rapid yet thoughtful change. All call for political will, intelligence, kind heartedness, and taking a stance.

The interdependency of our urban systems is undeniable, as is their vulnerability to extreme weather events that are bound to happen again. If our collaborators' insightful articles show something, it's that there isn't just one single answer. Responses are manifold and multidisciplinary thinking—a cornerstone of the Rice Design Alliance—is compulsory right from the start.

What happened in Houston in the late summer of 2017 was, to many watching from afar, a paralyzing event. Not to Houstonians. To this community and to the writers who have contributed to this number, the urgency of action that is clearly transmitted through the pieces of this special edition should be listened to and acted upon.

For this special issue we have gathered some of the most relevant and fresh voices in town to touch on just some of the myriad points that make up this story. Climate change, buyouts, insurance, accurate mapping, zoning, emotional stress, environmental equity, regulations, displacement, resilience. Everything around us is design and design can indeed save—and improve—your life, so listen up, we've got some ideas.



Maria Nicanor
Executive Director
Rice Design Alliance

Maria Nicanor is Executive Director of Rice Design Alliance. She is an architectural historian and a curator of architecture, design, and urbanism. She was Director of the Norman Foster Foundation in Madrid and a curator at the Victoria & Albert Museum, London, and Guggenheim Museum, New York.

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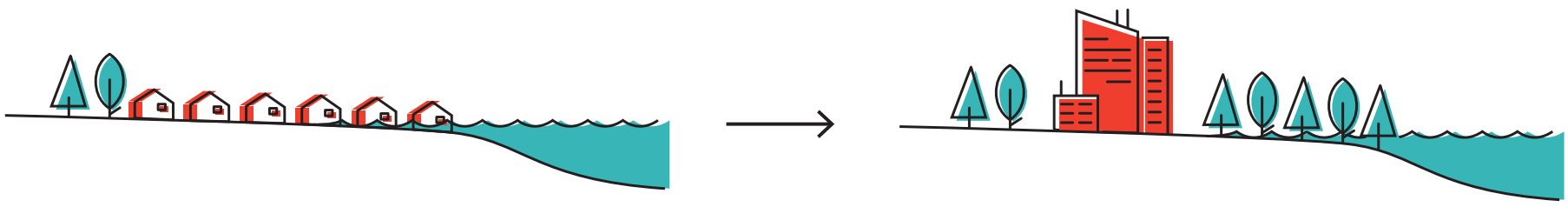
On the cover: Barker Reservoir photographed by Alex MacLean.

In the aftermath of Harvey that struck the Texas Gulf Coast in late August of 2017, Rice Design Alliance recognizes the special role our organization can play in the recovery efforts in and around the Houston region. We will interpret technical knowledge across a range of disciplines and we will advocate for holistic solutions. The biggest challenge, in the view of the board of directors, is to be optimistic enough to imagine a way forward that addresses many issues at once. As members of the art, design, architecture, landscape architecture, urban planning, engineering, construction, and developer communities, our role for the rebuilding of our city is to connect people to opportunities for education, work, and a healthy and happy life. We will do just that through our programs and publications. Our goal is that thirty years from now we can say that, out of all the destruction this storm has caused, the Houston region became not only more resilient to floods but also more beautiful and equitable.

RICE DESIGN ALLIANCE BOARD AUG. 31, 2017 8:47 AM

An Optimistic Response to Harvey



As people in Houston and the region begin to transition from rescue and recovery to damage assessment and rebuilding, a word has begun to creep into more common usage as people look to put their lives back together: resilience.

With more articles describing Harvey as a new normal and discussing how to rebuild with the idea of resilience in mind and with various experts making recommendations for revising public policies, it is an appropriate moment to understand what the idea of resilience really means in the context of rebuilding after such a devastating event as Harvey. There are no shortages of professionals, researchers, policy experts, civil servants, and politicians with ideas for how we should significantly change infrastructure planning, development patterns, construction techniques, etc. in the Houston region to increase the resilience of our city. However, the average family whose home just flooded for the first time might not immediately understand why someone would tell them to hold off making that trip to Home Depot to replace the soaked sheetrock they just cut out of their just submerged house. Therefore, it is important to clearly articulate how we should approach making the region more resilient to prepare for the next catastrophic storm that we all know is coming.

As a concept, resilience is as broad and open to interpretation as other terms like sustainability, affordability, urban, or even natural. A frequently cited definition of resilience from researchers at Columbia University and the University of Rochester describes it as "a dynamic process encompassing positive adaptation within the context of significant adversity." An adviser to the World Bank interprets it to mean "the ability of people, communities, governments and systems to withstand the impacts of negative events and to continue to grow despite them." The United Nations defines resilience as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions." However, in the context of Harvey, how do Houstonians approach creating a more resilient Houston, especially as the region decides how and where we want to rebuild?

A Forensic Approach

One approach to rebuilding a more resilient Houston is to look at what happened in a forensic manner. The process would identify the relevant interconnected systems that were in place before Harvey, analyze how those systems interacted with one another, and pinpoint which ones were incapable of withstanding such a massive shock and which ones were able to adapt and recover. Once the strengths and weaknesses of the systems and their interactions are understood, it would be possible to determine what steps need to be taken to ensure future outcomes are significantly improved. By understanding both the larger context and finer details of what happened, experts from across the region can work to devise strategies that help better adapt Houston to future catastrophes.

The systems that led to Harvey's outcome exist in various forms and span multiple scales. Physical systems range from the region's vast networks of flood control infrastructure down to the gypsum board used for walls across the city. Regulatory systems encompass everything from regional development policies (or lack thereof) to how many parking spaces are required for each bedroom in a residential dwelling. Energy systems link the vast windfarms of West and North Texas to the electric plug placed a few inches above the floor. Technological systems can be as complex as the most advanced supercomputers used by sophisticated weather forecasting software or as basic as the two-cycle outboard motors powering the flat-bottomed fishing-cum-rescue boats. Political systems include not only politician and civil servants that exist across all levels of governments, but also the citizens, lobbyists, and special interest groups that influence the decisions those public officials make. Social systems create the vast networks of personal connections that link all of these other systems together. Though the Houston region depends on these and many other systems, such as food, water, communication, and financial systems for its standard of living and economic performance, without careful planning, any and all of these

JOSÉ SOLÍS OCT. 18, 2017 3:11 PM

A More "Resilient" Houston:

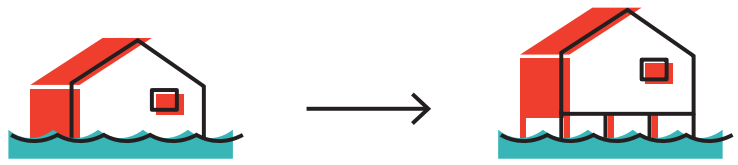
What Does That Mean and How Do We Get There?

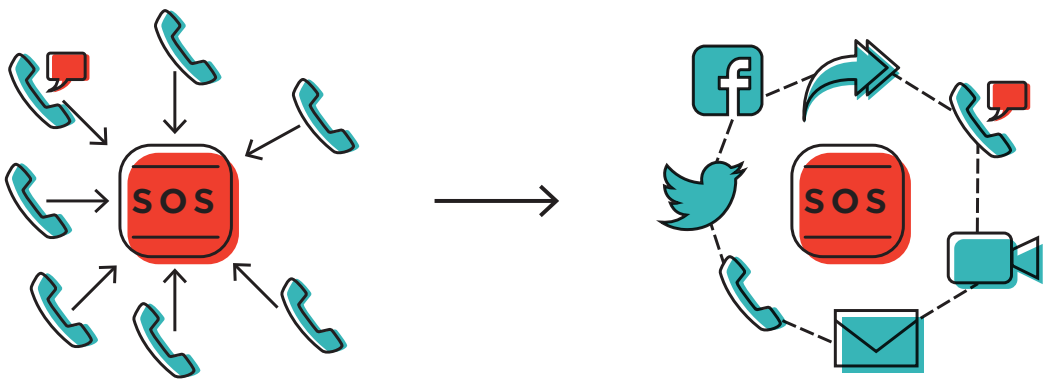
systems are vulnerable to the types of shocks Harvey represents. While the unprecedented amount of rainfall during Harvey created an almost inconceivable shock that would overwhelm the most robust system, how these systems jointly responded to that shock led to disastrous conditions so many across the region endured.

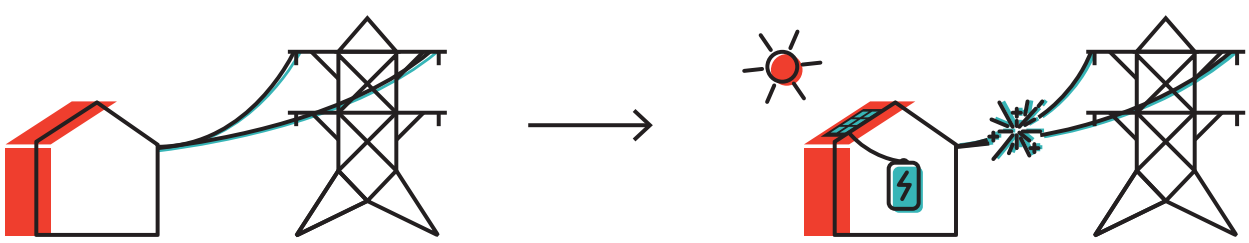
Numerous experts who worked within and studied these systems in the Houston region before Harvey had already identified many of their strengths and weaknesses and had clear ideas about how to make the city more resilient before the storm itself. That knowledge is why many of the recommendations that followed the storm were so specific, and so quick. Many of the underlying causes of the disaster were identified before it even happened. Yet, as with any complex system, not all of the reactions and outcomes of the disaster could be fully anticipated.

For example, technology and communication systems played a significant role in allowing for a much more resilient rescue and recovery response. Social media platforms and apps expanded communication networks far beyond overwhelmed 911 channels to allow first responders to identify more stranded victims faster. Groups like Sketch City created numerous digital tools for volunteers throughout Houston to remotely and very quickly organize relief efforts and compile essential information for storm victims. Political systems adapted when public officials invited the community to assist with rescue efforts including the "Cajun Navy," guided by a slew of volunteers, to significantly buttress overwhelmed official search and rescue resources. And social systems reacted as the close personal ties within the food and beverage industry allowed a dedicated group of volunteers to create an impromptu commissary that fed hundreds of thousands displaced people across the region. Ultimately, as the city begins to understand exactly what happened before, during, and after the storm, countless more examples of unexpected reactions will emerge.

A thorough forensic understanding of how all of these systems positively and negatively reacted then becomes the basis for devising the strategies necessary to create a more resilient Houston. Experts, public officials, business and community leaders, and residents can use that understanding to determine and agree upon the most efficient and effective solutions to "resist, absorb, accommodate to and recover from the effects of a hazard." Each future shock—whether cataclysmic or not—leads to additional insight and continual refinement of these systems. These iterative improvements then contribute to more robust systems that create a more resilient Houston.







An Outcomes Approach

An alternative approach to creating a more resilient Houston is based on a similar comprehensive understanding of these same systems, but looks to the future rather than the past for solutions. Rather than devising solutions based on the flaws and strengths of individual systems, the alternative approach would begin by identifying an ideal yet achievable outcome of such a catastrophic event and work backwards to devise what solutions would achieve that goal. Both methodologies begin with a very basic question but differ slightly but profoundly on exactly what that question is. While the first methodology begins with "What happened?", the second starts with "What do we want to happen?"

The second question can be applied to each system to identify intended goals. Do we want to minimize or eliminate the threat of rising waters or have structures that can withstand floodwaters with little to no physical damage? Do we want to protect the open prairies across the region that can absorb water before it reaches the city or require every individual property owner to have the flood protection measures in place to protect their own property? Do we want to pay for large-scale buyouts of properties before they flood again or pay for improved construction techniques that harden structures against rising floodwaters? Questions like these can help people across Houston imagine an optimal outcome of a storm like Harvey that experts would use to devise strategies for protecting the region.

This second approach can also begin with a broader perspective. A more basic answer to the question "What do we want to happen?" could look past answers for each individual system and start with a single answer of "No loss of life and minimal damage to property." In other words, Houstonians would have hunkered down for Harvey and then gone back to their normal lives with little to no recovery or rebuilding. While "no loss of life" would be an unquestionable goal, "no loss of property" is open to a broad spectrum of interpretations from removing structures from the most flood-prone areas to using construction techniques that allow waters to enter and recede from structures with little to no damage or any other number of combined solutions. Reaching a common consensus on the interpretation of "loss of property" would require not only experts that understand the complexities of all of the systems, but also engagement of people that live in the region. Not only can a broader base of creative solutions be explored by allowing all Houstonians to participate in conversations on how to rebuild, but the residents of Houston would be more likely to support solutions that they were engaged in developing.

Each of these approaches present a practical framework for how to achieve a more resilient Houston. Both require a thorough understanding of the numerous complex systems that protect the city. One approach then looks at how to refine, reshape, or completely restructure those systems to re-engineer a more resilient city. The other reimagines how residents expect those systems to perform to redesign a more resilient city. Either approach would require significant efforts from a broad constituency, but one allows for more fundamental engagement by the people who will ultimately be impacted by the changes required to create a more resilient Houston. Therefore, Houstonians should decide which approach they want to pursue. That decision represents the first step in creating a more resilient Houston. H

José Solís is the founder of Big and Bright Strategies, which specializes in sustainability, risk mitigation, and project management for architectural and planning projects. Xiangcheng Xing, who illustrated this article, is a graduate student at Rice Architecture.

Illustrations by Xiangcheng Xing

Illustration by Sarah Welch.

FALON MIHALIC OCT. 17, 2017 2:29 PM

Houston Floods:
A Literature Review of What We Know and Where We Go From Here

In 1977, Rice Design Alliance published *The Bayou Strategy,* a book of clear analysis of flooding in the Houston area alongside architecture studio proposals for multi-pronged solutions to redesigning the bayous. Many of the ideas are still relevant and echoed today by designers looking to improve the city. It could be said that flooding is a founding issue for the Rice Design Alliance and one that we continue to research and discuss. In fact, flooding has been covered extensively in the decades since RDA's inception in *Cite*. The wake of Harvey is a critical time to delve into the archives and understand some of the key findings of previous articles. This is step one in understanding where we need to focus our research and writing next as Houston recovers, rethinks, and rebuilds in the decades ahead.

Prairie Pothole. Courtesy Texas Sea Grant.

These articles have been pulled together here for citizen activists, local designers, journalists, and intellectually curious people everywhere to understand the history of flooding challenges and approaches to its management in Houston. The literature review is organized thematically beginning with 1) understanding Houston's innate relationship to water and history of flooding, 2) tracking the paradigm shifts in approaches to flood mitigation, 3) a look at precedents and proposals that offer innovative solutions, and, finally, 4) a critical view of what remains unanswered as we move forward.

1. Bayou City

From an ecological standpoint it's critical to understand that Houston is nested within a larger bioregion of the Texas Coastal Plain. John Jacob takes this large scale view in "Learn the Song of our Land,"[1] by positing that "The surface of the entire upper Gulf Coast of Texas is made up of sediment laid down by rivers." He calls for preservation of the important prairies and forests at the outer edges of the metropolitan region. These fringe ecosystems have everything to do with flooding within the city because our urban ecosystem is connected to the larger bioregion. Similarly, water connects us all since watersheds exist at nested scales of yard, street, neighborhood, bayou, bay, and coastal plain.

The early beginnings of Houston and our relationship to water are summarized well in "H2Ouston"[2] by Barrie Scardino Bradley. Her historical perspective frames the founding of our city on managing our water assets for navigation. She then explains the myriad ways that Houston benefited from floods here and in other nearby areas because it allowed us to build reservoirs that gave us the illusion of security from floods, making it temporarily easier to build in flood-prone areas.

2. Curly Engineers

After floods ravaged the city from the 1830s to the 1930s, the Harris County Flood Control District was formed and subsequent responses to flooding were aligned with the national approach by the Army Corps of Engineers: move the water out as fast as possible with concrete channels and straight lines. Thus, many miles of our bayous and streams were lined in concrete; their riverine ecology erased. Houston has worked hard to unlearn these practices of channelization and concrete coverage. In 1966, the approach shifted from concrete channels to "curly engineering," when Buffalo Bayou's channelization was hard fought by the neighborhoods along it.[3] This sea change occurred thanks to the long-time activism of Terry Hershey. Buffalo Bayou is lauded nationwide as a successful urban waterway project that provides recreational park space and flood mitigation simultaneously. In 1992, an alternative proposal for the Sims Bayou project also marked a shift in the Flood Control District's approach. The deepened bayou was given a bending, river-like form and the concrete lining is buried beneath soil planted with grasses.[4] Another change in thinking about managing floodwater is visible in Arthur Storey Park where massive detention areas can hold

Bagby Street. Photo by Claudia Casbarian.

stormwater. Entering its final construction phase, Willow Waterhole[5] represents another shift in approach to design for flooding that slows and stores water in detention basins that double as public amenities where the flood infrastructure itself is interesting. The mounds and wetlands of the park are shaped to retain stormwater and are fun to explore, creating a unique park experience for visitors.

Green infrastructure, as Keiji Asakura discusses,[6] is a constructed environment that works with living systems to mimic a natural water cycle, but is not in itself "natural." The nuance of this difference is well explored in Allyn West's essay "Synthetic Nature."[7] West points out that natural-looking should not be confused with naturally-occurring. The engineered lifeless concrete channel has been replaced by a constructed wild or synthetic natural channel.

3. Precedents and Proposals

Much attention has been focused on solving the potential social, economic, and ecological devastation that could be wrought by hurricane-induced storm surge. After Hurricane Katrina hit New Orleans, *Cite* published a prescient special issue in 2007, guest edited by Jim Blackburn and Thomas Colbert, on the risks Houston faces from hurricanes.[8] In September 2008, Hurricane Ike damaged about 75 percent of Galveston's homes and wreaked havoc through low-lying areas along Galveston Bay. That destruction served as a wake-up call that helped direct some design and planning focus towards implementing a National Recreation Area[9] for the immediate coastal areas and a series of proposals for resilient design in the East End flats.[10] The storm surge conversation and the subsequent proposals are based in predictable models of how storm surges swell and to what depths. It

[1] Jacob, John. "Learn the Song of Our Land." *Cite* 93. Winter 2014.
[2] Bradley, Barrie Scardino. "H²Ouston: How Water Shaped the Bayou City." *Cite* 46. Fall 1999. OffCite.org. April 25, 2016
[3] Hamilton, Ann. "'We Just Need Some Curly Engineers': Terry Hershey in Her Own Words." OffCite.org. March 6, 2017.
[4] Mankad, Raj. "Buried Concrete." *Cite* 86. Summer 2011.
[5] Leshinsky, Eric. "Designed to Flood: Urban Design in the Age of Unrelenting Floods." *Cite* 99. Winter 2016.
[6] Mankad, Raj. "Living in Floodplains: Expert Recommendations Before Harvey Still Ring True." OffCite.org. October 2, 2017.
[7] West, Allyn. "Synthetic Nature." *Cite* 99. Winter 2016.
[8] Blackburn, Jim and Thomas Colbert. The Hurricane Issue. *Cite* 71. Summer 2007.
[9] Sheehy, Sandy. "Sustainability: Coastal Tourism as Protection for Wetlands." *Cite* 89. Summer 2012. OffCite.org. November 14, 2012.
[10] Hight, Christopher. "Last Resorts: Proposals for Galveston's East End Flats." OffCite.org. July 9, 2010.

does not address what happens with unpredictable localized flash flooding or fifty inches of rain accumulation in a storm like Harvey. Thus, proposals that are scalable and can be implemented in multiple locations are needed.

Other proposals and ideas have been implemented with the hope of catalyzing more like it. Completed in 2014, Bagby Street, the city's pilot Complete Street[11] is a small example of how a street can achieve multiple goals by filtering stormwater and creating great streets for walking and biking. The 2015 master plan for Grisby Square is also aiming for some level of resilient stormwater management while creating walkable transit-oriented urbanism.[12] Natalia Beard at SWA proposes flood resilience through mobile interventions and permanent changes to Airline Drive, which is the site of massive weekend flea markets.[13]

There is a relationship between streets for transportation and streets for water movement; the challenges and opportunities of this duality could be better understood. Albert Pope's essay[14] is a good start because it discusses the disconnect between the hub-and-spoke organization of our car-dependent transportation system and the west-to-east natural drainage of the bayou flows. This overlay of freeways on top of a different natural logic is one facet of our city's inability to function in the face of climate change. Yet, the Bayou Greenways 2020 initiative has successfully amplified the network of bayous by working with the existing natural flows. The project map shows how the bayous thicken into multipurpose "ribbons" for water drainage, water retention, park space, and hike-bike trails.

Bagby Street, Grisby Square, and Bayou Greenways are local case studies in "thick infrastructure"[15] by accomplishing multiple goals at once. We don't have enough of these examples built locally, so it's useful to study how Austin is transforming Waller Creek[16] and Shoal Creek[17] into areas for flood control and public trails with an eye towards historic awareness. Raj Mankad's essay[18] on how TXDOT obliterated an internationally significant burial ground while constructing the Grand Parkway shows that transportation infrastructure must be carefully considered in cultural and ecological terms. Street design needs to be at the forefront of our discussions on flooding and we need better built examples here that are ambitious and grounded in the realities of Houston's terrain.

It is in the neighborhood street where we can more fully address city livability, as asserted by Sheryl Tucker de Vazquez in "Will Houston's Green Renaissance Reach Park Deserts?"[19]

4. Risk

Houston is shaped by water, this we know. Houston has always flooded, but Harvey has shown us, once again, that our efforts at reducing flooding risk are not smart enough. In 2016, Eric Leshinsky raised this question of smart design in his piece, "Designed to Flood: Urban Design in the Age of Unrelenting Floods."[20] He contends that we have been working on floodplain management and we have already spent billions of dollars to address the issues. He points out that we have many tools at our disposal, but they have not been implemented sufficiently. The pilot projects and small scale efforts have been hodge podge and ineffectual at the larger scale because they lack the cohesion, supporting policy, and political will across the region that's needed to make a meaningful impact.

Perhaps one of the most grim and sobering articles on Houston flooding was written in 2014 by Jim Blackburn, "Liquidation: In the Face of Water Extremes, Houston Cannot Go On with Business as Usual."[21] He calls out the 100-year floodplain designation as part of our collective denial about how we have come to lessen our expectations of both severity and frequency of storms. The 100- and 500-year benchmarks are no longer based in reality because we have far surpassed the inches of rain that accumulates and how often those rain events occur. The FEMA maps, flood insurance, and floodplain regulations are based on a system that does not adequately address the true risk. The issue of buyouts is addressed briefly, but a more detailed look at how communities are moved out of floodplains is needed. We have witnessed[22] the debris piles accumulate at the curb in the same flood-prone areas several times. If buyouts of repeatedly flooded properties are the right solution, why haven't they been more aggressively pursued? And if our benchmarks for floodplains are all wrong, how do we verify that we are buying out the right areas? One of the successful strategies of Buffalo Bayou's redesign is in its ability to flood. We need more strategies that anticipate the inevitability of flooding with planning and design that responds accordingly.

In reviewing Houston's history of flood response it's evident that change has come incrementally over an extended timeframe. Big, complex questions loom unanswered while our previously hidden vulnerabilities and inequities come into full view. Take for example that the conversation around storm surge protections prioritizes the importance of protecting the petrochemical infrastructure concentrated around the Ship Channel. Oil and gas represents a hugely important part of our current economic vitality. Yet, the system and the building practices and transportation planning it supports are extremely fragile in the face of climate change. Add to that the environmental injustices of people exposed to the toxins from the oil and gas industry and the problems feel overwhelming in their scope. Re-reading "An Optimistic Response to Harvey" highlights that we have, in fact, created meaningful change in our community.[23] Perhaps we should turn our attention to asking the right questions first, like how can a flood-responsive city rely on climate-adaptive industries instead of on ones that contribute to climate change induced flooding? The second part of Albert Pope's essay touches on these relationships between energy consumption, infrastructure, and flooding for a comprehensive and holistic view of our city's interconnected parts.

We need not only thick infrastructure but thick cities that function well when the weather is dry and then don't completely fail when it rains. What are the design responses for making that reality? Flood resiliency, not sustainability or benchmarks, needs analysis and a developed framework so that designers can respond, policies can be shaped, and funds raised for flood project implementation that lasts.

We need not only thick infrastructure but thick cities that function well when the weather is dry and then don't completely fail when it rains.

[11] Crossley, Jay Blazek. "Complete Streets Are Coming to Your Neighborhood Soon. We Hope." OffCite.org. August 27, 2014.
[12] Mankad, Raj. "Houston Has a Woonerf." OffCite.org. October 20, 2015.
[13] Beard, Natalia. "Airline Market Mile: Inclusive Design for Growth." *Cite* 94. Spring 2014. OffCite.org. July 22, 2014.
[14] Pope, Albert. "WaterBorne: Finding the Next Houston in Bayou Greenways 2020." *Cite* 97. Summer 2015. OffCite.org. March 21, 2016.
[15] Mankad, Raj. "Thick Infrastructure: Reconnecting by Way of What Divides Us." OffCite.org. May 23, 2003.
[16] Murphy, Jack. "Artificially Natural: On the Transformation of Austin's Waller Creek." OffCite.org. March 24, 2017.
[17] Murphy, Jack. "Watershed Urbanism: Shoal Creek's Infrastructural Future." OffCite.org. March 30, 2017.
[18] Mankad, Raj. "A Heartbreaking Loss: Grand Parkway Segment E Ruins Site of International Significance." OffCite.org. December 18, 2012.
[19] de Vazquez, Sheryl Tucker. "Will Houston's Green Renaissance Reach Park Deserts?" *Cite* 99. Winter 2016.
[20] Leshinsky, Eric. "Designed to Flood: Urban Design in the Age of Unrelenting Floods." *Cite* 99. Winter 2016.
[21] Blackburn, Jim. "Liquidation: If Houston is to be a Resilient City in the Face of Water Extremes, We Cannot Go On with Business as Usual." *Cite* 93. Winter 2014. OffCite.org. May 27, 2015.
[22] Flaherty, Tom. "Hit Hard in Meyerland: A Photo Essay." OffCite.org. June 4, 2015.
[23] "An Optimistic Response to Harvey." OffCite.org. August 31, 2017.

Falon Mihalic is a landscape architect and land artist working in sculpture, painting, textiles, and site installation.

Photo by Alex MacLean.

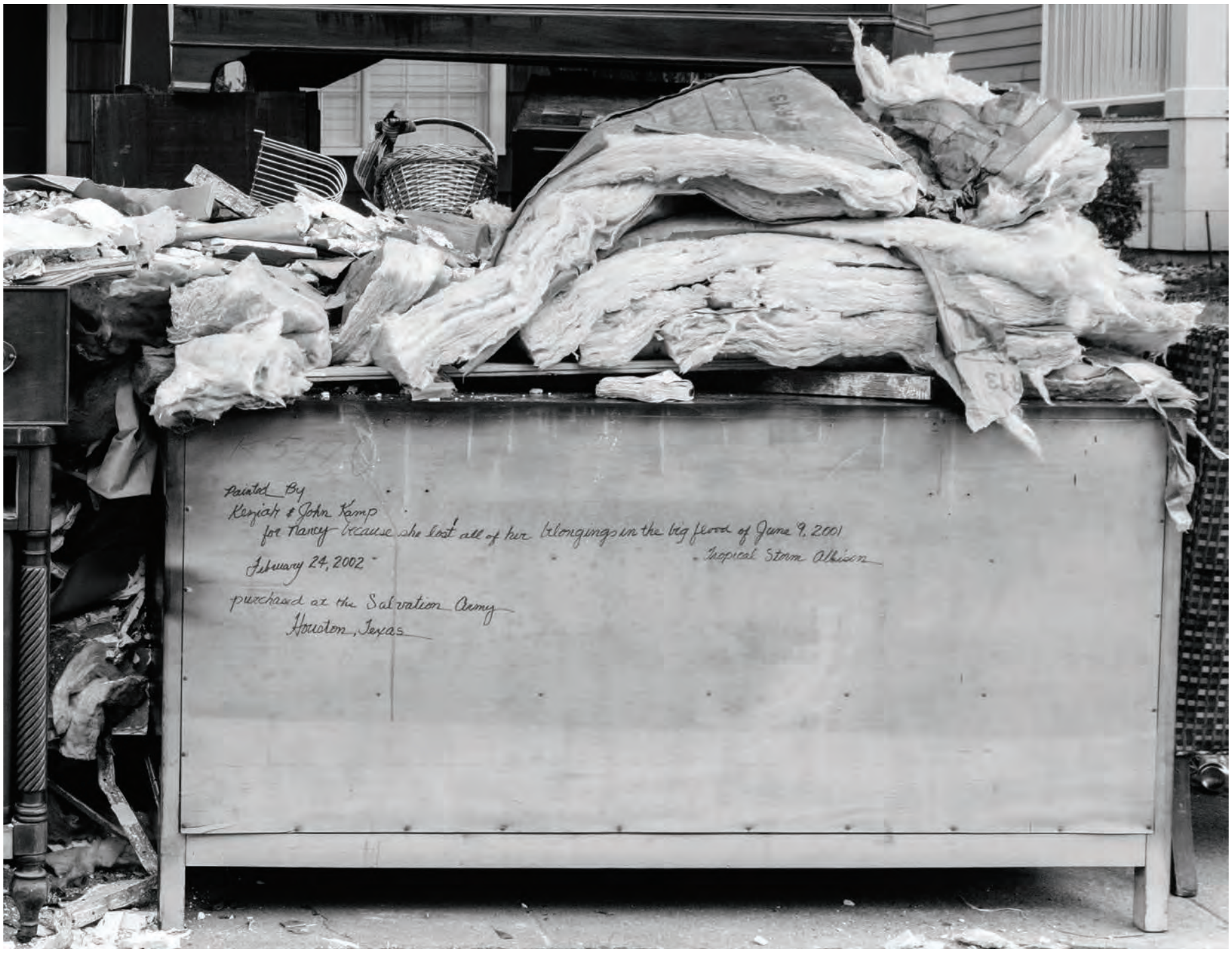
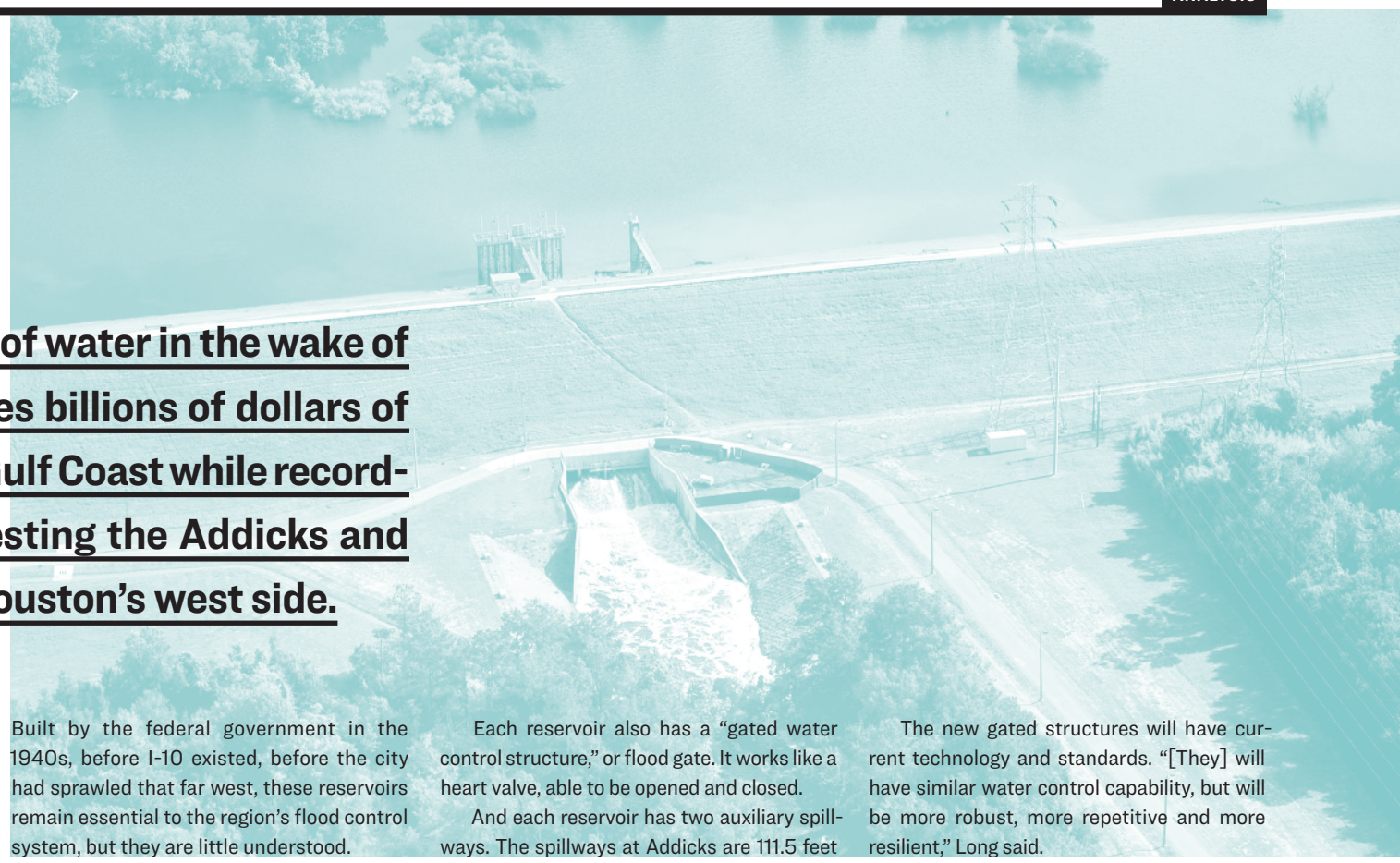
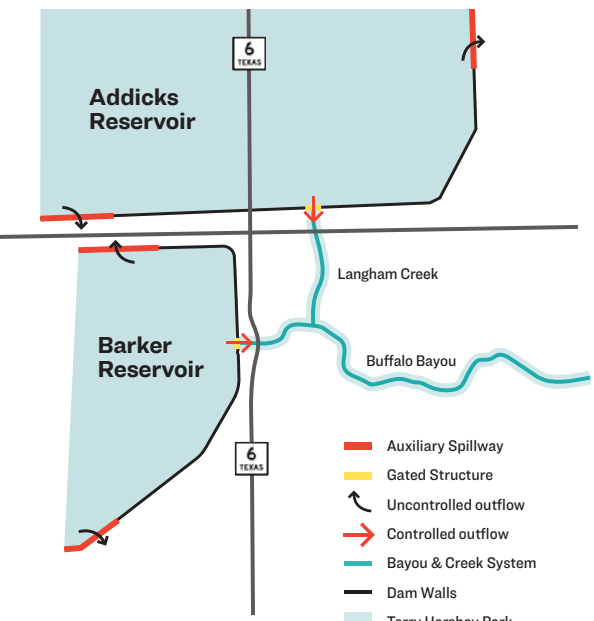


Photo by Tom Flaherty.

Photo by Alex MacLean.



The destructive power of water in the wake of Hurricane Harvey leaves billions of dollars of devastation along the Gulf Coast while record-shattering rainfall is testing the Addicks and Barker reservoirs on Houston's west side.



Built by the federal government in the 1940s, before I-10 existed, before the city had sprawled that far west, these reservoirs remain essential to the region's flood control system, but they are little understood.

How do they work? What are they designed to withstand? I talked to Richard Long, the natural resources manager at the U.S. Army Corps of Engineers, to answer these questions.

How the dams work

The reservoirs are designed to connect Houston's watersheds and bayous that traverse the region like the veins of a leaf and lead to Galveston Bay and the Gulf of Mexico.

North of I-10 is Addicks Reservoir, fed by Bear Creek, South Mayde Creek, Langham Creek, and Horsepen Creek. Water then flows outward to Langham Creek and Buffalo Bayou.

South of I-10 is Barker Reservoir, fed by Mason Creek and upper Buffalo Bayou from the Katy Prairie, its origin, and continues toward downtown.

Long explained that the reservoirs have three main structural components. There are earthen embankments, which are the highest walls. The embankments are 121 feet high at Addicks and 112 feet at Barker.

Each reservoir also has a "gated water control structure," or flood gate. It works like a heart valve, able to be opened and closed.

And each reservoir has two auxiliary spillways. The spillways at Addicks are 111.5 feet high, and they are 105 feet high at Barker. They are designed to back up the gated structures and work like the overflow holes in a sink, keeping water from going over the top or "overtopping" the embankments.

"We have designed the dams so that, in an extreme event larger than Harvey, water will go over the auxiliary spillway and never over the main embankment," he said. "The dams are prepared for events beyond what we are experiencing right now."

Additionally, both Barker and Addicks, which are designed similarly but are not identical, are undergoing a maintenance project. Two new gated structures are expected to be completed by 2020 with Granite Construction Company as the contractor.

"We are building new water control structures adjacent to the current [ones]. They are under construction. They don't work yet," Long said. The existing gated structures will hold up longer, he said, but for how long is not known. Once the new structures are working, the old ones will be decommissioned.

The new gated structures will have current technology and standards. "[They] will have similar water control capability, but will be more robust, more repetitive and more resilient," Long said.

More robust, he explained, because they will be in an all-concrete tower with embedded steel; the old gated structures were lined with steel. More resilient because their conduits will be lined with steel to prevent deterioration. And more repetitive because the new structures will have two gates. If one fails, it would have a backup.

What they are designed to withstand

Now, normally, water is held behind the earthen embankments and flows through the gated structures into creeks and streams. The dams control flow into Buffalo Bayou, which keeps Downtown Houston from flooding. Under normal, day-to-day conditions, and even during heavy rain events, the gated structure at Addicks releases water into Langham Creek and Buffalo Bayou; Barker releases into Buffalo Bayou.

But Harvey has not been a normal storm. The amount of rain that has fallen could fill the Astrodome 3,200 times, said meteorologist Jeff Lindner of the Harris County Flood

FLORENCE TANG SEP. 4, 2017 2:33 PM

Illustrations by Evan O'Neil with Andrew Albers and Ernesto Alfaro.

How the Barker and Addicks Dams Work

Editor's note: This article was produced in collaboration with the *Houston Chronicle*.

Control District (HCFCD). So much rain has necessitated the high-volume controlled releases of water from the reservoirs over the next two weeks.

HCFCD officials said the reservoir levels peaked on Aug. 30, 2017, at 109 feet at Addicks and 101.5 at Barker. With the releases, the reservoir levels are dropping.

Once these high-volume controlled releases are over, normal releases will continue for about three months until the reservoirs are drained. These releases are designed to avoid a larger catastrophe and to empty the reservoirs in the event of another storm.

The Army Corps is now faced with deciding how to handle the competing demands of upstream development and downstream neighborhoods along the bayou.

When overflow is activated at Addicks, it heads to Turkey Creek, Rummel Creek, and possibly White Oak Bayou. At Barker, it would head to Buffalo Bayou, and possibly Brays Bayou and Oyster Creek. Barker also has two ditches, Barker and Clodine, surrounding it, acting as support arteries. They collect water outside the reservoir and carry it to the bayou.

Because Harvey has unleashed more than 50 inches of rain in a matter of days, the auxiliary spillways have had to come into use, Long explained. Inside Addicks, water is passing around the spillway. But not at Barker.

But once there is too much water on both sides of the dam, the flow is impacted. Further complicating matters, when channels like Buffalo Bayou fill up, water will look for all the other spaces it can fill up. And that is causing the serious issues that neighborhoods and homeowners are currently facing.

Thousands of people have been displaced from their homes near the reservoirs, as they were built on vulnerable property that lies in what Long calls "a gray area."

Long explained that when the reservoirs were built, the federal government acquired a certain amount of land. At that time, the surrounding land was undeveloped. Historically, information sessions were conducted by the government as requested by private developers and homeowners. Public sessions were held when information was provided about the potential of water from the reservoirs encroaching on the surrounding land. But whether everyone who lives there now has been able to be fully informed is another matter.

"We can hold approximately a 100-year-flood within the boundaries of the government property," Long explained. "People have built on the land that is above the government property, but below the maximum possible pool level the dams can hold."

In short, the capacity of the dam is beyond the government property, and the Army Corps is handling a very complex emergency situation by controlling high-volume releases to protect the city as a whole.

"It has never flooded before above the property," Long said. "This is the first time we have flooded homes located adjacent to and upstream from the property."

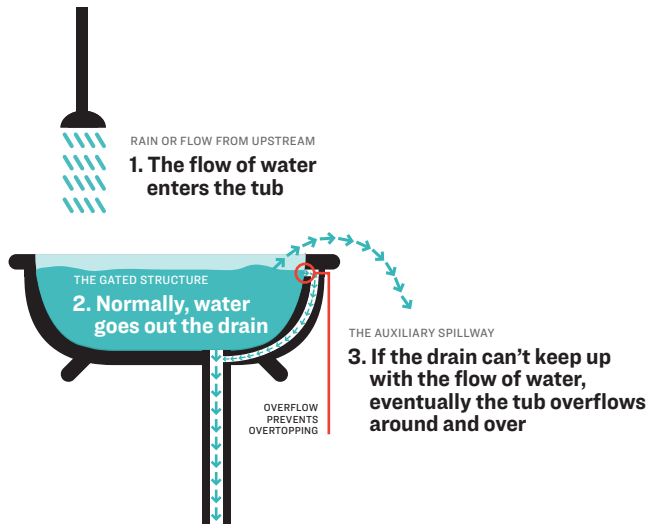
If more water from upstream enters the reservoirs, the water level will continue to rise. If the inflow and outflow match, the water is level. If the inflow is less than the outflow, the water level will start to fall.

Long, who has worked with the Army Corps for 36 years, unknowingly predicted this perfect storm that has sent so many along the Gulf Coast scrambling for dry land, safety, and shelter. In the span of a week, Houston has shown the rest of America and the world what it is made of.

The city has come together in collective grief while maintaining its indomitable spirit. More than 50 people have died. But teams with inflatable boats and human chains have rescued those trapped amid swirling waters and many volunteers are sending surplus supplies to Beaumont and other ravaged communities. The storm is challenging us to co-exist with our watersheds, creeks, streams, and, most importantly, Buffalo Bayou. Managing flooding is our city's greatest challenge and biggest opportunity. **H**

Tub Concept

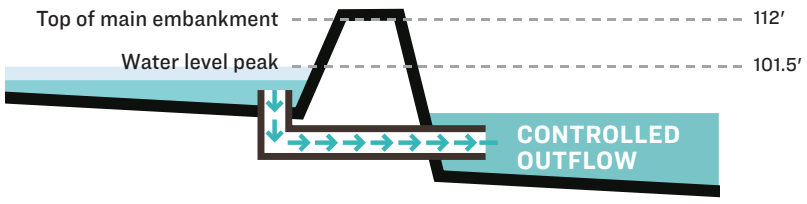
How the Reservoir Works



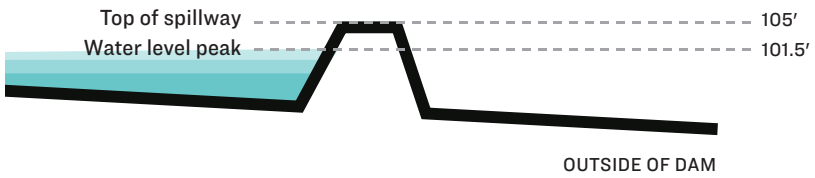
Barker Reservoir:

Gated structure and auxiliary spillway details

Gated Structure



Auxiliary Spillway



Addicks Reservoir:

In context with adjacent land

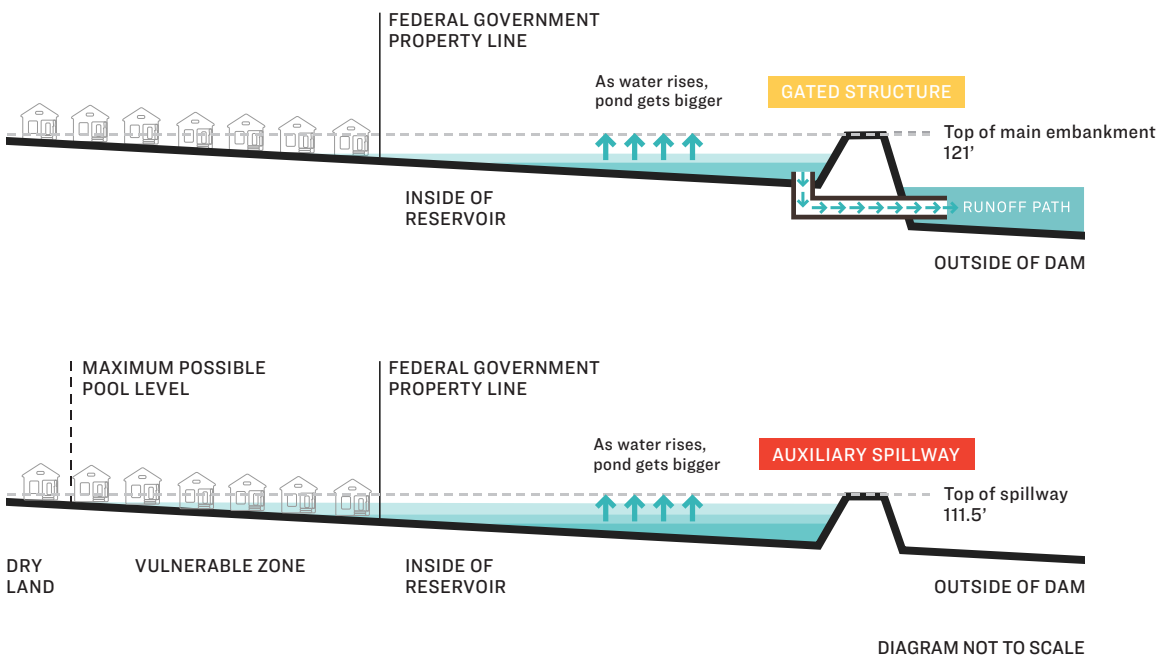


DIAGRAM NOT TO SCALE

Florence Tang is a journalist, architectural designer, and manager at Kendall/Heaton Associates. Evan O'Neil is a graphic designer in Houston. Andrew Albers, Vice President at OJB Landscape Architecture, and Ernesto Alfaro, Associate at SLA Studio Land, provided analysis and graphic support.

“The City of Houston is open for business,” Mayor Sylvester Turner announced eight days after Hurricane Harvey began its roughshod path through the city. Downtown office buildings are humming but a ten-minute drive northeast exists a parallel universe named Kashmere Gardens.

Kashmere Gardens is a historically African-American community with a growing Hispanic population and one of the poorest in Houston. The median household annual income in this community averages $22,000 with 43 percent of households having an income less than $14,000. Over 55 percent of the population are unemployed or out of the workforce.

Kashmere Gardens lies just beside Hunting Bayou and was one of the first areas to flood during Hurricane Harvey. It has been in a terrible waiting game ever since.

Residents watched as waters rushed into their one-story homes in the dark hours of August 26, with most waiting until daybreak to safely evacuate. Families waited for as many as eight hours. Some called 911 and waited. Others managed to wave down Houston Fire Department and garbage trucks. Many attempted to evacuate by foot. There were multiple accounts of flooding that reached residents’ necks as they moved towards higher ground. Small children and the elderly were carried or pulled on improvised flotation. Parents held tight to the arms of older children who were told to paddle their feet hard.

Keith Downey, incoming President of Kashmere Gardens Super Neighborhood 52, estimates over 60 percent of his constituents’ homes flooded. But this was no unprecedented “gee-whiz” event. Much of Kashmere Gardens falls within Harris County Flood Control District’s (HCFCD) fundamentally-flawed “100-Year floodplain.” It is inexplicable to residents that so few rescue and recovery resources were positioned for stranded citizens in a known flood-prone area and how little government presence has been felt on their streets in the weeks since.

Though the waters have receded, the waiting in Kashmere Gardens continues. But waiting should not be confused with doing nothing. Cleanup has been backbreaking and slow. The FEMA process has been long and confusing. Provisioning basic necessities without transportation has been nearly impossible. Urania Clark has waited beside her flooded home and car on Hoffman Street for two weeks now. Her job as an HISD school crossing guard has been delayed due to school closures so she’s unsure when her first paycheck will bring money in for storm-related expenses. In the meanwhile, she keeps a grim vigil for a FEMA agent to arrive. She has meticulously documented the soggy remnants of the life she shared with her husband and eight-year-old daughter: the recently purchased sofa, the flat-screen television, even the 23-year-old wedding gifts whose sentimental value cannot be monetized. She was proud of her tidy home and hoped the inspector would assess personal property loss in situ rather than as a tangled pile of debris at the curb. But this waiting is over. The landlord arrived before FEMA and has placed a lock on the front door, citing storm damage as cause to break her family’s lease.

“I can’t believe it,” says Ms. Clark as she lets out a tired, exasperated sigh. “FEMA hasn’t come but the management company is trying to put us out. They say if they don’t get our stuff out, they’re gonna trash it. Is it even legal? The least they can do is give us time so everyone can see FEMA. I saw it on TV... in Kingwood the army trucks were all lined up to help people. They were helping people: everyone, everywhere. I got none of that help, nowhere. They forget about the little people like us. But we work and we pay taxes. Just like the people in Kingwood. They forgot about us.”

LARA BAUGHMAN PURSER SEP. 19, 2017 10:07 AM

Kashmere Gardens After Harvey:

Grassroots Action as Wait for Government Drags On

Ms. Clark is, in many respects, correct. Houston is a high-tax city for the poor. The poorest 20 percent pay more of their income in taxes than any other income group in the state and have the sixth highest state and local tax bill in the nation (12.6 percent of income). Despite the fact that Houston is home to 24 Fortune-500 companies and boasts a regional GDP approaching half a trillion dollars per year, Harris County's $100 million annual spend on flood control is paltry compared to other flood-prone areas of the country. For example, adjusted for population, Southern Florida outspends Harris County 3 to 1. More generally, infrastructure projects tend to first serve affluent and politically-connected communities and business interests, resulting in what some experts term "ecological gentrification."

Kashmere Gardens residents who feel forgotten by their government depend on each other. They piled into each other's trucks in search of higher ground during Harvey's lashing rain. They help each other carry water-logged albums into the sun, hoping one or another photo can be saved. They pass FEMA paperwork between themselves, making twice-certain which form needs to be mailed and where. Pastors have opened their doors to feed many more than their congregation. Neighbors from surrounding areas of Houston are coming with bleach and masks and sandwiches.

Keith Downey, an architectural designer who worked as a project manager for New York Parks and Recreation, is helping coordinate these efforts. Driving his car down Minden Street, he stops to check in on an elderly woman. "Let's talk to this resident and help get her heart changed." Changing hearts and connecting them to one another is Mr. Downey's simple, motivating mantra: "No matter where you live or where you lay your head, it's about people caring about people. It's not about religion, it's not about creed, and it's not about color, it's about people helping people."

Kashmere Heights is recovering through grass-roots organization. Mr. Downey has joined forces with Huey German-Wilson, president of Trinity Gardens Super Neighborhood, and Kenneth Williams, President of Kashmere High School Alumni Association to become a triumvirate connecting volunteers and donations to needy citizens within the communities of Northeast Houston. They use their deep connections to learn which congregation halls didn't flood and call the pastor to see if it can be quickly repurposed into a donation center. They know which street corner might be the best location to serve up 200 Operation BBQ meals in eight hours' time. They learn which addresses need cleaning supplies and which need sheetrock demolition and match these needs with a myriad of larger citywide volunteer groups. They go door-to-door and use Facebook to connect with their social-media savvy constituents. Their phones erupt with calls and texts. Each one is answered.

Volunteer work crews and food distributions will inevitably thin as volunteers return to work and humanitarian aid migrates to communities affected by Hurricane Irma. When that happens, the longer-run challenges for Kashmere Gardens are formidable. Positioned between an industrial area and a rail corridor, Kashmere Gardens has also been isolated from the neighborhoods that once bordered it. Decades of road infrastructure projects, many of which serve Houstonians' unquenchable thirst for cheaper land on the city's periphery, criss-cross their "drive-by" community. Mr. Downey remembers his childhood, when Kashmere Gardens boasted quality shopping and services. But as the community became more geographically isolated, the number of local businesses dwindled. Today, it is classified a food desert where transportation is impeded by lack of sidewalks, pedestrian crossings, and inadequate public transportation service. Poor drainage due to illegal dumping, a dearth of quality affordable housing, and lack of sustained attention by the City of Houston to these longer-term problems remain obstacles. When asked where high-quality, affordable housing might be made available for residents permanently displaced by Harvey, Mr. Downey was eager to point out long-empty tracts of land in the immediate area, some of which were owned by Houston I.S.D.

Mr. Downey's community wish list is echoed and elaborated upon in the 2017 Kashmere Gardens Livable Centers Study undertaken by the Houston-Galveston Area Council in conjunction with the Northside Management District. He served on its advisory committee. The report recognizes that, in an era booming with urban infill development, Kashmere Gardens' proximity to downtown Houston makes it prime for longer-term market appreciation. The study, created with community input, sets forth a ten-year vision for Kashmere Gardens that is aligned with city goals and compatible with residents' identified needs. The report proposes attracting public-private funding to jump-start the housing market through a combination of new mixed-use and single family construction, and construction assistance and related funding for homes in disrepair, particularly those owned by senior citizens who lack the mobility and resources to do so otherwise. Other recommendations include upgrades to local infrastructure, including community gateways, railroad crossings, and increased public transportation options such as extending Community Connector Metro service that would provide user-generated "demand-response" service, as well as environmental mitigation of known soil and water contamination in the area.

Kashmere Gardens' long-term revitalization will also depend on creating flood resilient housing and taming Hunting Bayou waters during extreme weather events, like Hurricane Harvey. Hunting Bayou exceeded its banks multiple times since 2000, despite improvements in past years, including widening and deepening of the flood channel and construction of the Homestead Basin, which was due to enter its third and final phased construction this August. Harris County Flood Control District's (HCFCD) Hunting Project site work began in 2007 and is an estimated ten to fifteen percent finished with completion estimated in four to six years' time.

Hunting Project includes plans to mitigate flood risk, in part, through the voluntary and involuntary relocation of 40 homes within Kashmere Gardens' 100-year floodplain. This process has been a years-long effort with some, but certainly not all, residents amenable to relocation. Anxiety and resistance are keenly felt by residents with deep community attachments. Kevin A. Lynn's 2017 study of Kashmere Gardens highlights these relocation hurdles:

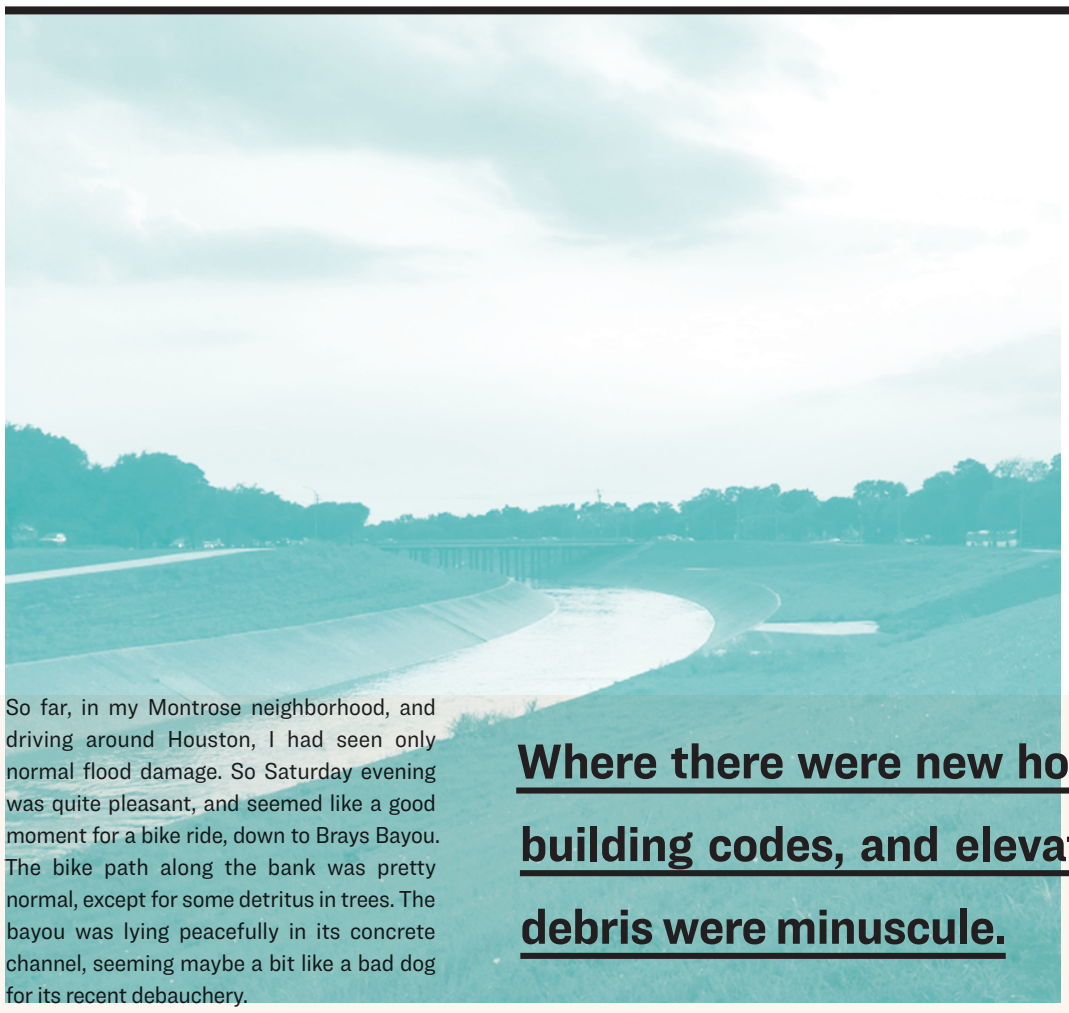
Keith Downey. Photo by Raj Mankad.

Monetary compensation may not be suitable to address certain community and social effects. The social impacts are likely to be especially significant for communities of color. Political outsiders who make plans for relocation often have inaccurate impressions of their needs and priorities, overlooking attachment to neighborhoods, and strong social ties. – Kevin Lynn

As she cleaned out her 79-year-old mother's flooded Kashmere Gardens home, Vera Matthews distilled Mr. Lynn's research findings more bluntly: "We were raised right here until I got married. Someone has been right here, forever. [Relocation] is not always convenient for elderly people. She has her community that she is familiar with so why would she want to move all the way out to Spring or Cypress or somewhere else? Transportation is not there. You have to have a vehicle."

The resilience of the Kashmere Gardens community as it undertakes the hurricane recovery process stands in tension with the endemic economic vulnerabilities residents face while doing so. Amid uninsured losses, FEMA denials, and lost wages due to the storm, the financial and emotional stress of rebuilding is enormous. To a great extent, political and policy decisions will help shape the longer-term pace and direction of revitalization. With sufficient political will and funding, Kashmere Gardens Livable Centers Study offers one promising blueprint for its post-Harvey future. H

Lara Baughman Purser is a writer and freelance consultant in domestic and international policy as well as corporate strategy, marketing, and communications.



Brays Bayou. Photo by Danny M. Samuels.

DANNY MARC SAMUELS SEP. 4, 2017 9:55 AM

Harvey Musings: Zoning made no difference. But stricter building codes did.

So far, in my Montrose neighborhood, and driving around Houston, I had seen only normal flood damage. So Saturday evening was quite pleasant, and seemed like a good moment for a bike ride, down to Brays Bayou. The bike path along the bank was pretty normal, except for some detritus in trees. The bayou was lying peacefully in its concrete channel, seeming maybe a bit like a bad dog for its recent debauchery.

Where there were new houses, built to the newer, stricter building codes, and elevated from the street, the piles of debris were minuscule.

Then I turned north into Aberdeen Way, and saw house after house with debris piled high in the front yards. This was the scene for street after street. Tired homeowners were piling and sifting, and talking quietly. I did not feel comfortable taking any pictures, but you have seen them on the news and after other floods. I am sure these scenes are playing out all around Houston.

These are upscale communities—Southside Place, Braeswood Place, Bellaire—that pretty much blend together. Bellaire and Southside have long-standing zoning codes, and more recently, stringent building codes, especially with respect to permeability, detention, and elevation.

But nonetheless, here was a massive flooding event. Zoning made no difference. But stricter building codes did.

Two things struck me. One was that the damage was pervasive on every street for about four or five blocks parallel to the bayou. Then, next street, no damage. The change in elevation is not discernible, but obviously a little can make a big difference.

Second, where there were new houses, built to the newer, stricter building codes, and elevated from the street, the piles of debris were minuscule (mostly, I think, from the garage). This was particularly evident on Tartan Lane, two blocks north of the bayou, where a row of recently built houses was hardly scathed. It seemed like the size of the debris pile was inversely proportional to the floor elevation.

These houses were built under the City of Houston International Residential Code, which sets floor elevations based on floodplain maps. The lenders and insurance companies act as strict enforcers. (Of course, raising floors to an arbitrarily higher elevation on a specific site is no guarantee that it won't flood the next time.)

So, the current building codes seem to work. They are tortuous during design, permitting, and construction, and add a considerable cost premium. But the elevated houses (typically on pier and beam) definitely fared better than the low-slung original houses (on slabs).

Harvey was a rain event. We should not forget about wind. Here the code authorities, the construction industry, and the enforcers are even more in harmony. We should be good up to 110 mph, at least for new construction.

But the codes don't apply to the existing houses, which are, rightfully, grandfathered. Until that housing stock is eventually replaced (or raised), these low-lying 1950s houses will continue to flood, or blow away.

The more prevalent these new construction standards become, the more the housing stock will skew to the fewer who can afford it. The Harvey flooding will likely accelerate that dynamic. H

Danny M. Samuels, FAIA, is Co-Director of Rice Architecture Construct (formerly Rice Building Workshop), Professor in Practice, Rice University, and Partner at Taft Architects.

A large portion of the housing stock in and near Meyerland has flooded three times over the last three years. Homeowners there have lessons to share about the hard choices people across the city are facing now for the first time. Among the options to rebuild and recover is to elevate.

Doug and Erin Anders of Heatherglen Drive elevated their home a month before Hurricane Harvey, and they were thus spared from the muck and gut their neighbors faced. Having flooded as much as a foot during the Memorial Day flood (2015) and two feet during the Tax Day flood (2016), the Anders decided to look into elevating their home above the floodplain. Doing so would be a difficult task—like most homes in the neighborhood, their home was built on a slab foundation. A slab foundation is composed of a single layer of concrete poured on the dirt, and is therefore more difficult to separate from the dirt during the elevation process than a house built on piers. The 1959 home was also historically significant, designed by the architect Arthur Steinberg for Mr. and Mrs. Alan Finger of Fingers Furniture. To the Anders, preserving the windows in their nearly 18-foot tall living room and the hand-crafted, white-stained, rough-hewn paneling in their den were paramount.

Arkitektura is an elevation company that specializes in lifting houses on slab foundations. With a degree in architecture from the University of Texas at Arlington, Phillip Contreras focuses his company on providing architecturally-minded design solutions to raising homes. Arkitektura offers their clients a turnkey elevation solution—accounting for permits, material, and labor. Since 2000, the company has elevated over 100 homes across Texas and Florida, with nearly 10 in Meyerland alone. Their lifting of a different house days before Harvey hit received national and local media coverage.

Even though the method to elevating a home is multi-fold, the entire process only takes roughly 6 to 8 weeks. The team first partners with Aran and Franklin Engineering to develop a design that is resilient, meets site constraints, and conforms with both HOA requirements and code.

City of Houston code and Harris County require structures to be 18 inches above base flood elevation. Arkitektura recommends at least two feet above the 100-year floodplain.

After receiving approved permits, the team excavates underneath the slab foundation and disconnects gas and water utilities. At this excavation stage, the foundation is further examined to confirm how many slabs need to be lifted—in older homes, multiple slabs for multiple additions and renovations are a strong possibility.

The Anders home consisted of two slabs, the first dating from its original construction in 1959 that was headed by architect Arthur Steinberg and the second dating from its renovation in 1974 that was headed by architect David D. Foster. Steel reinforcements were added, locking the two adjoining slabs, and ensuring that the home would be safely elevated.

Excavating under the slab allows for segmented, concrete piles to be placed systematically, every 5 feet on center, underneath the slab foundation. These piles are pushed underground to individual points of resistance, until they can be driven no further, to ensure consistent structural stability throughout the home. The team then sets jacks on top of these concrete piles, which integrate to create a unified elevation system. This unified system allows the foundation to be as "monolithic" as possible, centralizing the point loads and preventing the interior walls from cracking. New grade beams are then formed and poured to lock all of these piles into place. Above these new grade beams, the team's engineers request the build of solid, concrete columns to then solidify the connection between grade beam and home. Once the home is elevated to the final height and has passed all necessary inspections, utilities are reconnected and a "skirt wall" is built around the perimeter of the newly elevated home. This skirt wall then becomes both an aesthetic and a structural element of the home.

Arkitektura was able to successfully elevate the Anders home while maintaining the spirit of the mid-century home's indoor-outdoor relationship that defined its original design. With Meyerland requiring that 70 percent of a home's elevation be composed of masonry material, the owners decided on burnished concrete masonry units (CMUs) to line the newly elevated home. Contreras encouraged the homeowners to choose a product that differentiated from the rest of the preexisting home's elevation, which the chosen CMU does in both color and texture.

After the home is successfully lifted and skirted, the team can then focus on the finishes. The framing crew builds a new deck and accompanying stairs for each exterior entry door, as well as any other accompanying wooden element such as a fence or exterior paneling.

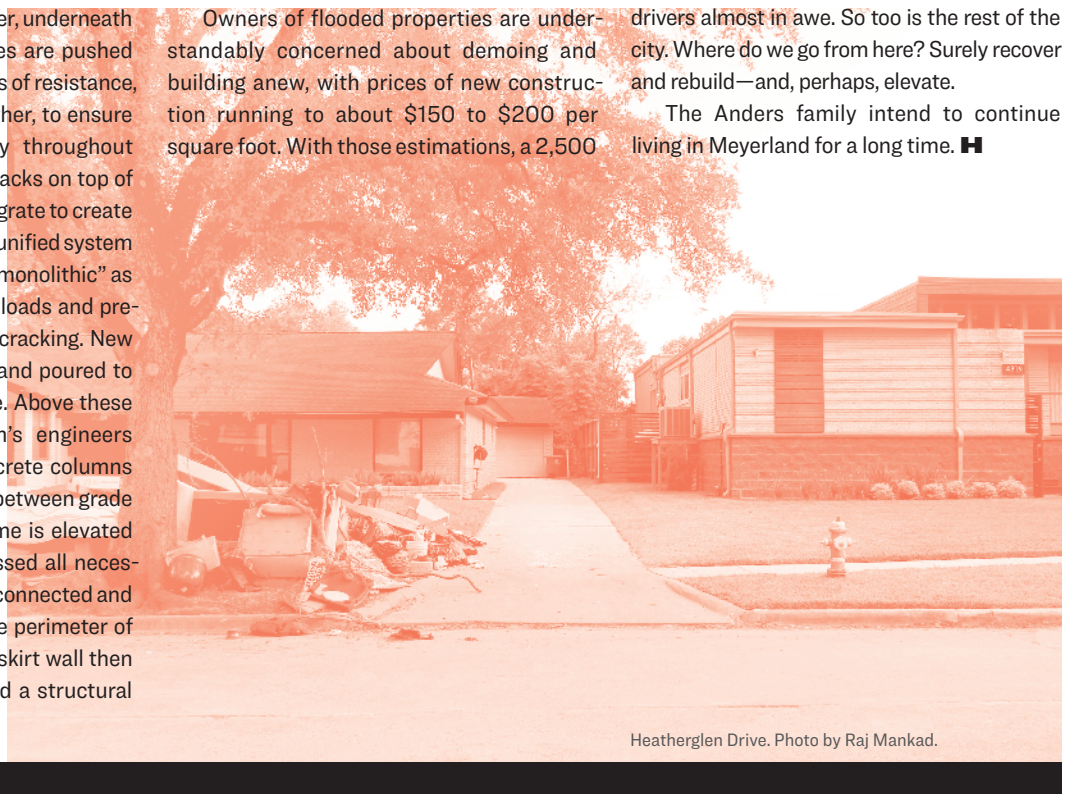
Arkitektura framed front entry stairs and a backyard deck for the newly elevated Anders home, which were both stained to match the wood on the preexisting elevation. The company was also able to extend the wooden slats on the front screen and front fence, to make up for the height of the newly elevated home. These wooden slats were originally built in 1974 during the renovation designed by architect David D. Foster.

Owners of flooded properties are understandably concerned about demoing and building anew, with prices of new construction running to about $150 to $200 per square foot. With those estimations, a 2,500 square foot house—customary for a neighborhood like Meyerland—will cost as much $500,000 to build. Arkitektura's design, elevation, skirting, and other finishes generally cost $75 to $80 per square foot, which can be a more cost-amenable solution than new construction, particularly if the quality of the design and construction of the original house is high.

Costs do vary, not only by company and the method of elevation, but by the requirements of neighborhoods and clients regarding the quality of the finishes and skirting.

The streets of Meyerland are lined with discarded debris, each pile directly correlating to the variety of housing stock behind it and each telling a story. After receiving over three feet of flood waters, houses on slabs often feature the largest piles. The most prominent element of these is scrapped sheetrock, entire homes being dissolved into lath and paper. As Danny Samuels observes, the piles in front of recently built houses are generally more minimal because of the City's requirements to build above the floodplain. The damage to these homes is often restricted to the garages. The smallest piles lay in front of elevated homes, like the Anders home, which had some damage to ancillaries stored outside. It is in front of these homes that cars drive slower, inquisitive drivers almost in awe. So too is the rest of the city. Where do we go from here? Surely recover and rebuild—and, perhaps, elevate.

The Anders family intend to continue living in Meyerland for a long time. H



Heatherglen Drive. Photo by Raj Mankad.

CHERYL JOSEPH SEP. 25, 2017 3:55 PM

Cheryl Joseph, Assoc. AIA is an architectural designer at Titan Homes in Houston. Cheryl is a recent graduate of the University of Houston College of Architecture and Design.

Mid-Century Elevated:

How an Architecturally Significant House Was Lifted Above the Floodplain

State of Vulnerability

Photography by Alex MacLean

1. Trucks dump debris outside Beaumont, Texas.

2. Blue tarps patch roofs in Rockport, Texas.

3. Visible losses in Vidor, Texas.

4. Recovery aid rolls into Rockport, Texas.

5. Brazos River in its banks near Rosharon, Texas.

6. Flooded vehicles at Royal Purple Raceway, Baytown, Texas.

On a bright Saturday last March, the Rice Design Alliance hosted its annual tour. This year's focus was "H2Ouston: Living in Floodplains," and the tour opened six structures to the public—four homes, one townhouse, one historic commercial building—that all negotiate how to inhabit flood-prone grounds.

A thousand visitors explored one or more of these locations and learned about different ways design can mitigate the impacts of flooding. It was a month of flood impact, as weeks earlier, experts gathered in a civic forum to discuss flooding from various intersected professional disciplines. Videos from these talks are now available online.

Five months later, Harvey struck. Now the city is faced with the consequences, and will be addressing them for a long time. How did the architecture featured on the "H2Ouston" tour fare during Harvey? Unfortunately, one home, a 1965 Brooks and Brooks design in Meyerland, sustained damage. In the past, the residence's terrazzo floors handled a small amount of flood water, showing that material choice can improve resilience.

What about the other buildings on the tour? Most buildings were in areas that did flood but they, along with their occupants, emerged intact. I spoke with three occupants who generously shared their stories. As Danny Samuels suggested previously, and as this article will reveal, newer houses constructed to current building codes handled floodwaters much better than the original housing stock. As suggestions cohere into long-term plans, it is clear that stricter controls on new construction, amidst other more transformative programs, should be implemented. "Building, hereabouts, has traditionally been a form of stealing," mused Larry McMurtry in his 1968 book of essays *In a Narrow Grave*, perhaps critiquing the housing developments that, half a century later, pose the greatest flood risks. Surely a house can be many things, but for thousands of Houstonians during Harvey, a few feet of elevation was the difference between having to evacuate yourself and welcoming neighbors who escaped into your house.

Linkwood

Jenna and Chad Arnold have lived on Linkwood, two blocks south of Brays Bayou just inside Loop 610, for nearly a decade. A few years ago, facing a long list of structural repairs to their 1951 ranch house, they decided to demolish and built new. The materials of the existing house were donated to Habitat for Humanity and the couple requested that every tree on the property be kept. Their architect Brett Zamore designed a 3,500-square-foot house faced in dark brick and light stucco that supports open interiors and a large exterior deck. Prized objects were given careful consideration; for example, a piano from Jenna's grandmother proudly sits in the open stairwell of the home. The floor structure of the residence, which was completed about a year ago, sits roughly four feet above grade. Regulations for new construction stipulate that the bottom of the lowest horizontal structural member must be eighteen inches above the Base Flood Elevation (BFE). The Arnolds' home was built an additional six inches higher.

During Harvey, this height made all the difference. Early Sunday morning, the Arnolds awoke to a call from a neighbor who was experiencing flooding in her home. Jenna watched her husband step off the porch and sink waist-deep in water. Chad helped a number of neighbors escape, and soon people that they recognized but don't know well were swimming over to their house. Later on Sunday, the Arnolds had nineteen people gathered in their house. Two big dogs made their home on the upstairs porch and a cat was stationed in every bathroom. Soon, neighbors wrapped in towels looked out at the flooded neighborhood. Boat owners navigated the shoulder-high waters in their vessels and plucked the remaining families from roofs and attics. At night most guests slept upstairs, as Jenna was concerned with the waters rising into the house. Chad slept downstairs with his hand on the floor to ensure he would wake up if water entered the house. After midnight he was awoken by a man outside in an air boat with a thick Louisiana accent; he was a member of the Cajun Navy, patrolling Linkwood to see if remaining residents needed any help.

On Monday morning, the waters had receded and residents returned to check on their houses. For the next week, Jenna and others helped direct clean-up crews to houses in need. Of the 140 houses in the Linkwood neighborhood, 120 were flooded. Thankfully residents were safe. "There's a newer house pretty much on every street and every new house was taking in people from the ranch houses," she said. Here, the archipelago of new construction provided safe havens during

JACK MURPHY OCT. 16, 2017 1:50 PM

Design Could Save Your Life:

Revisiting the H2Ouston Living in Floodplains Tour

Photos by Paul Hester.

the flood event and served as a base for coordinating clean-up in its aftermath. It is unclear how Harvey will transform the social fabric of Linkwood. Jenna said some neighbors already have "For Sale" signs up, but others plan to build new, and still others await pay-outs that will enable them to renovate.

Reflecting on the design of this house, Zamore stressed that it is important to keep the foundation skirting as open as possible. Instead of vents in a more typical closed wall that could retain moisture under the house, he used mesh on three sides of the foundation that allow water to pass through, ensuring the crawlspace will air out quickly. The Arnolds' house remained dry, though water flowed under the house and nearly reached the bottom of the floor structure. The garage is at grade; inside it is faced using cement board, not drywall, with smart vents installed in the walls, a material choice that makes clean-up easier. Unfortunately, the garage still filled with two feet of water, and Jenna lost her car. All in all, the Arnolds emerged as helpful survivors, and are grateful to Brett Zamore's expertise in designing for a flood-prone lot. "We've been so pleased about some of the decisions that were made about our house," Jenna said. Their house shows "there's a way you can build that will survive this crazy bayou area."

Shirkmere

Jacki and Andrew Schaefer moved into their new house the week before the Rice Design Alliance tour last March. Jacki is a Rice Architecture alum and teaches a Building Information Management (BIM) course at the school during the spring semester. She completed some initial sketches herself for the house before working with architect and Rice Architecture professor Nonya Grenader to design the house.

Jacki and Andrew's two-story, L-shaped residence sits at the end of Shirkmere in a residential pocket inside the Loop and west of White Oak Bayou. Its primary strips of windows open north towards the neighborhood. Southern openings are minimized both for thermal reasons and to turn away from the adjacent railway and industrial lot, as townhouses are planned for the site but haven't been built (though the plots are visible on Google maps). The house is bigger than the previous one on the lot, but because so much paving was removed, the impervious coverage actually decreased.

The design takes the typical but important flooding precautions. It is raised to the minimum required height and smart vents are used to ventilate the crawlspace. Throughout, architectural split-face concrete masonry units (CMU) are used as a foundation skirt, including in the garage and in the demising wall between the garage and the elevated house. There is no drywall in the garage, which again makes clean-up easier.

The couple has two small children and, worrying about an extended power outage, they evacuated to Dallas on the Thursday before Harvey's arrival. Jacki kept in touch with her tight-knit group of neighborhood friends via their Slack channel. Andrew, who works in optimization in the oil and gas industry, had installed cameras at the house, so the family watched Harvey batter their piece of Houston until their house lost internet access. As with the house in Linkwood, newer houses served as places of refuge until neighbors could be evacuated to higher ground. One neighbor, wading across the street, snapped a picture, included below, and sent it to Jacki. They also own the house next door, a ranch on a slab; Jacki thought for sure it was gone.

They waited without an update until Tuesday, when a neighbor was able to check on their house and the one next door. Miraculously, both were dry. The family, still in Dallas, immediately began raising money online from friends and, a few days later, drove a U-haul truck full of supplies back to Houston. Arriving back at their house, they immediately began assisting neighbors in clearing out the muck.

Many residents are now faced with the decision of whether and how to rebuild. It can be stressful, as families just want to get back into their houses. But for most, the FEMA or insurance payouts are a big chance to do some house improvement. "You don't get that opportunity, with these funds and the demolition work already done," Jacki said. She has given some advice, mostly to be thoughtful in analyzing their family's flow and usage of space. Instead of building bigger, build smarter and with more flexibility, she says.

At night the neighborhood is dark, with few lights on and not a lot of AC units running. Already there are vacant lots—"FEMA lots," in the neighborhood's parlance—from Hurricane Allison that serve as gathering places for the community. There may be more in the coming years as homeowners decide to relocate. In rebuilding, Jacki hopes people think about the "large-scale implications" of their individual actions, and to not add more impervious coverage to the city. It is "hard to get people to care about the public good," she notes, but it becomes very real when it happens to you: "I hope people get smart."

Left photo courtesy Jacki Shaefer.
Right photo by Nash Baker.

Photos courtesy Buffalo Bayou Partnership.

Sunset Coffee Building

Next to Allen's Landing, the Sunset Coffee Building was both the only commercial and oldest structure featured on the "H2Ouston" tour. It has been significantly renovated by Lake|Flato and BNIM and now serves as the home for the Buffalo Bayou Partnership. (Colley Hodges recently wrote an in-depth appreciation of the Sunset Building for *Cite*.) The design of the renovated structure allows its first level to flood: there are durable finishes, and mesh security gates allow the water to move through the space. Located at the confluence point of the Buffalo and White Oak Bayous, the area was inundated with high, fast, and debris-laden waters, as images show. All sources indicate that the design performed as anticipated.

"We knew it was coming," Anne Olson told me, of Harvey. The staff moved exhibit materials to the second floor and secured the elevator on an upper floor. But there are always issues. The grease trap filled with water, thermostats need to be replaced, and the elevator shaft had five feet of standing water at the bottom, causing electrical issues. Security cameras mounted on the building filled with water and malfunctioned. The fire alarm went off for four days, making the area sound like a war zone, even catching the attention of a CNN reporter. Still, water didn't crest into the offices on the second floor. (It was almost this high during Allison.) Shortly after the waters receded, the building was habitable again.

Soon, the Partnership's staff and volunteers were hard at work cleaning silt and debris out of their parks, including deep deposits in the Houston Police Officer's Memorial. Trails downstream largely weren't affected, though serious erosion took place, to the extent that the BBP is considering increasing the depth of the land the Partnership purchases for easements, Olson said. The BBP lost a dock and boat, but the pair was found in the Ship Channel by the Coast Guard, still roped together. (Rice Crew, who rows along this stretch of the bayou, was also impacted.)

Olson said the intensity of this flood will have an impact on the master planning effort underway for the eastern portion of Buffalo Bayou. She remembered that Allison hit in 2001 during the master planning stages for the first section of improvements, and after that the "whole hydrology and flooding aspect took on this greater role in the plan." Other proposals that were shelved due to cost may be reviewed; one example is a diversionary canal from White Oak to the lower Buffalo that was studied in 2002 but never funded. Olson said one flood model predicted the improvement would reduce flood waters by 5.5 feet in this stretch of downtown.

During my visit in late September, the waters still ran high and fast. On the narrow docks, a pair of workers hosed silt back into the bayou. Behind the building, a Bobcat scraped silt from the rear courtyard. Above my head, debris remained woven into the chainlink fence enclosure of the fire stair. Having a café tenant with seating throughout the courtyard and a kayak rental vendor would complicate flood preparation matters in the future, but the building—and the BBP—will be ready.

As with the residential projects seen on the "H2Ouston" tour, the Sunset Coffee building is a testament that good design is not mere surface aesthetics: it is a deeper structural concern. Design can save your life—or at least the memory-laden objects you collect and hold dear. The BBP's Rebecca Leija and Anne Olson told me their insurance adjuster said the Sunset Building, built in 1910, was well-suited to handle floods due to its height and angle relative to the bayou. Sure enough, in plan the building is set at an angle to the bayou's flow, presenting a corner to floodwaters rather than a flat face. And, its east façade breaks slightly, perhaps to further reduce the surface area "seen" by floodwaters and therefore reduce their force on the walls and foundation. Good design works and then it keeps working. This is an important message to carry with us as post-Harvey rebuilding efforts move forward. **H**

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After Harvey, Houston's sprawling developments have been blamed for contributing to flooding of those downstream by paving over the prairies and ecosystems that once stored and drained water. The outer-ring suburbs of the Houston region, it turns out, are more complicated than that and, in some cases, have been places of design innovation that could teach the rest of Houston some lessons about living in floodplains.

The story of our flooding problem, like most environmental hazards, starts with natural resources sold as commodities. From about the 1830s to 1870s, "earlier settlers made a ton of money off plantations because [the land along Houston's bayous] was so fertile," says Keiji Asakura, Principal Designer at Asakura Robinson, a planning, urban design, and landscape architecture firm. Well before urbanization, farmers raising cattle and growing crops like cotton and rice fundamentally changed the soil. In addition, farm-to-market roads and railroads displaced organic drainage patterns. Coastal prairie that took root in Houston for thousands of years was decimated in a few decades.

Urbanization further altered soils and drainage. Bayous were dug up then paved over. More and more highways, more and more parking lots. And as the *Houston Chronicle* reported, the detention of water in new developments was not mandated until 1984 and is not enforced well over time.

In this past half-century, a different story has unfolded in some master planned communities along Houston's periphery where designers and developers have tested bold ideas.

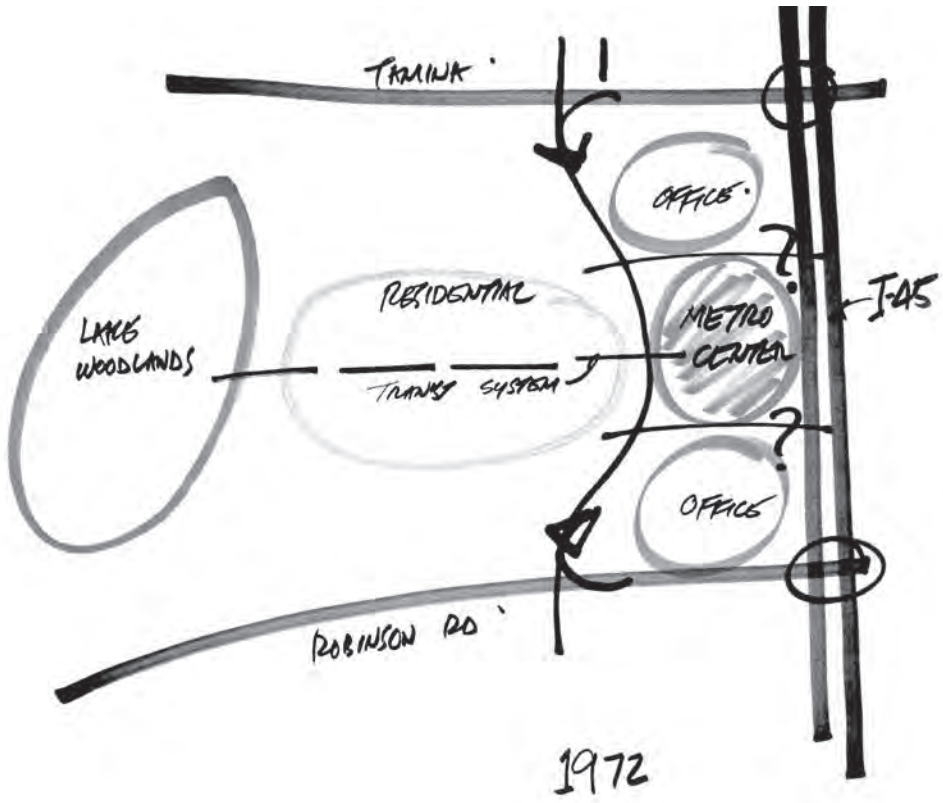
Design with Nature: The Woodlands

"Let us abandon self-mutilation which has been our way and give expression to the potential harmony that is man-nature.... To do this he must design with nature," the chief landscape designer for The Woodlands, Ian McHarg implores in his book *Design with Nature*.

This principle—work with, not against, a site's natural condition—was first promulgated in The Woodlands in the 1970s and continues to hold sway in developments surrounding Houston. Two of the most notable master planned communities currently under construction are Springwoods Village—just south of The Woodlands—and Cross Creek Ranch out in Fulshear. You wouldn't guess it from the repetitious McMansions, but these three developments are unique—indeed, radical for their time—with their respect to the piney woods and coastal prairies they replaced.

The Woodlands was conceived from the most unlikely of sources: George Mitchell, an oil tycoon hoping to develop a piece of land thirty miles north of Downtown Houston along I-45. His conversion was recently written about in the *Houston Chronicle* by Loren Steffy and unfolds in greater detail in Ann Forsyth's book *Reforming Suburbia*: "McHarg suggested using the natural drainage system of the Woodlands site to structure development. This would, he noted, help reduce the prospects for flood damage. Ever the geologist, Mitchell asked. 'All right, natural drainage works, but what does it mean to me?' 'First, George, it means you'll get $50 million from HUD and, second, it will save you even more money,' McHarg responded. 'For instance, you won't have to build a storm drainage system. This will save you $14 million for the first phase alone.' And so McHarg converted the oilman into an ecologist."

This conversation vastly underplays the technology needed to employ natural drainage systems. Dr. Phil Bedient, now a professor in Rice University's Civil Engineering Department, reminisced about being a hydro-engineer on the project some four decades ago. A preliminary survey of the site showed Dr. Bedient and his team that one-third of the property was on the 100-year floodplain, with flat land and thick woods



"Let us abandon self-mutilation which has been our way and give expression to the potential harmony that is man-nature.... To do this he must design with nature."

promising stagnant rainwater throughout. Undeterred, Mitchell and McHarg planned for retention ponds, golf courses, and forest preserves to be in the most flood-prone areas. This accomplished two goals: it kept personal property away from low elevation sites and instead programmed a dual purpose for recreation on otherwise clement days.

The early stages of planning had very little to do with return on investment for number of buildings on the land, rather "landscape [was] used very consistently as a basic framework underlying the urban design of The Woodlands, with villages, transportation corridors, and commercial centers having secondary importance" (Forsyth 175).

It was a special set of circumstances that made The Woodlands possible: I-45 had just been completed; the U.S. Housing and Urban Development Department (HUD) had a well endowed yet unaccomplished new program, Title VII, for the country's first round of master planned communities; and the Mitchell family could bankroll an entire city's worth of development during the first few decades of growth. The Woodland's greatest advantage, though, was having Ian McHarg as the lead landscaper. It was this canvas, in all its flood-prone glory, where he first applied this revolutionary theory of landscape.

GENEVA VEST OCT. 6, 2017 10:04 AM

Post-Harvey Houston Can Learn from Suburbs Designed with Nature

The Woodlands was indeed an anomaly for its time. Recent reincarnations copy the natural aesthetic of The Woodlands—its most lucrative attraction—and paste it onto landscapes without thinking through the differences in context. A retention pond with a fountain does not a Woodlands make. Most of the six-million-plus people in Houston's metropolitan area live in these more mundane suburbs. I grew up in one myself. But the Greater Houston area has a handful of exceptional master planned communities improving upon The Woodlands legacy. I learned a bit about two of the most intentionally sustainable master planned communities currently being developed—Springwoods Village and Cross Creek Ranch—but the list could go on. Up in Cyprus is Bridgelands, with landscape design by OJB which normalizes green roofs and rain gardens and in Fort Bend there is Harvest Green with landscape design by SWA. I will focus on just the two: Springwoods Village and Cross Creek Ranch.

Cross Creek. Photos courtesy SWA.

Springwoods Village

Before writing this article, I knew that all the lakes in Texas were man-made and that all the "lakefront" properties of the suburbs were really retention-pond-front properties. After interviewing Keiji Asakura about his firm's role in the planning of Springwoods Village, I came to realize these "fake" lakes represent a major shift. The goal of flood management infrastructure, especially after World War II, was to move large volumes of water away from development as fast as possible. This strategy didn't work for a number of reasons, mostly because channel intersections became flooded bottlenecks. Not so nice to those downstream.

More recently, since the 1980s, the goal became "to first slow the water to lower the peak in any way we can," says Asakura. The new question is how to create more time for rainwater thereby lowering peak volume? Rather than expunge rainwater as channels do immediately or detention ponds do eventually, retention ponds collect rainwater from the source and retain the water for slow evaporation into the atmosphere and percolation into the soil.

Retention ponds do one of two things that every landscape architect and environmental engineer seems to agree will mitigate Houston's flooding: one is "holding water where it falls," says Dr. Bedient, and the other is "increase vegetation with good roots and open up that soil mass," says Asakura.

This latter method, "good roots," is the same one that I mentioned was destroyed by early settlement of the coastal prairie. The benefits of deep-rooted, tall grass are numerous. Typical lawn grass sequesters approximately 100 pounds of carbon per acre. The grasses seeded in Springwoods Village and Cross Creek Ranch sequester 6,000 pounds of carbon per acre. They also are flexitarians, adept at absorbing large volumes of water or surviving without such luxuries.

You can very easily find both of these methods—the retention and the roots—in Springwoods Village. Off I-45 and Grand Parkway, you are immediately met with traffic medians lined with detention ditches for capturing water at the source. These medians, along with the lakes, parks, and all other opportunities for landscaping, were outfitted with tall grasses indigenous to the region. All of the utilities of a community have been bundled into its infrastructure, bringing together roads, pipes, drainage, and vegetation and freeing up the remaining space for parks, lakes, houses, and, of course, ExxonMobil's campus.

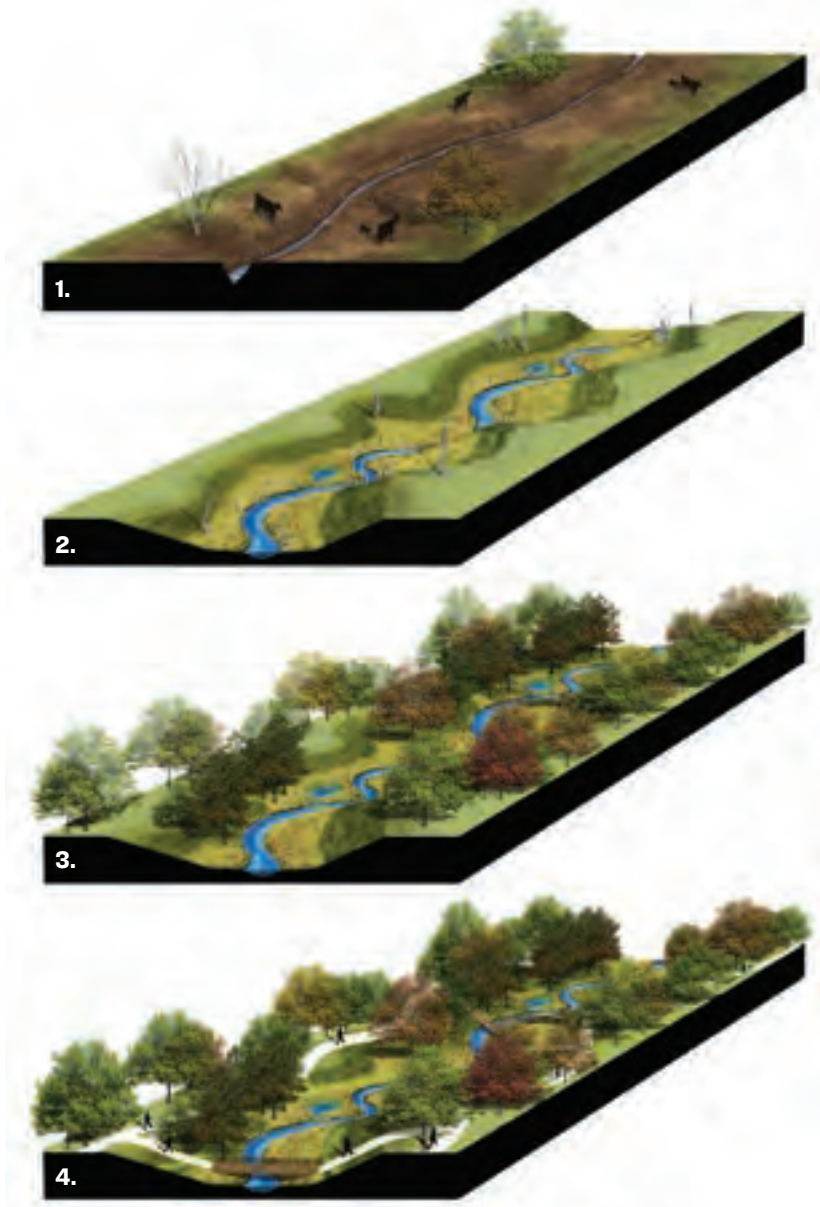
Cross Creek Ranch

Fifty miles west then south of Springwoods Village on Grand Parkway is Cross Creek Ranch. Houses there are suspiciously similar to those of Springwoods Village (and all their lakes similar to those of Minnesota), but the land upon which they stand are not. Despite driving past the same empty ranch and plantation land surrounding both developments, fifty miles of separation left room for the piney woods of The Woodlands to become the Katy Prairie of Cross Creek Ranch.

Johnson Development Corp. purchased the property as denuded pastures with the early intention of "doing something that was green and sustainable" says Matthew Baumgarten, SWA's lead landscape architect on the project. They did so through a number of means, both familiar and novel. "Just like any other master planned community, there's a very large basin that stores a one-hundred year event" but, on a normal day, it acts as a wetland park, says Baumgarten. There's that dual purpose again. Like Springwoods Village, traffic medians at Cross Creek Ranch are lush with "Tall Grass Zones" and backyards are resplendent with lake views. There is also the development's namesake, a three-mile long restored creek that used to be a watering hole for cattle.

Baumgarten planned for "all those things to look like landscape features" to the casual observer but subtly detain a "one-hundred year" flooding event. From my experience in Cross Creek Ranch, subtlety verged on invisibility. Finding the creek was surprisingly laborious: The band of bordering wetlands were maybe five to ten feet wide and recessed well below street-level. Once spotted, I arbitrarily parked and stepped into 110 percent humidity to walk through muddy, freshly mowed grass which gave way to unmowed, tall grasses and wildflowers recently soaked by rain the night before.

At last, there was a narrow stream with a smattering of plant diversity modeled after the Katy Prairie. The creek resembles Buffalo Bayou Park, which is no coincidence. SWA's success in creating a "synthetic nature" along the bayou caught Johnson Developers' attention who requested a similar approach here. Unlike Buffalo Bayou Park, there weren't paths or a recreational space to lure neighbors to the creek. This may explain why my guide, Christian, a five-year resident of Cross Creek Ranch, didn't know there was an actual Cross Creek. His high school buddies and his little brother didn't know they were participating in a natural restoration project either.



Reform

I began writing this article months before Harvey and the conclusion I had in the works is suddenly far more urgent. Though I have moved to Chicago, it is impossible for me to disconnect from the deluge of friends checking themselves in as safe, the articles proclaiming "catastrophe," the texts and phone calls from friends and family promising me they are okay. The eyes of the world are on the place I will always consider home. And everyone has an opinion.

Journalists, experts, and politicians are keen to draw or deny a causal relationship between Houston's lack of zoning and Harvey's destruction. A voice that breaks through the discordant noise is Mayor Sylvester Turner's who tweeted, "Zoning wouldn't have changed anything. We would have been a city with zoning that flooded." It's tempting to overextend the importance of zoning, which is about separating different types of land uses (residential, commercial, industrial), and to equate the lack of zoning with Houston's sprawl. What we lack in zoning inside Houston tends to be made up for with other types of development codes for everything from the number of parking spaces to elevation above the 100-year floodplain. Danny Samuels, Professor of the Practice at Rice Architecture, observes that "zoning made no difference" but newer houses up to stricter building code weathered the storm far better. In addition, Albert Pope, also at Rice Architecture, and many others have argued that we should not be building in the 100-year floodplain at all, and that vacating this space would open opportunities to organize dense developments around bigger green spaces. In other words, Houston would do well if it learned from and adapted lessons from its master planned fringes.

The Woodlands, Springwoods Village, and Cross Creek Ranch did and are doing well. The Woodlands had water on its streets during Harvey, and 220 people had to be rescued, according to Steffy's report in the *Chronicle*, with "the hardest-hit areas bordering Spring Creek." Nearby, Springwoods Village volunteered themselves and their resources for afflicted Houstonians but its developer reported that little flooding occurred within. The Kinder Institute tool showing where buildings are expected to have flooded marks a few properties in Springwoods Village along Spring Creek. I checked in with Christian about his family and neighbors in Cross Creek Ranch; he said they are "really lucky...no one got flooding in their house." The systems the architects put in place appear to have performed the way they were designed to. They captured water and absorbed it as quickly as possible.

While these master planned communities received Harvey well, they are not the solution to Houston's flooding problem. Even if a single well-designed development manages to hold more flood water than before it was built, all the energy and infrastructure required to service it is not sustainable in terms of maintenance costs, carbon emissions, and other measures. Think of the billions spent on new and widened highways like the Grand Parkway. They are still suburbs and lack the diversity of uses, people, and building types that make cities thrive over time.

Neither the landscape architect, Asakura, nor the engineer, Dr. Bedient, expect Houston to be retrofitted along the lines of The Woodlands after decades of unconstrained development. But these case studies in sustainably designing Houston's native ecosystems is evidence that the city can do better. That we don't have to combat nature but can design with nature. That we must do better for more than just the folks who can afford a quarter-acre plot of land in a refurbished prairie or the 385-acre ExxonMobil campus in former greenfields. With the storm waters receded, it's time for those who can plan for reconstruction to do so immediately.

My favorite issue of *Cite* magazine was published the Fall of 1997, when I was just two years old—*Cite 39: Texas Places*—opens with an interview of a personal hero of mine, Larry McMurtry. He is best known for his novel *Lonesome Dove*, which, for so long, I read as a tragic romantic comedy about Texas' Wild West glory days. The interview reveals otherwise. McMurtry calls his work "a critique of... the myth of the cowboy" and expansion to the West "a failure because of the destruction of the environment, the landscape, and the indigenous population." In the myth's wake are ghost towns squelched of any optimism that settled the damned place.

It is unsurprising that McMurtry sets many of his novels and movies in Houston. Like the western plains of Texas, Houston "never really has been controlled...It's always been fairly wide open, filled with graft and corruption." Correlations between Houston's unconstrained development and that of the Wild West have been made for as long as it's been heralded America's largest unzoned city. But this relationship is often used as justification for continued expansion. Our Manifest Destiny.

For so many years, development patterns in Houston have approached nature as an adversary, laying ever more concrete and exploiting its flat surface, ever chasing the bottom line. Perhaps Harvey has exacted extreme enough damage for us to take what has worked in a few parks and neighborhoods here and there, and scale up working with nature. H

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After Hurricane Katrina, New Orleans faced many of the same existential questions that Houston is now facing about how, where, and what to rebuild.

The scale of devastation in New Orleans led to many big ideas about creating immediate, wholesale change in flooded areas. However, today, New Orleans' urban footprint is still the same as it was before Katrina, and we have learned that recovery and resilience are not short-term propositions but long-term struggles that play out over years of federal funding applications, individual heartbreaks, and collective action by neighborhoods and residents.

In contrast to New Orleans' experience, Houston's floods from Harvey affected a smaller proportion of the city's population, and much of the city is now back to "business as usual," though an enormous number of families are still displaced and uncertain about the future. Houston needs to absorb the lessons learned in New Orleans quickly in order to ensure an equitable, consistent recovery for all of its neighborhoods and residents.

The long-term tragedy of Hurricane Katrina has proven to be the sheer inequity of recovery for families based on wealth, resources, and race. After Katrina, New Orleans lost more than 75,000 African-American residents, many of whom were never able to return from the cities where they settled after the storm—including Houston, where the city's open arms and large stock of reasonably-priced apartments led many families to remain. Skyrocketing housing costs for renters, and inequitable compensation policies for homeowners, were major factors in the lack of recovery for low-income and minority families. Service-sector workers and lower-income families who did return often took far longer to be able to fully return to their homes; many experienced adverse mental and physical health consequences due to the long-term trauma and stress, and the problems with living in often inadequately remediated homes.

Today, twelve years after Katrina, a strong economic and population recovery has taken place in New Orleans, but the benefits of this recovery have accrued unequally. After the devastation of the city's "naturally affordable" older rental housing stock, New Orleans still faces an extremely high percentage of cost-burdened renter households who spend over 30 percent of their monthly incomes on housing costs: 62 percent of renters are paying more than this HUD-defined standard. This is largely because many landlords with older properties did not have the financing to rebuild, or charged higher prices when the homes came back online due to the shortage of properties and the high cost of rebuilding.

Homeowners also experienced an unequal recovery. Neighborhoods like the Lower Ninth Ward, New Orleans East, and Pontchartrain Park, which were bastions of middle-class African-American homeownership, still have large pockets of vacancy when compared to New Orleans' predominantly White neighborhoods. One reason for this was the structure of the "Road Home" program that funded home repairs and buyouts after Katrina: compensation for homeowners was based on the home's pre-storm property value. What this meant in practice was that homeowners with similar homes and equivalent needs were provided with widely varying amounts of funding based on where they lived; a court case brought by the Greater New Orleans Fair Housing Action Center proved that these disparities clearly occurred along racial lines, since neighborhoods where Black families lived had lower property values than predominantly White neighborhoods (as is true throughout the rest of the country).

Houston risks a similarly inequitable recovery without immediate action. We do not yet know the exact number of low-income homeowners affected, but early projections show that more renters than homeowners were affected. East Houston, Greenspoint, Kashmere Gardens, and other areas took major damage. We also know that a large number of both subsidized and "naturally affordable" rental properties, such as the city's garden apartment complexes, were damaged. However, Houston also has many distinct advantages over New Orleans when entering a housing recovery.

New Orleans was almost completely devastated as a city after Katrina, with a larger percentage of the city that was flooded, and essentially no businesses open for months even in areas that were not flooded. A huge number of residents were not able to re-enter their homes for months, by which time the damage from water, mold, and humidity had compounded itself. In Houston, the quantity of housing stock devastated may yet exceed Katrina's numbers, but there are a far greater number of options available in the region for re-housing families on an efficient basis—though even these options will certainly be strained by the sheer level of need. In addition, many businesses and major job centers in Houston remain operational, allowing most residents to continue to earn an income while they figure out how to restore their lives.

ALEXANDRA MILLER AND ANDREANECIA MORRIS SEP. 28, 2017 3:42 PM

Equal Funds for Equal Need:

Learning from New Orleans and the Loss of Affordable Housing after Katrina

Houston has the chance to leverage its local economic strength, and its political advocacy for federal and state resources, to ensure an equitable recovery by making strategic decisions based on the following principles:

1.

Involve citizens in the recovery through routine points of engagement and provide regular updates on key statistics.

2.

Acknowledge that the needs of renters are different, but not less urgent than the needs of homeowners. Important tasks to ensure an equitable recovery for renters include:

- Help renters access assistance from FEMA for short-term rehousing.
- Evaluate the amount of rental stock affected, relative rent ranges of the properties affected, household sizes in affected areas, and the amount of vacancy in other rental properties, in order to evaluate housing need for renters at various income levels.
- Focus on accessing federal funding for short-term rental assistance and long-term reconstruction of rental property to meet the needs of renter households.

3.

Homeowners should be given every opportunity to return to their property. Houston policymakers and officials should learn the lessons from Katrina, Rita, and Sandy to ensure that any federal funding assistance is based on the cost of repair or level of damage to a property, rather than the home's value. Recommendations for an equitable recovery for homeowners include:

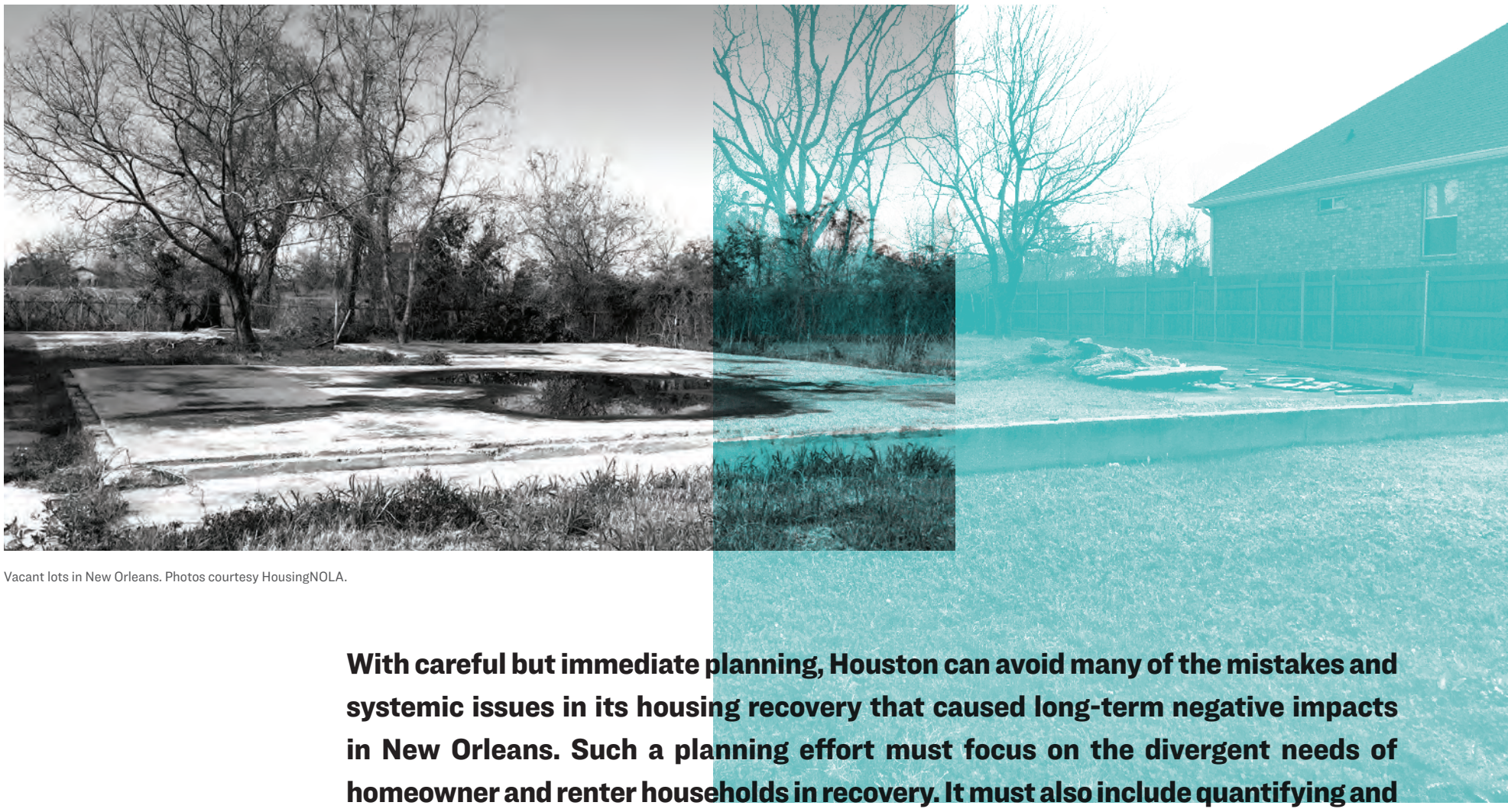
- Ensure that there is adequate and coordinated access to damage assessment information for all affected properties, and use this information to inform the design of federal funding programs for homeowner recovery.
- Ensure all homeowners are aware of where and how to apply for benefits from FEMA and HUD and have information on how to navigate any systems required to quantify the damage to their properties.
- Help households living in "generational" homes access legal help to firm up the ownership of their properties so they can receive federal aid.

4.

Address infrastructure and zoning and rebuild the understanding that 100-year storm models are no longer accurate. The "New Normal" means that Houston is likely to be impacted again in the very near future.

5.

Waiting for federal funding for home repairs and compensation is a slow and uncertain process. As Congress debates future funding allocations, Houston stakeholders should push for program design that provides equal funds for equal need.



Vacant lots in New Orleans. Photos courtesy HousingNOLA.

With careful but immediate planning, Houston can avoid many of the mistakes and systemic issues in its housing recovery that caused long-term negative impacts in New Orleans. Such a planning effort must focus on the divergent needs of homeowner and renter households in recovery. It must also include quantifying and addressing barriers for vulnerable and low-income household recovery; ensuring that federal, state, and local resources can be coordinated; and instituting new policies and programs that encourage long-term resilient development. H

Alexandra Miller is an urban planner and Principal in Asakura Robinson's New Orleans office, where she focuses on housing, real estate, and policy strategies that promote inclusion and economic opportunity. **Andreanecia M. Morris** serves as the Executive Director for HousingNOLA, a 10-year partnership between community leaders, and dozens of public, private, and nonprofit organizations working to solve New Orleans' affordable housing crisis.

The urban ambitions of our government leaders—so easy to dismiss in the past as nice words with no budget—may get a serious infusion of funds because of Harvey.

Recenter. Courtesy BRAVE / ARCHITECTURE.

The Texas delegation that Governor Abbott took to Washington D.C. lobbied for $61 billion beyond what the state already expects to receive from FEMA and the federal housing department. Almost two thirds of the funds would go to floodgates, seawalls, dams, and reservoirs. Of the third for housing, $9 billion would be for housing assistance in the City of Houston, which would help rebuild 85,000 single and multi-family housing units damaged by Harvey. Even though that request has stalled for now and even if the final budget numbers are smaller, Houston could see an unprecedented investment in housing.

How will that housing money be spent? Will it rebuild multi-family housing for low- and moderate-income Houstonians? Will new housing be located along transit? And will architects be given the opportunity to design beautiful, equitable, and resilient housing?

A Turning Point

"The post-Harvey disaster recovery could be a huge turning point that sets a positive course for the city," says Tom McCasland, Director of the City of Houston's Housing and Community Development Department. "The city can encourage multi-family housing where there is good transit, with service that is every 15 minutes during peak hours, and that is 100 percent affordable or has a mix [of affordable, workforce, and market-rate housing]."

McCasland's emphasis on equitable transit-oriented development, or eTOD for policy geeks, would bring Houston in line with a national push for community development that considers housing and transportation costs together when measuring affordability. Houstonians on average spend 45 percent of our income on housing and transportation together according to a Center for Neighborhood Technology report. Houston could achieve a more affordable future by lining up housing investments and METRO's current services, and its capital planning.

An estimated 300,000 cars flooded during Harvey. For many, the disaster is not being able to get to work. So eTOD would address poverty, mobility, air pollution, housing costs, and flood resilience.

The challenge for building good eTOD in Houston is one of overcoming NIMBY protests, navigating policy oriented to cars, and finding large enough parcels of land that are not toxic, not in floodplains, served by frequent transit, and not expensive—or so opportune that the expense is politically feasible.

Many of those areas are in majority Black and Brown communities that endured decades of systematic disinvestment going back to "redlining" practices in the 1930s, and that now fear displacement. At the start of 2017, Mayor Sylvester Turner designated five areas—Acres Home, Gulfton, Second Ward, Near Northside, and Third Ward—as pilot neighborhoods for the Complete Communities initiative. The key phrase for what "complete" means is "access to quality services and amenities." As several Livable Centers Studies already completed in these neighborhoods have noted, new and rehabilitated multi-family housing will be key to drawing services and amenities like grocery stores. "Retail follows rooftops" is the mantra.

"Density outside the floodplain is a big opportunity for resilience and, if done sensitively, neighborhoods can accommodate more growth," says Pat Walsh, Director of the City of Houston's Planning and Development Department.

McCasland adds, "Harvey is an accelerator and multiplier of a process that was already underway."

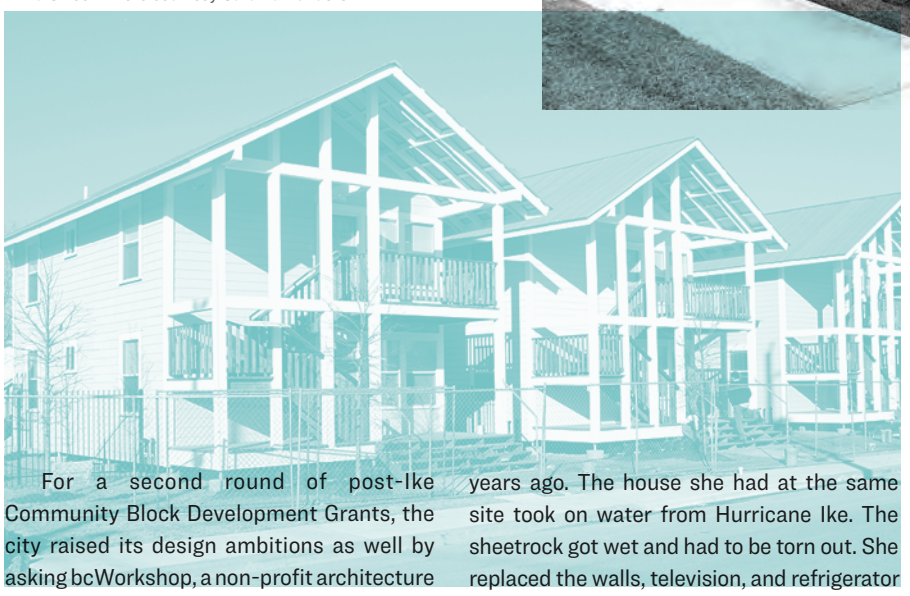
At the December 6 *Houston Chronicle* forum on Harvey, the City of Houston's "recovery czar" and former Shell CEO Marvin Odum said that using incentives to encourage equitable development is "high on the agenda." At the same event, Mary Landrieu, the former Louisiana Senator helping Houston lobby Washington D.C. for disaster recovery funds, said more progress has been made with the type of grants that fund housing than with big infrastructure projects.

One needle that the city is attempting to thread is encouraging development that does not displace the very people the Complete Communities initiative seeks to benefit. Another challenge is navigating the U.S. Supreme Court decision that prohibits the use of federal housing money to further concentrate poverty. Yet another challenge is the city's own development code including its minimum parking requirements, which can add substantial cost to housing along high-frequency transit routes.

RAJ MANKAD DEC. 7, 2017 3:53 PM

Harvey to be a Turning Point for Equitable Transit-Oriented Development in Houston

Edwina Hampton at her home. Photo by Raj Mankad.



Anita Street. Photo courtesy Catama Builders.

Precedents

Houston does have precedents for eTOD funded by disaster recovery funds. After Hurricane Ike struck in September 2008, Houston received Community Block Development Grants Disaster Recovery (CBDG-DR) through the federal department of Housing and Urban Development (HUD). Houston issued a request for proposals from private developers to build workforce and affordable housing along transit lines. The Village at Palm Center along the Purple Line in Greater Third Ward is now nearing completion, and is the first mixed-use, mixed-income, transit-oriented development in Houston. To finance The Village at Palm Center, the ITEX Group leveraged Low Income Housing Tax Credit vouchers for housing veterans, $15.3 million from the Hurricane Ike Disaster Recovery Housing Program funds, and an undisclosed mix of loans and equity. Developers call this the "capital stack."

The Ike disaster recovery funds also partially funded the Hardy Yards development, which recently broke ground and is another example of a mixed-use, transit-oriented development that includes affordable housing.

McCasland considers these multi-family projects valuable models while noting the need for a faster turnaround and a fuller mix of housing options that serve low-income, moderate-income, and market-rate paying individuals and families. In addition, Avenue CDC has built two equitable transit-oriented developments along the red line in the Near Northside at Avenue Station and the Fulton Garden Senior Apartments. The two Knowles-Temenos properties and one under construction, funded in part by none other than Beyoncé, are all located in areas served by light rail or frequent buses. New Hope Housing is building a mixed-use eTOD on the green line along Harrisburg Boulevard. Other smaller-scale examples of eTOD in Houston have been built or are underway. The Anita Street houses, built through a collaboration of Project Row CDC and the Midtown TIRZ, are an iteration of a design first developed by the Rice Building Workshop under the direction of Rice Architecture professors Danny Marc Samuels and Nonya Grenader.

Beauty and Equity

Good design by accomplished, local architects like Val Glitsch and GMSA is at the heart of New Hope Housing's approach to bringing people off the streets, which not only benefits the residents but also gains support from neighbors. The New Hope Housing developments are not only beautiful in terms of style, they engage the material and context of the surrounding neighborhoods, and elevate the experience of residents with units that open onto courtyards. The Recenter, which helps men recover from addiction, is planning to build a 50,000-square-foot, mixed-use building in Midtown along METROrail on Main Street with over 60 residential units. The contemporary design by BRAVE / ARCHITECTURE is sited to enhance the pedestrian realm along with terraces, porches, and a vegetated roof where the residents can grow some of their own vegetables.

For a second round of post-Ike Community Block Development Grants, the city raised its design ambitions as well by asking bcWorkshop, a non-profit architecture practice founded in Dallas, to set up a process to build single-family houses for seniors affected by the hurricane. bcWorkshop was supported by the Gulf Coast Community Design Studio, Unabridged Architecture, and the University of Houston Community Design Resource Center. This group in turn partnered with several local architects—MC2, Taft, McIntyre + Robinowitz, Brett Zamore, Metalab, m+a architecture, Lantz Full Circle, Logan and Johnson, and Cedric Douglas—to create a catalog of houses that clients could choose from.

"The process included good community engagement that went beyond the usual putting dots on a board," says Douglas. "The architects met interested residents, and we had a real exchange about the program. After the first draft, we did another pin-up with residents so the design would respond to what they were looking for."

From his participation ten years ago in the Rice Design Alliance's 99K House Competition, Douglas knew the potential and limitations of designing affordable houses. His approach was to maximize shared spaces for multi-generational families and make a tight plan for bedrooms. Small directional changes in the cementitious board used for the facade correspond to the interior. The vertical panels on one side correspond with the open living spaces and porch while the lap-siding lines up with the bedrooms.

Of the 400 houses originally planned under the program, 306 were built or are under construction in Acres Homes, Independence Heights, Near Northside, OST/S. Union, and Sunnyside. Many but not all of the locations are close to high-frequency buses and light rail.

Edwina Hampton, now 80 years old, moved into her new home a little over two years ago. The house she had at the same site took on water from Hurricane Ike. The sheetrock got wet and had to be torn out. She replaced the walls, television, and refrigerator but she didn't have enough money to complete the kitchen. The insurance she carried did not pay enough for total repair, and FEMA would not help because she had insurance. As a result, she qualified for the city's single-family program and chose the design by m+a architecture.

She wanted the front and side porches. "I didn't mind that it didn't have a carport or garage because I don't have a car," says Hampton. The site is a close walk to a bus line that runs every 30 minutes during peak periods and within a mile of light rail.

Many details in the plans submitted to the city by the participating architects, most of whom had extensive experience in residential construction, were changed by the city based on guidelines that specified, among other things, the maximum size allowed for porches. According to Mark Schatz, a founding principal at m+a, the dignity of his firm's design survived the alterations but not the delight.

In response to this point, the bcWorkshop team notes that the guidelines that limit home designs in disaster recovery come from the state and federal levels. By email, they wrote, "We believe empowering local jurisdictions to draft and implement their own home design guidelines will increase the choices and options residents have during a housing reconstruction process, and that community and neighborhood engagement shouldn't be optional but a priority in these processes."

Although the implementation by the city was not perfect, the DR2 program was recognized with a national design award, the 2016 AIA/HUD Secretary's Awards. The city deserves praise for its use of disaster recovery funds after Ike to rebuild in creative ways; bcWorkshop and the participating design firms deserve credit for their patience in working through complex bureaucracies; community organizers like GO Neighborhood teams are indispensable to bringing these projects to the neighborhoods where they are needed most; and the clients, like Edwina Hampton, must be praised for their grace and grit when the rest of the city has moved on from disaster mode.

And yet, we could do better. Housing takes time to build but why ten years? Why undermine good design that meets budget requirements because of federal guidelines when the city can adopt its own? Can costly minimum parking requirements be changed for housing near high-quality transit?

Houston now has a chance to learn from past mistakes made after past disasters, and to get housing right and in a big way.

The Impossible Paradise

As José Solís notes, rebuilding by design can be integrated at every stage of disaster recovery. For example, the city can partner with organizations like the Rice Design Alliance, publisher of *Cite* magazine and my employer, to raise the design standards of the teams that carry out projects funded by disaster recovery funds.

In ten years, we really could be looking back at Harvey as a true turning point. Will Houston turn into Brooklyn or Boston or San Francisco? Houston's future is likely a continued hodge-podge with no single destiny except perpetual tearing down and building. But these repeated catastrophic floods are already shifting the region's development patterns and regulations. Harvey may well establish a new model that connects people of different incomes to one another, and to jobs, schools, and ecosystems.

There is a window for a massive investment in equitable transit-oriented development, and it won't be open long. **H**

Raj Mankad has served as *Cite* editor since 2008 and is a co-founder of Grackle and Grackle.

Where does design fit in post-Harvey policy?

After Harvey, County Judge Ed Emmett, Rice University faculty Jim Blackburn, and others released lists of recommendations for rebuilding after Harvey. The ideas can be broken into three basic food groups.

Fortify.

This group is generally large in scale and expensive. The projects prevent flooding and, with the involvement of designers, possibly expand access to parks, trails, housing, and economic development. Projects include:

- Fortifying the coast with gates and walls
- Building a new reservoir in the northwest
- Widening bayous
- Rebuilding streets with better drainage and retention capacity
- Requiring more on-site detention from developers

Get out of the way.

This group is generally small in scale and paid out in small chunks, though it adds up. Designers can make the individual parts also add up into a greater whole. Policies include:

- Buying out or elevating properties that flood repetitively
- Stopping new developments in floodplains (or requiring them to meet much tougher regulations like higher base elevations and electrical systems out of harm's way)
- Redrawing the flood maps that inform regulations
- Creating carbon sequestration markets that preserve wetlands and prairies
- Reforming the National Flood Insurance Program to discourage vulnerable new developments
- Publicizing rather than hiding flood risks from those buying land and building on it

Coordinate.

This group has to do with sharing information and governing in a way that matches how water moves (without respect to arbitrary jurisdictional boundaries). Designers often are the ones who have to work across these systems and can quickly point to the breakdowns:

- Coordinating flood management across counties, cities, river authorities, the Army Corps, Municipal Utility Districts, etc.
- Alerting people about hazards at a dwelling-by-dwelling, underpass-by-underpass level of detail

Missing from proposals on the table is an explicit commitment to urban design, though the mayor's Complete Communities initiative, Plan Houston, Bayou Greenways 2020, and METRO capital planning are being discussed by leaders as a way to direct rebuilding.

History provides a guide for how Houston can rebuild after the devastation of Harvey. In the wake of destructive floods in the early twentieth century, both Los Angeles and San Antonio undertook significant flood control projects to mitigate future flood risk.

Rendering of The Big U. Image from rebuildbydesign.org.

However, the forms those projects took differed drastically. In Los Angeles, the Army Corps of Engineers channelized the L.A. River with concrete and created an urban eyesore that has lasted for nearly a century. In San Antonio, the local community strongly advocated a flood control project that not only provided protection, but also served as an amenity for the city. An architect, Robert H. Hugman, developed a plan that would ultimately become the Riverwalk, drawing tourists from across the globe with an estimated $13 billion annual impact. Meanwhile, nearly a century later, Los Angeles has realized the potential of the L.A. River as an amenity rather than a blight and has engaged a design team led by architect Frank Gehry to reimagine it.

In anticipation of the federal and state moneys that will start flowing into the Houston region in the wake of Harvey's devastation, local officials are already identifying major infrastructure projects that help protect the area from future disasters. The public and private sectors should work together to make sure that, in addition to providing the critical protection that our city needs, these projects enhance the quality of life for adjacent communities and the region as a whole.

These two historical examples illustrate how considering design as an integral part of a project solution has the potential of creating public spaces that can transform the city and help drive the local economy in addition to providing protection. Houston, too, has taken some major steps in this direction since the 1970s with detention basins and bayous that double as parks. Austin's flood mitigation plans for Waller Creek are enabling investments in parks, trails, luxury housing, and workforce housing. As much as Texans don't like getting lectured by Northerners, when it comes to the scale of rebuilding we need after Harvey, we should also look to the Northeast.

After Superstorm Sandy, states in the Northeast were in the same position that Houston is now. Faced with destruction across the region, local officials also had to develop projects to help protect their communities from future threats. As will likely happen with Houston, billions of dollars began flowing into the region for rebuilding. While a majority of those funds were designated for specific projects and programs, officials also understood the potential for design to play a significant role as they rebuilt. They created the Rebuild by Design Competition, which evolved into a broader initiative for rebuilding cities to be more resilient, to bring the top design teams from around the world to imagine projects, funded through Housing and Urban Development (HUD) block grants, for their communities. Teams led by acclaimed firms and institutions such as Bjarke Ingels, OMA, and MIT developed solutions that would not just provide protection from future storms but also create public spaces that would revitalize communities across the region.

Such an undertaking would be just a slice of the work done to help the city, county, and region recover. And our region would need to discuss what form such an effort could take for the Houston area. How much funding should we devote to it? What geography should it include? Which entities should be invited to submit ideas? How would we structure such an initiative?

Most of Houston's challenges will require interventions different than Manhattan's. The fact that we live in a flat plain might mean the best solutions are more dispersed across the region, and not readily visible to the untrained eye. At the same time, some grand and iconic gestures may be worth the investment too in order to regain the ability to attract major corporations who may be leery of relocating their employees to Houston now. Houston needs to demonstrate to the world that we are serious about addressing flooding issues. Houston's version of Rebuild by Design could help frame long term priorities even as we continue to address affected people's immediate needs. Our version could focus investment on traditionally underserved areas during the recovery process by encouraging project proposals to build from meaningful community input. The conversation to determine the scope and goals of a Harvey effort could be one that all Houstonians could participate in. While the type of impact that the Northeast experienced after Sandy was very different than what Houston experienced, an effort tailored to address the specific needs of our region could identify the most innovative and impactful solutions for rebuilding a better Houston.

Many individuals and groups across the region are in intense discussions for how we should be rebuilding after Harvey. Jim Blackburn and Rice University's Baker Institute have issued recommendations. Judge Ed Emmett has released a fifteen-point plan and major foundations have put together a research consortium to guide decision-makers. Multifunctional design should be one more topic that is added to those conversations.

As Houston contemplates how it will rebuild after Harvey, local, state, and federal officials should recognize that flood management projects should not mitigate flood risk at the expense of the region's vitality, character, and quality of life. The histories of San Antonio and Los Angeles provide strong arguments for why design should play an essential role in developing new infrastructure and a cautionary tale for what happens when it is ignored. Rebuild by Design provides a blueprint for how Houston can attract leading thinkers to develop solutions that will not only protect us during future floods, but let people enjoy living here for all the times in between. For a city that was daring enough to build the world's first indoor stadium and send a man to the moon, Houston has the opportunity and experience to reshape itself as it rebuilds after Harvey. Let's be daring enough that when we do rebuild Houston, we make it great. **H**

José Solís is the founder of Big and Bright Strategies, which specializes in sustainability, risk mitigation, and project management for architectural and planning projects.

JOSE SOLIS OCT. 30, 2017 2:24 PM

A Call to Rebuild Houston by Design:

Mitigation Alone is not Enough

In the aftermath of two "500-year" floods in the last three years and more recently a "1,000-year" flood following Hurricane Harvey, a two-book volume illustrating the work of the Risky Habit[at]: Dynamic Living on Buffalo Bayou studio, led by my colleague Peter Zweig at the University of Houston, reads more like prophecy than architectural research. Expanding upon the late University of Houston Professor Tom Colbert's mapping of environmental issues confronting the Houston-Galveston Bay region, the studio proposed ten interventions along the 100-mile length of Buffalo Bayou that would defend against or mitigate Houston's intense environment; their work received the Global Art Affairs Foundation (GAAF) award for best exhibition at the Venice Architecture Biennale in 2014.

All images from Risky Habit[at] Studio, Venice Biennale, 2014.

SHERYL TUCKER DE VAZQUEZ DEC. 5, 2017 10:12 AM

Bold Visions for Buffalo Bayou

Proposals Incorporate Park Access, Housing, and Delight in Flood Management Infrastructure

Over the course of three semesters, the Risky Habit[at] design studio students took a holistic look at Houston's environmental challenges to reveal the interconnectedness between the city's oil-driven economy, car-culture, unchecked sprawl, loosely-regulated petroleum refining industry, higher health incidents of cancer along specific sections of the bayou, and poor air and bayou water quality, as well as two aging and at-risk dams. According to Zweig, other risky habitats like Houston such as the Netherlands, New Orleans, and Argentina have utilized three strategies against flooding—evacuation, defense, and mitigation. The Risky Habit[at] studio investigated the strategies of defense and mitigation in their design proposals.

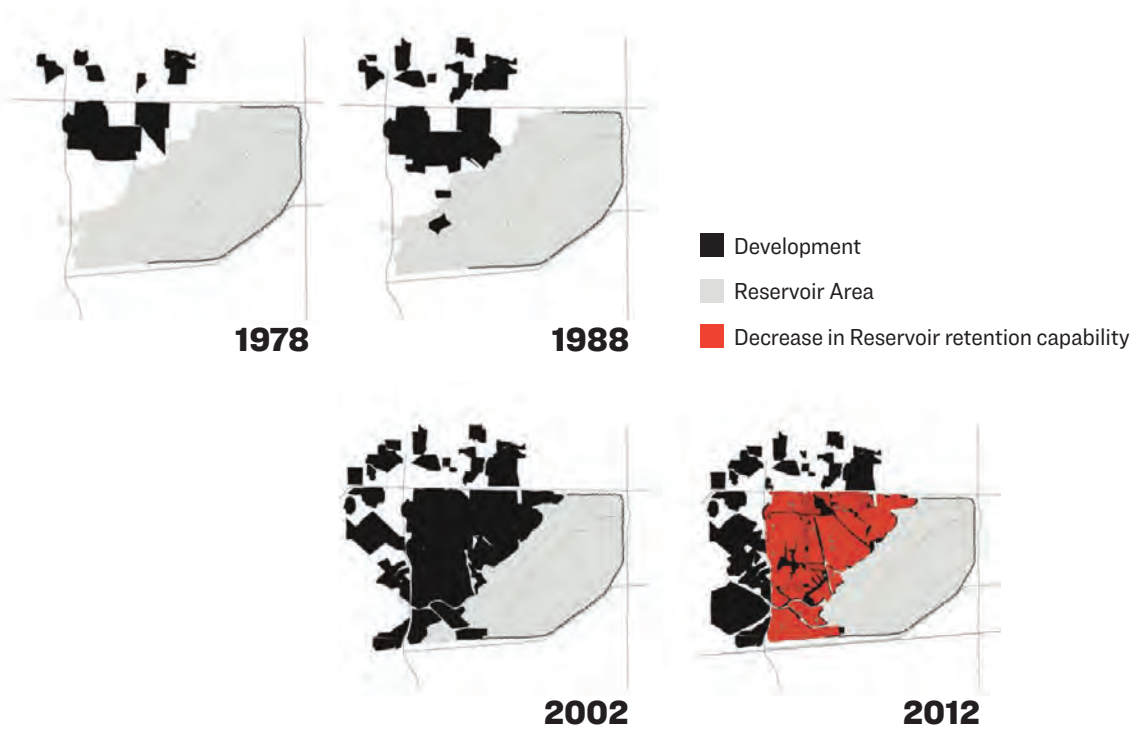
Beginning at the mouth of Buffalo Bayou with the Addicks and Barker Dams that straddle I-10 west of Houston, the Risky Habit[at] studio cut nine north-south sections at distinctive moments along the bayou including suburban communities to the west, downtown Houston, the East End, the Turning Basin, the Ship Channel, and the Chemical Corridor. With sustainability and resiliency built into all of the proposals, they operate at three distinct scales—the city, the building and the room.

At the scale of the city, public amenities are integrated with defensive infrastructures that bookend the bayou at the Addicks and Barker Dams to the west and the Shipping Channel to the east. In between, and at the in-between scale of the building, interventions are programmed to respond to their specific context with the goal of restoring the bayou. For example, in the East End, shipping containers are re-purposed as a self-contained prison that would capitalize on a rehabilitation program to help rehabilitate both the prisoners and the bayou system. At the smallest scale, that of a 20-foot room, the more traditional conception of façade is re-imagined as a spatial condition that mediates between the interior spaces and an often volatile external environment and the programming tends towards the recreational and whimsical. For example, in one project an inflatable façade morphs into different configurations to become a lantern for boaters, a swimming pavilion or a backdrop for performances just to name a few.

"Where the built environment is a main force exacerbating the impacts of urban flooding, Houston is number one and it's not even close."

Samuel Brody, Professor of Marine Sciences, TAMUG

In the wake of Hurricane Harvey, the proposals at either end of the bayou are particularly compelling—Ship Gate on the eastern end of the bayou at the mouth of the Houston Shipping Channel and Dam City, a high-density housing intervention that would wrap around the eastern perimeter of Addicks Dam. Completed in the 1940s, the Addicks and Barker Dams were constructed after the Rivers and Harbors Act of 1938 in the wake of a 1935 flood that flooded downtown Houston and killed seven people. Today the reservoirs remain the only means to manage water flowing into the mouth of Buffalo Bayou. On August 27, 2017, after two days of heavy rainfall during which water was rising at a rate of 6 inches per hour, water flowed over the Addicks reservoir spillway for the first time in its 80-year history. In an effort to prevent more catastrophic failure of the reservoir and flooding, on August 28th, officials decided to release record amounts of water. Water was released from Addicks and flowed south under I-10 through an outlet leading to the bayou. The surrounding communities of Cinco Ranch southwest of Barker Reservoir and Bear Creek Village on the western edge of Addicks Reservoir were flooded, but without this controlled release, officials say, the damage to the surrounding area could have been far worse.



Although officials in the Harris County Flood Control District reject this notion, in many ways Houston is a victim of its own success. Laissez-faire regulations have made Houston a great place for businesses, and the lack of zoning and the acceptance of uncontrolled sprawl have made the Houston housing market one of the most affordable in the country. The combination of a relatively strong economy and affordable housing beckons more newcomers each year which leads to more expansion and more newcomers and so on. One of the casualties of this growth is the soil's natural ability to drain off heavy rainfall. Houston's soil (which is in large part clay) is among the least absorptive of all soil types, but tall prairie grasses that once grew before the area was settled by ranchers and farmers and then built up with housing, could have absorbed much of the run-off.

Looking at the project's diagrams that describe the gradual encroachment of housing developments on the reservoir since the 1980s, one can easily understand the increasing pressure put on Barker Dam as land disappeared underneath house foundations and parking lots. By returning much of this developed land to prairie and compressing single family homes into a high density settlement with communal green space, Dam City becomes not just a new type of building, but a new way of life in Houston's suburbs. Project designer Yoelki Amador proposed excavating a deeper bowl at the Barker Dam site and using the excavated earth to build up the bowl's rim around the deepened reservoir. This built up rim would contain run-off waters within the bowl and lift a linear thirteen-mile housing development along its eastern, north and southern edges up above any potential threat of flooding.

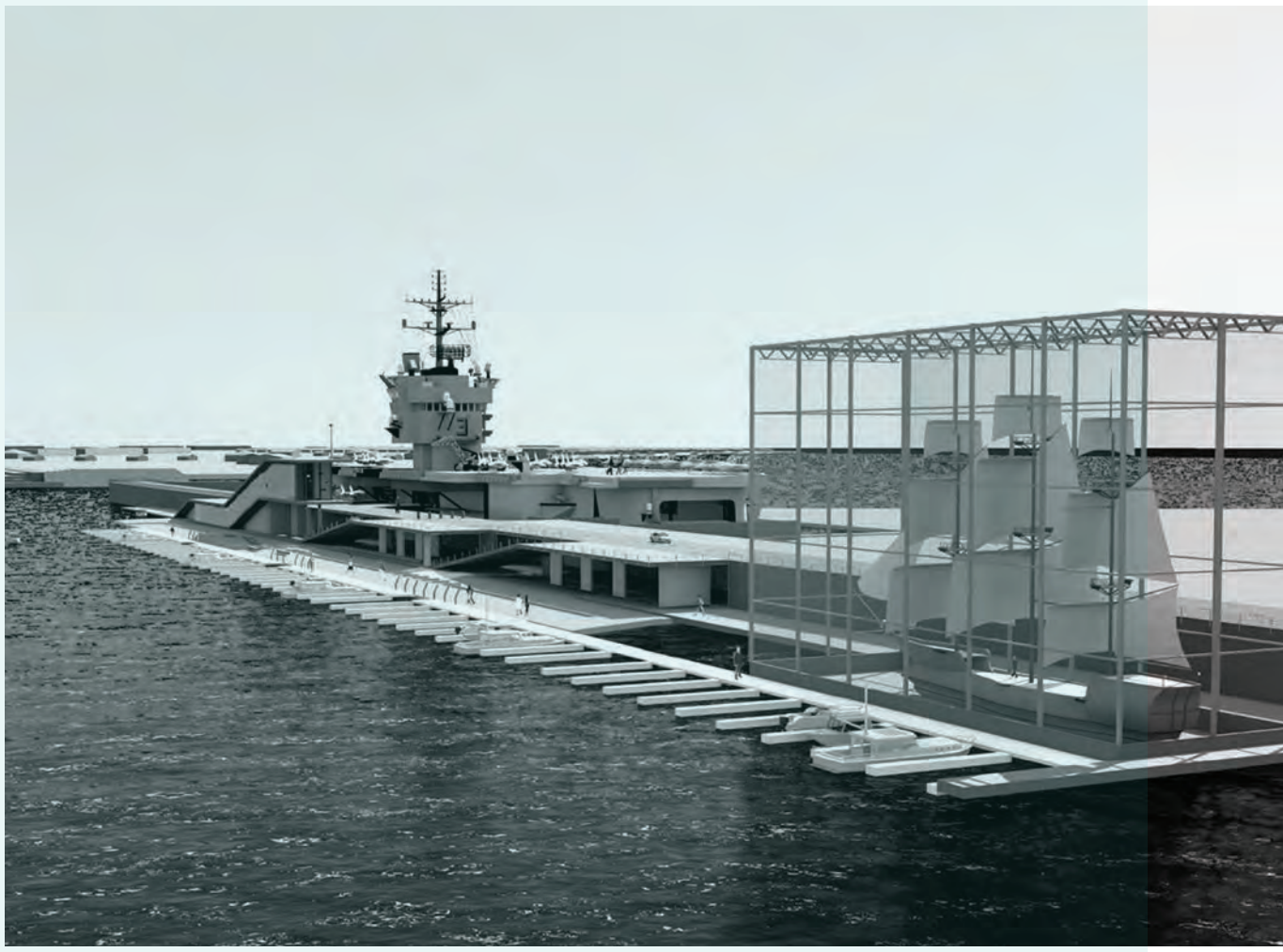
"There is no singular solution to address urban expansion, population growth and climate change with regard to how they impact our coastlines."

Tom Colbert

The architecture consists of two interwoven paths that shift relative to each other based on changes in the program as they rotate around the rim. Retail shops and schools would be layered between housing above and parking below, but informed by solar orientation and views, the program changes as the system moves around the perimeter of the reservoir. The linear scheme would be connected by an electric transit system with garbage pickup at the lowest levels. The reservoir would always contain water giving residents a lake view year-round. The powerful perspectives of Dam City are created with an overlapping and interlocking structural system that occurs where vertical circulation towers connecting the levels overlap and would reinforce the dam's strength, and garages below grade would help the system resist torque forces.

The studio considered the economic viability of the proposals as well. Replacing the dam as is would cost billions, but Dam City would be a private/public partnership with public funds coming in part from a consortium of public tax credits, TIRZ funds, and private real estate developers.

As devastating as Hurricane Harvey was for many Houstonians, in many ways Houston dodged yet another bullet. Working with SSPEED (Severe Storm Prediction, Education and Evacuation from Disasters) in the wake of Hurricanes Katrina and Ike, Professor Colbert warned that if the city suffered a direct hit to the Ship Channel, the collateral damage would be catastrophic. Colbert pointed to SSPEED studies that showed that "if Ike had hit the Ship Channel directly rather than east of the Bolivar Roads, it would have generated a storm surge of 18 feet in the Houston Ship Channel and 15 feet on the western side of Galveston Bay." The same report says that "although Hurricane Ike was only a Category 2 storm, it generated over $25 billion dollars in damage." In the event of such a surge, thousands of lives would be in danger if people are not evacuated.



In addition to the loss of life and property, scholars like Hanadi Rifai have warned for years that Houston's chemical storage tanks are vulnerable in the wake of high storm surge. A direct hit to the Ship Channel would mean that the thousands of chemical storage tanks that flank both sides of the channel could become unmoored and crash into other floating debris or buckle in high winds and leak dangerous chemical toxins miles around. During Katrina, damaged chemical storage containers leaked several million gallons of oil into the surrounding landscape. The storm surge from Harvey was not as high as that of Katrina and Houston avoided the large scale chemical spills, though some storage tank leaks were reported. Zweig believes that the pollution to air, water, and land created by the shutting down and restarting of chemical facilities before and after Harvey was greater than reported during the outbreak of Harvey: Texas allows the chemical storage industry to self-regulate and the industry often limits what they report regarding spills and toxic air.

Risky Habitat's proposed Ship-Gate, designed by Chase Stanley, would utilize a decommissioned military vessel that would be permanently docked at the mouth of the Ship Channel. Until needed, its upper levels would house a museum much like the retired offshore rig, Ocean Star, in Galveston. In the event of a potential storm surge, the vessel, which would be docked perpendicular to one side of the channel opening, would glide into the mouth and a valve would release, allowing water into the lower levels and partially sinking the ship. The vessel would remain there as a protective barrier until the surge threat passed. Since only the lower portions of the ship would be flooded, when the water drained from the hull, the vessel would return to use as a museum.

Ship-Gate was designed when the SSPEED center proposed the Centennial Gate (a floodgate that would be built mid-bay near the Fred Hartman Bridge) and Lone Star Coastal National Recreation Area, a non-structural surge mitigation proposal that would restore the natural habitat as a protective surge barrier and provide a public amenity for locals and tourists alike. Colbert sought to highlight how this infrastructure could enhance public access to the bay and serve as a symbol for our community through a rendering that playfully positioned the Statue of Liberty at the site.

The SSPEED center has since revised its proposal. Researchers at Rice University, Texas A&M, and TU Delft have developed several proposals for gates and barriers. The broad concept of Ship-Gate and other recommendations for ecological barriers that serve multiple uses remain intact. The 2017 plan (H-GAPS) recognizes that no single intervention will protect the coastal system and has investigated "multiple lines of defense." As the specific approaches are evaluated, debated, and refined, and as the engineering ideas are developed, the Risky Habitat proposal serves as a reminder to incorporate public access, housing, and delight into the final concept.

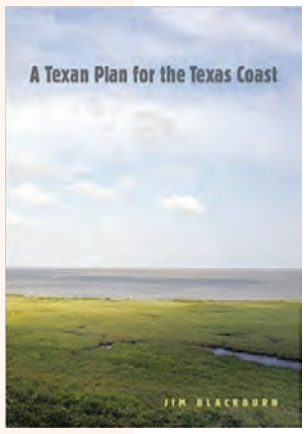
Houston was born from imagination—a narrative spun by the Allen family to attract investors to a non-existent, inland port. The settlers then set about making that narrative a reality. Two hundred years later, Houston is still a unique confluence of geography, people, and rugged individualism that resists more traditional models of urban planning. The Risky Habitat studio illustrates the same imaginative kind of thinking from which the city was born, but it remains to be seen if Houstonians have the will to once again build from imagination. H

"Houston is a city that is still becoming."

Cite Co-founder, University of Houston Professor Bruce Webb

Sheryl Tucker de Vazquez is a registered architect and lecturer at the University of Houston School of Architecture. **The UH Risky Habit[at] Studio** is one component of a broader investigation conducted by the "Three Continents Studio: Living in Dynamic Equilibrium," a year-long research partnership with Tulane University, the University of Buenos Aires, and Technical University, Delft. Developed under the auspices of the University of Houston Gerald D. Hines College of Architecture and Design Dean Patricia Oliver and sponsored by the Gerald Hines Foundation, UPS and Thomas Printworks, the work of the Three Continents Studio was exhibited in three International Biennales in the 2013-14 academic year: Buenos Aires, Venice, and Rotterdam. The UH Three Continents Studio was led by professors Peter Zweig and the late Tom Colbert along with faculty advisors Michael Rotundi of RoTo architects and Kulapat Yantrassat of wHY architects. The Risky Habit[at] Studio was led by Peter Zweig with key student contributors: Chase Stanley, Jackson Fox, Lacey Richter, Sam Goulas, David Regone, and Wells Barber.

Jim Blackburn loves (and lives) the Texas Gulf Coast. Much has been written and debated on how to mitigate the impacts of industry and climate change on future destructive flood events. But the policy recommendations of Blackburn—an environmental lawyer, educator, wildlife preservationist, birder, and outdoorsman—may surprise you. He calls not for greater regulation but for new markets.



To provide a foundation for these policy ideas, Blackburn gives us a basic understanding of coastal ecology while guiding us along the 624-mile long stretch of the Gulf Coast.

The book identifies three major assets of the Texas coast: green (natural assets), gray (industry), and water. ("Without freshwater inflow, our bays would die.") The wildlife of the coast depends not only on adequate water but specifically freshwater to desalinate the bays. Without freshwater, oysters, blue crabs, shrimp, and juvenile finfish could not be sustained, and the demise of the bird species that feed on these creatures would soon follow.

Clear diagrams are populated with meticulously researched data. Some are more familiar, such as maps of Texas bays and rivers and annual rainfall. These are juxtaposed against lesser known systems, such as coastal wetlands, oyster reefs and seagrasses, navigation channels, pipelines, power plants, and refineries.

It is the complete interdependency of these seemingly distinct systems that would result in a costly if not deadly disaster, if one or more of these systems were to fail.

The multi-institutional research group headed by Blackburn, Severe Storm Prevention, Education, and Evacuation from Disasters Center (SSPEED), modeled the effects of a 24-foot storm surge in the Houston Ship Channel, in which 90 million gallons of crude oil would be released into Galveston Bay, far surpassing the Exxon Valdez oil spill and possibly the Deepwater Horizon event. Rather than spill into open water, the spill would be into Galveston Bay, one of the most productive estuaries in the U.S.

The more immediate concern, post-Harvey, is the widespread problem of flood mitigation. FEMA maps, until recently, have more effectively described riverine flooding rather than hurricane surge flooding. Additionally, residents in flood-prone areas are not automatically required to enroll in flood insurance programs.

The Texas Gulf coast is one of the least regulated of U.S. coastal areas. Blackburn attests that without federal environmental law (Clean Air Act and Clean Water Act) and the Army Corps of Engineers, for which he taught in the 1980s, there would be no environmental law on the Texas coast. Since 1972, when Texas rejected the federal regulations and funding of the Coastal Zone Management Act (CZMA), the state has more or less managed its own coast.

By having rejected a strong coastal management act, it has fallen on private parties (80 percent of the land along the Texas coast are private lands) to protect the coast, much of this through litigation. Blackburn believes that preservation (such as prairie restoration or sustainable ranching) is to be accomplished not in the form of regulation, but funded through the creation of new markets. In a market economics based approach, private landholders would sell carbon sequestration credits to corporations in the form of (unregulated) commodity contracts. The consumer would then, ostensibly, purchase such products branded as carbon-neutral. ("One can envision having a choice to purchase from a gasoline dealer that provides carbon-neutral gasoline at a slightly higher price than non-carbon-neutral gasoline.")

Some environmentalists question whether there would be sufficient willing buyers in a voluntary system and the market base for such a system. Blackburn is optimistic. For Blackburn, eco-services of ranching, birding, and fishing, are to continue to be maintained through private litigation, entrepreneurship, competition, and personal commitment.

The reader has the sense that Blackburn himself would perish without the Texas coast, just as the whooping crane (a species that almost became extinct) would without the oysters that depend on freshwater flow to the bays. Aptly, he ends with a series of poems, as a tribute to our coast. H

NuNu Chang is co-owner and principal of Albers Chang Architects in Houston. She serves on the editorial committee of *Cite*.

NUNU CHANG DEC.18, 2017 10:33 AM

A Market-Based Environmentalism:

Review of *A Texan Plan for the Texas Coast* (2017) by Jim Blackburn


August 29, 2017
I'm 3 cars down in H-Town.
Car 1 cheated on its emissions testing.
RECALL
Car 2 refused to turn off.
CHECK ENGINE
CRISIS OF EXISTENCE
Car 3 fell victim to the hurricane.
Me, along with 300,000 others, lost our cars to flood damage.
Luckily, I live within a bike ride of a rail station.
Hermann Park/Rice U
Northbound Red Line
I have another way to get where I need to go.
RAIL RIDER
PROLOGUE
Story/Art by Victor Benavides
Concept by Natalye Appel
Edited by Ernesto Alfaro

2017 RDA GALA

LAUNCH

CELEBRATING LINDA SYLVAN

More than 850 guests came together on Saturday, November 11, at the Hilton Americas to attend Launch, the thirty-first annual Rice Design Alliance gala. Honoring Linda Sylvan, retired Executive Director of the Rice Design Alliance, the evening raised critical support for the Rice Design Alliance's 2018 educational programs and publications, celebrated 45 years as the community engagement program of Rice Architecture, and introduced our organization's new Executive Director, Maria Nicanor.

Co-chaired by Mikki Hebl and David Harvey and Lynn and Ty Kelly, Launch brought together professionals in the architecture, engineering, construction, and design industries; as well as Rice alumni, developers, artists, philanthropists, and others. A special segment of the crowd included many Rice Design Alliance Hometown Tour participants, who have traveled with Linda from San Antonio to Japan. Underwriters of Launch included the following: Cardno; DPR Construction and Stantec; D.E. Harvey Builders; Louisa Stude Sarofim; and Walter P Moore.

Guests arrived ready to bid on more than 100 auction items, which included trips to New Orleans, Hawaii, and Mexico; furniture and jewelry, local architecture experiences, wine, and even a kid's ride-on Tesla. The wonderful auction was chaired by Barbara Amelio and Laurie Scott.

The environment and graphics designed by Randall Walker, Craig Minor, and Cheryl Beckett added to the fun as huge balloons held up paper airplanes and cutouts of Linda decorated each centerpiece. Bright florals by Bergner and Johnson Design added to the energy and beauty of the environment. Entertainment by Yvonne Washington and the Mix kept the crowd dancing until midnight.

A program, presided over by current Rice Design Alliance President Kristi Grizzle, honored Linda's history with the Rice Design Alliance, through a video that told about her many accomplishments at the organization. The video featured comments by Rice Architecture Professor Carlos Jiménez, Rice Design Alliance President-Elect Juliè Gauthier, and former Rice Design Alliance Board members Christof Spieler and Nicola Springer. Houston City Council member David Robinson presented Linda with a city proclamation of November 11 as Linda Sylvan Day.

The program was capped with the introduction by Dean Sarah Whiting of Maria Nicanor, the incoming Executive Director of the Rice Design Alliance. Also in attendance was Angie Chen, who during Maria's transition to Houston is expertly serving as interim director. Launch was the perfect place and time to welcome her to Houston.

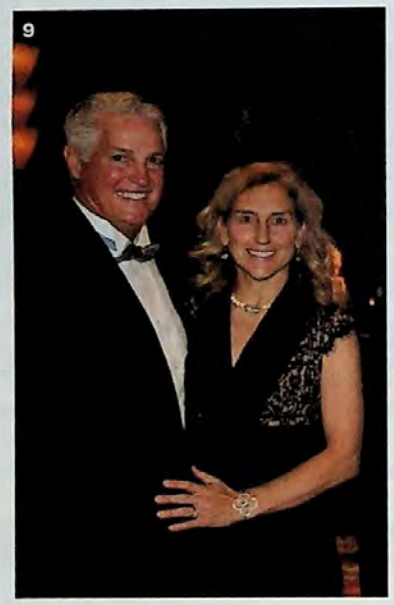
The Rice Design Alliance provides community engagement for Rice Architecture and Rice University, offering lectures, tours, educational events, and publications that promote a vigorous discussion about the built environment in Houston. Gala proceeds provide operating support for RDA's programs and publications. Since 1989, the RDA gala has recognized individuals and institutions that have made exceptional contributions to architecture and design in Houston and in Texas, including Gerald D. Hines, Raymond Brochstein, Bobby and Phoebe Tudor, Stephen Klineberg, Uptown Houston, and Ric Campo.















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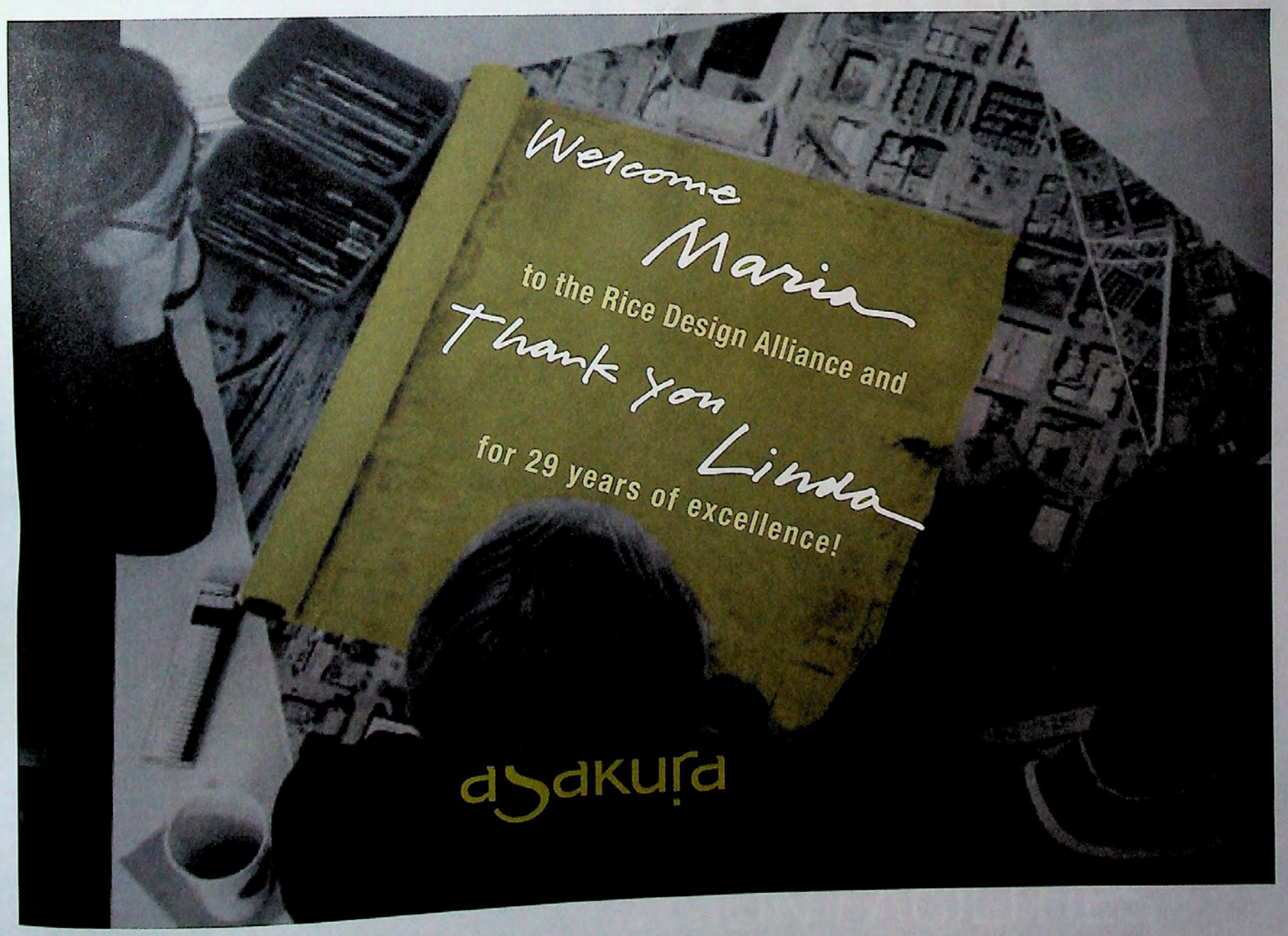

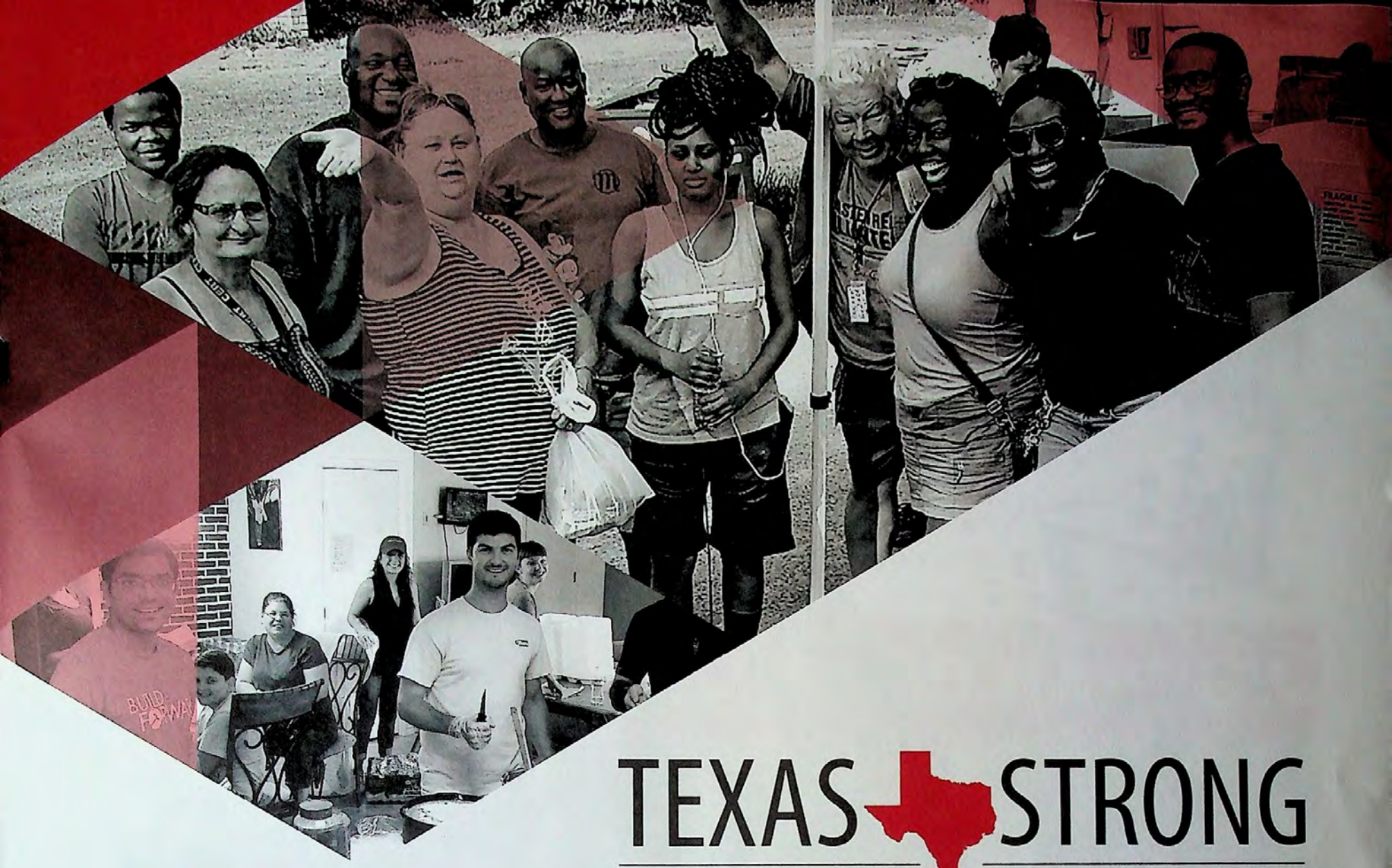

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