

Land Lines

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Computing the Value of Urban Trees

St. Louis: Fitting a Federal Spy Center
into a Disinvested Urban District

Houston: Reconsidering Regulation
After Another Megastorm

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THE LINCOLN INSTITUTE OF LAND POLICY is an independent, nonpartisan organization whose mission is to help solve global economic, social, and environmental challenges to improve the quality of life through creative approaches to the use, taxation, and stewardship of land. As a private operating foundation whose origins date to 1946, the Lincoln Institute seeks to inform public dialogue and decisions about land policy through research, training, and effective communication. By bringing together scholars, practitioners, public officials, policy makers, journalists, and involved citizens, the Lincoln Institute integrates theory and practice and provides a forum for multidisciplinary perspectives on public policy concerning land, both in the United States and internationally.

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Cover: Tree-lined street of historic brownstone buildings in a Greenwich Village neighborhood in New York City. Credit: iStock/Getty.



MESSAGE FROM THE PRESIDENT GEORGE W. MCCARTHY

Lessons from David C. Lincoln

WHEN I LAST SPOKE WITH DAVID C. LINCOLN, WE WERE IN HIS STUDY REGARDING HIS DOG AND BEST BUDDY, PEPPER. David told me, “You know, I calculated Pepper’s age in dog years, and he’s exactly the same age as me, 92.” With a twinkle in his eye and a wry smile, he continued, “So, there you have it, two elderly guys the same age, happy to be living under the same roof, sharing meals together, enjoying each other’s company . . . both with bladder control issues.”

This was characteristic of David’s generosity. Rather than skirt his obvious health issues, he lightened the conversation with humor, putting me at ease and opening the space for the more meaningful, lengthy conversation that followed.

It is with immense sadness that we mark the passing of David Lincoln—founder, architect, chairman, and spiritual leader of the Lincoln Institute of Land Policy. David’s importance to this organization is impossible to capture in words. He was the visionary who saw the need to launch original research and to train and assist others who understood the central role of land in driving economic and social progress. He forged this vision in bricks and mortar 44 years ago when he founded the Lincoln Institute that we know today.

In the brief four years that I knew David, I learned valuable lessons. I will share some of them here.

It isn’t hard to do well while doing good.

For David, life was a positive-sum game. One’s needs can be met while leaving more

on the table for others. One could accomplish this by subscribing to a simple principle, the Golden Rule. Although David was a leader of industry, inventor, humanitarian, philanthropist, father, and teacher, to us at the Lincoln Institute, he was a mensch—a man of integrity and honor who didn’t just talk about the Golden Rule, he lived and breathed the ethical code he inherited from his father, John C. Lincoln (1866–1959). In David’s words:

My father’s core ethical principle was to treat people as you would like to be treated. This implied the following precepts:

Treat people with absolute fairness. *This means all people. In business, it includes all the constituents of a company—employees, customers, owners, and the community. In society, it means government must treat individuals fairly, and vice versa.*

Whoever creates something should be entitled to keep it. *Receiving the fruits of someone else’s labor—a windfall—often occurs. But for each windfall there is a wipeout—someone doesn’t get all he or she produced. Both the windfall and the wipeout are unethical.*

People are important. *They should be treated with respect and dignity, not as machines or cogs in a wheel.*

—David C. Lincoln
Annual Founder’s Day Lecture,
Cambridge, MA, August 1, 1996.

David put these principles to work on a daily basis and in all of his endeavors. For example, in the companies he ran, he adopted the practice of profit-sharing with employees—a concept that was piloted at Lincoln Electric. As he explained in his 1996 Founder’s Day talk, this involved “providing a fair but not excessive dividend to shareholders and investing in new products and production methods. Beyond these costs, employees at Lincoln Electric get to keep any extra profit they produce. Recently bonuses have been about 50 to 60 percent of annual salaries.”

David understood that living ethically isn’t sufficient to generate a positive-sum game; one needs to create additional value through hard work and invention. But a commitment to ethics is necessary to ensure that the benefits of that hard work and invention are distributed fairly.

Don’t avoid difficult conversations; find a way to promote civil discourse.

David adhered to the Golden Rule, but he also understood that even such a simple ethical guideline left a lot of room for interpretation, and even conflict. To confront this challenge, he created venues where people could convene to discuss and understand various interpretations of ethical behavior, and resolve or avoid conflicts. Claremont Lincoln University (CLU)—an institution founded in 2011 by David and his wife, Joan, and Jerry Campbell—is designed to give students the opportunity to learn how to cooperate and collaborate with others who have different viewpoints. Students build solid bases of self-knowledge and then add critical but constructive engagement skills and deep understanding of key differences among religions and governments. Students learn how to respectfully explore the differences and reconcile them both intellectually and emotionally. David stated his goal for CLU simply: “I believe that if we could get people who practice religions working together, understanding each other and cooperating instead of fighting, then everybody would be better off.”

David supported other venues where students could explore and understand the importance of ethics and ethical behavior across a variety of disciplines. In 2001, David and Joan established the Lincoln Center for Applied Ethics at Arizona State University (ASU), to foster the study of ethical dilemmas in law, biomedical sciences, and spirituality. In 2005, the couple founded the Lincoln Center for Ethics in Global Management at the Thunderbird School of Global Management at ASU. In 2008, they created a permanent endowment there to support faculty, scholarships, and research efforts. For two decades, they supported the exploration of ethical behavior through the Lincoln Program in Applied Ethics at the Chautauqua Institution in upstate New York. All these efforts illustrated David’s faith that civil intellectual exchange would not only lead to better understanding among participants—it would help to make a better world.



Always have goals and a plan to reach those goals, but remain open to discovery.


David was the youngest son of John C. Lincoln, the Cleveland industrialist and preacher's son who founded the Lincoln Electric company in 1895. John held 54 patents on inventions that included arc welders, variable-speed electric motors, and brakes for streetcars. His inventions helped to build the industries and cities that established the United States' global economic and military dominance in the 20th century. David followed in his father's footsteps, serving on the board of Lincoln Electric and, among his many ventures, founding Lincoln Laser Company and Cross Spear Marble Inc., both based in Phoenix. David's ventures were guided by clear goals: to produce a product of value and to do it ethically. But it was the Lincoln Laser experience that best captured David's openness to discovery.

David and Randy Sherman founded Lincoln Laser in 1974 with a simple proposition. They wanted to use lasers to make wooden jigsaw puzzles. They began experimenting with mirrors to use in conjunction with the lasers, to help cut the wood in a jigsaw pattern. They soon realized that the combination of lasers and mirrors opened up all sorts of other possibilities. Hughes Aircraft came to the same realization and began purchasing the company's mirrors for its infrared-detecting cameras. Soon, Xerox came calling, seeing the mirrors as a solution to challenges it faced in duplicating images. Through its own process of discovery, Lincoln Laser continued to find new uses for its technology. Today, Lincoln Laser produces mirrors that are used in such disparate applications as bar code scanners, tattoo removal, biomedical imaging, navigation systems for jets, and solar cell production. David laughingly told me, "You know, we never made a jigsaw puzzle, but I bet we would've made good ones."

Meet the world where it is, not where you wish it was.

David was an aerospace engineer who trained at the California Institute of Technology. As such, he approached problems in a practical way. He was comfortable with the messiness of the world. Gravity and friction were natural obstacles to overcome, using human ingenuity. He was a little mystified by the purely theoretical worlds constructed by academics, like economists and physicists, who assumed away worldly complications in the models they constructed. Engineers like David confronted the real world with all its complications and figured out how to make things work. He couldn't understand how things that worked only in purely imaginary or theoretical contexts could apply to the real world. As he once noted, "I guess there's a value to understanding how objects move in a world without gravity or friction, but it will give me only a little insight into how things work on this planet with all its friction and dust and gravity." And he added, wryly, "Sometimes, theory guys throw the baby out with the bathwater. If you're trying to overcome gravity, you're going to need a little friction. Otherwise, how will you generate lift for your wings?"

David founded the Lincoln Institute to focus on practical things that affect the quality of life for residents of this planet. He understood that land policy often bridges theory and practice and insisted that we try to solve worldly challenges using creative approaches to the use of land.

Since he passed away, I don't feel that a light has gone out, as we sometimes do when we lose someone of true greatness. I know that the flame he lit—under notable organizations, for hundreds of family and friends, and for the thousands of people whose lives he touched—will continue illuminating our efforts to make the world a better place. Thank you, David. 

Quantifying the Economic Benefit of Trees

A 2012 UNITED STATES FOREST SERVICE STUDY OF URBAN TREE COVER ESTIMATED THAT AMERICAN CITIES WERE LOSING AROUND FOUR MILLION TREES PER YEAR. Worldwide, agriculture, logging, and other factors eliminate 18.7 million acres of forest annually, according to the World Wildlife Fund. Yet the cost of that loss is hard to quantify. It's widely recognized that plants absorb carbon dioxide, helping to mitigate the effects of climate change, but city planners could benefit from a more precise, data-driven assessment of the urban canopy's value to guide how trees and other vegetation can most sensibly figure in the design and planning of the contemporary city.

After all, that's how we evaluate and install gray infrastructure, counting every light pole and parking lot to help us think about how these elements work in a city's design. Historically, we haven't been as thoughtful or demanding about quantifying, and thus managing, green infrastructure, according to David Nowak, a senior scientist with the U.S. Forest Service.

As a rule, cities compile and track the details of the built infrastructure, but not trees. This makes it harder to plan for, or even debate, the various potential impacts of maintaining, increasing, or reducing urban vegetation.

But that has been changing. Nowak leads a pioneering effort in the form of a Forest Service project called i-Tree, a suite of Web tools drawing in part on geographic information system (GIS) data. i-Tree combines satellite imagery and other data to help citizens, researchers, and officials understand urban canopies and other green infrastructure elements, often in economic terms.

For example, an i-Tree analysis of Austin, Texas, found that trees save the city about \$19 million a year in residential energy use, \$11.6 million in carbon capture, and almost \$3 million in pollution removal. The city's arboreal infrastructure produces oxygen and consumes carbon

dioxide, for instance, adding up to a reduction in carbon emissions that i-Tree values at \$5 million annually. Other tree payoffs—some quantified, others not—include absorbing ultraviolet radiation, helping absorb rainwater, and reducing noise pollution.

In another i-Tree analysis, conducted in 2017, researchers in the United States and Italy concluded that, worldwide, cities with populations over 10 million realize median annual savings of \$505 million from reduced air pollution, mitigated "heat island" effects, and other benefits derived from their urban canopies.

City planners could benefit from a more precise, data-driven assessment of the urban canopy.

This type of analysis can help cities deploy green resources for maximum impact and understand the tradeoffs involved in many planning decisions. Clearing trees to make way for a parking lot entails a loss, not just the gain associated with increased parking, Nowak noted.

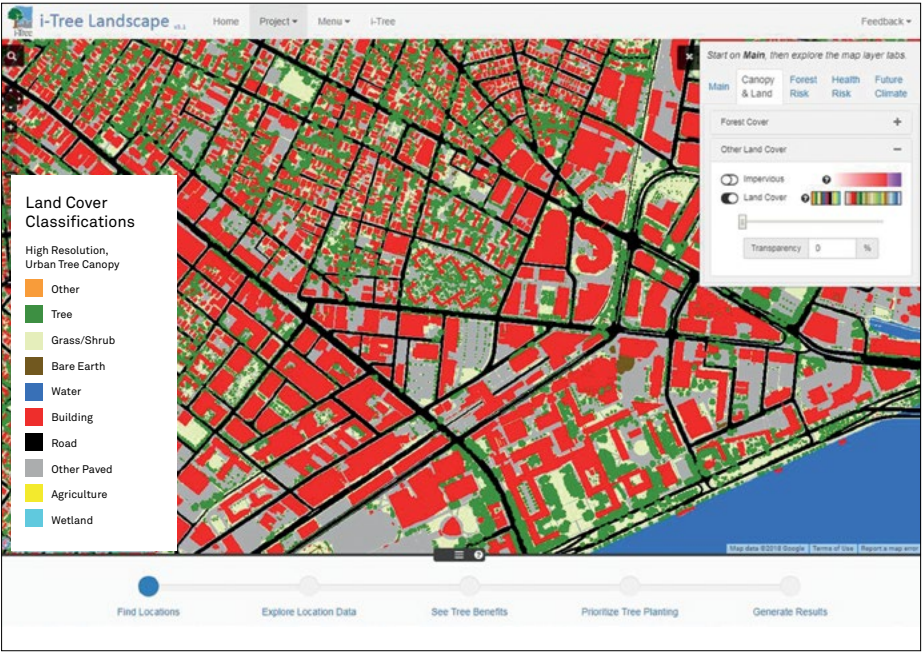
In the past, trees were more likely a concern for the parks or forestry department. Increasingly, they're central to cities' responses to climate change. "I can tell you definitively that cities and towns across the nation are very interested in figuring out, whether or not you can talk about climate change politically, 'What exactly are we going to do about it today?'" said Jim Levitt, associate director of land conservation programs at the Lincoln Institute, and director of conservation innovation at the Harvard Forest. That's true from New England to Miami to Newport News, Virginia, and Phoenix, he added, even if the specific reasons vary, whether flood issues, heat island effects, or others.

Recent arboreal infrastructure-related technology responds directly to this city-level interest. In late 2016, MIT’s Senseable City Lab, in collaboration with the World Economic Forum, launched a tool called Treepedia and has since published analyses of tree coverage in 27 cities around the world. In an interesting twist, it draws not on the satellite data behind many GIS projects, but on imagery culled from Google Street View. It offers a different skew on tree data, since, for example, it underrepresents large urban parks. But this is by design. The tool’s creators believe that detailing the “street greenery” citizens actually experience can inform the planning process. The lab will continue to add cities and has a backlog of requests from municipalities, academics, and others, according to Carlo Ratti, director of the

MIT Senseable City Lab and founder of the design firm Carlo Ratti Associati.

“Cities are trying to acquire better information and understand the current state of the urban canopy,” Ratti said. “Most of them do not have the resources to manually survey the entire city. Treepedia data can give them a solid baseline” and focus efforts where they may be needed most. “Others, like planners and designers, find it useful as a proxy for measuring the perception of green space and trees by citizens,” he said, because it captures a kind of shared perspective “from the ground.” The lab will soon release an open-source version of its software to let cities, nongovernmental organizations, and community groups compile their own data. The hope is that NGOs and local groups will use Treepedia “as a tool to both determine where planting is needed and lobby

MIT’s Senseable City Lab created Treepedia to allow researchers, city officials, community groups, and others to take stock of urban tree cover from the ground-level perspective of city dwellers, using Google Street View panoramic images. The resulting Green View Index, presented on a scale of 1 to 100, indicates the percentage of a particular location occupied by the urban canopy. Below: MIT Senseable City Treepedia view of Sydney, Australia. Credit: MIT Senseable City Lab



The U.S. Forest Service and partners developed iTree to assess urban tree cover by analyzing satellite imagery. The suite of tools includes Landscape, shown at left displaying the breakdown of land cover in Cambridge, MA. Credit: U.S. Forest Service

their local governments with evidence-based campaigns,” Ratti explained.

This is consistent with a broader interest among citizens and planners in green city initiatives, including high-profile projects from New York to Atlanta and beyond. Nowak, of the i-Tree program, said that its tools helped guide the organizers of Million Trees NYC, a public-private initiative that increased New York’s aggregate urban forest by an estimated 20 percent. The London i-Tree Eco Project, according to its 2015 report, used i-Tree to quantify “the structure of the urban forest (the physical attributes such as tree density, tree health, leaf area, and biomass),” with a specific eye toward capturing its value “in monetary terms.” Carbon sequestration savings logged in at £4.79 million (roughly \$6.75 million) annually, according to the report. “Our hope is to provide numbers that are locally derived, to help people make informed decisions—whether it’s pro or against trees,” Nowak said.

One i-Tree Web application, Landscape, is intended for planners in particular. Users can explore tree canopy, cross-matched with basic demographic information down to the census-block level, offering data related to pollution mitigation, temperature impacts, and other factors. For example, users can easily identify areas with high population density but low tree cover. The i-Tree project is adding data on tree species over the next year and is seeking feedback to modify the tool in ways that make most sense for planning, according to Nowak.

The broad idea is the same one that has shaped i-Tree from the start—a data-driven approach to thinking about green infrastructure. “We want to help answer the question: If I can plant only one tree or make one change to the city’s green landscape, where should I do it?” Nowak said. □

Rob Walker (robwalker.net) is a columnist for the Sunday Business section of the New York Times.

“We want to help answer the question: If I can plant only one tree or make one change to the city’s green landscape, where should I do it?”



St. Louis & Missouri Bank On Federal Spy Center

By Kathleen McCormick

ST. LOUIS OFFICIALS EXULTED WHEN THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA) ANNOUNCED in June 2016 that it planned to stay in the city and build its new facility, Next NGA West, on the disinvested North Side. The \$1.75 billion complex, known as the “spy center,” would be the largest federal project in St. Louis history, representing thousands of jobs and millions of dollars in tax revenue and development. Had the NGA opted to leave, the city would have lost its single largest source of tax revenue. City and state officials committed significant resources to keeping the facility.

The NGA is the nation’s primary source of geospatial intelligence, providing the U.S. Department of Defense and intelligence community with digital mapping for counter-terrorism and counter-narcotics efforts, border and transportation security, and humanitarian and disaster relief. NGA Director Robert Cardillo said the agency chose the North Side site because of the city’s partnerships with universities and technology companies, the appeal of the urban setting to younger workers, and because the NGA’s data facilities and workforce were already in town. “Next NGA

West will be attractive to millennials and the next generation of the NGA workforce,” Cardillo said at the August 2017 Department of Defense Intelligence Information Systems Worldwide Conference, in St. Louis.

The new NGA facility, which will be located about a mile northwest of downtown and several miles northwest of NGA’s current location on the Mississippi riverfront, will spur “a transformation with reinvestment and redevelopment” in the city’s North Side, said Don Roe, executive director of the St. Louis Planning and Urban Design Agency.

The NGA’s plan calls for one million square feet of buildings and the same amount of structured parking, surrounded by a 500-foot security perimeter. Given the North Side’s history of disenfranchisement, economic stress, neglect, and blight, some wonder whether this ultra-secure facility will be an unapproachable fortress in the neighborhood, and whether it will ultimately benefit the community.

Credit: Chris Lee/St. Louis Post-Dispatch/Polaris

CITY AND STATE LINK PROJECT TO NORTH SIDE REVIVAL

Site Opportunities and Challenges

From 1866 to 1904, St. Louis was the fourth largest city in the United States, with booming flour mills, shoe factories, meatpacking plants, and brick, paper, and paint manufacturing facilities drawing thousands of European-immigrant workers. But the second half of the 20th century saw large-scale loss of industry, suburban sprawl, and white flight, and the urban population declined from 857,000 in 1950 to 312,000 today.

In the past two decades, the city has worked to reinvent itself as a technology and bioscience center. These efforts have borne fruit for the downtown Central Corridor, stretching from the iconic Gateway Arch on the Mississippi

riverfront west to Forest Park, and encompassing the city's major universities, museums, and other popular amenities. Cortex Innovation Community and T-REX have attracted a highly skilled workforce. The 200-acre Cortex campus—formed in 2002 by Washington University, BJC Healthcare, the University of Missouri—St. Louis, St. Louis University, and the Missouri Botanical Garden—has generated over \$550 million in investments and 4,200 jobs within the 250 companies located there. And the T-REX technology incubator building has provided a home for 200 companies since 2011, including 180 startups and 2,230 jobs. Its annual economic output is over \$350 million.

But the city has remained deeply divided racially and economically. The South Side of the city has become increasingly white and affluent and has attracted the lion's share of new development. In the core North Side neighborhoods around the NGA site, 93 percent of residents are black and half live below the federal poverty level, and there are hundreds of vacant buildings and empty lots.

Former Pruitt-Igoe playground, near Jefferson Avenue, between Cass Avenue and Carr Street; and a recent view of the western end of the Pruitt-Igoe site, near Jefferson Avenue. Credits: left, The State Historical Society of Missouri; right, Michael R. Allen.



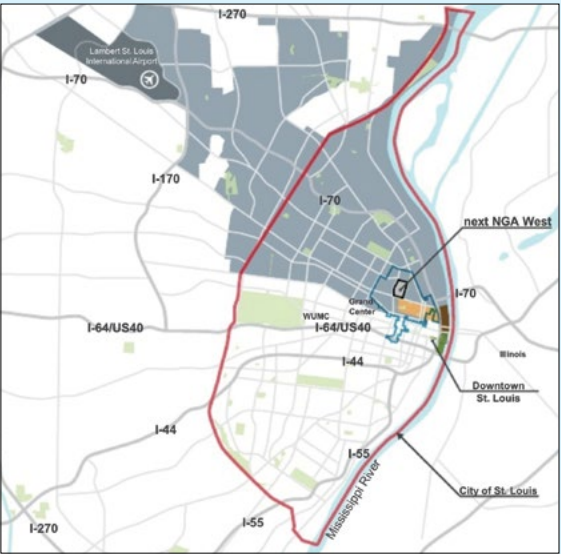
The South Side of the city has become increasingly white and affluent and has attracted the lion's share of new development. In the core North Side neighborhoods around the Next NGA West site, 93 percent of residents are black and half live below the federal poverty level, and there are hundreds of vacant buildings and empty lots.

Figure 1
Next NGA West Site in Proximity to Areas with Federally Funded Initiatives

- 2014 Strong Cities, Strong Community
- NorthSide Regeneration, LLC TIF* Boundary
- 2015 Promise Zone
- 2015 Choice Neighborhood
- 2015 North Riverfront Open Space and Redevelopment Plan
- 2015 CityArchRiver

* tax increment financing

Credit: St. Louis Development Corp.



On the North Side, which has some of the nation's highest violent crime rates, development comes mostly in the form of self-contained, subsidized affordable and low-income housing, said Alan Mallach, city planner, senior fellow for the Washington, DC-based Center for Community Progress, and author of *The Empty House Next Door: Understanding and Reducing Vacancy and Hypervacancy in the United States*, to be published by the Lincoln Institute in May 2018. The neighborhoods there have few jobs and lack resources such as new market-rate housing, health-care facilities, transportation connections, grocery stores, and other amenities. The area encompasses several federal economic and community development zones (figure 1).

St. Louis officials initially proposed building the new NGA complex on a vacant 34-acre North Side site where part of the infamous Pruitt-Igoe public housing project once stood. Erected in the 1950s and acclaimed as a monument to modern architecture, the project was supposed to be a great leap forward for the large number of residents living in overcrowded 19th-century tenements. But Pruitt-Igoe's 33 high-rise

apartment buildings were demolished in the 1970s following years of neglect, high crime rates, and abandonment, and the project became a case study in how not to provide public housing. Most of Pruitt-Igoe's 57-acre site was never redeveloped and now exists as a wild urban place with vacant fields and heavily forested areas. The city wanted the U.S. government to assume some responsibility for a federal site that had so spectacularly failed the community, but the NGA plan was scrapped in 2015, when the agency expanded the site's size requirement to 100 acres.

The city chose a new site for the NGA campus just north of Pruitt-Igoe at the intersection of North Jefferson and Cass Avenues, in the St. Louis Place neighborhood, and ultimately delivered 97 acres. This new site proved challenging and costly to procure.

In the decades after Pruitt-Igoe was razed, few incremental public and private efforts to redevelop the North Side with new housing and services succeeded, outside of reinvestment pockets such as the Old North St. Louis historic district. Roe, who presented the NGA project at Lincoln's 2016 Big City Planning Directors

Institute (BCPDI), said two federal initiatives by the Obama administration will leverage revitalization around the site: the 2015 designation of North St. Louis as part of a Promise Zone, giving the high-poverty area priority access to federal investments, and the 2016 award of a U.S. Department of Housing and Urban Development Choice Neighborhoods grant. The \$29.5 million grant will go toward rehabilitating a distressed 625-unit public housing complex into a less densely packed group of buildings, funding social services, and building a new community center. The idea is to invest in low-density, mixed-income housing in diverse neighborhoods, green space, educational opportunities, job training, and social services for some 14,000 residents.

“We see [the NGA relocation] as a complementary project” that will, at the very least, bring better transit to the near North Side, said Esther Shin, president of Urban Strategies, Inc., in St. Louis, the nonprofit managing the Choice grant efforts.

The city looked at the new NGA facility as “a retention effort” that will spark new growth and services in the North Side neighborhoods.



In their successful bid to keep the National Geospatial-Intelligence Agency's western headquarters, the State of Missouri and City of St. Louis offered to acquire and deliver the land for the project, ready for construction. Credit: National Geospatial-Intelligence Agency.

The Effort to Keep a Valuable Asset

The city looked at the new NGA facility as “a retention effort” that will spark new growth and services in the North Side neighborhoods, said Otis Williams, executive director of the St. Louis Development Corporation (SLDC). Williams led the city’s initiative.

One fundamental reason the city wanted to retain the NGA presence was tax revenues. People who live or work in the city contribute 1 percent of their earnings each year, and this income tax represents the city’s largest source of general revenue. If NGA had selected another location outside St. Louis—such as its nearest rival for the project, a cornfield site near the Scott Air Force Base east of the Mississippi in St. Claire County, Illinois—the city would have lost as much as \$2.6 million in annual payroll-tax revenue from NGA’s 3,100 current employees, who earn an average salary of around \$85,000.

“If you’re going to grow in the next few years, you’re competing with Amazon and Google, and you need to be in the city and make a place where people want to be,” said Mark Johnson, principal of Denver-based Civitas, an urban design and landscape architecture firm that consulted on the NGA site for the city. “Staff recruitment and retention needed to be the most important issue.”

Since the early 1950s, the Springfield, Virginia–based NGA and its precursors, including the Defense Mapping Agency and the National Imagery and Mapping Agency, has operated its western headquarters in a series of converted 19th-century riverfront buildings at the 27-acre St. Louis Arsenal complex. In 2014, the agency announced it needed a new facility to allow for workforce expansion, heightened security, and new technology. The NGA plans to move into its new home by 2024.

In its bid to keep the NGA, the city offered free land, cleared of buildings on the North Side site. This meant assembling 551 properties quickly. A 2015 blight study reported that 78 percent of the

land was vacant, and 6 percent had vacant buildings, for a total of 84 percent vacancy, according to the Environmental Impact Statement for the NGA campus. Roe said 137 structures on the site included active businesses and 63 homes inhabited by owners or renters. Most property owners agreed to sell to the city, though as the *St. Louis Post-Dispatch* and other local media reported, the process was somewhat contentious.

A historic brick house was moved several blocks to an appropriate infill site, but the city demolished 17 structures on the National Register of Historic Places, according to the *Post-Dispatch*. One was the redbrick Buster Brown Blue Ribbon Shoe Factory, built in 1901, when St. Louis was one of the nation’s largest shoe manufacturing cities. (Listing on the National Register does not, by itself, prevent a property’s demolition.)

The city spent \$69 million acquiring properties within the 97-acre NGA site, including approximately \$3.75 million to compensate owners of the 46 properties taken through eminent domain, and funds to buy back properties that the city had previously sold to a local developer, according to Russell Halliday, principal with consulting firm Stantec and NGA site preparation manager for the SLDC.

“It’s an unusual relationship where the city is making a lot of efforts to keep a federal employer as opposed to a private-sector employer. To the extent that it sets a precedent, it’s a precedent we really want to think about carefully.”

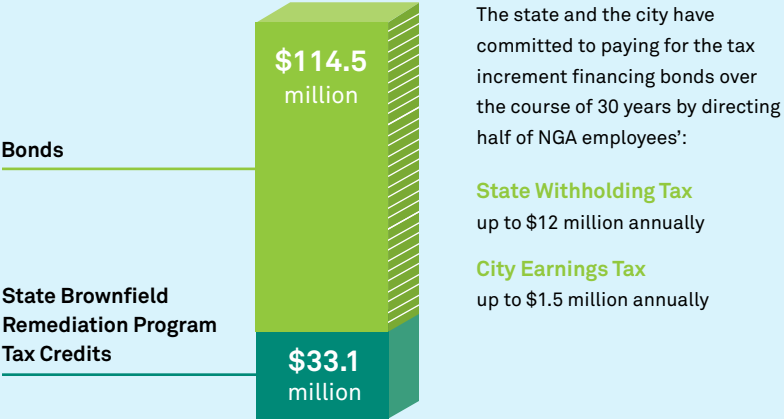


The family home of Charlesetta Taylor, an early opponent of the NGA’s North St. Louis relocation, was itself relocated—from 2530 North Market Street to nearby 2200 St. Louis Avenue. As St. Louis Public Radio reported, the city spent roughly half a million dollars moving the 367-ton house. Credit: St. Louis Development Corp.

Figure 2
State and Local Contributions Backed by Tax Revenue, Credits

The funding from the State of Missouri and the City of St. Louis has come primarily through the sale of \$114.5 million in bonds and \$36 million in transferable state brownfield tax credits (which netted the state \$33.1 million).

Credit: St. Louis Development Corp



The City of St. Louis is expected to finish preparing the 97-acre NGA site—a process involving the acquisition, clearing, and remediation of the north St. Louis property—by late 2018, and transfer it to the U.S. Air Force. Construction is scheduled to begin by 2020. Credit: Robert Cohen/St Louis Post-Dispatch/Polaris



In addition to razing the buildings, the city agreed to clear the site of infrastructure including 27 streets, relocate utilities, and remediate arsenic in the soil. And it agreed to construct new infrastructure such as sidewalks and a full highway interchange.

The State of Missouri is providing the majority of the total \$147.6 million in public funding needed to ready the site and provide access—\$114.5 million in bonds has been set aside for construction costs, and \$33.1 million in funds resulting from the sale of Brownfield Remediation Program tax credits. The city will allocate half of the earnings tax generated by the NGA—up to \$1.5 million per year—and the state will direct up to \$12 million in state withholding taxes for the next 30 years to the project (figure 2).

The city and state investments in the NGA's cross-town move, which is effectively the shuttering of one military/intelligence installation and construction of another, reverses the usual roles in military base closings. In those cases, the federal government typically cushions the blow to the local economy, said David Merriman, professor of economics at the University of Illinois at Chicago and author of *Improving Tax Increment Financing (TIF) for Economic Development*, a Lincoln Institute policy report to be published in July 2018. "It's an unusual relationship where the city is making a lot of efforts to keep a federal employer as opposed to a private-sector employer. To the extent that it sets a precedent, it's a precedent we really want to think about carefully," he said. "This really raises questions about the federal government's responsibility here."

Site Preparation and Financing

NGA West site preparations are slated to be completed by November 2018, when the land will be transferred to the US Air Force, which also owns the current NGA facility, said Stantec's Halliday. The project is being overseen by teams from four separate entities: the city and its redevelopment corporation; the NGA, which will lease the site; the Air Force; and the Army Corps, which has issued a request for proposals (RFP) for design-build firms.

By early 2019, the Corps will select a firm to design and build the project. Its total \$1.75 billion price tag includes \$700 million for design and construction; the rest will pay for outfitting the campus with specialized NGA equipment, as well as the city's costs for preparing the site for development.

Construction, due to begin by 2020, will tentatively include a 900,000-square-foot office building, a visitor center, inspection facility, access control points, one million square feet of parking garages plus surface parking, a cafeteria, fitness center, meeting spaces, and a campus landscape of grass, trees, and walking paths. Roe said the land within the NGA site, upon the federal government's request, has been consolidated into one zoning district that allows for mixed-use buildings—offices, housing, small commercial, retail, and restaurant spaces—at greater heights than in the surrounding residential area.

Community Wants and Needs

The agency has said the project will create jobs in construction, security, maintenance, and administration that do not require a college education and will be made available to the community. The city is working to help neighborhood residents prepare, said Sal Martinez, executive director of the North Newstead Association, a community development corporation. The St. Louis Agency on Training + Employment (SLATE) has opened offices in the area and is focusing on the skills needed for NGA employment—technical skills like coding and software design.

"SLATE programming could be a gateway to that world and spark an interest in residents," Martinez said.

Choice grant manager Esther Shin said residents understand that NGA's highly skilled and relatively affluent staff of 3,100 will largely transfer to the new site, potentially displacing existing residents and businesses as new housing and services are built. "There's definitely some tension, but the important thing is to be sitting at the table with NGA. The city, NGA, and

residents see this as an opportunity to leverage other jobs for folks who live in the neighborhood," Shin said.

"Some residents don't want this facility in their neighborhood," noted Martinez, "but the greater percentage are excited about what this can do for North St. Louis and the city. I'm very confident that amenities will come with redevelopment around the NGA, such as sit-down restaurants, major shopping, and other retail entities that will want to take advantage of these new workers and the residents." In the past, it has been difficult to bring in "grocery stores, shoe repair, dry cleaners, office and school supplies, everyday things that people in thriving neighborhoods take for granted," he noted. "But now we're getting calls and interest from commercial developers because they see the potential for customers."

National Geospatial-Intelligence Agency, city and state officials, and the U.S. Army Corps of Engineers pitched the NGA West project to area residents and local businesses in a series of events preceding construction. On offer: blight reduction, public safety, and development opportunities. Credit: St. Louis Development Corp.



Project Connect

In 2016, the city launched Project Connect, an initiative to engage neighborhood stakeholders and coordinate redevelopment efforts by the public and private sectors. Project Connect provides “a vision for city and regional agencies to collaborate,” said Isa Reeb, a Civitas urban designer and Project Connect coordinator. Working with over 30 entities, including federal, state, and local agencies, community groups, and some 30,000 residents who live and work in the eight neighborhoods surrounding the NGA site, the group produced the Project Connect Action Plan, published in April 2017.

The action plan summarizes market, traffic, and storm water studies; financial modeling; and community and city goals for catalytic redevelopment around the NGA site. The plan presents priorities and locations for infill development to improve the place and character around the NGA site, gateway mixed-use development east of the NGA site to connect with downtown, neighborhood redevelopment with a community center, new retail and service development, including a potential local and regional retail center on the Pruitt-Igoe site, and locations for light

manufacturing and industrial development that could bring more permanent jobs. The nonbinding plan is also intended to guide future investments in streets, transit, bicycle access, social services, parks, open spaces, and storm water facilities. Public realm redevelopment can draw on revenues from a tax increment financing district established in 2009 that allows for up to \$390 million to be used primarily to finance infrastructure improvements, but because the neighborhoods have been so distressed, other funding sources likely will be needed. A newly hired Project Connect manager will work with the SLDC on a process for reviewing redevelopment projects.

“Continued alignment and coordination is key to the success of this area, and to changing the perception of this area,” said Reeb. “We’ve had a lot of discussions with developers, [and] we want to hold them accountable.”

The NGA’s new western headquarters is taking shape in the St. Louis Place neighborhood, north of downtown. A diminished but cohesive community of roughly 200 people resided within the construction footprint when the city began purchasing the land. It acquired 46 properties through eminent domain. Credit: Paul Sableman (Flickr)



A potential scheme for the NGA campus includes the facility’s requisite 500-foot security barrier and buffer zone. A key question is how such a secure facility can be integrated with the surrounding neighborhood and how amenable the NGA and the Army Corps of Engineers, which is overseeing the construction, will be to creative solutions. Credit: St. Louis Development Corp.

Security Buffer: Isolation v. Engagement

Probably the greatest controversy surrounding Next NGA West has to do with its rigid security protocols. Post-9/11, federal regulations for an intelligence-mapping facility require 500 linear feet of defensive space from property line to building. The March 2017 RFP soliciting design and construction firms indicated the site would need a “layered security” approach, with access controlled by fences, bollards, and other barriers. A visitor control center, remote inspection facility, and checkpoints will manage access to the main operations building, which will have another layer of security.

The NGA has discussed the 500-foot security barrier at community meetings that include city and Army Corps representatives. “The community respects the need for security,” Martinez said, “but we don’t want this to be an intimidating barrier.” He said many community

members would like to see ample green space around NGA that would provide a “calming and welcoming feel,” perhaps with monuments to the area’s cultural history and art created by local schoolchildren, “to soften the wall and honor the neighborhood.” Residents desire places for community members to meet within the building and outside the perimeter, as well as tours of what he said could become a “destination site.”

“Space and programming within the building for exhibits and educational opportunities like mapping and data-analysis programs for kids could benefit the community and help bridge the divide,” said city planner Alan Mallach, who has not worked directly on the project but offered perspective during a presentation of the NGA project at the 2016 BCPDI.

Mallach said Next NGA West is “very challenging” and unlike any project he has seen in other U.S. cities. Because of the “sheer size” of the facility and the buffer, he said, “it runs the risk that what you’ll have is a black hole with no

real connection to the neighborhood. If it's just a high-security box, there are no spillover benefits," he said. "What would make a facility with a big wall and security gates attractive for housing, cafes, and shops in a commercial district?" The NGA buildings will be a self-contained workspace, he said, and most workers would not feel the need to relocate from a pleasant and more stable neighborhood to move across the street from a gated facility in a transitioning area.

Toni Griffin, professor in practice in urban planning at the Harvard Graduate School of Design, who also provided an independent perspective at Lincoln's 2016 BCPDI, observed that "It's challenging when you have a suburban typology in an urban environment in this very big lot site with very little development." Griffin, who has worked on urban revitalization projects in Detroit, St. Louis, and Washington, DC, noted that NGA's security perimeter width is more than twice the 200 linear feet of an urban block in many cities. To make the site as urban as possible, she said, designers will have to be "more creative about what they allow to exist within the security belt," she said. "There has to be some sort of value and usable amenities for the community there." Project designers could place the building at the perimeter, at the edge of the street wall, to activate local businesses, and use that as a first line of defense, with more secure functions set back, she noted.

Griffin points to the Navy Yard in Washington, DC, as an example of the project's catalytic potential. Contractors for the Navy set up their offices adjacent to the secure federal facility, which "created demand for investment in the neighborhood," including not just commercial office space but also restaurants, shops, and services, as well as market-rate and affordable housing. Griffin said St. Louis could ask NGA and the Army Corps not to program the campus with

everything employees need during their day. With the number of employees at NGA, "that's a fairly large consumer potential if the workers were encouraged to patronize businesses within the neighborhood."

For project leaders, security is the primary objective, rather than integrating the facility within the urban fabric. "We've expressed that our security requirements specify a secure barrier," and that shared public space for elements like recreation fields and walking paths within that barrier would not be permitted, said David Berczek, chief of corporate communications for Next NGA West.

Residents don't want the facility to "look like a fortress," according to Halliday, who has been asked by the city to find out what the community wants. "A barrier wall can be done in so many ways" and does not have to be a brick wall with barbed wire, he said. "We're informing the NGA and Army Corps: please consider the neighborhood."

NGA security forces will have jurisdiction adjacent to the site to protect NGA employees and neighborhood residents, and the site will have 24-hour security patrols. How will this security scenario play among residents of North Side—a community with a racial dynamic and socioeconomic conditions similar to those of nearby Ferguson, Missouri, which experienced protests and riots after a white police officer killed an unarmed black teenager, Michael Brown, in August 2014?

Martinez said the grand jury's decision not to indict the police officer for any crimes related to Brown's death "strained things a bit, but that happened outside of this district." Martinez said the Fourth District of the metro police assigned several officers specifically to building strong relationships within the community. "They show up at block meetings, neighborhood association meetings, and other events, and we have a very good working relationship."

Even if the place ends up being a fortress, Martinez said, NGA's security measures, such as new exterior lighting and strengthened police presence, will provide the "ancillary benefit" of helping make the North Side safer.

Next Steps for St. Louis


"There's no playbook for a project of this size and complexity," said Civitas's Reeb. "The area is so distressed that single projects here and there will not be effective in changing the opportunities and perceptions of the area. We need everyone to focus on the same vision for the same areas" and pursue opportunities "where the city can make an impact."

Around the NGA site there is vacant land, and Roe said the city is evaluating zoning and proposing short-term changes, with an overlay zone "to enhance and protect the site and goose development." He said the city is considering public-realm projects that would benefit residents and encourage new commercial development for firms that work with NGA, innovation clusters, and service-oriented businesses.

But the classified nature of the NGA's work and its strict security requirements limit the facility's potential for spin-offs and other development compared to university research and technology hubs, according to Merriman.

Reeb, meanwhile, is focused on two areas not immediately adjacent to the NGA site. At Cass Avenue and North 14th Street, about a mile east of the site, manufacturing could give way to mixed-use development as a segue to downtown. At Florissant and St. Louis avenues, about a mile northeast, vacant land could be redeveloped for apartments and neighborhood-serving retail, and infrastructure enhancements could improve safety and connectivity.

Developers will begin planning more projects "when they see NGA starting," Halliday said. "We're hearing interest from local and outside developers about mixed-income housing and commercial development." Redevelopment plans underway include a nearby medical clinic and a grocery store/gas station.

Despite the agency's non-negotiable security demands, an August 2017 *Post-Dispatch* article quoted NGA director Cardillo as saying the agency wants close collaboration on its campus with contractors involved in geospatial mapping, cybersecurity, and other defense systems. "We wall ourselves off at our own risk," he said. Reinforcing that the agency is looking to develop its future workforce in St. Louis by encouraging science and technology education in local school districts and universities, Cardillo added, "We're placing a bet on St. Louis, and it's a hundred-year bet." 

Kathleen McCormick, principal of Fountainhead Communications, LLC, in Boulder, Colorado, writes frequently about healthy, sustainable, and resilient communities.

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"We wall ourselves off at our own risk.
We're placing a bet on St. Louis, and it's
a hundred-year bet."

A photograph of the Houston skyline with a flooded area in the foreground. The skyline features several tall skyscrapers, including the Service Corporation International building. The foreground shows a wide, muddy river or flooded area with some trees and bushes. The sky is overcast.

HOUSTON SURVEYS

POST-HARVEY

POLICY

LANDSCAPE

By Kathleen McCormick

LATE LAST AUGUST, HURRICANE HARVEY SWEEPED THROUGH TEXAS, CAUSING WIDESPREAD FLOODING AND DESTRUCTION WHEN IT STALLED OVER THE HOUSTON METROPOLITAN REGION, dumping over 50 inches of rain in four days. Harvey paralyzed Houston, the nation's fourth-largest city and a global center for the oil industry, and it tested the resilience of a state that's home to nearly one in twelve U.S. workers. As Houston recovers and faces the next hurricane season, preparing for inevitable and potentially more devastating storms is highly stressful for urban planners, public officials, business leaders, and others who live and work there. Having been slammed with three 500-year floods in the past three years, the region is reconsidering its "build and let build" attitude. Harvey has occasioned a rethink—though not a complete redo—regarding urban planning and development.

Nicknamed the "Bayou City," Houston is naturally flood-prone. But critics say the region's longtime approach to urban planning (read: the lack of it) has resulted in zone-free development, low-density urban sprawl, and weak regulations that have led to or exacerbated destructive flooding. Many are calling for resilience planning that takes a regionwide, long-term, and greener approach to land planning, urban development, and storm water management.

Houston's city and county officials are pivoting to stricter regulations on building new homes in floodplains, and considering a wide range of flood mitigation strategies, infrastructure needs, and development changes. These include creating new flood barrier and detention facilities, rehabilitating urban drainage systems, buying out more homes in flood-prone areas, and creating green infrastructure. An important test of resilience-building will be how well the region can communicate and collaborate on these strategies.

"Harvey was a wake-up call that it might be time to revisit the sins of the past," said Houston director of planning and development Patrick Walsh, who presented a summary of Harvey's impacts at the Lincoln Institute's 2017 Big City Planning Directors Institute last October. Walsh has been involved in several aspects of post-Harvey planning. "There's a broad consensus from the community and from developers and builders that we need to do better, that we're all in this together. We need a resilient city." Houston has recovered reasonably well in the short term, said the Houston native, "but many people are still suffering." A new way of operating may be needed, he added, "if we want to continue to attract talented people and businesses to the city."

Many are calling for resilience planning that takes a regionwide, long-term, and greener approach.

Credit: Maribel Amador/SWA

(Not So) Equal Opportunity Disaster

Houston has a long history of flooding from tropical storms. Hurricanes in the 1920s and 1930s caused catastrophic floods that killed thousands. Tropical Storm Allison triggered mass flooding and caused 20 Texas deaths in 2001. Harvey came on the heels of the Memorial Day Flood of 2015 and the Tax Day Flood of April 2016. But Harvey was exponentially bigger, causing flooding in about one-third of the Houston metro region, including highways, waste-water treatment plants, and City Hall in downtown Houston. Half of the homes and businesses that were flooded by Harvey had not flooded previously, while many others flooded for the third time in three years. Harvey caused 68 deaths and \$125 billion in damages in Texas, according to the National Hurricane Center’s official report, which noted that it was the most significant tropical cyclone rainfall event in U.S. history, both in scope and peak rainfall amounts, since reliable rainfall records began in the 1880s. In the Houston area, Harvey damaged an estimated 300,000 housing units and displaced more than 1 million people, forcing some 42,000 of them to seek emergency shelter. The storm left 200 million cubic yards of debris.

With climate change, rising ocean temperatures have fueled more frequent and more intense storms and higher sea levels, increasing the risk of flooding. Harvey could have caused an even greater catastrophe. A storm surge from the Gulf of Mexico could have destroyed oil refineries and sent toxic floodwaters up the Houston Ship Channel to the Houston region. That threat remains, and many say Houston cannot rely on past data to predict future storms.

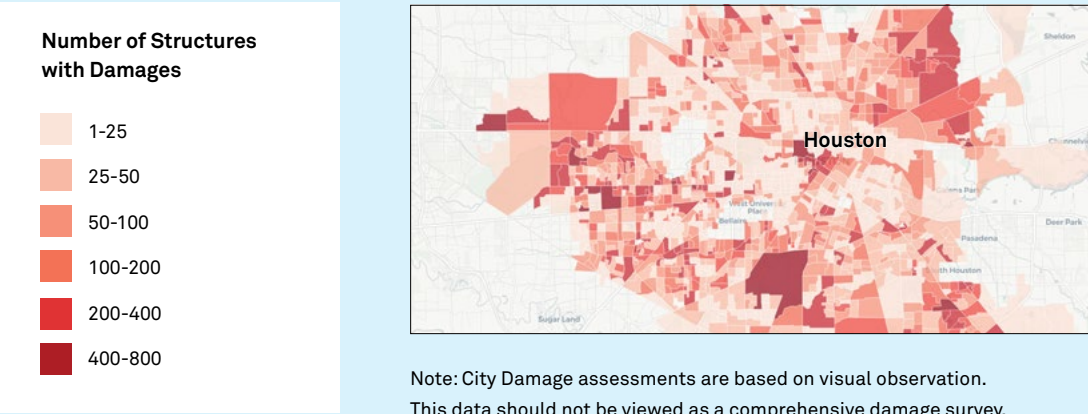
Harvey slammed the region’s economy and quality of life. Before the storm—spurred by jobs in oil and gas, tech, healthcare, and other industries, as well as relatively cheap and plentiful housing—Houston was considered an affordable region. Its median July 2017 home price of \$230,000 compared to a national median of \$293,400, according to Redfin. Housing supply declined and costs jumped in the months following Harvey as residents competed to resettle in neighborhoods that weren’t flooded. Roughly 80 percent of Harris County homeowners lacked flood insurance; many weren’t located in areas designated as flood-prone. Prospects for renovating or rebuilding damaged homes, and the availability and cost of flood insurance, remain uncertain. Recipients of post-Harvey federal disaster assistance will have to purchase flood insurance, the *New York Times* reported.

While homes in the region’s high-, middle-, and low-income neighborhoods alike were affected, many regional leaders note the impacts on middle- and lower-income households have been much greater, considering these households have fewer resources to rebound from flood damages, lost wages, lost jobs, and the lost fabric of community. National media reported on problems faced by renters in poorer neighborhoods near petrochemical plants and other industrial areas, including high levels of toxins in the floodwater and air, and lack of resources for storm preparedness, response, and recovery. Many renters could not pay for proper home clean-up or find alternative housing.

As of early December, the budget-strapped Federal Emergency Management Agency (FEMA), facing clean-ups from multiple climate-related disasters, had promised \$160 billion in post-Harvey aid for Houston, in addition to funds for individual recovery assistance and debris pickup. The federal funds are only a fraction of what’s needed to recover and plan for resilience. The *Houston Chronicle* noted the state legislature won’t reconvene until 2019, but lawmakers will be asked to consider a range of proposals, such as increasing local governments’ ability to bar development in certain areas, changing the operational guidelines of reservoirs,

A storm surge from the Gulf of Mexico could have destroyed oil refineries and sent toxic floodwaters up the Houston Ship Channel to the Houston region. That threat remains.

Figure 1
City of Houston and FEMA Estimates of the Number of Structures Damaged During Harvey



and mandating disclosure of flood risk for new home buyers or renters. Meanwhile, officials in Houston’s Harris County are considering a bond referendum to finance more than \$1 billion in flood control projects.

Magnified Flood Risks

Houston is often criticized for its lack of zoning: It’s the only major U.S. city without a zoning code to help determine land-use planning and development rules. While urban planning alone can’t prevent a disaster like Harvey, critics have said that zoning, along with careful land-use planning and stricter development regulations, could have prevented much of the destruction (figure 1).

Planning and Development Director Walsh maintains that zoning would not have made the city less flood-prone. “It’s time that we dispel the myth of zoning,” he said. “If we were a zoned city, we would have been a zoned, flooded city with Harvey. Any zoned city that is flat like ours would have flooded.” He said the city’s “tremendous amount” of development regulation such as setbacks, parking, and landscape requirements, plus a market-driven approach, determine how and where development occurs. “We look a lot like a zoned city. We have commercial development

along major thoroughfares and neighborhoods tucked away on smaller streets,” he said.

According to Walsh, other factors contributed to Harvey’s impact, including the storm’s extreme rainfall, the region’s clay soils, which don’t absorb water well, its aging and inadequate storm water infrastructure, and a “significant amount of low-density sprawl” in the surrounding county.

Walsh noted that Houston drains from west to east and that intensive growth on the western periphery has increased the volume of runoff flowing through the city. “Altering this growth pattern will be difficult, but we should be considering options like protecting the Katy Prairie,” he said, referring to the shrinking remnant of the vast prairie and wetlands west of Houston.

About 20 miles west of downtown, thousands of homes that flooded for the first time had been developed decades ago inside the “dry” basins of the Addicks and Barker reservoirs. The U.S. Army Corps constructed the basins in the 1940s to control the flow of water along Buffalo Bayou and prevent downtown flooding. Because FEMA maps didn’t place these basins in the 100-year floodplain, mortgage companies did not require flood insurance, and prospective home buyers had not been informed of the risks. Concerned that the reservoirs would fail during Harvey, the

Corps allowed a controlled release of water from the dams into the bayou, inundating downstream areas, including downtown.

Unchecked development has heightened flood risks regionwide, according to hydrologists, environmental engineers, and federal officials interviewed in 2016 by the *Texas Tribune* and *ProPublica*. At an elevation of about 50 feet above sea level, the region is drained by 22 watersheds in which storm water flows west to east in a network of bayous and drainage channels that empty into the Houston Ship Channel. Once a great expanse of prairie, wetlands, and woods that were better able to absorb rainwater, much of the area is now covered with low-density development.

A city of 2.2 million people, Houston spans 627 square miles. It lies within 1,777-square-mile Harris County, which has nearly 4.6 million residents, according to 2016 U.S. Census estimates. The vast metro region has a population of 6.8 million people and, at 9,000 square miles, is equivalent in size to New Jersey. Since 2000, over 80 percent of Harris County's nearly 1 million new residents have moved into unincorporated areas, connected by thousands of square miles of paved streets, parking lots, and over 360,000 new buildings, according to the *Houston Chronicle*. Development has increased storm water runoff, and during Harvey, the record amount of rainfall caused storm water, mixed with toxic chemicals and sewage, to rise to new heights and spread out, inundating areas previously not considered vulnerable to flooding.

"Cities that have a strong planning culture, including general plans and a tool kit of policies they use as part of everyday practice—with disaster plans, natural hazard mitigation plans, and zoning that reflects risk—tend to do better,"

said Laurie Johnson, a Bay Area planning consultant who specializes in catastrophe risk modeling, and coauthor of *After Great Disasters*, published by the Lincoln Institute. Johnson, lead author of a recovery plan for New Orleans after Hurricane Katrina, said that one of the biggest tests for Houston is whether the city and county can work together effectively.

Resilience Efforts

In October 2017, Harris County officials released a 15-point plan calling for strategies such as a regional flood control organization to coordinate water management across county lines, and tougher regulations on development in flood-prone areas. The plan also proposed buying out all homes that are located in the 100-year floodplain or that have flooded repeatedly, an expansion of an existing county buyout program that could cost billions.

The City of Houston has begun to define its own strategies. "We're now focusing on recovery and looking at long-term resilience," said Stephen Costello, a former city council member and an engineer with 40 years of storm water management experience who was appointed the city's chief resilience officer in 2016 by Houston Mayor Sylvester Turner. Costello said Houston does not have a resiliency plan per se, and that his role is "to open the discussion, and hopefully the regulatory issues." He organized and led the city's redevelopment and drainage task force, which issued a report in February addressing rules on detention for redevelopment, placement of fill dirt in floodplains, and protection of the city's rights of way that obstruct drainage flow.

In September 2017, Mayor Turner appointed former Shell Oil Co. Chairman and President Marvin Odum as Houston's chief recovery officer. Odum led Shell's business recovery after Hurricane Katrina. He is charged with expediting disaster recovery and preparing the city for the next record-breaking storm. The resilience and recovery officers report to the mayor, who brings policy recommendations to the 16-member elected city council for a vote.



The upscale Meyerland neighborhood is among the areas under consideration for a buyout program. Rice University's Baker Institute for Public Policy recommended such a program in its post-Harvey report. Credit: Cityswirl, via iStock/Getty

The city and county collaborate through a storm water management joint task force and with the Harris County Flood Control District (HCFCD), a nonregulatory special district that develops storm water management plans and builds and maintains flood control infrastructure. The county's five elected officials determine regulations for unincorporated areas. Each of the county's 34 municipalities has its own criteria for drainage systems, including storm water detention storage. HCFCD, among others, has asked for a "big-picture regional planning effort," said Rob Lazaro, communications officer. Costello said he doesn't favor a regional flood mitigation authority. "Rather than creating an overlapping entity, we need intergovernmental agreements."

Houston is considering building a coastal barrier of dunes and gates to provide storm-surge protection for the region's vulnerable oil refineries and shipping channel. Construction of the system could cost \$10 billion. Harris County has supported the concept, which was also included in a request for FEMA funding.

Development Regulations

David Hightower, executive vice president of Midway Companies, a Houston-based developer, is a member of the city's redevelopment and drainage task force. He said solutions may "require some out-of-the-box thinking, which is a challenge when you're dealing with bureaucrats managing over 600 square miles." Developers would consider "reasonable, equitable, fairly applied" rules, but they object when people blame development such as strip malls for flooding, "when factors like aging and inadequate drainage infrastructure" are really to blame, Hightower asserted.

Hightower, also a member of a Harris County flood mitigation committee, said 2009 county drainage regulations proved effective. The county analyzed where and how Harvey flooded homes in its unincorporated areas, he said, and found that only 467 built after 2009 were flooded.

"It's the areas that are much older, like Meyerland, developed in the 1960s and located mostly within the city limits, that got hit really hard," said Hightower. In Meyerland, an upscale enclave of 2,000 homes located west of downtown Houston along Brays Bayou, some homes have flooded three years in a row. Many homeowners say these older homes have flooded because of newer upstream development, and they want buyouts.

Planning consultant Johnson said risk modeling can show scenarios that link development with flooding risk. "You can show if you put a house here, that impervious surface will affect the system in a certain way." Three years of 500-year storms in Houston "shows that the past is no longer a good indicator of the future," she said. "What is lacking is a common understanding of the future risk, and that's the challenge right now with a changing climate. As modelers, we have to add in the range of possibilities, the uncertainty."

"Cities that have a strong planning culture, including general plans and a tool kit of policies they use as part of everyday practice—with disaster plans, natural hazard mitigation plans, and zoning that reflects risk—tend to do better."

"Risk modeling can show scenarios that link development with flooding risk. You can show if you put a house here, that impervious surface will affect the system in a certain way." Three years of 500-year storms in Houston "shows that the past is no longer a good indicator of the future."

Houston is using climate modeling to predict future flooding impacts, according to Walsh. Post-Harvey, Harris County is requiring that all new buildings on unincorporated land be raised at least 24 inches above the flood plain. The first finished floor of new construction must be at least as high as the 500-year flood level. New houses in the floodplain must be built on piers and cannot use fill dirt to elevate construction. The regulations received wide support from the Greater Houston Builders Association, Houston Real Estate Council, American Council of Engineering Companies of Houston, Houston Apartment Association, and the Houston chapter of the American Institute of Architects.

“These regulations apply in 100-year, 500-year, and outside of 500-year floodplains,” said Christof Speiler, vice president and director of planning for Houston’s Huitt-Zollars architecture and urban planning firm and project manager for the Greater Houston Flood Mitigation Consortium. “These are very fundamental changes that have a very real impact on new development.”

The regulations apply only in unincorporated areas of the county, however, and Houston and other municipalities make their own regulations,

Speiler noted. It is unlikely that new regulations will stop homes from flooding in older developed areas, however, because “a very large portion of the city is legacy building stock, which preceded any flood regulations at all.”

Walsh agrees that many homes were built in places where they never should have been, such as along the bayous. Four out of five structures in the city’s official floodplain areas were built before stricter regulations were adopted in 1981, he said. “For decades, we have allowed development in the floodplain, but we’ve had to build it higher.” Current city regulations require new or rebuilt homes to be raised one foot above the 100-year FEMA floodplain elevation; as a result, in some neighborhoods, ground-level homes that were flooded by Harvey sit side-by-side with elevated homes that were not.

In January, Mayor Turner proposed new development regulations that would require all new buildings to be raised two feet above the projected flood level, noting that Houston could not call for more state and federal flood and resilience funding “without showing that we are moving urgently at the local level to find solutions for ourselves.”



Houston, with its limited and aging storm water management infrastructure, faces the daunting task of preparing for more of the severe storms experts attribute to climate change. Credit: (left) Houston First Corporation; (right) Geoffrey Lyon/SWA

Floodplain and Detention Mitigation

Detention is Houston’s main method of flood control, but lack of available land limits the city’s ability to build large detention infrastructure that could handle Harvey-like flooding. HCFCD manages about 15,700 acres of storm water reservoirs across a 1.1 million-acre area. In the past year, HCFCD invested over \$100 million in capital improvement projects to repair detention basins and widen and deepen channels along the county’s major bayous. The state plans to pay for a third reservoir to better protect areas west of Houston and to avoid the kinds of releases from Addicks and Barker dams that swamped Houston during Harvey. A systemwide upgrade to protect the region fully from a 100-year storm would require an estimated 52,000 additional detention acres, but the cost of acquiring that land exceeds HCFCD’s annual budget several times over.

Mayor Turner in January proposed new detention rules based on the recommendations of the redevelopment and detention task force. Under current measures, only new development is required to manage storm water runoff from rooftops, parking lots, and other impervious surfaces by means of detention. The task force advised closing this loophole, so that a developer intending to build a skyscraper on a parking lot would now have to provide detention to support

effective drainage. Another new rule would require those redeveloping lots under 15,000 square feet to pay a fee in lieu of providing detention. Proposed changes also would provide detention credit for low-impact development options like green swales—typically planted, shallow basins designed to absorb and filter runoff.

Much of the city’s detention and drainage infrastructure dates from the 1940s and ’50s. A January 2017 report from Houston’s Storm Water Maintenance Branch said certain areas developed before 1985 were prone to flooding because of “inadequate and undersized infrastructure.” The city spends over \$250 million per year on street and drainage infrastructure, and its public works department estimated it would cost \$650 million annually to rebuild and maintain decaying storm water infrastructure to reduce flood threats along the city’s bayous, remove properties from the floodplain, replace storm sewer and outfall pipes, regrade ditches, and accomplish other upgrades.

The city faces other big decisions. Harvey flooded 18 of the city’s 39 waste water treatment plants, eight of which were completely inundated, said Costello. Does the city retrofit and design protection for inundated plants, or does it relocate them to other sites? Does it consolidate the waste water treatment system at an estimated cost of \$10 billion?

Roughly 80 percent of the city’s buildings located in mapped floodplains were constructed before the maps were drawn. Harvey inundated some areas that had flood control measures in place. Credit: Karl Spencer, via iStock/Getty



New Mapping Needed

Walsh said the city adopted more stringent floodplain mitigation regulations after FEMA reissued maps for Harris County in 2007. Homes built after 2007 are generally elevated and protected from floods. In neighborhoods that were flooded by Harvey, many homes that were not elevated had their first floor flooded. New maps would help regulate floodplain development and facilitate other resilience efforts, he said.

FEMA maps floodplains and flood levels by modeling how water spills out of creeks, bayous,

and ditches during storms and by projecting where and how high the water would rise. In Harris County, a “100-year event” equates to between 12 and 14 inches of rainfall within 24 hours, and a “500-year event” produces between 17 and 20 inches of rainfall within 24 hours. Initial post-Harvey National Oceanic and Atmospheric Administration estimates for Houston increased the 100-year-event level to 18 inches of rainfall within a 24-hour period. Data show that Harvey was at least a 500-year event across the county and in some areas rose above a 1,000-year storm level.

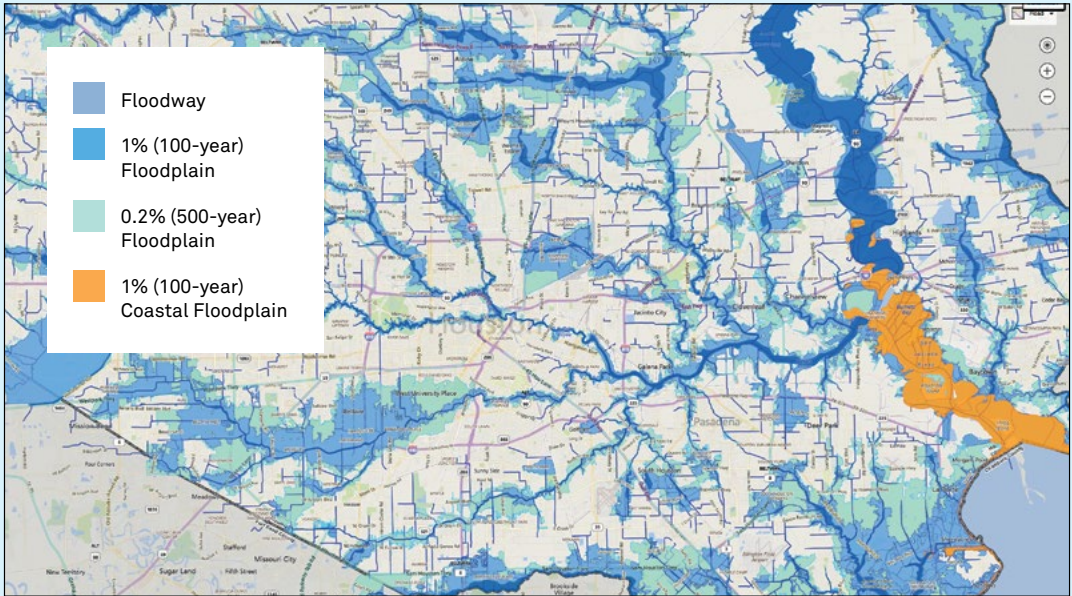
Costello noted, however, that remapping might come too late, at too high a cost, and with too little effect. “Even if we were to decide to remap, it would take a couple years for regulations to change,” he said.

Data show that Harvey was at least a 500-year event across the county and in some areas rose above a 1,000-year storm level.



Figure 2
Houston Floodplains

Credit: Federal Emergency Management Agency.



- A floodway is defined as a waterway and adjacent land, kept free of obstruction, that can carry flood water downstream and keep water levels from rising above a certain height.
- A 100-year flood has a 1 percent chance of occurring in any given year.
- A 500-year flood has a 0.2 percent chance of occurring in any given year.

Buyouts

A post-Harvey report from Rice University’s Baker Institute of Public Policy, recommended a home buyout and removal program, noting that many homes had flooded three or more times since Tropical Storm Allison.

Although buyouts involve an initial public investment and remove properties from tax rolls, they mitigate flood-risk and reduce the cost of repeated damage to property and infrastructure while bolstering communities’ resilience (Freudenberg et al. 2016).

Since 1985, the HCFCD’s voluntary buyout program has purchased more than 3,000 properties; over 1,060 acres have been restored as natural floodplain. By November 2017, the county had received over 3,000 requests for buyouts related just to Harvey, and in February HCFCD notified the state it would request \$180 million for home buyouts. Countywide, over 100,000 homes and other buildings currently sit within 100-year floodplains along 2,500 miles of waterways, said HCFCD.

Harvey’s record rains dispersed waves of floodwater mixed with toxic chemicals and sewage throughout the city, depositing tons of debris and silt, and raising questions about the residue’s composition. Credit: Jonnu Singleton/SWA

Advocates say more buyouts would have a host of resiliency benefits: They would relocate people out of harm’s way and eliminate future flood damages and health and safety risks, reduce repetitive subsidized flood insurance payments and federal disaster assistance, and allow for restoration of the floodplain to its natural function for storm water storage and release.

On the other hand, a larger scale buyout program could cost billions and have other downsides. “In a lot of very established subdivisions, people like their homes and schools, and you’d damage the fabric of the community,” said Walsh. “How aggressive should a buyout program be? Do you take the first row of houses backing up from the bayou? Do you take the first three rows? We have limited resources. It’s a difficult policy question.”

Green Infrastructure

A regional planning strategy focused on natural infrastructure like wetlands would provide “shock protection” from climate-related floods and store and slowly release floodwaters, said Forster Ndubisi, professor of landscape architecture and urban planning at Texas A&M, senior fellow with its Hazard Reduction Recovery Center, and contributor to Lincoln Institute’s *Nature and Cities*. The city and county could provide flood protection and amenities like parks and trails by buying and removing homes in certain neighborhoods and redeveloping bayou riparian zones with detention ponds and native vegetation, he said. “It’s a proactive plan, and it’s so much cheaper” than engineered solutions.

The Houston region has already begun to create detention basins and bayous that double as parks. On the Sims Bayou, HCFCD and the Army Corps built two regional storm water detention basins and planted trees and shrubs along the channel banks. “Sims was the only

bayou that didn’t overflow its banks during Harvey,” noted HCFCD’s Lazaro. In a \$480 million project with the Corps, HCFCD is building four detention ponds and widening and deepening a 21-mile stretch of the Bray’s Bayou channel, which they will plant with native vegetation. The Houston Parks Board and the city’s Parks and Recreation Department, collaborating with HCFCD, are developing the Bayou Greenways 2020 project, a 150-mile greenways trail system that provides drainage, transportation, and recreation along eight bayous. A voter-approved bond referendum is funding \$100 million of the \$220 million project.

Advocates of an extensive network of “green infrastructure”—including parks and golf courses running along Houston’s bayous—point to the success of such landscaped buffers as Buffalo Bayou Park (below) in detaining and slowly releasing Harvey’s floodwaters. Credit: SWA



In downtown Houston, a 2.3-mile stretch of Buffalo Bayou Park—part of a \$58 million public-private project led by the Buffalo Bayou Partnership, the city, and HCFCD—included restoration of the banks with reinforced infrastructure and a riparian landscape, walking trails, boat launches, and picnic areas. During Harvey, when water from the Addicks and Barker dams was released into the bayou, the flood level reached as high as 25 vertical feet, said Scott McCready, senior project designer and principal of SWA Group in Houston. The deluge left 8-foot piles of sand, but compared to engineered bayou channels, he said, the park worked as intended, detaining and slowly releasing floodwaters.

Houston region officials may also use golf courses as storm water detention basins. The metro area has more than 200 golf courses, which are generally easier and cheaper to redevelop for flood control purposes than areas with construction. Clear Lake City, a master-planned community 23 miles southeast of downtown Houston, had a history of flooding, and in 2011 the city’s water authority acquired a former golf course for detention purposes. A nonprofit organization is now developing a detention and open-space park, Exploration Green, with contoured basins, wetland preserves, and miles of trails that can survive flooding. It passed its first trial during Harvey by saving 150 homes from flooding. When completed, it will manage up to one-half-billion gallons of storm water and protect up to 3,000 homes, according to the *Texas Tribune*.

Focus and Accelerate

“There is a larger conversation that needs to happen,” said Speiler. “What is resiliency for the region?” He said many local efforts “seem to be the right things, but we just haven’t done enough of them.” Some changes may be required to retrofit infrastructure for older developed sections of Houston and protect natural habitat upstream. But generally, he said, “it isn’t so much that we need to change, but rather that we need to focus and accelerate what we’re doing.”

Many say Houston is not likely to enact a zoning code as a resilience measure, nor is a prohibition or even a moratorium on development in floodplains likely. But Walsh said Houston is taking a more thoughtful approach. He said city and county officials are considering a resilience plan and making decisions with resilience in mind. City council, for example, is looking more carefully at infrastructure and development-related decisions they used to approve routinely. “They’ve shown they’re concerned about development in flood-prone areas,” he said, “even something like a MUD [municipal utility district].”

Ultimately, Walsh said, Houston’s long-term concern is “keeping the focus on resiliency—that’s the political challenge when the skies are blue.” □

Kathleen McCormick, principal of Fountainhead Communications in Boulder, Colorado, writes frequently about healthy, sustainable, and resilient communities.

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Ben Walsh was sworn in as the 54th mayor of Syracuse in January 2018, leading a postindustrial metropolis that, like many, has struggled with job and population loss. The 37 year-old, who helped establish the Greater Syracuse Land Bank and redevelop the Hotel Syracuse, is known for a pragmatic and creative approach to urban planning.

Prior to becoming mayor—a job held by his grandfather—he was the city’s deputy commissioner of neighborhood and business development. He also held positions at the Metropolitan Development Association and the private firm Mackenzie Hughes LLP. He has a Master’s degree in public administration from the Maxwell School at Syracuse University. He resides on the city’s west side with his wife, Lindsay, and his two daughters. He was interviewed by Lincoln Institute Fellow Anthony Flint.

Syracuse Endorses the Value of Its Legacy

ANTHONY FLINT: You were born into a political family—your grandfather was mayor and Congressman, and your father was also elected to Congress—but you took some time before running yourself. What finally prompted you to want to be chief executive?

BEN WALSH: It’s the public service that is important. I admired my dad’s ability to see politics as a means to an end. I was never confident in my own ability to strike that balance. But ultimately, when I came to work for the city [under the previous mayor, Stephanie Miner], I started to consider running for office.

AF: In your first weeks on the job, what would you describe as the biggest challenge, and the biggest promise, in leading a legacy city such as Syracuse?

BW: We have a structural deficit, anticipating a \$20 million [shortfall] this year. The good news is we have built up a good funds balance over the years. The bad news is we are drawing down on it. But that’s balanced by all the ingredients that Syracuse has to be a vibrant city. I look at the trends and where young people want to be, and we can offer them urban amenities, proximity to work, density, and walkability.

AF: According to our recent report *Revitalizing America’s Smaller Legacy Cities*, many post-industrial cities have a strong tradition of foundations, other nonprofits, and “eds and meds,” or anchor institutions. What kind of partnerships are you developing?

BW: We actually don’t have a large philanthropic base. We have local foundations, but they’re on the smaller side. It’s a blessing and curse of our industrial legacy. We never relied on one industry or company, so we never went as high but also didn’t go so low. Eds and meds are a significant part of the city. One of the highest concentrations of colleges and universities is in this region. Three great hospitals [are] major employers. St. Joseph’s Hospital has very intentionally grown in a way that supports the neighborhood around it. Same for Syracuse University. We would like to be doing a better job of commercializing the technology that comes out of those institutions. If you look at our legacy institutions, [they have] a foundation of knowledge and expertise to create new companies and industries. . . . We see a lot of companies in the UA (unmanned aerial) space based on radar technologies going back to General Electric. With Carrier, though the manufacturing is gone, they have maintained R&D, and some great work is being done on indoor air quality technologies.

AF: Syracuse made a bid for Amazon HQ2. Did you learn anything from that process about Syracuse’s assets or shortcomings?

BW: It forces the region to work together and collaborate and prepares us for future, perhaps more realistic, opportunities. We’ve seen our fair share of hard times over the years, and I think it has made us a risk-averse community. I liked the way we thought outside the box.

AF: Another important element for many regenerating legacy cities has to do with history and a sense of place. What are the urban “bones” of the city that give Syracuse a competitive advantage in this regard?

BW: When you look at the renaissance of our urban core, it’s the adaptive reuse of our industrial and historic building stock. People are looking for that sense of place, that authenticity. It’s real. We’re not trying to recreate a Main Street. We’ve used both federal and New York state historic tax credits. It has been a major driver of our redevelopment.

“If you look at our legacy institutions, [they have] a foundation of knowledge and expertise to create new companies and industries.”



Mayor Walsh advocates replacing the elevated section of Interstate 81 running through Syracuse with a ground-level transition into the city’s street grid. Credit: City of Syracuse.

Reinventing Development Regulations

By Jonathan Barnett and Brian W. Blaesser

Every community across the land can and should revise their zoning and subdivision regulations—a move that will build sustainability and resilience, increase affordability, and improve quality of life, say the authors of a new book published by the Lincoln Institute of Land Policy in October 2017.

In *Reinventing Development Regulations*, two well-known experts—urban designer Jonathan Barnett and real-estate lawyer Brian W. Blaesser—argue for major adjustments to land use regulations that are within existing legal frameworks and respectful of property rights, making the politics of the necessary changes much more manageable. Their recommendations include integrating development with natural ecosystems and using regulations to manage climate change, which is particularly urgent for communities confronting wildfires, floods, and volatile weather, which will become even more serious problems as global warming continues.

“This is an eminently practical guide to transforming development rules to deal with some of the most pressing challenges faced by communities today,” said Armando Carbonell, senior fellow and chair of the Department of Planning and Urban Form at the Lincoln Institute. The work spells out “a robust set of measures that can be implemented primarily at the local level.”

Development regulations determine the urban form of our cities, suburbs, and towns, and have a huge impact on the natural environment, influencing how, when, and where real estate development occurs. Development regulations can help solve pressing land use and environmental problems. But current regulations have structural deficiencies and biases that must be corrected to achieve public objectives for land use and development in balance with market realities.

Changing official zoning maps so they incorporate topography, streams, flood plains, and other natural features and pinpoint locations of existing buildings will make it easier to develop sustainably and adapt to the effects of climate change, the authors argue. Walkable neighborhoods with a variety of different housing types and compact, mixed-use business centers could be built today if the regulations that stand in their way are modified.

While some advocate jettisoning outdated zoning and starting over, Barnett and Blaesser lay out strategies to amend existing regulations to promote better land use without



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To order, visit www.lincolninst.edu/publications/books/reinventing-development-regulations.

disrupting the basic governance frameworks and real estate markets of cities, towns, and suburbs. The right regulations can help cities, towns, and suburbs preserve the natural environment, create desirable civic places, conserve historic buildings, reduce housing inequality, ease the pressures for urban sprawl, and deal with floods, erosion, and wildfire, without infringing upon fundamental property rights.

Barnett and Blaesser lay out strategies to amend existing regulations to promote better land use without disrupting the basic governance frameworks and real estate markets of cities, towns, and suburbs.

When you look more broadly [at] the importance of history here, a few things come to mind—[the Syracuse region was] the birthplace of the Iroquois confederacy, an important stop on the Underground Railroad, the birthplace of the women’s suffrage movement, the hub of the salt industry. We’re embracing that history.

AF: Can you tell us about your interest and experience in land banking, and how that might translate to more equitable development?

BW: We saw it as an opportunity, first of all, to help the city be more effective in collecting taxes. We made a policy decision in the past not to foreclose on delinquent properties, and that created an environment where there wasn’t any accountability. Properties were falling vacant. We also wanted to be more intentional in how we dealt with these vacant lots, not as liabilities but as assets. What we had been doing was selling tax liens. We realized we owned the problem regardless. We passed state legislation to create a city-county land bank. We have built up a sizeable inventory of properties and have sold over 500 to date. Now we turn to more equitable development. We favor selling to [homeowners], and we’re enabling affordable housing development using low-income tax credits. The first step was getting our arms around the problem, and now we’re looking at planning processes.

We passed state legislation to create a city-county land bank. We have built up a sizeable inventory of properties and have sold over 500 to date.

AF: The era of urban renewal took a particular toll on cities like Syracuse. How important is the proposed dismantling of the Interstate 81 viaduct through downtown, and what can be done to make that project become reality soon?

BW: I’ve been a vocal proponent of removing the elevated portion of I-81 in favor of the community grid option. We have existing infrastructure to reroute through-traffic around the city and accommodate traffic coming into the city through an enhanced street grid. There are primarily suburban interests that understandably see any alteration of the existing conditions as a threat. At the [state level], it’s taking longer than anyone expected. We’re waiting on a draft EIS (Environmental Impact Statement). [The options include] replacing the viaduct, which would require it to be higher and wider, and a tunnel option. We’re talking a difference in billions. The community grid option comes in at \$1.3 billion; the least expensive tunnel option is \$3.2 to \$4.5 billion, and goes up from there. That’s a pretty big difference for a mile and a half stretch. Even if we could afford to build the tunnel, we don’t need it. Eighty percent of the traffic already comes into the existing grid. It’s just bottlenecked at a couple of off ramps. This is a once-in-a-generation opportunity to right a past wrong.

AF: Not every city can be a tech hub alternative to Silicon Valley. What is it about Syracuse that could create a niche?

BW: We can’t compete in every arena, so we identify where we have core competencies, like indoor air quality and unmanned aerial systems. I believe we’re the only city in the country where you’ll be able to test drones beyond line of sight.

AF: What will it take to get younger people to stay in Syracuse? Do you have a target population size in mind?

BW: I don’t have a target in mind. For decades, we lost population. The first step is stabilizing. We’ve done that, and we’re right around 140,000. When we peaked as a population, we didn’t have the suburban sprawl we have today. The region remained stable as we were losing [downtown residents], as people moved to the suburbs. Now when you look at the national trends, the city is what young people are looking for. □



- **Relate development to the natural environment.** Current regulations recognize land as a commodity but not as a living ecosystem. The authors show how to incorporate modern environmental information into a regulatory framework that, up to now, has been largely blind to it.
- **Manage climate change locally.** The consequences of a changing climate, particularly flooding and wildfire, have an increasing effect on land use and development. While the problem is global, there is a significant role for local governments in both mitigating climate change and adapting to it through changes to the way development regulations are written and implemented.
- **Encourage walking by mixing land uses and housing types.** Walking is the most efficient form of transportation for distances of a quarter of a mile, and very competitive with buses and even taxis for up to half a mile. Walking is also important for maintaining health. Current regulations make it difficult to develop walkable neighborhoods and business centers.
- **Preserve historic landmarks and districts.** Much of the success of historic preservation has been achieved in opposition to zoning and other regulations that are designed to facilitate new development. There are ways to bring designated historic buildings and districts into harmony with regulations where permitted development creates an incentive to tear down a historic structure.
- **Create more affordable housing and promote environmental justice.** Zoning and subdivision regulations have been used as a way to exclude low-income people from some communities, and the location of industry and infrastructure has had a disproportionately negative effect on low-income communities. The book addresses how to mitigate these biases in the existing regulatory system.
- **Establish design principles and standards for public spaces and buildings.** Zoning and subdivision regulations have been written to prevent the worst development, not to encourage the best. Regulations can be used to foster better design for the places most important to the public.
- **Implement regulations while safeguarding private property interests.** Any overhaul must be informed by an understanding of fundamental legal principles essential to safeguarding private property interests in the formulation and implementation of regulations, and in government decision making on proposed development projects.

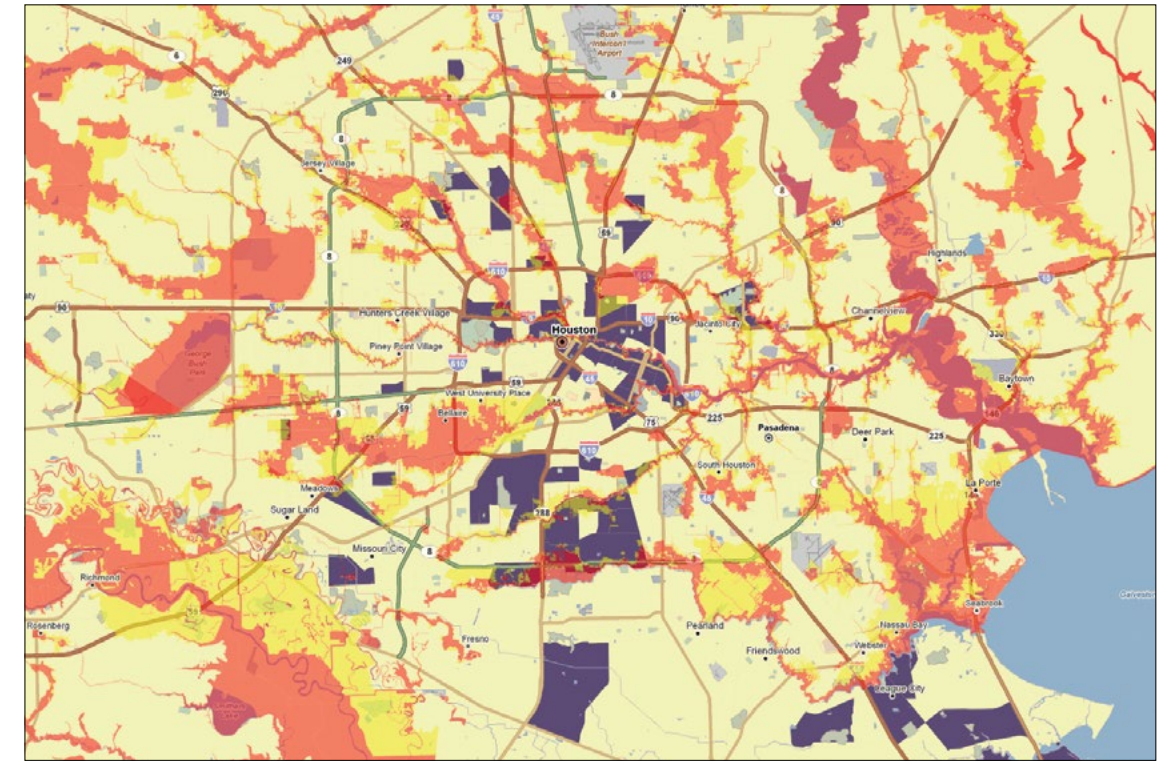
Reinventing Development Regulations made its debut at the 18th annual Big City Planning Directors Institute in Cambridge, Massachusetts. The gathering of city planning directors from the U.S. and around the world, many of whom say their cities are overhauling zoning, is a partnership of the Lincoln Institute, the American Planning Association, and Harvard University's Graduate School of Design.

ABOUT THE AUTHORS

Jonathan Barnett has served as the director of the graduate urban design program at the University of Pennsylvania and previously at the City College of New York, and as a visiting professor, critic, and lecturer at many other universities. He worked in the reform administration of New York City Mayor John Lindsay and documented the city's innovations in the book *Urban Design as Public Policy* (McGraw-Hill: 1974). Barnett is also author of the book *City Design: Modernist, Traditional, Green, and Systems Perspectives* (Routledge, 2nd edition 2016), exploring the history and practice of city design, and coauthor of *Ecodesign for Cities and Suburbs* (Island Press: 2015), among other works.

Brian Blaesser is a partner in the law firm Robinson & Cole LLP and heads the Land Use and Real Estate Development Group in the firm's Boston Office. He is coauthor of the books *Federal Land Use Law & Litigation* (Thomson-Reuters: 2017) and *Discretionary Land Use Controls: Avoiding Invitations to Abuse of Discretion* (Thomson-Reuters: 2017), and co-editor of *Redevelopment: Planning, Law, and Project Implementation* (ABA Publishing: 2008) and *Land Use and the Constitution: Principles for Planning Practice* (Planners Press: 1989).

Houston-Area Brownfields Located in Flood Zones



- Insufficient Data
- Brownfields
- No Brownfields
- High Flood Risk
- Moderate Flood Risk

In the aftermath of Hurricane Harvey, the Environmental Protection Agency reported that 13 of the 41 federal Superfund sites in Texas had flooded. The Texas Commission on Environmental Quality lists 26 federal and state Superfund sites in Harris County. Houston is the county seat.

Regulations can be used to foster better design for the places most important to the public.

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