

# Land Lines

QUARTERLY MAGAZINE OF THE LINCOLN INSTITUTE OF LAND POLICY

APRIL 2020

## The Resilient City

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Report from Shenzhen, China

Deconstructing the Highway

Building an Equitable Renaissance



# Land Lines

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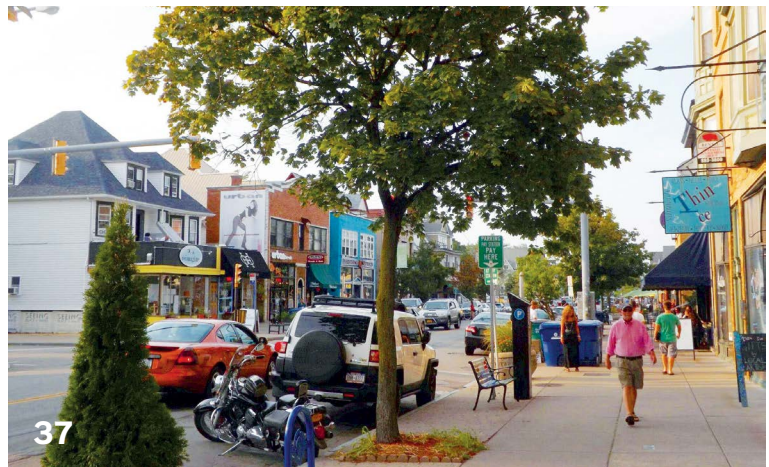
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Industry and nature meet in Shenzhen, China. Credit: Fuyu Liu via Shutterstock.

# Reflections from Our Readers

We welcome letters to the editor. Letters may be edited for length and clarity. Please send your thoughts, ideas, and inquiries to [publications@lincolnst.edu](mailto:publications@lincolnst.edu).

**I APPRECIATED** your article on green infrastructure financing [“Riches of Resilience,” January 2020]. Notably missing, however, was any mention of natural green infrastructure and financing its conservation. In many urban areas, flood problems are substantially related to the failure to conserve natural wetlands, waterways, and banks. Protecting and enhancing these areas would go a long way toward reducing flood damages. All landforms are not created equal, and the failure of our planning, zoning, and legal systems to safeguard floodways is a continuing problem. Sound land use planning à la Ian McHarg would include protection of these features. I believe it would be worth a follow-up article to investigate good examples of protecting, restoring, and enhancing natural features for flood management. We would all be a lot better off for it.

**Barry Pendergrass**  
Albany, New York

*Ed. Note: We agree that conservation is a key piece of the climate resilience puzzle. We hope you'll enjoy this issue's feature on natural stormwater management in Shenzhen, China. We especially appreciate the way author and landscape architect Kongjian Yu describes the importance of conducting urban planning with conservation in mind: “You plan what's not built. You plan what's protected.”*

**I ENJOYED** George McCarthy's October President's Message [“Lessons Never Learned,” October 2019]. It's tragic how much effort and public funding has been spent pursuing what seemed to be a worthy goal: “A decent home and a suitable living environment for all Americans.”

It seems that the broader idea got reduced to the first phrase without the second. And the first phrase—a decent home—cannot exist without the second—a suitable living environment.

So how should we define a suitable living environment? I like the definition of “neighborhood” by Congress for the New Urbanism: “A walkable area of limited size, on a grid of connected smaller streets, with mobility options, containing a variety of housing types, numerous workplaces, adequate shopping, and most or all of the facilities for education, worship, recreation, entertainment, and civic life.”

The goal should be “affordable living,” not affordable housing. How can housing be affordable to the working poor if they must own an automobile to get to a low-wage job? Many and probably most of the 2.5 million Low Income Housing Tax Credit units were built in suburban areas where walking and transit and cycling are simply not an option.

The federal government approach to affordable housing needs to be



completely revamped, to direct public policy and public funding assistance to the private sector building complete neighborhoods as defined above. Affordability comes from the neighborhood structure, not just the home.

**Rob Dickson**  
Albuquerque, New Mexico

**CORRECTION:** In our feature about the elimination of single-family zoning in Minneapolis [“Rezoning History,” January 2020], we incorrectly identified Mapping Prejudice as a joint project of the University of Minnesota and Augsburg University. The project is housed at the John R. Borchert Map Library at the University of Minnesota. We regret the error and have updated the online version of the article. □





## What We Didn't Know Then

IN MY OCTOBER MESSAGE, I ruminated on the classic lyric by Bob Seger: "Wish I didn't know now what I didn't know then." The lyric provides an invitation to reflect on lost innocence. Though that column was written not long ago, it already feels like the product of a different era. The coronavirus pandemic has rapidly changed the ways we conduct our public and private lives. I'm certain we will learn many lessons from this experience, in and well beyond the realm of land use. Some of the responses to my last column might even prove instructive. In that column, I invited readers to share their own "lessons learned," and got several interesting responses. I'll reflect on a couple of them here, and I hope this will spur more of you to engage with us as we launch a new Letters section with this issue.

Our colleagues at the Babbitt Center for Land and Water Policy weighed in with this reflection: We wish we didn't know now that the apportionment of Colorado River water in the 1920s relied on an unusually wet period at the beginning of the 20th century as a baseline. The commission that divided water rights assumed that the river supplied 17.4 million acre-feet (MAF) of water annually. They allocated 15 MAF in equal parts to the U.S. states in the Upper and Lower Basins and 1.5 MAF to Mexico. The actual annual flow of the river varies from less than 5 MAF during droughts to 22 MAF in wet years. A more reasonable estimate for average annual flow is between 12 and 13 MAF.

Aware of the structural challenges created by the allocation and the variability of water flow,

the river commissioners devised ways to store water by building dams and reservoirs. But they could not have foreseen the factors now affecting water supply in the West, from population growth to climate change.

Some 40 million people depend directly on the Colorado for drinking water and tens of millions of others depend on the food produced using its water for irrigation. From 2000 to 2019, the river had its lowest flow over a 20-year period since the Glen Canyon Dam was completed in 1963. At the beginning of this year, water storage in the system was at 53 percent of capacity, a welcome increase over 2019 when it was at 47 percent of capacity. The system is surviving, but barely, and communities throughout the basin are finding new ways to reduce demand in the face of reduced supply. It's a productive but painful exercise, one that might have been avoidable had a bit more humility and precaution been in play from the start.

What lesson can we draw from this? Since science is always improving, it might have been wise for the commission to enact an adaptive policy. This would have left room to revisit and revise allocations when more was known about the river's hydrology. However, as noted by river historian and Justice Greg Hobbs: "the Commission fended off a suggestion of the U.S. Geologic Survey that the [agreement] should last only 50 years and then be renegotiated. Instead, the Commission produced a perpetual allocation between the upper basin states and the lower basin states." Perhaps humility was off the table.

A very different, but no less painful, example arrived from our partners in New York, who wish they didn't know now that when the city considered rezoning the neighborhood around the Gowanus Canal in Brooklyn, speculators would lay claim to potential future land values—to the tune of billions of dollars—almost immediately.

This neighborhood, built around a mostly abandoned industrial canal, is one of the last affordable places in Brooklyn. It is well-located—next to Park Slope and close to Prospect Park—and well-served by transit. It remained affordable because the canal was badly polluted with industrial waste over many decades. The Environmental Protection Agency (EPA) put the canal on its Superfund National Priorities List in 2010, formalizing a cleanup plan in 2013.

The city is only now preparing to release its proposed zoning plan for public review. So how could speculators capture so much of the future publicly created additions to land value? For one reason, they've known for over a decade that the area would likely be rezoned; the New York City Department of City Planning invited public comment on a rezoning study in 2008. And once the area became a Superfund national priority, the race was on to buy up everything available.

In the face of this spree, residents became concerned. A coalition of housing and community development advocates organized to defend the neighborhood. They asked the Lincoln Institute for help understanding whether rezoning might gentrify the neighborhood by increasing land and property values and displace current residents. We recommended a firm that could analyze historical and potential future property values.

That firm looked at 798 land properties designated for rezoning. Based on very conservative assumptions, they estimated that the land value of those parcels increased by \$2.1 billion to \$2.4 billion between 2013 and 2018. They then looked at the 387 parcels that were most likely to be redeveloped after rezoning and estimated that their land values would increase another \$1 billion to \$1.7 billion. The total increase in the land value created by rezoning

the Gowanus was \$3 billion to \$4 billion, but almost two-thirds of it was captured by landowners by 2018, *before any rezoning had been put into effect.*

In New York, development rights are traded and transferred in a billion-dollar private market. This allows developers to build beyond current zoning limits by buying unused building rights from nearby landowners. Purportedly, JPMorgan Chase paid \$200 million to purchase the right to add 18 floors to its headquarters on 270 Park Avenue, which was built to its zoning limits. Oddly, the public sector doesn't participate directly in these markets; if it did, the city could have sold the new development rights it created in the Gowanus for upwards of \$3 billion. This increased land value was the product of public action—rezoning and investment in the clean-up—and should not have ended up in the pockets of landowners or developers.

In the case of places like the Gowanus, we need to stop making windfalls available to landowners and developers and find ways to recover the land value created by public action—whether through direct investment or policy change. And we need to recognize that timing is important. Speculators will act in a nanosecond to manifest a value proposition. The public sector needs to be ready with policies and procedures to claim what is rightfully its own before the speculators show up.

We all know it's easy to engage in Monday-morning quarterbacking. Neither you nor I faced the monumental task of dividing up the Colorado River, or cleaning up and rezoning that New York neighborhood, or deciding whether to shut down an entire state or country to protect public health. What I do know is that more humble and adaptive policy approaches better prepare us for the unknown, and more proactive approaches will build more resilient communities. By embracing these tools, we can move forward more confidently, minimizing the regret, lost value, and missed opportunities that too often linger for decades after significant policy decisions are made. □



## New Apps Encourage Climate Positive Design



The web-based app Pathfinder, at left, was the brainchild of landscape architect Pamela Conrad, who created the tool to measure the climate impacts of her work after discovering that no such tool existed. At right, an explanation of climate positive design, which seeks to sequester more carbon dioxide than it embodies or emits. Credits: Courtesy of CMG Landscape Architecture.

A COUPLE OF years ago, landscape architect Pamela Conrad got curious about the climate impact of her work. How much carbon dioxide did her chosen materials release into the atmosphere? How much carbon was sequestered, or captured, by any given project's mix of trees, shrubs, grasses, and other plants? What factors could she adjust to improve the net outcome? Conrad, a principal at the San Francisco firm CMG Landscape Architecture, decided to investigate.

"I went online and I just assumed there was going to be some magical tool that I could download, and it would just tell me," she says. "I kind of expected to find it that afternoon."

That didn't happen. She did find helpful tools and data intended to help gauge and improve the emissions impact of the *built* environment, but what she was looking for didn't seem to exist: a tool to help landscape architects understand, in a holistic way, the climate impacts of their work.

Beyond her personal curiosity, this struck Conrad as a surprising absence. "We haven't been measuring anything outside the building," she says. That meant crucial conversations with policy makers and clients weren't happening, because "we haven't had the data." Because landscape architecture can not only reduce emissions but also make tangible contributions to carbon sequestration, this field is perfectly positioned to offer "climate positive design," as Conrad calls it: design that sequesters more carbon dioxide than it emits.

Conrad set out to make the tool she couldn't find, with the support of a research grant from the Landscape Architecture Foundation. She worked with environmental consultants and tech developers to create a beta version of the free, web-based app now known as Pathfinder. The app, which formally launched in September 2019, has been used by 300 firms and counting. It is intentionally simple and accessible. Users enter

various details of a project, large or small, from a backyard garden to a city plaza. The interface asks for information about materials (e.g., sand, crushed stone), plant types (e.g., trees, lawn), and other details.

On the back end, the app draws on data from sources including the U.S. Forest Service and the Athena Impact Estimator software created by the Athena Sustainable Materials Institute (ASMI) for building materials. It provides a kind of carbon profile for each project and offers suggestions to improve it, such as substituting a no-mow meadow for a lawn, or a wood deck for paving. The suggestions are intended to reduce the time it will take for each project to become carbon neutral, and then carbon positive.

In the course of designing Pathfinder, Conrad tapped into a vein of similar efforts in other corners of the architecture and construction sectors that are contributing fresh insight to broader discussions of policy, planning, and land use. ASMI, a nonprofit collaborative, has been a pioneer on this front: since 2002 it has provided a variety of software tools that help designers

measure the building, construction, and material impacts of their projects and materials.

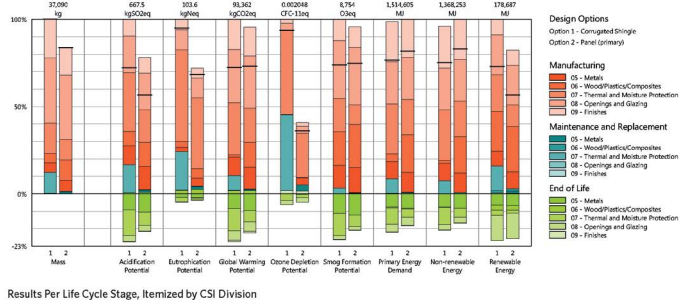
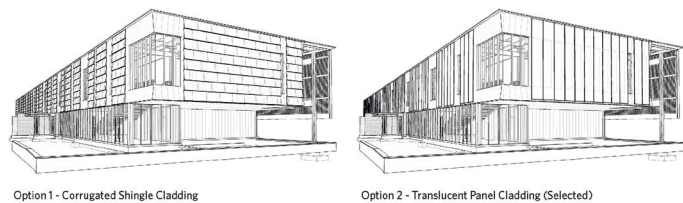
Interest in this sort of resource is surging. Stephanie Carlisle, a principal at Philadelphia architecture firm KieranTimberlake, caused a stir earlier this year with a lengthy call-to-arms essay on the contribution of architects to climate change in *Fast Company*. New construction contributes massively to carbon emissions, she wrote: "Although it's become mainstream to discuss energy efficiency and advocate for minimizing those impacts, architects, engineers, and planners have yet to truly reckon with the magnitude and consequences of everyday design decisions."

Carlisle says she has been heartened by the enthusiastic response to the essay. As it happens, KieranTimberlake introduced its own carbon measurement tool, Tally, a few years ago. Tally was designed to be folded into workflow processes, as a plug-in to a 3D modeling software commonly used in the industry called Revit. This means, Carlisle explains, that a designer can substitute and change material and other options

A designer can substitute and change material and other options on a work in progress, then run a report on its potential carbon impact: "It tells designers where to spend their energy."

Tally allows architects to compare the climate impacts of various materials. Credit: Courtesy of KieranTimberlake.

Tally™ can be used to compare design options.





on a work in progress, then run a report on its potential carbon impact. “It tells designers where to spend their energy,” she says. Some 200 firms now use Tally, and its sales rose about 150 percent last year.

Tally, Pathfinder, and other similar tools fit into a broader trend of architects and landscape architects responding to climate change. “These [projects] are great pieces of the puzzle,” says Billy Fleming, Wilks Family Director for the Ian L. McHarg Center at the University of Pennsylvania and a coeditor of the recently published *Design with Nature Now*, a collaboration between the university and the Lincoln Institute of Land Policy. “The core of [the challenge] is absolutely about social, technical, and political systems that have to be reorganized around an international mobilization and response to climate change. So these efforts should be treated as the beginning of a conversation—not the end of it.”

Indeed, both Carlisle and Conrad emphasize that these tools are just a means to an end. Such tools are “directly empowering architects and engineers,” Carlisle says, but they can also help establish common benchmarks that make it easier for communication around carbon standards to “make its way into policy and code.” That’s starting to happen—Carlisle cites Marin County’s recent introduction of carbon standards for construction materials, and Conrad notes that San Francisco is embarking on a sustainable neighborhoods framework that factors in carbon sequestration standards—but they say there’s still not enough awareness of the possible positive impacts of design outside the design professions, or perhaps even within them. “We need way more investment in R&D, and in tools,” Carlisle says.

Conrad extends the point: as much as she intends Pathfinder to offer “really quick, accessible answers” with practical impacts on real projects, she also wants it to serve as an educational experience that builds awareness. “Landscape architects are the primary target,” she says. “But I see [potential use for] a lot of

“We think you can cut emissions [on a given project] in half, and increase sequestration by two or three times, just by having the right information in front of you.”

other players in the space, like policy makers using it to set standards.” While it’s easy for an individual to use Pathfinder to plan a backyard renovation, large-scale landowners can use it to gauge the impact of setting aside portions of development for trees and other elements that build climate resilience.

A simple slider interface shows the user that, for example, a combination of 400 large trees and 1,100 medium-sized ones can sequester 2.3 million kilograms of carbon. “Once we’re able to measure what we’re doing and collect that data and get that feedback,” Conrad continues, “then we can start understanding what we’re doing and evolve our practices.”

Conrad has been spreading the word about Pathfinder through conferences and webinars, and has been taking suggestions that will guide updates in 2020. Late last year, she helped organize the Climate Positive Design Challenge, aimed at landscape architects, which established specific targets for projects large and small to achieve carbon-positive status: five years for parks, for instance, or 20 years for streetscapes or plazas. Pathfinder is meant to play a central role in helping designers meet that challenge.

“We could potentially take a gigaton of carbon dioxide out of the atmosphere over the next 30 years,” Conrad says. “We think you can cut emissions [on a given project] in half, and increase sequestration by two or three times, just by having the right information in front of you.” □

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**Rob Walker** is a journalist covering design, technology, and other subjects. His book *The Art of Noticing* was published in 2019.





# SHENZHEN EXPLORER

Shenzhen Explores the Benefits  
of Designing with Nature



By Matt Jenkins

**AT THE HEART OF** Shenzhen, China, the city's massive, wavelike Civic Center stands surrounded by a mind-boggling panoply of futuristic skyscrapers. Forty years ago, this area was home to just a few scattered fishing villages on the Pearl River Delta. Today, approximately 24 million people live within Shenzhen's greater urban area. In China, Shenzhen has come to stand for something much bigger than itself.

On a hill downtown, a statue of revered former Chinese leader Deng Xiaoping striding purposefully toward the Civic Center helps explain why. Deng took control of China in 1978, after the death of Mao Zedong. The transition marked an end to decades of isolation from the outside world that had been dominated by command-and-control planning. Deng turned the country in a radically new direction, launching the Reform and Opening program to loosen the strictures that had bound the country for so long. And Shenzhen led the way into the future.

Deng granted the newly created city a license to operate as an economic super-laboratory, a place to explore the promise of the free-market economy. It was a sink-or-swim proposition, and in the years since, Shenzhen has succeeded wildly.

Yet Shenzhen's spectacular growth has come at a cost. As the area transcended its naturally marshy environment and turned from literal backwater into economic powerhouse, much of its land cover succumbed to blacktop and concrete. During storms, the abundance of paved-over land caused widespread flooding, as well as large-scale releases of urban pollution into nearby Shenzhen Bay and the Pearl River Delta.

Shenzhen is hardly alone in facing these problems. But continuing in its role as a national hotspot of innovation, it has become a unique laboratory for thinking about how to build livable cities throughout China and beyond.

Left: Lotus Park, Shenzhen, China. Credit: LZJ via iStock.  
Right: A statue of former Chinese leader Deng Xiaoping, who orchestrated Shenzhen's economic boom, overlooks the downtown area. Credit: Matt Jenkins.



SIX MILES NORTHEAST of Deng's statue, Professor Huapeng Qin stands on a rooftop, surrounded by sensors measuring wind speed, temperature, and evaporation. He is looking for solutions. Based at the local satellite campus of Peking University, Qin is at the forefront of an effort to turn Shenzhen into a "sponge city." Using techniques that mimic nature, sponge cities can catch, clean, and store rain, which reduces the risk of flooding and keeps local drainage and water treatment systems from being overwhelmed.

Although it takes its cue from centuries-old thinking, the modern concept of the sponge city began forming in Europe, Australia, and the United States in the early to mid-1990s. The movement was a reaction to two common phenomena in urban development. First, just as happened in Shenzhen, most rapidly developing cities pave over huge amounts of land, eliminating a significant amount of natural forest cover, filling in lakes and wetlands, and severely disrupting the natural water cycle. Second, the traditional approach to urban stormwater management has focused on moving as much

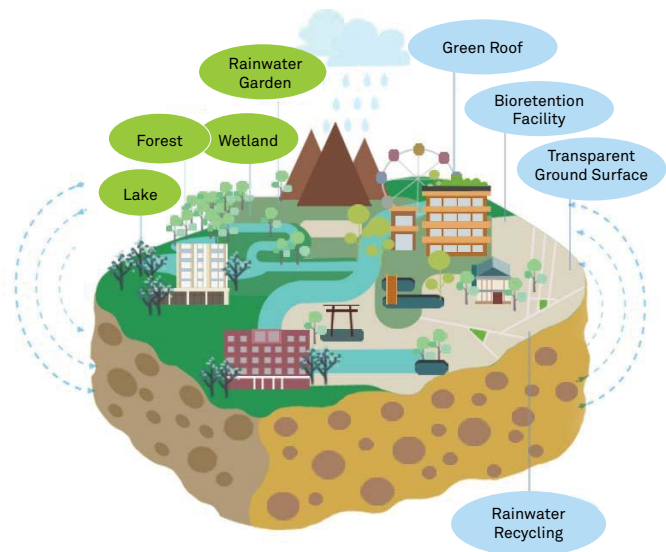
rain as possible off the land as quickly as possible, not capturing it for reuse.

Sponge city thinking marks a significant shift away from traditional "gray infrastructure"—think concrete pipes and dams—to "green," or natural, infrastructure such as rain gardens and forests. The sponge city approach aims to restore some of those natural functions by allowing urban areas to transform the menace of stormwater into a boon: extra water for dry times. Sponge city techniques therefore have multiple benefits. They can help soften the impact of flooding, improve both water quality and water supply, and help fix environmental problems.

The sponge city concept is a relatively new arrival in China, but it has gained traction here fast. That's partly due to the country's tremendous growth over the past several decades, which has drastically altered the landscape.

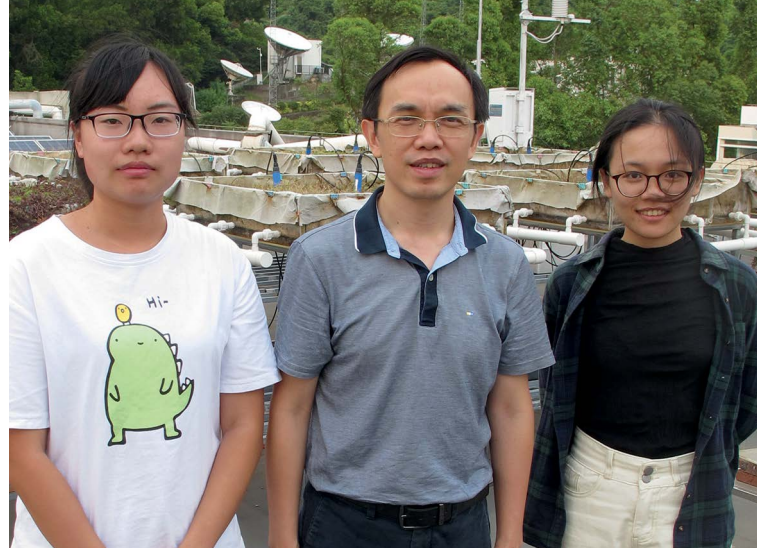
It's also due to a new mindset about the risks of pursuing prosperity at all costs. In July 2012, a huge rainstorm in Beijing led to flooding that caused 79 deaths and an estimated \$1.7 billion in damage. The incident galvanized national leaders.

Sponge city thinking marks a significant shift away from traditional "gray infrastructure"—think concrete pipes and dams—to "green," or natural, infrastructure such as rain gardens and forests. The sponge city approach aims to restore some of those natural functions by allowing urban areas to transform the menace of stormwater into a boon: extra water for dry times.



Graphic: Jiang Rong, designer/www.gochengdu.cn, Chengdu Daily.





Rooftop experiments at the local satellite campus of Peking University are providing researchers in Shenzhen with data about how natural systems can help create a “sponge city.” At right, Professor Huapeng Qin (center) and students. Credit: Matt Jenkins.

In late 2013, President Xi Jinping officially endorsed the sponge city concept, and the following year the Ministry of Housing and Urban-Rural Development issued a set of technical guidelines aimed at ensuring that 70 percent of surface runoff be captured in place. The central government also launched what would ultimately become a 30-city pilot program to prove out the concept.

Shenzhen is one of the pilot cities, and it's no coincidence that the sponge city concept has gotten more traction here than anywhere else in China. From financial policy to the tech sector, “Shenzhen has always been very willing to borrow ideas from outside China and try them out,” says Qin. The sponge city idea is no different. “First it was just scattered pilot projects, but now the concept is being incorporated into Shenzhen’s master plan.”

In this case, Qin and his students are trying to learn more about techniques for creating green roofs, using plants grown in a medium of lightweight engineered soil to catch rain where it falls, slowly metering it out afterward. Such techniques are “very similar to natural systems,” Qin says. “Natural systems look very simple, but the processes are very complex. So we’re trying to understand those processes.”

“Shenzhen has always been very willing to borrow ideas from outside China and try them out,” says Qin. The sponge city idea is no different. “First it was just scattered pilot projects, but now the concept is being incorporated into Shenzhen’s master plan.”

A sponge city has several interchangeable building blocks. At a large scale, protecting or restoring forests and natural ground cover helps give water a chance to sink in. At smaller scales, there are several options. Permeable pavement can be used on roadways, sidewalks, and pathways to allow water to infiltrate the ground, rather than wash off into the local stormwater system. Retention ponds and constructed wetlands help catch and filter water, allowing it to slowly percolate into the local water table. So-called rain gardens perform a similar function at a smaller scale, and can easily be incorporated into neighborhood green space or even homes. Green roofs catch and filter rain, along the way watering plants that, Qin says, can help reduce surface temperature by up to nine degrees Celsius.

In 2018, SuperTyphoon Mangkhut blew down half the trees in the city. With climate change expected to increase the intensity and frequency of such extreme weather events, Shenzhen is prioritizing resilience projects and investments. Credit: REUTERS/Jason Lee.



Shenzhen's embrace of the sponge city concept has been driven by its spirit of innovation, but also by the fact that the effects of an unbalanced water cycle are often plain to see here. Heavy rains can overwhelm local water treatment plants, sending nutrient-laden wastewater directly into Shenzhen Bay and the Pearl River Delta, causing large algae blooms.

People are also worried about the impacts of climate change. In what may have been a taste of what's to come, Super Typhoon Mangkhut, which hit in 2018, blew down half the trees in the city. Qin says computer models predict that with climate change, total annual rainfall will be comparable with current levels, but that precipitation will be much "flashier": extreme events like short-duration, high-intensity rainstorms will become more common.

This area has absorbed an influx of millions of people over the past few decades, largely by turning its back on the water that was once its defining characteristic. Now, Qin and others across the city are committed to finding new ways forward. The lessons they are learning and applying here are the first steps in what may soon be a sweeping transformation—not only in the city around them, but also throughout China.

"Sponge cities are just one example of how China is taking up the sustainability agenda," says Zhi Liu, director of the Peking University-Lincoln Institute Center for Urban Development and Land Policy. Acknowledging the urgency of building climate resilience in the face of extreme weather and other challenges, he says, "This is not something China wants to do in order to look good. It comes out of necessity."

Shenzhen's embrace of the sponge city concept has been driven by its spirit of innovation, but also by the fact that the effects of an unbalanced water cycle are often plain to see here. Heavy rains can overwhelm local water treatment plants, sending nutrient-laden wastewater directly into Shenzhen Bay and the Pearl River Delta, causing large algae blooms.



UNTIL TWO YEARS AGO, the 105-acre patch of green space now known as Honey Lake Park was an abandoned agricultural experiment station. The dominant features of the park, which sits not far from downtown Shenzhen, were a neglected grove of lychee trees and two fish ponds. Today, walking into the park feels like walking into an architectural rendering. Yet in the company of an expert, it quickly becomes clear that the park is not only aesthetically pleasing but also eminently functional.

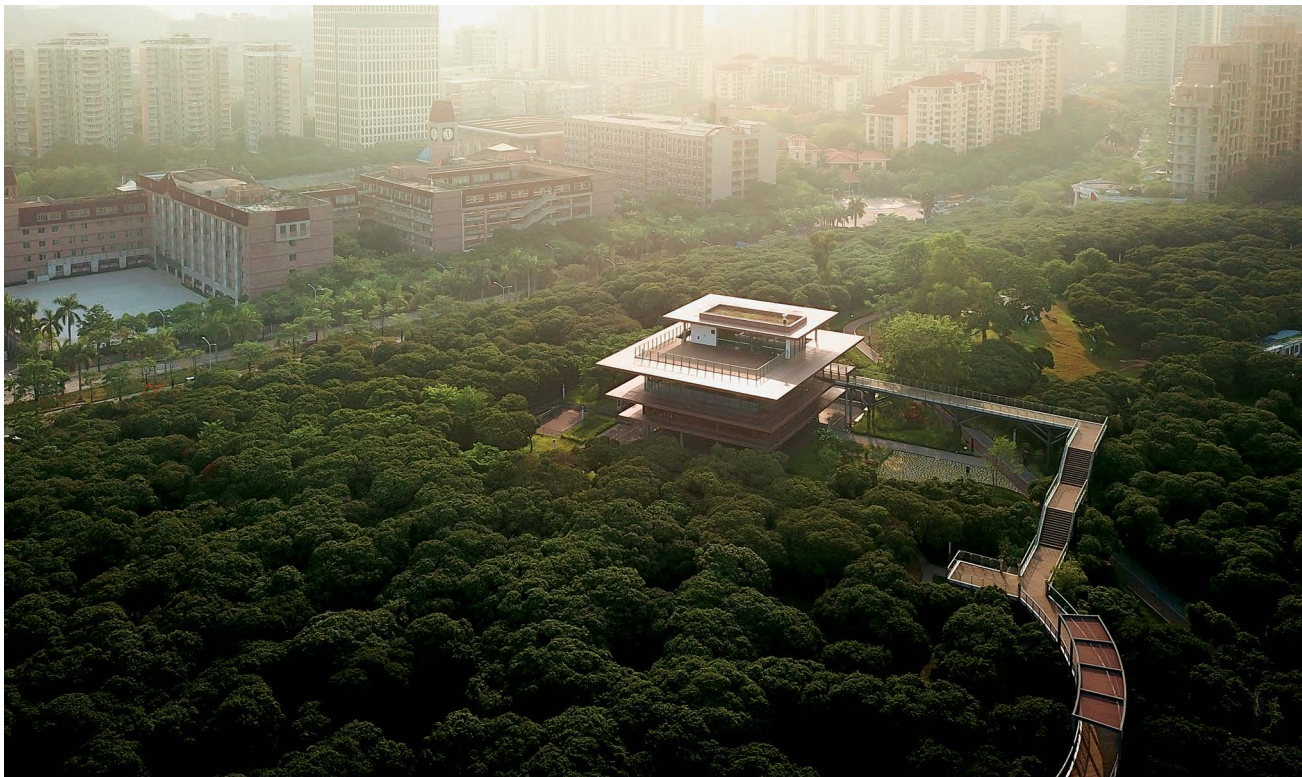
Yaqi Shi, a technical director with the Shenzhen-based Techand Ecology & Environment company, helped design the park. The paths that we are walking on, she explains, are constructed of permeable pavement, and the park's rolling contours are hugged by small swales that help slow and catch runoff. A series of ponds in the middle of the park is sown with native rushes that Techand raised in its own nursery. Signs throughout the park point out the various sponge city elements and explain how they work.

Shi, whose professional focus is ecological restoration, speaks with the brisk economy of an engineer. But the delight in her voice is evident when she speaks of the evolution of this project. "The park turned out to have a really user-friendly feeling," she says.

As we walk, Shi points out a library, a children's play center, and the local wedding registration office, all within the boundaries of the park. A pavilion at the edge of a pond provides an ideal backdrop for cooing newlyweds to pose for portraits.

Walking into the park feels like walking into an architectural rendering. Yet in the company of an expert, it quickly becomes clear that the park is not only aesthetically pleasing but also eminently functional.

Xiangmi Park, also known as Honey Lake Park, is a former agricultural research area that was redesigned for community use. Bioswales, permeable pavement, and other elements allow it to double as a stormwater management tool. Credit: Vlad Feoktistov.





Sponge city elements in the new suburb of Guangming include, from left to right: a green roof on the water treatment plant; planted medians at a local foreign languages school; and permeable roads and parking lots. Credit: Matt Jenkins.

A walk with Shi also makes it clear that much of the technology underlying sponge cities is, in fact, surprisingly low-tech. The real art of the approach lies not so much in being technically clever, but simply in being thoughtful. Shi explains, for example, that much of Shenzhen is underlain by a layer of clay, which prevents water from infiltrating very far into the ground. To make permeable pavements work means hiring contractors to dig out the clay, sometimes to a depth of six feet, and replace it with gravel and more permeable soil.

Nonetheless, once you get a sense of what to look for, Shenzhen suddenly starts to seem like an entirely different city. On the northwest side, a relatively new suburb called Guangming has wholeheartedly embraced the sponge city concept. The suburb's recently built New City Park is a model of retaining stormwater in place,

from a water-absorbing latticework in the parking lot to permeable pavement on the paths, to swales and miniature, artificial wetlands designed to slow and soak up water. The massive adjacent public sports center has a green roof and a vast expanse of permeable bricks and pavement. The anaerobic digesters at the Guangming water treatment plant are covered by an enormous green roof; there's another at the foreign languages school. Over at the high-speed rail station, where bullet trains thunder in from Hong Kong, the streets out front are made of permeable pavement.

After a while here, it's hard to resist the temptation to, little by little, empty your water bottle onto Shenzhen's sidewalks and streets, simply for the novel sensation of watching the water disappear into what otherwise appears to be regular blacktop and concrete.

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**BACK DOWNTOWN,** The Nature Conservancy's Xin Yu shows me another side of the sponge city revolution. We meet in the lobby of a Hilton hotel just a mile from the Civic Center and the nearby hilltop statue of Deng Xiaoping. After quick pleasantries, Yu takes me out a back service door. Compared to the airy elegance of the hotel lobby, it feels as if we've passed through a portal into another dimension.

We find ourselves in the narrow alleyways of an area known as Gangxia, a former farming village that Shenzhen gradually engulfed, and that subsequently metamorphosed into a crowded warren of five- and six-story apartment buildings. Gangxia and other so-called urban villages are a phenomenon found in practically every Chinese city, and are testament to the frenetic pace at which the country has urbanized over the past 40 years. They are often gritty, but they're an important haven for low-income migrants who otherwise wouldn't be able to afford the high rents of most urban areas. They typically come to form largely self-contained communities with small businesses that cater to all the needs of their residents, from vegetable sellers to modest karaoke parlors.

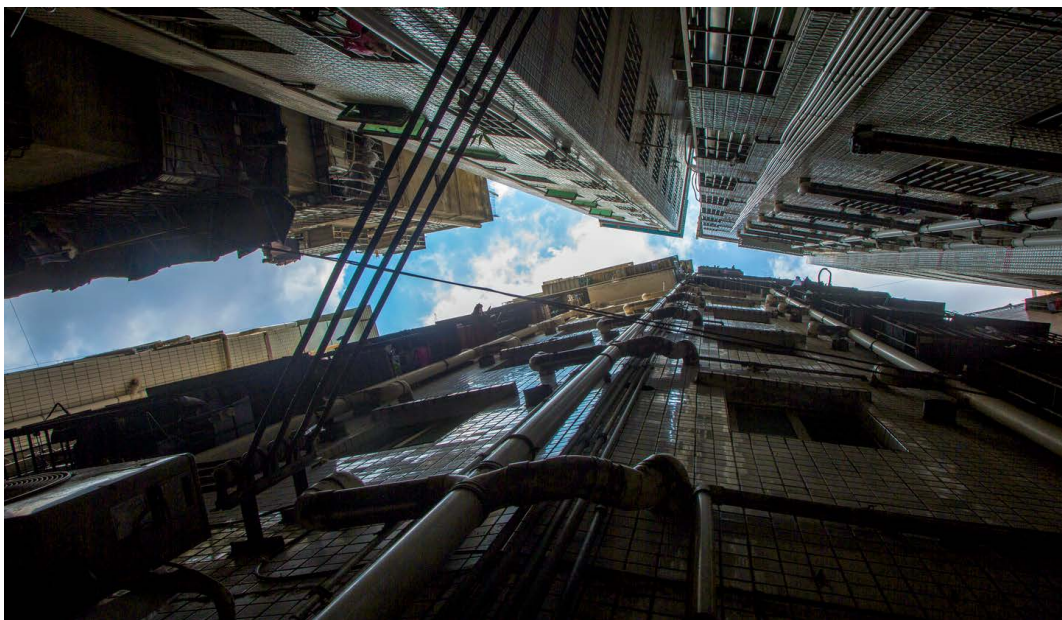
Yu nimbly leads me through the narrow back alleys, and it quickly becomes clear that

“village” is a misnomer. The densely packed buildings here are known as “handshake apartments,” built so close together that residents of neighboring buildings can reach through their windows to shake each other's hands. Restaurants are preparing for the lunchtime rush, and the air is filled with the staccato rhythm of vegetables being chopped. Business here, Yu says, is vibrant and extremely competitive: “These alleyways really are alive.”

Gangxia's original residents didn't technically own the land upon which their houses were built, but they did have rights to use that land. As Shenzhen grew during the 1980s and 1990s, they replaced their own houses with apartment buildings, often keeping one floor for themselves and renting out the rest, to take advantage of rising rents.

The Nature Conservancy (TNC) has played an important role in showing that it's possible to incorporate sponge thinking even in the heart of the urban jungle. “There are a lot of ideas, but the government or companies can't necessarily try things out,” Yu says. “NGOs can. We can figure out what ideas work and take them back to the government to promote more broadly.” (Due to the political climate in China, Shenzhen officials were not in a position to meet for this story.)

The “handshake apartments” of Shenzhen's urban village of Gangxia, so close residents can nearly touch each other, are the site of an experimental green roof project. Credit: Yang Xu.





Yu opens a gate to an otherwise nondescript apartment building and climbs several flights of stairs to the roof—and an improbable flourish of lush greenery. A multilevel lattice framework groans with plants of every description. This green roof, Yu says, catches over 65 percent of the rain that lands on it.

Showing what's possible hasn't always been easy. When TNC first started this green roof project, Yu and his colleagues had to contend with angry neighbors who thought they were illegally adding another story to the building.

"People kept calling different government departments: the police, or the construction bureau, or the city administration bureau," Yu says. That led to several visits from local code enforcement teams, who used ladders to gain access to the building and a cutting torch to try to dismantle the garden's supporting framework. "They kept asking for approval documents," Yu says, and laughs. "But those don't really exist. We had nowhere to go to get them."

With time, however, efforts like this have spread broader awareness of the sponge city concept. "Public consultation—how you get the public to understand what this is about—is very important," says Liu of the Lincoln Institute. "I think NGOs can play a big role in this area, and TNC is a trusted international NGO in China."

TNC's work has also gained the backing of officials and business leaders. Yu was invited to be a member of the technical committee for Shenzhen's municipal sponge city program. When corporate tech giant Tencent decided to incorporate sponge city techniques in its iconic new headquarters in Shenzhen, the company turned to TNC for ideas. And Tencent's founder, chairman, and CEO, Pony Ma, is not only a member of TNC's board of directors for China, but also a delegate to the powerful National People's Congress. There, he has made sponge cities part of a broader personal platform of advocating for nature-based solutions. Ma has also inspired fellow business leaders to commit to—and invest in—ensuring that their businesses meet sponge city standards in Shenzhen.

The Nature Conservancy's green roof project in the urban village of Gangxia catches over 65 percent of the rain that falls on it. Credit: John Siu.



SOME 1,200 MILES NORTH of Shenzhen, in Beijing, Kongjian Yu's office seems to sprout a plant from every spot where he hasn't managed to stuff a book. The *Where the Wild Things Are* feel is entirely consistent with Yu's personality, which is driven by a kind of restless energy. It's hard to imagine him sitting in one spot for five minutes.

Yu, who was born in a small farming village in coastal Zhejiang Province, went abroad and earned a Doctor of Design degree at Harvard, in 1995. Upon returning to China, he was deeply disheartened by the direction that development had taken. "When I came back, I was shocked by the scale of urbanization," he says. "I was amazed by how this process ignored all our natural and cultural heritage, filling in wetlands, destroying the rivers, cutting down the trees, and wiping out all these old buildings."

Yu was hired as an urban planning and landscape architecture professor at Peking University. In the staid world of Chinese development theory, he has made his name as something of a flower child—and a gadfly. Yu became a prodigious author and tireless lecturer, and

turned out a series of open letters to China's top leaders. He called for China to abandon its mania for building monumental public squares; advocated for a revival of the traditional Chinese approaches to farming, water management, and settlement; and suggested that the money allocated for annual National Day parades be better spent building good parks.

Above all else, Yu railed against China's obsession with concrete, a repudiation of decades of thinking here. "The philosophy in China, in Mao's era, was that humans can beat nature," Yu says. "And that caused a lot of disasters for us."

That attitude only accelerated in the years after Mao's death, and by the early 21st century, China was setting records for the amount of concrete it was pouring each year. Global systems demystification guru Vaclav Smil has estimated that China used more cement in just three years, 2011 to 2013, than the United States did in the entire 20th century.

While Yu has encountered opposition to his outspokenness, he has also tapped into a growing demand for this new kind of systems thinking. Today, in addition to serving as dean of Peking University's College of Architecture and Landscape, he heads a 600-person landscape architecture and urbanism consultancy called Turenscape. Municipal governments across China routinely seek the company out for help. He also wrote the definitive two-volume practitioners' guidebook on sponge cities in China, and contributed to the Lincoln Institute of Land Policy book *Nature and Cities*.

A core tenet of Yu's overall approach is a concept he calls *fan guihua*. The concept is frequently translated as "negative planning," but might be more accurately rendered as "inverse planning." It's essentially a counter to the type of development that has shaped China's growth for so long.

"You plan what's *not* built," Yu explains. "You plan what should be protected."



In the course of his work, Yu came to a surprising realization: the idea of living with water, rather than battling it, was a concept that had historically been very familiar.

This, obviously, is a fairly radical idea in contemporary China. Yet in the course of his work, Yu came to a surprising realization: the idea of living with water, rather than battling it, was a concept that had historically been very familiar.

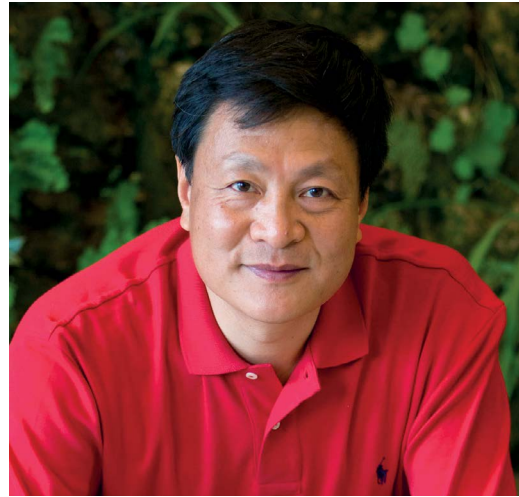
In central and southern coastal China, including the area where Shenzhen now stands, a distinctive method had evolved over centuries to catch rainfall and carefully manage it with earthen dikes to raise mulberries, silkworms, and fish, a sort of landscape-scale aquaponics system. And when Yu and his students looked deeper, they realized that sponge city-like concepts had been a fundamental principle of Chinese city planning for centuries. Traditionally, he says, many Chinese cities had the capacity to absorb two-thirds of local rainfall within their boundaries.

With this discovery, the idea of a different way of managing water—and the perils of a drastically altered hydrologic cycle—became a major theme of Yu’s work.

Nature, for its part, began putting an increasingly fine point on the issue.

During the 2012 flood in Beijing, “seventy-nine people were killed. Drowned. On the street,” Yu says. “In the capital, we drowned 79 people. How is that possible? We lost face. That immediately became a political issue.”

Yu wrote another letter to high-level leaders saying that adopting the sponge city approach and creating a resilient landscape might offer hope. As it happens, Xi Jinping had recently become the secretary general of the Communist Party and president of China.



Landscape architecture professor and practitioner Kongjian Yu. Credit: Courtesy of American Academy of Arts and Sciences.

After decades of the country struggling with notorious pollution and other environmental problems, Xi has staked his reputation on creating an “ecological civilization” in China. The exact contours of that concept are sometimes difficult to discern, but in broad outline it encompasses both a nationwide push for ecological sustainability and the creation of a green, uniquely Chinese alternative development model for the rest of the world. Both sponge city thinking and a more expansive embrace of low-impact development fall squarely within Xi’s larger aspirations.

“China’s in an environmental crisis. We have to do this,” Yu says. “When people can’t breathe, when the water is polluted—I think he’s very sensitive to those issues. I think he really wants to build his legacy on doing this.”

**THE BIGGEST CHALLENGE** to making sponge cities work on a broad scale has nothing to do with building rain gardens, installing permeable pavement, or placating neighbors. “Finance is a major issue,” says Liu.

Liu, who came to the Lincoln Institute after 18 years with the World Bank, is largely focused on governance and financing issues associated with land use in China. Taking the sponge city



concept to scale won't be easy, and he cites the challenges in Shenzhen as an example. Sponge city improvements in Shenzhen, which officially began in 2017, now cover 24 percent of the city's total surface area. The government has a goal of increasing that to 80 percent by 2030. But hitting that target will be a significant challenge.

The central government has pledged a total of \$5.8 billion (40 billion Chinese yuan) to incentivize Shenzhen and the 29 other pilot cities to invest in and carry out sponge city work. But it wants each of those places to bring at least 20 percent of its developed area up to the sponge city standard by the end of this year.

Liu says that bringing a square kilometer of already developed urban land up to the standard typically costs \$22 million to \$29 million (150 to 200 million CNY). The 30 pilot cities are each eligible for 400 to 600 million Chinese yuan per year from the central government for three years. That's enough to upgrade, at most, four square kilometers per year.

To meet—and actually exceed—the central government's 20 percent by 2020 target, Shenzhen brought about 235 square kilometers up to standard, at a cost that likely ran anywhere from \$5 billion to \$7 billion.

"Asking the municipal government to come up with that kind of money is not easy," Liu says. Shenzhen was able to pull it off because of its strong municipal budget and private commitments from the city's tech and manufacturing giants. But, he adds, "if you go to the interior cities where the municipal finance is very weak, it's very difficult." (See next page for an exploration of the potential role of green bonds in the sponge city financing mix.)

Liu points out that in the case of new development, cities can implement standards that will require developers to pay for improvements, a cost typically passed on to residents and firms. "If you look at the upfront costs for development, sponge cities are not a very expensive thing to do," Liu says. Retrofitting existing development, however, is a much bigger challenge.

"The toughest issue is that public finance is used to finance the public good, with very little opportunity for cost recovery," he continues. "That's really the toughest story about China. It's a matter of priority. The cities just have too much on their plate. So by the end of the day, very few cities can find enough money."

Sponge city infrastructure is "just like a streetlight," Liu says. "It's a shared public good, but nobody wants to pay for it."

**IN TRUTH**, the biggest challenge of turning the sponge city into reality may well be unraveling the financing mechanics. Yet the cost of not rising to the challenge may be higher than anyone fully appreciates.

"It's really like thinking about buying insurance," Liu says. "We are all facing uncertainties, but the trend of more intense storms is quite clear . . . The cost of inaction might not look that high today, but when we're faced with a catastrophic outcome in 10 or 20 years, we'll regret that we didn't spend the money earlier."

Even given those high stakes, the sponge city idea could ultimately be about even more. Back in Shenzhen, standing on the roof of the apartment building in Gangxia, TNC's Yu says sponge cities do a lot more than tame floods and save water for dry seasons.

"If you only talk about stormwater management or runoff control, the average person won't necessarily buy in, because they'll feel like it doesn't have any connection to them," he says. "But features like green rooftops are different. They can have a synergistic effect. They help absorb rainfall, but they also improve the neighborhood view, contribute to urban biodiversity, and create a green space that everybody can use." □

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**Matt Jenkins**, who has previously worked as an editor for *Nature Conservancy* magazine, is a freelance writer who has contributed to *The New York Times*, *Smithsonian*, *Men's Journal*, and numerous other publications.

## THE POTENTIAL OF GREEN BOND FINANCING IN CHINA

Underlying the urgent need for sustainable, high-quality urbanization in China—a new approach taking hold after decades of unchecked growth—is the question of money. Public funds can supply only a small amount of the total investment needed to build low-carbon infrastructure in cities across the country. In the specific areas of energy conservation and environmental protection, some estimates state public funds will cover less than 25 percent of costs (*Bond Magazine* 2018). For Chinese cities, this means mobilizing private capital is imperative. A growing interest in green bonds—bonds specifically intended to fund projects related to sustainability—suggests this financing tool could be a viable option.

The World Bank issued the first official green bonds in 2009. In the 10 years following, cumulative global green bond issuance exceeded \$521 billion. As of 2018, green bonds account for about one percent of the global market (Tay 2019). China has rapidly become the world's second largest green bond market since releasing national green finance guidelines in 2016; the total amount of money raised through state-issued Chinese green bonds—not all of which align with international definitions and standards—was about \$31 billion in 2018 (Meng et al. 2018) and hit almost \$22 billion in the first half of 2019 (Meng, Shangguan, and Shang 2019).

Generally speaking, the projects that benefit most from green bond proceeds are large, have long investment horizons, and rely on proven technology—metro lines and other clean transportation are good examples. Green bond proceeds can be allocated to existing assets, such as a solar energy plant operating in a city, or to upcoming capital investment.

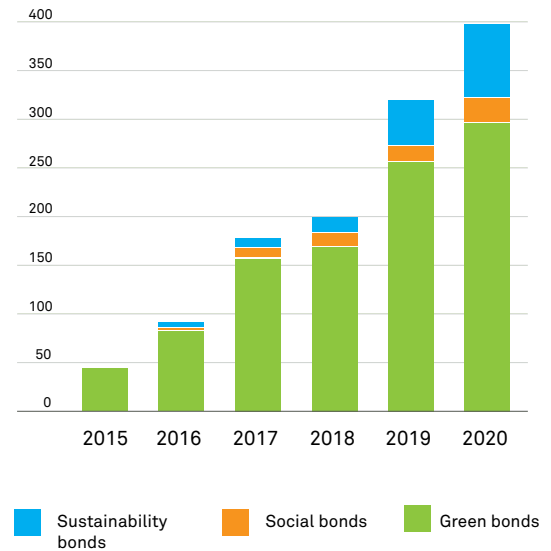
In June 2019, the Ganjiang New Area in Jiangxi Province issued the first municipal bond in China bearing a “green” label (China Securities Network 2019). The bond followed the regulations

of the People's Bank of China, the country's central bank, and was issued to finance smart utility pipelines. The issuance was 12 times oversubscribed, indicating that investors in China are willing to finance projects tied to sustainable infrastructure and industry (Ibid).

Farther south, in Shenzhen, two unlabeled green bonds helped finance an International Low Carbon City (ILCC) project launched in 2012. The ILCC is a flagship demonstration project of the China-E.U. Partnership on Sustainable Urbanization. When completed, it will cover more than 53 km<sup>2</sup> and display an array of green buildings and low-carbon technologies (Zhan, de Jong, and de Brujin 2018).

## GOING GREEN

SALES OF BONDS USED FOR ENVIRONMENTAL AND SOCIAL INITIATIVES ARE BOOMING



Note: 2020 figures reflect projections.  
Source: Moody's Investors Service.

Cities like Shenzhen, which have a relatively large GDP and municipal budget, can afford to experiment with innovative financing methods in order to circumvent financial barriers and constraints. Many cities still rely on sales of land as the main municipal finance resource for capital investment. This is a serious problem for smaller cities in particular, because the value and amount of their land and level of private sector interest in the land are all lower than in larger cities. Oftentimes, smaller local governments will have to settle for selling land to a nonideal or polluting industry, such as a steel company. Chinese cities hoping to reduce carbon footprints could look to aspects of Shenzhen's financing efforts to diversify funding away from land sales.

This alternative was further validated in November 2018 when a local finance vehicle in Wuhan issued offshore green bonds and raised \$400 million (Davis 2018). The bond proceeds will go toward expanding sustainable public transportation (Moody's Investors Service 2018).

Municipal officials can increase the efficacy and feasibility of green bonds by providing incentives such as interest rate subsidies, bundling different environmental assets (such as solar, water, and pollution cleanup investments) into larger bonds to attract big investors, and attaching measurable indicators to create accountability and transparency (IISD 2018). Monitoring, reporting, and verification is also a key part of green bonds.

As a debt instrument that can harness private capital for climate-oriented projects, green bonds appear naturally suited to the needs of cash-strapped cities in China that are trying to achieve low-carbon transition. Green bonds will almost certainly play a larger role in the Chinese and global financial sector going forward.

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Excerpted and adapted from "Green Bond Financing and China's Low-Carbon City Development" by **Carl Hooks**. Master's thesis, Peking University, 2019.

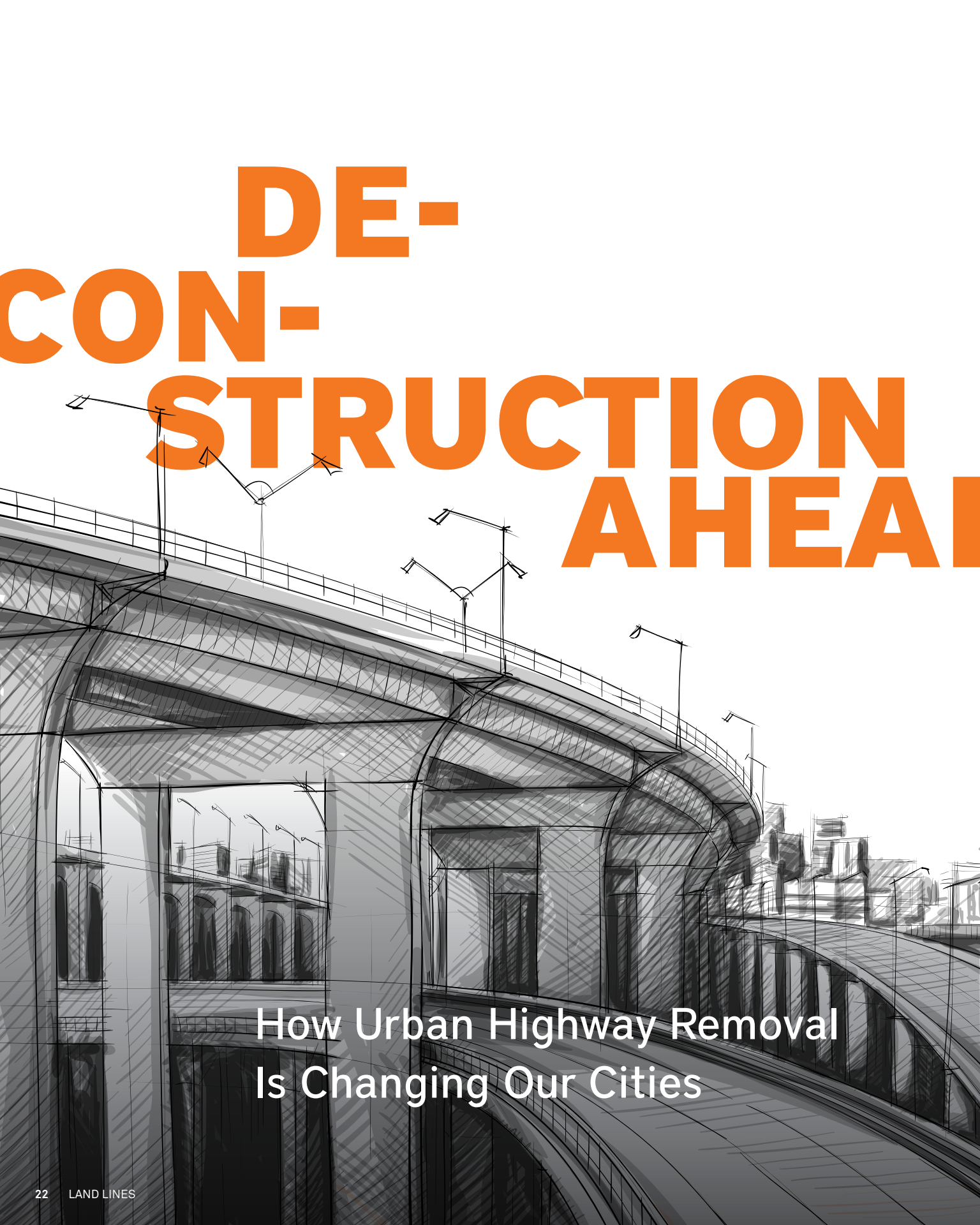
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# DE- CON- STRUCTION AHEAD

An architectural sketch in black ink on a white background, depicting a multi-level highway interchange. The drawing uses fine lines and cross-hatching for shading and texture. Several streetlights with multiple lamps are positioned along the overpasses and ramps. The perspective is from a low angle, looking up at the structure.

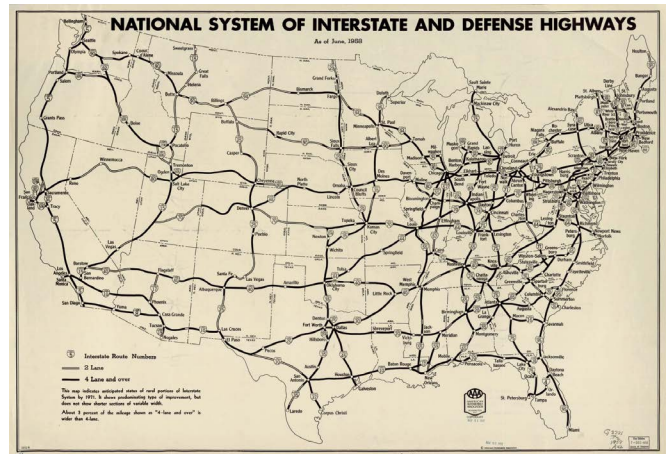
How Urban Highway Removal  
Is Changing Our Cities

By Kathleen McCormick

WITH THE interstate highway system in its seventh decade, the condition of many urban highways in the United States has deteriorated. Crumbling viaducts and other unsafe conditions call for an urgent fix. But rebuilding is complicated by rising construction costs, higher engineering and safety standards, scant funding, and other factors. While the federal government underwrote most of the cost of building the interstate system in the 1950s and 1960s, state and local governments now provide about 80 percent of public infrastructure funding. With perspectives on land use, transit, and equity also evolving, many cities are finding themselves at a crossroads when it comes to highways: remove or rebuild?

Some cities are opting for reconstruction. In Orlando, Florida, a 21-mile stretch of interstate jammed with 200,000 vehicles a day is being upgraded in the \$2.3 billion “I-4 Ultimate” project, which includes building or rebuilding 140 bridges, redesigning 15 interchanges, moving exits, and adding toll lanes. But other cities have removed their highways entirely or relocated them underground, which repairs divided neighborhoods and opens new vistas. San Francisco’s Octavia Boulevard, completed in 2003, replaced the former Central Freeway, damaged in the 1989 Loma Prieta earthquake. Boston’s “Big Dig” moved an elevated section of the Central Artery underground, making way for the Rose Kennedy Greenway and reconnecting downtown districts to the harborfront.

Credit: SireAnko via iStock.



A 1958 map of the planned federal interstate system.  
Credit: U.S. Library of Congress.

Following these and other successful projects in places from Portland to Chattanooga, some of the biggest urban highway infrastructure efforts now involve deconstruction. Cities and states are trading highways for boulevards and connected streets that create space for public transit, walking, and cycling.

The Michigan Department of Transportation is planning to convert a one-mile stretch of I-375 in Detroit into a surface street; its construction in the 1960s paved over black neighborhoods in the city’s core. The Texas DOT is exploring ways to remove or reduce the footprint of the two major interstates that cut through Dallas, I-345 and I-30.

While government plays a key role, the highway removal movement often is built “from a grassroots base, by people in the neighborhood who have a vision for what it could be without the highway,” says Ben Crowther, manager of the Highways to Boulevards program of the Congress for the New Urbanism (CNU). The organization advocates for replacing freeways with streets networks that can contribute to urban vitality and livability. But this is no high-speed process, Crowther says. These efforts “don’t take years— they take decades.”





Milwaukee tore down the 0.8-mile Park East Freeway spur (left), replacing it with McKinley Boulevard (right) and freeing up 24 acres of land for redevelopment. Credit: Courtesy of Congress for the New Urbanism.

## An Accelerating Trend

“Urban highway removal has been happening in the United States for the last 30 years,” says Ian Lockwood, a livable transportation engineer with Toole Design Group in Orlando. “During the past few years, interest has accelerated.”

Lockwood has served multiple times on the National Advisory Committee for CNU’s *Free-ways Without Futures* report, which identifies and studies roadways that are ripe for removal (see sidebar). Since 1987, more than 20 highway segments have been removed from downtowns and urban neighborhoods and waterfronts, mostly in North America, says CNU. Lockwood says the movement has gained a national focus as more cities recognize “how costly and incompatible building highways was in cities.”

According to federal lore, President Eisenhower didn’t intend for interstates to blast through cities when he signed the Federal Aid Highway Act in 1956. But during previous congressional hearings, mayors and municipal associations had testified in favor of the interstate system because of the benefits cities expected to receive from urban highway segments, and the idea soon became unstoppable. The interstate system would eventually span 47,000 miles, many of them routed through cities experiencing what would turn out to be peak mid-century population growth.

Lockwood, who has worked on many highway removal projects, says bringing highways

up to code can heavily impact neighborhoods, due to requirements such as adding lanes or bridges and realigning ramps. Removal, however, has positive impacts. “As we slow things down, value gets added” to cities through more mobility choices, better urban design, and greater investments, which draw new people and businesses, he says.

“This trend is part of an evolution in how we think about who cities are designed to serve,” says Lincoln Institute of Land Policy Associate Program Director Jessie Grogan, who leads the organization’s work in the area of reducing poverty and spatial inequality. “No longer are cities being planned for cars and commuters from the suburbs; instead, their multiple roles as commerce centers, homes, and places of recreation and tourism are being acknowledged and encouraged.”

This trend also has economic benefits. Milwaukee replaced the 0.8-mile elevated Park East Freeway spur with McKinley Boulevard and restored the street grid to enhance access to downtown, surrounding neighborhoods, and the Milwaukee Riverwalk. A master urban design plan and form-based code were prepared to shape pedestrian-scaled development and reinforce the area’s original form and character. Removing the spur cost \$25 million in federal and state funds, as well as local tax increment financing (TIF) funds, says Peter Park, former Milwaukee planning director. The project transformed 24 underutilized acres into prime downtown

## FREEWAYS WITHOUT FUTURES

For over a decade, the Congress for the New Urbanism (CNU) has campaigned for removing highways to improve cities. CNU published its first biannual *Freeways Without Futures* report in 2008, charting the benefits of highway removal, including knitting neighborhoods and communities together; revitalizing downtown cores; supporting active transportation; freeing up land for redevelopment for affordable housing, new businesses, and open space; and increasing tax revenues. The latest *Freeways Without Futures* report (CNU 2019) provides highway removal case studies for: I-10 (Claiborne Expressway, New Orleans, LA); I-275 (Tampa, FL); I-345 (Dallas, TX); I-35 (Austin, TX); I-5 (Portland, OR); I-64 (Louisville, KY); I-70 (Denver, CO); I-81 (Syracuse, NY); I-980 (Oakland, CA); and Kensington and Scajquada Expressways (Buffalo, NY).

real estate. Ongoing development in the area has helped generate more than \$1 billion in new downtown investments, Park says. Between 2001 and 2006, the average assessed land values per acre in the freeway footprint grew by over 180 percent, and the average assessed land values in the TIF district grew by 45 percent, compared to a citywide increase of 25 percent.

“We’ve shown that when you take the highway out of the city, it gets better,” says Park. “It’s that simple.” The most valuable real estate in any city is downtown, adds Park, who is a consultant to cities, a repeat member of CNU’s National Advisory Committee for the *Freeways Without Futures* report, and a former Lincoln/Loeb Fellow. By removing a highway, a city can develop more valuable assets, he says. An aging highway might attract matching dollars from the federal government for repairs, but if the city removes it and frees up land for redevelopment, that’s a much better long-term option for producing jobs, housing, tax revenues, and other benefits: “Building a city is the long play. There are no examples of a neighborhood that improved when a highway was cut through or over it. But every in-city highway removal has improved economic, environmental, and social opportunities for the local community.”

## Overcoming a Dubious Legacy

While Eisenhower-era advocates promoted urban highways as expedient for shipping companies and suburban commuters, time has revealed a different story. Demographic and health data, photos, and maps confirm a fact known all too well by those living adjacent to highways: these roads cause serious health, economic, social, and environmental damage. Inserting highways often occurred in conjunction with “urban renewal” efforts, which targeted predominantly low-income and black communities with the least political purchase and least likelihood of resistance. Freeway construction in many U.S. cities caused homes and businesses to be demolished; limited access to housing, services, jobs, and open space; and polluted air, soil, and water.

Research on the short- and long-term impacts of living, working, and attending school near highways has documented many environmental and health risks, including elevated rates of asthma, cardiovascular disease, preterm birth, immune damage, and cancer. Tailpipe exhaust contains particulate matter, carbon monoxide, nitrogen oxides, and volatile organic compounds (VOCs) such as benzene. VOCs can react with nitrogen oxides to produce ozone, the most widespread outdoor air pollutant. Children, older adults, and people with preexisting conditions, especially in low-income urban areas, are at greater risk for air pollution-related health impacts, according to the Environmental Protection Agency (EPA). These environmental and health risks persist despite today’s more stringent emission and fuel standards, which have reduced harmful emissions by 90 percent compared to 30 years ago (EPA 2014).

“It’s important to understand the impact of the highway on the local community,” says Chris Schildt, senior associate at Oakland-based PolicyLink, a national research and action institute for advancing economic and social equity. Schildt managed the All-In Cities Anti-Displacement Policy Network in 2018



and 2019, which was composed of elected officials, senior staff, and representatives of local organizations in 11 cities impacted by displacement. The network focused on anti-displacement strategies cities can use when planning new public infrastructure investments.

“This is a chance for cities to start to repair the harm they created by bringing highways” through neighborhoods, Schildt says. One way to do that is for cities to secure land produced by highway removals for the community through land trusts or nonprofit organizations. If the city gains ownership of the land with the intent to redevelop, Schildt says, it should make sure that what gets built reflects actual needs expressed by the community.

In Minneapolis, the city’s newly adopted comprehensive plan includes a Freeway Remediation Recovery policy, which states the city will “repurpose space taken by construction of the interstate highway system and use it to reconnect neighborhoods and provide needed housing, employment, green space, clean energy, and other amenities consistent with city goals.” The city estimates the impacts on land value and tax revenue for property taken for freeway construction at \$655 million.

## Reclaiming a Roadway in Rochester

On a one-mile stretch of road in Rochester, New York, a neighborhood is growing, with new housing, restaurants, and retail. It’s the kind of development that might seem promising in any rebounding legacy city—but it’s especially remarkable for its location atop a former section of highway.

In the 1950s and early 1960s, a growing population of 332,000 and an increasingly traffic-clogged downtown led Rochester to construct the Inner Loop, a sunken beltway around the city core that spanned up to 12 lanes with travel lanes, ramps, and frontage roads. Officials demolished nearly 1,300 homes and businesses to make way for the 2.7-mile expressway, which connects to I-490. At least two similar projects didn’t get built because of local opposition. Before the loop’s eastern segment was built, the corridor was home to a working-class neighborhood with dense, tenement-style apartment buildings that was connected to more affluent East End neighborhoods. In the five decades that followed, as

Rochester’s beltway, known as the Inner Loop, effectively cut off the downtown from the rest of the city. The construction that transformed the eastern portion of the highway into an at-grade boulevard is visible in the lower left; the city is studying the feasibility of removing another segment. Credit: © Rochester Democrat and Chronicle – USA TODAY Network via Imagn Content Services, LLC.





To convert a sunken highway to an at-grade boulevard, Rochester demolished retaining walls and bridges and imported 120,000 cubic yards of dirt. Credit: City of Rochester/Stantec.

population declined by a third, many sites adjacent to the loop remained or became vacant.

The idea of eliminating the loop's eastern segment and replacing it with a boulevard first appeared in 1990 in the city's Vision 2000 plan, says Erik Frisch, a transportation planner and manager of special projects for the Rochester Department of Environmental Services: "From that point forward, every city plan created by or on behalf of the city contained the idea of removing this section, saying it had been overbuilt and created a moat-like barrier to downtown." Traffic on this section of highway, which Frisch said never met its potential, had declined to only 7,000 vehicles per day, a volume that could be accommodated by a boulevard.

Federally funded planning and scoping began in 2008, says Frisch, but it wasn't until 2013, when the city secured a TIGER (Transportation Investment Generating Economic Recovery) grant, that the project began to take shape. The city adjusted its plans, mobilized public engagement, and moved quickly to complete design and begin construction. The \$22 million planning and construction costs were covered with \$17.7 million in federal TIGER funds, \$3.8 million in state matching funds, and \$414,000 in city matching funds.

"It took so long to go from idea to reality that we had many planning layers," notes Frisch. The city worked with small businesses, developers, and property owners in the corridor and on adjacent streets. "The goal of this effort was

consistent: to serve transportation needs and encourage investment in a walkable and bikeable neighborhood."

In 2014, the city began the work of burying the segment and building an at-grade, two-way street with cross-street connections to downtown. It demolished retaining walls and three bridges that had spanned the expressway and filled the roadbed with 120,000 cubic yards of earth. Stantec engineers and urban designers helped plan the streets, addressing challenges such as design for the north and south ends of the boulevard to ensure safe transitions from expressway to city streets. Getting land uses and character right was a big part of the redevelopment success, says Frisch. The city extended the existing center-city zoning, which is a form-based code, to these properties.

Completed in 2017, the new Union Street features two to four vehicle lanes, parking lanes, sidewalks, two-way protected bike lanes, signaled crosswalks, bike racks, benches, trees, and landscaping. The city maintains the new street infrastructure. Between 2014 and 2019, walking increased 50 percent and biking 60 percent in the project area, and the city anticipates more pedestrian and bike traffic as development around Union Street increases, says Frisch.

Charlotte Square on the Loop, with 50 affordable apartments, eight of which are reserved for ex-offenders reentering the workforce, was the first development in Rochester's Inner Loop East



Transformation Project. In the fast-growing area, Rochester-based Home Leasing also developed 10 market-rate townhomes and recently began construction on Union Square at the East End for Trillium Health, with 66 affordable apartments, including homes for people living with HIV and seniors requiring assistance. The project also will have a pharmacy, a service that downtown had lacked.

In all, the new neighborhood on and around the former expressway will include 534 housing units, more than half subsidized or below market rate, and 152,000 square feet of new commercial space, including services and amenities such as a day care center and restaurants, reflecting the city's priority for an inclusive neighborhood with affordable homes and needed services. The largest project located on the new parcels will be the Neighborhood of Play, an expansion of the city's popular Strong National Museum of Play that will include 236 apartments, a 120-suite hotel, retail, and a parking garage.

Seeing "\$229 million in economic development from \$22 million in public investment is a real coup," said Anne DaSilva Tella, Rochester's assistant commissioner of the Department of Neighborhood and Business Development, in a CNU webinar (CNU 2020). She noted that the project had also created 170 permanent jobs and over 2,000 construction jobs.

"The value created on the 6.5 acres is an incredible return on investment," says Frisch. With only one project so far completed within the seven parcels created by burying the expressway, the city doesn't have property tax revenues yet. But Frisch says private investment that otherwise would not have happened has extended beyond the site to increase property values and tax revenues and encourage new development, including residential and mixed-use structures on both sides of the boulevard, and redevelop-



New construction on the site of the former Rochester Inner Loop includes Charlotte Square on the Loop, an apartment complex with affordable homes. Credit: Gene Avallone.

ment of nearby brownfield sites. Within blocks, a former hospital campus and an underused office building are being redeveloped, and a brewpub is expanding.

Removing the highway segment "has lifted the whole downtown area," says Frisch. "We've seen it come back strong, because we're making places of value where people want to invest." The city also saved taxpayers \$34 million by avoiding the future costs of federally required highway lifecycle repairs and maintenance. "That alone was greater than the project cost," he says. The city recently began a Phase 2 planning study for the potential removal of the northern segment of the Inner Loop, which could help an area with more concentrated poverty connect to economic opportunities downtown.

"When federal or state funds are available for this kind of major investment in infrastructure, examples like Rochester show how these investments are repaid in multiples," says Grogan of the Lincoln Institute. "Not only is this good for the short-term bottom line of cities, it can also increase access to opportunity for residents, which can lead to an improvement in their long-term financial and other life outcomes."

Removing the highway segment "has lifted the whole downtown area . . . We've seen it come back strong, because we're making places of value where people want to invest."



## I-10 in New Orleans

“My early memories of Claiborne Avenue were of being able to walk to the butcher, the grocery store, the dance supply shop,” says Amy Stelly, an urban planner and designer. “Those kinds of businesses don’t exist now. Some people lost land, some lost their businesses. We had a median with grass and trees and a grand traffic circle. Everyone misses that, because it made the area beautiful.”

Stelly is cofounder and creative director of the Claiborne Avenue Alliance, a coalition of local residents and property and business owners lobbying to “reclaim, restore, and rebuild” the Claiborne Corridor in New Orleans, which for over half a century has existed in the shadows of the elevated I-10 expressway. As a kid, she says, “I knew intuitively this was not right, and promised myself to work to change this situation.”

One of CNU’s Freeways Without Futures, the I-10 Claiborne Expressway slices through the neighborhood of Tremé (tre-MAY). Located next to the French Quarter, Tremé historically was the city’s main community of free people of color, and is renowned for its African-American and

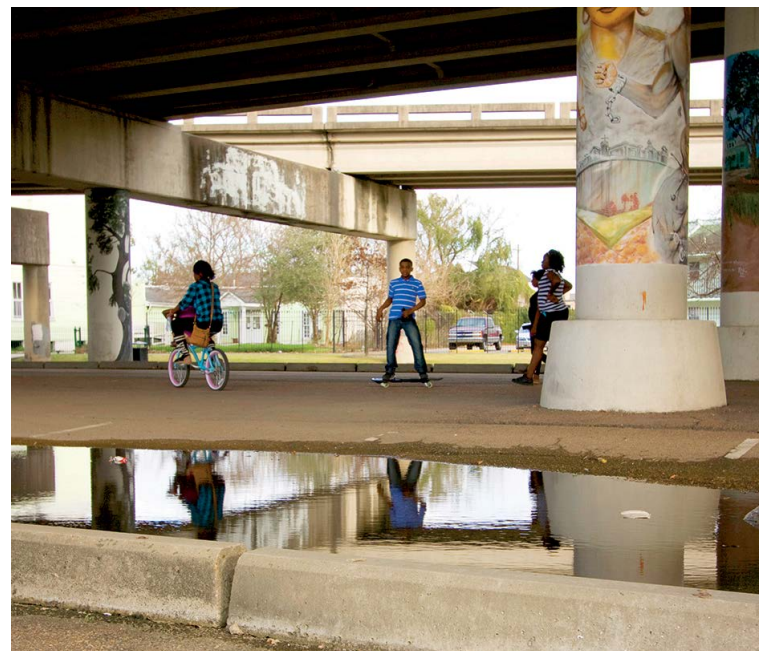
“My early memories of Claiborne Avenue were of being able to walk to the butcher, the grocery store, the dance supply shop. Those kinds of businesses don’t exist now.”

Creole-influenced food, music, and culture. Claiborne Avenue, which stretches for seven blocks through Tremé, was its main boulevard and commercial corridor, distinguished by a wide, tree-lined median park that served as the community’s main gathering place, including for Mardi Gras parades. Today, Mardi Gras revelers gather within sight of looming overpasses.

Construction on the Claiborne Expressway finished in 1968, around the time that a decades-long preservation battle resulted in the defeat of a proposed expressway along the Mississippi River in the French Quarter. The Claiborne Avenue community had little political clout. Hundreds of businesses, homes, and trees in the thriving corridor had been destroyed.

In 2012, Stelly returned to Tremé and her childhood home less than two blocks from the

In the New Orleans neighborhood of Tremé, life plays out in the shadows of the elevated lanes of the Claiborne Expressway.  
Credits: Christian Bélanger/Flickr CC BY 2.0 (left); Derek Bridges/Flickr CC BY 2.0 (right).





Before the construction of I-10, Claiborne Avenue was a community gathering place lined with oak trees. A study by Louisiana State University found that the interstate “fragmented the community socially, culturally, and economically.” Credit: CIDnola.com.

interstate after working for years in other cities, including with New Urbanist planners Andrés Duany and Elizabeth Plater-Zyberk. She began researching the history of the I-10 and became an advocate, like others before her, for taking down what many call “the monster.” Few thriving businesses line the corridor now, and the paving beneath the expressway is used as “a two-mile free parking lot,” Stelly says, with some areas occupied with drug sales, prostitution, and encampments for homeless people.

Demographic data point to impacts on the area’s population, racial composition, and economic level at least partially due to the arrival of the interstate. Over the past few decades, Tremé’s population has declined along with that of the city at large; the population of New Orleans shrank from 628,000 in 1960 to an estimated 391,000 by 2018. Between 2000 and 2017, the population of Tremé declined from 8,853 to 4,682, according to the Data Center, an independent nonprofit data analysis resource for Southeast Louisiana (The Data Center 2019). Both declines were partly the result of Hurricane Katrina, which caused significant flooding and damage in 2005. Tremé saw a post-Katrina influx of more affluent white residents, amplified by outside investors who renovated or built homes for short-term rentals, displacing long-term residents. In 2000, over 92 percent of households were black, and 57 percent lived below the poverty line; by 2017, 63 percent of households were black, 28 percent were white, and

39 percent of residents were living in poverty, compared to a citywide rate of 25 percent.

The notion of removing I-10 has been the subject of multiple studies, the first dating to the 1970s. In 2010, CNU’s Highways to Boulevards program brought planners to Tremé to create a vision for restoring the commercial corridor. A subsequent report and preliminary design advocated for the restoration of North Claiborne Avenue as a vibrant boulevard, with new street connections and multimodal infrastructure, a landscaped median park and grand traffic circle, and new homes and businesses (Smart Mobility and Waggonner & Ball 2010).

These planning efforts helped the city obtain a \$2 million federal TIGER planning grant, which funded the Livable Claiborne Communities Study (Kittelsohn & Associates and Goody Clancy 2014). That study presented three options: maintain the expressway (\$300 million for repair and maintenance over 20 years), remove ramps and develop street infrastructure in residential areas (\$100 million to \$452 million over the same time period), or remove the expressway entirely and develop a street-level urban boulevard, new street connections, and alternative transportation infrastructure (\$1 billion to \$4 billion). The third option would reclaim nearly 50 acres of land for open space and redevelopment.

While CNU’s vision of removing the highway and restoring the corridor “really resonates with people,” says Stelly, the city pursued another path. In 2017, city leaders partnered with the

Foundation for Louisiana to launch an effort to develop the Claiborne Cultural Innovation District (CID) under I-10. With support from city, state, and regional agencies and the Greater New Orleans Funders Network, composed of 10 national and local foundations, a master plan for a 19-block innovation district was developed that would include micro-businesses, a market-place, a youth activity area, performance space, and green infrastructure elements including bioswales, trees, and freeway drainage systems. The district would be phased in over 15 years, at a cost of \$10 million to \$45 million. Though some areas beneath the expressway have drawn artists, pop-up retail, and food vendors, revitalization has not been widespread or consistent, says Stelly, illustrating her point with a photo of an abandoned shipping-container kiosk that now provides a place for homeless people to gather.

The Alliance has objected to the plan and called for freeway removal, as well as for funds to improve the avenue's existing building stock, for infill development on vacant land, and for restoration of the median as public open space. The group faces political opposition, however, from heavyhitters including the Port of New Orleans, which generates \$100 million in revenue annually. In 2013, Port officials publicly supported the retention of I-10 as an important corridor between industrial real estate properties on the Inner Harbor and its riverfront facilities. The irony, says Stelly, is that "the avenue beneath the interstate is often empty while the interstate is backed up. People don't think of other options."

The Alliance has been gathering data to convince the community and city officials that the CNU vision will provide economic, social, and health benefits. The group commissioned a study by the Louisiana State University Health Sciences Center School of Public Health, located just south of Tremé, that analyzed decibel levels, air quality, and other indicators. The study found concerns including traffic-related air contaminants, lead in the soil, noise pollution, and fine-particulate emissions. It said vulnerable populations included children, seniors, pregnant

women, those with compromised immune systems, and homeless populations living under I-10, and that policies encouraging use of the land beneath the interstate posed additional threats to health. The study also noted "the removal and paving over of historic green spaces along the corridor have exacerbated the impacts of local flooding, with consequences for water quality, ease of local transportation, [and] use of outdoor spaces."

In summary, the LSU researchers noted that the interstate's "physical division of previously connected neighborhoods and the removal of businesses along what used to be a commercial artery have fragmented the community socially, culturally, and economically. Today, poverty and crime are disproportionately experienced by residents of the Claiborne Corridor, and reliable access to jobs, housing, and transportation remains a challenge" (LSU 2019).

**"Today, poverty and crime are disproportionately experienced by residents of the Claiborne Corridor, and reliable access to jobs, housing, and transportation remains a challenge."**

In January 2020, the Alliance launched a data-gathering "tactical urbanism" project on I-10 structural columns called "Paradise Lost, Paradise Found" to seek community responses to its vision for a restored Claiborne Avenue. It also presented its vision to the New Orleans City Council's Transportation Committee.

"Very clear environmental racism led to the destruction of businesses and homes along that corridor," notes Kristin Gisleson Palmer, the city council member who represents Tremé and chairs the Transportation Committee. As a city council member in 2010, Palmer advocated for taking down the expressway and wrote a grant that led to the Livable Claiborne Communities Study.



Given the increasing impacts of climate change, including storms that repeatedly flood Tremé and other parts of the city, she says, the city council has priorities other than removing the viaduct. Short-term, the city's focus in the Claiborne Corridor should be on an incremental plan for new green infrastructure and housing, Palmer suggests. Bike and walking paths, alternative transportation, and flexible open space with trees and other stormwater management elements under and adjacent to the expressway would mitigate flood risks, enhance the corridor's business environment, and still be useful if the expressway eventually were taken down.

Palmer still advocates for removal, as do most people in the community, she says, though some fear that taking it down will lead to further gentrification and displacement.

## The Way Forward

In July 2019, the U.S. Senate's Environment and Public Works Committee advanced the America's Transportation Infrastructure Act of 2019, which includes funding for the study and removal of highways in cities. The five-year program would allocate grants of up to \$2 million for planning, \$15 million for technical assistance, and \$5 million up to half the total cost of capital construction, with total federal assistance capped at 80 percent. Priority would be given to disadvantaged communities whose highway removal projects could be covered completely. Unlike past federal block grants, this funding is targeted specifically for removing highways, and focuses on economic development. Grants would be available to cities, states, metropolitan planning organizations, and, for the first time, community and nonprofit organizations.

To prepare for a potential infusion of federal highway removal funds, CNU is assembling a best practices manual and tool kit that could be adopted by municipalities. "Cities have been working from scratch," says Larry Gould, a

principal and transit planner with Nelson\Nygaard in New York City and a CNU board member. Decisions about highway removals are "context-sensitive," he says, and determining factors include physical and policy contexts, as well as funding and community vision. The manual will likely include design standards, transportation network concepts, engineering specifications, and metrics to measure success.

Some planners have already been sharing lessons learned. In a webinar for the global Institute for Transportation and Development Policy on the unintended consequences and solutions for urban highways, Peter Park outlined several requirements for successful highway removal and redevelopment (ITDP 2019):

1. strong community support, leadership, and political will;
2. an urban vision for the city that is not dominated by automobiles and favors short trips by different modes, such as walking and biking, along routes that are part of the city fabric, like well-connected streets and multiuse path networks;
3. decisions driven by a long-term community investment strategy rather than by the short-term pressure of spending federal allocations;
4. control of land by local government and clear regulations, such as form-based codes that create walkable urban places and shape new development that supports priorities like affordable housing and job creation.

PolicyLink's Schildt says public officials and staff should consider key questions: Has the city discussed highway removal with the neighborhoods affected before seeking funding or beginning planning? How will the city reduce the impacts of deconstruction? How will the city ensure that investments don't signal to the private market that this is an up-and-coming neighborhood, which could catalyze higher land costs, rent increases, and destabilization? What kinds of affordable housing, tenant protections, and job-generation policies and programs are in



Amy Stelly, left, leads the Claiborne Avenue Alliance, which seeks to “reclaim, restore, and rebuild” the urban corridor that was divided by the construction of I-10 in the 1960s. Credit: Courtesy of Congress for the New Urbanism.

place? Be transparent about the realities on the ground and present them to the community early in the planning process, says Schildt. “If you receive a \$2 million grant for planning a highway teardown that took 10 years to get, but the community doesn’t want to remove the highway, are you willing to reject it and start over with a planning process that identifies and responds to what the community wants?”

As urban highway removal becomes a viable option, the costs and benefits are increasingly clear. New Orleans City Council member Palmer notes the city now has “concrete examples of other cities that have taken down expressways” resulting in success and economic development. “The reality is that something has to be done with the expressway, and at some point the feds are going to have to reconstruct it or take it down,” she says. “Taking it down is expensive, but reconstructing it could cost even more.” □

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**Kathleen McCormick**, principal of Fountainhead Communications in Boulder, Colorado, writes frequently about healthy, sustainable, and resilient communities. As a board member for CNU Colorado in 2012–2014, she advocated for removing I-70 through Denver.

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Athens Mayor Kostas Bakoyannis. Credit: City of Athens.

As Greece emerges from a decade-long financial crisis, the city of Athens is grappling with major challenges: E.U.-imposed austerity measures, a real estate collapse, ongoing security and migration issues, climate change, and now COVID-19.

**Kostas Bakoyannis**, 41, was elected mayor in 2019, promising stability and reinvention. The son of two prominent Greek politicians, Bakoyannis is the city's youngest elected chief executive but has had considerable experience. Holding undergraduate and graduate degrees from Brown University, Harvard University, and the University of Oxford, he was governor of Central Greece, mayor of Karpenissi, and served at the Greek Ministry of Foreign Affairs, the European Parliament, and the World Bank. He also holds positions with the Hellenic Agency for Local Development and Local Government, European Council on Foreign Relations, and United Nations Sustainable Development Solutions Network. On a recent visit to Cambridge, he spent time with Lincoln Institute Senior Fellow Anthony Flint.

## Stability and Sustainability in Athens, Greece

**ANTHONY FLINT:** You have said that you are focused not on grand projects, but on day-to-day quality of life in a city trying to make a comeback in a more incremental fashion. What are your reflections on your successful campaign and the experience thus far of being at the helm of local government?

**KOSTAS BAKOYANNIS:** I think in any campaign, it's always about the message and not the messenger. Elections in the past in Greece have been about candidates higher up, talking down to the people. I took a different approach and started walking out in the neighborhoods. I listened with care and found that the people want a city to build its self-confidence and be optimistic again. Now we are reinventing city services and reinventing the city. Athens has three records: the least urban green per capita in Europe, the most asphalt, and our houses have the most square meters. We want to reclaim public space and especially reclaim space from the automobile. We have been studying traffic circulation, and are planning to close parts of the city center to cars. We will also create an archeological walkway around the city.

All in all, I'm living my dream. I'm giving it my all. I've been in local government for 10 years; higher office doesn't compare. One day, when I first began my journey in local government, I was depressed and thinking we are a failure, and then I walked out and saw a playground we had just opened. It's not about resolving the conflict between North and South Korea. It's real, tangible, incremental change, improving the quality of life.



“One day, when I first began my journey in local government, I was depressed and thinking we are a failure, and then I walked out and saw a playground we had just opened. It’s not about resolving the conflict between North and South Korea. It’s real, tangible, incremental change, improving the quality of life.”

**AF:** Athens has been vexed over the years by the problem of vacant buildings and storefronts, graffiti, homelessness, and a general image of being dark and dirty. Can you tell us about your plans to clean things up?

**KB:** There was a very good article in an international magazine about the Greek economy, but at the top there was a photo of Athens, with two homeless people sleeping in front of closed stores that were full of graffiti. This is our challenge. Don’t forget that we are in a global race to attract talent, technology, and investment. And Athens is changing day by day. To mention a few examples: We have adopted the “broken windows” theory of social behavior [which suggests that visible signs of crime and decay invite more of the same] and are coordinating with the police. We have special equipment and run campaigns to clean up graffiti. We have a program called Adopt Your City, and public-private partnerships that are already bearing fruit. We are asking people who care and love the city to come help us. Regarding drugs, reforms have been made. The parliament recently passed a measure on supervised spaces for drug use—we haven’t operated one yet, but we are preparing to make it mobile, so it doesn’t stay too long in any one neighborhood. Local government will be able to operate such spaces. We are reclaiming public space, like Omonia Square, a city landmark—I think that’s going to be a symbol. There are elevated expectations about public space . . . it’s not just public works. We are producing more of a product, an experience.

Athens is embarking on a comprehensive response to its residents’ desires for a safer, cleaner, more self-confident city. Credit: Matthew Peoples/Flickr CC BY 2.0.

**AF:** As part of that effort, you attracted controversy for clearing out squatters in the neighborhood of Exarchia, an effort that included dawn raids and relocating refugees and undocumented immigrants. How do you fulfill your campaign promise to restore law and order and curtail illegal immigration, while still being sensitive to the human lives at stake?

**KB:** Here is an example: An individual calling himself Fidel was running a hostel in a school, occupying it, and charging money. We securely moved the children to take advantage of social service provisions. Greek media have a thing about Exarchia. It becomes a political weapon for one side or the other. I don’t look at it that way. We have 129 neighborhoods, and Exarchia is a neighborhood with its own issues. Much of what we do has to do with persisting and insisting—it’s a question of who will get tired first. We will not get tired first.



On the subject of pluralism, we're the canary in the coal mine. We survived the economic crisis, and we're stronger today than in the past 10 years. We have more depth to our democracy, stronger institutions. We isolated extremists. We confronted the Fascist Nazi party Golden Dawn—we went to neighborhoods where they were doing well. We didn't wag our fingers and tell people they were bad for voting for Golden Dawn. We said: we can provide better solutions to the problems you face.

Athens is a Greek city, a capital city, and a center for Greeks around the world. Having said that, Athens is changing and evolving. I remember seeing a young woman who was black in a parade, and she was proudly holding the flag—I think what she was saying was, 'I'm as Greek as you are.' We want to make sure everyone living in the city has the same rights and obligations.

**AF: What are the most important elements of your plans to help Athens combat climate change—and prepare for its inevitable impacts in the years ahead?**

**KB:** Think different! It is all about working bottom up. What's happening that is most interesting in terms of public policy is in the cities, which are true laboratories of innovation. Nation-states are failing—there's so much partisanship, and a toxic environment, and bureaucracies that cannot handle real problems; cities are closer to the citizen. We are proud to be a part of C40. Athens has developed a policy for sustainability and resilience. Among other things, we are working on ambitious but realistic interventions to liberate public space, multiplying green space, and creating car-free zones. For us, climate change is not a theory or an abstraction. It is a real and present danger that we can't just sweep under the rug. It demands concrete responses.



Most of the early months of Bakoyannis' first term have been dedicated to basic improvements to urban parks and other public areas, even as he confronts the local impacts of global issues such as coronavirus and climate change. Credit: City of Athens.

**AF: You recently had the opportunity to return to Cambridge and Harvard. What level of interest did you find in the future of Athens? Are there things you have learned from American cities, and what can the United States learn from you?**

**KB:** I was enthused and heartened by the level of interest and am thankful for the engagement. I must admit that I was very proud to represent a city with a long and glorious past and a promising, bright future. We may live on different sides of the Atlantic, and in very different cities, but it is interesting that we face similar challenges as urban centers evolve and are transformed. And it is always great to share experiences and learning moments. Policies to further resilience are the most obvious example. And of course, battling social inequalities is at the top of all of our agendas. I am glad to have begun promising and fruitful conversations which will continue in the months and years to come.

**“For us, climate change is not a theory or an abstraction. It is a real and present danger that we can't just sweep under the rug. It demands concrete responses.”**

# Legacy Cities:

## Building an Equitable Renaissance

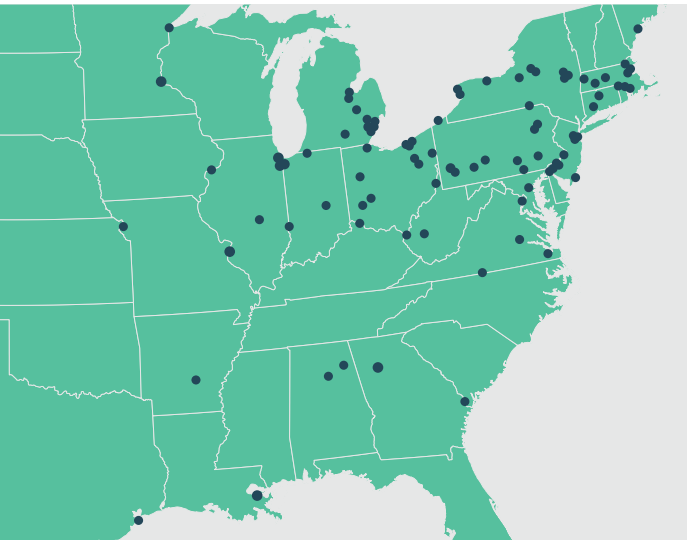
By Jessie Grogan

Legacy cities have been at the center of some of America's most historic achievements, and they possess a strong civic spirit and culture of innovation at a time when these qualities are most needed. These cities offer growth potential not only for families, businesses, and communities seeking a stable future—but also for the country as a whole.

Once drivers of industry and prosperity, legacy cities lost millions of residents and jobs in the 20th century due to a changing economy—but many of them are now on a path toward revitalization.<sup>1</sup> Home today to nearly 17 million people and a collective economy of \$430 billion, legacy cities share the potential for an inclusive, prosperous future.

The challenges faced by legacy cities—spatial inequality, economic decline, population loss, divisive gentrification, and more—reflect a national struggle that too often leaves disadvantaged groups behind.<sup>2</sup>

Most legacy cities are located in the upper Midwest, Rust Belt, New England, and Southeast. However, cities around the country share many of the same assets and challenges.



Home today to nearly 17 million people and a collective economy of \$430 billion, legacy cities share the potential for an inclusive, prosperous future.

Yet legacy cities are also poised to seize many similar opportunities. They are affordable places to live and create businesses at a time when rising costs of city living make larger metropolitan areas inaccessible to all but the highest-income households.<sup>3</sup> Their existing infrastructure and density mean that interventions can be small, targeted, and inexpensive—with an outsized impact. And they can each capitalize on rich histories, cultures, and unique assets not found in many newer suburbs or Sun Belt cities.

Though the national conversation often focuses on larger legacy cities like Detroit, Michigan, and Pittsburgh, Pennsylvania, smaller urban centers such as Akron, Ohio; Birmingham, Alabama; and Buffalo, New York, face comparable challenges—but lack access to resources and solutions.<sup>4</sup> Nevertheless, with the right strategies, smaller postindustrial cities can take steps to regenerate and follow in the footsteps of their larger counterparts on the rebound. In fact, their smaller size can even be an asset, allowing them to move quickly and experiment in ways that are challenging for larger cities.

Regardless of size, these places will revitalize only with deliberate, concentrated effort from new coalitions of civic actors. As dozens of legacy cities have already proven, this type of change is possible: with strategic and timely support, reinvigorated cities can again become beacons of industry and culture.



# Revitalization Strategies

By definition, legacy cities already have many of the assets they need for regeneration, including vibrant cultural scenes, historic neighborhoods, multimodal transit networks, and underutilized workforces. Their challenge is to capitalize on those resources—and to mobilize collaboration among local leaders in politics, business, and other sectors. As cities evolve and redevelop, they can act not as victims of their past successes but rather as investors with foresight, vision, and faith in their communities.

Cities can learn from each other and adapt key strategies to their specific assets, locations, and needs. Variations in size, housing markets, anchor industries, immigration patterns, and other demographic trends will demand different policy interventions, but a core set of scalable, adaptable strategies has already emerged from the experiences of diverse communities.

## IMPLEMENT INCLUSIVE ECONOMIC DEVELOPMENT

Legacy cities must proactively expand economic opportunity and access to capital to low- and middle-income residents. Cities that lose population tend also to experience heightened unemployment and reduced household income; by ensuring that success is shared by all residents, leaders can entice current residents to stay and bring newcomers to the community as well.

- **Lima, Ohio**, has created an umbrella organization to coordinate workforce development efforts.
- **Lowell, Massachusetts**, has an accelerator program that helps early-stage entrepreneurs develop small businesses and nonprofit organizations.

## TAILOR NEIGHBORHOOD STRATEGIES TO MARKET CONDITIONS

Cities must stabilize distressed neighborhoods and encourage reinvestment in order to rebuild local housing markets, strengthen community, and preserve home affordability. Local governments and community development corporations should act methodically and use data to help make decisions about where to deploy resources while incorporating input from community members.

- **Youngstown, Ohio**, collects data to pinpoint struggling neighborhoods and prioritize funding to address housing in poor condition.
- **Cleveland, Ohio**, stabilizes middle-income neighborhoods by providing technical assistance and low-interest financing to help homeowners improve and maintain the value of older homes.

## BUILD ON A COMMUNITY'S UNIQUE STRENGTHS

By leveraging existing assets to bring in and retain residents, consumers, and talent, an individual city can stand out and claim a singular identity. Cities with “anchor” institutions—such as hospitals, universities, and major corporations—can use these assets to attract workers and consumers from across the region. Diversity is also a proven benefit, given that rebounding legacy cities tend to have significantly higher immigrant and nonwhite populations than still-faltering ones.

- In **Lancaster, Pennsylvania**, the private sector led the deployment of a plan that reimagined the city as a tourist hub.
- **Scranton, Pennsylvania**, encourages former residents who had moved to New York and other large cities to return home, emphasizing the local quality of life.

## BUILD LOCAL GOVERNMENT AND CIVIC CAPACITY

Elected officials, public servants, and civic leaders should work together to expand and align capacity and to strengthen municipal finances. Change begins with leadership, and leadership starts with local government. By bringing fresh voices, ideas, energies, and perspectives into city hall and to community development agencies, a city can put itself in the position to attract new businesses and residents.

- **South Bend, Indiana**, offers fellowships that place talented young workers in management-level positions in the private and public sectors.
- **Hamilton, Ohio**, recruited a city manager from out of town to change city hall culture.

## ENGAGE IN COMMUNITY AND STRATEGIC PLANNING

Leaders of all sectors must participate in developing a shared vision for the future and take responsibility for executing complex revitalization strategies. Through planning processes that deeply engage residents, cities must wrestle with different future scenarios and shape a vision for the future they seek. They must then develop a plan that aligns with that vision.

- **Grand Rapids, Michigan**, encourages neighborhoods to create plans to guide new development, while its business leaders created an organization that revitalized the central business district.
- **Dayton, Ohio**, and **Flint, Michigan**, have engaged residents in tough conversations about future land use after extreme population losses.

## STRATEGICALLY LEVERAGE STATE AND FEDERAL POLICY

Cities must forge partnerships at all levels of government to expand funding, programs, and policies dedicated to the equitable revitalization of urban centers. No city exists in a vacuum, and increasing coordination among governments at the local, regional, and state levels can lead to reduced regulatory pressures and increased support for local priorities. A more streamlined government presence can also be attractive to businesses and individuals looking to relocate.

- **Massachusetts** authorized counties to create local land banks in response to the foreclosure and vacancy crises. The commonwealth also collaborates with a statewide think tank to direct resources to targeted legacy cities.
- **New York** has awarded selected communities \$400 million over four years to develop downtown strategic investment plans and implement key catalytic projects.

Bustling Elmwood Avenue in Buffalo, New York, shows the results of targeted strategies like eliminating parking minimums. Credit: Andre Carrotflower.

## FOCUS REGIONAL EFFORTS ON A STRONG URBAN CORE

To spur sustainable growth and build inclusive and prosperous communities for all, legacy cities must concentrate investments in their urban cores. With fewer people come vacant properties; changing a city's physical form to recycle, recreate, or otherwise contend with disused buildings, lots, and infrastructure is critical for avoiding widespread vacancies and the risk of blight.

- The regional chamber of commerce in **Syracuse, New York**, tied a redevelopment project to high-paying jobs and skills training, and the city prioritized downtown revitalization efforts to help create jobs and attract talented workers.
- **York, Pennsylvania**, created a business improvement district to reestablish the downtown as a retail center.

The Legacy Cities Initiative is a national network of community and government leaders working to create shared prosperity and bring attention to the common needs and collective importance of legacy cities.

A project of the Lincoln Institute of Land Policy, the initiative promotes sustainable and equitable revitalization by convening networks, facilitating the exchange of ideas and practices, and researching and advancing new policy approaches.

Visit [legacycities.org](https://legacycities.org) to learn more and to access strategies, resources, and a searchable map charting nearly 100 legacy cities and their pathways to growth.





# Strategies in Practice: Legacy City Case Studies

As legacy cities are increasingly able to shape their own futures, they prove that, with the right approach, every city has the potential to build upon its historical legacy and generate sustainable new growth that improves conditions for all residents.<sup>5</sup>

Looking ahead, an individual legacy city's continued success depends on its ability to rebuild civic capacity for making and implementing plans for the future across disciplines and sectors. A few representative samples of cities on paths to growth follow.

## LOTS OF GREEN (YOUNGSTOWN, OHIO)

Youngstown, Ohio, demonstrates the power of incremental action. The city's 2005 plan to rethink itself as a smaller city led to little action until 2009, when a local foundation created the Youngstown Neighborhood Development Corporation (YNDC) to pursue strategies consistent with that plan's vision. YNDC decided to focus on the Idora neighborhood in the city's southwest, with the Lots of Green program as a central strategy. The program repurposes vacant land as green space to reduce blight and make the neighborhood more healthy, productive, and safe.<sup>6</sup> In the first two years, over 115 vacant lots in the Idora neighborhood were reused for purposes including the expansion of an adjacent regional park, community gardens, an urban farm and training center, and side yard expansions.

## GARY COUNTS (GARY, INDIANA)

Facing pervasive blighted properties, Gary, Indiana, partnered with the

University of Chicago Harris School of Public Policy in 2012 to strategize how best to demolish abandoned buildings. About 300 volunteers and students ultimately surveyed some 58,000 parcels. With grants from the U.S. Department of the Treasury, the Center for Community Progress, and others, the Gary Counts team developed software that uses real-time parcel-level data and mapping to provide an accurate inventory of vacant and abandoned properties and guide Gary's efforts to stabilize its neighborhoods. The city has since strategically deployed \$500,000 for demolition and redevelopment, reducing the number of vacant buildings by 18.5 percent in just six years.<sup>7</sup>

## NEIGHBORWORKS ROCHESTER (ROCHESTER, NEW YORK)

An early leader in tailoring place-based strategies to middle neighborhoods, NeighborWorks Rochester launched an innovative neighborhood marketing project in 2015. Working with residents and a local marketing team, NeighborWorks helped develop an official community name—the Triangle of North Winton Village—as well as a logo, branding strategy, advertising materials, and more. The two-year program increased the sale price of homes by about \$10,000, making them more likely to be purchased by owner-occupants, rather than investors.<sup>8</sup> The project complemented other work to stabilize weak-market neighborhoods and it proved how modest, targeted, and time-limited investments can achieve results.

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## REFERENCES

This Policy Brief is based in part on Policy Focus Reports by Alan Mallach and Lavea Brachman, *Regenerating America's Legacy Cities* (Cambridge, MA: Lincoln Institute of Land Policy, 2013), and by Torey Hollingsworth and Alison Goebel, *Revitalizing America's Smaller Legacy Cities: Strategies for Postindustrial Success from Gary to Lowell* (Cambridge, MA: Lincoln Institute of Land Policy, 2017).

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# Reorganizing Around Revitalization



Credit: Shane Wynn

Akron, Ohio, is changing the structure of its government to ensure that all its work is oriented toward equitable revitalization. The city created an Office of Integrated Development (OID) to eliminate government silos and align relevant departments around the goal of creating opportunity for residents. This is one of many innovative practices America's legacy cities are adopting. The Legacy Cities Initiative lifts up models like Akron as examples of places implementing real-world, replicable solutions. We are working to provide city leaders in Akron and elsewhere with access to tools, resources, and a growing peer network that will help them help their communities thrive.

To learn more about the Legacy Cities Initiative, visit: [legacycities.org](https://legacycities.org).

You can also download *Revitalizing America's Smaller Legacy Cities* for free from the Lincoln Institute's website, [lincolninst.edu](https://lincolninst.edu).

*"Our new approach to economic development recognizes two related truths: Development is about more than financial incentives and job counts, it's about the health and well-being of our citizens. And constructing an equitable, resilient, and well-designed city is not just the right thing to do—it's also good business."*

— MAYOR DAN HORRIGAN

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